# ROOTING PERFORMANCE OF MOLAVE (Vitexparviflora juss) CUTTINGS PLANTED WITH INDOLE BUTYRIC ACID (IBA) AT DIFFERENT CONCENTRATIONS

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**ABSTRACT** The molave tree is known in the Philippines for its dense durable wood which are used widely in making boats, furniture, utensils, and as constructional materials. This study was conducted in the rooting chamber of the Clonal Nursery Complex of the GSC Baterna Campus, San Lorenzo, Guimaras to determine the rooting performance of molave cuttings as affected with the different concentrations of IBA hormone: number of roots, length of roots, number of new leaves, length of new leaves, and percentage of cuttings ready for potting and determine the significant difference of the different levels of IBA as a rooting hormone to the cloned molave. A Completely Randomized Design (CRD) was used in this study. The following treatments were used in the study: treatment A–No hormone (Control), treatment B–100 ppm with talcum powder, treatment C–300 ppm with talcum powder, treatment D–500 ppm with talcum powder and treatment E–500 ppm/No talcum powder. For the number of roots, only cuttings in Treatment E (500 ppm/no talcum) have rooted and with a mean of 1.3 and 20.3 in length. The highest number of new leaves was attained by Treatment E (500 ppm/no talcum powder) with a mean of 4.3. For the length of new leaves, the longest was Treatment C (300 ppm with talcum powder) has a mean of 20.3 cm. For the number of cuttings ready for potting after 21 days inside the rooting chamber, the highest mean was obtained by Treatment E (500 ppm/no talcum powder) is 73.3%.

**Keywords:** Molave, rooting, performance

## INTRODUCTION

### Background of the Study

The molave tree (Vitexparviflora juss) is a close relative of the five-leaved chaste tree or lagundi (Vitex negundo). It is also called molawin and tugas. It is a medium to large size, drought-tolerant hardwood tree which grows to 15 meters and is indigenous to the Philippines and other Asian countries (Bareja, 2010). The leaves are compound with three leaflets. The flowers are bluish, numerous in clusters at the end of small branches. It is occasionally planted along roadsides and parks (Manila Old Timer, 2017)

This tree can be propagated following sexual or asexual method. The latter includes the use of natural propagules such as modified roots and stems, plantlets and offshoots. It also includes root, leaf and stem cutting propagation, air layering or marcotting, budding and grafting. The molave trees are uniquely versatile and should deserve more vigorous attention. Stem cutting has long been used in propagating many woody plants including coffee, cacao, calamansi, and ornamental crops. This propagation method has potential application in the commercialized production of molave seedlings for the purpose of agro-forestry, reforestation, urban greening, landscaping, and other use (Bareja, 2013).

Cloning refers to the process of making duplicate plants out of a cutting from a mother plant. It is a great way to keep certain plants around that are very productive or otherwise beneficial to the grower.

Indole Butyric Acid (IBA) is a water-soluble superior rooting hormone that achieves great results for many difficult to root plants. It often gives superior results to NAA based rooting hormone (Tripantol, 2015). In order to have a very good result in the production of molave planting materials, nursery operators must establish a cloning protocol for them to follow during the rooting process. Hence, this research study was conducted.

## OBJECTIVES OF THE STUDY

This study aims the following: (1) to determine the rooting performance of molave cuttings as affected with the different concentrations of IBA hormone: number of roots, length of roots, number of new leaves, length of new leaves, and percentage of cuttings ready for potting, and (2) to determine the significant difference of the different levels of IBA as a rooting hormone to the cloned molave.

## MATERIALS AND METHODS

This study was conducted in the clonal chambers of the Clonal Nursery Complex of the GSC Baterna Campus, San Lorenzo, Guimaras on November-December, 2017. A Completely Randomized Design (CRD) was used in this study. The following treatments were used in the study: treatment A–No hormone, treatment B–100 ppm with talcum powder, treatment C–300 ppm with talcum powder, treatment D–500 ppm with talcum powder and treatment E–500 ppm/No talcum powder. There were five (5) treatments and were replicated three (3) times making a total of fifteen (15) variates. Each variates has ten (100) cloned molave cuttings as experimental plants.

Table 1. Experimental lay-out.

| | | | | |
|---|---|---|---|---|
| A | C | C | B | E |
| E | B | D | D | E |
| A | C | A | D | B |

Legends:
A - No Hormone (Control)
B - 100 ppm with talcum powder
C - 300 ppm with talcum powder
D - 500 ppm with talcum powder
E –500 ppm/No talcum powder

Soil Media Preparation. The soil media used was pure river sand. It was disinfected using chlorine solution and was left overnight. Then it was rinsed with water on the next day.

Source and Collection of Planting Materials. Molave cuttings were collected from the hedge garden of the clonal nursery. Juvenile cuttings were selected and cut personally by the researchers for the study. Cuttings were directly placed inside a plastic pale with water to avoid temperature shock and were brought to the clonal laboratory area for processing.

Application of Treatments and Planting. After the collection of cuttings, it was treated with fungicide. There were 1500 cuttings, with 100 cuttings per replication. From fungicide treatment, cuttings were dipped into talcum powder with different concentrations of IBA except for cuttings in treatment A (the control/no IBA), and treatment E cuttings that were soaked to IBA solution for 30 minutes. All were simultaneously planted inside the rooting chamber.

Water Management. Cloned seedlings were misted to keep the rooting media moist using mist system inside the chamber for eight (8) hours daily.

Pest Management. To prevent pest infestation, the screen house was closed in the entire period of the study.

To evaluate the rooting performance of molave cuttings planted with IBA at different concentrations, the following data were gathered: number of roots, length of roots, number of new leaves, length of new leaves, and percentage of cuttings ready for potting. Data gathering was conducted twenty-one (21) days after planting (DAP). All the data were analyzed using Analysis of variance (ANOVA). Significant means will be tested using Duncan's Multiple Range Test (DMRT).

## RESULTS AND DISCUSSIONS

Table 2 presents the summary of rooting performance of molave cuttings applied with IBA. The second and third column presents the number and length of the roots of molave cuttings. For the number of roots, only cuttings in Treatment E (500 ppm/no talcum) have rooted and with a mean of 1.3 and with a mean of 20.3 cm in length. This implies that the application of IBA by soaking before planting will result in early root development and roots develop faster by length within 21 days.

The number of new leaves was presented in the fourth column. The highest number of new leaves was attained by Treatment E (500 ppm/no talcum powder) with a mean of 4.3, followed by Treatment C (300 ppm with talcum powder)

and Treatment D (500 ppm with talcum powder with a mean of 4.0, Treatment A (no hormone) got 3.0 and Treatment B (100 ppm with talcum powder) has the mean of 2.7, respectively. Based on the Analysis of Variance, there was no significant difference among treatments. All the treatments responded the same to the hormone, in the development of new leaves.

The fifth column presents the length of new leaves. Treatment C (300 ppm with talcum powder) has a mean of 20.3 cm, based on the Analysis of Variance there was a significant effect of the different concentrations of IBA to the length of new leaves of the cuttings. Data show that the length of new leaves will increase if it will be applied with IBA in higher concentrations compared to the control group.

The last column was the number of cuttings ready for potting after 21 days inside the rooting chamber. Highest mean was obtained by Treatment E (500 ppm/no talcum powder) is 73.3%. Based on the Analysis of Variance there was a highly significant effect on the use of IBA to the percentage of molave cuttings ready for potting after 21 days. Among treatments, Treatment E contributed much to a significant result. Cuttings soaked in 500 ppm and with no talcum powder have the greater number of rooted cuttings than those treatments were not applied with IBA. Higher concentration may induce early rooting development, so therefore there will be higher survivability.

Azad and Matin (2015) concluded that the rooting hormone applied for cuttings, especially IBA, has significant importance in rooting various tropical forest species. Moreover, they found that the number of roots per cuttings, average longest root, and number of sprouts per cuttings were significantly increased with increasing the concentration of IBA.

Table 2. Summary table of the number of roots, length of roots, number of new leaves, length of new leaves, and survival percentage of molave cuttings applied with IBA.

| Treatment | Number of roots | Length of roots (cm) | Number of new leaves | Length of new leaves (cm) | Rooted cuttings ready for potting after 21 days (%) |
|---|---|---|---|---|---|
| A | 0.0 | 0.0 | 3.0 | 7.7b | 6.7d |
| B | 0.0 | 0.0 | 2.7 | 18.0a | 36.7b |
| C | 0.0 | 0.0 | 4.0 | 20.3a | 16.7c |
| D | 0.0 | 0.0 | 4.0 | 18.0a | 40.0b |
| E | 1.3 | 20.3 | 4.3 | 19.3a | 73.3a |
| Signifinance | | | Ns | * | ** |
| CV (%) | | | 45.9% | 45.4% | 48.7 |

## CONCLUSION

Based on the study conducted, the researchers concluded that soaking of molave cuttings to 500 ppm concentration for 30 minutes before planting may induce root development with the desired length earlier than 21 day and using different concentrations to molave cuttings before planting will not affect the development of new leaves. Additionally, the length of new leaves will increase if it will be applied with IBA in higher concentrations before planting. Moreover, cuttings soaked in 500 ppm and with no talcum powder have the greater number that was rooted than the cuttings that were not applied with IBA. Higher concentration may induce early rooting development, so therefore there will be higher survivability.

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# AWARENESS, ATTITUDE, AND PRACTICES OF GUIMARAS STATE COLLEGE (GSC) PERSONNEL ON E-WASTE MANAGEMENT

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**ABSTRACT** Electronic waste (e-waste) is the fastest growing waste stream, and its disposal is a major environmental concern in all parts of the world. These waste components are responsible for hazardous pollution of the environment and affect the health of the population. This study was carried out to ascertain the GSC Personnel's level of awareness, attitude, and practices on e-waste management, their mode of disposal of the e-waste and their awareness of the dangers inherent in the improper handling and disposal of wastes. The study made used of descriptive research design. Data were collected from 73 faculty and staff respondents. Likert Scale and Positive-Negative scale were adopted for the analysis of the data. The findings of the study revealed that majority of the personnel were in the age bracket of 18 to 25 years old, female, single, baccalaureate degree holder and casual personnel of GSC. High level of awareness and Positive attitudes of the GSC personnel were found regardless of their ages, sexes, civil status, degrees, and positions. Moreover, moderate level of practices was found in terms of age, sex, civil status, degree, and position. However, low level of practices was found on the personnel with doctoral degree. The level of awareness of the respondents were significantly influenced by their degree and position in the organization, in which those baccalaureate degree holders show a higher level of awareness while undergraduate personnel have higher positive attitude, and master's degree holder has a higher level of practices on e-waste management compared to other degrees of the respondents. There were no significant differences in the levels of awareness, attitude, and practices when grouped according to sex, age, and civil status. While there were significant differences in the level of awareness, attitude, and practices of the respondents in terms of degree and position. Furthermore, there were significant relationships between attitude and awareness and also between practices and attitude.

**Keywords:** e-waste, awareness, attitude, practices, personnel, GSC

## INTRODUCTION

### Background of the Study

Waste Electrical and Electronic Equipment (WEEE) or e-waste for short is a generic term embracing various forms of electric and electronic equipment which are disposed of or are required to be disposed of (Needhidasan, Samuel, & Chidambaram, 2014; Basel convention, 2017). During the last few decades, the electrical and electronics industry has experienced enormous growth. The increase in consumption of electronic equipment, personal computers, and mobile phones in particular has been unprecedented. Coupled with increasing consumption is the increasing accumulation and generation of e-waste (Liza, 2015). Advances in technology, decreasing product prices, and product designs that discourage upgrading and repair have increased the demand for new products and the disposal of old ones.

In 2018, 50 million metric tons of e-waste is estimated to be generated globally. E-waste contains of over 1000 different substances, some of which are hazardous substances such as arsenic, beryllium, lead, mercury and cadmium (Balde, et al., 2015; UN Nations Environmental Programme as cited in (Ohajinwa, et al., 2017).

In the Philippines, the International Telecommunications Union estimates that cellular mobile phones ownership increased from 34,000 units in 1991 to almost 52 million units in 2007. With a population of about 80 million, approximately 2 out of 3 persons in the country possess a cellular phone. The same is true for personal computers, wherein a phenomenal increase in ownership is observed over the last 15 years. In 1991, personal computer ownership was estimated to be around 6,300 units and it went up to 6.3 million units in 2006.

The flood of used and discarded information and communication equipment, as well as other electronic products, is a growing concern. In addition to the quantities of waste, there are a number of toxic substances that require special handling, and precious metals are being lost.

Hence, this study is conducted to facilitate the development of an E-waste management infrastructure in the Guimaras State College, develop the policy framework for E-waste management, identifying E-waste generation and accumulation, and finally, to promote a favorable climate which encourages recycling and materials recovery of E-waste.

### Statement of the Problem

This study was conducted to determine awareness, attitude, and practices of GSC personnel on e-waste management. Specifically, this sought an answer to the following questions: (1) What is the profile of the Guimaras State College personnel in terms of age, sex, civil status, and course, (2) What is the level of awareness, attitude, and practices of the GSC personnel on e-waste when grouped in terms of age, sex, civil status, course, and when taken as a whole, (3) Is there a significant difference between the level of awareness, attitude, and practices of the GSC personnel on e-waste management when grouped in terms of age, sex, civil status, and course, and (4) Is there a significant relationship between the level of awareness, attitude, and practices of the GSC personnel on e-waste management?

## METHODOLOGY

The study used a descriptive research design. The respondents of this study were the 74 teaching and non-teaching personnel of the Guimaras State College regardless of the status of employment. A researcher-made questionnaire was used to gather data from the respondents. In addition, they were designed to retrieve further information about the presence and nature of possible informal recyclers and the purpose for which e-waste is used. Personal interview was also conducted with various experts in order to obtain or complement the information needed.

The total enumeration was used as a sampling procedure. The statistical tools to be used were frequency count, percentage distribution, mean, Mann Whitney U, Kruskal Wallis test, and Multivariate Analysis.

## RESULTS AND DISCUSSIONS

### Profile of the Respondents

Data in Table 1 shows the profile of the respondents. Results revealed that most of the respondents were young with age ranging from 18 to 25 years old and dominated by female respondents. Majority of them were single, attained bachelor's degree, and working as casual personnel.

Table 1. Profile of the Respondents

| | Profile | Frequency | Percent |
|---|---|---|---|
| Age | 18 to 25y/o | 29 | 39.7 |
| | 26 to 34 y/o | 12 | 16.4 |
| | 35 to 43 y/0 | 8 | 11.0 |
| | 44 to 52 y/o | 11 | 15.1 |
| Sex | Not Specify | 13 | 17.8 |
| | Male | 28 | 38.4 |
| | Female | 45 | 61.6 |
| Civil status | Single | 40 | 54.8 |
| | Married | 33 | 45.2 |
| Degree | Undergraduate | 4 | 5.5 |
| | Baccalaureate | 49 | 67.1 |
| | Master | 14 | 19.2 |
| | Doctoral | 6 | 8.2 |
| Position | Permanent | 15 | 20.5 |
| | Casual | 37 | 50.7 |
| | Job Hire | 19 | 26.0 |
| | Part-Time | 2 | 2.7 |
| | TOTAL | 73 | 100.0 |

**Level of Awareness, Attitude, and Practices on E-Waste Management**

Data in Table 2 shows the level of awareness, attitude, and practices of GSC personnel towards e-waste management. Result revealed that part time personnel were very high aware on the level of awareness and regardless of the profile of the personnel they got high aware on e-waste management. On the level of attitude, shows positive attitude in terms of age, sex, civil status, degree, and position. On the level of practices, they got moderate practices in terms of the profile of the respondents. Further, moderate level of practices was found in terms of age, sex, civil status, degree, and position. While low level of practices was found on the personnel that attained doctoral degree.

Table 2. The respondents Awareness, Attitude and Practices towards E-Waste Management when grouped according to profile and taken as a whole

| Profile | | Awareness | | Attitude | | Practices | |
|---|---|---|---|---|---|---|---|
| | | Mean | Interpretation | Mean | Interpretation | Mean | Interpretation |
| Age | 17 to 25y/o | 3.87 | High | 12.31 | Positive | 2.79 | Moderate |
| | 26 to 34y/o | 4.04 | High | 12.50 | Positive | 3.21 | Moderate |
| | 35 to 43y/o | 4.12 | High | 12.50 | Postive | 2.97 | Moderate |
| | 44 to 52y/o | 3.97 | High | 12.27 | Positive | 2.87 | Moderate |
| Sex | Male | 3.97 | High | 12.57 | Positive | 2.97 | Moderate |
| | Female | 4.02 | High | 12.27 | Positive | 2.86 | Moderate |
| Civil status | Single | 3.93 | High | 12.30 | Positive | 2.90 | Moderate |
| | Married | 4.09 | High | 12.48 | Positive | 2.90 | Moderate |
| Degree | Undergrad | 3.79 | High | 13.00 | Postive | 2.95 | Moderate |
| | Baccalaureate | 4.03 | High | 12.49 | Positive | 2.91 | Moderate |
| | Masters | 4.01 | High | 11.93 | Positive | 3.04 | Moderate |
| | Doctoral | 3.92 | High | 12.17 | Positive | 2.51 | Low |
| Position | Permanent | 3.96 | High | 12.07 | Postive | 2.72 | Moderate |
| | Casual | 3.99 | High | 12.43 | Positive | 3.09 | Moderate |
| | Job Hire | 4.00 | High | 12.47 | Positive | 2.65 | Moderate |
| | Part-time | 4.50 | Very High | 13.00 | Positive | 3.14 | Moderate |
| | Total | 4.00 | High | 12.38 | Positive | 2.90 | Moderate |

| Scale: | | | | | |
|---|---|---|---|---|---|
| 1.00-1.79 | Very low | 1-10 | Negative | 1.00-1.79 | Very Low |
| 1.80-2.59 | Low | 11-20 | Positive | 1.80-2.59 | Low |
| 2.60-3.39 | Moderate | | | 2.60-3.39 | Moderate |
| 3.40-4.19 | High | | | 3.40-4.19 | High |
| 4.20-5.00 | Very High | | | 4.20-5.00 | Very High |

An examination in Table 3 shows that there were no significant differences in the levels of awareness, attitude, and practices when grouped according to sex, age, and civil status. The result was supported based on the given p-values which were greater than 0.05 alpha level.

While the same examination shows significant differences in the level of awareness, attitude, and practices of the respondents in terms of degree and position. The result was also supported by the given p-values of less than 0.05 alpha level, therefore the hypothesis was rejected. This implies that the level of awareness, attitude, and practices of the respondents were significantly influenced by their degree and position, in which those baccalaureates shows a higher level of awareness, while undergraduate have higher positive attitude, and master's degree have a higher level of practices compare to those other degrees of the respondents.

Table 3. The difference between respondents Awareness, Attitude and Practices towards E-Waste Management when grouped according to profile

| Variables | Tabular | Awareness value | Interpretation | Tabular | Attitude value | Interpretation | Tabular | Practices value | Interpretation |
|---|---|---|---|---|---|---|---|---|---|
| Sex | -1.23 | 0.618 | Not Significant | -0.62 | 0.535 | Not Significant | -1.418 | 0.102 | Not Significant |
| Age | 3.264 | 0.8055 | Not Significant | 2.001 | 0.78 | Not Significant | 1.658 | 0.563 | Not Significant |
| Civil Status | 4.3245 | 0.3555 | Not Significant | 1.97 | 0.373 | Not Significant | 0.882 | 0.643 | Not Significant |
| Degree | 42.885 | 0.000 | Significant | 23.265 | 0.003 | Significant | 19.264 | 0.002 | Significant |
| Position | 19.503 | 0.005 | Significant | 14.539 | 0.002 | Significant | 22.873 | 0.000 | Significant |

*p<0.05 level of significance

Table 4 below shows that there was no significant relationship between the level of awareness and the attitude of the respondents but a significant positive relationship between the practices and level of awareness and the attitude of the respondents was observed. This implies that the levels of practices were significantly dependent on the level of their awareness and attitude towards the management of e-waste, but their attitude was not influenced by their awareness. Further, the positive significant relationship implying that the higher the attitude of the respondents will have, their positive attitude will also increase, that will leads to a higher positive e-waste management practices.

Table 4. The relationship between respondents Awareness, Attitude, and Practices towards E-Waste Management

| | r-value | p-value | Interpretation |
|---|---|---|---|
| Attitude*Awareness | 0.240* | 0.041 | Significant |
| Practices*Awareness | 0.220 | 0.062 | Not Significant |
| Attitude*Practices | 0.248* | 0.034 | Significant |

p.0.05 level of significance

## CONCLUSION

Based on the findings of the study, the following were plausibly concluded: The respondents have high awareness, positive attitude, and a moderate level of practices on e-waste management. The level of awareness, attitude, and practices of the respondents were significantly influenced by their degree and position, in which those baccalaureate shows a higher level of awareness, while undergraduate has a higher positive attitude, and master's degree has a higher level of practices compare to those other degrees of the respondents. There were no significant difference in the levels of awareness, attitude, and practices when grouped according to sex, age, and civil status while significant differences found in terms of degree and position. Further, there were significant relationships between attitude and awareness and between practices and attitude. The higher the attitude of the respondents will have, their positive attitude also increases, and that leads to higher positive e-waste management practices.

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# THE ACCEPTABILITY OF MANGO-CASHEW SPREAD

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**ABSTRACT** The molave tree is known in the Philippines for its dense durable wood which are used widely in making boats, furniture, utensils, and as constructional materials. This study was conducted in the rooting chamber of the Clonal Nursery Complex of the GSC Baterna Campus, San Lorenzo, Guimaras to determine the rooting performance of molave cuttings as affected with the different concentrations of IBA hormone: number of roots, length of roots, number of new leaves, length of new leaves, and percentage of cuttings ready for potting and determine the significant difference of the different levels of IBA as a rooting hormone to the cloned molave. A Completely Randomized Design (CRD) was used in this study. The following treatments were used in the study: treatment A–No hormone (Control), treatment B–100 ppm with talcum powder, treatment C–300 ppm with talcum powder, treatment D–500 ppm with talcum powder and treatment E–500 ppm/No talcum powder. For the number of roots, only cuttings in Treatment E (500 ppm/no talcum) have rooted and with a mean of 1.3 and 20.3 in length. The highest number of new leaves was attained by Treatment E (500 ppm/no talcum powder) with a mean of 4.3. For the length of new leaves, the longest was Treatment C (300 ppm with talcum powder) has a mean of 20.3 cm. For the number of cuttings ready for potting after 21 days inside the rooting chamber, the highest mean was obtained by Treatment E (500 ppm/no talcum powder) is 73.3%.

**Keywords:** Molave, rooting, performance

## INTRODUCTION

### Background of the Study

Bread by itself has a number of vitamins and minerals, especially if it is enriched or made with 100 percent whole grains. Unfortunately, it can also be bland. That's where a spread comes in. The trick is to spare yourself empty calories by using a spread that has its fair share of nutrients. With many varieties available, it is really a matter of preference as to which one is best for you (Rail, 2018).

A spread is a food that is literally spread with a knife onto food products such as bread and crackers. Spreads are added to food to enhance the flavor and/or texture of the food, which could be considered bland without it. Spreads should be distinguished from dips, such as salsa, which are generally not applied to spread onto food but have food dipped into them instead. Common spreads include dairy spreads (such as cheeses, creams, and butter-although the term butter is broadly applied to many spreads), plant-derived spreads (such as jams, jellies, and hummus), yeast spreads (such as Vegemite and Marmite), and meat-based spreads (such as pâté) (Jaiswal, 2018).

The spreads are made from edible vegetable oil or animal fat or a combination of both such as margarine, cheese and butter and those obtained from fruits and vegetables such as jams, preserves, and marmalades. It is largely known that margarine is a water-in-oil emulsion. Margarine consists of a continuous oil phase and with a finely dispersed discontinuous aqueous phase. Butter is perhaps the traditional spread developed since the inception of ancient food technology and its production technology has since not changed much. It is obtained by churning the cream that has been separated from warm cow's milk to a product consisting of unaltered fat globules and moisture droplets embedded in a continuous phase of butterfat.

Due to problems associated with consumption of such as cheeses and margarine, alternatives which can deliver the functionalities required in traditional spreads with less nutritional problems are being sought. Mangifera indica fruit also known as mango and cashew nuts comes in. Mango plays an important part in the diet and cuisine of many diverse cultures. There are over 1000 named mango varieties throughout the world, which is a testament to their value to humankind. Mango is a common garden tree throughout the tropics. When ripe, this delicious dessert

fruit is particularly high in vitamin A. The fruit is also eaten green, processed into pickles, pulps, jams, and chutneys, and is frozen or dried (Sharma, 2014). While Cashews are rich in iron, phosphorus, selenium, magnesium, and zinc. They are also good sources of phyto chemicals, antioxidants, and protein. Delicately sweet yet crunchy and delicious cashew nut is packed with energy, antioxidants, minerals, and vitamins that are essential for robust health. Cashew, or "caju" in Portuguese, is one of the popular ingredients in sweet as well savory dishes worldwide. Cashew nuts as ingredients impart characteristic flavor, aroma, or piquancy and color to foods. Several researches have documented the use of plant extracts or their essential oils as additives in food which demonstrated antioxidant properties (Ifesan, Fasasi, & Ehoniyotan, 2012). An increasing number of consumers prefer minimally processed foods, prepared without chemical preservatives.

Since the acceptability of a product is of utmost importance in product development, the objective of this research was to know the acceptability of the Mango-Cashew Spread.

**Objectives of the Study**

This study was conducted to determine the acceptability of Mango-Cashew Spread. Specifically, it aimed to determine (1) the acceptability of Mango-Cashew spread its appearance, aroma, color, taste, texture, mouth feel and general acceptance, and (2) the significant differences in evaluation of the respondents as to general appearance, aroma, color, mouth feel, taste, and texture.

## MATERIALS AND METHODS

Experimental Research has gained the reputation of being the most prestigious method of advancing scientific knowledge because it is the only hypothesis for establishing a cause-and-effect relationship and for discovering and developing an organized body of knowledge. This Experimental Research Design was used to determine the acceptability of Grind Cashew Nuts when mixed with Mango Spread.

Table 1 presents the list of materials and the function of materials in relation to the preparation of Mango-Cashew Spread.

Table 1. List of materials that will be used and their functions

| Equipment/Tools | Functions |
|---|---|
| Gas Range | Used for cooking the Mango-cashew spread |
| Mixing bowl | Used to hold ingredients or batter mixture |
| Wooden spoon | Use to mix the ingredients well, used to cream or beat cakes by hand,to mix batter or dough. |
| Measuring spoon | Used to measure small amounts of ingredients |
| Measuring cups | Used to measure large amount of ingredients |
| Sifter | Used to sift flour and all dry ingredients |
| Knife | Used to cut or slice ingredients into desire shape |
| Chopping board | Used to hold ingredients when slicing |
| Spatula | Used to level off the surface of the ingredients |
| Rubber scraper | Used to scrape drip of batter or meringue out of a bowl |
| Food Jars | Used as container of the finished cashew-mango spread |
| Plastic cups | Used as container of Mango-Cashew spread for sensory evaluation |
| Small plastic spoons | Used to spoon the spread for evaluation |

**Recipe of Mango Cashew Spread**

Ingredients:
2kg whole ripe mangoes
1 cup lemon juice
1 cup orange juice
1 cup water
6-8 cups white sugar (approx)
2 cup grind cashew

Procedures:

1. Wash, peel and dice mango flesh. Place chopped mango flesh into a large, heavy-based pot. Repeat with the remaining mangoes.
2. Combine the diced mangoes, lemon juice and orange juice in your large heavy-based pot. Bring to a boil for 10 minutes, then reduce heat and simmer for approximately 25-35 minutes or until most of the liquid has evaporated. Puree mango.
3. Measure the mango puree, adding 3/4 cup sugar per 1 cup of puree. Heat gently, stirring occasionally, until sugar has dissolved. Bring to a boil and boil gently for about 20-30 minutes, until as thick as possible. Add grind cashew

The most widely used scale for measuring food acceptability is the 9-point hedonic scale. David Peryam and colleagues developed the scale for the purpose of measuring the food preferences of US soldiers. The scale was quickly adopted by the food industry and now is used not just for measuring the acceptability of foods and beverages, but also of personal care products, household products, and cosmetics. The scale comprises a series of nine verbal categories ranging from dislike extremely to like extremely and is described as such in various sensory texts (Wichchukit & O'Mahony, 2014).

**Respondents of the Study**

The respondents of the study were selected 10 students, 5 faculty and 10 staff of the Guimaras State College–Main Campus and 5 food consumers who are not employed nor enrolled in this College. They determined the acceptability and sensory qualification of the raw materials used and appropriateness of its ingredients in creating a delightful and innovative spread for crackers and bread that are favorable to the taste of everyone.

Data in Table 1 shows the male consist of 5 (16.7%) of the population while female consists of 25 (83.3 %); 5 (16.7%) are 19 and below, 12 (40.0%) are 20-30 years old, 2 (6.7%) was 31-40 years old and 11 (36.7%) was 41 and above as to the age bracket of the respondents; 13 (83.3%)are single, 16 (53.3%) are married and 1 (3.3%) is separated as to the civil status of the respondents; as to the educational attainment of the respondents, 1(3.3%) is a doctoral degree, 4(13.3%) is a bachelor's degree, 13 (43.3%)are college level, 8 (26.7%) are master's degree, and 4 (13.3%) does not specify their educational attainment.

Table 2. Distribution of Parcticipants

| Category | f | % |
|---|---|---|
| Entire group | 30 | 100 |
| Age | | |
| 19 and below | 5 | 16.7 |
| 20-30 y/o | 12 | 40.0 |
| 31-40 y/o | 2 | 6.7 |
| 41 and above | 11 | 36.7 |
| **Total** | **30** | **100** |
| Sex | | |
| Male | 5 | 16.7 |
| Female | 25 | 83.3 |
| **Total** | **30** | **100** |
| Civil Status | | |
| Single | 13 | 43.3 |
| Married | 16 | 53.3 |
| Seperated | 1 | 3.3 |
| **Total** | **30** | **100** |

| | | |
|---|---|---|
| Educational Attainment | | |
| Doctoral Degree | 1 | 3.3 |
| Bachelor's Degree | 4 | 13.3 |
| College Level | 13 | 43.3 |
| Master's Degree | 8 | 26.7 |
| Others | 4 | 13.3 |
| **Total** | **30** | **100** |

**Tasting Evaluation Procedure**

This research utilized the 9 points Hedonic Scale for evaluation of the product divided into two parts. Part I was on the personal profile of the respondents that includes their name, age, civil status, gender, highest educational attainment, year and course. Part II dealt with the sensory evaluation score sheet that was used based on the 9 Point Hedonic Scale was provided for the evaluation as to 9; like extremely, 8; like very much, 7; like moderately, 6; like slightly, 5; neither like or dislike, 4; dislike slightly, 3; dislike moderately, 2; dislike very well, 1; dislike extremely.

**Statistical Data Analysis**

The data were subjected to descriptive analysis such as mean, for descriptive statistics. Mann Whitney (z test) and Kruskal-Wallis (chi-square) were used to test the degree of difference among treatment. Analyzing mean is getting the entire mean and interpreting it based on the 9 points Hedonic Scale.

## RESULTS AND DISCUSSIONS

**Acceptability Level of Mango-Cashew Spread**

**Appearance**

As shown in Table 3 below, the acceptability of Mango-Cashew Spread when grouped according to the profile of the taste panelist shows that, those 19 years old and below (8.20), and others (8.25) who does not specify their educational attainment were extremely like the appearance of the product, while those 20-30 years old (7.58), 31-40 years old (7.50), 41 year old and above (7.73), either male (7.60), or female (7.76), regardless of civil status as single (7.85), married (7.63), and separated (8.00), having an educational attainment as college level (8.00) and master's degree (7.63), were very much like the product; but those bachelor's degree holder (7.00) moderately like, and those doctoral degrees (6.00) was slightly like the product. Overall mean was 7.73 which implies that the taste panelist very much like the product. The result implies that the appearance of Mango-Cashew Spread was acceptable by the taste panelist.

Table 3. Acceptability of Mango-Cashew Spread when group according to the profile of the respondents in terms of appearance

| | | APPEARANCE | |
|---|---|---|---|
| | Profile | Mean | Interpretation |
| Age | 19 and below | 8.20 | Extremely Like |
| | 20-30 y/o | 7.58 | Very Much Like |
| | 31-40 y/o | 7.50 | Very Much Like |
| | 41 and above | 7.73 | Very Much Like |
| Sex | Male | 7.60 | Very Much Like |
| | Female | 7.76 | Very Much Like |
| Civil Status | Single | 7.85 | Very Much Like |
| | Married | 7.63 | Very Much Like |
| | Seperated | 8.00 | Very Much Like |

| | | | |
|---|---|---|---|
| Educational Attainment | Doctoral Degree | 6.00 | Slightly Like |
| | Bachelor's degree | 7.00 | Moderately Like |
| | College level | 8.00 | Very Much Like |
| | Master's Degree | 7.63 | Very Much Like |
| | Others | 8.25 | Extremely Like |
| | **Total** | **7.73** | **Very Much Like** |

Scale: 9 (like extremely), 8 (like very much), 7 (like moderately), 6 (like slightly), 5 (neither like or dislike), 4 (dislike slightly), 3 (dislike slightly), 3 (dsilike moderately), 2 (dislike very well), 1 (dislike extremely)

**Aroma**

As shown in Table 4 for the acceptability of the Mango-Cashew Spread based on aroma when grouped according to the profile of the taste panelist shows that those 19 years old and below (M=8.20), single in civil status (m=8.15), and college level panelist extremely like the aroma of the product, while those, 20-30 years old (M=8.08), 31-40 years old (M=8.00), 41 and above (M=7.82), both male and female (M=8.00), Married (M=7.88), those who are separated (M=8.00), bachelor's degree (M=7.75), master's degree (7.88) and others who does not specify their educational attainment (M=7.75) were very much like the product, but those who are doctoral degree (M=6.00) slightly like the aroma of the product. Overall (M=8.00) the respondents very much like the product. The result implies that the aroma of mango-cashew spread was acceptable by the taste panelist.

Table 4. Acceptability of the Mango-Cashew Spread based on aroma when grouped according to the profile of the taste panelist in terms of Aroma

| | | AROMA | |
|---|---|---|---|
| | Profile | Mean | Interpretation |
| Age | 19 and below | 8.20 | Extremely Like |
| | 20-30 y/o | 8.08 | Very Much Like |
| | 31-40 y/o | 8.00 | Very Much Like |
| | 41 and above | 7.82 | Very Much Like |
| Sex | Male | 8.00 | Very Much Like |
| | Female | 8.00 | Very Much Like |
| Civil Status | Single | 7.85 | Very Much Like |
| | Married | 7.63 | Very Much Like |
| | Seperated | 8.00 | Very Much Like |
| Educational Attainment | Doctoral Degree | 6.00 | Slightly Like |
| | Bachelor's degree | 7.00 | Moderately Like |
| | College level | 8.00 | Very Much Like |
| | Master's Degree | 7.63 | Very Much Like |
| | Others | 8.25 | Extremely Like |
| | **Total** | **7.73** | **Very Much Like** |

Scale: 9 (like extremely), 8 (like very much), 7 (like moderately), 6 (like slightly), 5 (neither like or dislike), 4 (dislike slightly), 3 (dislike slightly), 3 (dsilike moderately), 2 (dislike very well), 1 (dislike extremely)

**Color**

Table 5 below shows the result of acceptability of the Mango-Cashew Spread based on its color when grouped according to the profile of its tastes panelist, it shows that 19 years old and below (M=8.20) taste panelist extremely like the color of the product, while 20-30 years old (M=7.42), 31-40 years old (M=8.00), 41 and above years old (M=7.64), either male (M=7.80), or female (M=7.64), single (M=7.85), married (M=7.50), separated (M=8.00), bachelor's degree holder (M=7.25), college level (M=7.92), master's degree (M=7.63) and others who do not specify their educational attainment (M=7.50) were very much like the wproduct, but the doctoral degree (M=7.00) were moderately like the product. Overall mean was 7.67 this implies that the taste panelist were very much like the product. The result also implies that the color of Mango-Cashew spread was acceptable by the taste panelist.

Table 5. Acceptability of the mango-cashew spread based on its color when grouped according to the profile of its tastes panelist in terms of color

| | | COLOR | |
|---|---|---|---|
| | Profile | Mean | Interpretation |
| Age | 19 and below | 8.20 | Extremely Like |
| | 20-30 y/o | 7.42 | Very Much Like |
| | 31-40 y/o | 8.00 | Very Much Like |
| | 41 and above | 7.64 | Very Much Like |
| Sex | Male | 7.80 | Very Much Like |
| | Female | 7.64 | Very Much Like |
| Civil Status | Single | 7.85 | Very Much Like |
| | Married | 7.50 | Very Much Like |
| | Seperated | 8.00 | Very Much Like |
| Educational Attainment | Doctoral Degree | 7.00 | Moderately Like |
| | Bachelor's degree | 7.25 | Very Much Like |
| | College level | 7.92 | Very Much Like |
| | Master's Degree | 7.63 | Very Much Like |
| | Others | 7.50 | Very Much Like |
| | **Total** | **7.67** | **Very Much Like** |

Scale: 9 (like extremely), 8 (like very much), 7 (like moderately), 6 (like slightly), 5 (neither like or dislike), 4 (dislike slightly), 3 (dislike slightly), 3 (dsilike moderately), 2 (dislike very well), 1 (dislike extremely)

**Mouth feel**

As shown in the table 6 below, the acceptability of mango-cashew spread when grouped according to the profile of the taste panelist shows that, those 19 years old and below (M=8.20), single (M=8.15) and college level (M=8.38) were extremely like the mouth feel of the product, while those 20-30 years old (M=7.83), 41 years old and above (M=7.73), either male (M=7.60), or female (M=7.80), as to civil status married (M=7.44), and separated (M=8.00), having an educational attainment as bachelor's degree (M=7.50) and master's degree (M=7.50), were very much like the product; but those 31-40 years old (M=6.50) and others who do not specify their educational attainment (M=7.00) were moderately like the product. Overall mean was 7.77 this implies that the taste panelist very much like the product. Moreover, the mouth feel of Mango-Cashew Spread was acceptable by the taste panelist.

Table 6. Acceptability of Mango-Cashew Spread when grouped according to the profile of the taste panelist in terms of Mouth feel

| | | MOUTHFEEL | |
|---|---|---|---|
| | Profile | Mean | Interpretation |
| Age | 19 and below | 8.20 | Extremely Like |
| | 20-30 y/o | 7.83 | Very Much Like |
| | 31-40 y/o | 6.50 | Moderately Like |
| | 41 and above | 7.73 | Very Much Like |
| Sex | Male | 7.60 | Very Much Like |
| | Female | 7.80 | Very Much Like |
| Civil Status | Single | 8.15 | Extremely Like |
| | Married | 7.44 | Very Much Like |
| | Seperated | 8.00 | Very Much Like |
| Educational Attainment | Doctoral Degree | 6.00 | Slightly Like |
| | Bachelor's degree | 7.50 | Very Much Like |
| | College level | 8.38 | Extremely Like |
| | Master's Degree | 7.50 | Very Much Like |
| | Others | 7.00 | Moderately Like |
| | **Total** | **7.77** | **Very Much Like** |

Scale: 9 (like extremely), 8 (like very much), 7 (like moderately), 6 (like slightly), 5 (neither like or dislike), 4 (dislike slightly), 3 (dislike slightly), 3 (dsilike moderately), 2 (dislike very well), 1 (dislike extremely)

**Texture**

As shown in Table 7 below, the acceptability of Mango-Cashew Spread when grouped according to the profile of the taste panelist shows that, regardless of the age 19 years old and below (M=7.80), 20-30 years old (M=7.50), 31-40 years old (M=7.50), 41 and above (M=7.55), either male (M=7.80) or female (M=7.52), regardless of the civil status, single (M=7.85), married (M=7.31), separated (M=8.00), and those others who did not specify their educational attainment(M=7.25) were very much like the product, while doctoral degree (M=6.00) was slightly like the product, those bachelor's degree holder (M=6.75) and master's degree (M=7.13) were moderately like the product, but the college level taste panelist (M=8.31) were extremely like the product. Overall Mean was 7.57 this implies that the taste panelist very much like the product as to its texture. Moreover, the texture of mango-cashew spread was acceptable by the taste panelist.

Table 7. Acceptability of Mango-Cashew Spread when grouped according to the respondents' profile in terms of texture

| | | TEXTURE | |
|---|---|---|---|
| | Profile | Mean | Interpretation |
| Age | 19 and below | 7.80 | Extremely Like |
| | 20-30 y/o | 7.50 | Very Much Like |
| | 31-40 y/o | 7.50 | Moderately Like |
| | 41 and above | 7.55 | Very Much Like |
| Sex | Male | 7.80 | Very Much Like |
| | Female | 7.52 | Very Much Like |
| Civil Status | Single | 7.85 | Extremely Like |
| | Married | 7.31 | Very Much Like |
| | Seperated | 8.00 | Very Much Like |
| Educational Attainment | Doctoral Degree | 6.00 | Slightly Like |
| | Bachelor's degree | 6.75 | Very Much Like |
| | College level | 8.31 | Extremely Like |
| | Master's Degree | 7.13 | Very Much Like |
| | Others | 7.25 | Very Much Like |
| | **Total** | **7.57** | **Very Much Like** |

Scale: 9 (like extremely), 8 (like very much), 7 (like moderately), 6 (like slightly), 5 (neither like or dislike), 4 (dislike slightly), 3 (dislike slightly), 3 (dsilike moderately), 2 (dislike very well), 1 (dislike extremely)

**Flavor**

As shown in Table 8 below, the acceptability of mango-cashew spread when grouped according to the profile of the taste panelist shows that, 19 years old and below (M=8.40), 20-30 years old (M=8.17), female (M=8.24), single (M=8.23), college level (M=8.69) and others who did not specify their educational attainment (M=8.25) were extremely like the product, while 31-40 years old (M=7.50), 41 years old and above (M=8.09), male (M=7.60), either married (M=8.06) or separated (M=8.00), bachelor's degree holder (M=7.50) and master's degree holder (M=7.75) assessed flavor of mango-cashew as very much like, but doctoral degree holder (M=6.00) slightly liked the product. Overall mean was 8.13. This implies that the taste panelist extremely like the product and was acceptable by the taste panelist.

Table 8. Acceptability of Mango-Cashew Spread when grouped according to the profile of the taste panelist in terms of flavor

| | | FLAVOR | |
|---|---|---|---|
| | Profile | Mean | Interpretation |
| Age | 19 and below | 8.40 | Extremely Like |
| | 20-30 y/o | 8.17 | Extremely Like |
| | 31-40 y/o | 7.50 | Very Much Like |
| | 41 and above | 8.09 | Very Much Like |
| Sex | Male | 7.60 | Very Much Like |
| | Female | 8.24 | Very Much Like |
| Civil Status | Single | 8.23 | Extremely Like |
| | Married | 8.06 | Very Much Like |
| | Seperated | 8.00 | Very Much Like |

| | | | |
|---|---|---|---|
| Educational Attainment | Doctoral Degree | 6.00 | Slightly Like |
| | Bachelor's degree | 7.50 | Very Much Like |
| | College level | 8.69 | Extremely Like |
| | Master's Degree | 7.75 | Very Much Like |
| | Others | 8.25 | Extremely Like |
| | **Total** | **7.57** | **Extremely Like** |

Scale: 9 (like extremely), 8 (like very much), 7 (like moderately), 6 (like slightly), 5 (neither like or dislike), 4 (dislike slightly), 3 (dislike slightly), 3 (dsilike moderately), 2 (dislike very well), 1 (dislike extremely)

**General Acceptance**

As shown in Table 9 below, the acceptability of Mango-Cashew Spread when grouped according to the profile of the taste panelist shows that, 19 years old and below (M=8.17), and college level panelist (M=8.28) were extremely like the product, while 20-30 years old (M=7.76), 31 to 40 years old (M=7.50), and 41 years old and above (M=7.76), either male (M=7.73), or female (M=7.83), regardless of civil status single (M=8.01), married (M=7.64) and separated (M=8.00), bachelor's degree (M=7.29), master's degree (M=7.58) and others who did not specify their educational attainment (M=7.67) were very much like the product, but the doctoral degree (M=6.17) slightly like the product. Overall mean was 7.81, this implies that the taste panelist very much like the product and acceptable as to its general appearance.

Table 9. Acceptability of the Mango-Cashew Spread when grouped according to the profile of the taste panelist in terms of General Appearance

| | | GENERAL ACCEPTANCE | |
|---|---|---|---|
| | Profile | Mean | Interpretation |
| Age | 19 and below | 8.17 | Extremely Like |
| | 20-30 y/o | 7.76 | Very Much Like |
| | 31-40 y/o | 7.50 | Very Much Like |
| | 41 and above | 7.76 | Very Much Like |
| Sex | Male | 7.73 | Very Much Like |
| | Female | 7.83 | Very Much Like |
| Civil Status | Single | 8.01 | Very Much Like |
| | Married | 7.64 | Very Much Like |
| | Seperated | 8.00 | Very Much Like |
| Educational Attainment | Doctoral Degree | 6.17 | Slightly Like |
| | Bachelor's degree | 7.29 | Very Much Like |
| | College level | 8.28 | Extremely Like |
| | Master's Degree | 7.58 | Very Much Like |
| | Others | 7.67 | Very Much Like |
| | **Total** | **7.81** | **Very Much Like** |

Scale: 9 (like extremely), 8 (like very much), 7 (like moderately), 6 (like slightly), 5 (neither like or dislike), 4 (dislike slightly), 3 (dislike slightly), 3 (dsilike moderately), 2 (dislike very well), 1 (dislike extremely)

**Differences on the level of acceptance in terms of appearance, aroma, color, mouth feel, texture, flavor and general acceptance**

An examination in Table 10 shows that there was no significant difference on the level of acceptance of the mango-cashew spread in terms of appearance when grouped according to age, sex, and civil status of the taste panelist. Result showed that there were no significant differences in the level of acceptance in terms of appearance, aroma, color, mouth feel, texture, flavor, and general acceptance when grouped according to age, sex, and civil status. Moreover, there were no significant differences in terms of aroma, color, and flavor while there were significant differences in terms of appearance, mouth feel, texture, and general acceptance when grouped according to educational attainment. This implies that whether the respondents were male or female, young or old, and regardless of their marital life it did not affect their sensory evaluation.

Table 10. Differences on the level of acceptance in terms of sensory evaluation

| Variables | Tabulars | p-value | Interpretation |
|---|---|---|---|
| APPEARANCE | | | |
| Age | -.239 | .811 | Not significant |
| Sex | 2.393 | .495 | Not significant |
| Civil Status | .915 | .633 | Not significant |
| Educational Attainment | 10.965 | .027 | Significant |
| AROMA | | | |
| Age | -.367 | .714 | Not significant |
| Sex | 1.070 | .784 | Not significant |
| Civil Status | 1.222 | .543 | Not significant |
| Educational Attainment | 7.296 | .121 | Not significant |
| COLOR | | | |
| Age | -.093 | .926 | Not significant |
| Sex | 2.817 | .421 | Not significant |
| Civil Status | .792 | .673 | Not significant |
| Educational Attainment | 3.172 | .529 | Not significant |
| MOUTHFEEL | | | |
| Age | -.379 | .704 | Not significant |
| Sex | 3.848 | .278 | Not significant |
| Civil Status | 2.644 | .267 | Not significant |
| Educational Attainment | 9.559 | .049 | Significant |
| TEXTURE | | | |
| Age | -.559 | .576 | Not significant |
| Sex | .255 | .968 | Not significant |
| Civil Status | 1.822 | .402 | Not significant |
| Educational Attainment | 14.924 | .005 | Significant |
| FLAVOR | | | |
| Age | -1.343 | .179 | Not significant |
| Sex | .356 | .949 | Not significant |
| Civil Status | .249 | .883 | Not significant |
| Educational Attainment | 9.427 | .051 | Not significant |
| GENERAL ACCEPTANCE | | | |
| Age | -1.478 | .197 | Not significant |
| Sex | .391 | 1.044 | Not significant |
| Civil Status | .274 | .971 | Not significant |
| Educational Attainment | 10.369 | .005 | Significant |

p>0.05 level of significance

## CONCLUSION

The Mango-Cashew Spread was highly acceptable based on the sensory evaluation of the evaluators. The respondents rated very much like in most of the attributes of Mango-Cashew Spread such as appearance, aroma, color, mouth feel, texture, and general acceptance while extremely like was rated by the respondents in terms of flavor. There was no significant difference in terms of all sensory criteria such as appearance, aroma, color, mouth feel, texture, and general acceptance of Mango-Cashew Spread when grouped according to age, sex, and civil status of the taste panelist. However, in terms of educational attainment results revealed that there is a significant difference in the level of acceptance in appearance, mouth feel, texture, and general acceptance of Mango-Cashew Spread. This implies that the sensory evaluation of the taste panelist was greatly affected by its educational attainment maybe because the higher their educational attainment the more experience they have when it comes to the taste and physical appearance of the product.

***

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# EMPLOYMENT STATUS OF BACHELOR OF SCIENCE IN BUSINESS ADMINISTRATION GRADUATES FROM ACADEMIC YEAR 2013 TO 2017

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**ABSTRACT** The study focused on the determination of the employment status of the Bachelor of Science in Business Administration (BSBA) graduates of the Guimaras State College curricular programs from Academic Year 2013 to 2017. The study utilized the descriptive research design using the adopted researchers made-questionnaire of the previous tracer study of Bachelor of Science in Business Administration and Bachelor of Science in Hotel and Restaurant Management graduates (BSHRM Work Performance as Perceived by their Employers) as an instrument with 224 retrieved graduates taken through simple random replacement sampling technique and used frequency, mean, percentages, and rank. Results of the study showed that majority of the graduates were female, single, and employed within age bracket of 21 to 25 years old. Majority of the graduates took financial management. As to employment status, most of them were regular permanent in Merchandising Company with accounting/finance type of job. Their job focused on clerical work and knowingly majority of them says it was their first job after graduated. Further, the graduates expressed that the course they took in college was related to their current job. Most of the graduates stayed 7 to 11 months in their first but currently stayed employed. However, most of them got a salary lower than 10,000. Moreover, salaries and benefits were number one reasons they accepted the job. The most developed skills from College that they applied in their job were Communication skills, human relation skills, and Information technology skills.

**Keywords:** Employment, Status, Graduates, College of Business and Management

## INTRODUCTION

### Background of the study

In a world where knowledge is a critical element for nations to prosper and compete, primacy is placed on the quality and relevance of education and how it can ensure that graduates have the knowledge, skills, attitudes, and values that industries need (Same Inanotech, 2014). Employability is improved by a good academic record plus skills and attributes that enable to adapt and manage the constantly changing work environment. The Colleges should have quality teachers and the students should imbibe something from them. Universities focused on theoretical study, in terms of mark system but industries are expecting the manpower in terms of good attitude, commitment, self-responsibility, quick learner, and in short an smart or an intelligent guy. According to Harbemas (2014), "Employment status is the moral practical discourse detaches itself from the orientation to personal success and one's own life to which both pragmatic and ethical reflection remains tied." The foundation has identified employment status as one of the major factors influencing quality of work. Since then, the College of Business Management, Bachelor of Science in Business Administration formerly School of Business Administration of Guimaras State College was opened last A.Y. 2005-2006 and up to the present, it has produced seven (7) batches of graduates from 2009-2017. As one the growing college in terms of population, its graduates are always monitored regarding their employment status.

Paul Rajan Rajkumar (2011), in his study entitled "Employability Skills In Chennai Retail Market, India" The objectives of the study was, to understand the requirement of skill set for jobs and to investigate method of developing employability skills nor estimate human resource requirements of organized retailing industry and to assess the employability skill set. Finding of the study is, the underlying skill set required in getting and sustaining employment in the organized grocery and vegetable retail industry. The study concludes that, the mix of academic qualifications, important vocational skills and personal skills are selling skills for entry level jobs. Employers in retail industry are looking for people for their managerial jobs with different skill set of factors such as academic qualifications, communication skills, leadership skills, teamwork skills and work experience.

This study was anchored on the theory of Human Capital essentially states that the relative paths of earnings and value of marginal product diverge over the working life. According to this perspective, people were likely to enter self-employment when they were dissatisfied with their compensation as employee or have expectancies of increase compensation as self-employed. According to Wuttaphan (2017), Human Capital Theory can improve a firm's performance and explain the significance of labor maximization and how an organization can accumulate employees' knowledge, skill, and ability by investing in humans through training, educating to enhance an employee's capacity to work effectively.

According to the Labor Secretary, Patricia Sto. Tomas, every March, the end of the academic calendar in the Philippines, we are often faced with a high number of college graduates completing with the unemployed for limited job opportunities. However, many companies claimed that their posted vacancies in the classified advertisements cannot be filled by numerous jobseekers. The failure to get a match is often a result of the jobseekers' inability to qualify for requirements needed by employers.

The Philippines as a developing country faces this same challenges having been beset for decades with structurally high unemployment and underemployment rates. High population and labor force growth continues to outpace formal job creation. The Philippine education system churns out more and more college graduates with various professional disciplines such as commerce, engineering, health, sciences and law to name a few. But the jobs are not really created as fast as the universities handing out of the college diploma (De Ocampo, 2013).

The image of a tertiary education institution in the Philippines is most likely tied to its reputation of producing excellent graduates who easily land a job after graduation. Graduate Tracer Studies are common research methods for these educational institutions to check on the employability of their recent graduates (Maratas, 2018).

The Bachelor of Science in Business Administration (BSBA) is four year degree that will help students learn the ins and outs of running business as well as necessary traits and skills that they need and develop to become successful business leaders. Thus, this study was conducted to determine the employment status of Bachelor of Science in Business Administration Graduates Academic Year, 2013, 2014, 2015, 2016 and 2017.

**Statement of the Problem**

This study was conducted to determine the employment status of BSBA Graduates of the GSC batches 2013, 2014 2015, 2016 and 2017. Specifically, the study sought to answer the following questions: (1) What is the profile of the BSBA Graduates in terms of age, sex and civil status, year graduated, specialization, and advance studies/ trainings attended, (2) What is the employment Status of Graduates in terms of whether employed or unemployed, type of job, job level position, length of service, salaries and wages, and (3) What is the reason for accepting/changing jobs and skilled developed from college that applied on job?

## METHODOLOGY

The descriptive method of research was used in this study to determine the Employment Status of the BSBA Graduates of the Guimaras State College from Academic Year 2013, 2014, 2015, 2016 to 2017. Descriptive research is appropriate for studies, which aims to find out what prevail in the present conditions or relationships, help opinions and beliefs, processes and effects, and developing trends. The respondents of the study were the graduates of the College of Business Management, Bachelor of Science in Business Administration (BSBA) Program of Guimaras State College from A.Y. 2013, 2014, 2015, 2016, and 2017. There were a total population of 509 however, researchers retrieved 224 questionnaires due to time constraints using simple random replacement sampling technique.

Table 1. Presents the total number of graduates as to year of graduation

| Year of Graduation | No. of Graduates | TOTAL |
|---|---|---|
| 2013 | 42 | 19 |
| 2014 | 55 | 24 |
| 2015 | 89 | 39 |
| 2016 | 157 | 69 |
| 2017 | 166 | 73 |
| Total | 509 | 224 |

The researchers used a simple random replacement sampling technique to determine the sample needed out of 509 graduates of Bachelor of Science in Business Administration. The data was gathered using researcher made questionnaire. The questionnaire was composed of 2 parts. Part I focused on the profile of the BSBA Graduates in terms of age, sex, civil status, year graduated, specialization, and advance studies/ trainings attended; Part II focused employment Status of Graduates in terms of employment status, reasons for being unemployed, employment status, reason for accepting/changing jobs, length of service, salaries and wages, relevance of curriculum to their jobs, and suggestions to improve the curriculum. Since the questionnaire was adapted from previous tracer studies of the department, it was already considered validated and reliable. The gathered data were tallied, tabulated, and computer processed for analysis and interpretation. Statistical tools used were frequency count and percentage.

## RESULTS AND DISCUSSIONS

### Profile of the Respondents

Table 2 presents the profile of the respondents includes, age, sex, civil status, year graduated, specialization, and advance studies/trainings attended. Results revealed that the average age of the respondents was 23 years old and there were 195 or 87.1% of the respondents which were in age grouped 21-25 years old and 29 or 12.9% were grouped in 26 years old and above. They were composed of 43 of 19.2% males and 181 or 80.8% females. It is dominated by single respondents which comprised 219 or 97.8%, about 4 or 1.8% and 1 or 0.4% were married and separated respectively. Generally, it was noted that majority of the respondents were young but an expected age to be employed. Moreover, they were got employed within 1 to 2 years or right after graduated in college. This simply means that the BSBA graduates of AY. 2013-2017 might in good standing during their internship and likely performed the knowledge and ideas gained from school attended and later developed the skills that was needed to be employed.

The BSBA graduate respondents were dominantly composed of 74 or 33.0% graduates for A.Y. 2017 then followed by 67 or 29.9% for A.Y. 2016. There were 24 or 10.7% and 19 or 8.5% for A.Y. 2015 and A.Y. 2014 respectively. More than half 136 or 60.7% were specialized in Financial Management. Followed by 63 or 28.1% were Marketing Management. Only 19 or 8.5% and 6 or 2.7% were Management Accounting and Entrepreneurship respectively. Meanwhile, almost all BSBA graduates respondents were not able to pursue their advance studies 213 or 95.1% and only 6 or 2.7% enrolled in MBA, 3 or 1.3% in MBM, 1 or 0.4% in MPA.

Table 2. Profile of the Respondents

| Categories | f | % |
|---|---|---|
| Age | | |
| 21 to 25 years old | 195 | 87.1 |
| 26 years old and above | 29 | 12.9 |
| Average = 23.24 | | |
| Sex | | |
| Male | 43 | 19.2 |
| Female | 181 | 80.8 |
| Civil Status | | |
| Single | 219 | 97.8 |
| Married | 4 | 1.8 |
| Seperated | 1 | 0.4 |
| Year Graduated | | |
| A.Y. 2013 | 19 | 8.5 |
| A.Y. 2014 | 24 | 10.7 |
| A.Y. 2015 | 40 | 17.9 |
| A.Y. 2016 | 67 | 29.9 |
| A.Y. 2017 | 74 | 33.0 |
| Specialization | | |
| Management Accounting | 19 | 8.5 |
| Financial Management | 136 | 60.7 |
| Marketing Management | 63 | 28.1 |
| Entrepreneurship | 6 | 2.7 |
| Advance Studies/ Training Attended | | |
| MBA | 6 | 2.7 |
| MBM | 3 | 1.3 |
| MPA | 1 | 0.4 |
| Listing of Farm Household | 1 | 0.4 |
| None | 213 | 95.1 |
| Total | **224** | **100.0** |

**Employment Status of the Respondents**

More than half (136 or 60.7%) of the BSBA graduate respondents had a regular permanent employment status. Followed by one-third of the respondents (83 or 37.1%) were casual/contractual. Only 3 or 1.3% and 2 or .9% were temporary and self-employed respectively. Most of them worked in a merchandize company (90 or 40.2%); 72 or 32.1% worked in social service; government (55 or 24.6%); financing (5 or 2.2%) and only 2 or .9% in abroad. They in placed in the type of job mostly as office/admin support staff (87 or 38.8%), followed by accounting/finance (84 or 37.5%) and sales/marketing (42 or 18.8%). Only few obtained managerial (6 or 2.7%); social service (3 or 1.3%), and both with 1 or 0.4% in education and engaged in business respectively.

About more than three-fourths of the respondents (171 or 76.3%) occupied rank and file or clerical position while 45 or 20.1% were on professional and technical or supervisory position. A number of them were in managerial or executive (6 or 2.7%) and self-employed (2 or .9%). Majority of the respondents was employed in their first job after graduation (198 or 88.4%) and only 26 or 11.6% was not. They were asked also if the job was related to their course they took during college, almost all of them agreed it was related (220 or 98.2%). Only 4 or 1.8% responded it was not. In terms of their length of stay in a certain job, majority of the respondents stayed only for 7 to 11 months (77 or 34.4%) followed by 1 year to less than 2 years (61 or 27.2%). There were 2 years and less than 3 years (41 or 18.3%), and 3 years and above (32 or 14.3%). Only 10 or 4.5% were 1 to 6 months and 3 or 1.3% were less than a month.

Mostly (123 or 54.9%) the graduate-respondents received a salary earning less than Php 10,000.00. This shows that mostly were occupying rank and file positions. There were 76 or 33.9% received salary or wage between Php 10,001-Php 15,000 and only 17 or 7.6% received salary or wage between Php 15,001–Php 20,000. Lastly, there were only few (8 or 3.6%) received a salary of Php 20,001 and above salary. This can be gleaned that respondents were skillful, responsible, obedient, reliable and hardworking employee.

Table 3. Employment Profile of the Respondents

| Categories | f | % |
|---|---|---|
| Employment Status | | |
| Regular Permanent | 136 | 60.7 |
| Temporary | 3 | 1.3 |
| Self-Employed | 2 | 0.9 |
| Casual/Contractual | 83 | 37.1 |
| Company | | |
| Abroad | 2 | 0.9 |
| Financing | 5 | 2.2 |
| Government | 55 | 24.6 |
| Merchandizes | 90 | 40.2 |
| Services | 72 | 32.1 |
| Type of Job | | |
| Accounting/Finance | 84 | 37.5 |
| Office/Admin support staff | 87 | 38.8 |
| Education | 1 | 0.4 |
| Managerial | 6 | 2.7 |
| Owner | 1 | 0.4 |
| Sales/Marketing | 42 | 18.8 |
| Social Service | 3 | 1.3 |
| Job Level Position | | |
| Clerical Work | 171 | 76.3 |
| Technical and Supervisory | 45 | 20.1 |
| Managerial or Executive | 6 | 2.7 |
| Self-Employed | 2 | 0.9 |
| First Job After Graduated in Course | | |
| Yes | 198 | 88.4 |
| No | 26 | 11.6 |
| Job Related to Course | | |
| Yes | 220 | 98.2 |
| No | 4 | 1.8 |

| | | |
|---|---|---|
| Length of Stay | | |
| Less than a Month | 3 | 1.3 |
| 1 to 6 Months | 10 | 4.5 |
| 7 to 11 Months | 77 | 34.4 |
| 1 Year to Less Than 2 Years | 61 | 27.2 |
| 2 Years and Less Than 3 Years | 41 | 18.3 |
| 3 Years and Above | 32 | 14.3 |
| Salaries and Wages | | |
| Php 5,001 to Php 10,000 | 123 | 54.9 |
| Php 10,001 to Php 15,000 | 76 | 33.9 |
| Php 15,001 to Php 20,000 | 17 | 7.6 |
| Php 20,001 and above | 8 | 3.6 |
| Total | **224** | **100.0** |

**Reason for Accepting Job**

When graduates were asked on the reasons for accepting job, all of them cited salaries and benefits derived from the job (224 or 100%).This was followed by related to special skills (192 or 85.7%) and some considered career challenge (68 or 30.4%) and proximity of residence (14 or 6.2%). This means that respondents prefer to work in the company that offers better salary and have benefits.

Moreover, the skills that had been developed from the respondents which applied on job, all of them cited communication skills as their top skills (224 or 100%). Followed by human relation skills (221 or 98.7%); information technology skills (211 or 94.2%); entrepreneurial/technical skills in business (189 or 84.4%); problem-solving skills (186 or 83%) and critical skills (173 or 77.2%) as shown in table 3. This implies that the graduates are honed both in oral and technical skills. This is consonance to the finding the most skills learned by graduates were communications skills and human relations skills (Catacutan, et al., 2019). Moreover, to achieve the fullest potential for all by giving quality education to provide high quality human resources and to help their students discover their own talents, make the best of these talents and realize their full potential (Busted, 2009).

Table 4. Reason for Accepting Job

| Categories | f | % |
|---|---|---|
| Reason for Accepting Job | | |
| Salaries and Benefits | 224 | 100.0 |
| Career Challenge | 68 | 30.4 |
| Related to Special Skills | 192 | 85.7 |
| Proximity of Residence | 14 | 6.2 |
| Skills Developed from College that Applied on Job | | |
| Communication Skills | 224 | 100.0 |
| Human Relation Skills | 221 | 98.7 |
| Entrepreneurial/Technical Skills in Business Administration | 189 | 84.4 |
| Information Technology Skills | 211 | 94.2 |
| Problem-Solving Skills | 186 | 83.0 |
| Critical Skills | 173 | 77.2 |
| Total | **224** | **100.0** |

## CONCLUSION

Majority of the respondents were aged 21- 25 years old, female, single, graduated last AY. 2017, Financial Management major, and most of was not able to pursue graduate studies. Most of the respondents were regular permanent in Merchandising Company with accounting/finance type of job, focused on clerical work and knowingly majority of them says it was their first job after graduated. Further, the graduates expressed that the course they took in college was related to their current job. Most of the graduates stayed 7 to 11 months in their first but currently stayed employed. However, most of them got a salary lower than Php 10,000. The main reason they accepted the job was the salaries and benefits followed by related to their special skills. The most skills that was developed on them was communication skills and human relationship skills.

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# ECONOMIC EFFICIENCY OF THE BROILER AT DIFFERENT HERBAL WATER SUPPLEMENT

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**ABSTRACT** This study was conducted to determine the effect of different herbal extracts as water supplement on the growth and economic characteristics of broilers. A Completely Randomized Design (CRD) was used with four (4) treatments and one (1) control and replicated three (3) times. The treatments that were used in the study was the following: Control-no herbal extract supplement; Treatment A-10% Lemon Grass (Cymbopogon citrullus); Treatment B-10% Gotu kola (Centenella asiatica); Treatment C-10% Oregano (Origanum vulgare); and Treatment D-10% Horseradish tree (Moringa oleifera). The analysis shows a significant difference between the final weight and weight gain of broiler at different treatments, wherein treatment D showed the most significant effect followed by treatment C and treatment B while treatment A and control shows the same treatment effect. The supplementation of Horseradish tree extracts into the water commensurate a better growth performance of broiler. Also, in terms of feed conversion efficiency, treatment D shows the best feeding efficiency compare to other treatments while control, treatment A and B show the least feeding efficiency and shows lower efficiency compare to treatment C. There is a significant effect of supplementing Horseradish tree extract at 10% level of solution to the growth performance and feeding efficiency of broiler. The water supplementation of Horseradish extract was economically efficient, which commensurate the highest income among other herbal extracts and those with no supplementation.

**Keywords:** Growth Performance, Economic Efficiency, Broiler, Herbal Extracts

## INTRODUCTION

### Background of the study

Poultry is the most progressive animal enterprise today. It is one of the world's foremost and fastest producers of meat. While in the Philippines, it has been a significant contributor to the country's agricultural sector. In 2010, the chicken population in the Philippines were estimated 159 million, slightly higher (0.2 percent) than last year's level. Layer and native chicken inventory grow by 13 ad 2 percent, respectively and almost 50 percent of the total chicken population were accounted for native or village chicken raised in backyard farms while the remaining 32.8% (broilers) and 18% (layers) were taken up by commercial broilers.

Medicinal plants have been identified and used throughout human history. Plants can synthesize a wide variety of chemical compounds that are used to perform important biological functions and defend against attack from predators such as insects, fungi and herbivorous mammals (Krishnaveni, Amala, Priya, Rasik, & Mekala, 2019). High levels of production and efficient feed conversion are the need of the modern poultry industry, which to a certain extent could be achieved by the use of specific feed additives. Antibiotic feed additives as growth promoters have long been supplemented with poultry feed to stabilize intestinal microbial flora, improve general performances and prevent some specific intestinal pathology. Organic treatments composed of individual acids and blends of several acids have been found to perform antimicrobial activities similar to those of antibiotics (Hassan et al., 2010; Wang et al., 2009 cited in Khan, 2016).

Organic farming systems have attracted increasing attention over the last decade because they are perceived to offer some solutions to the problems currently besetting the agricultural sector. Organic farming has the potential to provide benefits in terms of environmental protection, conservation of nonrenewable resources and improved food quality.

### Objectives

This study was conducted to determine the effect of different herbal extracts as water supplements on the economic performance of broilers. Specifically, this study aims to determine the following: (1) the economic characteristics of broilers supplemented with different herbal extracts in terms of capitalization, cost of production, net income, profit, Internal Rate of Return (IRR), and break-even analysis, and (2) the significant differences between the economic characteristics of broilers supplemented with different herbal extract in terms of capitalization, cost of production, net income, profit, IRR, and break-even analysis.

**Significance of the Study**

This research will help and give a guide to the farmers and poultry raisers who want to engage in broiler production. This will give them some knowledge on the usefulness of the herbs as a supplement in making the broiler economically productive and healthy. This research was free for antibiotics which are safe for human consumption.

**Delimitation of the study**

The study was used to determine the economic efficiency of broilers as influenced by the four different medicinal plants as water supplements. Arbor acre day-old chickens were used in the study. There were five (5) treatments and three (3) replications. The treatments of the study were the following: (a) Control (without herbal extract); (b) Lemon Grass (Cymbopogon citrullus; (c) Gotu kola; (d) Pot Marjoram (Origanum vulgare) and (e) Horseradish tree (Moringa oleifera). Each treatment Bages have ten (3) heads of birds that were replicated three (3) times. The study have a total of 45 heads of birds. The parameters that were used in data gathering were capitalization, cost of production, net income, profit, IRR, and break-even analysis.

## MATERIALS AND METHODS

**Materials**

The materials needed in the conduct of the study in gathering the data are bowl jars, feeding through were used in feeding and watering the broilers. Bulb, switch, electrical wire, outlet and socket were used in lighting the chickens. Weighing scale, zip lock, containers, and butchering knife were used for slaughtering the broilers.

**Methods**

Experimental Design and layout. A Completely Randomized Design (CRD) was used in this study. The study will have four (4) treatments and one (1) control that was replicated three (3) times. The experiment was within 40 days. The treatments that were used in the study were the following:

Control- no herbal extract supplement
Control-Lemon Grass (Cymbopogon citrullus) (10% of the amount of water)
Treatment A-Gotu kola (Centenella asiatica)(10% of the amount of water)
Treatment B- Oregano (Origanum vulgare) (10% of the amount of water)
Treatment C- Horseradish tree (Moringa oleifera) (10% of the amount of water

| | | |
|---|---|---|
| A | Control | C |
| C | D | B |
| B | C | Control |
| D | B | A |
| Control | A | D |

**Randomization Treatments.** All treatments were represented by letters and were distributed randomly through draw lots.

**Construction of the Poultry House and Cages.** The poultry house was made up of light materials such as Nipa, Bamboo, and nails. The building measuring 18ft. by 10ft.

Booking and Selection of the Stocks. The experimental stocks were books from Commercial Hatchery. The Chicks were paid cash during the delivery at Php 35/ head. The chicks were selected to ensure healthy stocks. Select only healthy birds. This is important for two reasons:

- It increases the chances of winning the price since healthy birds will have good physical condition and a bright appearance.
- It reduces the chances of spreading diseases to other birds present in the show.

Floor Space, Feeder Space and Waterer Space.

The floor is covered with a 5 to 10 cm deep layer of rice hull. During the brooding period, the day-old chicks were confined in a brooder cage measuring 3 meters by 1.5 meters. During the rearing period, the birds were fully confined in a cage. Each bird requires a floor space of 1squared ft. The feeder and waterer space also varies depending on the environmental temperature and health condition of the birds.

**Disinfection of the Area.** The area was prepared and disinfected a week before the arrival of the stocks.

**Transporting the Birds.** Transporting the birds in a clean cage with straw or wood shavings as bedding material. Do not provide water since it will spill and spoil the bedding material. If the birds are to be transported to a long distance, water should be provided at intervals during transport.

**Arrival of Stocks.** One (1) hour before the arrival of the stocks, the electric bulb inside the brooder was switched on to make the floor and wall heated and to have the desired brooding temperature. Bowl jars were filled with clean and potable drinking water. Upon the arrival, the chicks were placed inside the brooder and will keep them undisturbed for more than four (4) hours.

The broiler chicks were provided with 5% sugar solution for drinking within three (3) hours of arrival. The purpose of adding sugar to their water is that it helps replenish the depleted energy in the chicks due to a long period of transportation. It may also stimulate the chicks to consume the feed. Sweet water can also loosen up the impacted intestine and prepares the gut linings of chicks for the incoming feeds. Thereafter, they were given fresh feeds and water.

**Brooding Management**

**Feeding.** According to Flavio Henrique, specialist (Cobb-Vantress South America), the brooding period–the first 14 days of the broiler's life– is the most sensitive period because the bird changes from an immature thermoregulation system to a mature one.

One common mistake is to think only of maintaining the proper temperature. We need to take care of other issues, too. A way to define these other issues is the 80-20 rule (Pareto's Law), which means that 80% of the consequences come from 20% of the causes. We should always think in our brooding about temperature, air quality, water, and feed. Proper management of these areas was the key factor to uniformity, which results in a good performance. We will assume that we receive good quality chicks from the hatchery, which means that the day-old chicks are active with bright eyes wide open, with strong and shiny shins, navels healed, without physical defects, no pathogens and with good maternal immunity.

The first week corresponds to 23% of the life of the 1.75g broiler, according to the latest Cobb Weight Supplement (April 2012). This first week represented 11% of the entire life in 1978 to achieve the same weight. So the proper commitment to a good start is very important for the broiler, and each good point achieved was rewarded in a good performance. In many countries, some producers think that the birds are already adults by the second week and stop giving them external help to maintain good conditions. This could lead to one of the worst situations in the brooding period.

Linear feeding troughs were installed before the stocks were introduced in their respective treatment Bages. A feeding space requirement of 65 cm/bird was followed in making the linear feeders (PNS, 2003). Organic commercial feeds were provided to the birds on an ad libitum basis for the first week of brooding and were change to restricted feeding after a week until maturity.

For the first week of brooding, in addition to the feeding troughs, a small amount of feeds were provided to assist the chicks to easily access the feeds. This helps the chicks find the feed more successfully in the first few days. The feeds and watering devices were placed close to each other during the first week to ensure that the chicks eat and drink the feeds and water provided to them.

After initial brooding, feeds were placed away from the waterers to prevent wet feed and dirty water. Feeder heights were adjusted regularly. After one week of brooding, the feeds were given on a restricted basis (Beutler, 2007).

**Water Management.** According to Chance Bryant, Technical Service Manager (Cobb- Vantress. Inc), water management is one of the most crucial components in a top-performing broiler flock. Broilers have advanced to grow faster, become larger with more breast meat, eat more feed at younger ages and be far more efficient than their predecessors, increasing their demand for water.

All this has put more emphasis on the need for ample water supply and storage so birds can perform successfully. Here, we focus on water flow rates and water temperature - factors that sometimes get overlooked.

In high performing flocks, at around 21˚C, modern broilers on average will consume 1.8 to 2 times more water than feed, in weight. Consumption is dependent on house temperature. In hot climates, flocks can consume up to 5 times in weight the amount of feed they intake.

Water consumption will vary depending on environmental temperature, feed quality and bird health:

- ☐ Water consumption increases by 6% for every increase in 1˚C between 20-32°C.
- ☐ Water consumption increases by 5% for every increase in 1˚C between 32-38°C.
- ☐ Feed consumption decreases by 1.23% for every increase in 1˚C above 20°C

Any substantial change in water usage should be investigated as this may indicate a water leak, health challenge or feed issue. A drop in water consumption is often the first indicator of a flock problem. To evaluate the flock performance properly we need to know how much water birds are consuming every day. More advanced water meters record not only 'daily' consumption attainable but also enable an understanding of consumption at critical times of the day and critical times during the flock--both very relevant in assuring maintaining proper water intake. These critical times can include feed changes, turning birds out from the brood area to three quarters or full house, transitioning from power ventilation to tunnel, field vaccinations, etc. If you monitor consumption during these periods, you can better understand if flocks are being properly managed.

**Light Management.** According to Naheeda Portocarero (2011), light is an important management tool in broiler production. If used successfully, it can influence aspects of growth, productivity and behaviour, and is therefore the subject of intense research. From presentations at the 2010 PSA meeting in the USA, it became clear that proper lighting regimes will lead to good flock performance.

While we know that light intensity has an impact on behavior and physiology, there is debate surrounding the optimum level that should be used. A comparison of different light intensities; 1, 10, 20 and 40 lux carried out at the University of Saskatchewan showed that birds exposed to 1 lux rested more and showed reduced foraging, preening, dust-bathing, stretching and wing-flapping behaviors in comparison to birds exposed to brighter light intensities. These birds also had bigger and heavier eyes. While there was no effect of light intensity on skeletal health, deep ulcerative foot pad lesions decreased linearly as the light intensity was increased. And although diurnal rhythms of serum melatonin were unaffected, these results suggest that very low light intensities can compromise the welfare of birds.

**Temperature.** Litter temperature is the most important because day-old chicks are extremely dependent on floor contact to help regulate the changing temperatures. The ratio of body surface to body mass is large in the day-old chick and it decreases with age, so the young chick will therefore lose heat faster than an adult bird. The young chick's body is covered in down which has a poor insulating value, so if the temperature is not controlled, it will lose heat rapidly through radiation and conduction. We suggest having the litter preheated and stabilized 24 hours before placement, which means preheating for 48 hours in many broods, depending on the season, region and outside temperature. A comfortable chick will breathe through its nostrils and lose 1-2g of moisture in the first 24 hours. The yolk contains this amount of moisture will lose weight but not become dehydrated. If the birds are exposed to cold temperatures, they will try to save or make heat by huddling or burning feed to keep warm, which affects feed conversion ratio and is the most expensive way.

If the ambient temperature is 26ºC (78.8ºF), the same moisture loss (1-2g) in the yolk will last the chick three days. This is why, in practical terms, when we see large yolks, we can say that the bird was cooled in the first few days. In the opposite case, with temperature too high, the birds will try to remove heat or avoid producing heat, pant to lose heat (losing FCR) and stop eating. If chicks start panting, they can lose 5-10g of moisture in the first 24 hours and dehydration will occur. The correct temperature will also influence the bird's health and immunity because immune system development and stress are costing energy and when the birds are not comfortable during this development they were more sensitive to infections and less immune competent. The chick's internal temperature (cloaca measurement) should be maintained between 40.4-40.6ºC (104.7-105.1ºF); below 40ºC (104.0ºF) is cold and above 41ºC (105.8ºF) will lead to panting.

According to Muchacka and Herbut (2007), reduced and elevated air temperature during the first period of rearing reduced the rate of growth, with clear differences observed in the group of birds reared at a lower temperature. Baarendse, et al. (2006) reported that rearing chicks during the first five days of life at 28°C (82.5ºF) has a long term negative effect on further growth and development. Ideal would be 32ºC (89.6ºF) with 30-50%

relative humidity (RH) in the litter at placement.

For the first two weeks, the chicken house should feel too warm for the caretaker–if not, the temperature is likely to be too low for the chicks. We suggest the air temperature in the brooding area at placement, with 30-50% RH, begin at 33ºC (91.4ºF); at seven days, with 40-60% RH, 30ºC (86ºF); and at 14 days, same RH, 27ºC (80.6ºF). If the humidity is less than above, increase the temperature by 0.5-1.0ºC (1ºF). If the relative humidity is greater than above, reduce the house temperature by 0.5-1.0ºC (1ºF). Always use bird behavior and effective temperature as the ultimate guide to determine the correct temperature for the birds. Chicks from smaller eggs (younger breeder flocks) require higher brooding temperatures because they produce less heat (about 1ºC) for the first seven days. According to the seasonal climate, it is very important to have tools to heat and cool the air, and options to provide correct air flow and distribution. Do not forget that the broilers in a brooding phase do not need air velocity more than 0.3m/s at floor level.

**Pre-Conditioning.** Pre-Conditioning was done 14 days after the arrival of the birds. It will help the birds to adapt to changes in the environment, temperature, and climate.

**Distribution of Stocks in Different Cages.** The distribution of the stocks was done after the pre-conditioning period. There were five (5) birds per cage.

**Disease Prevention.** Farmers have a documented pest control program to reduce the risk of diseases being carried on to the farm by rodents. Strict records are kept by the farmer of the chickens' health, growth and behavior, so that any emerging disease problem is rapidly identified and acted upon.

Disease prevention is an essential strategy for poultry producers. It is much more beneficial to the birds and the commercial poultry producer to prevent the disease from occurring rather than relying on treatment. The agents which sound biosecurity practices attempt to prevent include bacteria, viruses, protozoa, fungi, parasites, and any other agents capable of introducing an infectious disease into a poultry flock.

To prevent and reduce the risks of diseases of the broiler, herbal extract was produced. The following are the preparation of herbal extract:

1. Prepare a clean jar for storage and a blender to get the extract.
2. Collect the desired amount of fresh leaves.
3. Wash and chop the leaves finely and place them inside the blender.
4. Pour 20% of water into the blender.
5. Blend the leaves.
6. After blending, the extract was strained through a piece of cloth and poured into a clean jar.
7. The desired volume of the extract can be used for desired purposes.

**Routing Care of the Birds.** Waterers were regularly cleaned to ensure that the birds are provided with clean drinking water. Water was given and libitum. Fecal droppings and rice hull were removed from feeding and drinking troughs before feeds were served.

**Statistical Analysis.** Data collected were analyzed using One Way Analysis of Variance (ANOVA) at 1% and 5% level of significance. Significant mean were compared using Duncan's Multiple Range Test (DMRT).

## RESULTS AND DISCUSSIONS

### The Growth Performance of Broiler

Table 1 below shows the Growth Performance of Broiler supplemented with different Herbal Extract. As to the initial weight, control (control-no herbal supplementation) gained 238.3g, while treatment A (lemongrass extract) gained 246.0g, treatment B (gotu kola extract) gained 255.0g, treatment C (oregano extract) gained 270.0g, and treatment D (horseradish extract) gained 290.0g.

In terms of final weight, treatment D gained 1411.1g, treatment C gained 1314.5g, treatment B gained 1231.7g, treatment A gained 1177.6g, and control gained 1160.4g. The analysis showed a significant difference between the final weight of broiler at different treatments, wherein treatment D showed the most significant effect followed by treatment C and treatment B while treatment A and control shows the same treatment effect. The result implies that the supplementation of malunggay extract into the water will commensurate a better growth performance of broiler.

When it comes to weight gained, treatment D gained 1121.1g, treatment C gained 1044.5g, treatment B gained 976.7g, treatment A gained 931.6g, and control gained 922.1g. The analysis showed a significant difference between the weight gain of broiler at different treatments, wherein treatment D showed the most significant effect followed by treatment C and treatment B while treatment A and A shows the same treatment effect. The result implies that the supplementation of malunggay extract into the water will commensurate a better growth performance of broiler in terms of weight gained.

As observed in the total feed intake of the broiler, the analysis showed no significant differences between the feed consumption of the experimental animals wherein control consumed 2519.2g, treatment A2686.9g, treatment B2714.6g, treatment C2576.6g, and treatment D2472.4g.

The analysis showed a significant difference between the feed conversion efficiency of broilers at different treatments wherein, treatment D with FCE value of 2.21 shows the most efficient followed by treatment C with 2.47, treatment B with 2.78, treatment A2.88 and control with 2.73. The result implies that treatment D shows the best feeding efficiency compare to other treatments while control, treatment A and B show the least feeding efficiency and shows lower efficiency compare to treatment C.

The result of this study was supported by some of the related findings such that, Moringa oleifera tree contains high crude protein (CP) in the leaves (251 g/kg DM) and negligible content of tannins and other anti-nutritive compounds and offers an alternative source of protein to ruminants (Nouala et al., 2006) and non-ruminants. The seeds contain a high amount of CP, followed by flowers and leaves, suggesting that M. oleifera can be used as a protein source for both livestock and humans. The fact that the seeds contain higher CP content than other parts suggests that they can be used as a valuable source of protein. Ojukwu (2012) stated that Moringa leaves are periodically harvested to make a sauce, locally known as "mboum" or can be used to feed poultry, pigs and cattle.

Malunggay (Moringa oleifera) is one of the herbs containing bioceutical agents that could substitute synthetic growth enhancers and supplements in broiler and other livestock production. Some of the published studies pertaining to its potential involved the study of Lannaon (2007). He reported that the performance of Starbro broilers given with Malunggay (M. oleifera) leaf decoction, revealed the improvement of feed consumption, daily weight gain, final weight and profit compared to the control group.

Furthermore, Du et al. (2007) evaluated the effects of dietary supplementation of Moringa oleifera on growth performance, blood characteristics and immune response of Arbor acres strain broilers. It was found out that increasing supplementation of Moringa oleifera decreases contents of uric acids, triglycerides and albumin/globulin ratio in the serum of broilers. Hence, the immune response of broilers increases significantly.

Table 1. The Growth Performance of Broiler supplemented with different Herbal Extract

| Treatment | Intial Weight (grams) | Final Weight (grams) | Weight Gained (grams) | Total Feeds consume (grams) | FCE |
|---|---|---|---|---|---|
| Control | 238.3 | 1160.4D | 922.1D | 2519.2 | 2.73C |
| A (Lemon grass) | 246.0 | 1177.6D | 931.6D | 2686.9 | 2.88C |
| B (Gotu kola) | 255.0 | 1231.7C | 976.7C | 2714.6 | 2.78C |
| C (Oregano) | 270.0 | 1314.5B | 1044.5B | 2576.6 | 2.47B |
| D (Horseradish tree) | 290.0 | 1411.1A | 1121.1A | 2472.4 | 2.21A |
| F-Test | | ** | ** | ns | ** |
| CV% | | 2.96 | 3.87 | 5.54 | 6.78 |

**The Economic Characteristics of Broiler**

Table 2 below shows the economic characteristics of Broiler supplemented with different Herbal Extract. As to the total cost, control (no herbal supplementation) gained Php 114.96, while treatment A (lemongrass extract) gained Php 118.62, treatment B (gotu kola extract) gained Php 119.23, treatment C (oregano extract) gained Php116.22, and treatment D (horseradish extract) gained 113.94. The analysis shows no significant difference among total costs in growing Broiler.

In terms of gross income, treatment D gained Php 155.22, which was significantly the highest among all treatments followed by, treatment C gained Php144.59, treatment B gained Php 135.48, treatment A gained Php 129.54, and control gained 127.64. The analysis showed a significant result between the gross income of broiler at different treatments, wherein supplementing Horseradish tree extract showed the highest.

As to net income and Return of Investments (ROI) relative to the gross income gained in supplementing different herbal water supplements, treatment D gained Php 41.27 (ROI=36.2%), which was significantly the highest among all treatments followed by, treatment C gained Php 28.37 (ROI=24.4%), treatment B gained Php 16.25 (ROI=13.6%), treatment A gained Php 10.91 (ROI=9.2%), and control gained Php 12.67 (ROI=36.2%). Therefore the supplementation of horseradish extracts commensurate the highest income among other herbal extracts and those with no supplementation.

Table 2. The economic characteristics of Broiler supplemented with different Herbal Extract

| Treatment | Total Cost (Php) | Gross Income (Php) | Net Income (php) | ROI |
|---|---|---|---|---|
| Control | 114.96 | 127.64C | 12.67D | 11.0%C |
| A (Lemon grass) | 118.62 | 129.54C | 10.91D | 9.2%C |
| B (Gotu kola) | 119.23 | 135.48C | 16.25C | 13.6%C |
| C (Oregano) | 116.22 | 144.59B | 28.37B | 24.4%B |
| D (Horseradish tree) | 113.94 | 155.22A | 41.27A | 36.2%A |
| f-test | ns | * | ** | ** |
| cv% | 8.1% | 5.6% | 6.3% | 4.8% |

## CONCLUSION

Supplementing Horseradish extract at 10% level of solution significantly enhanced the broiler's growth performance and feeding efficiency. The water supplementation of Horseradish extract was economically efficient, which commensurate the highest income among other herbal extract and those with no supplementation. Based on the study conducted, it was recommended that water supplementation of Horseradish extract (10%) to enhance the growth performance and feeding efficiency of broiler. In addition, the supplementation of this extract could provide higher income when engaging in broiler production.

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# COMPETENCY SKILLS TRAINING ON FOOD PREPARATION, BEVERAGES SERVICES AND PROCESSING AMONG THE OUT-OF SCHOOL YOUTH'S UNEMPLOYED WOMEN: INPUT TO ACQUISITION OF NCII

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**ABSTRACT** This study was conducted to determine the competency skills of trainees on Food and Beverage Services (FBS) in order for them to acquire National Certification from Technical Education and Skills Development Authority (TESDA). This study employed a descriptive method. The respondents of this study were the 12 participants during the conduct of extension service of the School of Hotel and Restaurant Management usually they are the Out-of-School Youth (OSY) and unemployed women of Barangay, all of them passed the assessment and are now holding a National Certificate Level II in Food and Beverage Services. To determine competency skills on Food and Beverage Services, a researcher-made questionnaire was used. Data gathered were categorized, tabulated and compared using the statistical package for social sciences. Results revealed that all of the respondents attained necessary skills and passed the NC II Food and Beverage Services assessed by assessors of Technical Education and Skills Development Authority.

**Keywords:** Competency Skills, Food and Beverage Services, National Competencies

## INTRODUCTION

### Background of the Study

On August 25, 1994, Technical Education and Skills Development Authority (TESDA) was established through the enactment of Republic Act No. 7796, also known as the "Technical Education and Skill Development Act of 1994", which was signed into law by President Fidel V. Ramos. Section 22, "Establishment and Administration of the National Trade Skills Standards" of RA 7796 known as the TESDA Act of 1994 mandates TESDA to establish national occupational skill standards (TESDA, 2018). The Authority shall develop and implement a certification and accreditation program in which private industry groups and trade associations are accredited to conduct approved trade tests, and the local government units to promote such trade testing activities in their respective areas in accordance with the guidelines to be set by the Authority.

The Training Regulations (TR) serve as basis for the:

1. Competency assessment and certification;
2. Registration and delivery of training programs; and
3. Development of curriculum and assessment instruments.

Each training regulation has four sections:

Section 1 Definition of Qualification- refers to the group of competencies that describes the different functions of the qualification.
Section 2 Competency Standards- gives the specifications of competencies required for effective work performance.
Section 3 Training Standards- contains information and requirements in designing training program for the Qualification. It includes curriculum design, training delivery; trainee entry requirements; tools, equipment and materials; training facilities, trainer's qualification and institutional assessment.
Section 4 National Assessment and Certification Arrangements- describes the policies governing assessment and certification procedures.

(Adapted from TESDA or Technical Education and Skills Development, 2011)

TESDA implements assessment and certification for all qualifications with promulgated Training

Regulations. The Training Regulation defines the knowledge, skills and attitudes/values required for competent performance in the workplace.

The competency requirements, as defined in the relevant Training Regulations shall be the take-off point of all corresponding qualifications, assessment and certification in all industry sectors. National Certificate is issued when a candidate has demonstrated competence in all units of competency that comprised a Qualification. Certificate of Competency is issued to individuals who have satisfactorily demonstrated competence on a particular or cluster of units of competency (TESDA, 2018).

Food and Beverage Services National Certificate Level II (FBS NC II) qualification consists of competencies that a person must achieve to provide food and beverage service to guests in various food and beverage service facilities. To attain the National Qualification of FBS NC II, the candidate may apply for assessment in any accredited Assessment Centers and demonstrate competence in all units/clusters of core units of the Qualification (TESDA Online Program, 2018).

A person who has achieved was awarded National Certificate (NC) is competent to be employed as Bus Boy, Room Attendant, Waiter and Food and Beverage Service Attendant (TESDA, 2018). Hence, the researchers came up with the study on the necessary competencies for adequate training to the future takers of the National Competency II on FBS or Food and Beverage Services.

**Statement of the Problem**

Generally, this study determined the competency skills of trainees on Food and Beverages, Food Preparation and Food Processing. Specifically, this study sought to answer the following questions: 1) What is the profile of the respondents in terms of age, sex, educational attainment, and source of livelihood, 2) What are the competency skills of the trainees on Food and Beverages, Food Preparation and Food Processing as a whole and competencies as to their socio-economic profile, and 3) What is the trainees' outcome in terms of the number of successful trainees recommended for NCII?

## METHODOLOGY

This study employed a descriptive method. This method is appropriate for determining the competency skill on Food and Beverages, Food Preparation and Food Processing among the OSY's Unemployed women; Input to the acquisition of NCII. Descriptive research design is a type of research design that can obtain facts about existing conditions; can detect significant relationships between current phenomena which are helpful in decision making and educational planning, and internal evaluation or assessment. The respondents of this study were the 12 participants during the conduct of Extension service of the School of Hotel and Restaurant Management usually they are the Out of School Youth and Unemployed women of the barangay. To determine competency skills on Food and Beverages, Food Preparation and Food Processing among the OSY's Unemployed women; Input to acquisition of NCII, a researcher-made questionnaire was used. The research questionnaire was composed of two parts: Part I for the Profile of the Respondents; Part II evaluation on the skills on Food and Beverages, Food Preparation and Food Processing to validate their competency if they are recommended to take the NCII. Data gathered on this study were categorized, tabulated and compared using descriptive statistical tools such as frequency, mean and percentages were used to present the profile of the respondents. Data were processed using Statistical Package for Social Sciences (SPSS). The statistical tools that were used are frequency count and percentage.

## RESULTS AND DISCUSSIONS

**Profile of the Respondents**

Table 1 shows the profile of the respondents in terms of age. Result revealed that 6 or 50 % of the respondents were aging from 31 to 40 years old, 5 or 41.67% were aging from 20 to 30 years old and 1 or 8.33% was aging above 40 years old. This means that half of the number of respondents was 31 to 40 years old. In terms of sex, result revealed that 12 or 100% of the respondents were females. This means that all respondents who took NC II were all girls. In terms of their educational attainment, result revealed that 7 or 58.3 % were high school graduates, 4 or 33.3 % were college level and 1 or 8.3% was college graduate. This means that at least half of the respondents who took NC II were high school graduates. In terms of source of livelihood, result revealed that 11 or 91.7% had no source of livelihood and 1 or 8.3 % was into teaching. This means that majority of the respondents had no source of livelihood for their living.

| Particulars | frequency | percent |
|---|---|---|
| Age | 5 | 41.67 |
| 20-30 years old | 6 | 50.00 |
| 31– 40 years old | 1 | 8.33 |
| Above 40 years old | 12 | 100.0 |
| Total | | |
| Sex | 12 | 100.0 |
| Female | | |
| Educational Attainment | 7 | 58.3 |
| High School Graduate | 4 | 33.3 |
| College Level | 1 | 8.3 |
| College Graduate | 12 | 100.0 |
| Total | | |
| Source of Livelihood | 11 | 91.7 |
| None | 1 | 8.3 |
| Teaching | 12 | 100.0 |
| Total | | |

Table 2 shows the competency skills for TESDA Food and Beverage Services. Results revealed that 12 or 100% of the respondents attained the necessary skills for NC II Food and Beverage Services assessed by the Technical Education and Skills Development Authority assessors.

This implies that all respondents developed the skills that they learned on preparing the dining room or restaurant area that their trainer taught. Moreover, they properly applied the tasks during their training. Specifically, they know how to answer the phone, completed and confirmed the details of the reservations, maintained the cleanliness and orderliness of the dining room and ensured comfort and convenience of the guests. Competencies are identified behaviours, abilities, knowledge, and skills and can be objectively measured, enhanced, and improved through coaching and learning opportunities. Thus, indicates sufficiency of knowledge and skills that enable someone to act in a wide variety of situations (Ylagan, et. al, 2013).

Table 2. Competency Skills of the Respondents for NC II (Food and Beverage Services) in terms of Prepare Dining Room/Restaurant Area for Service

| Prepare Dining Room/Restaurant Area Service | frequency | percentage |
|---|---|---|
| 1. Answer the phone and inquiries promptly, clearly and accurately. | 12 | 100 |
| 2. Ask pertinent questions to complete the details of the reservations data accurately on forms based on establishment's standards. | 12 | 100 |
| 3. Repeat and confirm the details of the reservations with the party making reservation. | 12 | 100 |
| 4. Provide additional information about the foodservice establishment when necessary. | 12 | 100 |
| 5. Stock the service or waiter's stations with supplies necessary for service. | 12 | 100 |
| 6. Clean and wipe all the tableware and dining room equipment and put in their proper places. | 12 | 100 |
| 7. Put-up special tent cards and similar special displays for promotion. | 12 | 100 |
| 8. Check the cleanliness and condition of all tables, tableware and dining room equipment. | 12 | 100 |
| 9. Fill the water pitchers and ice buckets. | 12 | 100 |
| 10. Turn on and keep ready the electrical appliances or equipment like coffee pots, teapots, plate warmers, etc. in the dining area. | 12 | 100 |
| 11. Refill the condiments and sauce and wipe the necks and tops of the bottles. | 12 | 100 |
| 12. Set the table according to the standards of the foodservice establishment. | 12 | 100 |

| | | |
|---|---|---|
| 13. Set the covers correctly according to the pre-determined menu in case of pre-arranged or fixed menus. | 12 | 100 |
| 14. Wipe and polish tableware and glassware before they are set on the table. | 12 | 100 |
| 15. Folds the cloth napkins properly and lays them appropriately on the table according to napkin folding style. | 12 | 100 |
| 16. Skirt properly the buffet or display tables taking into account symmetry, balance and harmony in size and design. | 12 | 100 |
| 17. Adjust the lights according to time of the day. | 12 | 100 |
| 18. Arrange the tables, chairs, and other dining room furniture to ensure comfort and convenience of the guests. | 12 | 100 |
| 19. Play appropriate music when applicable. | 12 | 100 |
| 20. Clean the floors/carpets and makes sure that all are dry. | 12 | 100 |
| 21. Adjust the air conditioner or cooling units for the comfort of the guests. | 12 | 100 |
| 22. Set-up the decorations according to theme or concept of the dining room. | 12 | 100 |

Table 3 presents the competency skills of the respondents for NCII (food and beverage services) in terms of welcome and take food and beverage orders. Results revealed that the respondent attained the necessary skills in this area.

This implies that all of the respondents acquired positive attitude in welcoming the guests and provide effective food services. Specifically, the respondents acknowledged and greeted the guest as soon as they arrive, checked details of reservation and escort them to their seat, presented the menu and take orders, provided appropriate table ware and cutlery for the menu choices, placed order and carried out plates and/or tray safely, and relayed accurate information about special request, dietary or cultural requirements.

| Welcome and Take Food and Beverage Orders | frequency | percentage |
|---|---|---|
| 1. Acknowledge guests as soon as they arrive. | 12 | 100 |
| 2. Greet the guest with an appropriate welcome. | 12 | 100 |
| 3. Check details of the reservations based on established standard policy. | 12 | 100 |
| 4. Escort seat guest according to table allocations. | 12 | 100 |
| 5. Utilize table according to the number of party. | 12 | 100 |
| 6. Seat guests evenly among stations to control the traffic flow of the guests in the dining room. | 12 | 100 |
| 7. Open the table napkins for the guests when applicable. | 12 | 100 |
| 8. Serve water when applicable according to the standards of the food service facility. | 12 | 100 |
| 9. Present to the guests the menu according to established standard practice. | 12 | 100 |
| 10. Take the orders completely in accordance with the establishment‘s standard procedures. | 12 | 100 |
| 11. Note special requests and requirements accurately. | 12 | 100 |
| 12. Repeat the back orders to the guests to confirm it. | 12 | 100 |
| 13. Provide appropriate tableware and cutlery for the menu choices and adjust in accordance with the establishment’s procedures. | 12 | 100 |
| 14. Place order and send to the kitchen or bar promptly. | 12 | 100 |
| 15. Check the quality of foods in accordance with establishment standards. | 12 | 100 |
| 16. Check table ware for chips, marks, cleanliness, spills and drips. | 12 | 100 |
| 17. Carry out plates and/or trays safely. | 12 | 100 |
| 18. Advise the colleagues promptly regarding readiness of items for service. | 12 | 100 |
| 19. Relay accurately the information about special requests, dietary or cultural requirements to kitchen where appropriate. | 12 | 100 |
| 20. Observe the work technology according to establishment standard policy and procedures. | 12 | 100 |

Table 4 shows the competency skills of the respondents for NC II on Food and Beverage Services in terms of promoting food and beverage products. Results revealed that all of the respondents possess the skills in this area.

This indicates that respondents were competent in promoting food and beverage products. Moreover, they master the names and pronunciations of the dishes in the menu and its ingredients, master common food allergens, provided information about food items, suggested name of specific menu items to guests, gave the general choices to provide more options to guests, and recommend new items to regular guests to try other items in the menu. Food and Beverage Services program is designed to enhance the attitude, knowledge, and skills of the participants (Buted, Felicen and Manzano, 2014).

Table 2. Competency Skills of the Respondents for NC II (Food and Beverage Services) in terms of Prepare Dining Room/Restaurant Area for Service

| Promote Food and Beverage Product | frequency | percentage |
|---|---|---|
| 1. Master the names and pronunciations of dishes in the menu. | 12 | 100 |
| 2. Memorize the ingredients of dishes. | 12 | 100 |
| 3. Know sauces and accompaniments by heart. | 12 | 100 |
| 4. Study the descriptions of every items in the menu. | 12 | 100 |
| 5. Master common food allergens to prevent serious health consequences. | 12 | 100 |
| 6. Provide information about the food items in clear explanations and descriptions. | 12 | 100 |
| 7. Offer items on specials or promos to assist guests with food and beverage selections. | 12 | 100 |
| 8. Suggest a name of specific menu items to guests rather than just mentioning the general categories in the menu to help them make a choice and know what they want. | 12 | 100 |
| 9. Recommend standard food and beverage pairings. | 12 | 100 |
| 10. Give the general choices to provide more options to guests. | 12 | 100 |
| 11. Use a descriptive words while explaining the dishes to make it more tempting and appetizing. | 12 | 100 |
| 12. Carry out a suggestive selling discreetly so as not to be too pushy or too aggressive. | 12 | 100 |
| 13. Suggest a slow-moving but highly profitable items to increase guest check. | 12 | 100 |
| 14. Offer second serving of items order. | 12 | 100 |
| 15. Mention the food portion or size for possible adjustments with the orders. | 12 | 100 |
| 16. Recommend new items to the regular guests to encourage them to try other items on the menu. | 12 | 100 |

Table 5 shows the competency skills of the respondents for NC II on food and beverage services in terms of providing food and beverage service to the guests. Results revealed that all respondents attained the necessary skills on this area.

This implies that the respondents developed appropriate and effective skills in providing foods and beverage service to the guests. Specifically, they picked up food orders promptly, served it to the right guest, mentioned the name of the dishes upon serving in front of the guests, and clear the food orders with minimal disturbance to the other guests. Moreover, they monitor the sequence of service and meal delivery, anticipated additional requests or needs of the guests, and food based on food safety procedures.

| Provide Food and Beverage Service to Guests | frequency | percentage |
|---|---|---|
| 1. Pick up the food orders promptly from service areas. | 12 | 100 |
| 2. Check food orders for representation and appropriate garnish and accompaniments. | 12 | 100 |
| 3. Serve the food orders to the right guests who ordered them. | 12 | 100 |
| 4. Serve and clear the food orders with minimal disturbance to the other guests and in accordance to hygienic requirements. | 12 | 100 |
| 5. Mention the name of the dish or order upon serving in front of the guest. | 12 | 100 |
| 6. Monitor the sequence of service and meal delivery in accordance with enterprise procedures. | 12 | 100 |
| 7. Anticipate additional requests or needs of the guests. | 12 | 100 |
| 8. Offers an additional food and beverage and served at the appropriate time. | 12 | 100 |
| 9. Provides necessary condiments and appropriate table ware based on the food order. | 12 | 100 |
| 10. Recognize delays or deficiencies in service and follow up promptly based on enterprise policy. | 12 | 100 |
| 11. Conduct the 3-minute Check to guest satisfaction. | 12 | 100 |
| 12. Treat children and guests with special needs with extra attention and care. | 12 | 100 |
| 13. Prepare the (banquet) service ware and checks for completeness ahead of time. | 12 | 100 |
| 14. Set up the tables and chairs in accordance with the event requirements. | 12 | 100 |
| 15. Serve food according to general service principles. | 12 | 100 |
| 16. Handle food based on food safety procedures. | 12 | 100 |
| 17. Ensure coordinated service of meal courses. | 12 | 100 |
| 18. Keep assigned areas clean in accordance with the industry procedure. | 12 | 100 |
| 19. Clear the tables and prepare soiled dishes to be brought for dishwashing after the event or function. | 12 | 100 |
| 20. Note and monitor the number of guests being served. | 12 | 100 |
| 21. Pick up the beverage orders promptly from the bar. | 12 | 100 |
| 22. Check the beverage orders for presentation and appropriate garnishes. | 12 | 100 |
| 23. Serve the beverages at appropriate time during meal service. | 12 | 100 |
| 24. Serve beverages efficiently according to established standards of service. | 12 | 100 |
| 25. Serve beverages at the right temperature. | 12 | 100 |
| 26. Open a wine for full bottle wine orders efficiently with minimal disturbance to the other guests. | 12 | 100 |
| 27. Carry out wine service in accordance with the establishment procedures. | 12 | 100 |
| 28. Carry out coffee and/or tea in accordance with the establishment procedures. | 12 | 100 |
| 29. Prepare and process the bills accurately in coordination with the cashier. | 12 | 100 |
| 30. Verify amount due to customer. | 12 | 100 |
| 31. Accept cash and non-cash payments and issue receipt. | 12 | 100 |
| 32. Give change as required. | 12 | 100 |
| 33. Complete the required documentation in accordance with enterprise policy. | 12 | 100 |
| 34. Remove the soiled dishes when guests are finished with the meal. | 12 | 100 |
| 35. Handle the food scraps in accordance with hygiene regulations and enterprise procedures. | 12 | 100 |
| 36. Clean and store the equipment in accordance with hygiene regulations and enterprise procedures. | 12 | 100 |
| 37. Clear, reset, and make ready the tables for the next sitting when guests are finished with the meal. | 12 | 100 |
| 38. Thank guest and give a warm farewell. | 12 | 100 |

Table 6 shows the competency skills of respondents for NC II on food and beverage services in terms of providing room service. Results revealed that all respondents attained the skills on this area. This implies that the respondents acquired all the necessary skills in providing room service. Specifically, they answered the phone promptly and courteously, checked and used guests' names throughout the interaction, clarified and checked details of orders for accuracy, interpreted accuracy of room service orders, prepared room service equipment and supplies, and greeted guests politely.

Table 6. Competency Skills of the Respondents for NC II (Food and Beverage Services) in terms of Provide Room Service

| Provide Room Service | frequency | percentage |
|---|---|---|
| 1. Answer the telephone calls promptly and courteously in accordance with | 12 | 100 |
| customer service standards. | 12 | 100 |
| 2. Check and use the guests' name throughout the interaction. | | |
| 3. Clarify, repeat and check the details of orders with guests for accuracy. | 12 | 100 |
| 4. Use suggestive selling techniques. | 12 | 100 |
| 5. Advise guests the approximate time of delivery. | | |
| 6. Record and check the room food orders with relevant information in accordance | 12 | 100 |
| with establishment policy and procedures. | 12 | 100 |
| 7. Interpret accuracy room service orders received from door knob dockets. | | |
| 8. Transfer the order promptly and relayed to appropriate location for preparation. | 12 | 100 |
| 9. Prepare the room service equipment and supplies in accordance with | 12 | 100 |
| establishment procedures. | 12 | 100 |
| 10. Set up trays and strolleys keeping in mind balance, safety, and attractiveness. | | |
| 11. Set up room service trays or trolleys in according to the food and beverage | 12 | 100 |
| ordered. | | |
| 12. Check the order before leaving the kitchen for delivery. | 12 | 100 |
| 13. Cover the food items during transportation to the room. | 12 | 100 |
| 14. Verify the guest's name on the bill before announcing the staff's presence | 12 | 100 |
| outside the door. | | |
| 15. Greet the guests politely in accordance with the establishment's service | 12 | 100 |
| procedures. | 12 | 100 |
| 16. Acknowledge and then present to the cashier the cash payments for | 12 | 100 |
| processing in accordance to establishment guidelines. | 12 | 100 |
| 17. Asks guest to sign for charge accounts. | 12 | 100 |
| 18. Explain the procedure to take away the tray or trolley when the guests have | 12 | 100 |
| finished their meal. | | |
| 19. Check and clear floors in accordance with the establishment policy and | 12 | 100 |
| guidelines. | 12 | 100 |
| 20. Clear the dirty trays in accordance with the establishment's procedure. | 12 | 100 |
| 21. Clean the trays and trolleys and returned to the room service area. | 12 | 100 |
| 22. Obtain the entire story or issue of concern from the guest without interruption. | 12 | 100 |
| 23. Note detail of guest complaint or concern. | 12 | 100 |
| 24. Give full attention to the complaining guest. | 12 | 100 |
| 25. Paraphrase the guest complaint to determine if the concern is correctly | | |
| understood. | 12 | 100 |
| 26. Offer sincere apology for the disservice. | 12 | 100 |
| 27. Show an empathy to the guest to show genuine concern and consideration. | 12 | 100 |
| 28. Avoid excuses or blaming others. | 12 | 100 |
| 29. Express the gratitude to the guest for bringing the matter up for attention. | 12 | 100 |
| 30. Take appropriate action regarding guest's concern. | 12 | 100 |
| 31. Inform the right person or department who can solve the problem for proper | 12 | 100 |
| action. | 12 | 100 |
| 32. Elevate or refer the difficult situations or serious concerns to higher authority. | 12 | 100 |
| 33. Follow up on the problem to check whether it solved or not. | | |
| 34. Documents the complaints according to the establishment standard | 12 | 100 |
| procedures. | | |
| 35. Recognized person's concerned record actions taken. | 12 | 100 |
| 36. Collate, log feedback received from guests. | 12 | 100 |

## CONCLUSION

The study revealed that half of the number of respondents was 31 to 40 years old, all respondents who took NC II were all girls, at least half of the respondents who took NC II were high school graduates, and majority of the respondents had no source of livelihood for their living. Results revealed that all the respondents attained the necessary skills in terms of preparing dining room/restaurant area for service, welcome and take food and beverage orders, promote food and beverage products, provide food and beverage service to guests, and provide room service and passed the NC II Food and Beverage Services assessed by the Technical Education and Skills Development Authority assessors.

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# TRAPPIST MONASTERY (ABBEY OF NORMANDY): THEIR JOURNEY IN GUIMARAS

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**ABSTRACT** Cistercian monasticism is a form of Benedictine monastic life based on the Rule of St. Benedict as interpreted by the twelfth-century monks in Citeaux, France. The Order of Cistercians of the Strict Observance is a Roman Catholic contemplative religious order and takes the name of "Trappist" from La Trappe Abbey or "La Grande Trappe" in Normandy, France, where it began as a reform movement in 1664. The Our Lady of the Philippines Trappist Abbey was founded by the United States Region in 1972 and is the only men's monastery in the country located on the small island of Guimaras, separated from Panay and Negros islands. A 75-hectare land was donated formerly owned by the then Senator and Ambassador to the USA, Don Oscar Ledesma through the Archbishop of Jaro, Iloilo, Jaime Cardinal Sin for the establishment of a monastery to the six foreign monks from different monasteries and a Filipino monk, Bro. Pedro Lazo. In the 1980's the first Abbot was Father Joseph Chu-Cong, a Vietnamese monk from the St. Joseph Abbey. Three priests and 23 monks composed the Trappist monastery at present. The Trappist monks divided their contemplative life into religious and work-life practices between prayer and work "Ora et labora". Prayer focuses on the Divine Office, Lectio Divina and various other forms of meditative and contemplative prayers. Productive work assignments are scheduled and mostly done manually. The burial tradition is a one day wake and inclusion in seven times prayer a day, in white cowl cloth, and covered with a white blanket then placed on a hand-made bamboo or wood on the top, and wrapped in the quilt's embrace before lowering into the grave. The contribution of the Trappist monastery to community development included accommodation of guests to spend for prayer, meditation, and retreats, livelihood, and employment generation involving agriculture, vegetable production, mango orchard, food manufacturing, and others.

Keywords: Monastery, monks, abbey, Guimaras, Philippines

## Objectives of the Study

This paper seeks to present the journey of the Cistercian Order to Our Lady of the Philippines (OLP). It specifically, 1) traces the humble beginning of the Trappist Monastery in Guimaras; 2) describes the religious and work life practices of the Trappist monks; and 3) assesses its contribution to community development.

## METHODOLOGY

This study used the descriptive research design. Anchored on the grounded theory, observation, interview with the Trappist monks, personnel, and suppliers and study of written documents were done. Accordingly, grounded theory takes a case rather than variable perspective, although the distinction is nearly impossible to draw. This means in part that the researcher takes different cases to be wholes, in which the variables interact as a unit to produce certain outcomes. As introduced by Glaser & Strauss in 1967, this is to legitimize qualitative research (Glen, 2017). Shared experiences of the respondents including data taken from written documents were jotted down, grouped and coded to come up with abstract categories. These were organized and documented following the objectives of the study. Photo documentations were taken and presented as part of the findings of the study.

## RESULTS AND DISCUSSIONS

### The Humble Beginning and today of the OLP-Trappist Abbey

The Philippines is one of the world's largest archipelago nations. It is situated in Southeast Asia in the Western Pacific Ocean. Its islands are classified into three main geographical areas- Luzon, Visayas, and Mindanao. The Philippine country was known as one Christian country in the whole world.

The monastery is strategically located on the small island of Guimaras, which is considered one of the exotic islands in the Philippines and was once a sub-province of Iloilo, but by virtue of R.A. 7160, it was proclaimed a regular province on May 22, 1992. Guimaras is located Southwest of Panay Island and Northwest of Negros Island

in Western Visayas with a total land area of 60,465 hectares or 604.65 square kilometers. The island province of Guimaras is composed of five towns: Buenavista (36 barangays), Nueva Valencia (22 barangays), Jordan (14 barangays), San Lorenzo (12 barangays), and Sibunag (12 barangays).

Fig.1. Home of the Contemplative Trappist Catholic Christian Monks of the Philippines.

The primary role of Cistercian life is to seek union with God and to witness to His holiness and His desire for the salvation and sanctification of all persons and to unite all people in their adherence to Him through their faith in Christ and his Catholic Church. The means of fulfilling this role in the world and in the Church is primarily by prayer, both public and private.

Accordingly, the Trappist Abbey in Guimaras began sometime in 1970 to 1971, six (6) monks from different monasteries came to the Philippines in search of a place where they could establish a monastery. The then Archbishop of Jaro, Iloilo, named Jaime Cardinal Sin, contacted Don Oscar Ledesma, the former Senator and US Ambassador, and upon knowing their very purpose of coming, that was to find a place open to those who seek the solace and self-examination through meditation and retreat from taxing endeavours of the materialistic world. He thought of Guimaras as the best place and donated his 75-hectare land in Barangay San Miguel, Jordan, Guimaras.

In 1972, the Trappist Monastery was started in Guimaras Island composed of the six monks and Brother Pedro Lazo, the only Filipino monk at that time. The Trappist Monastery ground is a peaceful and sacred enclave in Guimaras run by the Monks of the Cistercian Order of the Strict Observance. These Monks follow the rule of St. Benedict and are best known for the extreme austerity or strictness that characterizes their discipline.

Fig 2. Photo of the six monks with Brother Pedro Lazo in 1972

They follow the rule of life, which emphasizes community life lived under a superior known as the Abbot. In the 1980s, Trappist Monastery had its first Abbot, named Father Joseph Chu-Cong, a Vietnamese monk from St. Joseph Abbey. The abbot governs not in his own name but as a representative of Christ so that it is his task to discern the will of the Father in all things, after the example of Jesus in his life and death on earth.

Fig. 3. Father Joseph Chu-Cong, the first Vietnamese abbot of the monastery in 1980.

By early 2000, there were a total of 33 monks at the Trappist monastery. Most of them were Filipino of varied professions coming from different parts of the country because of the calling to serve the Lord.

Fig. 5. Trappist Monks in early 2000.

However, after the death of the last foreign monk, the Abbey at present has three (3) Priests including the Abbot, Father Gerard N. Ingusan and the twenty three (23) monks.

Trappist monks strive to "prefer nothing to Christ." They follow a lifestyle marked by simplicity and prayer. They treated death as a natural part of life. They do not hide what happens to the body at death or interfere with the natural process of returning it to the earth. They took care of their dead following their burial tradition of a one-day wake and inclusion in seven times prayer a day. The remain is dressed in white cowl cloth, placed on a hand-made bamboo or wooden open casket and laid down inside the Trappist church within the day. Their family, relatives, friends and other people in the community attend in vigil and prayer. Before the 24th hour, a mass is offered then the body is wrapped with a white blanket before lowering into the grave.


Fig. 6. The Burial Practices of the Trappist Monks in Guimaras.

On the other end, Guimaras has its share of amazing destinations where people can renew their faith or devote themselves to prayer. What is unique, is that, the Our Lady of the Philippines Trappist Abbey, is a place where one can catch a glimpse and perhaps experience how to live simply and humbly, with God and nature in mind.

Within the Trappist monastery grounds, a larger church was built and a modern guest house way back in 1997 for weekend or some days or even weeks to be with the monks in prayer and meditation, joining in prayer at the office and mass along with the monastic community.

In order for the monks to be free to dedicate themselves more fully to prayer, holy reading and study, they are to labour with their own hands as well to administer the monastery buildings and the grounds. Daily routine lives of the Trappist monks are only focused on prayer and work or what they call "Ora et labora." Such as that, a morning prayer or "laudes" at 5:30 in the morning, at exactly 6:00 o'clock a mass is being held and could be attended by the community people. Productive work starts at 7:30 until 11:00 in the morning, where monks perform their respective assignments at the monastery. At 11:30 AM, all monks gathered together at the Trappist church for a "sexta" prayer at 11:45 AM, lunch break and short siesta until 1:45 PM in the afternoon where they were gathered again at the church for a 15 minute prayer. Ora et labora in the afternoon is from 2:00 PM-4:00 PM, and by 5:00 PM they were again gathered at the church for a "visper" or "sunset prayer," then each works in silence until 5:45 PM for supper, after which, a private prayer until 6:45 in the evening for a compline or "evening prayer. The monks end the day at 7:00 PM, and they go to sleep individually in their respective rooms.

Fig. 7 Trappist Monastery grounds.

Working hours of the Trappist monks were from 7:45 to 11:00 in the morning and from 1:45 to 4:00 in the afternoon, while that of the workers are from 8:00 a.m. to 12:00 noon and from 1:00-5:00 in the afternoon. Their livelihood involves agriculture, growing vegetables for their own and guests' consumption, mango orchard, processing plant for mango, pineapple, and guava fruits into jelly, jam, juice, dried, piaya, cookies and others. Monks, but rather, in the demand of fate that the monastery could start helping the Aetas, who were the first suppliers of native guava, as well as the poor people in the community. Even up to the present, Aetas and other micro entrepreneurs continue to supply their products to the Trappist gift shop for other products not produced by the Trappist monks. All products are displayed in their gift shop at Guimaras Trade and Information Center (GTIC) Pasalubong Center. Any guest or one can write a petition/intention and drop it in the box located at the entrance of the church. Religious items purchased may be blessed by the monks upon request. The monks earn a living by selling their products. The income of the gift shop has never been trimmed into Two Hundred Thousand (Php 200,000.00) to Three Hundred Thousand (Php 300,000.00) Pesos weekly. Lastly the Monks are very proud to say that the sales of their products today are impressive. They could earn higher than Ninety five thousand pesos (Php 95, 000.00) per month for the stores which they had agreed for consignment located at the Central Market of Alibhon in San Miguel, Jordan.

Fig. 8. The rice fields

In fact, Bro. Peter Patiño, in 1983, started to experiment the production of cashew since the raw material of this only costed at P3.00 per kilo from the Aetas of which their income had been enough to buy their food, clothing, utensils, and other basic needs at home. At that time until early 2000, Bro. Peter was assigned to take charge of the food manufacturing of the monastery. For almost two decades (1984-2004), Bro. Peter continued to experiment of producing other products. Religious institutions like the Sagrado Corazon de Jesus and St. Pauls in Iloilo City patronized the Trappist products because of the very objectives of helping the poor especially the Aeta community. From then on, in 1990's Trappist monks started to expand their market in Manila like guava jelly, guava jam, calamansi marmalade, among others, and later on they started to produce bakery products.

Fig. 9. Production of Cashew of the Trappist Monastery in 1993.

In 2003, food products at the FM building were produced using automatic machines and equipment with a funding assistance coming from the European monastery. From then on, workers increased from 2 to 4 and later on 40 to 45 male workers including maintenance workers. Some of the workers hired were high school students on part-time basis, aside from the out-of-school youth and adult men workers. Other female workers were assigned at the office and at the gift shop. For six month they were on contract, thereafter, they were hired as regular workers while

others remained on contractual basis, especially those working on part time basis. Following the labor law, workers were from ages 18 years old and older, mostly TESDA trained and were paid P 300.00 daily. They were also given uniforms, benefits and insurances for security purposes. In addition, every 25th of December the Trappist monks celebrate foundation day what they call "Religious Enterprise", sumptuous meal is served, relief goods (groceries and clothing) including medicines were given.

Fig. 10. Workers of the Trappist Monastery.

Indeed, the Rule of St. Benedict calls Monks to manual labor as an essential part of the monastic experience "Ora et labora"- to pray is to work-is a principle that the new Monks quickly learn at Mepkin.

**Contribution to Community Development**

Trappist Monastery in Guimaras contributes a lot not only to community development, but also to every Guimarasnon in particular, especially those whose very lives have been touched by the Trappist monks either through prayers or in communion with them and those who have been employed at the monastery as well as those who in one way or the other had been part of the existence of the OLP Trappist Abbey in Guimaras Island.

During the late 1990's, the Trappist Abbey had initiated the Contemplative Outreach Project (COP) for the poor and to continue helping the Aeta community, constructed a school building at the "Kati-Kati" where the natives or the Aeta families in Jordan are living. Qualified teachers were hired to teach in the elementary and later on in high school. Other livelihood projects, initiated included the coconut shell craft and water refilling station.

They established not only an institution for education but also a hope for the native community, to be partakers of the development in the educational system, and that had changed their aspirations in life.


Fig. 11. Immaculate Heart of Mary Academy of Guimaras, INC.

The Trappist Monastery also provides benefits for their workers by making sure that all of them received equal benefits including free medicines, food, uniforms and accommodation facilities especially for outside Guimaras personnel. In addition, relief goods such as food, clothing, and medicines are made available for the families of the workers and other people of the community. This way, they can pay back the blessings that the Lord God Almighty hath provided to the monastery.

Trappist monastery has become one of the tourist destinations and is included in the tourism circuit of the province of Guimaras. Visits to Guimaras Island by tourists either local or foreign would not be complete without dropping by at the Trappist monastery church for solemn prayer and moment with the Lord and at the Trappist gift shop for souviner items and Trappist made food products, also, a blessing for a safe travel from the Trappist monks. Being the only Trappist monastery in the country, it leads Guimaras to be one of the tourist destinations in the country. With the influx of tourists and guests in Guimaras every year, the demand for the supply of goods and services also increases of which the Trappist monastery had been a part of making Guimaras to take its pride and be known in the country and to the whole world.

Fig. 12. The Trappist Monastery Church in Guimaras Island.

Success always starts from a small and simple endeavors of "Ora et labora", and, though faith, perseverance and hard work, for the OLP Trappist Monastery, greater heights and economic impact is achieved

## CONCLUSION

The Our Lady of the Philippines Trappist Abbey was founded by the United States Region in 1972 and is the only men's monastery in the country located on the small island of Guimaras, separated from Panay and Negros islands. In the 1980's the first Abbot was Father Joseph Chu-Cong, a Vietnamese monk from the St. Joseph Abbey. Three priests and 23 monks composed the Trappist monastery at present. The Trappist monks divided their contemplative life into religious and work-life practices between prayer and work "Ora et labora". The contribution of the Trappist monastery to community development included accommodation of guests to spend for prayer, meditation, and retreats, livelihood and employment generation involving agriculture, vegetable production, mango orchard, food manufacturing and others. Moreover, Trappist Abbey in Guimaras, being the only monastery in the Philippines leads Guimaras to be one of the tourist destinations in the country. So with the influx of tourists and guests every year, the demand for the supply of goods and services also increases of which the Trappist monastery had been a part of making Guimaras take its pride and be known in the country and to the whole world.

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**ABSTRACT** This study aimed to determine the performance in the Licensure Examination of Guimaras State College Teacher Education graduates A.Y. 2008-2015. This study used the analytical method of research and documentary analysis utilizing the secondary data taken from the official results of Licensure Examination for Teachers (LET) released by Professional Regulation Commission (PRC) from September 2008 to September 2015. The statistical tools employed were mean, frequency counts and percentage, Chi-square and linear regression. Results revealed that there were 248 or 47.3% BEED takers and 276 or 57.3% BSED takers from year 2008 to 2015. BSED and BEED fresh and old graduates took the Licensure Examination for Teachers. It further revealed that large number of first takers took and passed the LET. Furthermore, the study showed that 2008 and 2010 had a larger number of takers. There were more passers from BEED and first takers performed better than retakers. BEED graduates LET performance was 73.65% while BSED was 68.41%. For the BEED, the highest passing percentage was in September 2015 while the lowest passing percentage was in March 2012. The BEED LET takers, in September 2012 had the highest passing percentage and in March 2013, none of the takers passed the LET. There was a significant difference in the performance of LET takers in terms of their degree, type of takers and year of examination. The result showed that in terms of degree, type of taker, and the year of examination, the P-value of .000 was lower than the set p-value at 0.05 level which was significant, thus, the null hypothesis was rejected. This simply shows that the profile of the LET takers influences their performance. A model or trend predicting the LET performance of graduates was formulated. The predicted institutional rating for BSED for 2016 was 37.246 and 87.952 for BEED LET takers.

**Keywords:** Licensure Examination, Performance, Education Graduates, GSC

## INTRODUCTION

### Background of the Study

Commission on Higher Education (CHED) Memorandum Order 30, Series of 2004, stipulates that quality pre-service teacher education is a key factor in quality Philippine Education. The quality of pre-service training greatly depends upon the teachers who are amply prepared to undertake the different significant functions and roles of the teaching profession. Truly, the higher educational system acknowledges two most essential factors of the teacher education enterprise, the teacher and the learner (Faitado, 2015).

However, the teachers play a vital role in the process of learning of the students they deal with. Whether the students achieve the objective and competencies set depends largely on the skill of the teacher.

The preparation of future teachers for both elementary and secondary educational sectors is a very important function assigned to pre-service educators of Teacher Education Institution's. Indeed, the teachers are accountable for providing quality instruction and ensuring that the right and quality education is inculcated to the learners. The teachers' crucial roles in molding and producing competent graduates still remain the most influential factor in attaining excellence in education.

In this regard, the need to assure the supply of teachers who could live up to the expectations and trust of society, who are not just fully prepared but also committed to do their tasks and more so, teachers whose competencies are at par with the national standards as confirmed by the results of the Licensure Examination for Teachers (LET).

Guimaras State College as provider of Teacher Education graduates is committed to cope with the standards so as to maintain the quality of its graduates. The result of the licensure examination will be a gauge as to the quality of instruction at the same time the need for improvement for the succeeding years. To evaluate and reevaluate the performance in the Licensure Examination for Teachers is indispensable for a higher learning institution like GSC to be considered a quality learning institution. Hence, the need for this study.

### Statement of the Problem

This study was conducted to determine the performance of education graduates in licensure examination. Specifically, this study sought answers to the following questions: 1) What is the profile of the LET takers in terms of degree, type of takers and year of examination; 2) What is the LET performance of Education graduates when classified according to profile and when taken as a whole; 3) What are the national passing percentage and the institutional passing percentage of LET takers; 4) Is there a significant difference in the performance of LET takers in terms of degree, type of takers and year of examination; and 5) Is there a model to predict the LET performance of education graduates?

## METHODOLOGY

This study used the analytical method of research and documentary analysis utilizing the data taken from the official results of LET released by Professional Regulatory Commission (PRC) from September 2008 to September 2015. The quality of graduates in Guimaras State College of Teacher Education is measured through the evaluation of the performance licensure examination of education graduates and the results of the study, recommendations will be formulated as the basis for the increase of the passing percentage of education graduates. Therefore, evaluation of the licensure examination performance of education graduates becomes the utmost necessity. The evaluation is in terms of examination performance that includes graduates profile composed of degree, specialization, age, year graduated and type of takers. Data gathered from the results of the study were used to formulate recommendations which will be the basis for the improvement of the teaching performance, instructional materials and instruction to improve the performance of the College. The secondary data were analyzed and interpreted using the SPSS Program for Windows. The statistical tools used in this study were mean, frequency count and percentage distribution, chi-square and linear regression.

## RESULTS AND DISCUSSIONS

### Profile of the Graduates

Table 1 presents the profile of the graduates in terms of degree, type of takers and year of examination. The profile of the graduates in terms of degree is presented in Table 1. It shows that there are two Education degree of the graduates, the Bachelor of Elementary Education (BEED) major in General Education and Bachelor of Secondary Education Major in English, Mathematics, Filipino and Social Studies. It was revealed that there are 248 or 47.3% BEED graduates and 276 or 57.3% BSED graduates. In terms of type of takers, the graduates were classified into two categories. It was determined that there were 274 or 52.3% first takers of the LET which comprise the largest number of takers. It showed that 250 or 47.7% were retakers. In terms of year of examination by the graduates, there were eight years utilized in the study. It started from the year 2008 up to 2015.In 2008, there were 123 or 23.5 % who took the LET. It covered the largest number of graduates in the distribution.

Further, in 2009, 66 or 12.6%; in 2010, 32 or 6.1%; in 2012, 67 or 12.8%; in 2013, 41 or 7.8%, in 2014, 104 or 19.8%; and in 2015, 91 or 17.4%.

Table 1. Profile of graduates in terms of degree, type of takers and year of examination

| Categories | f | % |
|---|---|---|
| Degree | | |
| BEED | 248 | 47.3 |
| BSED | 276 | 57.3 |
| Total | 524 | 100.0 |
| Type of Taker | | |
| First Taker | 274 | 52.3% |
| Repeater | 250 | 47.7% |
| Total | 524 | 100.0 |
| Year of Examination | | |
| 2008 | 123 | 23.5 |
| 2009 | 66 | 12.6 |
| 2010 | 32 | 6.1 |
| 2012 | 67 | 12.8 |
| 2013 | 41 | 7.8 |
| 2014 | 104 | 19.8 |
| 2015 | 91 | 17.4 |
| Total | 524 | 100.0 |

**LET Performance of Education Graduates when taken as a Whole and in terms of degree, type of taker and year of examination**

The LET performance of BEED graduates is 73.65 which is higher than BSED which is 68.41. Moreover, the first takers performed better than retakers with the average rating of 74.95 than the retakers which is 66.44. The performance of education graduates in terms of the year of examination in 2008 is 72. 27; in 2009, 65.34; in 2010, 67.64; in 2012, 71.89; in 2013, 70.72; in 2014, 71.93; and in 2015, 72.35 which has the highest rating among the years covered.

The overall mean of the education graduates is 70.89 in terms of degree, type of taker and year of examination. These findings were conforms to the study of Pascua and Navalta (2011) who asserted that BEED performed better than BSEd. However, these findings contradicts to the study made by Guanson and Marpa (2013) of Philippine Normal University who asserted that graduates in secondary education perform better in the licensure examination.

Table 2. LET Performance of Education graduates when taken as a whole and in terms of degree, type of taker and year of examination

| Categories | Passed | | Failed | | Total | | Mean | | Overall Mean |
|---|---|---|---|---|---|---|---|---|---|
| | f | % | f | % | f | % | Passed | Failed | |
| Degree | | | | | | | | | |
| BEED | 133 | 53.6 | 115 | 46.4 | 248 | 100.0 | 77.22 | 69.52 | 73.65 |
| BSED | 96 | 34.8 | 180 | 65.2 | 276 | 100.0 | 76.29 | 64.21 | 68.41 |
| Total | 229 | 100.0 | 295 | 100.0 | 524 | 100.0 | 76.83 | 66.28 | 70.89 |
| Type of Taker | | | | | | | | | |
| First Taker | 166 | 60.6 | 108 | 39.4 | 248 | 100.0 | 77.70 | 70.72 | 74.95 |
| Repeater | 63 | 25.2 | 187 | 78.9 | 276 | 100.0 | 74.55 | 63.71 | 66.44 |
| Total | 229 | 100.0 | 295 | 100.0 | 524 | 100.0 | 76.83 | 66.28 | 70.89 |
| Year of Examination | | | | | | | | | |
| 2008 | 26 | 21.1 | 97 | 78.9 | 123 | 100.0 | 76.57 | 71.12 | 72.27 |
| 2009 | 14 | 21.2 | 52 | 78.8 | 66 | 100.0 | 76.67 | 62.28 | 65.34 |
| 2010 | 9 | 28.1 | 23 | 71.9 | 32 | 100.0 | 76.49 | 64.18 | 67.64 |
| 2012 | 40 | 59.7 | 27 | 40.3 | 67 | 100.0 | 75.51 | 66.54 | 71.89 |
| 2013 | 21 | 51.2 | 20 | 48.8 | 41 | 100.0 | 77.94 | 63.14 | 70.72 |
| 2014 | 61 | 58.7 | 43 | 41.3 | 104 | 100.0 | 77.24 | 64.40 | 71.93 |
| 2015 | 58 | 63.7 | 33 | 36.3 | 91 | 100.0 | 77.13 | 63.94 | 72.35 |
| Total | 229 | 43.7 | 295 | 56.3 | 524 | 100.0 | 76.83 | 66.28 | 70.89 |

**National Passing Percentage and the Institutional Passing Percentage of BSED LET Takers**

Figure 1 shows the institutional passing percentage and the national passing percentage of BSED LET takers. In September 2015, there was a highest passing percentage of 60.87 and in March 2012, a record of the lowest passing percentage of 14.29 is reflected. There was an increase in number of passing percentage because the institution provided venue for LET review in the school and coordinated with review centers.

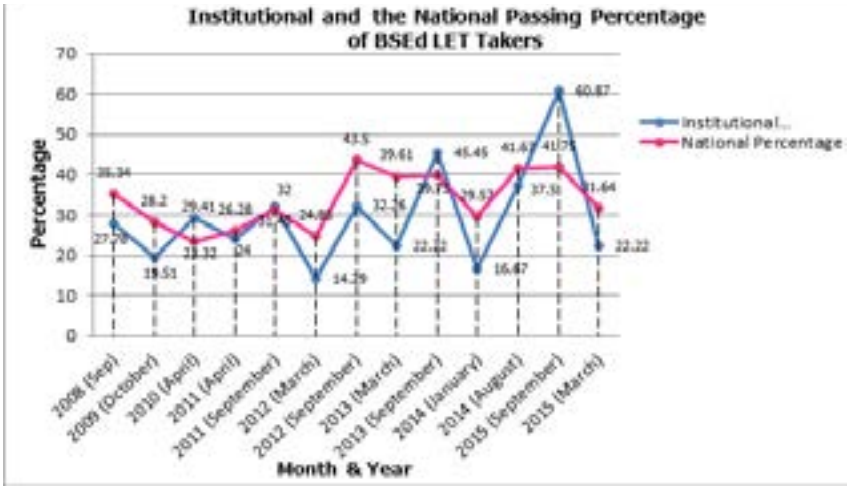


Figure 1. National Passing Percentage and the Institutional Passing Percentage of BSED LET Takers

## National Passing Percentage and the Institutional Passing Percentage of BEED LET Takers

Figure 3 shows the institutional passing percentage and the national passing percentage of BSED LET takers. In September 2012, there was a highest passing percentage of 83.33 and in March 2013, none of the takers passed the LET.

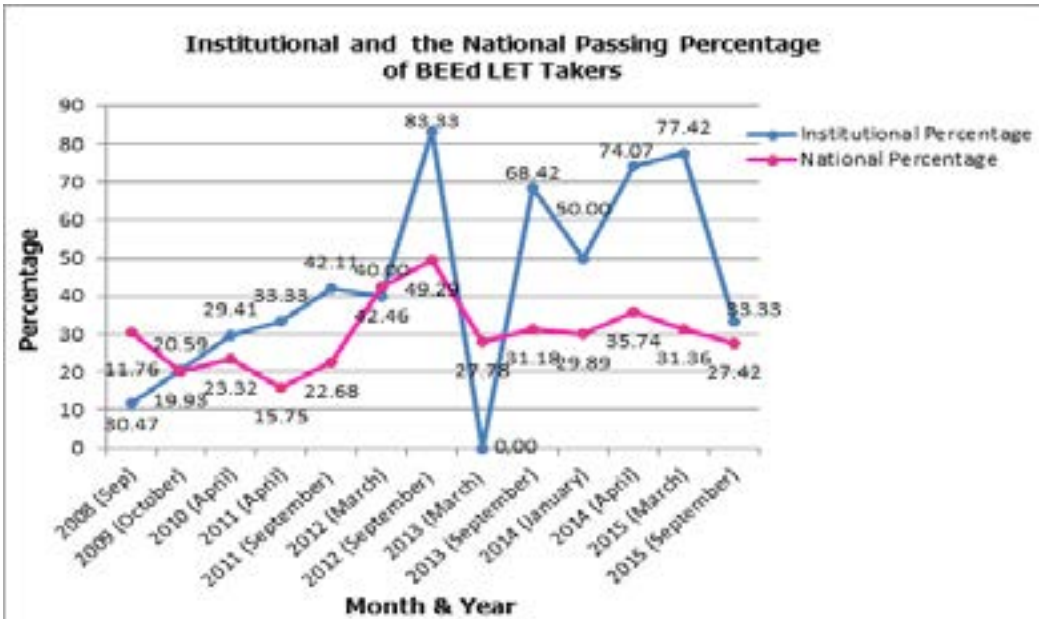


Figure 3. National Passing Percentage and the Institutional Passing Percentage of BEED LET Takers

## Difference in the Performance of LET Takers and their Profile

The result of the Chi-square in Table 3 reveals that there is a significant difference in the performance of LET takers in terms of their degree, type of takers and year of examination.

The result shows that in terms of degree, type of taker, and the year of examination, the P-value of .000 is lower than the set p-value at 0.05 level which is significant. This simply shows that the profile of the LET takers influence their performance.

Table 3. Difference in the Performance of LET Takers and their Profile

| Categories | Passed | Failed | Chi-square | P-value | Interpratation |
|---|---|---|---|---|---|
| Degree | | | | | |
| BEED | 133 | 115 | 18.858* | .000 | Significant |
| BSED | 96 | 180 | | | |
| Type of Taker | | | | | |
| First Taker | 166 | 108 | | | |
| Repeater | 63 | 187 | 66.524* | .000 | Significant |
| Year of Examination | | | | | |
| 2008 | 26 | 97 | | | |
| 2009 | 14 | 52 | | | |
| 2010 | 9 | 23 | | | |
| 2012 | 40 | 27 | 74.385* | .000 | Significant |
| 2013 | 21 | 20 | | | |
| 2014 | 61 | 43 | | | |
| 2015 | 58 | 33 | | | |

*p<0.05 level of significance

**Model to Predict the LET Performance of Education Graduates**

The results in Table 4.1 showed a model or trend predicting the LET performance of graduates. The basis of the model (Table 4.1) is shown in tables 4.2 and 4.3 which reveals the percentage change in the passing percentage of education graduates from the years 2008 to 2015. The predicted institutional rating for BSED for 2016 based on the model formulated is 37.246 and 87.952 for BEED LET takers.

Table 4.1. Model to Predict the LET Performance of Education Graduates

| BSEd | | BEEd | | |
|---|---|---|---|---|
| Rate | Year | Rate | Year | |
| 27.78 | 2008 | 11.76 | 2008 | -4 |
| 19.51 | 2009 | 2059 | 2009 | -3 |
| 29.41 | 2010 | 27 | 2010 | -2 |
| 24.00 | 2011 | 33.33 | 2011 | -1 |
| 14.29 | 2012 | 40 | 2012 | 1 |
| 22.22 | 2013 | 68.42 | 2013 | 2 |
| 16.67 | 2014 | 50 | 2014 | 3 |
| 22.22 | 2015 | 76.92 | 2015 | 4 |
| 32.00 | 2011 | 34.62 | 2011 | -1 |
| 32.26 | 2012 | 42.11 | 2012 | 1 |
| 45.45 | 2013 | 83.33 | 2013 | 2 |
| 41.67 | 2014 | 74.07 | 2014 | 3 |
| 60.87 | 2015 | 77.42 | 2015 | 4 |
| 37.246 | 2016 | 87.952 | 2016 | |

Table 4.2. Percentage Change of BEEd and BSEd LET Takers' General Average

| Categories | 2008 | 2009 | 2010 | 2012 | 2013 | 2014 | 2015 |
|---|---|---|---|---|---|---|---|
| BEEd | | | | | | | |
| Mean | 66.82 | 66.62 | 69.69 | 74.66 | 71.53 | 73.98 | 73.21 |
| N | 51 | 25 | 15 | 29 | 21 | 60 | 47 |
| Sd | 5.941 | 8.260 | 6.630 | 8.0937 | 12.209 | 7.607 | 8.510 |
| Percentage | | (-) | (+) | (+) | (-) | (+) | (-) |
| Change | - | 0.3% | 4.4% | 6.66% | 4.38% | 3.31% | 1.05% |
| BSEd | | | | | | | |
| Mean | 67.79 | 64.56 | 65.84 | 69.78 | 69.87 | 69.15 | 71.43 |
| N | 72 | 41 | 17 | 38 | 20 | 44 | 44 |
| Sd | 7.604 | 8.384 | 8.8793 | 6.437 | 7.116 | 7.243 | 8.127 |
| Percentage | - | (-) | (+) | (+) | (+) | (-) | (+) |
| Change | | 5.00% | 1.94% | 5.65% | 0.13% | 1.04% | 3.19% |

## CONCLUSION

Based on the result of the study, the following conclusions were made BSED and BEED fresh and old graduates took the Licensure Examination for Teachers (LET). It further revealed that large number of first takers took and passed the LET. Furthermore, the study shows that there were two (2) years that had a larger number of takers. The study revealed that there were more passers from BEED and first takers performed better than retakers. The study further revealed that in September 2015, there was a highest passing percentage in the LET. There was a significant difference in the performance of LET takers in terms of their degree, type of takers and year of examination. A model or trend predicting the LET performance of graduates was formulated.

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# IMPACT OF HOSPITALITY SKILLS TRAINING: BASIS FOR SUSTAINABILITY PROGRAM DEVELOPMENT

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**ABSTRACT** This study aimed to determine the impact of hospitality skills training as basis for sustainability program development for Barangay Suclaran, San Lorenzo, Guimaras for A.Y. 2012-2017. The study made use of an evaluation type of descriptive research designs utilizing a total of 30 respondents who were the beneficiaries of the hospitality skills training conducted. A researcher-made questionnaire and the TESDA NCII Competency on "Food and Beverage Services" assessment tool were used in gathering data and frequency, percent and mean were the statistical tools used. It was found out that the Hospitality Skills Training program of BSHRM has impacted the beneficiaries the fact that it has increased their average gross monthly earnings; the beneficiaries were very skillful in all the hospitality skills trained to them; all the takers of NCII for the Competency "Provide Food and Beverages Services to Guests" passed; through the training program, the beneficiaries have improved their values and economic status as evident on the way they associate with others in the community where in totality has improved their way of life in the barangay.

**Keywords:** Hospitality Skills, GSC BSHRM, Evaluation

## INTRODUCTION

### Background of the Study

Food and beverage services sector contributes a great deal to the profits in hospitality industry. With the increase in importance of business meetings, a range of personal and social events, a large number of customers visit catering establishments frequently. The food and beverage professionals tirelessly work to intensify customers' experience through their service. The F&B Services providing businesses deliver food and beverages to their customers at a particular location (on-premise) such as hotel, restaurant, or at the customer's intended premises (off-premise) (Gatera, 2018).

Community extension services respond not just the needs of community but to the Vision-Mission of the College as well as the expectations to make education accessible to the poor and to "pursue an excellent and socially relevant education centered on the young, poor and the youth at risk; and promote the Filipino spirit of solidarity by upholding justice and human dignity". The academe is one of the main actors in the society which could possibly effect change by way of empowering the people in the community. Thus, Guimaras State College, as an academic institution, is socially responsible in bringing its expertise to the community especially in the field of teaching, research, and community extension (Dilao & Maghamil, 2011).

An integrated extension approach is needed to address multi-faceted community issues effectively and it is one of the major functions of the academic community in order to enhance the capacity of the faculty in their field of expertise by way of extending it to the partner community/communities. Issues in the community will not be solely addressed by the local government officials nor by the residents, but these need a knowledge' based sector or the epistemic community and the academe for it to come up with a scientific diagnosis with regard to the occurrences of problems in the community (Gonzales & Maghamil, 2009).

The Guimaras State College-Hotel and Restaurant Management Department has been extending hospitality skills training as part of their extension program to the community for so long and has also evaluated its other extension programs, however, as to the "Hospitality Skills Training" conducted in the locale of their study, an impact assessment has not yet done. Thus, this study was conducted.

### Statement of the problem

This study aimed to determine the impact of community extension activities and programs of BSHRM on the residents/clientele. Specifically, this study sought to determine the (1) the gross monthly earnings of the clientele before and after joining the livelihood program; (2) the extent of skills learned by the clientele from the training program; (3) the impact of training program to the skills, values and economic status of the beneficiaries; and (4) an action plan to sustain the implementation of the program.

## METHODOLOGY

Descriptive research using the evaluation method was used in this study. The respondents of the study were the 30 beneficiaries of the Hospitality skills training conducted by the College of Business Management – Hotel and Restaurant Department. The primary instrument used was the researcher-made questionnaire consisted of the following parts: Part I dealt with the profile of the respondents including the gross monthly earnings before and after the training, part II was about on the impact on values and economic status of the beneficiaries. A TESDA NC II on Competency "Food and Beverage Services" for the assessment of the impact on skills was used using the following scale for rating: 5-Very Highly Skillful, 4–Very Skillful, 3–Skillful, 2–Moderately Skillful and 1-Not Skillful. The statistical tools used in this study were the frequency count, percentage and mean.

## RESULTS AND DISCUSSION

### Gross Monthly Earnings of the Beneficiaries

Data in table 1 shows the gross monthly earnings of the beneficiaries before and after joining the livelihood program. Result revealed that the gross monthly earning of the beneficiaries increased after joining the program from 1, 753.33 was raised to 4, 333.33 with the gross monthly difference of 2, 580.00. Further, result shows that the income of respondents increases before and after the program. Moreover, the livelihood program became a big opportunity to those ten beneficiaries that does not have an income. This implies that the livelihood program were effectively implemented which gives opportunity to those beneficiaries to earn and raised an income.

Table 1: Gross Monthly Earnings of the Beneficiaries before and After Joining the Livelihood Program

| Gross Month | Gross Monthly Earnings before joining the Livelihood Program (N=30) | Gross Monthly Earnings after joining the Livelihood Program (N=30) | Difference in Gross Monthly Earnings |
|---|---|---|---|
| No income | 10 | 0 | |
| 3,000 and below | 11 | 13 | |
| 3,001 – 6,000 | 9 | 10 | |
| 6,001-9,000 | 0 | 6 | |
| 9,001 – 12,000 | 0 | 1 | |
| Ave. Gross Monthly Earnings | 1, 753.33 | 4,333.33 | 2,580.00 |

### Extent of Skills Learned by the Beneficiaries from the Training Program

Table 2 presents the extent of skills learned by the Beneficiaries from the Training Program. The beneficiaries were very skillful in checking food orders for presentation with appropriate garnish and accompaniments. Also, in serving the right food orders to the right customers and picking up food promptly from service areas. This implies that beneficiaries ensure that they take the right orders from customer, the food are well-presented, and delivering the order to right customer.

However, they got the lowest mean on recognizes delays or deficiencies in service and follow-up promptly based on enterprise policy; conducts the 3-minute check to know the guest satisfaction; and treat children and guest with special needs with extra attention and care all described as skillful. This means that beneficiaries still need training or seminars to improve their skills in interacting with customers.

| Skills Learned by the Beneficiaries from the Training Program | Mean | Intrepretation |
|---|---|---|
| 1.Pick up food orders promptly from service areas | 4.0 | Very Skillful |
| 2.Check food orders for presentation and appropriate garnish and accompaniments | 4.0 | Very Skillful |
| 3.Serve food orders to the right guests who ordered them | 3.97 | Very Skillful |
| 4.Serve and clear food orders with minimal disturbance to the other guests and in accordance to hygienic requirements | 3.76 | Very Skillful |
| 5.Mention name of the dish or order upon serving in front of the guest | 3.43 | Very Skillful |
| 6.Monitor sequence of service and meal delivery in accordance with enterprise procedures | 3.21 | Skillful |
| 7.Anticipates additional requests or needs of the guests | 3.17 | Skillful |
| 8.Offers additional food and beverage and served at the appropriate time | 3.40 | Skillful |
| 9.Provides necessary condiments and appropriate tableware based on the food order | 3.34 | Skillful |
| 10.Recognizes delays or deficiencies in service and follow up promptly based on enterprise policy | 2.90 | Skillful |
| 11.Conducts the 3-Minute Check to check guest satisfaction | 2.90 | Skillful |
| 12.Treats children and guests with special needs with extra attention and care | 3.03 | Skillful |
| 13.Prepare (banquet) service ware and checks for completeness | 3.38 | Skillful |
| 14.Set up tables and chairs in accordance with event requirements | 3.66 | Very Skillful |
| 15.Serves food according to general service principles | 3.57 | Very Skillful |
| 16.Handle food based on food safety procedures | 3.28 | Skillful |
| 17.Ensure coordinated service of meal courses | 3.28 | Skillful |
| 18.Keep assigned areas clean in accordance with industry procedure | 3.24 | Skillful |
| 19.Clear tables and prepare soiled dishes to be brought for dishwashing after the event or function | 3.13 | Skillful |
| Over all Mean | 3.40 | Skillful |

Scale: 4.21 – 5.00 – Very Highly Skillful; 3.41 – 4.20 – Very Skillful; 2.61–3.40 – Skillful; 1.81-2.60 – Moderately Skillful; 1.00-1.80 – Not Skillful

**Impact of Training Program to the Skills of the Beneficiaries**

Results reveal that all the 12 beneficiaries of the livelihood program who took the NC II for "Provide Food and Beverages Service to Guest" passed with Very Satisfactory rating with the highest mean of 4.0 in the following skills: Serve and clear food orders with minimal disturbance to the other guests and in accordance to hygienic requirements; Recognizes delays or deficiencies in service and follow up promptly based on enterprise policy; Prepare (banquet) service ware and checks for completeness ahead of time; and Keep assigned areas clean in accordance with industry procedure and got the lowest mean of 3.8 in: Check food orders for presentation and appropriate garnish and accompaniments; Serve food orders to the right guests who ordered them; Anticipates additional request or needs of the guests; Offers additional food and beverage and served at the appropriate time; Serves food according to general service principles; Handle food based on food safety procedures and Ensure coordinated service of meal courses.

Table 3. Impact of Training Program to the Skills of the Beneficiaries

| Skills Learned by the Beneficiaries from the Training Program | Mean | Intrepretation |
|---|---|---|
| 1.Pick up food orders promptly from service areas | 3.8 | V.S |
| 2.Check food orders for presentation and appropriate garnish and accompaniments | 3.8 | V.S |
| 3.Serve food orders to the right guests who ordered them | 3.8 | V.S |
| 4.Serve and clear food orders with minimal disturbance to the other guests and in accordance to hygienic requirements | 4.0 | V.S |
| 5.Mention name of the dish or order upon serving in front of the guest | 3.9 | V.S |
| 6.Monitor sequence of service and meal delivery in accordance with enterprise procedures | 3.9 | V.S |
| 7.Anticipates additional requests or needs of the guests | 3.8 | V.S |
| 8.Offers additional food and beverage and served at the appropriate time | 3.8 | V.S |
| 9.Provides necessary condiments and appropriate tableware based on the food order | 3.9 | V.S |
| 10.Recognizes delays or deficiencies in service and follow up promptly based on enterprise policy | 4.0 | V.S |
| 11.Conducts the 3-Minute Check to check guest satisfaction | 3.9 | V.S |
| 12.Treats children and guests with special needs with extra attention and care | 3.9 | V.S |
| 13.Prepare (banquet) service ware and checks for completeness | 4.0 | V.S |
| 14.Set up tables and chairs in accordance with event requirements | 3.9 | V.S |
| 15.Serves food according to general service principles | 3.8 | V.S |
| 16.Handle food based on food safety procedures | 3.8 | V.S |
| 17.Ensure coordinated service of meal courses | 3.8 | V.S |
| 18.Keep assigned areas clean in accordance with industry procedure | 4.0 | V.S |
| 19.Clear tables and prepare soiled dishes to be brought for dishwashing after the event or function | 3.9 | V.S |

Scale: 4.21 – 5.00 – Very Highly Skillful; 3.41 – 4.20 – Very Skillful; 2.61–3.40 – Skillful;
1.81-2.60 – Moderately Skillful; 1.00-1.80 – Not Skillful

**Impact of Training Program to the Values of Beneficiaries**

Table 4 presents impact of training program to the values of the beneficiaries. It is revealed that the training program had made them established good relationship with others, they learned how to save money, be patient, resourceful, value money; developed interest in doing work; being helpful to others, friendly, confident, polite, attentive and thoughtful in dealing with customers; they became hardworking, persistent and know how to share knowledge to others as unity and happiness are observed in the community. This means that the program change the values and perspective of the beneficiaries.

Table 4. Values Impact of the Training Program of the Beneficiaries

| Values Gained from the Training Program |
|---|
| 1. Established a good relationship with others |
| 2. Learned to save money |
| 3. Learned to be patient |
| 4. Developed interest in doing work |
| 5. Shared knowledge to others |
| 6. Learned to be resourceful |
| 7. Learned the value of money |
| 8. Being helpful to others |
| 9. Unity in the community |
| 10. Hardworking and persistent |
| 11. Happiness in the community is observed |
| 12. Become more aggressive in looking for extra income |
| 13. Being friendly, confident, polite, attentive and thoughtful in dealing with customers. |

**Impact of the Training Program to the Economic Status of Beneficiaries**

Table 5 shows the responses of the beneficiaries when they were asked of the results of skills training that they have learned for their daily living and for their everyday needs. The training program has impacted the economic status of the beneficiaries in the way that their way of life has improved; earning knowledge thereby knowing how to earn money; they were provided with extra income which gave them additional business capital, greater employment opportunity; additional facilities in the family where their family income increased. Thus, as the low earners rate in the family decreased, the economic status of the barangay leveled up.

Table 5. Effects of the Training Program to the Economic Status of Beneficiaries

| Economic Benefits Gained by the Beneficaries |
|---|
| 1.The program was great help to our way of life that has improved. |
| 2.Earned knowledge |
| 3.I know how to earn money. |
| 4.Provided extra income so it really helped the family. |
| 5.Additional business capital |
| 6.Decreased in low earners rate of the community |
| 7.Leveling up of economic status of the barangay |
| 8.Were able to provide additional facilities in the family |
| 9.For employment opportunity |
| 10.Earned a source of living for the family |
| 11.Increased income |

## CONCLUSION

The beneficiaries before joining the livelihood program had an average gross monthly earnings of P 1,753.33 and P 4,333.33 after joining the program where the increase to in their average gross monthly earnings with 147.15% increase. Generally, the beneficiaries were very skillful in all the hospitality skills trained to them with overall mean of 3.9. The training program has impacted to the skills of beneficiaries the fact that all takers of NCII for the Competency "Provide Food and Beverages Service to Guests" passed. As to the values impact, the training program benefitted the beneficiaries as they have gained the following values: good relationship with others; saving money; be patient; interest in doing work; sharing knowledge to others; be resourceful; value of money; being helpful to others; unity in the community; hard work; persistent; happiness, aggressiveness in looking for extra income, being friendly, confident, polite, attentive and thoughtful in dealing with customers. The training program has impacted the economic status of the beneficiaries in the way that their way of life has improved; earning knowledge thereby knowing how to earn money; they were provided with extra income which gave them additional business capital, greater employment opportunity; additional facilities in the family where their family income increased. Thus, the low earners rate in the family decreased therefore the economic status of the barangay had leveled up. The Hospitality Skills Training Program of BSHRM has impacted the beneficiaries the fact that it has increased their average gross monthly earnings; the beneficiaries were very skillful in all the hospitality skills trained to them; all the takers of NCII for the Competency "Provide Food and Beverages Services to Guests" passed; through the training program, the beneficiaries have improved their values and economic status as evident on the way they associate with others in the community where in totality has improved their way of life in the barangay.

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# VALUE CHAIN ANALYSIS (CALAMANSI): ITS CONTRIBUTION TO THE LOCAL ECONOMY OF GUIMARAS

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**ABSTRACT** The calamansi (Citrus madurencis) is considered as one of the major fruit crops in the Philippines, which is indigenous to the country. Introduced by the Batangueños in 1961, Calamansi growing in Oriental Mindoro where initially established in the towns of Naujan, Victoria, and Sorro then later spread to other municipalities when production demand had increased. This study aimed to determine the extent of the supply, value and market chain of the calamansi products and their contribution capability to the local economy of Guimaras. The descriptive survey method was used in the study. The respondents of this study were the calamansi vendors of Buenavista, Guimaras. The data gathering instrument used was a researcher-made questionnaire. The validated research questionnaire was reproduced and personally administered to the respondents. After the survey procedure was completed, the data were encoded and computed through the use of a computer in Excel format. The same data was analyzed using the Statistical Package for Social Sciences (SPSS) and interpreted using the appropriate statistical tools. Results revealed that most of the respondents are Roman Catholic, aged 56-65 years old, male, elementary graduate, married, and have a monthly gross income of below Php 1,000. Moreover, the Value Chain and Value-adding practices were slightly practiced by the calamansi vendor. Further, the contribution capability of the calamansi vendor is slightly practiced.

**Keywords:** Calamansi, value chain, economy, Guimaras

## INTRODUCTION

### Background of the Study

Value chain analysis (VCA) is a management concept that aims to identify and evaluate the processes, cost and values, area of competitive advantage for industries and come up with a strategic plan, program and projects to address issues and constraints in the development of industry (Department of Trade and Industry, 2008).

In the Philippines, Calamansi (spelled kalamansi in native Tagalog orthography) is a small, very round citrus fruit that's ubiquitous in the Philippines. The fruits are often used when the thin rind is still green on the outside, and that is the color associated with it. Kalamansi is often combined with soy sauce, the mixture of which is used as a marinade or dipping sauce. The Philippines grows more calamansi than any other citrus fruit. Its sour taste constitutes the main ingredient of the locally popular beverage known as calamansi juice. On January 15, 2013, a group consisting mainly of calamansi processors came together to form The Philippine Calamansi Association, Inc. (Benedict, 2015).

For the second quarter of 2016, production of calamansi declined by 9.2% to18.49 thousand metric tons from 20.37 thousand metric tons last year. If this will be developed in a sustainable manner, it has a potential to be an economic growth engine of the country. The product of the calamansi does not only contribute to the economy of the country but it also maintains the cultural of integrity and in the life support system for the vendors. With all of this, one can realize the essence of the calamansi vendors and their contribution to the local economy, specifically, the Municipality of Buenavista, Guimaras (Tagalog Lang, 2016).

According to Dorfman, the theory of production is an effort to explain the principles by which a business firm decides how much of each commodity that it sells (its "outputs" or "products") it will produce, and how much of each kind of labor, raw material, fixed capital good, etc., that it employs (its "inputs" or "factors of production") it will use. The theory involves some of the most fundamental principles of economics. These include the relationship between the prices of commodities and the prices (or wages or rents) of the productive factors used to produce them and also the relationships between the prices of commodities and productive factors, on the one hand, and the quantities of these commodities and productive factors that are produced or used, on the other (Dorfman, 2016).

Buenavista is the oldest municipality in Guimaras. It was established in 1775, during the Spanish colonial period. A Spanish governor general was reputedly impressed by the place Buenavista, in Spanish called for "beautiful view". With 36 barangays, Buenavista envisioned to develop the economy through town-building, and agricultural crops are most considered to realize this vision.

The researchers conducted this research to gather empirical data of calamansi vendor's capability to contribute to the economy of the municipality, as well as the extent of the supply, value and market chain of their products. This study further aimed at determining the marketing flow and the corresponding expenses incurred by marketing participants in distributing calamansi from the producers to the consumers.v

### Statement of the Problem

This study aimed to determine the extent of the supply, value and market chain of the calamansi products and their contribution capability to the local economy of Guimaras. This study sought answers to the following question: (1) What is the value, supply and market chain of calamansi; (2) What are the value-adding activities that can be produced using calamansi; and (3) What are the contributions of calamansi in the local economy of Guimaras?

## METHODOLOGY

The research design used in this study was a descriptive method to determine the practices of the calamansi vendors with an interpretation of the findings. In the study, the descriptive survey method is directed toward the conditions that prevail in a group of cases chosen for the study. Calmorin & Calmorin (2012) said that in descriptive design, the study focuses on the present condition. The purpose is to find out new truth. The study was conducted in the province of Guimaras. The specific location of the study was limited to the four barangays of the municipality of Buenavista, only considering the limited time of the researchers to complete the study and financially they are constrained to finance an island wide study. Hence, the four selected barangays were chosen based on the list taken from the Municipal Agriculture Office, namely: Agsanayan, Piña, San Nicolas and San Fernando. The respondents of this study were the calamansi vendors of Buenavista, Guimaras. They were the ones who sell calamansi product in the locale or nearby towns and provinces. They were determined by actually knowing them by means of being in Buenavista Public Market and Buenavista Wharf and other possible exits from the town. Also, the barangay captains of each barangay identified these calamansi farmers and vendors. Using purposive sampling, a total of 36 farmers and vendors were included as respondents of the study.

Before the questionnaire was administered to the respondents' inter-rates validity determine the reliability of the item. The item was considered reliable when 80 of the jury have signified that a particular item was appropriate. The data gathering instrument was a researcher-made questionnaire. The questionnaire was composed of two parts: Part I–Profile of the Respondents and Part A of Part 2-Value Chain Analysis of Calamansi. The validated research questionnaire was reproduced and personally administered to the respondents. After all the filled-in questionnaires were gathered, the same were coded and tabulated for data analysis through the use of computer in Excel format. The same data was analyzed using the Statistical Package for Social Sciences (SPSS) and interpreted using the appropriate statistical tools. Statistical tools used in this study were frequency count, percentage distribution, and mean.

## RESULTS AND DISCUSSIONS

### Profile of the Respondents

Table 1 presents the profile of the calamansi vendors. As to age, result revealed that 6 or 16.67% were 35–45 years old, 10 or 27.78% were 46–55 years old, 17 or 47.22% were 56-65 years old, and 3 or 8.33% were 66 years old and above, as to sex, 23 or 63.9% were male and only 13 or 36.1% were female. As to educational attainment, 2 or 5.6% were college graduates, 5 or 13.9% were college level, 10 or 27.8% were high school graduates, 5 or 13.9% were high school level, 13 or 36.1% were elementary graduates, and 1 or 2.8% were Elementary Level. As to civil status, 2 or 5.6% were single, 32 or 8.9% were married, 1 or 2.8% were separated, and 1 or 2.8% were widowed. As to monthly gross income, 8 or 22.2% has a monthly gross income of Php 1,000 and below, 6 or 16.7% has a monthly gross income of Php 1,000-Php 2,000, 3 or 8.3% has a monthly gross income of Php 2,001–Php 3,000, 7 or 19.4% has a monthly gross income of Php 3,001–Php 4,000, and Php 4,001–Php 5,000, respectively, while only 5 or 13.9% has a monthly gross income of above Php 5,000. This implies that the majority of the respondents were married males with ages ranging from 56 to 65 years old, elementary graduates and have below Php 1,000 monthly gross income.

Table 1. Profile of respondents

| Particulars | frequency | percentage |
|---|---|---|
| Age | | |
| 35 – 45 years old | 6 | 16.67 |
| 46 – 55 years old | 10 | 27.78 |
| 56 - 65 years old | 17 | 47.22 |
| 66 years old and above | 3 | 8.33 |
| Total | 36 | 100.0 |
| Sex | | |
| Male | 23 | 63.9 |
| Female | 13 | 36.1 |
| Total | 36 | 100.0 |
| Educational Attainment | | |
| College Graduate | 2 | 5.6 |
| College Level | 5 | 13.9 |
| High school Graduate | 10 | 27.8 |
| High School Level | 5 | 13.9 |
| Elementary Graduate | 13 | 36.1 |
| Elementary Level | 1 | 2.8 |
| Total | 36 | 100.0 |
| Civil Status | | |
| Single | 2 | 5.6 |
| Married | 32 | 88.9 |
| Separated | 1 | 2.8 |
| Widowed | 1 | 2.8 |
| Total | 36 | 100.0 |
| Monthly Gross Income | | |
| Below Php 1,000 | 8 | 22.2 |
| Php 1,000 – Php 2,000 | 6 | 16.7 |
| Php 2,001 – Php 3,000 | 3 | 8.3 |
| Php 3,001 – Php 4,000 | 7 | 19.4 |
| Php 4,001 – Php 5,000 | 7 | 19.4 |
| above Php 5,000 | 5 | 13.9 |
| Total | 36 | 100.0 |

**Value Chain**

Table 2 presents the value chain of the calamansi vendors. Result showed that the overall mean for the value chain of calamansi was M=3.09, described as slightly practiced. Moreover, results revealed that majority of the respondents moderately practice decreasing the sales because of many competitors (M=81), owning plantation of calamansi (M=3.64), selling the calamansi at a lower price (M=3.53), easily adapt the changing conditions of the sales (M=3.36), and the number of buyers was just and/or what they have expected (M=3.28). Moreover, they slightly practiced on monthly sales of the calamansi products are decreasing (M3.25), inventory of calamansi is easily disposed (M=3.22), having trouble adapting to the changing conditions of sales (M=3.08), renting a booth to sell the products (M=2.83), and the profit is still increasing even if they have many competitors (M=2.81). However, they fairly practiced owning a booth at the market to sell the products (M=2.56), the booth rent is high (M=2.53), pay the rent of the booth in a low price (M=2.53) and not having their own plantation (M=2.44). The results imply that vendors sell their calamansi products at a lower price and their sales decrease due to many competitors.

Table 2. Value Chain

| Statement | Mean | SD | Interpretation |
|---|---|---|---|
| 1.Have own plantation of calamansi. | 3.64 | 1.39699 | Moderately practiced |
| 2.Do not have own plantation of calamansi. | 2.44 | 1.29713 | Fairly practiced |
| 3.Vendor booth's rent is high. | 2.53 | 1.25325 | Fairly practiced |
| 4.Pay the rent of the booth in a low price. | 2.50 | 1.10841 | Fairly practiced |
| 5.Renting a booth to sell the products. | 2.83 | 1.23056 | Slightly practiced |
| 6.Own a booth at the market to sell the products. | 2.56 | 1.15745 | Fairly practiced |
| 7.The inventory of calamansi is easily disposed. | 3.22 | 0.98883 | Slightly Practiced |
| 8.The number of buyers was not what expected. | 3.50 | 0.65465 | Moderately Practiced |
| 9.The number of buyers was just what had expected. | 3.28 | 0.91374 | Moderately Practiced |
| 10.Having trouble adapting to the changing conditions of the sales of the calamansi products. | 3.08 | 0.76997 | Slightly Practiced |
| 11.Easily adapt the changing conditions of the sales of the calamansi products. | 3.36 | 0.89929 | Slightly Practiced |
| 12.Have many competitors that the sales decrease. | 3.81 | 0.66845 | Moderately Practiced |
| 13.Sell calamansi at a low price. | 3.53 | 0.81015 | Moderately Practiced |
| 14.Monthly sales of calamansi products are decreasing. | 3.25 | 0.84092 | Slightly Practiced |
| 15.The profit is still increasing even if they have many competitors in selling calamansi products. | 2.81 | 1.09073 | Slightly Practiced |
| Overall Mean | 3.09 | 0.92854 | Slightly Practiced |

Scale: 1.00 – 1.79 (Not Practiced); 1.80 – 2.59 (Fairly Practiced) 2.60 – 3.39 (Slightly Practiced); 3.40 – 4.19 (Moderately Practiced); 4.20 – 5.00 (Highly Practiced)

**Value Adding Practices**

Table 3 presents the value-adding practices of the calamansi vendors. Result showed the overall mean of M=3.38, described as slightly practiced. Moreover, results revealed that the vendors highly practiced on knowing the product very well (M=4.33). Vendors moderately practice ensuring the products have no defects (M=4.03), creating their own way to sell their products (M=3.89), estimating the cost of their products (M=3.86), innovating new products out of the calamansi to sell in the market (M=3.50) and selling other kinds of fruits to go with the calamansi product (M=3.50). However, they slightly practiced doing the same strategy as competitors (M=3.22), ensuring that the calamansi products is up to the buyers' expectation, do not know how the competitors work with their products (M=3.17), sorting their calamansi fruit into kilogram or half kilogram to reduce the waiting time of buyers (M=3.00), and only sell calamansi fruit (M=2.69). However, they fairly practiced not estimating the cost of products (M=2.58) and selling calamansi juice in bottles and other calamansi products (M=2.31). The results imply that vendors have enough knowledge about their products and ensure the quality meets customer satisfaction.

| Value Adding Practices | Mean | SD | Interpretation |
|---|---|---|---|
| 1.Know the product very well. | 4.33 | 0.53452 | Highly Practiced |
| 2.Estimates the cost of their products. | 3.86 | 0.68255 | Moderately Practiced |
| 3.Knows how their competitors sell their products. | 3.86 | 0.68255 | Moderately Practiced |
| 4.Creates their own way to sell their calamansi products. | 3.89 | 0.62234 | Moderately Practiced |
| 5.Innovate new products out of the calamansi to sell in the market. | 3.50 | 1.08233 | Moderately Practiced |
| 6.Ensure that the calamansi products have no defects. | 4.03 | 0.69636 | Moderately Practiced |
| 7.Ensure that there is someone with them to accommodate the buyers immediately. | 3.61 | 0.87105 | Moderately Practiced |
| 8.Sort my calamansi fruits into kilogram and/or half kilogram to reduce the waiting time of the buyers. | 3.00 | 0.86189 | Slightly Practiced |
| 9.Do not need to estimate the cost of the product. | 2.58 | 0.87423 | Fairly Practiced |
| 10.Choose to do the same strategy as competitors. We sell the same product, anyway. | 3.22 | 0.63746 | Slightly Practiced |
| 11.Don't know how competitors work with their products. | 3.08 | 0.76997 | Slightly Practiced |
| 12.Only sell calamansi fruit. | 2.69 | 1.03701 | Slightly Practiced |
| 13.Also sell other kinds of fruits to go with the calamansi products. | 3.50 | 1.08233 | Moderately Practiced |
| 14.Also sell calamansi juice in bottles and other calamansi products. | 2.31 | 0.92023 | Fairly Practiced |
| 15.Ensure that the calamansi product that I sell is up to the buyers' expectation. | 3.17 | 0.81064 | Slightly Practiced |
| Overall Mean | 3.38 | 0.81103 | Slightly Practiced |

Scale: 1.00 – 1.79 (Not Practiced); 1.80 – 2.59 (Fairly Practiced) 2.60 – 3.39 (Slightly Practiced); 3.40 – 4.19 (Moderately Practiced); 4.20 – 5.00 (Highly Practiced)

**Contribution to the Local Economy**

Table 4 presents the extent of the contribution of the calamansi vendor to the local economy in the Municipality of Buenavista, Guimaras. Result revealed the overall mean was M=3.20, described as slightly practiced. Contribution to the local economy being was moderately practiced with a mean of M=3.64, followed by aware of the contribution to the local economy (M=3.58), contributing to the local economy is decrease the sales in calamansi (M=3.53), can still meet the required contribution to the local economy (M-=3.44), and gross income every month can still give a high contribution to the local economy (M=3.42), all described as moderately practiced. Moreover, vendors slightly practiced on not knowing where the contributions will go (M=3.39), required contribution to the local economy affects the income in selling calamansi (M=3.36), contribution to the local economy is low (M=3.25), contribution to the local economy benefits the business (M=3.22), do not agree with the amount of the contribution to the local economy (M=3.14), fully agree with the amount of contribution to the local economy (M=3.00), the required contribution to the local economy does not affect the income in selling calamansi (M=2.97), do not have money left after they give the contribution to the local economy (M=2.94), and profit is enough for the family to live that they cannot contribute to the local economy at all (M=2.44). The results imply that the vendors have a significant contribution to the local economy of Guimaras. However, their contribution resulted in decreasing the sales of calamansi.

Table 4. Contribution to the Local Economy

| Statement | Mean | SD | Interpretation |
|---|---|---|---|
| 1.Contribution to the local economy is high. | 3.64 | 0.89929 | Moderately Practiced |
| 2.Gross income every month can still give a high contribution to the local economy. | 3.42 | 0.80623 | Moderately Practiced |
| 3.Can still meet the required contribution to the local economy. | 3.44 | 0.90851 | Moderately Practiced |
| 4.Aware of the contribution to the local economy. | 3.58 | 0.64918 | Moderately Practiced |
| 5.Fully agree with the amount of contribution to the local economy. | 3.00 | 1.01419 | Slightly Practiced |
| 6.The required contribution to the local economy affects the income in selling calamansi. | 3.36 | 0.86694 | Slightly Practiced |
| 7.Contributing to the local economy is decreasing the sales in calamansi. | 3.53 | 0.77408 | Moderately Practiced |
| 8.The contribution to the local economy benefits the business | 3.22 | 0.89797 | Slightly Practiced |
| 9.Don't know where the contributions will go. | 3.39 | 0.90326 | Slightly Practiced |
| 10.Do not agree with the amount of the contribution to the local economy. | 3.14 | 0.79831 | Slightly Practiced |
| 11.The required contribution to the local economy does not affect the income in selling calamansi. | 2.97 | 1.02779 | Slightly Practiced |
| 12.Contribution to the local economy is low. | 3.25 | 0.69179 | Slightly Practiced |
| 13.Have enough money left after they gave the contribution to the local economy. | 2.75 | 0.99642 | Slightly Practiced |
| 14.Profit is enough for the family to live that they cannot contribute to the local economy at all. | 2.44 | 0.99841 | Slightly Practiced |
| 15.Do not have money left after they give the contribution to the local economy. | 2.94 | 0.86005 | Slightly Practiced |
| Overall Mean | 3.20 | 0.87282 | Slightly Practiced |

Scale: 1.00 – 1.79 (Not Practiced); 1.80 – 2.59 (Fairly Practiced); 2.60 – 3.39 (Slightly Practiced); 3.40 – 4.19 (Moderately Practiced);4.20 – 5.00 (Highly Practiced)

## CONCLUSION

Most of the respondents are Roman Catholic, aged 56-65 years old, male, elementary graduate, married, and with monthly gross income of below Php 1,000. The Value Chain and Value-adding practices was slightly practiced by the calamansi vendor. The contribution capability of the calamansi vendor was slightly practiced. The Calamansi vendors of Buenavista must develop more strategies in selling their calamansi products to boost up their income, like innovation of new product out of calamansi.

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# CASHEW APPLE CHIPS

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**ABSTRACT** This study aimed to select the most suitable ripeness of cashew apple for processing chips. Data were gathered using the Hedonic Scale for Sensory evaluation utilizing 15 evaluators through physical observation and laboratory tests. The following were the finding revealed in the study: Slightly ripe cashew apple produced dilated, light green, and crunchy chips and strongly like as to appearance, color, texture, aroma, mouthfeel and taste; Ripe cashew apple produced constricted, yellow and less crunchy and strongly like as to color, aroma and taste moderately ripe for mouth feel and slightly like for appearance and texture; Overripe cashew apple produced constricted, golden brown and least crunchy and strongly like for aroma and taste moderately like for color and mouthfeel and slightly like for appearance and texture; and The microorganism has not controlled the fact that the sample submitted for laboratory test was not newly produced due to in availability of cashew apple is from February to May while the last test was last August 8, 2018.

**Keywords:** Cashew Apple, Chips, sensory evaluation

## INTRODUCTION

### Background of the Study

The cashew tree, a tropical evergreen, produces a cashew nut and cashew apple. The cashew nut is served as a snack or used in recipes, like other nuts. The cashew apple is the fruit. In Guimaras, cashew is one of the fruit trees widely grown in the province where often only the seeds have the economic value once produced as nuts seeds. After the seeds are detached from the fruit, they are just thrown. If there are those that eat these, only few.

Unfortunately, cashew apples are remarkably perishable. Unless they are frozen or kept at a cool temperature, fresh apples last only for a day or so. Ripe cashew apples, once dropped, are prone to bruising and rotting in the sun. When their colors have fully formed, it is best to gently pluck the fruits from the tree. If ripe, they should come off the tree easily. In warm conditions, cashew apples will continue ripening, but they should only be kept at room temperature for a day.

Populations around the world have extolled the health benefits of cashew apples for centuries which is a good source of iron, calcium and phosphorous and has five times the vitamin C of an orange. Among the cashew fruit's health benefits are lowering the risk of heart attack, controlling blood pressure, dealing with asthma, against cancer, healthy eyes, preventing free radicals, handling anemia (The Earth of India, 2019).

### Objective of the Study

This study was conducted to select the most suitable ripeness of cashew apple for vacuum frying.

## MATERIALS AND METHODS

### Materials

Ripe cashew apple
Knife
Chopping board
Boiling container
Small basin
Weighing scale
Polypropylene bag
Freezer
Vacuum fryer
Sackcloth
Wooden scream cabinet

### Methods

The procedure of Cashew Apple Chips

1. Slice the cashew apple into appropriate sizes for chips.
2. Blanch (2 minutes) the pulp in boiling water until the pulp turns soft to touch.

3. Let the blanches cashew apple to cool. Then pack in a polypropylene bag and freeze.
4. The following day, take out the frozen cashew apple. Deep fry (95ºc, 10 minutes, 20 stirring) in frying chamber.
5. Place the fried product inside a clean sackcloth and centrifuge for 7 minutes. After centrifuging, allow to cool and pack in thick polypropylene bags. Store packed products inside a wooden screen cabinet in a cool dry place.
6. Repeat steps 1-5 for replications as indicated below (slightly ripe, ripe and overripe).

## RESULTS AND DISCUSSIONS

Table 1 shows that for trial 1 for all kinds of maturity, the process did not proceed to vacuum frying because after slicing the cashew apples were sliced they were placed inside the freezer where they stayed for 2 weeks and when they were taken out from the freezer, it has been found out that they were moldy already. In trial 2, the 5 kgs slightly ripe produced 3 kgs sliced the 7 kgs ripe, 2kgs and the 8 kgs overripe, 1 ½ kgs while for trial 3, the 6 slightly ripe produced 4 kgs sliced, 6 kgs ripe produced 3 kgs and the 8 kgs overripe produced 3 kgs. The reason why there were more chips produced by the slightly ripe because of more wastage in slicing ripe and overripe cashew apples.

Table 1. Mass of Sliced Cashew

| Maturity of Cashew Apple | Trial 1 | | Trial 2 | | Trial 3 | |
|---|---|---|---|---|---|---|
| | Cashew Apple | Sliced Cashew Apple | Cashew Apple | Sliced Cashew Apple | Cashew Apple | Sliced Cashew Apple |
| Slightly ripe | 6 kgs | The sliced cashew apples were not subjected to vacuum frying due to poor quality as a result of long stay at the freezer | 5 kgs | 3 kgs | 6 kgs | 4 kgs |
| Ripe | 6 kgs | | 7 kgs | 2 kgs | 6 kgs | 3 kgs |
| Overripe | 6 kgs | | 8 kgs | 1 ½ kgs | 8 kgs | 3 kgs |

Table 2 shows that out of 4 kgs slightly ripe cashew apple, 524.8 grams of chips produced; the 3 kgs ripe produce 478.32 grams chips and 3 overripe produced 483.6 grams.

Table 2. Mass of Cashew Apple Chips Produced

| Maturity of Cashew Apple | Mass of Sliced Cashew Apple | Mass of Cashew Apple Chips |
|---|---|---|
| Slightly ripe | 4 kgs | 524.8 grams |
| Ripe | 3 kgs | 478.32 grams |
| Overripe | 3 kgs | 483.6 grams |

It is shown in table 3 that for physical characteristics of cashew apple chips as to appearance the slightly ripe produced dilated chips while the ripe and overripe the chips were constricted; as to color the chips from slightly ripe were light green, the ripe yellow and the overripe golden brown; as to texture the slightly ripe was crunchy, ripe less crunchy and the overripe least crunchy.

Table 3. Physical Characteristics of Cashew Apple Chips

| Maturity of Cashew Apple | Cashew Apple Chips | | |
|---|---|---|---|
| | Appearance | Color | Texture |
| Slightly ripe | Dilated | Light green | Crunchy |
| Ripe | Constricted | Yellow | Less crunchy |
| Overripe | Constricted | Golden brown | Least crunchy |

In table 4 the sensory evaluation results of cashew apple chips show that those produced from slightly ripe for appearance, color, texture, aroma, mouth feel and taste were strongly like; for the ripe strongly like as to color, aroma and taste moderately ripe for mouth feel and slightly like for appearance and texture and those from overripe were strongly like for aroma and taste moderately like for color and mouth feel and slightly like for appearance and texture.

Table 4. Results of Sensory Evaluation of Cashew Apple Chips

| Maturity of Cashew Apple | Cashew Apple Chips | | | | | |
|---|---|---|---|---|---|---|
| | Appearance | Color | Texture | Aroma | Mouth Feel | Taste |
| Slightly ripe | Like strongly | Like strongly | Like strongly | Like strongly | Like strongly | Like strongly |
| Ripe | Like slightly | Like strongly | Like slightly | Like strongly | Like moderately | Like strongly |
| Overripe | Like slightly | Like moderately | Like slightly | Like strongly | Like moderately | Like strongly |

Table 5 shows micro laboratory test result where the aerobic plate count is <250 cfu/g sample, Escherichia coli count is <1.8 MPN/g sample and the molds and yeast count is <100 cfu/g sample. The microorganism was not controlled the fact that the sample submitted for laboratory test was not newly produced due to in availability of cashew apple is from February to May while the last test was last August 8, 2018.

Table 5. Micro Laboratory Test Results

| Sample Description | Parameter | Result |
|---|---|---|
| Cashew Apple Chips 90 grams | Aerobic Plate Count | < 250 cfu/g sample |
| | Escherichia Coli Count | < 1.8 MPN/g sample |
| | Molds and Yeast Count | 100 cfu/g sample |

## CONCLUSION

The slightly ripe cashew is the most suitable for vacuum frying. The chips produced possessed exact characteristics of chips. Microorganism contamination of the product can be controlled if the sample are newly produced.

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# MANGO SEED KERNEL FLOUR

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**ABSTRACT** This study aimed to select the most appropriate maturity of mango seeds for processing flour. Data were gathered using the Hedonic Scale for Sensory evaluation utilizing 15 evaluators through physical observation and laboratory tests. The following were the finding revealed in the study: Flour can be taken from any ripeness of indian mango seeds from slightly ripe, ripe to overripe when the appropriate methodology is applied. All the flour produced were strongly like for aroma, slightly dislike for taste, moderately like for texture and color, the slightly ripe and overripe was strongly like and moderately like the ripe. The microorganism contamination was not controlled the fact that these were procedures performed outside of FIC due to the lack of necessary equipment.

**Keywords:** Mango Seed, Flour, sensory evaluation

## INTRODUCTION

### Background of the Study

Mango is a very common tropical fruit usually found in Western Visayas, especially here in Guimaras. Mangoes belong to the genus Mangifera in the flowering plant family Anacardiaceae. It is cultivated and grown vastly in many tropical regions and is widely distributed in the world. Ripe mangoes are processed into canned products, frozen mango products, dehydrated products, and ready-to-serve beverages. After consumption or industrial processing of the fruits, substancial amounts of mango seeds are discarded as waste (Kittiphoom, 2012). They account for 35%–55% of the fruit, depending on the variety. Therefore, the utilization of mango by-products, especially mango seed, maybe an economical way to reduce the problem of waste disposal from mango production. Disposal of their materials usually represents a problem that is further aggravated by legal restrictions. Thus, new aspects concerning the use of their wastes as by-products for further exploitation on the production of food additives or supplements with high nutritional value have gained increasing interest. It is well known that by-products represent an important source of dietary fiber, sugars, minerals, organic acid, and phenolics with a wide range of action including anti-tumoral, antiviral, antibacterial, cardioprotective and anti-mutagenic activities.

### Objective of the Study

The study was conducted to select the most appropriate maturity of mango seed for processing.

## MATERIALS AND METHODS

Materials
Mango Seeds
Stainless Steel Knife
Cabinet Dryer
Air Tight Container
Chopping Board
Food Processor
Sealer

Procedures
1. Mango seeds were washed and dried in cabinet dyer 60˚c for 6 hours.
2. Kernels were separated from stone manually using stainless steel knife and dried in a cabinet dryer at 50˚c for 4 hours and stored in our tight container.
3. During processing, stored kernels were soaked 6-7 hours in the vwater, sliced into pieces, blanched (1-2 mins) dried 60˚c for 5 hours and ground into powder in food processor, sieved and stored in our tight container.
4. Repeat procedures 1-3 for the different ripeness of mango seed (slightly ripe, ripe, and overripe).

## RESULTS AND DISCUSSIONS

Table 1 shows the mass of Indian Mango seeds used and the amount of flour produced for every trial. Results show that for the first trial for the maturity of seeds the process ended only at cabinet drying due to undesirable result for the reason that the seeds used have stayed for two weeks before they were processed for drying. For trial two, the amount of sliced and blanched seeds was minimal for grinding due to more wastage during the peeling and slicing. In trial three, for the slightly ripe, out of 5 kgs seeds, 300 grams flour was produced; for ripe 166 grams and overripe 133 grams.

Table 1. Mass of Indian Mango Seeds and Flour Produced

| Maturity of Indian Mango Seeds | Trial 1 | | Trial 2 | | Trial 3 | |
|---|---|---|---|---|---|---|
| | Mango Seeds | Flour Produced | Mango Seeds | Flour Produced | Mango Seeds | Flour Produced |
| Slightly ripe | 5 kgs. | After cabinet drying, the | 5 kgs. | There were more wastage | 5 kgs. | 300 grams |
| Ripe | 5 kgs. | seeds became black, so the | 5 kgs. | of seeds due to wrong procedures | 5 kgs. | 166 grams |
| Overripe | 5 kgs. | process did not proceed to further steps | 5 kgs. | in peeling and cutting of seeds | 5 kgs. | 133 grams |

Table 2 shows that for the final production of flour to be the sample for laboratory test, improvement was done starting from peeling and slicing in order to produce the desired quantity for laboratory test, the 5 kgs slightly ripe produced 300 grams; the ripe 295 grams and the overripe 290 grams.

Table 2. Mass of Indian Mango Seeds and Flour Produced for Final Production of Sample for Laboratory Tests

| Maturity of Indian Mango Seeds | Trial 1 | |
|---|---|---|
| | Mango Seeds | Flour Produced |
| Slightly ripe | 5 kgs. | 300 grams |
| Ripe | 5 kgs. | 295 grams |
| Overripe | 5 kgs. | 290 grams |

Table 3 shows that the flour produced from slightly ripe and overripe is colored white and fine as to texture while that from ripe is light brown in color and fine in texture.

Table 3. Physical Characteristics of Flour Produced

| Maturity of Indian Mango Seeds | Trial 1 | |
|---|---|---|
| | Color of Flour | Texture of Flour |
| Slightly ripe | White | 300 grams |
| Ripe | Light brown | 295 grams |
| Overripe | White | 290 grams |

Data in Table 4 shows that the sensory evaluation results for color, the flour produced from slightly ripe and overripe was strongly like while that from ripe was moderately like; as to texture, all the flour produced from different maturity were moderately like; for aroma, all the flour produced were strongly like; and for taste, slightly

Table 4. Results of Sensory Evaluation of Indian Mango Seed Kernel Flour

| Maturity of Indian Mango Seeds | Indian Mango Seed Kernel Flour | | | |
|---|---|---|---|---|
| | Color | Texture | Aroma | Taste |
| Slightly ripe | like strongly | like moderately | like strongly | slightly dislike |
| Ripe | like moderately | like moderately | like strongly | slightly dislike |
| Overripe | like strongly | like moderately | like strongly | slightly dislike |

Table 5 shows micro laboratory test results, where the aerobic plate count is 48,000 cfu/g sample and Escherichia coli count is <1.8 MPN/g samples. The molds and yeast count are 55,000 cfu/g sample. The indian mango seeds were ground at the private grinder due to the unavailability of such equipment at the Food Innovation Center. Thus, the possibility of contamination was not controlled.

Table 5. Micro Laboratory Test Results

| Sample Description | Parameter | Result |
|---|---|---|
| Indian Mango Seed Kernel Flour 200 grams | Aerobic Plate Count<br>Escherichia Coli Count<br>Molds and Yeast Count | 48 000 cfu/g sample<br>< 1.8 MPN/g sample<br>55 000 cfu/g sample |

## CONCLUSION

Flour can be taken from any ripeness of indian mango seeds from slightly ripe, ripe to overripe when the appropriate methodology is followed. Microorganism contamination of the product can be controlled if all the necessary equipment are available at the FIC.

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# TRADITIONAL KNOWLEDGE SYSTEM OF WATER AND COASTAL ENVIRONMENT FOR CULTURAL RESILIENCY AND SUSTAINABLE DEVELOPMENT IN GUIMARAS

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**ABSTRACT** Traditional Knowledge System is vital in maintaining stability in the physical, socioeconomic and cultural ecosystem. They provide backgrounds in the operation of human interaction and adaptation to the environment, especially for resources sustainability. This study was conducted to identify water bodies, the traditional method of catching fish and other marines/water resources, its preservation, fishlore, and other practices which have kept the sustainability of the water resources in Guimaras Island. The research design used was qualitative. Most of the fishermen learned from their fathers and grandfathers that the Island is rich with unique features and habituated by equally important organisms. The water bodies surround and within Guimaras, the Panay Gulf (facing Suba Malawig), Visayan Sea, and Guimaras Strait (area of Siete Picados), with major river system Mantangingi, Sibunag, and Cabano. In these fishing grounds locals use baroto "boat" for fishing and traveling, traditional fishing methods of catching fish and other water resources were " Pangurantayan" used to catch "tabagak" (anchovy), "Pamanggal" used to catch crab, fish and shrimp using circular hand-woven bamboo, "Pang-agihis" method of catching freshwater shell (agihis), "Panangub" method of catching freshwater shrimp, crab "alimango", and "Pamunit" method of catching fish using "bunit" (Hook) that proved to be sustainable, used by the locals to acquire aquatic resources from the shore down to the sea. Other marines and water resources available were Dugong "sea cows", Banagan "Lobster", Lumba-Lumba "Irrawaddy Dolphin", Pawikan "marine turtles" and Pulang Pasayan "red shrimp" which is believed to be enchanted. A traditional way of fish preservation was common practice in the island known as pamulad "sun drying" to form uga "dried fish" and steamed cooking techniques for crabs. Folklore and beliefs were associated with the sea and other resources were feared species, and precautionary measures like panuob "fumigation ritual" and other fishing rituals are performed for bounty catch before fishing. Some practices related to water and coastal environment of Guimaras Island are tultul-making, the process of producing a solid rock salt tablet, seaweed farming, and salt making. The collection of traditional knowledge of water and coastal environment in Guimaras Island are integral among the locals which have been learned from personal experiences of the elders and handed down to succeeding generation through knowledge transfer which ensure the perpetuation of the resources.

**Keywords:** Traditional Knowledge System, water, coastal environment, cultural resiliency, sustainable development, Guimaras

## INTRODUCTION

### Background of the Study

Guimaras is an island province of the Republic of the Philippines located in the Western Visayas region. It lies in the Panay Gulf, southeast of Panay Island. It is separated from Panay Island by Iloilo Strait (1.5 n.m.wide) and from Negros Island by Guimaras Strait (6 n.m.wide). Guimaras Province includes the islands of Guimaras, Inampulugan, and many small islands, covering approximately 605 km. The major fishing ground is the Guimaras Strait, which covers 7,120 km and is 18 m deep on average. Over 60% of the cities and municipalities in Guimaras Province face the sea. The population of the island is about 151,000 persons, with about 28,000 households. The province is basically agricultural, including fisheries. Its major industries are tourism, fruit processing, coconut processing, fish farming, handicrafts, mining, and lime production. Municipals surveyed in this study include Jordan and Nueva Valencia.

Guimaras is surrounded by bodies of water for navigation, fishery, and habitat of different marine organisms. Natives of the island use banka "boat," either motorize or not, to navigate the island and to explore as well as to fish. The Island is rich with unique features and habituated by equally important organisms. Most of the fishermen learned from their fathers and grandfathers that this place was abundant with fish and other sea creatures.

'Traditional Knowledge Systems' as defines by the United Nations University" is a Traditional knowledge or 'local knowledge' is a record of human achievement in comprehending the complexities of life and survival in often unfriendly environments. Traditional knowledge, which may be technical, social, organizational, or cultural was obtained as part of the great human experiment of survival and development." Laura Nader stated that studying Traditional Knowledge Systems (TKS): "The point is to open up people's minds to other ways of looking and questioning, to change attitudes about knowledge, to re-frame the organization of science — to formulate a way of thinking globally about traditions."

Traditional Knowledge System (TKS) is the know-how of the people, gathered through day to- day walk of life, to overcome the hurdles and tap the potentialities from their immediate neighborhood. In fact, TKS evolved in a specific location within certain physical and sociocultural environment, where it reflects people's specific knowledge, understanding as well as observational and experimental information about their dwelling environments, along with skill and technology to design a lifestyle in that specific environmental context.

**Objectives of the Study**

This study was conducted to traditional knowledge system on water and coastal environment specifically to identify water bodies, the traditional method of catching fish and other marines/water resources, its preservation, fish lore, and other practices which have kept the sustainability of the water resources in Guimaras Island.

## MATERIAL AND METHODS

The research design used in the study was qualitative to identify traditional knowledge on water and coastal environment. The informants of this study were the identified locals' age ranging 60 years old and above, a residence of Guimaras that were engaged in catching fishes and other practices willing to participate in the research. To gather the needed data, an interview guide prepared by the researchers was used. One-on-One Interview was conducted. It is a personal interview that is carried out with the informant at a time. This is purely a conversational method and invites opportunities to get details in depth from the informant. A qualitative observation was also done to gather systematic information on the site and during the actual act of the informant. Qualitative use subjective methodologies to gather information on specific area. Narrative analysis was to analysis collected data which was done by reformulation of stories presented by the informants taking into account the context of each case and different experiences of each respondent.

## RESULTS AND ANALYSIS

**Water Bodies surround and within Guimaras**

The water bodies surround and within Guimaras, the Panay Gulf (facing Suba Malawig), Visayan Sea, and Guimaras Strait (area of Siete Picados), with major river system Mantangingi, Sibunag, and Cabano. This water bodies provide a bountiful source to the locals.


*Fig. 1. Guimaras major river system Mantangingi, Sibunag, and Cabano.*

**SietePicados "Las Islas De Siete Picados"**

Island specifically Barangay San Miguel, Buenavista, Guimaras Siete Picados is a place where a lot of fishers goes to catch fish, most of the people who catches fish came from Barangay, Magsaysay, Sawang, Zaldivar, Tacay, Taminla, Getulio, Navalas, Bacjao and other near Barangays.

People of the surrounding Barangay considered fishing as a source of their food and livelihood to support the needs of their families. Traditionally, fisher folks within the Island of Guimaras get its source near the small islets of Siete Picados. It is believed that the seven islets served as the niche of different marine organism that was found in the surrounding water.

*Fig. 2. Siete Picados Island located at Baranggay San Miguel, Buenavista, Guimaras*

**Suba Malawig**

Suba Malawig is a river which stretches to approximately two km up to the boundary of Barangay San Roque and Barangay La Paz. At the right of the river, nearing the end point is the islet called "Bantigue Daku", adjacent to it, it is another islet called "Bantigue Gamay". These two islets were named after the Bantigue Trees which are abundantly growing in this area.

Suba Malawig was traditionally known to all fishermen to be a Fishing ground where a lot of fish lived in extending along the coastal water of La Paz and San Roque Nueva Valencia. This place was known by the people living on that place to be a good fishing ground since they learned it from their fathers and grandfathers through regular convoying during fishing.

*Fig. 3. The Suba Malawig.*

**Traditional fishing methods of catching fish and other water resources**

**Traditional fishing methods**

In these fishing grounds locals use baroto "boat" for fishing and traveling, traditional fishing methods of catching fish and other water resources.

**Pangurantayan** is a one of the method used to catch fish called tabagak using net. This has been one of the traditional methods and a source of food and livelihood of the people in the community. Along with this method, fishermen use Bangka and later was change to a motor Bangka with their nets and other equipment such as flashlight made of a small bulb and covered with plastic container used to give light during night time of fishing. They have started to use this fishing equipment since 2009 due to its convenience and its ability to last for a longer time compared to improvised light equipment such as torch light (sulo) which he used since 1980's until 2000's.

Fig. 4. Bangka and net used as fishing equipment of fishermen in the community.

Nowadays, when catching crabs new styles and techniques have evolved and are used by fisherman due to modern technologies. New equipment were discovered and some of the old practices were changed.

*Fig. 5. Circular handwooden Panggal made of bamboo material.*

**Pang-agihis** is a traditional method of getting freshwater agihis. This method does not use any gear, they only use their hands and feet to get the agihis. Agihis is a kind of shell that can be found on the shallow and muddy portion of the river. It is a 7-10 mm bivalve, a much sought-after supplemental feed for shrimp and a treasure for those who love seafood. It is a member of genus Potamocorbula, and it belongs to the species group of Corbula fasciata. Its shell can be provisionally identified as Potamocorbula sp. (Family Corbulidae).

Most of the time, they catch agihis in the morning and in the afternoon, so that it is not hot. During the catch, one should not be noisy in order for him to have plenty of catch.

Pang-agihis has been one of the traditional methods of catching fish and other crustaceans once the sea water is in low tide among the communities in the area ever since that the informant can remember. Pang agihis has been the alternative mode of sourcing of food and livelihood of the people in the community.

*Fig. 6. The freshwater agihis found in the riverside*

**Panagub** is a traditional method of catching freshwater orang (shrimp), alimango (crabs), isda (fish) and other freshwater creatures. Manugtagob is the person who uses a tinagub to catch freshwater orang (shrimp), alimango (crabs), isda (fish) and other freshwater creatures. The gear needed in this method is a tinagub which is made of bamboo strips and tied with balagon (vines).

The manugpanagud brings his tinagub on the Linab River of Brgy. Tanglad, Sibunag, Guimaras and rivers of Ravina to set up his tinagub on the mouth of the river, in order to trap the freshwater orang (shrimp), alimango (crabs), isda (fish) and other freshwater creatures. He sets it up in the morning and gets the tinagud in the afternoon. He is inspired by his family to practice panagob in order to provide for the needs of his family, for it is one of their sources of food.

Panagob has been one of the traditional methods of the communities in the area since time immemorial given that it's both a source of food and livelihood of the people in the community. The method is being learned by children from their parents through regular convoying and observation during panagob.

*Fig. 7. Tinagub that were used to catch freshwater creatures.*

**Pamunit** is a traditional method of catching fish with the use of bunit (Hook). This is popularly known as Hook and line method. The bunit is composed of the holder commonly made a bamboo pool, the line or nylon string where the hook (taga) is attached.

Nagapamunit is a person, who uses bunit, the bait being used was pinned on his taga (hook) were frog, locally known as lab-as nga paka nga bug ungan, and shrimp, locally known as orang. He sets up his bunit on the fishing area and waits until a fish or alimango was baited. He frequently caught alumna, luad-luad and alimango. He uses a non-motor banca equipped with a paddle, locally known as bugsay, made of Gemelina tree. He catches fish at the Cabano River.

Pamunit has been one of the traditional methods of catching fish in the communities in the area since time immemorial given that it's both a source of food and livelihood of the people in the community. Anybody can easily create their own hook and line gadget either by using indigenous materials such as bamboo pool as holder, nylon string and hook. Others are already using the commercially sold hook and reel. Pamunit became a hobby to some but to small fisher folks it is a form of livelihood for them.

*Fig. 8. Pamunit*

**Other marines and water resources**

**Dugong 'Sea Cows'**. Dugong (Dugong dugon) belonged to class mammalia. This sea mammal is herbivorous and thrived on diet seagrass. Dugongs graze on underwater grasses day and night, rooting for them with their bristled, sensitive snouts and chomping them with their rough lips. These mammals can stay underwater for six minutes before surfacing. They sometimes breathe by "standing" on their tail with their heads above water (National Geographic, 2018).

Dugongs sighted in Guimaras were still young. They were light brown in color, and do not have a well-developed snout. They were trapped in a fish pen in Taminla, Buenavista, Guimaras. The length is approximately between 1-2 meters. Another sighting was at San Lorenzo, Guimaras. It was pinkish-brown in color. It was believed by the locals that a captured dugong must sent back to the sea to avoid bad luck. No conservation program was implemented by the Department of Evironement and Natural Resources as of the moment.

*Fig. 9. Dugong sighted in Guimaras Island.*

**Lumba-Lumba "Irrawaddy Dolphin (Orcaella brevirostris)"**. The Guimaras Sea is home to rare sea turtles likewise haven for rare Irrawaddy dolphin and dugongs. In Guimaras Island, the color and the shape of the head/mouth was described by the people to be at an approximate length of between 1-2 m long, black with brown tummy. It appeared during the last quarter moon between Roca Encantada and Tangab in Buenavista, Guimaras at 8 a.m, then they moved away, and, at 9-10 a.m, they returned back to the area. Lumba-lumba or "Irrawaddy Dolphin" was sighted along the coastal waters of Buenavista to San Lorenzo, Guimaras.

Lumba-Lumbas are still sighted in the area, within the same parameters as observed by the barrio folks, but not as frequent as the past years. Conservation and protection programs were not yet established to include areas with sightings of Irrawaddy dolphins for preservation and perpetuation of their species.

Irrawaddy dolphins are directly threatened in the area by means of getting themselves along with the daily catch or trapped in fishing gears. The solid wastes thrown in the water, and well as the presence of fast crafts also threaten their sightings due to the waves and sound that the fast crafts create, as the dolphin are sensitive.

*Fig. 10. The Lumba-lumba (Irrawaddy Dolphin) sighted along the coastal waters.*

Banagan. Lobster (Panulirus sp.), locally known as banagan, is a highly-priced marine crustacean both in local and international markets. It is trapped using bottom gill nets, and the availability of supply is dependent on a day's catch.

In Guimaras, spawning of lobsters peaks in October. Young lobsters are found in the local coral reef areas during low tide. Lobsters are difficult to catch because of their small size, spiny body and swift movement. In San Miguel, Buenavista, Guimaras, it was observed that the fishermen focused their activities in catching lobsters. Both big and juveniles were caught and are being marketed. Fisher folks use bangka to go to the sea and dive-in to capture the lobster within the area of Siete Picados in Buenavista, Guimaras, and back to the shore or buying area as early as 7:00 o'clock in the morning until 10:00 A.M. or until such time that the lobster buyers would go home, which signals that no more fishermen would be selling their catch.

*Fig. 11. Banagan*

**Pawikan.** One of the five marine turtles, locally called pawikan, found in the Philippines is the hawksbill turtle which is known scientifically as Eretmochelys imbricata. It is found throughout the Philippine archipelago which includes the Guimaras Island. Its natural habitat is the coral reefs which serve as nesting areas. Coral reefs are rich sources of food from which the hawksbill turtle gets its food. Its main diet consists of sponges, anemones, and invertebrates. In Guimaras, pawikans are sighted in different municipalities. Sightings of and captive pawikans in Getulio, Buenavista, Guimaras were sent to, cared for, and are protected in Nueva Valecia, Guimaras through the help of the Government Agency.

Pawikans are threatened in the area by bycatch when they accidentally get caught in fishing gears. Human exploitation for commercial purposes; marine pollution (debris dumped into the sea by humans); beach development; and shoreline erosion were observed as threats among them.

*Fig. 12. Pawikan*

**Pulang Pasayan.** Pulang pasayan in Pandaraonan, Nueva Valencia, Guimaras is also known as Tiniguiban Islet in the maritime charts is home to the rare species of scarlet-colored shrimps. Pulang pasayan is a specie of a shrimp that is colored red. Locals believe that the scarlet-colored shrimps found in the island are enchanted and refrained from consuming the brightly

colored crustaceans. Fisher folks would warn visitors from pointing the shrimps to spare them from being harmed by enchanted beings.

It has been believed by the people living in that place to be a "sapat nga mariit" kay tumalagsa lang ini makita tungod sa iya kolor, kag sila may pagpati nga kun ikaw magakaun sang ini nga sahi sang pasayan (because they are seldom seen due to their unique color, and the elders believe that when one eats these kind of shrimp), ikaw amu ang masinda (you are supernaturalistic). The island of Tiniguiban was privately owned by Mr. Jose Martinez.

The people in the island built a pond for the pulang pasayan to live in. They are "talan-awon sang mga tawo nga nagakadto sa Isla tungod isa ini sa pinakasahi nga sapat" (a sight for people who go to the islet because of their uniqueness).

Pulang pasayans in Guimaras are translucent to grayish in color, with a single red band. They thrive in a small pool-like area near the shore. Pulang pasayans showed distinct similarities with fresh water Red Cherry Shrimps, but researchers based the description on the available materials that they were able to gather from sources on the Internet, but no specific descriptions were available for the pulang pasayan of Guimaras.

*Fig. 13. Pulang Pasayan*

**Traditional way of fish preservation in the Island**

**Pamulad "sun drying"**. In completion of the process for sustainability of the resources, pagbulad was applied as a fish processing technique used to preserve fish with the use of kaping which is made of bamboo and tied with a rattan. It is done during a sunny weather in order to have a dried fish.

Tabagak was placed in a large container or box, locally known as tumanan for a period of 3-5 days wherein a container is closed. The containers contain saline solution where the fish body is allowed to imbibe the salt for preservation. After which, once ready, the fish are placed in bamboo-made sun-drying equipment which is locally called kaping. It is a bamboo slotted drying equipment wherein the fish are exposed to the sun and allowed the fish to dry for a period of one day or more depending upon the intensity of the heat of the sun.

The method is being passed on to children from their parents through regular convoying and observation during pagpangisda, panginhas and pamulad.

*Fig. 14. Process of Pamulad*

**Steamed Cooking Techniques for Crabs.** There are a lot of processing techniques practiced nowadays but in the previous years, people mostly used the steaming cooking techniques in order to preserve the catch they got to prolong the consummation of food. Steaming is a cooking process used by the key informants. They prepare the crabs to be steamed using a stainless pot. A pot made of nets designed according to pot size was placed inside the stainless pot to hold the crabs.

After the crabs were cooked, they are placed flat on a drying area made of net to be dried. The dry crabs are then placed inside a plastic container, which is then placed in a styro box added with ice for preservation before it was transported to the buyer.

*Fig. 15. Steamed cooking techniques for crabs*

**Some practices related to water and coastal environment of Guimaras Island**

Tultul. Tultul is a solid rock salt tablet only produced and manufactured by the Padohinog family residing in Hoskyn. It is one of the attractions in Guimaras Island and one of the bestselling products not just of the Municipality of Jordan, but of the entire province. Tul-tul is an intricate process of collecting and drying salt particles found in selected wooden and bamboo floatsom and jetsam found along the shoreline of Jordan particularly in Brgy. Hoskyn's by means of burning.

Upon gathering the dagsa, along the shoreline, the Padohinog family will start a fire in a rock-and-sand pit deep enough for them to do the firing process. Later on pile of woods and bambooes they have gathered as dagsa would be added on top of the fire one batch after the other. They pile a dagsa one batch over another for five consecutive days until the lowermost portion will produce pure and fine ash through continuous firing. The dagsa that they choose from are those plants or tree parts which they found along the shoreline particularly the bamboo parts and other wooden particles which adrift along the shoreline of Brgy. Hoskyn, Jordan, Guimaras

*Fig. 16. Piling of bambooes and woods for firing process of making Tultul*

On the sixth day, the collected ashes shall be poured with saltwater while being exposed to open air for cooling down. When the ash is already cool, they collect it and put it inside plastic sacks. If the ash is deemed to be enough, it is gathered in two large kaings or bamboo containers, which are then placed on an elevated platform.

*Fig. 17. The process of collecting ashes poured with saltwater to cool it down (left) and gathering of cooled ashes in two large kaings which is placed in elevated form (right).*

Seawater is then poured over the first kaing to wash down the salt from the ashes. A pail then catches the strained saltwater. The second bamboo container will be poured over by the earlier strained saltwater from the first container. This process is repeated over and over again until the saltiness is deemed to be enough by a secret mixture/chemical which only the producer knows it.

*Fig. 18. Pouring of seawater to wash down salt from the ashes.*

The next step involved is a hurnohan or a molder made out of large cooking oil tin containers. The strained saltwater from the second kaing is poured into these hurnohans, which have live fire below them. While the cooking goes on, small amounts of this strained saltwater is continuously added to the container. This goes on until the moisture from the solidified salt has completely evaporated. The finished product, called a bareta, is then left in the pan.

Fig. 19. The process of straining saltwater into hurnohans until the moisture completely evaporated (left) and the bareta (right).

**Significance:**

Tultul-making is a form of eliminating marooned wastes along the seashores. Through the gathering of dagsa, tultul producers help segregate the trash from Iloilo brought to the island by tidal action found adrift along the shoreline of Brgy. Hoskyn, Jordan, Guimaras. Brgy. Hoskyn faces Iloilo City and its geographical location is very ideal of catching whatever particles found adrift along sea waters separating Iloilo and Guimaras province.

**History/Evolution:**

Making tultul is about preserving a familial tradition and means of living that's been with the Padohinog family for more than a hundred years. According to Tatay Sirafin, the oldest person who practices the making of tultul in Guimaras, he actually didn't know when was the exact time when the process of tultul making begun. When Tatay Sirafin was a kid, his father Meliton Ganila said that tultul was cooked using the "buhos sang bunga" (areca or beettle nut palm leaves), which servde as cooking pan, and charcoal as fuel for cooking. This palm leaves base was hung in two bamboo poles and cooked using charcoal because, during that time, the cost of charcoal is very cheap and fire produce was easily manipulated/handled. This practice was witnessed by Sirafin's father from his grandaunt Polina Ganila.

When the tin-canned sardines became popular, the tin cans were used as cooking pans in exchange of palm peotle, with both charcoal and wood used as fuel. The advantage of using tin can is that it is easily heated, which hastes the solidification process of liquid salt during cooking. Moreover, it is more durable compared to palm peotle because the latter requires a measured amount of fuel in order for it not to burn.

On 1946, Rizaldo de Asis, the father of Sirafin's wife Emma de Asis Ganila, started his tultul production and introduced this newly discoveredsubstitute for a cooking pan and stove for tultul which is still being used until now. The cooking pan is made of mantiqulla/oil tin can brought from Iloilo City. The tin can measure 10" x 14" x 2" and is deformed into a square. The stove was made up from a pile of rocks which were covered with ash, which was taken after filtration. However, these were changed into concrete hallowblocks and this new design only used wood for fuel because it is more efficient and is cheaper than charcoal.

When Tatay Sirafin started his tutltul production in 1976, he also used the same design of cooking pan introduced by Rizaldo de Asis. At present, his niece Nanay Sherly Padohinog and her family are the only ones who prepare the material for tultul, and Tatay Sirafin only assists them in cooking.

**Superstitious Belief**

Hindi pwede magkadto ukon maglantaw sa pagluto sang tultul kung ikaw halin sa isa ka namatyan ukon may nalabayan nga patay nga sapat. (People cannot observed in the preparation process of Tultul once you have visited a wake of a dead person or even you have just seen along the way one dead animal).

Hindi pwede magkadto ukon maglantaw sa pagluto sang tutltul ang babayi nga may ara sang menstruation ukon ang mag-asawa nga nagpakighilawas sang nagligad lang nga gab-i asta sa tiempo sang pagluto. Suno sa mga katigulangan, nagakabuka ang asin pagkatapos luto kag may gahurma nga daw "monay" sa tableta sang tultul (A woman who has menstruation likewise cannot see and observe the Tutltul processing or a couple who have sex a night before because according to old folks' beliefs the Tultul once formed have developed a female organ shape in one of the products).

**Seaweeds.** Seaweed refers to several species of macroscopic, multicellular, and marine algae. The term includes some types of red, brown, and green algae. Seaweed can also be classified by use (as food, medicine, fertilizer, filtration, industrial, etc.). The varieties/species of seaweeds that can be found in the area were: cotonie (green and brown) and spynosom.

*Fig. 19. Seaweeds*

The informant added that "manami ang tubo sang seaweeds kon manami ang timpla sang tiempo kapin pa gid naga ulan-ulan. After the cultivation of seaweeds, ginatipon ini kag ginapanguha ang mga dalagko na kag ginaseparar ang gagmay pa para ihigot balik sa dagat gamit ang kawayan nga ginabugsok kag ginahigtan ang mga ini sang kalat."

It will take 3 months for the seaweeds to grow. Some people consume the seaweeds directly; some are processing it to make seaweed atsara and seaweed crackers, and some are also exporting it.

*Fig. 20. Sun-drying Seaweed (left) and Seaweed atsara (right)*

Seaweed culture has been identified as one alternative income generator for coastal communities. The General Impact of the Seaweed Industry. The municipality of Sibunag is successful with its project developing quite fast as expected. In less than a year, it was able to sell in big volumes and break into the markets of Cebu with its dried seaweed. The industry has steadily improved and has sustained the income sources of seaweed growers which started with 18 registered members in 2004 to 218 in 2006. As it was not much affected by the oil tragedy compared to other coastal barangays such as in Nueva Valencia, the industry complemented with the resiliency of the town folks is fast recovering and expected to exceed its past peak performance. Seaweed is consumed and exported by the people living near the coastal Barangay since it is both their source of food and livelihood. Seaweed production is a great help in improving the livelihood of the fisher folks especially during times that fish catch is not good.

The Philippine Rural Development Project (PRDP) in support of the seaweed farming in the community created additional employment for women and out-of-school youth and ensured sustainability of volume and quality of production.

Seaweeds are one of the traditional foods that can be found near the coastal Barangay of Sabang, Sibunag, Guimaras. Previously, it was planted to feed abalone shell as the demands for abalone shell was high in the previous years, with the decline on the demands of abalone shell from foreign costumers at the same time it opens the gate for another opportunity. Seaweeds growers shifted into selling dried seaweeds until today.

Seaweed growers in Guimaras Island are increasing production through a counterpart-funding scheme with the World-Bank supported Philippine Rural Development Project (PRDP). More than 400 seaweed growers from the towns of Sibunag, Nueva Valencia, San Lorenzo and Jordan are participating in P18.5-million initiative called the Guimaras Seaweed Production and Marketing Project under the enterprise component of the PRDP.

**Salt Making.** Salt is the number one go-to in terms of food preservation and preparation. In Barangay Sebaste, Sibunag, arirings (wind turbines) are devised. These arirings are made out of PVC sheets, wood, and timber. They are used to pull the water from the saltwater river towards where a community produces salt. The saltwater is then gathered in makeshift ponds called hay-angan, which are then connected to tubes leading to a shallow bubons (wells) called tuba-an.

*Fig. 21. The images show the ariring (left) and fisher folks preparation of making salt.*

Kahons (boxes) are dug in the ground and lined with cellophane to allow saltwater to dry. Each kahon can contain a balde (pail) or 5 liters of saltwater, approximately an inch high. All kahons are left to dry for 24 hours and are scraped with a non-toothed flat-ended rake called kagot. Each kahon makes 1/3 pail of salt, estimated to be half a ganta.

*Fig. 22. The salt making in the kahons.*

The scraped soft salt crystals are then stacked in a heap at an elevated papag lined with screen where they are left to dry for another 12 hours. The salt is then stored in a kamalig built of sawali and screen for further drying. It will be stored until the salt is sold or bought.

Even after hi-tech advances led to the beginning of more efficient processes in salt making in the province, older techniques are still observable on the present method used by the salt makers. The survival of the methods and practices was employed in the improved process of salt making in addition of locally-specific improvised equipment which are naturally available in the environment and economically sustainable.

*Fig. 23. Storing of salt in kamalig for further drying.*

Traditional knowledge includes the architectural method, tools and ways of production salt. While some of the tools and materials used have slight change for past years, others have been replaced with new ones for convenience and efficiency. The artisanal knowledge needed had been improved through the construction of improvised ariring and in general the salt making sustainability is dependent on the climate change as drying process was dependent with the sun if there is a continuous change in climate salt making will be increasingly in danger. Salt production will be less as compared to its demands from neighbouring provinces such as Negros Island and Iloilo.

Salt was considered as an additive and preservative in foods, it has been traditionally used by the people for food and later was used other forms. Salt making is one of the livelihoods among the people of San Lorenzo and Sibunag, Guimaras, significantly help their income as well as help other members of the community as part of the working force throughout the salt making process.

**TRADITIONAL BELIEF:**

*Indi pwede ka pamayong kon naga pangsudsud sang asin kay, suno sa ila pagpati, ang payong nagapanghagad sang ulan* (It is advised not to use umbrella when doing some activities in the salt farms because you are inviting rain).

## CONCLUSION

The Guimaras Island is favored with aquatic resources that provides maintenance producing a solid rock salt tablet, seaweed farming, and salt making. A traditional way of fish preservation was common practice in the island known as pamulad "sun drying" to form uga "dried fish" and steamed cooking techniques for crabs. Folklore and beliefs were associated with the sea and other resources were feared species, and precautionary measures like panuob "fumigation ritual" and other fishing rituals are performed for bounty catch before fishing. Some practices related to water and coastal environment of Guimaraas Island are tultul-making, the process of producing a solid rock salt tablet, seaweed farming, and salt making. The collection of traditional knowledge of water and coastal environment in Guimaras Island are integral among the locals which have been learned from personal experiences of the elders and handed down to succeeding generation through knowledge transfer which ensure the perpetuation of the resources.

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# COASTAL WASTE IN BUENAVISTA, GUIMARAS: INPUT TO BRIQUETTE PRODUCTION

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**ABSTRACT** Charcoal briquette production is environmentally friendly in another way. Briquettes have a wide variety of use from household to industrial. The study was conducted to produce briquette out of the collected waste materials to support the agenda biodiversity and climate change mitigation and environmental studies of Research and Extension Services of Guimaras State College. The study used descriptive-experimental research methodology. The product was derived from the biodegradable coastal waste gathered through the following steps: a. Sorting/ sieving b. Shredding coastal waste materials into small pieces c. mixing all shredded waste materials d. Addition of binder and adding of water and lastly e. compaction & drying. Briquettes are made from raw materials that are compacted into a mould. Coastal-waste fuel briquette was formed in a cylindrical shape with a dimension of 2 inches in diameter and 2 ½ in height. The compositions of treatment were (a) 75% shredded coastal waste and 25% powdered charcoal (b) 50% shredded coastal waste and 50% powdered charcoal (c) 100% shredded coastal waste and 0% powdered charcoal. All physical properties measurements were made in triplicate and three (3) trials per replication. Test conducted per single briquette which allowed to burn freely to determine the combustibility rate. The rate of combustibility was higher in treatment 3 with 100% coastal waste shredded. The rate of combustibility of the briquette shows that the higher the charcoals content the faster the combustibility. Briquettes can potentially cost-effective as they are made from coastal waste. In order to address other areas such as the test for temperature during the combustion, another experiment will be conducted to determine the temperature.

**Keywords:** Coastal Waste, Briquette Production, Buenavista, Guimaras

## INTRODUCTION

There is strong evidence that the warming of the Earth over the last half-century has been caused largely by human activity, such as the burning of fossil fuels and changes in land use, including agriculture and deforestation. The public needs awareness over the environment because everyone has a responsibility towards the environment. If everyone knows about the threats to our environment, they may take some steps or advice young generation the role of human to its environment, such as being a steward to protect, preserved and not to do anything that harms. An environment is nothing but the place where we survive. There are several ways to protect the environment in your everyday life. To reduce waste, conserve energy and prevent pollution one can clean up a local natural resource like the coastal area, teach others how to take care of the environment and developed technologies to reduce the effect of environmental issues. Guimaras State College-College of Criminal Justice Education focused on a project that brings about community awareness of social, political issues, environmental issues and for cultural aesthetic enrichment. One of Guimaras State College Research Center agenda is Environmental and Ecological Management of the residence of the Barangay or Community. As the only institution for higher learning in Guimaras Island, we have a role to perform in helping make people aware of the importance of proper waste management and segregation whether it is in the land, water, or along the coastline as well as how to minimize this environmental issue. A way of showing support to the community, production of useful technology to answer the issues on the environment and to help the community support the project of briquette production from coastal waste accumulated in the northern part of Guimaras during the Habagat or Summer Monsoon weather which is characterized by a strong, generally West or southwest breeze predominant weather pattern from late April through to early October each year.

Charcoal briquette production is environmentally friendly in another way. Briquettes have a wide variety of use from household to industrial. The fuel has not been fully exploited as there has not been a scarcity of fuel in the past. However, with the current fuel shortage and ever-rising prices, consumers are looking for affordable alternative fuels and briquettes fill this gap for: Cooking and water heating in households; heating productive processes such as tobacco curing, fruits, tea drying, poultry rearing etc.; firing ceramics and clay wares such as improved cookstoves, pottery, bricks etc; fuel for gasifiers to generate electricity; Powering boilers to generate steam. Benefits Briquettes can potentially offer the following benefits over traditional biomass fuels (firewood or charcoal): uniformity and

standardization; could be tailored to the particular usage, long burning time, stove types (institutional or households), smoke and ash levels among others; lower overall fuel costs for users as they are made from biomass waste. Briquettes are made from raw materials that are compacted into a mould which could be made of different shapes and sizes depending on the mould. The appearance, burning characteristics of briquettes depends on the type of waste material and the level of compactness and the mould used. Coastal waste is very abundant in Guimaras Island which is a probable material for briquette as charcoal is a desirable fuel because it produces a hot, long-lasting, virtually smokeless fire. Combined with other materials and formed into uniform chunks called briquettes, it is popularly used for outdoor cooking in the United States. According to the Barbecue Industry Association, Americans bought 883,748 tons of charcoal briquettes in 1997.

The study was conducted in the Municipality of Buenavista the northern part of the province, 15 minutes away from Iloilo City and its rural communities. This study was conducted to produce briquette from the accumulated coastal waste of the municipality during the Habagat or Summer Monsoon. Specifically, aim to (i) develop briquette out of the collected waste materials (ii) determine a quality formulation of coastal water briquette, and evaluate the combustion rate of the coastal waste briquette.

## METHODOLOGY

The study makes use of descriptive-experimental research methodology. Specifically, this study does identification of the composition of the Coastal waste at Barangay San Miguel and Navalas, Buenavista, Guimaras which was used in producing briquette as fuel for cooking that can be used by the community. Prior to the conduct of the activity, communication and necessary permits were secured from the identified Barangay requesting their support and commitment to the project. Segregation of coastal waste was done and segregated into leaves, seaweeds, bamboo, wood and coconut husk. Coastal wastes were processed into briquettes through the following steps:

i. Sorting/sieving: all unwanted materials or large coastal waste are removed to ensure that all the required biodegradable coastal waste was recovered.
ii. Shred coastal waste materials into small pieces: The biodegradable coastal waste materials are shred using the developed briquette machine of the Guimaras State College into small pieces so as to enhance their workability and compactness.
iii. Drying. Shredded coastal waste was sun-dried to release extra moisture of the materials.
iv. Mixing: This process is done with the use of different coastal waste to optimize the desired characteristics of the final briquette. At this stage, procedures and formulation were developed for achieving a good quality briquette. Three types of briquettes were formulated, with different composition mixed. Types I contained 75% shredded coastal waste and 25% Powdered Charcoal, Type II contained 50% shredded coastal waste and 50% Powdered Charcoal, and Type III contained 100% shredded coastal waste and 0% Powdered Charcoal,
v. Binder: In addition to coastal waste mixing, an appropriate binder was added and mixed with the coastal waste thoroughly. This enhances the compactness of the coastal waste materials and prevents them from falling apart.
vi. Adding water: Water was added to the coastal waste materials to make them loose and easy to work on.
vii. Compaction & Drying: Finally the coastal waste materials are ready for compaction, by the briquette machine developed by the GSC- ITRDC. The briquettes were left to dry for up to a week. Coastal-waste fuel briquette was formed in a cylindrical shape with a dimension of 2 inches in diameter and 2 ½ in height. The composition of treatment as showed in the table below determined the appropriate composition and ratio of materials.

## RESULTS AND DISCUSSION

1. Production of Briquette

After collecting the materials, the coastal waste was dried and shredded. Three types of briquettes were formulated, with different composition mixed. Types I contained 75% shredded coastal waste and 25% Powdered Charcoal, Type II contained 50% shredded coastal waste and 50% Powdered Charcoal, and Type III contained 100% shredded coastal waste and 0% Powdered Charcoal. Type I to Type III was added with the same amount of binder. With this briquette were pressed using the briquette machine(Figure 1).

Collecting the materials

Dried and shredded Coastal Waste

Briquette made of Coastal Waste

Briquette Machine

Figure 1. Production of Briquette from Coastal Waste

2. Briquette Formulation

Table 1 display relevant facts and quality parameters of briquettes produced using coastal waste materials obtained from the identified coastal barangay of Buenavista. They were cylindrical in shape with a hole at the center. The briquettes in the first row appeared brown-gray because these briquettes were produced with the addition of 25% of powdered charcoal. The briquette types shown at the second raw were darker and gray in color. This appearance was due to the presence of 50% Coastal waste and 50% powdered charcoal. In the last raw, the absence of powder charcoal resulted in a brownness color of the briquette. The briquettes had a diameter of 2 inches in diameter and a thickness that varies from 2.00 to 2.50 in, while the inner hole was about 0.5 in.

| Treatment | Characteristics | | Appearance |
|---|---|---|---|
| Type I | Coastal waste Shredded (75%) + Powdered Charcoal (25%) | Equal amount of binder (cassava starch) were used for all treatment |  |
| Type II | Coastal waste Shredded (50%) + Powdered Charcoal (50%) | |  |
| Type III | Coastal waste Shredded (100%) + Powdered Charcoal (0%) | |  |

3. Briquette Testing

The results presented in Table 2 showed the test conducted per single briquette when observe and allowed to burn freely to determine the combustibility rate. All physical and chemical properties measurements were made in triplicate and three (3) trials per replication. Type I briquettes with an average weight of 180 g took 1.2 minutes to ignite, burned with short tongues of hot yellow flame with very little white smoke and 26.04 minutes to burn to ashes. Type II briquettes weighing 180 g each took 1.8 minutes to ignite, burned without yellow flame without smoke and took 33.32 minutes to burn to ashes. Type III briquettes weighing 180 g took 2.4minutes to ignite, burned with hot yellow flame, and produced very white smoke and 38.61 minutes to burn to ashes.

Table 2. Characteristics of the three types of Briquette

| Type of Briquttes and Experiment producer | Average time taken to fully Ignite/light (minutes) | Smoke produced by the Briquettes | Flame characteristics | Time taken to burn into ashes | | |
|---|---|---|---|---|---|---|
| | | | | Trial | Time | Mean(Time) |
| Types I contained 75% shredded coastal waste and 25% Powdered Charcoal ( one briquette) | 1.2 | Very Little smoke | Small hot yellow-flame | 1 | 25.46 min | 26.04 min |
| | | | | 2 | 26.11 min | |
| | | | | 3 | 26.54 min | |
| Type II contained 50% shredded coastal waste and 50% Powdered Charcoal ( one briquette) | 1.8 | No Smoke | Small hot yellow-flame | 1 | 33.28 min | |
| | | | | 2 | 31.51 min | 33.32 min |
| | | | | 3 | 35.18 min | |
| Type III contained 100% shredded coastal waste and 0% Powdered Charcoal ( one briquette) | 2.4 | Little smoke | Small hot yellow-flame | 1 | 38.37 min | |
| | | | | 2 | 37.42 min | |
| | | | | 3 | 40.05 min | 38.61 min |

## CONCLUSION

Coastal waste has a potential raw material for fuel briquette and its potential can be maximized to create a formulation for a quality briquette. The rate of combustibility of the briquette shows that the higher the charcoals content the faster the combustibility. Once quality is assured, fuel briquettes can potentially cost-effective as they are made from coastal waste which could be widely adopted among the households in the community in both poor and middle-income neighborhoods. In order to address other areas such as the test for temperature, ash content, moisture content, level of volatile matter and calorific value during production and combustion another experiment will be conducted to determine necessary value.

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# GREEN JACKFRUIT(Artocarpus heterophyllus) FLOUR AS SUBSTITUTE TO COMMERCIAL FLOUR

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**ABSTRACT** Jackfruit (Artocarpus heterophyllus Lam.) is an ancient fruit that is widely consumed as a fresh fruit. The use of jackfruit bulbs and its parts has also been reported since ancient times for their therapeutic qualities. The beneficial physiological effects may also have preventive application in a variety of pathologies. The health benefits of jackfruit have been attributed to its wide range of physicochemical applications. This review presents an overview of the functional, medicinal, and physiological properties of this fruit. Some physicochemical and rheological properties of jackfruit seed flour and starch, isolated from the flour were investigated. The flour had good capacities for water absorption (205%) and oil absorption (93%). Substitution of wheat flour with the seed flour, at the level of 5, 10 and 20% markedly reduced the gluten strength of the mixed dough. The Brabender amylogram (6% concentration, db) of seed starch showed that its pasting temperature was 81 °C and its viscosity was moderate, remained constant during a heating cycle and retrograded slightly on cooling. The starch showed an A-typed X-ray powder diffraction pattern.

**Keywords:** Jackfruit Flour, Jackfruit Starch, physicochemical and rheological properties

## INTRODUCTION

### Background of the Study

Flour has been made since prehistoric times. The earliest methods used for producing flour all involved grinding grain between stones. Home-based flour makers who produce flour for their own daily consumption and to give to friends and family. Most flour makers, no matter what level, normally aim for one or all of these objectives in their practice. Flour is the perfect complement to bake some cakes or different cakes and also it can make some desserts like "lutong pinoy (kakanin)".

Jackfruit (Artocarpus heterophyllus) is popular fruit crop that is widely grown in Thailand and other tropical areas including the Philippines. The ripe fruit contains well flavored yellow sweet bulbs and seeds (embedded in the bulb). The edible bulbs of ripe jackfruit are consumed fresh or processed into canned products.

Seeds make-up around 10 to 15% of the total fruit weight and have high carbohydrate and protein contents. There have been few studies on jackfruit seeds. Seeds are normally discarded or steamed and eaten as a snack or used in some local dishes. There had been researches conducted for utilizing the jackfruit seeds such as conducted by Bobbio et al (1978) which reported some physicochemical properties; Kumar et al (1988) studied the proximate compositions of two varieties of jackfruit seeds and reported considerable biochemical difference between the two varieties; Rahman et al (1999) in which the starch content of the seed increases with maturity. All above studies and researches conducted are focused in the utilization of jackfruit seeds which may have neglected the process on how to utilize or to process the unripe jackfruit flesh flour. It was observed that in the locality, aside from being sold in the market as part of the local recipes and menus, still a large volume of these unripe fruit are rotting caused by underutilization or somehow the lack of ideas on how to utilize them fully.

Based on thorough internet searches and journal sources, there are no studies that have been conducted for processing unripe jackfruit flesh flour as flour and using it for bake products. The researchers aimed to process flour made from unripe jackfruit flesh. Unripe jackfruit flesh is not fully utilized for human consumption or food production, hence this study was proposed.

### Objectives of the Study

This study is aimed to make process and formulation in producing flour from unripe jackfruit flesh and conduct acceptability testing for the three (3) treatments of bread using the said product. Specifically this study aims to:

1. to determine the feasibility of processing green jackfruit as flour.
2. to develop a process schedule for green jackfruit flour.
3. to conduct the acceptability testing of green jackfruit flour.

## METHODOLOGY

### Criteria of the study

The study was based on the information gathered and related studies conducted by other researchers which would be the basis in processing the flour from unripe jackfruit flesh.

Description of the Product. The study utilized the unripe jackfruit flesh flour in baked product for the conduct of sensory evaluation or acceptability testing of the product. The researchers determined the appropriate treatments, in which two (2) samples were done for each treatment.

Replication Treatments for Unripe Jackfruit Flesh Flour Bread. The researchers prepared two (2) treatments for the purpose of evaluating the appropriate formulation or ratio of flour mixture (unripe jackfruit flesh flour and bread flour) for the finished product. The researchers also prepared one (1) kilo of flour mixtures for each trial as reference volume for the study while all other ingredients are the same as reflected in the recipe. The table below showed the computed proportion of flours to be used for all replications.

| Treatment | Jackfruit Flesh Flour | | Bread Flour | |
|---|---|---|---|---|
| | % | Weight in Grams | % | Weight in Grams |
| 1 | 25 | 250 | 75 | 750 |
| 2 | 75 | 750 | 25 | 250 |

### Evaluation of the Study

Part One of the study determined the appropriate researchers-made procedure in producing flour from unripe jackfruit flesh. Part Two of the study, evaluation was conducted using the flour made from unripe jackfruit flesh by having a sample baked food product. Thirty (30) randomly selected students and faculty acted as respondents of the study. Five (5) hedonic scale was used as measure of acceptability as to sensory evaluation of the said product. Description of rating were: 5 (like extremely, 4(like moderately), 3 (Dislike slightly), 2 (Dislike moderately), and 1 (Dislike very much).

The following are the raw materials, supplies, tools and materials needed in making green jackfruit flour.

| Product | Raw Materials | Supplies | Tools/Equipment |
|---|---|---|---|
| Green Jackfruit Flour | Green jackfruit | Apron | Cabinet Dryer |
| | Rock salt | Hairnet | Strainer |
| | De-browning agent | Disposable Hand Gloves | Weighing scale |
| | | Face mask | Stainless Steel Bowls |
| | | Cheese cloth | Water tubs |
| | | | Basin |
| | | | Knife |
| | | | Chopping board |
| | | | Flour mill |

Procedures for Processing Green Jackfruit Flour

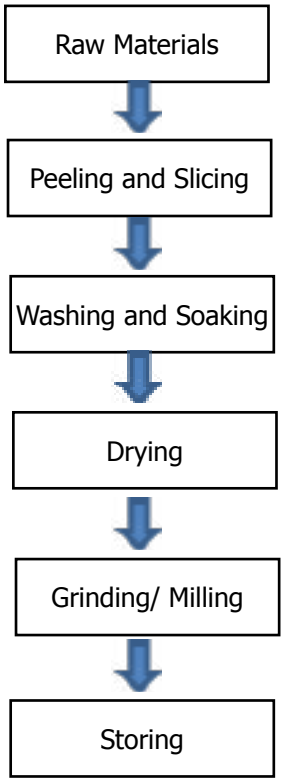
1. Peel the jackfruit.
2. Slice the unripe jackfruit flesh thinly.
3. Wash the sliced jackfruit thoroughly.
4. Soak in water with the treatment to remove the latex.
5. Drain and arrange in trays to dry
6. Grind the dried unripe jackfruit flesh until desired fineness is attained.
7. Sift and pack the jackfruit flour in air tight container and store in cool dry place.

Procedures for Utilizing Jackfruit Flour for Baked Product

1. Prepare (weigh/measure) all needed ingredients.
2. Add all ingredients and mix until the desired consistency of the dough is achieved.
3. Knead the dough thoroughly and form into desired shape and sizes.
4. Proof the sliced dough for 1 hour.
5. Pre-heat the oven at 110 degrees Celsius to 120 degrees Celsius for 15 minutes.
6. When it is finished, insert a toothpick into the center. If it becomes out clean, it's done. If not, bake it for a few more minutes.
7. After the bread is baked, let it rest in the oven for 2 minutes
8. Take out and serve.

Preparation of Materials and Equipment

All the products to be produced will undergo the following process:




**Output variable:**
Recovery
Yield

Table 2. Budgetary Requirements

| Quantity | Unit | Description | Unit cost | Total cost |
|---|---|---|---|---|
| 20 | Kilograms | Unripe jackfruit | 20.00 | 400.00 |
| 1 | cup | Rock salt | 5.00 | 5.00 |
| 20 | grams | De-browning agent | 25.00 | 25.00 |
| 2 | kilograms | White sugar | 60.00 | 120.00 |
| 1/2 | dozen | Egg | 8.00 | 96.00 |
| 25 | grams | Yeast | 10.00 | 10.00 |
| 350 | ml | Corn oil | 60.00 | 60.00 |
| 30 | ml | Vanilla | 30.00 | 30.00 |
| 1 | kilo | Bread Flour | 40.00 | 40.00 |
| 2 | cans | Evaporated milk | 30.00 | 60.00 |
| Sub Total>>>>>>>>>>>>>>>>>>>>> | | | | 846.00 |
| Grand Total (x 3 replications) >>>>>>> | | | | 2,538.00 |

Recipe for Utilizing Jackfruit Flour Bread
Ingredients

- ✓ 2 ¼ teaspoons active dry yeast
- ✓ ¼ cup warm water
- ✓ 1 cup lukewarm milk
- ✓ 2 tablespoon margarine
- ✓ ½ cup sugar
- ✓ 1 teaspoon salt
- ✓ 2 eggs, beaten
- ✓ 4 ½ cups bread flour or more as necessary
- ✓ jackfruit flour

Procedures for Utilizing Jackfruit Flour for Baked Product

1. Prepare (weigh/measure) all needed ingredients.
2. Add all ingredients and mix until the desired consistency of the dough is achieved.
3. Knead the dough thoroughly and form into desired shape and sizes.
4. Proof the sliced dough for 1 hour.
5. Pre-heat the oven at 110 degrees Celsius to 120 degrees Celsius for 15 minutes.
6. When it is finished, insert a toothpick into the center. If it becomes out clean, it's done. If not, bake it for a few more minutes.
7. After the bread is baked, let it rest in the oven for 2 minutes.
8. Take out and serve.

## RESULTS AND DISCUSSION

As a result of the study, attributes such as appearance, flavor or taste and aroma or smell of the finished product, the jackfruit flour bread, presented high results collectively ranging from "like moderately" to "like extremely"; while attributes such as texture and mouth feel, presented results ranging from "neither like or dislike" to "like extremely".

Evaluation as to appearance, yielded high assessment described as "like extremely". Treatment 1, frequency mean = 17 or 57% and treatment 2, frequency mean = 18 or 60% of the respondents respectively generally accepted the appearance of the finished product.

Evaluation results as to flavor or taste, yielded high marks described as "like moderately". For treatment 1, frequency mean = 16 or 53% and for treatment 2, frequency mean = 21 or 70% as presented in table 16, implied that this quality of the finished product was generally accepted to produce a pleasing impressions to the palate.

In terms of aroma/ smell the evaluation for treatment 1, frequency mean = 18 or 60% described as "like extremely" and treatment 2, frequency mean = 20 or 67% described as "like moderately" as reflected in table 16, shown that treatment 1 was more preferred than treatment 2 but that does not mean that the finished product is low-grade. This might imply that the preference of the treatment for the final product should follow the treatment 1 in order to be generally accepted by consumers.

As to texture, in treatment 1 the respondents evaluated "like moderately" with a frequency mean = 17 or 57% while treatment 2 was evaluated "like extremely" with a frequency mean = 25 or 83% which showed that the attribute (texture) of the finished product sought after by the consumer was presented by treatment 2. Although some of the respondents are undecided for treatment 1, this does mean that they do not like the product.

In terms of mouth feel, the ratings for treatment 1, frequency mean = 12 or 40% described as "like moderately" and treatment 2, frequency mean = 20 or 67% described as "like extremely" as reflected in table 16, the respondents assessed and agreed the finished product presented the softness was appealing to the touch and palate of the evaluators. The result showed that the attribute (mouth feel) of the finished product sought after by the consumer was presented by treatment 2. Although the same with "texture", some of the respondents are undecided for treatment 1, this does mean that they do not like the product, it might mean that they are expecting a more fineness and fullness in jackfruit flour bread the equally with commercial flour.

| Attributes | Hedonic | Treatment 1 | | Treatment 2 | |
|---|---|---|---|---|---|
| | | Descriptions | | Mean | |
| | | f | % | f | % |
| Appearance | Like extremely | 17 | 57 | 18 | 60 |
| | Like moderately | 13 | 43 | 12 | 40 |
| Flavor/Taste | Like extremely | 15 | 50 | 9 | 30 |
| | Like moderately | 16 | 53 | 21 | 70 |
| | Like extremely | 18 | 60 | 11 | 37 |
| Aroma/Smell | Like moderately | 12 | 40 | 20 | 67 |
| | Like extremely | 11 | 37 | 25 | 83 |
| Texture | Like moderately | 17 | 57 | 5 | 17 |
| | Neither like or dislike | 3 | 10 | | |
| Mouth feel | Like extremely | 11 | 37 | 20 | 67 |
| | Like moderately | 12 | 40 | 11 | 37 |
| | Neither like or dislike | 8 | 27 | | |

## CONCLUSION

The appearance, flavor or taste and aroma or smell was the attributes having high results was generally accepted by the respondents. Moreover, the texture and mouth feel of the finished product was highly satisfactory to the respondents and agreed that the finished product presented the softness and consistency was appealing to the touch and palate of the evaluators. Based on the high results of the sensory evaluation for acceptability of the product, the researchers conclude that the jackfruit flour bread offered a potential for production and has slated itself to the table as Pinoy almusal.

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# CUSTOMERS FEEDBACK TOWARDS FOOD AND BEVERAGE SERVICES OF THE DIFFERENT FOOD ESTABLISHMENTS IN BUENAVISTA: BASIS FOR EXTENSION SERVICES

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**ABSTRACT** Restaurants or food establishments services has been one of the most profitable business in the industry now a days since people wanted their lives to become more easier and faster when it comes to eating. The expectations of the customers are to get the best from the business organization. So, business organizations have to make the customers happy and treat them well equivalent to their paid amounts. Thus, the purpose of this study is to determine the feedbacks of the customers when it comes to the services offered by the food establishments in the municipality of Buenavista. This study will be beneficial to the food establishment owners, employees and most importantly the customers who will be consuming the food products offered by the food establishments. Results of the study reveals that in terms of the level of the Customers Feedback towards Food and Beverage Services of the Different Food Establishments in Buenavista, mean scores of each category such as reception, hygiene and sanitation, dining practices and food handling, and descriptive interpretations. Data reveals that the reception has the overall mean of 4.15 Very Satisfactory. Hygiene and Sanitation has an overall mean of 4.10 Very Satisfactory. For the dining practices the overall mean is 4.22 Very satisfactory. For Food handling the overall mean is 4.10 Very Satisfactory. There was no effect on the profile of the respondents when classified according to age, sex, civil status and economic status and there was no effect on the customers' feedback as to reception, hygiene and sanitation, dining practices and food handling because the different food establishments have reach the standards required by the authority and also by the customers.

**Keywords:** Customers; Feedback; Food Establishments; Food and Beverage; Services

## INTRODUCTION

### Background of the Study

Restaurants or food establishments services has been one of the most profitable business in the industry now a days since people wanted their lives to become more easier and faster when it comes to eating. Cooking at home has been minimal and eating out has been a habit of many people around. The rise of many food establishments was like mushrooms that paved its way wherever people come. International and local restaurant chains are satisfying the demand of customers in variety of range of products and services. For as long as people travel food is one of the basic necessities that need to be addressed by the locality. Basically this is the era of globalization and due to advancement of media world is shrinking in terms of culture and habits so the fashions as well as eating patterns are also being opted among all over the world and this the reason for such a huge spread of restaurant industry in the world. (Sabir, et.al, 2013). Customer satisfaction is very important for every organization; either they are service sector or the privet sector. Customers are the actual agents or stakeholders for determining or best judging the success of any product or service.

Both service quality and customer satisfaction are important from the point of view of marketing in terms of sellers and buyers. Similarly, sellers are known as the service giver and buyers are known as the service receivers, but both dealt with service. Givers always regard customers as the pillars of the business organization. So, they try to give quality service and the customers also want quality services offered by the restaurant or business organization. Thus, it is the responsibility of the organization to offer a good service and make the customer satisfied by providing their desires and wants. The expectations of the customers are to get the best from the business organization. So, business organizations have to make the customers happy and treat them well equivalent to their paid amounts. Business organizations and customers have a give and take relationship (Ghimire). Thus, the purpose of this study is to determine the feedbacks of the customers when it comes to the services offered by the food establishments in the municipality of Buenavista.

**Statement of the Problem**

This study was conducted to determine the customer's feedback towards food and beverage services of the different food establishments in the Municipality of Buenavista.

Specifically, this study aims to find answers to the following questions: (1) What is the profile of the respondents when classified according to age, sex, civil status, and economic status?; (2) What is the level of customer feedback when it comes to services offered by the Food and Beverage Establishments in the Municipality of Buenavista?, and (3) Is there a significant difference between the services offered by the Food establishments as perceived by their customers when categorized to age, sex, civil status and economic status?

## METHODOLOGY

This customer feedback study used the descriptive research design wherein according to Shuttleworth, it is a scientific method which involves observing and describing the behavior of a subject without influencing it in any way. The respondents will be informed on the purpose of the study and will be invited to participate in the survey with the assurance that the data provided in the survey will be treated with utmost confidentiality and will solely be used for the purpose of this research. The researchers administered the questionnaires through personal survey. The target populations of the study are the selected customers of the different food establishments in the municipality of Buenavista. The respondents were classified according age, sex, civil status, educational attainment and economic status. The sample selection was based on a convenience sample of the guest presented at the foodservice establishments at the time the data was collected. To gather the needed data for the study, the researchers utilized a researcher made questionnaire. The instrument was composed of two (2) parts, part I is the profile of the respondents which are the customers of the Food establishments. The part II is designed to assess the services of the Food establishments as to their attributes, level of customers satisfaction, reception, employee hygiene and sanitation, dining practices and food handling. The questionnaire was validated by juries who are experts in their field of specialization. Each question were analyzed whether the item was appropriate, not appropriate or it needs revision. The suggestions and comments of the panel of experts are followed in the preparation of the final draft. After the questionnaire were validated, it was pre-tested to a sample of 30 individuals who possessed the same characteristics as the actual respondents of the study. The data collected were sorted, and tabulated based on the requirement of the study. The data gathered will be processed through Statistical Package for Social Science (SPSS Version 17) and analyzed by gathering the mean, percentage and frequency. For inferential statistics, Mann Whitney U was used to determine the difference between the two vairables and Kruskal Wallis Test, for the difference of two or more variables, all were set at .05 level of significance for inferential statistics.

## RESULTS AND DISCUSSION

Table 1 presents the general percentage profile of respondents in terms of age, sex, civil status and monthly family income. In terms of age, 18-30 years old has a largest percentage of respondents with 82%, followed by age of 31-43 years old with 18% that summed up 100%. In terms of sex, female respondents acquired 62% while male respondents have only 38% that summed up to 100%.

In terms of civil status, single respondents have 64% while married respondents have 36% that summed up 100%. In terms of monthly family income, people whose income range 10,001-20,000 have a largest respondents with 50%, followed with those income range to 5,000-10,000 with 32%, lastly by those income range above 20,000 with 9% that summed up to 100%. Likewise, respondents whose age is 18-30 years old, female, single and have a family income range to 10,001-20,000 obtain the highest percentage, in contrast respondents whose age is 31-40 years old, male, married and the income range above 20,000 have lowest percentage in general.

Table 1. Profile of the Respondents

| Profile | | Frequency | Percent |
|---|---|---|---|
| Age | 18-30 | 41 | 82.0 |
| | 31-43 | 9 | 18.0 |
| | Total | 50 | 100.0 |
| Sex | Male | 19 | 38.0 |
| | Female | 31 | 62.0 |
| | Total | 50 | 100.0 |
| Civil Status | Single | 32 | 64.0 |
| | Married | 18 | 36.0 |
| | Total | 50 | 100.0 |
| Monthly Family Income | 5,000-10,000 | 16 | 32.0 |
| | 10,000-20,000 | 25 | 50.0 |
| | above 20,000 | 9 | 18.0 |
| | Total | 50 | 100.0 |

Table 2 presents the Customers Feedback towards Food and Beverage Services of the Different Food Establishments in Buenavista, mean scores of each category such as reception, hygiene and sanitation, dining practices and food handling, and descriptive interpretations.

As reflected on the table, the data reveal that the reception in terms of the receptionist promptly attends to the customers inquiries (4.08), the receptionist leads the customers to the available table (4.02), the customer's requests, complaints and comments are handled with diplomacy to the level of guest's satisfaction. (4.12) having a mean of 4.15 which is "Very Satisfactory" and in terms of the guests/customers are greeted with a smile, direct eye contact, friendly tone, and wished him/her a pleasant day (4.30), and the receptionist expresses appreciation, gratitude to the customers for their patronage (4.24) is " Excellent".

For the hygiene and sanitation in terms of staffs/crews suffering from illness are restricted from handling of food (4.00), personnel eat food at designated dining area for personnel only (4.00) and facilities for hand washing are provided at a convenient`` location in the food establishment (4.12), dining staff are well groomed and wearing neat and clean uniform (4.12) having a mean of 4.10 which is "Very Satisfactory".

In dining practices in terms of employees know the proper set-up of the table (3.96), tables, chairs and utensils are in good condition and well sanitized (4.14) is "Very Satisfactory" and in terms of the dining crew used tray when serving food and beverages (4.40), the dining crew knows the menu of the establishment (4.36) and the dining crew takes the order properly and repeat customers order according to establishments standard procedures (4.26) having a mean of 4.22 which is "Excellent".

Lastly, the food handling in terms of the foods are well plated (4.02), there are no foreign objects combined in the food served to the guests (4.06), the area is clean, well sanitized and free of flying insects and foul odors (4.02), the foods and beverage are served with proper temperature (4.20) having a mean a mean of 4.10 "Very Satisfactory" and in terms of the foods are properly cooked (4.22) is "Excellent".

Overall, the customers' feedback for reception, hygiene and sanitation, dining practices and food handling is 'Very Satisfactory" this means that the different food establishments have reach the standards required by the accrediting bodies and by the customers.

Table 2. Customers Feedback towards Food and Beverage Services of the Different Food Establishments in Buenavista

| Reception | Mean | Description |
|---|---|---|
| 1.The guests/customers are greeted with a smile, direct eye contact, friendly tone, and wished him/her a pleasant day | 4.30 | Excellent |
| 2.The receptionist promptly attends to the customers inquiries | 4.08 | Very Satisfactory |
| 3.The receptionist leads the customers to the available table | 4.02 | Very Satisfactory |
| 4.The customer's requests, complaints and comments are handled with diplomacy to the level of guests satisfaction. | 4.12 | Very Satisfactory |
| 5.The receptionist expresses appreciation, gratitude to the customers for their patronage. | 4.24 | Excellent |
| Mean | 4.15 | Very Satisfactory |
| Hygiene and Sanitation | | |
| 1.Employees are aware of proper hygiene and sanitation | 4.26 | Excellent |
| 2.Staffs/crews suffering from illness are restricted from handling of food. | 4.00 | Very Satisfactory |
| 3.Personnel eat food at designated dining area for personnel only | 4.00 | Very Satisfactory |
| 4.Facilities for hand washing are provided at a convenient`` location in the food establishment | 4.12 | Very Satisfactory |
| 5.Dining staff are well groomed and wearing neat and clean uniform | 4.12 | Very Satisfactory |
| Mean | 4.10 | Very Satisfactory |
| Dining Practices | | |
| 1.The dining crew used tray when serving food and beverages | 4.40 | Excellent |
| 2.Employees know the proper set-up of the table | 3.96 | Very Satisfactory |
| 3.Tables, chairs and utensils are in good condition and well sanitized | 4.14 | Very Satisfactory |
| 4.The dining crew knows the menu of the establishment | 4.36 | Excellent |
| 5.The dining crew takes the order properly and repeat customers order according to establishments standard procedures. | 4.26 | Excellent |
| Mean | 4.22 | Excellent |
| Food Handling | | |
| 1.The foods are well plated | 4.02 | Very Satisfactory |
| 2.There are no foreign objects combined in the food served to the guests | 4.06 | Very Satisfactory |
| 3.The area is clean, well sanitized and free of flying insects and foul odors | 4.02 | Very Satisfactory |
| 4.The foods are properly cooked | 4.22 | Excellent |
| 5.The foods and beverage are served with proper temperature | 4.20 | Very Satisfactory |
| Mean | 4.10 | Very Satisfactory |

Table 3 presents the Differences on Customers Feedback towards Food and Beverage Services in terms of Reception grouped according to profile.

First row, shows the difference of profile in terms of age with a U-value of 170.500 and p-value of .722 which shows no significant effect on reception according to profile.

Second row, shows the difference of profile in terms of sex with a U-value of 276.000 and p-value of .709 which also shows no significant effect on reception according to profile.

Third row, shows the difference of profile in terms of civil status with a U-value of 258.000 and p-value of .541 which shows no significant effect on reception according to profile.

Fourth row, shows the difference of profile in terms of monthly income with a H-value of 5.026 and p-value of .081 which shows no significant effect on reception according to profile.

Table 3. Differences on Customers Feedback towards Food and Beverage Services in terms of Reception grouped according to profile.

| Profile | U-value | p-value | Interpretation |
|---|---|---|---|
| Age | 170.500 | .722 | Not significant |
| Sex | 276.000 | .709 | Not significant |
| Civil status | 258.000 | .541 | Not significant |
| | H-value | p-value | Interpretation |
| Monthly income | 5.026 | .081 | Not significant |

p<0.05 level of significance

Table 4 presents the Differences on Customers Feedback towards Food and Beverage Services in terms of Hygiene and Sanitation grouped according to profile.

First row, shows the difference of profile in terms of age with a U-value of 181.000 and p-value of .929 which shows no significant effect on hygiene and sanitation according to profile. Second row, shows the difference of profile in terms of sex with a U-value of 269.000 and p-value of .608which also shows no significant effect on hygiene and sanitation according to profile. Third row, shows the difference of profile in terms of civil status with a U-value of 249.500 and p-value of .433 which shows no significant effect on hygiene and sanitation according to profile. Fourth row, shows the difference of profile in terms of monthly income with a H-value of 3.000 and p-value of .223 which shows no significant effect on hygiene and sanitation according to profile.

Table 4. Differences on Customers Feedback towards Food and Beverage Services in terms of Hygiene and Sanitation grouped according to profile.

| Profile | U-value | p-value | Interpretation |
|---|---|---|---|
| Age | 181.000 | .929 | Not significant |
| Sex | 269.000 | .608 | Not significant |
| Civil status | 249.500 | .433 | Not significant |
| | H-value | p-value | interpretation |
| Monthly income | 3.000 | .223 | Not significant |

p<0.05 level of significance

Table 5 presents the Differences on Customers Feedback towards Food and Beverage Services in terms of Dining practices grouped according to profile.

First row, shows the difference of profile in terms of age with a U-value of 158.000 and p-value of .499 which shows no significant effect on dining practices according to profile. Second row, shows the difference of profile in terms of sex with a U-value of 282.500 and p-value of .808 which also shows no significant effect on dining practices according to profile. Third row, shows the difference of profile in terms of civil status with a U-value of 238.500 and p-value of .312 which shows no significant effect on dining practices according to profile. Fourth row, shows the difference of profile in terms of monthly income with a H-value of 5.280 and p-value of .071 which shows no significant effect on dining practices according to profile.

Table 5. Differences on Customers Feedback towards Food and Beverage Services in terms of Dining practices grouped according to profile.

| Profile | U-value | p-value | Interpretation |
|---|---|---|---|
| Age | 158.000 | .499 | Not significant |
| Sex | 282.500 | .808 | Not significant |
| Civil status | 238.500 | .312 | Not significant |
| | H-value | p-value | Interpretation |
| Monthly income | 5.280 | .071 | Not significant |

p<0.05 level of significance

Table 6 presents the Differences on Customers Feedback towards Food and Beverage Services in terms of Food handling grouped according to profile.

First row, shows the difference of profile in terms of age with a U-value of 151.000 and p-value of .394which shows no significant effect on food handling according to profile. Second row, shows the difference of profile in terms of sex with a U-value of 290.000 and p-value of .928 which also shows no significant effect on food handling according to profile. Third row, shows the difference of profile in terms of civil status with a U-value of 236.500 and p-value of .294 which shows no significant effect on food handling according to profile. Fourth row, shows the difference of profile in terms of monthly income with a H-value of 1.391 and p-value of .499 which shows no significant effect on food handling according to profile.

Table 6. Differences on Customers Feedback towards Food and Beverage Services in terms of Food handling grouped according to profile

| Profile | U-value | p-value | Interpretation |
|---|---|---|---|
| Age | 151.000 | .394 | Not significant |
| Sex | 290.000 | .928 | Not significant |
| Civil status | 236.500 | .294 | Not significant |
| | H-value | p-value | interpretation |
| Monthly income | 1.391 | .499 | Not significant |

## CONCLUSIONS

The profile of the respondents has no effect on the customers feedback on the Food and Beverage Services of the Food Establishments in the Municipality of Buenavista. The customers feedback on the different areas such as, Reception, Hygiene and Sanitation, Dining Practices and Food handling of the Food Establishments in Buenavista is Very Satisfactory. The food service establishment should continually improve their food and beverages services especially on hygiene and sanitation and food handling, even though it was perceived by the customers as very satisfactory.

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# TABAGAK IN MANGO SAUCE: READY TO EAT EMERGENCY FOOD

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**ABSTRACT** Food assistance during calamities, war and food shortage play a vital role in helping those in need. This study aims to develop water retort tabagak in mango sauce a and to determine its general acceptability. Tabagak in Mango Sauce Composition per bottle with total weight of 250 g composed of 6 pieces pre-cooked tabagak, 70 g Mango Sauce composed of canola oil, mango concentrate, salt, laurel leaf and pepper corn. The hedonic rating scales are used to quantify affective dimension of the consumer perception of tabagak in mango sauce. The confirmatory test result indicated that Tabagak in Mango Sauce processed at 120 0C for 60 min had better quality since it had shorter cook value that affect highly influenced the physical quality parameters like appearance, aroma, taste, mouth feel and texture.

**Keywords:** tabagak, mango sauce, experimental

## INTRODUCTION

### Background of the Study

At present, emergency food stockpiled by local governments and households is low in absolute quantities and little of this food can be eaten without water or heat, which may be unavailable immediately after natural calamities like earthquake and typhoon. Furthermore, there are few cases of large, diverse stockpiles prepared with long-term emergency living conditions for survivors in mind, and much emergency food goes unused, as it is disposed of after its shelf life expires. It is important that we change the mind from conventional "Emergency food" that stockpilers assume will not be used, to "Disaster preparation food" (food prepared for disaster) that can be used in usual days as well as prove especially useful during a disaster.

Food assistance during calamities, war and food shortage play a vital role in helping those in need. Nothing is more important than providing food when people find themselves suddenly, and often critically, in need following a storm, earthquake, flood or other disaster emergency. Food aid has been invaluable in providing basic nutritional needs to shock-affected people, saving untold millions of lives over the past half century or more (Barrett and Maxwell, 2005). The most vulnerable members of shock-affected populations – children and women, in particular – typically suffer disproportionately from food consumption shortfalls during episodes of transitory food insecurity, and often suffer even when other members of the household are able to cushion themselves against shocks (Hoddinott, 2006). Food aid can be particularly effective in meeting the needs of these vulnerable groups. Equally important, timely delivery of food to severely food-insecure people relieves pressure to clear up scarce productive assets, enabling recipients to resume progress towards a fully secure livelihood as soon as the shock passes. Food aid is important in meeting the right to food and in protecting productive assets, especially the human capital that is the principal wealth of the poor.

Sardinella albella (Tabagak), body somewhat compressed but variable, from slender to moderately deep; total number of scutes 29 to 33. Vertical striae on scales not meeting at center, hind part of scales with a few perforations and somewhat produced posteriorly. A dark spot at dorsal fin origin. Lower gill rakers 41 to 68 (at 4 to 15 cm standard length, increasing a little with size of fish). Usually found in coastal waters. Forms schools. Feeds on zooplankton and phytoplankton. Distributed in Indo-West Pacific from Red Sea, Persian Gulf, East African coasts, Madagascar eastward to Indonesia and the Arafura Sea; north to Taiwan and south to Papua New Guinea. It found in western and southern Taiwanese waters, Penghu and in the Philippines. Marketed fresh, dried, dried-salted, and made into fish balls.

The water retort is an equipment or vessel (or sterilization through the application of heat) of food products packed in retort pouches (like suman, bibingka, fruit puree, rice, milk and chocolate flavored porridge). Provide an opportunity for food processor to shift to retort pouch as alternative packaging for thermally processed products at lower cost.

**Objective of the Study**

This study was conducted to develop water retort tabagak in mango sauce a ready to eat emergency food and to determine the general acceptability of water retort tabagak in mango sauce.

## METHODOLOGY

The following are the raw materials , supplies, tools and materials needed in making Tabagak in Mango Sauce.

| Product | Raw Materials | Supplies | Tools and Equipment |
|---|---|---|---|
| Tabagak in Mango Sauce | Tabagak (Sardinella albella)<br>Salt<br>Water<br>Mango Sauce<br>Corn Oil | Face mask<br>Paper Towel<br>Laboratory Gown<br>Hairnet<br>Hand gloves or potholder. | Cups, Measuring spoons, Knife, Spatula, Chopping Board, Plastic bowl or basin, strainer, Scissor, water retort pouch |

**Experimental Design and Sample Treatments**

The Completely Randomized Design (CRD) one where the treatments are assigned completely at random so that each experimental unit has the same chance of receiving any one treatment. For the CRD, any difference among experimental units receiving the same treatment is considered as experimental error. CRD was used in this study with the following sample treatments:

| | Time | Temperature |
|---|---|---|
| **Preminary Test** | 70 min | 120°C |
| **Confirmatory Test** | 60 min | 120°C |

**Preparation of materials and Equipment**

The procedures start with the preparation of the raw materials and equipment.

Fish Preparation
Procedure:

1. Removal of the head, tails, fins, and internal organs of each fish, followed by washing or cleaning the remaining fish.
2. Freezing the fish overnight.
3. Pre-cooked the fish in oil until slightly golden.

**Water Retort Process**

1. Arrange the fish in a glass bottle. Put 6 pcs of fish per bottle.
2. In every bottle, pour the mixture of oil, water, and mango sauce up to the rim of the bottle.
3. Sealed and place the bottle inside the water retort equipment. Cook according to procedure.

**Preparing the Finished Product**

Bottle was labeled according to the design after it was dried.

**Recording, Analysis and Interpretation of Data Gathered**

The water retort Tabagak in Mango Sauce were analyzed for data on sensory evaluation as to the aroma, taste (acceptability or patability), appearance, color, texture and general acceptability Hedonics Scale for sensory evaluation.

All the products produced undergo the following process:

## RESULT AND DISCUSSSION

Conditions of preparing Tabagak in Mango Sauce were shown in the procedural design section below. Tabagak was purchased from fish vendor upon arrival of fishing boat to insure the freshness of the tabagak fish. Plastic containers were used to hold the fish added with ice. Fish was then clean and freeze overnight.

During the preliminary test 5 kilogram of clean fish was pulled out from the freezer the fish was pre-cooked in oil until slightly golden. The fish were arrange the in a bottle due to unavailability of water retort pouch. About 6 pcs of fish per bottle pour with the mixture of canola oil, mango sauce up to the brim of the bottle weighing 389.5 grams (as shown in table 1. The bottles were sealed placed inside the water retort equipment. Cook at 120 0C for 70 min. Results showed a brownish color fish.

For the confirmatory test, 5 kilograms of clean tabagak fish were pre-cooked in oil until slightly golden. Fish was filled into glass bottle with the mixture of canola oil, mango sauce. The water retort was set to cook at 120 0C for 60 min. Results showed a light brownish color fish.

Illustration of Process of Tabagak in Mango Sauce

Table 1. Tabagak in Mango Sauce Composition

| Test | Sample | Composition per bottle (250.0 grams) | | Tempreature | Cooking Time | Observation |
|---|---|---|---|---|---|---|
| Pre-liminary | 30 bottles | 6 pcs<br>70 g | pre- cooked tabagak Mango Sauce composed of canola oil, mango concentrate | 120°C | 70 min | brownish color fish |
| Confir-matory | 30 bottles | 6 pcs<br>70 g | pre- cooked tabagak Mango sauce composed of canola oil, mango concentrate, salt & pepper corn | 120°C | 60 min | light brownish color |

Table 2 depicts the top five terms used to express the sensory qualities identified by the researchers as being most prevailing for Tabagak in Mango Sauce . The hedonic rating scales are used to quantify affective dimension of the consumer perception of foods (Tuorila, 2008). Among the hedonic rating scales, the 9-point degree of liking scale, also called the 9-point hedonic scale, is probably the most commonly used (Tuorila, 2008) (Lawless and Heymann, 2010). In the test consumers are asked to give their hedonic opinion to a product sample by choosing and marking one of nine alternatives, (ranging from 9 = like extremely to 1 = dislike extremely). Within the duration of hours after cooking during the preliminary test sensory evaluation were conducted to 25 consumers. Tabagak in Mango Sauce were perceived to have an appearance with a mean value of 7.32 =in between "Like Very Much" and "Like Moderately". The aroma of Tabagak in Mango Sauce was perceived with mean value 6.96= in between "Like Moderately" and "Like Slightly". The taste of Tabagak in Mango Sauce was perceived with a mean value 7.28= in between "Like Very Much" and "Like Moderately". Mouth feel was perceived as 7.08 = with in "Like Very Much" and "Like Moderately". Texture of Tabagak in Mango Sauce was perceived as 6.92= in between "Like Moderately" and "Like Slightly". The present study indicated that Tabagak in Mango Sauce at 120 0C for 70min had better quality since it was perceived with a mean value of 7.24 = in between "Like Very Much" and "Like Moderately".

For confirmatory test Tabagak in Mango Sauce sensory evaluation were conducted to 25 consumers. Result shows that Tabagak in Mango Sauce was perceived to have an appearance with a mean value of 7.96=in between "Like Very Much" and "Like Moderately". The aroma of Tabagak in Mango Sauce was perceived with mean value 7.92= in between "Like Very Much" and "Like Moderately". The taste of Tabagak in Mango Sauce was perceived with a mean value 8.04= in between "9-Like Extremely" and "Like Very Much". Mouth feel was perceived as 8.04= in between "9-Like Extremely" and "Like Very Much". Texture of Tabagak in Mango Sauce was perceived as 8.04= in between "9-Like Extremely" and "Like Very Much". The present study indicated that Tabagak in Mango Sauce at 120 0C for 60 min had better quality since it was perceived with a mean value 8.04= in between "9-Like Extremely" and "Like Very Much".

Table 2. Sensory Score of Tabagak in Mango Sauce at 120 0C cooked with different time

| Cooking time | Appearance | Aroma | Taste | Mouth Feel | Texture | Overall Acceptability |
|---|---|---|---|---|---|---|
| 70 min | 7.32 | 6.96 | 7.28 | 7.08 | 6.92 | 7.24 |
| 60 min | 7.96 | 7.92 | 8.04 | 8.04 | 8.04 | 8.04 |

Scale: 9-Like Extremely, 8-Like Very Much , 7-Like Moderately, 6-Like Slightly, 5-Neither Like nor Dislike, 4-Dislike Slightly, 3-Dislike Moderately, 2-Dislike Very Much, 1-Dislike Extremely

## CONCLUSION

Tabagak in Mango Sauce Composition per bottle with total weight of 250 g composed of 6 pieces pre-cooked tabagak, 70 g Mango Sauce composed of canola oil, mango concentrate, salt, laurel leaf and pepper corn. The confirmatory test result indicated that Tabagak in Mango Sauce processed at 120 0C for 60 min had better quality since it had shorter cook value that affect highly influenced the physical quality parameters like appearance, aroma, taste, mouth feel and texture.

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# SOLAR-POWERED COIN-OPERATED CHARGING STATION

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**ABSTRACT** This study is focused on the development of a coin-operated mobile gadget charging station that is powered by solar energy, which is attached to the charging station by means of a storage battery. The device is aimed for the promotion of solar energy as alternative off-grid source that demonstrate limitless potential for development. It can also be used for commercial use since it requires certain fee for a specified period to charge mobile gadgets. However, in case of calamities the charging station can be used as an emergency charging station in the event of prolonged power outages. Since the device is a standalone system it can charge mobile gadgets as long as there is sunlight. The coin-operated mobile gadget charging station has the ability to charge small or mobile gadgets and electronics during both day and night.

Keywords: Solar Powered, coin-operated, mobile gadget, charging station

## INTRODUCTION

### Background of the Study

Renewable power generation can help countries meet their sustainable development goals through provision of access to clean, secure, reliable and affordable energy. Solar technology is very popular nowadays and growing day by day. Solar powered gadgets are also taking attention of people and a use of solar energy is taking places where no electric power is available but also in cities. Many countries are aggressively producing renewable energy nowadays.1

In December 16, 2008, during the Second Regular Session of the Fourteenth Congress Republic Act No. 9513 also known as the "Renewable Energy Act of 2008" was enacted. "An Act Promoting the Development, Utilization and Commercialization of Renewable Energy Resources and for Other Purposes" 2 which aims in its declaration of policy the following: (a) Accelerate the exploration and development of renewable energy resources such as, but not limited to, biomass, solar, wind, hydro, geothermal and ocean energy sources, including hybrid systems, to achieve energy self-reliance, through the adoption of sustainable energy development strategies to reduce the country's dependence on fossil fuels and thereby minimize the country's exposure to price fluctuations in the international markets, the effects of which spiral down to almost all sectors of the economy; (b) Increase the utilization of renewable energy by institutionalizing the development of national and local capabilities in the use of renewable energy systems, and promoting its efficient and cost-effective commercial application by providing fiscal and non-fiscal incentives; (c) Encourage the development and utilization of renewable energy resources as tools to effectively prevent or reduce harmful emissions and thereby balance the goals of economic growth and development with the protection of health and the environment; and (d) Establish the necessary infrastructure and mechanism to carry out the mandates specified in this Act and other existing laws.

Governments across the Asia Pacific region are continuing the push for greater renewable energy contributions to domestic electricity demand. While the deal flow has been lower than expected over the last six months, there have been positive signs in several countries that local developers are very active at the approval level. International developers are increasingly taking advantage of the many government and market incentives for renewable energy investment and investing alongside locals.

Solar power is pollution-free during use. Photovoltaic (PV) installations can operate for many years with little maintenance or intervention after their initial set-up, so after the initial capital cost of building any solar power plant, operating costs are extremely low compared to existing power technologies. Modern technology has brought a huge impact on the way of life of many people in the globe. Paradigms of such advancement in technology are the gadgets like mobile phones, iPhones, iPods and tablet computers that make living a whole lot better than it was before.

The researcher's idea was due from the need of a green energy source to provide sustainable power to charge mobile gadgets during power outages and/or where electrical power is not available for a reasonable amount of time. The idea or a device that will charge mobile gadgets started when Guimaras State College participated in the annual Manggahan Festival booth display. The first prototype was then started and tested on September 2012. By April 2013, the first operational prototype was displayed during the said activity.

The researcher opted to engage in the field of Electronics and renewable energy, specifically the realm of mobile gadgets that is undeniably one of the most commonly used devices of today's generation. Recharging a mobile phone is one of the primary concerns of the people who use it in a daily basis.

The study is focuses on the application of photovoltaic (solar) power generation as an off-grid electrical source to power the study because it is a ubiquitous source of energy, with the huge potential of significant contribution to the development of Green Technology. The study also facilitated the understanding of the significance of promoting renewable energy as alternative source of electrical power and encourages further development, innovation and production of renewable energy systems.

In this premise, the researcher has developed the concept of developing an innovative design of the system using renewable energy from the sun which is one of the most abundant sources of energy. On this account, the researcher deal with the means of recharging mobile gadgets using solar power. Thus, this study is conducted.

**Objectives of the Study**

The main objective of the study is to construct a solar-powered coin-operated charging station–green technology instructional device for mobile gadgets using solar energy as alternative off-grid power source. Specifically, it will aim to: (1) develop an innovative design and application using renewable energy source as an alternative or off-grid power source for charging mobile gadgets for personal or commercial use; (2) construct a prototype that can charge various brands and models of mobile gadgets; (3) conduct testing on the compatibility by charging various brands and models of mobile gadgets; (4) conduct testing on the charge percentage of the system using various brands and models of mobile gadgets, (5) show the cost and return analysis of the project.

## METHODOLOGY

**Design Criteria**

A conceptual design of the Solar-powered coin-operated charging station was prepared based on the technical and operational information using other common and locally available materials was gathered. Materials needed and design calculations for the solar-powered coin-operated charging station materials were determined.

During the design of the Solar-powered Coin-operated Charging Station, the following criteria were considered:

1. availability of the local resources and materials for construction;
2. overall size and shape of the solar-powered coin-operated charging station;
3. design and placement of the circuitry;
4. placement of the PV panel and power storage.

**Description of the Device**

The research solar-powered coin-operated charging station will deliver a nominal 1,000 watts power output in which 200 watts will serve 10 stations charging banks to be operated 12 hours a day at initial run and 100 watts was used for automatic night-time lighting of the area for 10-12 hours. The 10-station charging banks was coin- operated which will use one (1) peso coin for the charging time of six (6) minutes.

*Solar (PV) System*. The PV system consist of 120 watts panel passing through the 10-ampere charge regulator to regulate the charging of the 120 ampere-hour storage battery which stores and supply power to the charging system and lighting.

*Charging System/ Lighting*. The charging system consist ten (10) individually placed charging banks with ten (10) different types of charger connectors for each bank to adapt to different brands and models of mobile gadgets. The additional feature of the system is the lighting system which will provide internal lighting of the charging station and external lighting to illuminate the area during night-time for the preset time of twelve (12) hours from dusk to dawn.

*Structural System*. The electrical and electronic system is housed into a hexagonally-shaped structure of sealed steel and wood framing as casing and hexagonally-shaped dome for protection against moisture and rain.

**Design Plans and Perspectives**
Concept and Design


Figure 1. Detailed design concept and perspective of the solar-powered coin-operated charging station

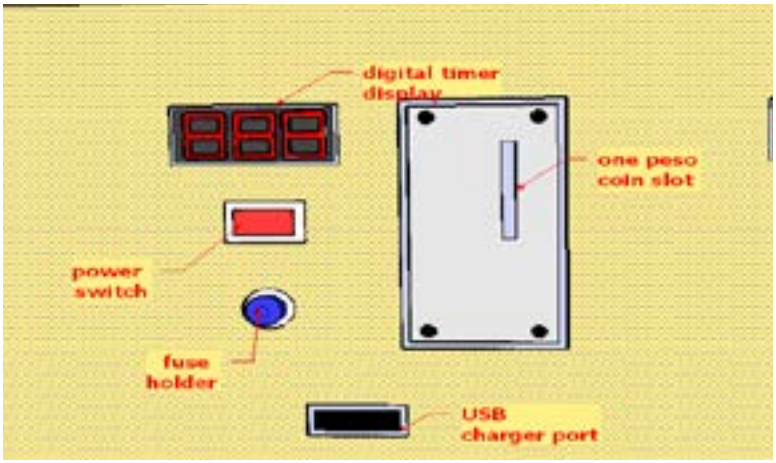


Figure 2. Detailed charging front panel showing the placement of the coin slot, digital display and other peripherals.

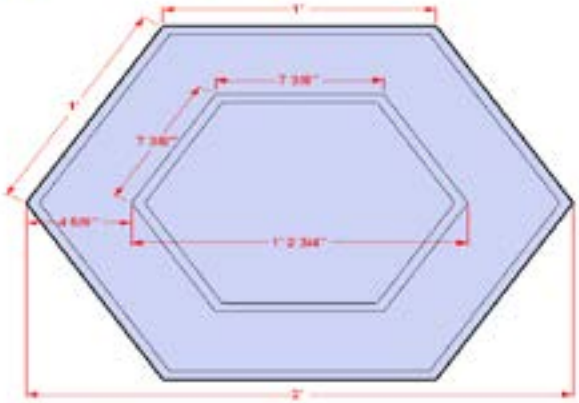

Figure 3. The hexagonally-shaped base design and dimensions of the charging station

Figure 4. Three dimensional (3D) rendering of the base casing and gadget top.

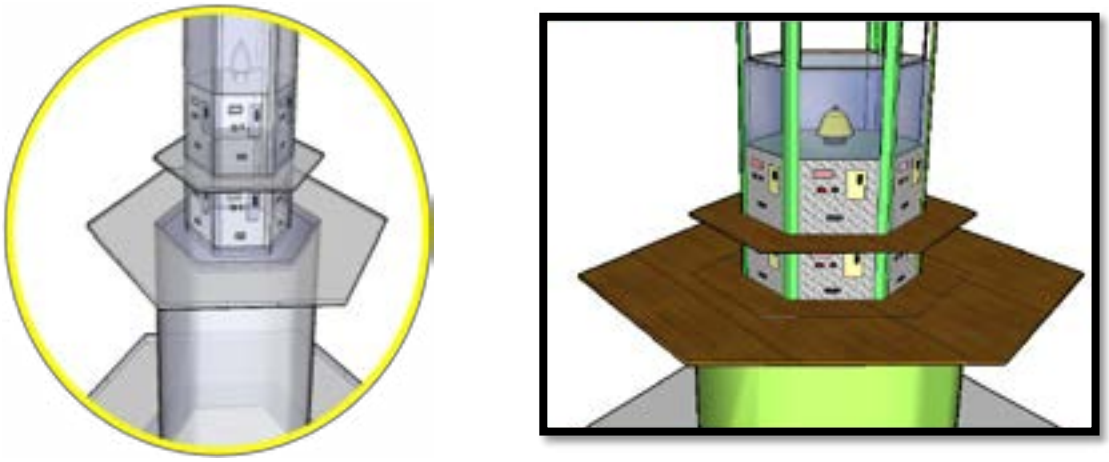

Figure 5. Three dimensional (3D) rendering of the base casing and gadget top with the internal lighting set-up.

**Evaluation of the Study**

Evaluation of the system was conducted using standard test equipment such as voltmeters and ammeters. Testing of the system using various brands and models of mobile gadgets according to generation classified as follows:

1. second (2nd) generation mobile gadgets are units with monochromatic (black and white) screen and digital display with touchpad commonly capable only of voice calls and text messaging,
2. third (3rd) generation mobile gadgets are units with color screen display with touchpad capable of voice calls, text messaging, multimedia service and internet browsing;
3. fourth (4th) generation mobile gadgets are units with color screen display with touch screen capability used for voice calls, text messaging, multimedia service, camera feature, Bluetooth file transfer and internet browsing;

The system evaluation will further include:

1. testing the charging system to determine the system compatibility as to charger acceptability and/ or rejection issues with various brands and models of mobile gadgets;
2. determine the charging rate percentage of various brands and models of mobile gadgets using the system.

List of Tools and Equipment

1. Welding machine
2. Power saw/ hacksaw/ jig saw
3. Electric drill press/ electric drill
4. Riveter/ wrench
5. Electric planer
6. Electric sander
7. Soldering iron
8. Side cutter/ long nose pliers

List of Materials

A. Solar (PV) System

1. 120W Solar Panel with 12V @ 10A Charge Controller
2. 12 volts @120Ah, Deep cycle Solar Battery

B. Charging System/ Lighting

1. coin slot, timer and front cover
2. 10-in-1 multifunction USB car charger with fuse
3. #18 AWG flat cord, polarized/ hook up wire
4. Rubber tape/ cable ties/ stove bolt
5. Dark activated switch with LED bulb, 12 volts, 5 watts

C. Structural System

1. GI pipe
2. plain sheet
3. Marine plywood
4. angle bar
5. bolt / blind rivets
6. Epoxy Primer/ body filler
7. Liquid tile paint/ reducer/ paint thinner
8. welding electrodes

9. cement, sand
10. paint roller/ paint brush

Procedures

1) Finalizing of design and procuring/ gathering of materials.
2) Cutting of angle bars and welding according to placement in the plan.
3) Laying out and cutting of the front panel.
4) Assembling the coin slot, timer and charging system and soldering of parts and components.
5) Preliminary testing of the system and calibration of the timer module to the desired charging time.
6) Final testing of the system to include the solar (PV) and charging system.

Picture Documentation

**Fabrication, Construction and Installation**

Figure 6. The first operational prototype of the solar-powered coin-operated charging station installed inside College campus

Figure 7. Inspecting the base structural frame of the charging station as shown in the picture.

Figure 8. The completed base casing and gadget top as shown in the picture.

Figure 9. Assembling the charger structural frame of the charging station as shown in the picture.

Figure 10. Completing the installation of the internal circuitry of the charging station.

Figure 12. The top dome steel framing as shown in the picture.

Figure 13. The technical expert in Steel Fabrication, Prof. Crisanto Occeña inspecting the completed steel dome.

Figure 14. Assembling the solar (PV) panel as shown in the picture.

Figure 15. The completed charging station showcased during the Municipal Fiesta 2013 as shown in the picture.

Figure 16. Additional feature of the solar-powered coin-operated charging station is the night time lighting set-up.

Figure 18. The fully operational charging station installed inside the College campus with AREC Director, Prof. Joel V. Japitana.

**Instrumentation and Set-up Testing**

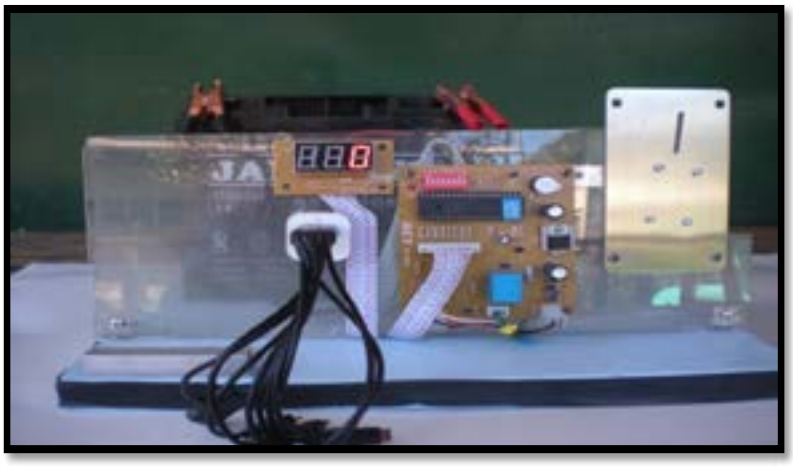

Figure 19. The operational test setup of the solar-powered coin-operated charging station as shown in the picture.


Figure 20. Charging and compatibility test of the system using the generic mobile phone brand.


Figure 21a. Charging and compatibility test of the system using the generic mobile phone brand.


Figure 21b. Charging and compatibility test of the system using the generic (4th Generation) mobile phone brand.

**Cost and Return Analysis**

Solar-Powered, Coin-Operated Mobile Gadget Charging Station

Basic Assumptions:

| | |
|---|---|
| No. of Charging Banks | 10 Stations |
| No. of Days of Operation/ Month | 25 Days |
| Charge Rate/Cost per Hour | Php10.00 |
| No. of Hours of Operation / Day (1st two months) | 8 Hours |
| No. of Hours of Operation / Day (3rd month- onwards) | 15 Hours |

A. Estimated Project Cost

| Items of Expenditure | |
|---|---|
| Solar (PV) System | 19,000.00 |
| Charging/ Lighting System | 18,837.00 |
| Structural System | 23,720.00 |
| Labor Cost , 35% (based on 3 labor work force) | 21,544.95 |
| Total Project Cost >>>>> | 83,101.95 |

B. Revenue

Table 1. Financial Aspect as to projected monthly revenue to include expenditures, net income, project breakeven period and ROI.

| Revenue | Months 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| Projected Daily Collection/Bank | 50.00 | 52.00 | 60.00 | 60.00 | 62.00 | 64.00 | 66.00 | 68.00 | 70.00 | 72.00 |
| Projected Gross Monthly Income | 12,500 | 13,000 | 15,000 | 15,000 | 15,500 | 16,000 | 16,500 | 17,000 | 17,500 | 18,000 |
| *Less: Expenditures Cash Expenses:* | | | | | | | | | | |
| Cost of Materials | 0.00 | 0.00 | 1,500 | 1,500 | 1,500 | 1,500 | 1,500 | 2,000 | 2,000 | 2,000 |
| Cost of Labor | 0.00 | 500 | 700 | 700 | 750 | 750 | 800 | 800 | 1,000 | 1,000 |
| Miscellaneous Expenses | 0.00 | .000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 |
| Contingency | 1,000 | 1,000 | 1,000 | 1,500 | 1,500 | 1,500 | 1,500 | 1,500 | 1,500 | 1,500 |
| Total Cash Expenses | 1,000 | 1,500 | 4,200 | 4,700 | 4,750 | 4,750 | 4,800 | 5,300 | 5,500 | 5,500 |
| Net Income/ Month | 11,500 | 11,500 | 10,800 | 10,300 | 10,750 | 11,250 | 11,700 | 11,700 | 12,000 | 12,500 |
| Projected Breakeven Period | 71,602 | 60,102 | 49,302 | 39,002 | 28,252 | 17,002 | 5,302 | 1,069 | | |
| ROI | 14% | 14% | 13% | 12% | 13% | 14% | 14% | 14% | 14% | 15% |

Figure 22 presents the ten-month period of breakeven assessment which is within the 8th month of operation.

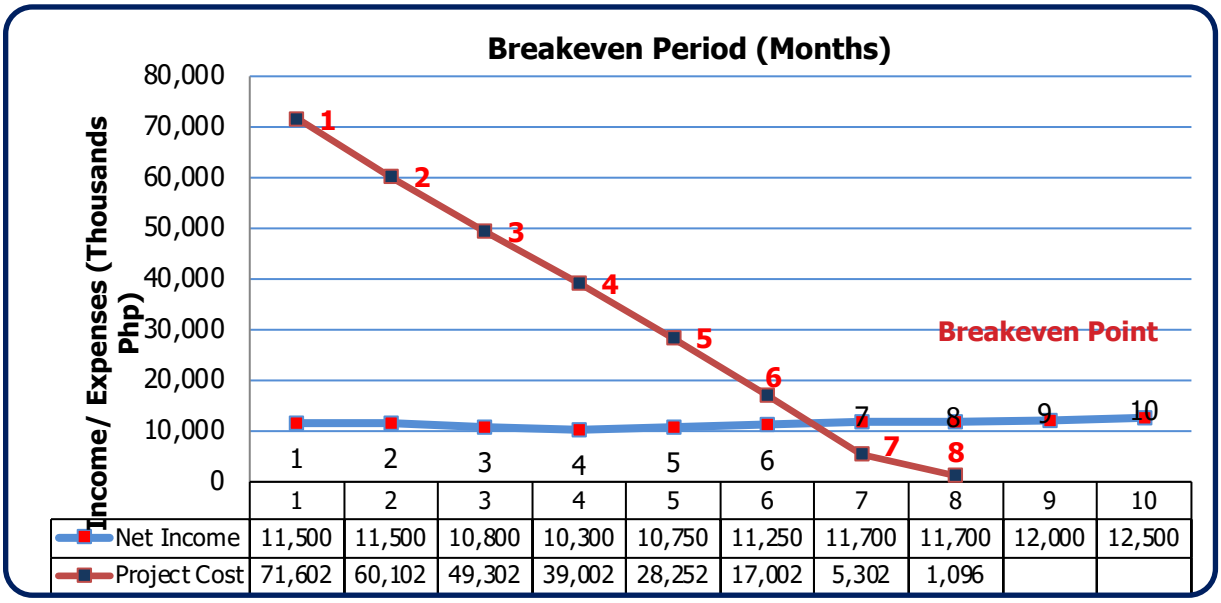


Figure 22. The breakeven period of the project as shown in the graph.

Figure 23 presents the graph of the monthly return of investment ranging from 12% to 15% during 1st month to the 10th month of operation

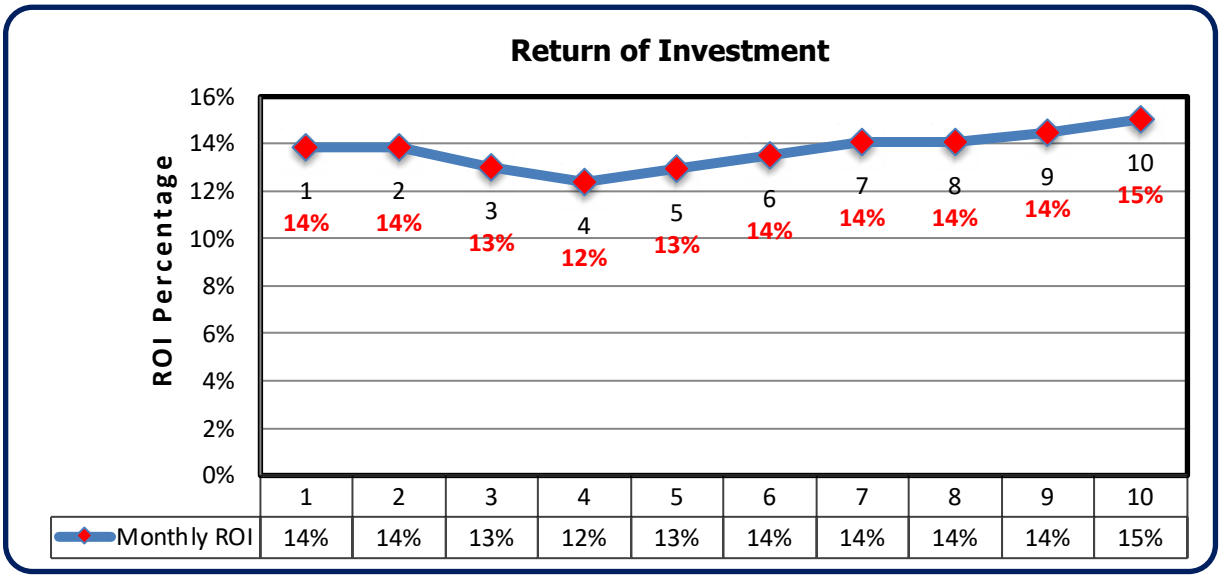


Figure 23. The monthly percentages of ROI of the solar-powered coin-operated charging station as shown in the graph.

## RESULTS AND DISCUSSION

Table 2 present the charging test trials for three (3) replications conducted using the generic 2nd generation mobile phone showing the average charge percentage ranging from 22% to 62% for the charging of six (6) to thirty (30) minutes duration.

Table 2. Test trials for charge rate of generic 2nd generation mobile phone

| Charge Time | 6 minutes (1.00PhP) | 12 minutes (2.00Php) | 18 minutes (3.00php) | 24 minutes (4.00 Php) | 30 minutes ( 5.00 Php) |
|---|---|---|---|---|---|
| Replication 1 | 20% | 26% | 41% | 50% | 60% |
| Replication 2 | 23% | 29% | 44% | 52% | 60% |
| Replication 3 | 22% | 30% | 45% | 55% | 65% |
| Average Charge % | 22% | 28% | 43% | 52% | 62% |

Figure 24 present the graph showing charging test trials for three (3) replications conducted using the generic 2nd generation mobile phone showing the charge percentage for replication 1 ranging from 20% to 60% for the charging of six (6) to thirty (30) minutes duration, replication 2 ranging from 23% to 60% for the charging of six (6) to thirty (30) minutes duration, replication 3 ranging from 22% to 65% for the charging of six (6) to thirty (30) minutes duration.

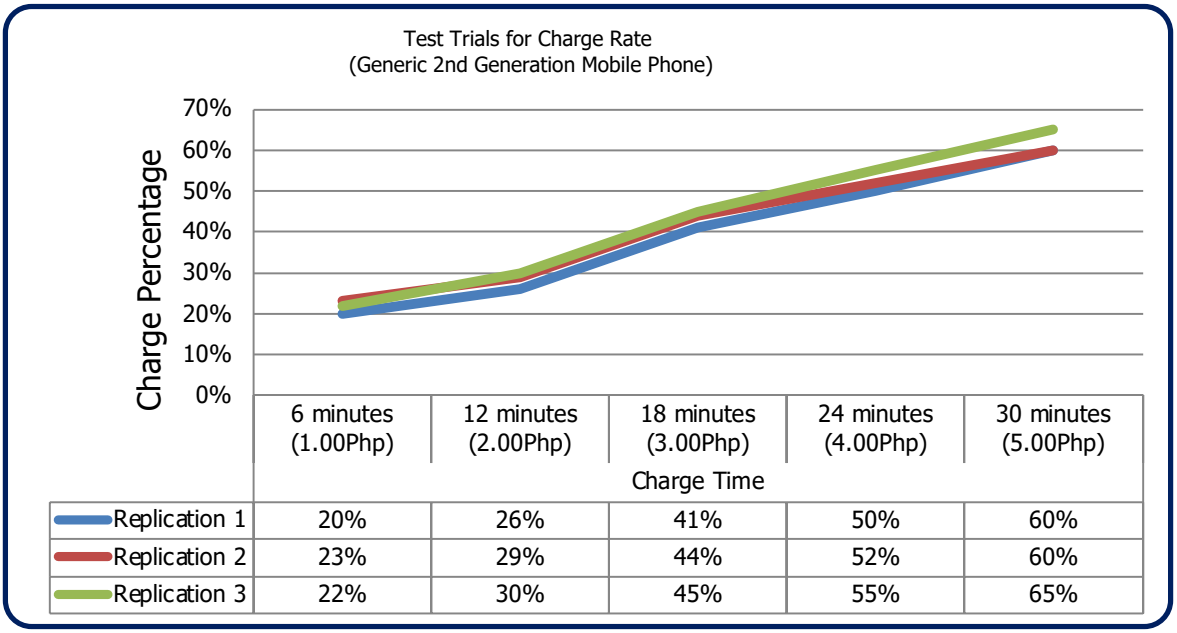


Figure 24. Test trials for charge rate of generic 2nd generation mobile phone

Table 3 present the charging test trials for three (3) replications conducted using the generic 3rd generation mobile phone showing the average charge percentage ranging from 22% to 55% for the charging of six (6) to thirty (30) minutes duration.

Table 3. Test trials for charge rate of generic 3rd generation mobile phone

| Charge Time | 6 minutes (1.00PhP) | 12 minutes (2.00Php) | 18 minutes (3.00php) | 24 minutes (4.00 Php) | 30 minutes ( 5.00 Php) |
|---|---|---|---|---|---|
| Replication 1 | 20% | 26% | 41% | 49% | 55% |
| Replication 2 | 23% | 29% | 44% | 51% | 54% |
| Replication 3 | 22% | 30% | 45% | 52% | 55% |
| Average Charge % | 22% | 28% | 43% | 51% | 55% |

Figure 25 present the graph showing charging test trials for three (3) replications conducted using the generic 3rd generation mobile phone showing the charge percentage for replication 1 ranging from 20% to 55% for the charging of six (6) to thirty (30) minutes duration, replication 2 ranging from 23% to 51% for the charging of six (6) to thirty (30) minutes duration, replication 3 ranging from 22% to 55% for the charging of six (6) to thirty (30) minutes duration.

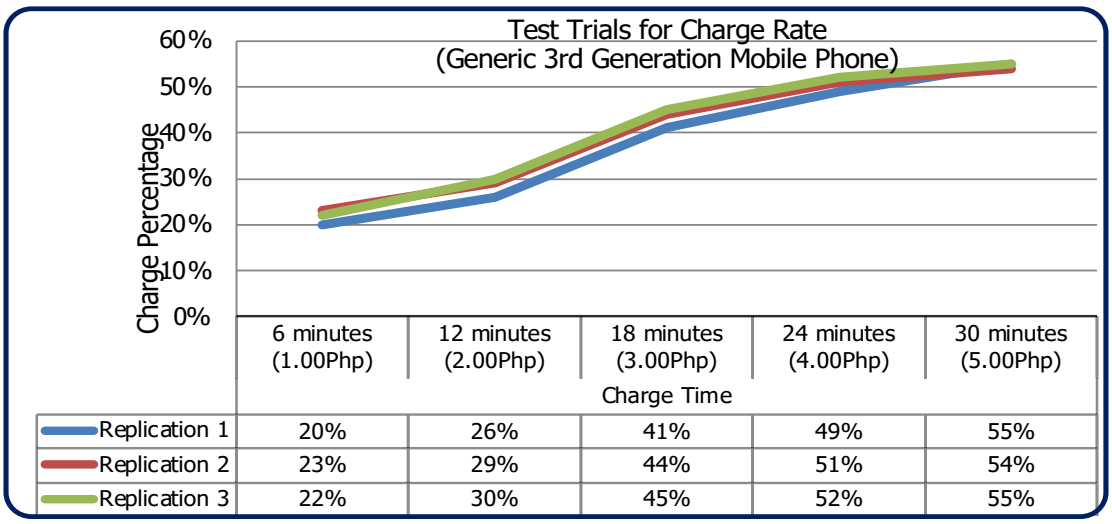


Figure 25. Test trials for charge rate of generic 3rd generation mobile phone.

Table 4 present the charging test trials for three (3) replications conducted using the generic 4th generation mobile phone showing the average charge percentage ranging from 15% to 53% for the charging of six (6) to thirty (30) minutes duration.

Table 4. Test trials for charge rate of generic 4th generation mobile phone

| Charge Time | 6 minutes (1.00PhP) | 12 minutes (2.00Php) | 18 minutes (3.00php) | 24 minutes (4.00 Php) | 30 minutes ( 5.00 Php) |
|---|---|---|---|---|---|
| Replication 1 | 15% | 26% | 35% | 40% | 51% |
| Replication 2 | 17% | 29% | 34% | 42% | 54% |
| Replication 3 | 12% | 24% | 36% | 40% | 55% |
| Average Charge % | 15% | 26% | 35% | 41% | 53% |

Figure 26 present the graph showing charging test trials for three (3) replications conducted using the generic 4th generation mobile phone showing the charge percentage for replication 1 ranging from 15% to 51% for the charging of six (6) to thirty (30) minutes duration, replication 2 ranging from 17% to 54% for the charging of six (6) to thirty (30) minutes duration, replication 3 ranging from 12% to 55% for the charging of six (6) to thirty (30) minutes duration.

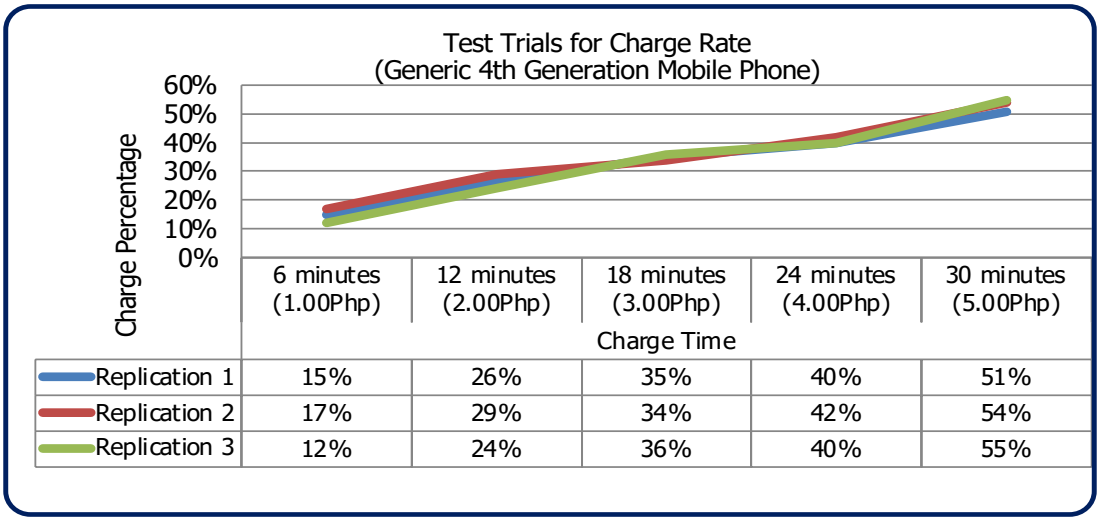


Figure 26. Test trials for charge rate of generic 4th generation mobile phone

## CONCLUSION

There are no incompatibility issues to various brands and models of mobile gadgets commercially available in the market. The solar-powered coin-operated charging station can be easily constructed and can be used for personal use and commercial purposes. The solar-powered coin-operated charging station presents cost effectiveness as to sustainability for low maintenance features. The solar-powered coin-operated charging station is an environment friendly source of power by harnessing solar energy thus promoting green technology generation vision of Guimaras State College.

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# SPRAY DRIED BATUAN POWDER

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**ABSTRACT** This study was conducted using a spray dryer to produce Spray Dried Batuan (Garcinia Binucao). Batuan pulps were extracted under optimum condition. The extract undergone the same processing parameters: Feed rate/ Feed Pressure=450psi, inlet temperature=210-240C, outlet temperature=80-95C. Spray Dried Batuan was subjected to sensory evaluation, microbial analysis and chemical/physical analysis. Results revealed that the product was very much liked by the respondents as to the taste, color and flavor while slightly like in odor/aroma. In terms of the microbial analysis, it was found out that it has an Aerobic Plate Count of<10cfu/g sample, an Escherichia coli Count which is <1.8 MPN/g sample and Molds and Yeast Count of 210 cfu/g sample. For chemical/physical analysis, the result showed that in a 100g sample in a plastic package of Spray Dried Batuan Powder the pH = 2.36, water activity = 0.34, total titratable acidity as acetic acid = 9.49% and moisture content = 5.31%.

**Keywords**: Spray Drying, Batuan Powder

## INTRODUCTION

Batuan is common and widely distributed throughout Luzon and the Visayan Island. In the island of Panay, the attractive tree grows tall and abundant, much so that the fruit found its way into the local sinigang dishes and the Visayan palette. These are used as a souring agent while cooking fish, beef and other foods. A local would readily prefer a Batuan sinigang than any cooked with other pampaasim. The young leaves are also used for this purpose if no fruits are available.

In food industry, Spray-drying is the transformation of liquid state feed into a dried particulate from. It is a technique to guard food ingredients from volatile loses and premature interaction with other ingredients. Under the optimum processing conditions, it has been proven to be an effective method to obtain products (Farimin, 2009). Transformation of fruit juices into dry particulate form results in much reduced volume and longer shelf-life. Spray-drying is achieved by atomizing the fluid into a drying chamber, where the liquid droplets are passed through a hot-air stream (Masters, 1991, Siddick 2014). It also provides the advantage of weight and volume reduction. Parameters like concentration of juice, addends, feed flow rate and also the inlet/outlet air temperatures have a significant role in the yield of Fruit powder.

### Objectives of the Study

This study aimed to: (1) Develop batuan powder using spray drying method; (2) Conduct sensory evaluation of spray dried batuan powder as to the following: odor, taste, aroma and flavor, and (3) Conduct biological test and chemical analysis of batuan powder such as: Aerobic Plate Count (APC), yeast molds, E.coli contents, water activity, moisture contents, pH and total titratable acidity.

## METHODOLOGY

*Procurement of the Materials*. The materials needed in the experiment were procured locally from the batuan growers while the conduct of the study was held in the Western Visayas Food Innovation Center.

*Method of preparing Batuan extract*. Batuan fruits were thoroughly washed with cleaned water. These were of 2 phases – the pre and final washing, this is to ensure that the samples are clean. Preliminary experiments were carried out to establish the best extraction procedure to give the best product. These were:

1. Fresh batuan fruits were macerated using a pulper, mixed with water and were gripped using a stainless steel gripper. The ratio of 6:1 (6 kgs. Of batuan fruits to 1 liter of distilled water), after which the batuan juices were extracted through the using of electric juicer.

2. The juice produced were filtered /strained to separate the solid particles. All of the pulps and seeds that has been separated during the extraction process were subjected to cabinet drying and sun drying for product adding while the juices were stored overnight in a refrigerator.

*Spray Drying*. Maltodextrin was added to the batuan extract. The mixture was stirred for 5 minutes and ready to spray dry. A spray dyer was employed for the spray dying process. The unit is self-contained and supplied complete and ready for immediate operation. All major components are housed within stainless steel tube/cabinet. All sample treatment undergone the same processing parameters: Feed rate/Feed pressure=450-500 psi, inlet temperature =210-2400C, outlet temperature=80-950C. Maltodextrin was added according to the mass of the batuan extract. The dryer was washed with water at desired parameter settings for 10-15 minutes before spray dying process. The powders produced were collected in a plastic pouch/container, sealed tight, weighed according to desired mass and stored at 4 oC in dark.

**Product Performance Evaluation and Testing:**

*Sensory Evaluation*. The 9 point Hedonic Scale was used for sensory evaluation to assess the product as to its odor, taste, aroma and flavor. Fifteen (15) students and fifteen (15) faculty and staff members were taken as respondents.

*Microbial Analysis*. The 100 gram spray dried batuan powder sample was subjected to microbial analysis to determine the Aerobic Plate Count (APC), yeast and molds, and Escherichia coli contents of the product.

*Chemical Analysis*. The spray-dried batuan powder was analyzed for moisture content, dissolution, water activity and hygroscopicity.

## RESULTS AND DISCUSSION

Sensory Evaluation. This was done to 30 faculty and staff and students of GSC in order to determine the acceptability level of Spray Dried Batuan in reference to its: color, taste, aroma & flavor. A 9-point Hedonic Scale was used. These were: Extremely Like (9), Very much Like (8), Moderately Liked (7), Slightly Liked (6), Neither Liked or Disliked (5), Slightly Disliked (4), Moderately Disliked (3), Very much Disliked (2) and Extremely Disliked (1). As to its color, the product was identified by the respondents as creamy/lightly brown having the mean of 7.63 (Like very much). For its aroma, the product has the mean of 5.71 (Slightly Liked). As to the product's flavor, it was evaluated by the respondents as desirable with the mean of 7.27 while for the taste, it was evaluated as sour with the mean of 7.13. Results revealed that the product was very much like of respondents as to the flavor, color, and taste while slightly like in odor. This implies that the product was generally acceptable.

Table 1. Results on Sensory Evaluation

| Sensory | Characteristics | Mean | Acceptability |
|---|---|---|---|
| Color | Creamy/lightly brown | 7.63 | Like very much |
| Aroma | Not desirable | 5.73 | Slightly like |
| Taste | Sour | 7.13 | Like very much |
| Flavor | Desirable | 7.27 | Like very much |
| Overall Mean | | 6.9425 | Like very much |

**Microbial Analysis**. Spray Dried Batuan was analyzed as to the Aerobic Plate Count (APC), yeast and molds and Escherichia coli contents. The results revealed that a 100 grams Spray Dried Batuan Powder has an estimated Aerobic Plate Count of < 10cfu/g sample, Escherichia coli Count which is < 1.8 MPN/g sample and Molds and Yeast Count of 210 cfu/g sample. This implies that the product passed the standard of food safety in terms of estimated Aerobic Plate Count.

Table 2. Results on Microbial analysis

| Sample Description | Characteristics | Mean |
|---|---|---|
| Spray Dried Batuan Powder, 100g | Creamy/light brown | <10cfu/g sample (estimated) |
| 2 packs @ 100g/pk | Escherichia coli Count | <1.8 MPN/g sample |
| MDF: 07/30/2018 | Molds and Yeast Count | 210 cfu/g sample |

**Chemical Analysis**. The spray-dried batuan powder was analyzed for moisture content, dissolution, water activity and hygroscopicity. In chemical analysis for pH of the product, the result showed that in a 100g sample in a plastic package of Spray Dried Batuan Powder the pH = 2.36. A pH value of 2.25 to 5.5 tends to prolong the shelf life of fresh fruit and inhibit the multiplication of micro-organisms. Likewise for vegetables with a more neutral pH IN THE 4.6 TO 6.4 range (The importance of pH in Food Quality and Production, 2018). This implies that the spray dried batuan powder has an extended shelf life since that it has a pH value of 2.36.

In terms of water activity, the analysis also revealed that a 100 gram spray dried batuan has 0.34. Most "spoilage" microorganisms are inhibited by αw values lower than 0.90 for bacteria, 0.88 for yeast and 0.80 for molds (Food and Drug Administration, 2018). This implies that spray dried batuan powder can able to prevent spoilage due to its lower water activity.

The analysis also showed that the 100 gram spray dried Batuan powder sample has 9.94% total titratable acidity as acetic acid. This implies that the spray dried batuan powder has a high percentage of acetic acid in terms of total titritable acidity.

For moisture, it was found out that the spray dried batuan powder has 5.13% moisture. Dried and powdered products have a target moisture content of 5-15% to preserve the shelf life of the product. This implies that the spray dried batuan powder has a lower moisture content which is a good factor to extent shelf life of the product.

Table 3. Results in Chemical Analysis

| Sample Description | Parameter | Results |
|---|---|---|
| 100g sample in a plastic | pH | 2.36 |
| Packed labeled as Spray Dried | Water Activity | 0.34 |
| Batuan Powder | Total Titritable Acidity as Acetic Acid | 9.46% |
| | Moisture | 5.13% |

## CONCLUSION

The 15 kilograms of fresh batuan fruit can produce approximately 7.16 kilograms of batuan extract based on the processes conducted by the researchers. The TSS of batuan extract was approximately 4.8% as conducted by the researchers which might vary depending on the condition and processes being implemented. Moreover, approximately 493.5 grams of batuan powder was obtained from 7.25 liters of extract with a TSS of 20%. Further study would be conducted by varying the volume of maltodextrin added to the batuan extract and another study on batuan powder obtained from different drying methods.

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# A PROCESS OF PREPARING SPRAY DRIED PICKLED MANGO

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**ABSTRACT** Mango is one of the most important tropical fruits in the world and currently ranked 5th in total world production among the major fruit crops. As mango is a seasonal fruit, about 20% of fruits are processed for products such as puree, nectar, leather, pickles, canned slices, and chutney. These products experience worldwide popularity and have also gained importance in national and international market. Processing of mango helps in preserving the fruit for future use especially during off season, it also adds value to the product for food and other industrial use. Mango as a popular fruit in the province of Guimaras helps in the industry and is a significant economic player in the province. It provides an income not just for the benefit of the community but also for the government to continuously offer public services and promote agri-tourism in the island. Thus, this study was conducted to produce pickled green mango powder as seasoning. Specifically the study aims to determine the general acceptability of spray dried pickled green mango as seasoning. Results of the study reveals that Appearance, Aroma and Color is very much liked by the respondents, while texture is moderately liked, Mouth Feel and Flavor is Slighly liked by the respondents when evaluated as powder. However, when the powder was used as seasoning for Fish Sinigang, results revealed that sample C with 30g Spray dried Picked Mango ranked 1st with mean of 2.1. The results of the microbial analysis conducted by the DOST for the project Sray Dried Pickled Mango with methods used are as follows: Aerobic Plate Count. Pour Plate Method, 35˚C 48 hours, result shows that there are <250 cfu/g sample g/100g (estimated). Coliform Count. Multiple Tube Fermentation Technique, that there are <1.8 MPN/g sample per g/100g. Mold and Yeast Count. Pour Plate Method, 25˚C, 5-7 days, result shows that there are <100 cfu/g sample (estimated) which means that the product or the sample given is safe for the growth of microbial organisms. Laboratory analysis conducted by the Department of Science and technology the following are the product properties found in the spray dried pickled mango; moisture content is 5.34 by Air Oven method. Official Method 925.45B, total titratable acidity as acetic acid is 2.27% by using the Acidity (Titratable) by Indicator Method. Official Method 942.15A, its pH level is 5.46 this was tested through Electrometric Method (10% solution), and water activity is 0.33 by Novasina Water Activity Meter. The maturity of mangoes is an important factor in processing the spray dried green pickled mango. It was observed that the green mango approximately 110-120 days is the better quality of mango to produce spray dried powder. Spray dried pickled mango is acceptable as seasoning and can be used as best choice for cooking different recipes at home for it was made in fresh raw materials without any synthetic preservatives and additives.

**Keywords:** Spray Dried, Mango, Food, Processed, Fruit

## INTRODUCTION

### Background of the Study

Mango is one of the most important tropical fruits in the world and currently ranked 5th in total world production among the major fruit crops. As mango is a seasonal fruit, about 20% of fruits are processed for products such as puree, nectar, leather, pickles, canned slices, and chutney. These products experience worldwide popularity and have also gained importance in national and international market. During processing of mango, by-products such as peel and kernel are generated.

Mango peels and seeds are rich in valuable bioactive compounds such as polyphenols, carotenoids, dietary fibres, enzymes phytosterols and tocopherol; whereas and the peel extract exhibits potential antioxidant properties. Processing of mango by-products reduces waste disposal problem, adds value to the product for food and other industrial use, and the isolated active component can be used in food fortification. Green mangoes in India are mostly used as pickles and chutneys. Pickles are prepared in almost every Indian home and also commercially. Mango pickles are classified as salt pickle or oil pickle or sweet pickle based on the type of preservation used. They are made from peeled or unpeeled fruit with or without stones and with different kinds of proportions of spices.

Mango pickle refers to a variety of pickles prepared using mango. This is a very popular pickle in South Asia. Pickles are main side dishes and many varieties of vegetables are used. However, raw mango or tender mango is the most popular variety of fruit used for pickling. There are multiple variety of mango pickles prepared depending on the region and the spices used but, broadly there are two types of - whole baby mango pickle or cut mango pickle. Whole baby mango pickle is a traditional variety very popular in Southern India and uses baby mangoes that are few weeks old. There are special varieties of mangoes specifically used just for pickling and they are never consumed as ripe fruit. Baby mangoes are pickled using salt, vegetable oil and a blend of hot spices, in a very careful process which ensures pickles are preserved for years.

Mango pickle inoculated with salt tolerant strain of Aspergillus niger got spoiled at 10% salt, 40% oil and 4.2% native acidity. Salt concentration of 15% protected the pickles against spoilage by the inoculated organism as well

as the native flora of the pickles. It was observed that groundnut oil did not have any preservative effects against microbial spoilage. Preservation of raw mango slices for use in pickle and chutney was also studied by Sethi (1991). Preservation in a chemical solution containing 5% salt, 1.2% acetic acid and 0.01% KMS was found to be better than dry salting. Addition of 0.5% calcium chloride helped to retain texture of slices during subsequent storage. Chemical changes and microbial growth during green mango fermentation for pickling was studied by Yunchalad et al. (2003). Spray drying of sugar-rich foods such as fruit juice has great economical potential. However, fruit juice powders obtained by spray drying have some drawbacles in their functional properties, such stickiness, solubility and higroscopicity making their packaging and utilization difficult. The possibility of reaching a highly organized structure during spray drying could reduce the stickiness phenomena, considering the fact that crystalline sugar has a lower water sorption potential. This work aimed the induction of crystallization on powder mango juice during the process of spray drying.

**Objective of the study**

This study was conducted to produce pickled green mango powder as seasoning. Specifically the study aims to determine the general acceptability of spray dried pickled green mango as seasoning.

## MATERIALS AND METHODS

**Materials:**

Guimaras Green mango is selected and purchased from mango sellers in the province. The fruits will be washed and peeled then will be sliced into 1/2 inch slices. Then this will be mixed with the pickling solution for different days of the week. First is 3 days, second will be 5 days and the last treatment will be 7 days. After the absorption of the pickling solution to the mango, it will be processed into a blender and will be squeezed and strained. Next, is to process the pickled mango together with its pickling solution to the spray dryer.

| Quantity | Unit | Ingredients |
|---|---|---|
| 15 | kg | green mango |
| **Pickling Solution** | | |
| 1/2 | kg | hot pepper |
| 1/2 | kg | red sweet pepper |
| 1/2 | kg | green sweet pepper |
| 1/2 | kg | onion |
| 1/2 | kg | ginger |
| 15 | cups | vinegar |
| 15 | cups | sugar |
| 5 | cups | salt |

**Procedure:**

1. Prepare tools, utensils and equipment needed.
2. Wash and drain mango and other raw materials.
3. Slice mango into 1/2 inch thick slices.
4. Slice hot pepper, red sweet pepper, green sweet pepper, onions, and ginger into strips.
5. Measure pickling solution and boil. Add other raw materials.
6. Pour boiled pickling solution with other ingredients in mixing bowl with mango.
7. Pack mango pickles in a jar with pickling solution.
8. Cover, seal and label.
9. After pickling time take out the mangoes from pickling solution and blend/extract to liquefy.
10. Add an amount of Malto Dextrin to the blended pickled mango
11. Process the blended pickled mango with malto dextrin together with the pickling solution to the spray dryer.

*Pickling solution recipe based on TESDA- Standardized Recipe

**Methods:**

a. selecting of mango;
b. washing of said selected mango;
d. preparing of pickling solution;
e. soaking of said cut mango into said pickling solution
f. storing said pickling solution containing said cut mango for about 3 days;
g. removing said cut mango from said pickling solution to obtain a pickled mango;

h. blending of said pickled mango to obtain an extract;
i. adding malto dextrin in the said obtained mango extract
j. processing of said extract in a spray dryer to obtain a powder; and
k. packing of said powder.

**Tools and Equipment Needed**

- 3 Mixing bowl- medium sized stainless bowl used as container of raw materials.
- 2 Chopping board- medium sized chopping board used for chopping ingredients.
- 3 Knives- used for cutting raw ingredients. Casserole/ cooking pot- Large size casserole or cooking pot used to cook pickling solution.
- Gas Range- used for cooking
- Blender- used to purée the pickled mango
- Spray Dryer- an equipment with special technology used to process the raw materials into powder.

*Maturity of the raw material*. The maturity of mangoes is an important factor in processing the spray dried green pickled mango. It was observed that the green mango approximately 110-120 days is the better quality of mango to produce spray dried powder.

*Pickling Solution.* Pickling solution should be measured properly and must be followed according to its standard recipe.

## RESULT AND DISCUSSION

### Sensory Evaluation of Spray Dried Pickled Mango

Data in table 1 presents the acceptability of spray dried pickled mango. Results revealed that the appearance, aroma and color was rated very much liked by the evaluators with mean of 7.5 for appearance, 7.72 for aroma, 7.84 for color. While texture was rated as moderately liked with 6.8 mean and mouth feel and flavor was rated slightly liked with mean of 6.42 for mouth feel and 6.32 for flavor.

Table 1. Summary of Sensory Evaluation of Spray Dried Pickled Mango

| Properties | Mean | Description |
|---|---|---|
| Appearance | 7.5 | VML |
| Aroma | 7.72 | VML |
| Color | 7.84 | VML |
| Mouth Feel | 6.42 | SL |
| Texture | 6.8 | ML |
| Flavor | 6.32 | SL |

Scale: 9 (Extremely Liked), 8 (Very Much Liked), 7 (Moderately Liked), 6 (Slightly Liked), 5 (Liked or Disliked), 4 (Slightly Disliked), 3 (Moderately Disliked), 2 (Very Much Disliked), 1 (Extremely Liked)

Data in table 2 presents the ranking of fish sinigang seasoned with different amount of spray dried pickled mango as evaluated by the evaluators. Results revealed that the recipe with higher amount of spray dried pickled mango of 30g ranked first among the three preparations evaluated by the evaluators. This means that it was the best amount to be used a recipe of 450 kg. of fish in 1.5 liter of water.

Table 2. Ranking of FIsh Sin igang with Spray Dried Mango Powder as evaluated by the Evaluators

| | A | B | C |
|---|---|---|---|
| Mean | 1.88 | 2.02 | 2.1 |
| Rank | 3rd | 2nd | 1st |

A- 10g Spray dried Picked Mango
B- 20g Spray dried Picked Mango
C- 30g Spray dried Picked Mango

Table 3 shows the results of the different trials made for Spray Dried Pickled Mango with different parameters; results shows that out of 4 trials, trial number 2 fails during the process and has the least amount of the powder yield among all the trials. All other trials are acceptable and have meet the higher yield when processed as powder. All trials were processed in a constant temperature and time.

Table 3. Results of the different trials made

| | Trial no. 1 | Trial no.2 | Trial no.3 | Trial no.4 |
|---|---|---|---|---|
| Weight of Raw Materials | 5 kilos green Mangoes | 5 kilos green Mangoes | 10 kilos green Mangoes | 10 kilos green Mangoes |
| Total weight | 2,762.7 g | 3137.5g | 5,891.5g | 5055.1 |
| TSS w/o water & malto | 18% | 15% | 12% | 9.5% |
| Water (50%) | 1,381g | 1568.4 g | 2,945.75 | 2527.5g |
| TSS w/ water | 12.2% | 15.8% | 7.7% | 6.1% |
| Malto | 1,056g | 968.07g | 2,815.30g | 2589.9g |
| Final weight | 4,961.2 g | 5612.9g | 11,374.1g | 10,978g |
| TSS (target: 30%) | 30.4% | 30.1% | 30.1% | 27.7% |
| Powder Weight | 609.9g | 54.4 (FAIL) | 1,523.9 g | 683.8g |
| Temperature | Inlet:212 °C Outlet: 85° C | Inlet: 212° C Outlet: 85° C | Inlet: 212 ° C Outlet: 85 ° C | Inlet: 212 ° C Outlet: 85 ° C |
| Time | 2 hours | 2 hours | 2 hours | 2 hours |

Table 4 shows the results of the microbial analysis conducted by the DOST for the project Spray Dried Pickled Mango. Methods used are as follows: Aerobic Plate Count. Pour Plate Method, 35˚C 48 hours, result shows that there are <250 cfu/g sample g/100g (estimated). Coliform Count. Multiple Tube Fermentation Technique, that there are <1.8 MPN/g sample per g/100g. Mold and Yeast Count. Pour Plate Method, 25˚C, 5-7 days, result shows that there are <100 cfu/g sample (estimated) which means that the product or the sample given is safe for the growth of microbial organisms.

Table 4. Result of Microbial Analysis

| Sample Description | Parameter | Result g/100g |
|---|---|---|
| Spray Dried Pickled Mango, ~100g<br><br>(2 packes @ ~100 g/pack<br>MFD: 08/01/2018 | Aerobic Plate Count<br><br>*Escherichia coli* Count<br><br>Molds and Yeast Count | <250 cfu/g sample (estimated)<br><br><1.8 MPN/g sample<br><br><100 cfu/g sample (estimated) |

Table 5 shows the result of the Analysis for Moisture content, Total Titratable Acidity, pH, and Water Activity. Based on the result of the laboratory analysis conducted by the Department of Science and technology the following are the product properties found in the spray dried pickled mango; moisture content is 5.34 by Air Oven method. Official Method 925.45B , total titratable acidity as acetic acid is 2.27% by using the Acidity (Titratable) by Indicator Method. Official Methods of Analysis of AOAC International (2016) 20th ed. Official Method 942.15A, its pH level is 5.46 this was tested through Electrometric Method (10% solution), and water activity is 0.33 by Novasina Water Activity Meter.

Table 5. Result of Analysis for Moisture content, Total Titratable Acidity, pH, and Water Activity.

| Sample Description | Parameter | Result g/100g |
|---|---|---|
| ~150 g sample in a plastic bag labeled as:<br><br>Spray Dried Pickled Mango | Moisture<br>Total Titratable Acidity as Acetic Acid<br>pH<br>Water Activity | 5.34<br>2.27%<br>5.46<br>0.33 |

## CONCLUSION

Spray dried pickled mango is acceptable as seasoning and can be used as best choice for cooking different recipes at home for it was made in fresh raw materials without any synthetic preservatives and additives.

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# CALAMANSI PRODUCTION PRACTICES AND EFFICIENCY IN BUENAVISTA, GUIMARAS

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**ABSTRACT** Calamansi or calamondin (Citrofortunella microcarpa) is one of the focus commodity of the Municipality of Buenavista, Guimaras. This had been a promising industry that had greatly improved the quality of life of the Buenavistahanons. However, with due to various constraints, this industry weakened for several years. The industry is still hoped to bring quality life to the calamansi farming community. Hence, this study was conducted municipal-wide to determine the latest status of the industry last November-December 2017. This aims to determine the profile and production practices of calamansi growers, economic efficiency of calamansi industry and the problems met and production constraints met by the calamansi growers. Majority of the respondents were already senior citizens with ages ranging from 60 years old and above. They were mostly male, married and generally have 2 children. Most of them were high school graduates. Their top three occupations noted were farmer, housewife, and laborer. The largest numbers of calamansi farms were located at Barangay San Nicolas. The largest numbers of respondents were into calamansi farming operations for 6 to 15 years but most of the respondents were not affiliated to any organization and were not able to attend any training or seminar. Almost all respondents sourced-out planting materials within the province. All respondents manually prepared their lands, propagate the calamansi plants through marcotting and planted seedlings on a manual basis. Fertilizer application is generally transitional, where farmers apply combinations of organic and commercial synthetic fertilizers. Majority of the respondents practiced conventional method in controlling or preventing pests and diseases. They generally raised calamansi under rainfed condition but some irrigate the farm with water sources from deep wells, streams or rivers. They generally harvested calamansi fruits on monthly basis or twice a month. Nearly all of the respondents practiced composting to manage residues in the farm. As to farm products, the majority of the respondents produce also rice, coconut, and banana. Other respondents also produce mango, papaya, and other native fruits. Majority of the respondents operated calamansi farms of less than 1 ha that were generally owned by the respondents. A hectare of calamansi yielded generally yielded 101 to 500 kgs of calamansi fruits per hectare. The farm gate price of calamansi fruits during the study was generally PhP 16-25. Majority of the respondents noted that they spent PhP 1001 to PhP 5000 per hectare and they generally employed one (1) worker on the farm. Majority of the respondents depended on wholesaling when selling their products they also noted that marketed products were generally paid in cash. The respondents noted drought, propagation constraints, pest and disease management, stray grazing livestock and the significantly low farm gate price during peak season as the most important problems and production constraints in calamansi production.

**Keywords:** citrus production, farming practices

## INTRODUCTION

### Background of the Study

Calamansi or calamondin (Citrfortunella microcarpa) is a fruit tree native to the Philippines. It is the most commonly grown backyard tree among the citrus species. It can thrive in a wide variety of environmental conditions. It is a small tree with a height ranging from 2 meters to 7 ½ meters at maturity. Its broad egg-shaped leaves are dark green in the upper surface and pale green underneath. The fruit is round about 2 cm to 40.5 cm in diameter and greenish - yellow in color.

Like its relatives, such as the mandarin, pomelo and sweet orange, the calamansi is rich in phosphorous, calcium, iron and Vitamin C or ascorbic acid. It is the most popular and most commonly used citrus fruit in the country. Its juice is nutritious and traditionally made into a fruit drink that helps prevent respiratory diseases. It also helps strengthen the bones and stimulate growth, especially among growing children. It can be used as a flavoring ingredient in desserts, e.g. leche flan, or as an additive in various food preparations, such as fish steak.

Its pulp is used as a major ingredient in beverages, syrups, concentrates, and purees. The peel is made into jams, candies, and marmalade. With its alkalinizing effect, on the body calamansi helps circulate blood evenly and facilitates normal digestion.

Filipinos can have a year-round supply of this versatile citrus fruits by growing the plant right in their front yards or backyards or even in big boxes (Department of Agriculture, 2016)

**Statement of the Problem**

This research understanding sought to investigate the production and marketing practices of calamansi growers and farms in Guimaras Province. Specifically, this study aimed to answer the following questions: (1) what is the profile of the respondents when categorized to; age, civil status, occupation, educational attainment, family monthly income, number of children, Farm location, Numbers of years in operation, organizational affiliation, and seminars and training attended; (2) what are the production practices of the calamansi growers when categorized to: sources of planting materials, land preparation, plant propagation, planting, fertilization, pest and disease management, watering management, harvesting period, farm waste management, and farm products; (3) what is the economic characteristic of calamansi growers/farms when categorized to: farm size, land ownership, yield per hectare, gate price, variable cost, fixed cost, capitalization, number of workers, and marketing schemes; (4) what are the problems met and production constraints when categorized to: environmental factors, technical factors, social factors, and economic factors.

## METHODOLOGY

A descriptive research design was used to gather information of the study. The respondents of the study were the 190 calamansi grower in Guimaras. The survey and farm visits was conducted in all calamansi farms in the province of Guimaras that covered the five municipalities: Buenavista, Jordan, San Lorenzo, Nueva Valencia, and Sibunag respectively. According to Librero (1996), a survey research design allows to study "naturally occurring phenomena." Furthermore, a researcher collects data from a part of the population to assess the interrelationship of the variables in his/her study. Survey research is the most efficient method of gathering data that was used to describe a very large population (Babbie, 1986). For this study, survey was done from enumerated respondents using key informant. The respondents represented by the farmers and farm owners served as participants in whom they have a direct engagement in calamansi production in Guimaras. The preliminary interview was facilitated to gather data from the calamansi growers agricultural instructors/professors, and researchers concerning the production and marketing of calamansi. Statistical tools used were frequency, percentage distribution, mean, and financial risk analysis.

## RESULTS AND DISCUSSION

**Profile of Respondents.** A total of 190 calamansi growers were interviewed for this study and their profiles were classified according to age, civil status, occupation, educational attainment, family monthly income, number of children, farm location, number of years in operation, organizational affiliation, and seminars and trainings attended. Table 1 shows the personal profile of the respondents in terms of age, gender, civil status, occupation, educational attainment, family monthly income, and number of children. Results show that the majority of the respondents were already senior citizens with ages ranging 60 and above (59 or 31.1%). It was followed by those aging from 41 to 50 years old with 49 or 25.8% responses, 51 to 60 years with 41 or 21.6% responses, 31 to 40 years old with 35 or 18.4%. The least number of responses was taken from those aging 30 and below (6 or 3.2%). The respondents were 76% (144) male and 24% (46) female. This only reflects that females also play an important role in calamansi industry. In terms of civil status, it was noted that majority of the respondents were already married (154 or 81.1%), 18 or 90.5% each were and widowed, 16 or 8.4% were single and only 1 or 0.05% was on live-in status and was separated.

Table 1. Profile of the Respondents

| Items | Frequency | Percent |
|---|---|---|
| Age: | 6 | 3.2 |
| 30 & below | 35 | 18.4 |
| 31-40 | 49 | 25.8 |
| 41-50 | 41 | 21.6 |
| 51-60 | 59 | 31.1 |
| more than 60 | 190 | 100.0 |
| Total | | |
| Gender: | 144 | 76.0 |
| Male | 46 | 24.0 |
| Female | 190 | 100.0 |
| Total | | |

| | | |
|---|---|---|
| Civil Status: | | |
| Live-in | 1 | 00.5 |
| Married | 154 | 81.1 |
| Separated | 1 | 00.5 |
| Single | 16 | 8.4 |
| Widowed | 18 | 90.5 |
| Total | 190 | 100.0 |
| Occupation: | | |
| Brgy. Officials | | |
| Businessman/woman | 6 | 3.16 |
| Farmer | 12 | 6.32 |
| Housewife | 107 | 56.32 |
| Laborer | 28 | 14.74 |
| Government Employee | 24 | 12.63 |
| Retired | 5 | 2.63 |
| None | 4 | 2.10 |
| Total | 4 | 2.10 |
| | 190 | 100.0 |

In terms of occupation, it was noted that the top three occupation of the respondents were farmer, housewife, and laborer, where farmers being the majority had 99 or 52.1% responses followed by housewives with 28 or 14.8% responses and laborers with 12 or 6.3%. Regarding educational attainment, most of the respondents were high school graduates with 69 or 36.3% responses, followed by elementary graduates with 56 or 29.5% responses, then college graduates with 39 or 20.5% responses. The least number of respondents reached a vocational level with 1 or 0.5% responses.

As to the number of children, the respondents generally has 2 children with 50 or 26.3% responses, 31 or 16.3% have 3 children, and 26 or 13.7% have no children. The least number of respondent have 11 children with 1 or 0.5% response.

Table 2. Profile of the respondents as to educational attainment, family monthly income, and number of children

| Items | f | % |
|---|---|---|
| Educational attainment: | | |
| College Graduate | 39 | 20.5 |
| College Level | 7 | 3.7 |
| Vocational Graduate | 5 | 2.6 |
| Vocational level | 1 | 0.5 |
| HS Graduate | 69 | 36.3 |
| HS Level | 9 | 4.7 |
| Elem. Graduate | 56 | 29.5 |
| Elem. Level | 4 | 2.1 |
| Total | 190 | 100.0 |
| Family monthly income: | | |
| 5000 & below | 136 | 71.6 |
| 5001-10000 | 26 | 13.7 |
| 10001-20000 | 15 | 7.9 |
| more than 20000 | 13 | 6.8 |
| Total | 190 | 100.0 |
| Number of children: | | |
| 0-3 | 123 | 64.74 |
| 4-7 | 59 | 31.05 |
| 8-11 | 8 | 4.21 |
| Total | 190 | 100.0 |

In terms of farm location, the largest number of calamansi farms were located at Barangay San Nicolas with 42 or 22.1% responses, this was followed by Barangay Pina with 28 or 14.7% responses, and Barangay San Fernando and Tinadtaran with 23 or 12.1% responses each. The least number of farms were noted in Barangays Supang and San Isidro with 1 or 0.5% response for each of them. San Nicolas had long been known as the largest producers of calamansi in Buenavista and in Guimaras as a whole.

When it comes to the number of years in operation, the largest number of respondents were into calamansi farming operations for 6 to 15 years already with 78 or 41.1% responses, 46 or 24.2% were into operation for 1 to 5 years only, and 33 or 17.4% were into operation for 16 to 25 years and more than 5 years for each period. The results implied that most of the calamansi growers in Buenavista are quite new to the industry.

As to organizational affiliation, the respondents generally were not affiliated to any organization with 128 or 67.4% responses. However, those respondents who were already 60 years and above were members of the Senior Citizens Association with 25 or 13.1% responses. The rest of the respondents were very thinly distributed to other organizations they have identified.

In terms of seminars or trainings, the majority of the respondents were not able to attend any training or seminar with 121 or 63.7% responses. Others with 45 or 23.7% responses have attended trainings or seminars but were not related to calamansi. On the other hand, 21 or 11% of the respondents were able to attend trainings or seminars related to calamansi production or processing. Hence, trainings are necessary to capacitate these respondents.

Table 3. Profile of respondents when categorized as to farm location, years in prison, organizational affiliation, seminars and trainings attended

| Items | f | % |
|---|---|---|
| Farm Location: | | |
| Agsanayan | 6 | 3.2 |
| Avila | 8 | 4.2 |
| Banban | 7 | 3.7 |
| Cansilayan | 14 | 7.4 |
| East Valencia | 2 | 1.1 |
| Nazaret | 17 | 8.9 |
| Pina | 28 | 14.7 |
| San Fernando | 23 | 12.1 |
| San Isidro | 1 | 0.5 |
| San Nicolas | 42 | 22.1 |
| Supang | 1 | 0.5 |
| Tanag | 6 | 3.2 |
| Tastasan | 10 | 5.3 |
| Tinadtaran | 23 | 12.1 |
| Umilig | 2 | 1.1 |
| Total | 190 | 100.0 |
| Years in operation: | | |
| 1-5 yrs | 46 | 24.2 |
| 6-15 yrs | 78 | 41.1 |
| 16-25 yrs | 33 | 17.4 |
| more than 25 yrs | 33 | 17.4 |
| Total | 190 | 100.0 |
| Organizational Affiliation: | | |
| 4Ps, IWAG | 2 | 0.5 |
| ASFA | 1 | 0.5 |
| Banana Planters Association, Senior Citizen's Assoc. | 1 | 0.5 |
| BOGA | 1 | 0.5 |
| Brgy. Officials | 1 | 0.5 |
| Calamansi Growers Association | 6 | 3.1 |
| chairman at kilusang pagbabago and multi-sectoral advisory council | 1 | 0.5 |
| Coco Feed | 1 | 0.5 |
| Rice cluster association | 8 | 4.2 |
| Hugpong Federal | 1 | 0.5 |
| IWAG | 1 | 0.5 |
| None | 128 | 67.4 |

| | | |
|---|---|---|
| PCA member | 2 | 1.0 |
| RONAT | 1 | 0.5 |
| Senior Citizen's Assoc. | 25 | 13.1 |
| SEPDIC | 1 | 0.5 |
| Sewing | 1 | 0.5 |
| TABA Association | 2 | 1.1 |
| TPAS ARC COOP | 5 | 2.6 |
| Ugyon | 1 | 0.5 |
| Total | 190 | 100.0 |
| Seminars or trainings attended: | | |
| Artificial Insemination | 1 | 0.5 |
| Calamansi& vegetable training | 1 | 0.5 |
| Calamansi related | 21 | 11.0 |
| Meat processing and food | 1 | 0.5 |
| preservation | 121 | 63.7 |
| None | 45 | 23.7 |
| Not related | 190 | 100.0 |
| Total | | |

**Production Practices**

The production practices of calamansi were determined by knowing the source of planting materials, land preparation practices, plant propagation, planting, fertilizer application, pest and disease management, water management, harvest period, farm waste management and other farm products.

As reflected in Table 4, it was noted that almost 100% of the respondents (189) sourced out their calamansi planting materials within the province. Their lands were 100% manually prepared with the aid of carabao-drawn plow. The plant was also 100% propagated through marcotting and planted on a manual basis. Fertilizer application is generally transitional, where farmers apply combinations of organic and commercial fertilizers, with 98 or 51.6% responses. It was closely followed by conventional fertilizer application with 86 or 45.3% responses. On the other hand, very few of the respondents (6 or 3.1%) practiced organic fertilizer management. The result implied that calamansi growers are not much dependent on synthetic fertilizers alone.

In terms of pest and disease management, the majority of the respondents (150 or 78.9%) practiced conventional method with the use of synthetically formulated pesticides. Very few practiced organic methods with 18 or 9.5% responses, 13 or 6.8% never applied any method of control and the least of the respondents (9 or 4.7%) practiced transitional or combinations of conventional and organic methods in controlling or preventing pests and diseases. The result implied that in terms of pest and disease management, the calamansi growers still rely on synthetic pesticides to prevent or control pest infestations.

As to water management, respondents generally raised calamansi under the rainfed condition with 155 or 81.6% responses. Others (35 or 18.4%) raised calamansi with irrigation coming from deep wells and streams/rivers with the aid of water pumps.

When harvesting, respondents generally harvested calamansi fruits on monthly basis or twice a month with 68 or 35.8% responses for each period. It was followed by a weekly basis with 29 or 15.3% responses and twice a week with 16 or 8.4% responses. When calamansi fruits are well taken cared through appropriate fertilizer application, these will really augment the income of the growers as it can be harvested several times in a year.

In terms of farm waste management, nearly all of the respondents practiced composting to manage residues in the farm with 178 or 93.7% responses. Only very few practiced dumping (6 or 3.2%), burning, combinations of burning and dumping, and those that never manage their residues with 2 or 1.1% responses for each. This implies that growers valued the benefits of composting in calamansi production. As to farm products, the majority of the respondents produce also rice, coconut, and banana. Other respondents also produce mango, papaya, and other native fruits.

Table 4. Production Practices of Calamansi

| Items | f | % |
|---|---|---|
| Source of planting materials: | | |
| Outside the province | 1 | 0.5 |
| W/in the province | 189 | 99.5 |
| Total | 190 | 100.0 |
| Land preparation: | | |
| Mechanical | 0 | 0.0 |
| Manual | 190 | 100.00 |
| Total | 190 | 100.0 |

| | | |
|---|---|---|
| Plant propagation: | | |
| Seeds | 0 | 0.0 |
| Marcotted | 190 | 100.0 |
| Total | 190 | 100.0 |
| Planting: | | |
| Manual | 189 | 99.5 |
| Mechanical | 1 | 0.5 |
| Total | 190 | 100.0 |
| Fertilizer application: | | |
| Conventional | 86 | 45.3 |
| Conventional, transitional | 1 | 0.5 |
| Organic | 6 | 3.1 |
| Organic, Conventional | 3 | 1.6 |
| Transitional | 94 | 49.5 |
| Total | 190 | 100.0 |
| Pest and Disease management: | | |
| Conventional | 150 | 78.9 |
| None | 13 | 6.8 |
| Organic | 18 | 9.5 |
| Transitional | 9 | 4.7 |
| Total | 190 | 100.0 |
| Water management: | | |
| Irrigated | 35 | 18.4 |
| Rain fed | 155 | 81.6 |
| Total | 190 | 100.0 |
| Harvest period: | | |
| 1 harvest | 1 | .5 |
| monthly | 68 | 35.8 |
| thrice/year | 1 | .5 |
| twice a month | 68 | 35.8 |
| twice a week | 16 | 8.4 |
| twice a year | 7 | 3.7 |
| weekly | 29 | 15.3 |
| Total | 190 | 100.0 |
| Farm waste management: | | |
| Burning | 2 | 1.1 |
| Burning, dumping | 2 | 1.1 |
| Composting | 178 | 93.7 |
| Dumping | 6 | 3.2 |
| None | 2 | 1.1 |
| Total | 190 | 100.0 |

**Economic Characteristics**

The economic characteristics of calamansi production were determined on the bases of farm size, land ownership, yield, gate price, production cost, capitalization, number of workers, and marketing and payment schemes (Table 5).

The results showed that majority of the respondents have a farm size of less than 1 ha with 158 or 83.2% responses. It was followed by 29 or 15.3% of the respondents having 1 to 2 hectares of calamansi farm. Very of the respondents have 2.1 to 3 hectares (2 or 1.1%) and 3.1 to 4 hectares (1 or 0.5%). These farms are generally owned by the respondents (160 or 84.2%) and some were tenants with 27 or 14.2% responses. Very few of the respondents' farms were either rented or owned by the cooperative.

In terms of yield, a hectare of calamansi yielded 101 to 500 kgs of calamansi fruits per hectare with 92 or 48.4% responses. It was followed by 501 to 1000 kgs with 62 or 32.6% responses, 1001 to 5000 kgs with 18 or 9.5% responses and 100 kgs and below with 15 or 7.9% responses. Very few responded (3 or 1.6%) to have yields of more than 5000 kgs. The result implied that the optimum yield of calamansi was not reached as the plants were not well taken care of as according to calamansi growers they have weakening interest to further engage in the industry as the gate price of calamansi does not warrant a good profit. It can also be attributed to the age of the trees as the majority of the calamansi growers had been in operation for only 6-15 years.

The farm gate price of calamansi fruits during the study was generally PhP 16-25 with 119 or 62.6% responses. It was followed by PhP 7-15 with 59 or 31.1% responses. Only very few noted for PhP 26-35 as farm gate price with 12 or 6.3% responses. This only reflects that the farm gate price of calamansi is not stable.

Looking at the production cost, the majority of the respondents (109 or 57.4%) noted that they spent PhP 1001

to PhP 5000 per hectare. Thirty or 15.8% of the respondents spent PhP 50001 to PhP10000, 28 or 14.7% spent more than PhP 10000 and only 23 or 12.1% spent below PhP 1000. Nearly of the respondents (180 or 94.7%) used their personal savings to capitalize their farm operations. It distantly followed by financing and loaned with 5 or 2.6% responses for each. Looking at the production cost, it can be noticed that most of the respondents do not spend enough money for a hectare of calamansi farm as supported by their weakening interest to the industry.

As to the number of workers, 70 or 36.8% of the respondents employed one (1) worker in the farm. It was closely followed by two (2) workers with 48 or 25.3% responses, zero (0) employment with 33 or 17.4%. The least number of respondents employed seven (7) workers (1 or 0.5%). In terms of marketing, the majority of the respondents depended on wholesaling when selling their produce. Majority of the respondents also noted marketed produce were generally paid in cash (137 or 72.1%), while others noted that they were being paid 1-15 days after disposing their products to the market.

Table 5. Economic Characteristics of Calamansi Production

| Items | f | % |
|---|---|---|
| Farm size: | | |
| Less than 1ha | 158 | 83.2 |
| 1-2.0 ha | 29 | 15.3 |
| 2.1-3.0 ha | 2 | 1.1 |
| 3.1-4.0 ha | 1 | 0.5 |
| Total | 190 | 100.0 |
| Land ownership: | | |
| Coop | 1 | .5 |
| Owned | 160 | 84.2 |
| Rented | 2 | 1.1 |
| Tenant | 27 | 14.2 |
| Total | 190 | 100.0 |
| Yield/ha: | | |
| 100kg & below | 15 | 7.9 |
| 101-500kg | 92 | 48.4 |
| 501-1000kg | 62 | 32.6 |
| 1001-5000kg | 18 | 9.5 |
| more than 5000kg | 3 | 1.6 |
| Total | 190 | 100.0 |
| Gate price: | | |
| 7-15 Php | 59 | 31.1 |
| 16-25 Php | 119 | 62.6 |
| 26-35 Php | 12 | 6.3 |
| Total | 190 | 100.0 |
| Production cost per hectare: | | |
| 1000 Php & below | 23 | 12.1 |
| 1001-5000 Php | 109 | 57.4 |
| 5001-10000 Php | 30 | 15.8 |
| More than 10000 Php | 28 | 14.7 |
| Total | 190 | 100.0 |
| Capitalization: | | |
| Financing | 5 | 2.6 |
| Loaned | 5 | 2.6 |
| Personal savings | 180 | 94.7 |
| Total | 190 | 100.0 |
| Number of workers: | | |
| 0 | 33 | 17.4 |
| 1 | 70 | 36.8 |
| 2 | 48 | 25.3 |
| 3 | 23 | 12.1 |
| 4 | 8 | 4.2 |
| 5 | 3 | 1.6 |
| 7 | 1 | .5 |
| No response | 4 | 2.1 |
| Total | 190 | 100.0 |

| | | |
|---|---|---|
| Marketing scheme: | | |
| Retail | 5 | 2.6 |
| Wholesale | 175 | 92.1 |
| Wholesale, retail | 10 | 5.3 |
| Total | 190 | 100.0 |
| Payment scheme: | | |
| 1-15days | 51 | 26.8 |
| Cash | 137 | 72.1 |
| Consignment | 2 | 1.1 |
| Total | 190 | 100.0 |

**Problems Met and Production Constraints**

In terms of problems and production constraints encountered in calamansi production, nearly all respondents noted that drought is the most crucial environmental factor affecting the yield of calamansi as they have observed that the fruits were much smaller during these periods. Others also cited heavy rainfall or typhoons as these damaged fruit formation particularly when the plant is at its flowering stage and these also resulted to premature fruit fall.

As to technical factors, the respondents cited propagation constraints and pest and disease management as the two important factors affecting calamansi production. Respondents stated that most of their newly planted marcots failed to survive in the field. Others also noted that they have problems on citrus cankers as it affects the quality of their produce.

Generally, calamansi farms are not fenced. Hence, most of the problems cited by the respondents are stray grazing livestock particularly goats. Some also cited cases of theft but they said they did not significantly reduce yield. In terms of economic factors, nearly all respondents cited that calamansi fruits have very low farm gate price during peak season. This factor greatly affected the calamansi growers income and this had prompted other growers to lessen their interest on the industry or even stop their production operations.

## CONCLUSIONS

Majority of the respondents were already senior citizens with ages ranging from 60 years old and above. They were mostly male, married and generally have 2 children. Most of them were high school graduates. Their top three occupations noted were farmers, housewive and laborers. The largest number of calamansi farms were located at Barangay San Nicolas. The largest number of respondents were into calamansi farming operations for 6 to 15 years but most of the respondents were not affiliated to any organization and were not able to attend any training or seminar. Almost all respondents sourced-out planting materials within the province. All respondents manually prepared their lands, propagate the calamansi plants through marcotting and planted seedlings on a manual basis. Fertilizer application is generally transitional, where farmers apply combinations of organic and commercial synthetic fertilizers. Majority of the respondents practiced conventional method in controlling or preventing pests and diseases. They generally raised calamansi under rainfed condition but some irrigate the farm with water sources from deep wells, streams or rivers. They generally harvested calamansi fruits on monthly basis or twice a month. Nearly all of the respondents practiced composting to manage residues in the farm. Majority of the respondents operated calamansi farms of less than 1 ha that were generally owned by the respondents. A hectare of calamansi yielded generally yielded 101 to 500 kgs of calamansi fruits per hectare. The farm gate price of calamansi fruits during the study was generally PhP 16-25. Majority of the respondents noted that they spent PhP 1001 to PhP 5000 per hectare and they generally employed one (1) worker on the farm. Majority of the respondents depended on wholesaling when selling their products they also noted that marketed products were generally paid in cash. The respondents noted drought, propagation constraints, pest and disease management, stray grazing livestock and the significantly low farm gate price during peak season as the most important problems and production constraints in calamansi production

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# FLAVORED SMOKED FISH

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**ABSTRACT** Smoking has been used as a method of preserving food throughout history. Across cultures and continents, fish and meats have been smoked by people so that they could be stored for long periods. Smoked fish is known for its tasty, smoky flavor. No additional condiments are needed to enjoy it because it is packed full of its own natural flavor. Smoking fish may seem like a hassle, but in reality, it is one of the easiest ways to prepare fish. Smoking fish produces a meal that is tender, delicious, and loaded with flavor. The researchers' aimed to develop a process and formulation in preparing flavored smoke fish hence this study was proposed. The researchers determined the correct procedure in preparing two (2) sample treatments and conducted two (2) replications for each treatment. The general acceptability of flavored smoked fish was rated moderately liked by the respondents in all replications in terms of its appearance, taste/ flavor, aroma/ smell, texture and mouthfeel, thus, as a result of the study paved the potential of flavored smoked fish and further exhibited the feasibility for production as additional source of income for fisher folks.

**Keywords**: fish, smoked fish, flavored smoked fish

## INTRODUCTION

### Background of the Study

Smoking has been used as a method of preserving food throughout history. Across cultures and continents, fish and meats have been smoked by people so that they could be stored for long periods. Thanks to refrigeration, smoking meat is not done out of necessity anymore, but instead for the enjoyment of the delicious flavor and texture.

Smoked fish started out as a very simple procedure where the flesh was cut and dried slowly over a fire. The drying being a key component of the process because the removal of all the moisture is what prevents bacteria from developing. The chemical properties of the smoke itself also aided in preservation, making for an end product that could be stored for extended periods, or easily packed for traveling long distances.

In Europe and Great Britain during the Middle Ages, smoked fish and meats were necessary to feed people through the cold, desolate winter when food was scarce. Fresh fish could not travel very far, so it was preserved, usually by salting.

Today the smoked fish market is thriving and has been elevated to new heights with a renewed interest in traditional products and methods. Fish smoking has been used as a way of preserving and flavoring food for many thousands of years. Smoking processes and methods have been passed down through generations and are still very much in use today around the world.

Although many of us are lucky enough to have refrigeration, food smoking today is still very popular due to the fantastic taste it imparts and still practice the art of food smoking which forms part of their everyday diets.

### Objectives of the Study

The researchers' aimed to develop a process and formulation in preparing flavored smoke fish and conduct acceptability testing of the product.

## METHODOLOGY

This chapter presents the criteria of the study, description of the study, evaluation of the study, list of tools and equipment, list of ingredients, procedures in preparing and processing flavored smoked fish and picture documentations during the processing and evaluation of the study. The study was based on related information gathered and studies and/or researches conducted by other researchers which provided basis for making the process and formulation for flavored smoked fish. Part one of the study focused on the formulations and processes in the preparation of flavored smoked fish. The researchers determined the correct procedure in preparing two (2) sample treatments and conducted two (2) replications for each treatment, in which two (2) trials will be done for each sample treatments. Part Two of the study was the conduct of sensory evaluation of the flavored smoked fish as

to appearance, flavor/taste, aroma/ smell, texture and mouth feel. Forty (40) randomly selected students and GSC personnel acted as respondents of the study. Five (5) hedonic scale was used as measure of acceptability of the said product.

**List of Tools and Equipment**

1. Knife
2. Chopping board/ scissors
3. Bowl
4. Measuring cup
5. Ladle
6. Weighing scale
7. Basin
8. Drying pan

**List of Ingredients**

1. Fish
2. Salt
3. Batuan
4. Sugar
5. Hot pepper (siling labuyo)
6. Water

**Procedures in Preparing Flavored Smoked Fish**

Sample 1- Hot & Spicy

1. Prepare tools, utensils and equipment.
2. Weigh fish.
3. Remove the guts of the fish and wash thoroughly.
4. Prepare brine solution, add the flavouring (finely chopped hot pepper) and soak fish for 40 minutes.
5. Prepare pre-cooking brine solution and soak fish until eyes turned white.
6. Drain to remove excess water.
7. Sundry for 1 hour.
8. Smoke fish in smoke house for 30 minutes.
9. After smoking, cool, pack, seal and label.

**Sample 2- Sweet & Sour**

1. Prepare tools, utensils and equipment.
2. Weigh fish.
3. Remove the guts of the fish and wash thoroughly.
4. Prepare brine solution, add the flavouring (mixture of macerated batuan and sugar mixture) and soak fish for 40 minutes.
5. Prepare pre-cooking brine solution and soak fish until eyes turned white.
6. Drain to remove excess water.
7. Sundry for 1 hour.
8. Smoked fish in smoke house for 30 minutes.
9. After smoking, cool, pack, seal and label.

## RESULTS AND DISCUSSIONS

The acceptability of the hot and spicy smoked fish regardless of the replications was rated as like extremely in terms of appearance, flavor, aroma, and mouthfeel. This means that the finished product was acceptable and suit the palate of the respondents.

Table 1. Acceptability of Hot and Spicy Flavored Smoked Fish

| Sensory | Replication 1 | | Replication 2 | |
|---|---|---|---|---|
| | f | % | f | % |
| Appearance | | | | |
| Neither like or dislike | 0 | 0.0 | 0 | 0.0 |
| Like moderately | 11 | 36.7 | 4 | 13.3 |
| Like extremely | 19 | 63.3 | 26 | 86.7 |
| Total | 30 | 100 | 30 | 100.0 |
| Flavor/Taste | | | | |
| Neither like or dislike | 2 | 6.7 | 0 | 0.0 |
| Like moderately | 12 | 40.0 | 5 | 16.7 |
| Like extremely | 16 | 53.3 | 25 | 83.3 |
| Total | 30 | 100 | 30 | 100 |
| Aroma | | | | |
| Neither like or dislike | 0 | 0.0 | 0 | 0.0 |
| Like moderately | 14 | 46.7 | 2 | 6.7 |
| Like extremely | 16 | 53.3 | 28 | 93.3 |
| Total | 30 | 100 | 30 | 100 |

The acceptability of the sweet and sour smoked fish regardless of the replications was rated as like extremely in terms of appearance, flavor, aroma, and mouthfeel. This means that the flavored smoked fish was acceptable to the respondents.

Table 2. Acceptability of Sweet and Sour Flavored Smoked Fish

| Sensory | Replication 1 | | Replication 2 | |
|---|---|---|---|---|
| | f | % | f | % |
| Appearance | | | | |
| Neither like or dislike | 0 | 0 | 0 | 0 |
| Like moderately | 11 | 36.7 | 4 | 13.3 |
| Like extremely | 19 | 63.3 | 26 | 86.7 |
| Total | 30 | 100 | 30 | 100 |
| Flavor/Taste | | | | |
| Neither like or dislike | 3 | 10.0 | 0 | 0 |
| Like moderately | 15 | 50.0 | 5 | 16.7 |
| Like extremely | 12 | 40.0 | 25 | 83.3 |
| Total | 30 | 100 | 30 | 100 |
| Aroma | | | | |
| Neither like or dislike | 3 | 10.0 | 0 | 0.0 |
| Like moderately | 12 | 40.0 | 8 | 26.7 |
| Like extremely | 15 | 50.0 | 22 | 73.3 |
| Total | 30 | 100 | 30 | 100 |
| Texture | | | | |
| Neither like or dislike | 4 | 13.3 | 0 | 0.0 |
| Like moderately | 11 | 36.7 | 11 | 36.7 |
| Like extremely | 15 | 50.0 | 19 | 63.3 |
| Total | 30 | 100 | 30 | 100 |
| Mouthfeel | | | | |
| Neither like or dislike | 2 | 6.7 | 0 | 0.0 |
| Like moderately | 12 | 40.0 | 9 | 30.0 |
| Like extremely | 16 | 53.3 | 21 | 70.0 |
| Total | 30 | 100 | 30 | 100 |

## CONCLUSION

The acceptability of flavored smoked fish was rated moderately liked by the respondents in terms of its appearance, texture/flavor, aroma/smell, texture, mouth feel.

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# CALAMANSI-BLUE TERNATE-LEMON GRASS READY TO DRINK JUICE

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**ABSTRACT** This study was conducted to develop a calamansi-blue ternate-emon grass ready to drink juice. The calamansi, blue ternate and lemon grass extract or juice were processed and combined with a proportion of 8% Calamansi + 62% Blue Ternate + 10% Lemon Grass + 20% Sugar Solution. The finish product was subjected to pasteurization using a water retort at different processing temperature varying from 70-75°C. Calamansi, Blue ternate, Lemon Grass Ready to Drink Juice was subjected to sensory evaluation using a 9 point hedonic scale to determine its general acceptability. Result revealed that the product was very much liked by the respondents as to its taste, appearance and aroma. Laboratory analysis revealed that the Ready to Drink Calamansi Blue ternate Lemon grass Juice pasteurized at 70 °C has a pH level of 2.65 and total titratable acidity as citric acid of 0.44%, on the other hand the Ready to Drink Calamansi Blue ternate Lemon grass Juice pasteurized at 75°C has pH=2.68 and total titratable acidity as citric acid = .48%. In terms of the microbial analysis, it was found out that both RTD Calamansi Blue ternate lemon grass juice at 70 °C and RTD Calamansi Blue ternate lemon grass juice at 75 °C has an Aerobic Plate Count of < 1 cfu/ml sample, an Escherichia coli Count which is < 0.018 MPN/ml sample and Molds and Yeast Count of 1 cfu/ml sample.

**Keywords:** calamansi, blue ternate, lemon grass, water retort, juice

## INTRODUCTION

Fruit or vegetable based Ready-To-Drink juices are popular drinks as they contain antioxidants, vitamins, and minerals that are essential for human being and play important role in the prevention of heart diseases, cancer, and diabetes. The combination of locally available ingredients in the development of Ready-To-Drink juices is now a trend in healthy lifestyle of the consumers as it's gradually gain popularity.

In the Philippines, one of the commonly consumed fruit beverage is calamansi juice. Considering its vitamin C and certain antioxidants such as limonene, potassium, vitamin A, and calcium, Calamansi (Citrofortunella macrocarpa) or calamondin / Philippine lime, regardless of its sour taste many people still consume it regularly as it is perceived to have multiple health benefits. To further enhance the taste, appearance and aroma of RTD juices, some people have upgraded their preparations as they combined two or more ingredients. Aside from its amazing brain boosting luminous property, Asian Pigeon Wings, Blue Bell Vine, Blue Pea, Cordofan Pea and Darwin pea, 'Butterfly Pea' (Clitoria ternatea) has gain popularity because of its indigo color which have been used to give aesthetics in both food and beverages.

Lemongrass (Cymbopogon citratus) on the other hand is a widely used herb in tropical countries, especially in Southeast Asia as it is used in aromatherapy. Many researchers have reported that lemongrass (Cymbopogon citratus) and its essential oil was bactericidal and fungicidal against a broad range of microorganisms, both pathogenic and spoilage (Naik et al., 2010). Among eight essential oils that were evaluated, lemongrass essential oil showed the strongest fungicidal effect against the target microorganisms in fruit juices (Helal et al., 2006).

Bacterial and microbial contamination are some of the major pitfalls in the fruit juice industry, thus , business owners and researchers created methods that are currently and commonly used to prevent microbial deterioration of fruit juices during storage. which include thermal processing (pasteurization) and the utilization of allowed food preservatives (Eissa, et al., 2008).

### Objectives of the Study

This study aimed the following: (1) to develop calamansi- blue ternate-lemon grass ready to drink juice pasteurized using the water retort; (2) to conduct chemical analysis of the product as to pH and total titratable acidity after subjected to pasteurization at different temperature; and (3) to conduct biological test as to the Aerobic Plate Count( APC), yeast and molds counts, E.coli content of the product.

METHODOLOGY

Procurement. The materials needed in the experiment were procured from the local calamansi, blue ternate and lemon grass growers while the study was held in the Western Visayas Food Innovation Center.

Method of preparing calamansi extract, blue ternate and lemon grass decoction

1. Washing of the Raw Materials. Calamansi fruits, blue ternate and lemon grass were thoroughly washed to ensure the cleanliness of raw materials;
2. Extraction of calamansi juice. The topmost of the calamansi fruits were sliced to avoid injuring the seeds to

prevent the bitter taste of the product. The fruits were squeezed to extract the juice. The extracted juice was strained to separate the seeds from the juice;

3. Preparation of blue ternate and lemon grass decoction. With the ratio of 1:1, a kilo of lemon grass was boiled in 1 liter of water for 15 minutes. The decoction was transferred to a container to let cool. The same process was done with the blue ternate, with lesser boiling period of 5 minutes; and

4. Preparation of Calamansi-Blue Ternate-Lemon grass ready to drink juice. Calamansi juice, Blue Ternate and Lemon grass decoction were combined and added with sugar to enhance taste of the product.

Pasteurization of the Product using the Water Retort. The water retort was employed for the pasteurization process. At a varying temperature of 70 °C and 75 °C, the products were pasteurized for 10 minutes.

Experimental Design. The experiment was conducted using a Two-way Anova experimental design following the formulation as stated in Table 1.

Table 1.Experimental Design

| Treatment | Pasteurization Temperature |
|---|---|
| $T_0$ | 0 |
| $T_1$ | 70 °C |
| $T_2$ | 75°C |

**Product Performance Evaluation and Testing:**

Sensory Evaluation. The 9 point Hedonic Scale was used for sensory evaluation to assess the product as to its color, taste, and aroma. Fifteen (15) students and fifteen (15) faculty and staff members were taken as respondents.

Chemical Analysis. After the pasteurization process at varying temperature, samples of Calamansi-Blue Ternate-Lemon Grass ready to drink juice were analyzed for pH and total titratable acidity.

Microbial Analysis. The 100 mL Calamansi-Blue Ternate-Lemon Grass ready to drink juice sample was subjected to microbial analysis to determine the Aerobic Plate count (APC), yeast and molds and Escherichia coli contents of the product.

## RESULTS AND DISCUSSION

Sensory Evaluation. It was done to 30 faculty and staff and students of GSC in order to determine the acceptability level of Calamansi-Blue Ternate-Lemon Grass ready to drink juice in reference to its: color, taste and aroma. A 9-point Hedonic Scale was used. These were: Extremely Like (9), Very much Like(8), Moderately Liked (7), Slightly Liked (6), Neither Liked or Disliked (5), Slightly Disliked (4), Moderately Disliked (3), Very much Disliked (2) and Extremely Disliked (1). As to its color, the product was identified by the respondents as solid pale purple having the mean of 7.67 (Like very much). For its aroma, the product has the mean of 7.15(Like Very Much). As to the product's taste, it was evaluated by the respondents as desirable with the mean of 7.27. This implies that the product was generally acceptable.

Table 2. Results on Sensory Evaluation

| Sensory | Characteristics | Mean | Acceptability |
|---|---|---|---|
| Color | Pale Solid Purple | 7.67 | Like very much |
| Aroma | Desirable | 7.15 | Slightly like |
| Taste | Desirable | 7.27 | Like very much |
| | Overall Mean | 7.36 | Like very much |

*Scale: 9 (Extremely liked), 8 (Very much liked), 7 (Moderately liked), 6 (Slightly liked), 5 (Neither liked or disliked), 4 (Slightly liked), 3 (Moderately liked), 2 (Very much disliked), 1 (Extremely disliked)*

Chemical Analysis. The Calamansi-Blue Ternate-Lemon Grass ready to drink juice was analyzed for its pH and total titratable acidity. In chemical analysis for pH of the product, the result showed that in a 100 mL sample of Calamansi-Blue Ternate-Lemon Grass ready to drink juice pasteurized at 70 °C has a pH level of 2.65, while samples pasteurized at 75°C has pH=2.68. This implies that the varying temperature has a direct effect on the pH level of the product.

As to the total titratable acidity, the analysis also showed that the 100 mL Calamansi-Blue Ternate-Lemon Grass ready to drink juice pasteurized at 70 °C has a total titratable acidity as citric acid of 0.44%, while the samples pasteurized at 75°C has and total titratable acidity as citric acid of .48%. This implies that total titratable acidity of the product was affected by the varying temperature during the treatment.

Table 3. Results in Chemical Analysis

| Sample Description | Parameter | Processing Temperature | |
|---|---|---|---|
| | | 70°C | 75°C |
| 100mL sample of Calamansi-Blue Ternate-Lemon Grass ready to drink juice | pH | 2.65 | 2.68 |
| | Total Titratable Acidity as Acetic Acid | 0.44% | .48% |

Microbial Analysis. Product was analyzed as to the Aerobic Plate count (APC), yeast and molds and Escherichia coli contents. The results revealed that samples of 100 mL Calamansi-Blue Ternate-Lemon Grass ready to drink juice pasteurized in 70 °C and 75 °C has an Aerobic Plate Count of < 1 cfu/ml sample, an Escherichia coli Count of < 0.018 MPN/ml sample and Molds and Yeast Count of 1 cfu/ml. This implies that the product passed the standard of food safety in terms of estimated Aerobic Plate Count, Escherichia coli Count and Molds and Yeast Count

Table 4. Results on Microbial Analysis

| Sample Description | Parameter | Result |
|---|---|---|
| 100mL sample Calamansi-Blue Ternate-Lemon Grass ready to drink juice | Aerobic Plate Count | < 1 cfu/ml (estimated) |
| | Escherichia coli Count | < 0.018 MPN/ml sample |
| | Molds and Yeast Count | 1 cfu/ml |

## CONCLUSION

The pH and total titratable acidity of the product varies along with the increasing temperature employed during the pasteurization. The pasteurization process reduced the APC, Molds and Yeast Count and E. coli Count in the product.

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# TEACHER EDUCATION ADMISSION TEST RESULTS IN MATHEMATICS: BASIS FOR PEDAGOGICAL ENHANCEMENT

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**ABSTRACT** College admission test is not an uncommon occurrence in an incoming freshman's journey. It is a measure of his/her aptitude and a guage whether he/she will be admitted in a higher education institution. Guimaras State College (GSC) conducts admission test yearly to all its incoming freshmen. This study looked into the admission test performance of all the 90 incoming freshmen to the College of Teacher Education of the GSC-Salvador campus, specifically looking into the mathematics outcome. It is aimed to determine whether pedagogical enhancement in mathematics is necessary. The study employed a descriptive methodology and utilized mean, percentage and rank as its statistical tool. The 90 incoming freshmen was composed of all the test-takers from 2015 to 2019 which is inclusive of four academic years. The office of the Guidance Counselor provided the data which was used in this study. It was found out in these data that the takers performed as "average" in their mathematics questions, which was composed of basic mathematics, algebra, geometry, trigonometry and statistics. It also showed that the students performed best in trigonometry and poor in basic mathematics. There were salient topics identified in each mathematics area where the students performed either good or poor. The author recommended, based on the outcome, that pedagogical enhancement be employed to improve student learning and performance.

**Keywords:** Guimaras State College, mathematics performance, pedagogical enhancement, achievement test, Buenavista

## INTRODUCTION

In the Philippine setting, a graduating high school student prepares for one of his anticipated activities. College or University admission test is one of the most anticipated activity of the graduating high school students especially in the Philippines. Preparation for the college examinations are popular that the parents even pay for review centers to secure their children's chance to be accepted in a prestigious university. In theory, all students in the Philippines can gain access to higher education if they meet the admission criteria most especially if they meet the tuition and living cost. However, admission requirements remain dependent upon individual higher education institutions (HEIs). Entrance to HEIs is dependent on the possession of a high school certificate of graduation and in many HEIs the result of their own entrance examination (Montalbo, Evangelista, & Bernal, 2018).

In the Philippines, admission to public universities can be very competitive. Universities and colleges, maintain their own admissions criteria, which may include a school administered admissions test, secondary school grades, an interview, and a medical examination. Admission test score is one significant metric in the selection of the students who will be successful in their later professional career and those candidates who are able to study diligently enough to pass all the study requirements. In that sense the selection procedure at admission is selecting in the best candidates (Bank, 2012).

On the other hand, most universities and colleges use high school grade point average instead of the admission test scores to decide which students to accept in an attempt to find the most dedicated students. The basic assumption is that a high school student with a high grade point average will achieve high grades at universities (Sulphey, Alkahtani, & Syed, 2018).

Senator Edgardo Angara (2009) lamented that the decline of science and math skills of Filipinos is part of the overall decline of education in the country. He pointed out that in the National Achievement Tests, for example, 97.9 % of high school students failed, and the average score for English was 50% (Senate of the Philippines, 2009). In the Trends in the International Math and Science Study or TIMMS, administered every four years by the International Association for the Evaluation of Education Achievement (IAEEA) based in Boston College, USA., the performance of the Philippines continues to be poor: 41st in Math and 42nd in Science, out of 42 countries, in the High School level (Macha, Mackie, & Magaziner, 2018).

Guimaras State College is conducting entrance examination to the incoming freshmen and such includes the item in Mathematics. Mathematics plays an instrumental role in the development of all scientific discipline. As distinct as it is, mathematics is thought of as a fundamental part of any curriculum (Gafoor & Kurukkan, 2015). Therefore, a solid background in mathematics is important for successful participation in all programs of Guimaras State College. And all of our students should prove they have attained a minimum level in mathematics through their entrance exam results.

Pedagogical enhancement then can be enforced if the results of their admission examination in Mathematics is low. Analysis of such results is empirical so measures can be affected if found to be really needed. It is on this ground that this study is conducted.

**Objectives of the Study**

This study was conducted to determine the GSC Teacher Education admission test results in mathematics as basis for pedagogical enhancement during the AY 2015-2019 at Guimaras State College, Buenavista, Guimaras, Philippines. Specifically, this study was conducted to seek answer to the questions (a) what is the performance of the incoming freshmen students of College of Teacher Education on mathematics admission test for the last four years; (b) what is performance of the freshmen students on areas of mathematics when grouped as whole; (c) what is the performance of the freshmen students on areas of mathematics when categorized as to basic mathematics, algebra, geometry, trigonometry, statistics, and calculus; and (d) what pedagogical enhancement can be done to students who are taking Math courses based from their entrance exam results.

## METHODOLOGY

This study utilized descriptive research design. The data used were secondary data taken from the office of the Guidance Counselor. The respondents of the study were the 90 incoming freshmen students of College of Teacher Education of Guimaras State College Salvador Campus from Academic Year 2015-2019 gathered through with a use purposive sampling. The study was conducted in the Salvador Campus of the Guimaras State College (GSC), located in the Province of Guimaras, Philippines. Utilizing a purposive sampling method, the subjects of the study were all of the 90 incoming freshmen students who took the College admission test for the academic years 2015 – 2019 and enrolled accordingly to the College of Teacher Education. The data were lifted from the records of GSC's Office of the Guidance Counselor. The data in focus was the admission test given to incoming freshmen, which involved 30 mathematics questions. Statistical tools used were frequency, percentage, mean, and rank.

## RESULTS AND DISCUSSION

Figure 1 presents the performance of the incoming freshmen students of college of teacher education on the mathematics admission test result for the last four years. Result revealed that Academic Year 2015-2016 got the highest test result (M=21.42) while Academic Year 2017-2018 got the lowest test result (M=17.37). It shows a downtrend in the mathematics performance means of incoming college freshmen, which is reflective of the worldwide situation for the past two decades (Maltese & Tai, 2011). Thus, Philippines is not alone in this scenario of decline in mathematics performance of its students (Blomeke & Delaney, 2014).

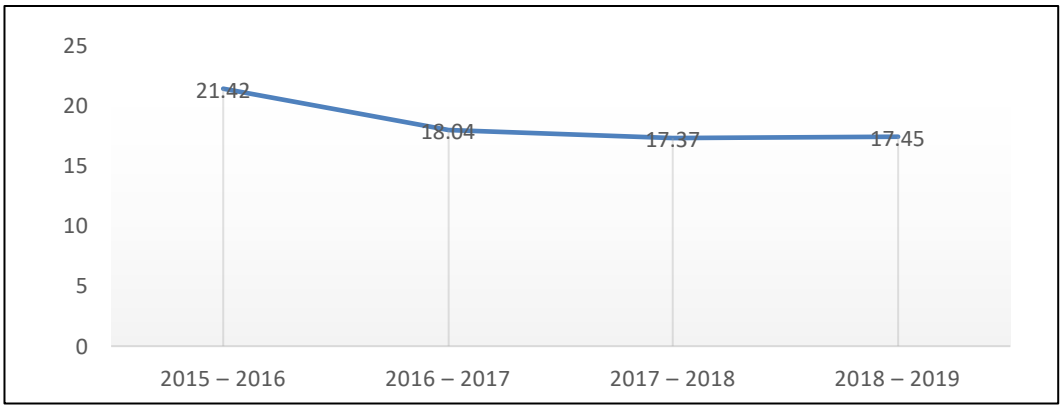


Figure 1. Performance of the incoming freshmen students of the College of Teacher Education from the last four years

Table 1 presents the performance of the incoming freshmen student of college of teacher education on areas of mathematics when grouped as a whole. Result revealed that the trigonometry got the highest percentage of 67 among the areas of mathematics. Followed by geometry (48.91%), Algebra (46.69%), and statistics (45.56%). However, basic mathematics got the lowest test result of 45.43%.

Table 1. Performance of the Incoming Freshmen Student of College of Teacher Education on Areas of Mathematics When Grouped as a Whole

| Areas of Mathematics | Percentage | Rank |
|---|---|---|
| Basic Mathematics | 45.43 | 5 |
| Algebra | 46.69 | 3 |
| Geometry | 48.91 | 2 |
| Trigonometry | 67.00 | 1 |
| Statistics | 45.56 | 4 |

Table 2 presents the performance of the incoming freshmen student of college of teacher education on areas of mathematics when grouped according to basic mathematics. Result revealed that 85% of the students got the correct score on item no. 1 "20% of 600 is ____." that rank first. Followed by item no. 14 "What is the Roman Symbol of 239?", that rank second, item no.16 "Reduce 12/48 to the lowest mean.", that rank third. However, item no.8 "The least common multiple of 12, 20, 42, and 56 is ___." got the lowest rank with 13% of correct answer.

Table 2. Performance of the Incoming Freshmen Student of College of Teacher Education on Areas of Mathematics in the subject Basic Mathematics

| Items | Percentage of students who got the correct answer | Rank |
|---|---|---|
| 1 | 85.00 | 1 |
| 8 | 13.00 | 7 |
| 9 | 18.33 | 6 |
| 13 | 28.33 | 5 |
| 14 | 80.00 | 2 |
| 16 | 50.00 | 3 |
| 18 | 43.33 | 4 |
| Overall Percentage | 45.43% | |

Table 3 presents the performance of the incoming freshmen student of college of teacher education on areas of mathematics when grouped according to algebra. Result revealed that item no.17 "Find the 14th term in sequences 5,7,9,11." got the highest percentage of 86.67% of correct answer. Followed by item no.5"The mini cab can carry at most twelve persons. Which is true?" with 60% and item no. 22 "In the expression 2x^2=3x-1, its leading term is __." With 51.67%. However, item no.4 "Express (4a-3b) (4a+3b) as polynomial." got the lowest percentage of 27%.

Table 3. Performance of the Incoming Freshmen Student of College of Teacher Education on Areas of Mathematics when grouped according to Algebra

| Items | Percentage of students who got the correct answer | Rank |
|---|---|---|
| 4 | 27.00 | 12 |
| 5 | 60.00 | 2 |
| 6 | 50.00 | 4 |
| 10 | 33.33 | 11 |
| 17 | 86.67 | 1 |
| 19 | 45.00 | 7 |
| 20 | 38.33 | 8.5 |
| 21 | 46.67 | 6 |
| 22 | 51.67 | 3 |
| 23 | 48.33 | 5 |
| 29 | 35.00 | 10 |
| 30 | 38.33 | 8.5 |
| Overall Percentage | 46.00 | |

Table 4 shows the performance of the incoming freshmen student of college of teacher education on areas of mathematics when grouped according to Geometry. Result revealed that item no. 25 "If <5=130°, what is m<6?" got the lowest percentage of 25% while item no. 15 "How many rectangular lots 10m by 40m can be contained in a square lot with an area of 160,000 square meters?" got the highest percentage (70%) of correct answer.

Table 4. Performance of the Incoming Freshmen Student of College of Teacher Education on Areas of Mathematics when grouped according to Geometry

| Items | Percentage of students who got the correct answer | Rank |
|---|---|---|
| 2 | 49.00 | 4 |
| 3 | 35.00 | 6 |
| 11 | 60.00 | 2 |
| 12 | 46.67 | 5 |
| 15 | 70.00 | 1 |
| 24 | 56.67 | 3 |
| 25 | 25.00 | 7 |
| Overall Percentage | 48.91 | |

Table 5 shows the performance of the incoming freshmen student of college of teacher education on areas of mathematics when grouped according to trigonometry. Result revealed that the questionnaire have only one item on areas of Trigonometry. Additionally, 67% of students got the correct answer on this item "If one acute angle of a right triangle is 22°, the other acute angle is ___?".

Table 5. Performance of the Incoming Freshmen Student of College of Teacher Education on Areas of Mathematics when grouped according to Trigonometry

| Item | Percentage of students who got the correct answer | Rank |
|---|---|---|
| 7 | 66.67 | 1 |
| Overall Percentage | 66.67 | |

Table 6 shows the performance of the incoming freshmen student of college of teacher education on areas of mathematics when grouped according to statistics. Result revealed that item no. 28 "The mean of seven scores is 2.1. Find the sum of the scores." got the highest percentage of 57.67%. Followed by item no. 27 "The score of a student in three tests are 19, 17, and 15. What must be his 4th score to gain an average of 17?". However, item no.26 "The graph used to show the relationship of a part to the whole is _____." got the lowest percentage of correct answer with 41.67%.

Table 6. Performance of the Incoming Freshmen Student of College of Teacher Education on Areas of Mathematics when grouped according to Statistics

| Items | Percentage of students who got the correct answer | Rank |
|---|---|---|
| 26 | 41.67 | 3 |
| 27 | 43.33 | 2 |
| 28 | 57.67 | 1 |
| Overall Percentage | 45.56 | |

## CONCLUSION

The study found that the admission test results of the incoming freshmen of the College of Teacher Education for mathematics for the past 5 years were on average level. It was also noted that among the areas of mathematics, it is trigonometry that ranked 1 where more of the students got the correct answers as opposed to basic mathematics that ranked 5. Considerably, the admission test did not include a question that involved calculus. Basic education curriculum prior to K to 12 does not include calculus and even in the new curriculum (K to 12), not all students need to study calculus among other specialized mathematics areas (Jaudinez, 2019). The study also identified salient topics in each area of mathematics where the incoming freshmen showed their weakness and their strength. For example, in basic mathematics, most of the students got correct answers in questions involving "percentage" while few of them got the correct answers in the topic of "least common multiple". For Algebra, most of them got the questions involving "sequences and series" while most of them got it wrong on questions involving "special products of binomial." Also, specific topics were also identified for geometry, and statistics. With the foregoing, the author deemed it appropriate to recommend some pedagogical enhancement that involves all the areas of mathematics, and taking into consideration the specific topics that the students showed poor performance. These pedagogical enhancement may include the design of learning materials and modes of implementation of these material (Yeh, et al., 2019).

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# TRADITIONAL KNOWLEDGE SYSTEM OF ARABLE AND HABITABLE TERRAINS OF THE PROVINCE OF GUIMARAS

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**ABSTRACT** Traditional knowledge played a critical role in farming systems in the past. People relied on what the environment could only offer, making practices sustainable. It is essential to recognize and document the practices of the past generations as this helps attain agricultural sustainability. Hence, the study on the traditional knowledge system of arable and habitable terrains of Guimaras was conducted to determine the rituals, beliefs, and practices related to farming, sustainable farming techniques, practices, access, utilization, conservation of land and its resources. Traditional knowledge and relevant data are obtained directly through interviews, communications, observations, taking images, recordings, etc., from the communities themselves. Primary commodities considered in the study were suha (calamansi), kasoy (cashew), paho (mango), rice and coconut. Documented traditional knowledge on suha (calamansi) production includes paghunol (marcotting), pag-arado kag pagpakaras (plowing and harrowing), paminhi, planting of hunol, pag-abono, mulching, paghilamon (weeding), pagkapon (pruning), pest and disease management, flower management, pagdugos (harvesting), marketing, and intercropping. Suha production is partially inorganic, and mulching creates a big impact on sustainability. Traditional practices in kasoy (cashew) production also include palutaw/ palutawon, seed color, and deshelling. Processing cashew can be in the form of salted nut and bandi, which have a high market value. Further, traditional practices on mango production include paaso (smudging), paglabo sa puno (hacking), traditional way of determining flower and fruit indices, climbing techniques such as palawa, use of bamboo ladder. Furthermore, traditional practices in rice include buray and linas. Threats in practicing buray includes, soil erosion, strong winds, stray animals and drought. Additionally, traditional coconut production practices have pagpananggot and pinarak using buri palm. Pagpananggot is still practiced in few rural areas in Guimaras and is a source of tuba and vinegar for rural community.

**Keywords:** traditional knowledge, arable, habitable, Guimaras

## INTRODUCTION

Traditional knowledge (TK) is a network of knowledge, beliefs, practices, and traditions intended to preserve, communicate, and contextualize indigenous relationships with culture and landscape over time. It represents a viable knowledge system that was the basis of old and developing societies (Wyenberg, Scroeder & Chennels, 2009). It is interchangeably used as indigenous knowledge (IK) that is used to describe any information, knowledge, innovation, or practices of the local indigenous communities that is of relevance in ensuring the conservation and sustainable use of biodiversity (Warren, Slikkerveer Brokensha, 1995; Amend, 2008). It covers all species of plants, animals, and micro-organisms and variations between them, which form an intangible component of the ecosystems they are part of (Semali & Kincheloe, 2002; Berkes, 1999; Berkes, Colding & Folke, 2000). It includes oral narratives that recount human histories; cosmological observations and modes of reckoning time; symbolic and decorative methods of communication; techniques for planting and harvesting; hunting and gathering skills, specialized understandings of local ecosystems, and the manufacture of specialized tools and technologies (Bruchac, 2014). It is developed and passed on from generation to generation in the form of stories, songs, cultural values, traditional laws, local languages, rituals, healing arts, and agricultural practices for the collective good of the communities (Huntington, 2000; Brucha, 2014).

Traditional knowledge (TK) can be a local context, practice-based, traditional and indigenous and endogenous with self-education, learning by doing and social interaction. Informal farmers' knowledge comes from their experimentations and practical experiences on the farm, holistic approach, own by the local community, and locally specific solutions (Šūmane et al., 2018). Local people developed their practice of resource use on their perspective based on their experience and knowledge (Berkes, Colding & Folke, 2000). Traditional knowledge systems have a broad view of the ecosystems and sustainable ways of using natural resources. However, the colonial education system replaced the practical everyday life aspects of indigenous knowledge and ways of learning with Western theoretical knowledge and academic ways of learning. Today, there is a grave risk that much indigenous knowledge is being lost and, along with it, valuable knowledge about ways of living sustainably both ecologically and socially (Senanayake, 2006). The rapid change in the way of life of local communities has primarily accounted for the loss of TK. Younger generations underestimate the utility of traditional knowledge systems (TKSs) because of the influence of modern technology and education (Ulluwishewa, 1993 cited by Ngulube, 2000).

The use of TK is now considered one of the cornerstones that can guarantee the survival of the developing

world's economies in the wake of scarce resources. Its use is essential in ensuring cultural resiliency in communities, developing the consciousness of each individual in protecting the environment for sustainable development, and conceptualizing localized

policies and intervention (Nkomwa, Joshua, Ngongondo, Monjerezi & Chipungu (2014). Therefore, TKs must be gathered, organized, and disseminated systematically as Western knowledge (Agrawal, 1995; Gonzalez, 1995 as cited by Ngulube, 2000). Recently, there have been no documented traditional knowledge systems on arable and habitable terrains of Guimaras. Therefore, to revitalize the core of Guimaras culture and traditional knowledge systems, these knowledge must be documented.

## METHODOLOGY

Traditional knowledge and relevant data are obtained directly through interviews, communications, observations, taking images, recordings, etc., from the communities themselves. The identification of the respondents was done informally by discussing traditional knowledge system with the barangay officials and asking them to identify people with traditional practices in their localities with reference to arable and habitable terrains. For indigenous people, community or tribe chief, the elder, the shaman, an individual farmer, a community council, or whatever formal representative person or body was contacted to engage and transmit data and information in the form of TK. Respondents were interviewed alone in their working environment or at their respective homes. The interview was conducted informally and concentrated on traditional knowledge on rituals, beliefs and practices related to farming, sustainable farming techniques and practices, access, utilization, conservation of land and its resources. Where necessary, informants who could not be found at the houses were interviewed at their duty stations separately.

## RESULTS AND DISCUSSION

### Suha (*Citrofortunella microcarpa*) production

Suha (*Citrofortunella macrocarpa*) belongs to the citrus family and is native in the Philippines. The tree is low set, spreading, and well-branched. The leaves are broad, oval, and dark green to pale green on the upper and lower surfaces. The fruit is usually small and round, ranging from 1.0 to 3.0 inches in diameter. The rind may be thin or thick.

*Suha* is commonly propagated asexually through marcotting. Marcotting is one of the oldest forms of plant propagation where 30-50 cm of the tree's bark is removed from the branch and replaced with moistened soil wrapped tightly using a plastic sheet to allow rooting to produce one independent tree for planting. In Guimaras, the common practice is to asexually propagate suha since the method is very simple and can be carried out by anyone involved in calamansi production.

Several indigenous practices noted in suha production need documentation and preservation to complement organic agricultural production.

### Paghunol (Marcotting).

*Suha* is generally propagated through *paghunol* (marcotting). In doing paghunol, a young twig of suha has to be chosen to serve as *hunol* (marcot). Then, remove the bark around the twig with a 30-50 cm length close to the base of the selected twig. The cut be must deep enough to get into the cambium layer (soft material between the bark and the wood). Then, the cut will then be covered with a handful of native earthworm casts or bunot (coconut husk) collected within the farm. According to the farmers, earthworm casts are used as these materials are cool and fertile, containing many beneficial organisms. The earthworm casts or bunot will be placed at the middle of the piece of plastic sheet enough to cover the cut area. Then they will be wrapped around the ringbarked area, tying first the bottom and then the top. The hunol will then be allowed to produce roots for 1.5 to 2 months. At this time, the hunol will have enough roots. It can now be detached from the main stem and become an independent plant. Paghunol is usually done during March to May. In that case, the hunol can be immediately planted in the field. If the paghunol is done from December until February, bagging of hunol is necessary to avoid mortality. Hunol will be detached on February to April, during the dry season.

The end product of vermicomposting utilizing earthworms is a finely ground vermicompost with nutrients in available form along with growth promoters and microorganisms and its application both at laboratory and field levels have proven to bring about better crop growth and yield. The end product of vermicomposting utilizing earthworms is a finely ground vermicompost with nutrients in available form along with growth promoters and microorganisms and its application both at laboratory and field levels have proven to bring about better crop growth and yield.

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Native worm casts almost have the same properties as vermicomposts. According to Karmegam and Daniel (2009), the end product of vermicomposting is a finely ground vermicompost with nutrients in available form along with growth promoters and microorganisms. This is supported by the study of Karmegam and Daniel (2009) in their

study entitled "Effect of application of vermicasts as layering media for an ornamental plant, Codiaeum variegatum". They found out that the use of vermicast as medium for air layering C. variegatum significantly increased root initiation, root length, total number of roots developed, fresh and dry weight of the roots. This indicated that vermicast is an excellent medium for C. variegatum layerage.

**Paminhi/ Panudlak**.

For the Ati (Aeta, an indigenous group), paminhi/ panudlak (asking permission and blessing from the spirits) before planting is still a practice. They have this belief that before planting they have to ask permission and blessing from spirits for them to have abundant harvests. They are also employing this practice immediately before planting hunol of suha. The first hole where the hunol will be planted will be filled with stones (maximum of 5 pieces). These stones, according to them, signify the production of bigger fruits and abundant harvest. Then, they pray that all that they have planted will be blessed.

This practice is different from the panudlak as noted by Jocanto (2008). He noted that farmers are doing this mostly in rice and corn in his book. The farmers perform several activities as part of the ritual or panudlak, that the Ati here in Guimaras do not practice. In his study, he noted that farmer have to make seven holes before planting. The stone then is placed beside each hole and the seeds are planted into the holes and covered with soil. After covering the holes, the farmer step on it and facing east he shouted loudly asking for abundant yield from the spirits.

**Planting of hunol**. According to one farmer, hunol should be planted facing the east. In that case, the tip of the plant will receive enough sunlight necessary for the plant's growth and development. For Ati people, planting of hunol should be done during hunas (low tide) and during the time when cumulus clouds are forming. In the absence of a calendar to determine hunas, the Ati people check on the eyes of the cat. When the pupil is thin or has a thin diamond shape, it is lowtide. However, when it becomes bigger or rounder, it means high tide. Likewise, when the wind continuously blows, it is low tide, and when it stops, it is high tide.

**Pagkapon (Pruning)**. It is practiced to remove lawi-lawi (water sprout) and unwanted branches such as diseased, dead interlacing branches using scissors and pruning shear. Lawi-lawi is a vigorous upright shoot from an adventitious or latent bud on a tree's trunk or main stem. Lawi-lawi should not be allowed to grow as it decreases branching continuously.

Pagkapon mainly aims to allow branching. To avoid wasting lawi-lawi when doing pagkapon, farmers utilize this plant part for marcotting. In that case, this plant part will be used as hunol for another planting, expansion, and marketing round. For farmers, pagkapon usually done to promote good branching and renew branches and provide good air circulation and enough sunlight within the canopy of suha.

**Pest and Disease Management**

The common pests observed in suha production are fruit fly (Bactrocera philippinensis), green waya-waya, brown waya-waya, and bao-bao. These pests are typically observed from October until November and seldom observed during the summer. According to the farmers, fruit flies infest fruits by laying their eggs that eventually damage fruits through rotting and manifest through premature yellowing and falling of fruits. Waya-waya and bao-bao feed on the leaves and sucks the leaves' juice, which eventually results in yellowing of leaves. To control pests, concoction made of a combination of tubli (Derris elliptica), manunggal (Quassia indica), and katumbal (Capsicum frutescens) are thoroughly crushed and soaked overnight with one (1) gallon of water to be sprayed on the infested plants. It will then be sprayed twice on the plants: in the morning and in the afternoon.

One common disease observed in suha production is "tagok sa puno" or gummosis. Gummosis is a fungal disease caused by Phytophthora citrophthora. The stem or trunk affected by this disease release gums or sticky substance on the surface of the infected areas. The infected part will be removed and burned away from the field to prevent the disease from spreading to the unaffected plant parts.

**Flower Management**

Suha should not bear fruit until it reaches three years old. Every time the plant bears flowers at a young age, the flowers should be removed from the plants. According to the farmers, this is done to prevent the plant from bearing fruits at a young age. They wanted to allow the plants first to be mature enough to bear fruits. When the plant reaches its maturity at more than three years old, it is allowed to continuously flower and bear fruits.

**Pagdugos (Harvesting)**. Pagdugos is usually done four (4) months after flowering. It is done through hand picking. During pagdugos, most harvesters bring pail or pandak (10kg capacity container made of woven bamboo slits) as immediate containers for fruits harvested in the field.

Once the pandak or pail is complete, the fruits will be transferred to the papag (sorting table) placed within the farm premises close to the harvesting area. When the fruits are placed on the papag, the sorters classify the fruits into marketable and non-marketable fruits. Marketable fruits are those that are not injured and have good size and

color. Non-marketable fruits are damaged, have ripe or yellow fruit peels, and kusog (not well-developed).

After sorting, marketable fruits are placed inside the fishnet instead of inside the kaing (woven container made of bamboo slits) bigger than pandak. This is so to avoid the fruits from experiencing lap-os (bruised fruits) while transporting the fruits from the farm to the local or regional market.

*Sustainability.* The practices currently employed in suha production play an important role in agricultural sustainability in the Province of Guimaras. The practice is partially inorganic, but the utilization of farm residues in crop production creates a big impact on sustainability. First, the farm produces no waste. The farm residues are valuable these days, considering that they are important in preserving soil moisture, particularly during dry season, and maintaining soil fertility and soil health. Second, the farm helps reduce greenhouse gas emissions, considering that burning farm residues is no longer practiced. When farm residues are not burned, there is much less chance of greenhouse gas emissions. Third, it reduces pollution (including air, water and soil) as the production practices gradually omit synthetic pesticides and fertilizers.

*Threats.* Suha production is one of the potential agricultural industries in Guimaras Province. However, some threats might hamper the success of this industry. One of the known threats is the possible lowering of price of suha fruits in the market. In the past several years, suha industry had been very promising in the province. However, when the price went down, the industry also weakened. According to the farmers, this is one of the significant threats they wish will not happen again.

Another threat viewed for the industry is the aging suha farmers. Like rice farmers, suha farmers in Guimaras Province are also aging. There are very few young generations who have an interest in agriculture. Even the children of the suha farmers are not into farming. Hence, the current generation of aging suha growers has no successors. The industry will eventually fall once the suha farm enterprise has no successors.

**Guimaras "Kasoy" Cashew**

"Isa ka prinsesa nagapungko sa tasa" is an old famous riddle known by Filipinos that depicts " kasoy " characteristics. Cashew (Anacardium occidentale L.), locally known as 'kasoy', is one of the most important nut crops in the Philippines. This crop is versatile in theood and feed industry (Magboo, 1998). This was first introduced worldwide by Portuguese explorers in South America in the 16th century. In 2002 cashew was ranked as number 1 the nut crop globally (Meyer, n.d.). In Guimaras, it is one of the abundant crops aside from mango (Province of Guimaras n.d.) and according to Mr. Sustituido, Mitra variety is the common cashew variety here in Guimaras

**Palutaw/Palutawon.** This method involves soaking the seed in the water to determine the filled/unfilled seed or premature kernel. This method shows that those seeds that floated after being soaked in water, more or less, have unfilled space or have early grain inside, which gives it the buoyancy effect. However, not all floating seeds have been rejected because some expert "manugkasoys " know if the floating seed has still kernel inside by just looking and weighing the seed with their hands: this technique is known as "Pamata."

**Seed Color**. Seed color is another method used to determine seed maturity. A mature cashew seed commonly has greenish gray color. Seed maturity is an important factor that affects the nut's quality and taste.

**Deshelling of Cashew**. The cashew seeds are sun-dried before deshelling. This is for the proper and easy removal of the shell. Sun drying the seeds takes around 2 to 4 days, depending on the seed situation. Sun drying turns the seed shell and kernel hard and compact, making the shell easy to cut and kernel easy to remove. On the other hand, one of the concerns in cashew deshelling is the presence of liquid in a cashew nutshell. This liquid coming from the shell can cause blisters if contact with the skin. To solve this constrain, applying cooking oil in the hands is one of the alternative ways to avoid the direct contact of the cashew nutshell liquid in the skin.

Significance. Cashew is considered a potential crop industry in Guimaras. Aside from mango, it also has different processed products such as salted nut and bandi which have a high market value. Likewise, this crop has a high nutritional food value. The cashew fruit contains a high concentration of vitamins C, carotenoids, phenolic compounds, and minerals (Cavalcante et al., 2005). The kernel contains antioxidant, good fat, and magnesuim for a healthy heart (Meyer, n.d.). Moreover, disregarded cashew fruit serves as an alternative feed for cattle, chicken, and swine most of the time.

On the other hand, gathering and picking of cashew is just a hobby for some children. One can see them collecting cashew seed along the road, making fun of it, or working together with their friends, to, which some earn by selling those seeds.

Status. The cashew nut production in Guiramas is mainly on a backyard basis, and there are only a few engaged in orchard plantation. The demand is high for both local and export markets for cashew, especially the unprocessed ones. However, due to the inability to meet the demand in quantity, the cashew industry is not sufficient to enter such a market.

Threat. The more the number of trees you have on a backyard basis, the more seeds you can get. But, because of the pag-uling (wood charcoal-making practice) in Guimaras, which is very common, the number of cashew trees tends to decrease, reducing seed production. Aside from that issue, climate change is also one of the threats in cashew production, particularly during the reproductive phase. Climatic factors on cashew study of Balogoun, et al (2016) reported that the unpredictable and unseasonal rain during the dry season could resulin unfavorable environmental conditionson and high incidence of pest and disease developme, leadingds to the cashew plants' failure to develop flower.

**Mango (Paho)**

**Paaso (Smudging).** Paaso is a Hiligaynon term referring to smudging. It is a traditional-cultural method of inducing the mango flower using smoking/fogging. The technique involves burning local plant materials (fresh and dried, e.g., shrubs, grasses, tree branches, etc) under the mango tree canopy. The dried materials are first ignited, filling the fresh ones to increase smoke formation. Moreover, paaso takes almost 2 weeks straight, starting from morning until afternoon, and it is mostly done during dry season or mango season.

On the other hand, in some areas where there is a presence of strong wind, people practice the use of kumbong (wind barrier) using amakan (bamboo mat) or lukay (coconut leaves), which is placed against the direction of the wind. This to prevent the smoke from being blown away from the tree canopy.

Significance. Scientifically, paaso in mango had been considered necessary during early days. The smoke produced from burned plant materials contains endogenous ethylene, a plant hormone that stimulates flowering. During smudging, smoke containing ethylene, which comes from the burned plant material, is absorbed by the leaves and is utilized by the plant to induce flower formation (Sandip et al., 2015). Moreover, it also serves as an insect/pest repellant to prevent diseases brought about by insect/pest infestation.

Status. Today, paaso is still practiced but only to act as pest repellent, However, the use of kumbong is not practiced anymore. Due to the discovery of chemical inputs in farm production, most people have now converted into using the modern farming system. The use of chemicals for flowering and pest control, which is more efficient, leads them to abandon the old practices.

History/Evolution. The paaso is a known traditional method for flower induction in early times. The scientific evidence has already been found behind this method. When the chemical approach in agriculture became popular around 1980s, the use of chemical flower inducers gradually changed the old practices of mango production in Guimaras. According to Roberto Galon, in 1973, the Provincial Department of Agriculture conducted a training about chemical flower inducers and pesticides for mangoes, wherein, after the training, the participant spreaded the information and technology to other farmers. Furthermore, he added that, in 1982, a method in the induction of mango flowers known as kalburo (calcium carbide) was brought by the people from Sta. Barbara. This powdered chemical is applied in the tree's base or between the branches by making a hole using drills and inserting the powder inside. However, years after using this method, people discovered the side effect of this chemical. They observed that the part to which they applied this chemical was gradually rotting. Additionally, according to Cerilo Tiniklan and Rodito Galpo, the Calburo application was introduced in Guimaras around late 1950s by people from Cabatuan.

**Paglabo sa Puno (Hacking the Mango Trunk).** Paglabo sa puno (hacking the trunk) is a traditional method to induce mango flowering and other fruit trees. It is performed by slashing the surface of the trunk using wasay (axe) or binangon (bolo) during fruit season before flowering. Moreover, people in early times observed that slashing the tree trunk during its season induces its flower. In addition, elders in Guimaras have a verbal expression about paglabo (hacking). When the fruit trees don't show any signs of flowering during its season, they say "pahuga bala" which means you need to stab the tree for it to produce flowers.

In scientific terms, Mr. Yonder, Center Chief of Guimaras National Crop Research Development and Promotion Center, explained that wounding inflicts a stress effect to the mango wherein it causes the initiation of flower induction. In addition, according to Haldankar et al. (2014), the removal of cambium, which is a common feature of girdling and hacking, will lead to plant stress and result to high production of ethylene in the plant. Due to the release of this hormone, the production of flowers tends to increase.

Meanwhile, today, hacking is still practiced in some parts of Guimaras, but very few apply it in mangoes as it is commonly done in jackfruits. Due to the invention of formulated flowering chemical in mangoes, most farmers discontinued using this method.

**Flower and Fruit Indices in Mango Production**

Flower and fruit indices in mango production are vital factors in the mango industry. The use of indexes to determine the proper time of method application is crucial to achieving the desired quality of the product. The benefits of visual and numerical estimates are the primary method for determination.

Flower Induction Indices. Applying a chemical flower inducer is always a question to mango farmers or growers. Four common indices are used to determine if the plant is ready for chemical flowering application. These indices are (1) dark green color of the leaves, (2)"pagkumos sang dahon" (leaf squeezing) – if the leaves produce a crackling like sound while squeezing, it means that it is ready for flower induction, and (3) bulging of shoot tip.

Fruit Maturity Indices. Maturity is an essential factor that affects the quality of the product. The ideal maturity of a mango fruit is considered a vital factor in production because it affects the fruit's sweetness and shelf life. The fruit maturity indices are (1) flattening of shoulders and fullness of cheeks, (2) the presence of "bloom" or powdery deposit, and (3) yellow-green color near pedicel and yellowing of pulp.

**Climbing Techniques**

In the absence of modern machines used to facilitate climbing tall trees, Filipinos employ traditional and improvised climbing methods, mainly when conducting fruit bagging and harvesting. In Guimaras it is popularly known as the "palawa".

Palawa is a Hiligaynon term that means hanging in a web; the person doing the method mimics a spider. The palawa involves two important persons: the one doing the palawa and the other who controls the rope, known as the "timon". Moreover, the person performing the "palawa" harnesses themselves in a knotted rope called "sakayan". The sakayan has a structure called bandoler, where the person is tied.

To do "palawa" is quite a hard work. According to Jay-R Igpuara, a 19-year-old resident from Gaban, San Lorenzo, Guimaras, a person should be skilled enough to perform "palawa". As for him, he needed a month of rigid training to join the "palawa" team. However, for Nelson Gonzaga, 29 years old, also from Gaban, he was only trained for a day and could go with the group after that. They were both trained by the family Sakayan whom they believed were the ones to introduce the technique in Buenavista. They said that "palawa" in Guimaras originated in Nueva Valencia, Guimaras.

According to Art Liarte, 21 years old from East Valencia, Buenavista, Guimaras, who acted as "timon" during the interview, "sa kada puno nga may nagapalawa, importante gid kaayo nga may isa ka "timon" para sa safety sang naga-"palawa". So, the two "palawa" groups have their own "timon" to ensure the safety of the baggers.

**Use of Ladders.** Team Tanag (who employs both "palawa" and ladders for bagging and harvesting) said that the use of ladder is much safer than doing "palawa" and the outer portion of the canopy with fruits can be bagged appropriately. According to Rolando Sanchez, 59 years old, and the Tanag team of baggers leader, when the fruits for bagging are located at the lower portion of the canopy, the ladders are used. Still, when they are at the highest portion, the member who knows the skill for "palawa" does the job. The group uses both two-post and three-post ladders. They can bag as high as 20 feet using ladders.

For Bating group, Rolando Niego, 52 years old, said that they are only using a ladder to reach the highest portion of the canopy. None in their group knows how to do "palawa" but sometimes, when they cannot get the highest part of the canopy, one of their group members climb the tree without any harness to do the bagging. The group uses both one-post and two-post ladders.

Significance. Fruit bearing trees, particularly centennial and old grafted mango trees, are tall enough to climb. Having a crane to facilitate the ease of bagging is impossible here in Guimaras. When doing fruit bagging and harvesting, hired labor to perform the job should know the techniques to complete the job successfully. Hence, various traditional methods emerged to ease climbing trees for fruit bagging and harvesting. The methods developed through time are essential for the mango industry in Guimaras as bagging and harvesting are not yet mechanized.

Status. Different indigenous maturity indices in mangoes are still practiced in Guimaras Province. However, fruit maturity indices like Days After Flower Induction (DAFI), fruit color and Total Soluble Solids using refractometer ensure the fruits are ready for harvest. The fruits are of good quality if harvesting of fruits is at the right age and maturity,

The practice of fruit bagging and harvesting techniques is common in the whole Province of Guimaras. Various teams informally organize themselves to be hired for bagging and harvesting, and they use different techniques based on their members' skills.

In Buenavista and San Lorenzo, the Cagay Team from East Valencia, Buenavista is known to perform bagging and harvesting through "palawa". They have 8 members in the group. Seven (7) people do the "palawa" and one (1) person serves as timon. The Mantasik team of Gaban, San Lorenzo is also known to practice such and they are

composed of 7 members (one timon and 6 baggers). Mixed "palawa" method and the use of ladders is practiced by Tanag team which is composed of 18 members (10 people use ladders and 5 people do the "palawa" and they said they can climb trees 20-feet high). For Team Bating in San Pedro, Buenavista, the group uses purely ladder to do the bagging and harvesting.

History/Evolution. The "palawa" technique for climbing trees was known to have originated from Nueva Valencia, Guimaras. This was according to the observations of the key informants. However, the younger key informants were trained by the Sakayan family who came from the Province of Negros Occidental. On the other hand, paper in fruit bagging became popular around the late 80s. According to the respondents, this practice was adopted from Cebu.

**Rice Production Practices**

**Buray.** "Buray" is a Hiligaynon term referring to a method of planting known as dry seeding of rice seeds which is usually done on uplands immediately after the onset of rainy season or last week of April or May. Before the rain comes, farmers prepare the field by doing arado (plowing) and pakaras (harrowing) three times across the slope to reduce erosion. The arado and pakaras are alternately conducted. Before the subsequent plowing, farmers first allow the weeds to grow a bit taller and then plow afterward. Harrowing is then done immediately after plowing. After which, the farmers wait for the first or second rainfall that indicates the start of the rainy season. Once the first or second rain falls, the field will be immediately plowed and buray will be simultaneously done with plowing. Before doing buray, the seeds are mixed with fertilizers to ensure that the sown seeds will have enough nutrients for initial growth and development in the field. Buray is done by placing the rice seeds following the idas (furrow) made through plowing. The seeds sown through buray are then covered with sul-ay (the soil scooped up during plowing) to ensure that birds and other animals do not damage the seeds. For other farmers, covering of seeds is done with their bare feet. When they do the buray, they sow the seeds along the idas (furrow), and scrape the sul-ay using their feet to cover the sown seeds.

Significance. The practice of buray in upland rice farming is essential for the farmers as it helps ensure food security during the lean month of August. According to the farmers, when they practice buray during April or May, they have enough rice for subsistence during August. However, they cannot harvest rice in August when they wait for June to start planting. Hence, the farmers will not have enough supply of rice, which then leads them to buy their rice supply, for personal consumption, from the market.

Status. Until recently, buray is still practiced in Guimaras Province, especially in upland rice farming areas. This is one of the important means employed by upland rice farmers to produce food during the month of tig-gulutom (August).

Structure/Meaning/Function. The practice of buray is only done in once every cropping per year to ensure rice harvest during August. It functions to produce rice harvest in August, usually considered to be a lean month in rice production.

Sustainability. Usually, lowland rice production for first cropping starts during May or June in rainfed areas. Farmers have to wait for the rainy season to prepare their fields for the first cropping season. To ensure that the rice has ample moisture or water for growth and development, farmers usually do sab-og sa binati (wet seeding). With sab-og sa binati, rice can be harvested during September or October. Hence, most of the people engaged in lowland rice farming will have a minimal supply of rice during August (a period where the supply of rice is scarce hence the price per kilogram is costly). However, with the practice of buray in upland rice farming, the farmers will have enough rice for subsistence and excess produce for market sale until the harvesting period for the first cropping season starts. Hence, the practice is still actively practiced in upland rice farming as it addresses problems on rice insufficiency during the lean month period.

Threats. As a farming method in rice production, farmers cited the following as threats for practicing buray:

Soil erosion: Buray is practiced in upland areas. Soi degradation will happen with continuous soil cultivation in the uplands. Buray is only practiced once every year To reduce the effect of soil erosion.

Strong winds: Strong winds affect grain filling. Farmers cited that the grains become upahon (unfilled) when strong winds blow during the grain-filling period.

Stray animals: Normally, there are many farm animals raised in uplands. Most of the upland rice areas are not surrounded with fences. Therefore, the area is open for stray animals to graze and trample.

Drought: Drought is also cited as one of the threats to the practice buray as drought will eventually reduce yield or even result to zero production.

**Linas.** "Linas" is one of the oldest traditional methods of rice threshing. This involves using bare feet or draft animals to thresh the crop. The harvested rice straw is spread over a mat or sack and trampled with feet to separate the grain from the straw.

Significance. Nowadays, most of farmers opted for mechanized threshing due to its efficiency compared to the traditional method. However, for a farmer with a small land area like Belenda Artosilla who practices salapi/ratoon, linas are considered economically practical in terms of cost for threshing.

According to Nanay Belenda, "salapi" or ratooned rice typically have lower yields than seedling rice production. If they rent a machine for threshing the yield they can get cannot compensate the cost of rental of machine, therefore, they prefer to use the traditional method. In that case, Nanay Belenda opted to use linas to thresh her harvest. m single planting and rice matures earlier.

Status. Currently, "linas" is still a practice in Barangay Getulio particularly for Nanay Belenda who only owns a small parcel of rice land.

History/Evolution. Long before the development and utilization of farm machineries in agriculture, "linas" had been used as method for threshing grains. However, due to the insufficiency in terms of time and productivity of this method, most farmers now prefer to use mechanization.

Structure/Meaning/Function. "Linas" involves using bare feet or draft animals to thresh the crop. The harvested rice straw is spread over a mat or sack and trampled with feet to separate the grain from the straw.

**Coconut Production and Management Practices**

**Pagpananggot.** Pagpananggot (toddy tapping) is one of the coconut management practices that denote harvesting of tuba (coconut toddy). A person performing pagpananggot is known as mananggete (toddy tapper). The work of mananggete is not an easy task. The person should be equipped with climbing skills, to be able to climb tall coconut trees, and expertise in observing the behaviour of the palm where he is harvesting tuba. To do pagpananggot, a mananggete needs coconut trees with ready to tap suwak (spadix). Suwak is composed of inflorescence and sheath or spathe that covers the inflorescence). To collect tuba (coconut toddy), the mananggete needs, kawit (a container made of cut bamboo pole with a wooden handle hung on the shoulder of the mananggete used to collect tuba during harvest), pasok (a container made of cut bamboo pole attached to the suwak which is already tapped to collect tuba), patik (a bamboo stick used to clean the pasok), sanggot (sickle) for tapping suwak, bol (a container made of cut bamboo pole used to measure the amount of tuba to be marketed) and ginit (coconut leaf sheath used to filter tuba).

Significance. Doing pagpananggot is very important as it produces tuba necessary for making vinegar and lambanog. At present, there had been various commercially produced vinegars and liquors, yet tuba is still very important for the community. The community prefers natural vinegars made out of tuba and prefers tuba compared to wine or liquors commercially available in the market.

Status. Pagpananggot is still practiced in a few rural areas in Guimaras and is a source of tuba and vinegar for the rural community.

Structure/Meaning/Function. To perform pananggot, the following are the activities to be observed:

Selection and preparation of suwak for tapping. The suwak used for pagpananggot is usually properly selected and prepared to ensure the successful collection of tuba from the coconut trees. According to the mananggete, to successfully collect tuba from the suwak, one shoule observe the folowing:

1. Bend daily the suwak (those with inflorescence still covered with spathe) two inches from its most recent position. This is conducted to train the suwak before collecting the tuba. The suwak must be already on its bent position when collecting tuba to flow directly to the pasok continuously. The tuba will not be collected successfully once the suwak is not bent correctly during the collection period. The tuba will flow back to the suwak causing the suwak to get rotten. Hence, training the suwak to bend is essential.

2. Always check the ikatlo nga manghod or third sibling from the older suwak as basis for tapping. Once the ikatlo nga manghod is already balangit (one normal finger span), the farmer is assured that tuba will just continuously flow once the suwak has begun to be tapped.

Tapping and collecting of tuba. The mananggete climbs coconut trees in the morning and afternoon. Once the suwak has been selected and is ready for tapping, the mananggete cuts the tip of the suwak using the sanggot. As previously mentioned, he always observes the length of the third sibling of the suwak to make sure that the tuba

will be successfully collected. After cutting its tip, the pasok will be attached to collect the tuba draining out from the suwak. The suwak is tightly tied to ensure that the inflorescence will not disintegrate when the pasok is connected. The tip of the suwak, with an attcahed pasok, is then covered with ginit to prevent rain from mixing with the tuba. For Mr. Gabiota, tapping and collection of tuba is done every afternoon as this time is more convenient for him.

Harvesting tuba. He climbs the coconut tree when harvesting with his kawit (with patik inside) attached to his shoulder and sanggot tied to his waist. When he reaches the tip of the coconut tree, he collects the tuba and pours it inside the kawit. Once the pasok is already empty of tuba, the mananggete uses the patik to take out the sediments inside the pasok and strike the patik on the coconut leaf petiole several times removing the residues taken from the pasok.

According to Mr. Gabiota, to make the tuba sweeter, he changes the pasok three times a day, which means that he is not, in a day, using the same pasok to collect the tuba. Instead, he uses three pasoks and changes the pasok three times a day. However, he has to climb the coconut tree several times a day, which is very tiring.

Likewise, he has observed that he usually has a poorer harvest of tuba when the wind direction changes from time to time in a day. However, when the wind direction is the same throughout the day, he is assured of a good harvest.

Storing and marketing of tuba. After being harvested, the tuba inside the kawit will be poured into a 20-liter container for storage and marketing. The harvested tuba is measured using a bol (that contains 600-700 ml). Hence, the cost is based on this measurement when selling it directly from the farm. For Mr. Gabiota, his harvested tuba is sold directly to his sister's retail (sari-sari) store.

Sustainability. Tuba is one of the most important beverages, particularly for the rural people. Rural people, especially men, used to gather and meet the mananggete or a place where tuba is sold every afternoon, after work, to socialize with colleagues and friends. They used to talk and spend time together over tuba. Drinking tuba is somehow a stress reliever for male workers. It also promotes good relationships among the people in the community.

Likewise, tuba is also used to make lambanog, a wine with much higher liquor potency than tuba. Tuba is also used to make vinegar. A fermented tuba is used to cook various Filipino dishes. Hence, tuba production is very sustainable in terms of sustainability as it is one of the important beverages and cooking ingredients until today. It is therefore essential to preserve the coconut industry to sustain pananggot.

Threats. Based on interviews, the following are considered threats to pagpananggot:

**Weather.** When the weather is bad, the mananggete could not collect quality tuba and enough volume for harvest. When there is heavy rainfall, the quality of tuba will be affected because it will be infused with rainwater. Also, there is not enough harvest if there is a subsequent heavy downpour or typhoons.

Apart from that, if the wind direction does not favor the flow of tuba from the suwak, the harvest will be low. As previously mentioned, when the wind direction within a day changes from time to time, the yield will be low. If the wind direction is the same within a day, the harvest is abundant.

**Commercial liquors and vinegar.** There are a lot of commercial liquors and vinegars in the market today that the community now consumes commercial varieties. Hence, the existence of these products in the market negatively affects the marketability of tuba and tuba by-products as these products are not as competitive compared to commercial liquors.

**Dying coconut industry.** In the past, Guimaras had a vast coconut plantation. However, because of residential and commercial establishments and developments, coco lumber is widely used as construction materials. In these cases, rampant cutting down of coconut trees to be made into lumber was observed in the Province of Guimaras. Very few of the coconut farm owners practice replacement or replanting of coconut trees. Therefore, it resulted to the decreasing number of coconut tree plantations in the province and a limited number of coconut trees for tuba production through pagpananggot.

**Buri Palm Sugar**

**Pinarak/Padak or Kalamay sa Buri.** Pinarak is a processed sugar of "buri palm" scientifically known as Corypha utan. The extracted liquid (tuba) from the heart of palm or "ubod sang buri" is collected and cooked by heating until the liquid turn into sticky sugar form.

The process usually starts by clearing the crown of the palm tree by removing some of the leaves and plant debris. The crown (upper part) will be cut to get into the heart of the palm (ubod) and then, the outside circumference of the ubod will be tied (pikitan) using the leaf petiole of buri. In collecting the liquid, a surab (bolo) is used to carve the core of the ubod. The carve shoul be concave with a canal structure.

The collected tuba, gathered for four hours after the liquid has started flowing from the ubod, will be immediately boiled to avoid "pasar" (over fermentation that leads to vinegar formation). Make a thin layer of ubod to make an

open wound that helps induce the liquid flow. These processes will be repeated with an interval of four hours until such time that the palm has no more juice left to be extracted. Moreover, in every dawat (collection of tuba) the liquid will just be added to the previously gathered ones, boiled again until it produces bubbles to stop the heating.

On the other hand, one of the practices to enhance the flowing of tuba sang buri (liquid extracted from the ubod) is the use of kutitot nga katumbal (hot peppers). After the scraping of ubod, these hot peppers are rubbed to the surface of the newly wounded ubod. The pinarak producers have observed that it prolongs and induces the flow of liquid. The cooking process will be done every two days (48 hours collection of tuba). More than two days of collection is not good because it allows for the longer period fermentation of the previous collection, resulting in pasar and dulit (pinarak which is sticky and not dried after it is cook).

The collected liquid will be cooked by boiling and then added with coconut meat (kinagod nga bukayuon nga lubi) for additional flavor (hamot kag mananam). The liquid will be continuously stirred during the cooking process using a rulugay (a wooden laddle characterized by its long handle with an oblong shape structure at the tip). Then, when the tuba turns into sticky sugar, this will be put into a kaha (a square-shaped container measured at around 8x8x1.5cm made from bamboo leaf) using palita (flat wooden spoon) will be left to cool and dry.

Significance. Pinarak was considered a delicacy by the Guimarasnons. This sweet delicacy has been a part of the Guimarasnon food table for more than a century. Likewise, pinarak is in-demand for local and international consumption commonly brought abroad by those people who have relatives here in Guimaras who bring pinarak as they return.

Status. Pinarak-making is still practiced in Guimaras, particularly in the municipality of Nueva Valencia. The production usually starts from December to May or towards the dry season. However, since the packaging property of pinarak is poor, the product's availability for export market is not accessible and fails to meet the proper protocol of food and safety standards.

Furthermore, the number of buri palm is now decreasing, primarily due to pinarak production. However, for most of our respondents, pinarak production is the most productive use of a buri palm even though there is a consequence that the tree will die afterward. Also, since only few still use the leaves of buri for banig-making, it is also challenging to collect the leaves of buri when it is tall. Moreover, the wood of this tree is not suitable for lumber production because it is weak and easily destroyed.

History/Evolution. According to most of our respondents, Igang, Nueva Valencia, Guimaras is the place of pinarak in Guimaras. The Gaugano family is one the oldest families to practice pinarak-making. Moreover, as stated by Danilo Gaugano, his ancestor from Tigbauan and Antique were the ones who brought the practice of pinarak-making in Guimaras.

In Tigbauan, they used coconut shells as container of pinarak before. When Guimaras invented the kaha, people adopted the new packaging style from other areas. Moreover, in Tigbauan, they added gata sang lahing, while here in Guimaras we use kinukudkud nga bukayoon nga lubi.

Other Terms:
Padakan – term used to describe a place where there is pinarak-making
Tarakos – a wood instrument used to measure the size of kaha
Pisgil – single-post bamboo used as ladder in climbing a buri

## CONCLUSIONS

It is evident that some local farmers still practice traditional farming methods that have to be documented and preserved. These traditional practices normally worked not against the environment but in complementary with the environment. The farmers' beliefs on the spiritual dimension and their respect for nature are important keys to environmental sustainability that has to pass from the present generation to the next continuously. In this manner, sustainable development in agriculture will be realized. Agricultural production and management have to work harmoniously with nature by applying and integrating traditional knowledge. Hence, researchers may incorporate traditional knowledge systems in agricultural production studies. Likewise, LGUs may consider developing policies on preserving and utilizing traditional knowledge systems.

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# AWARENESS, PRACTICES, AND IMPLEMENTATION OF GENDER AND DEVELOPMENT AMONG STATE UNIVERSITIES AND COLLEGES

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**ABSTRACT** This study assessed the awareness, practices, and implementation in terms of the key areas of GAD such as policy, people, enabling mechanisms, and programs/activities/projects of Gender and Development (GAD) among State Universities and Colleges in Region VI, Philippines for the academic year 2016-2017. The respondents of the study were the selected faculty and staff applying descriptive method as the research design in gathering data. The researcher made instrument was utilized after thorough validations of experts using Good and Scates 8 point agenda and reliability test using the Cronbach's alpha and the statistical tools used and setting level of significance at 0.05 alpha was prioritized. It found out that the respondents were highly aware, often practiced, and just implemented in terms of the key areas of GAD such as policy, people, enabling mechanisms, and programs/activities/projects. There were significant differences on the awareness when grouped according to SUC level, type of SUC, population, age, sex, civil status, religion, and employment status while no significant observed in terms of category, length of service, and educational attainment. There were significant differences on the practices when grouped according to SUC level, type of SUC, population, age, sex, civil status, and religion while no significant differences observed in terms of category, employment status, length of service, and educational attainment. There were significant differences on the implementation when grouped according to SUC level, type of SUC, population, age, sex, civil status, religion, and employment status while no significant observed in terms of category, length of service, and educational attainment. Lastly, there were significant relationship between the awareness, practices, and implementation.

**Keywords:** Awareness, Practices, Implementation, Gender and Development, State Universities and Colleges

## INTRODUCTION

Most of the countries are worried about gender inequality in society. In the Philippines, even though the country has a good record when it comes to gender equality, it is important to reach the widest possible audience (Sumasad and Tuazon, 2016). Article XIII, Section 14 says women need to have a say in how things work in the world. The Philippines is at the top of a list of countries with good records on gender equality in part because the country has a lot of good institutions in place to promote gender equality (MacPhail, 2015). It has been said that GAD looks at gender roles and social relations; how men and women show their "maleness" and "femininеness" in their access to resources. However, there is a glass ceiling, which means that there is a lot of opposition to women and minorities becoming managers in large organizations (Fritcher, 2017).

It was also thought that women were less productive because they would take a long time off work after having a child. Because women can see through the glass, they may be able to see where they could go, but they can't reach the ceiling, which leads to unfairness and discrimination. In the end, this led to efforts to include gender and development themes in government agencies and universities. In this study, the learned about the social aspects of hierarchical power relations that are built into social institutions, as well as how they affect men and women in society. After that, the survey asked about the awareness and implementation of GAD in the SUCs of Region 6. The results of this study can now be used to make changes to the Gender and Development Program Plan at State Universities and Colleges in Region VI, where this study took place.

In general, this study was conducted to assess the awareness, practices, and implementation of Gender and Development (GAD) when grouped according to SUC profile and respondent's profile in terms of the key areas of GAD such as policy, people, enabling mechanisms, and programs/activities/projects among State Universities and Colleges in Region VI. No significant differences were likewise hypothesized. Hence, this study was conducted.

## METHODOLOGY

This study employed descriptive research design that involved survey which describes the status quo, correlation studies which investigate the relationship between variables and developmental studies which seek to determine changes over time (Key, 2016). There are five provinces and this study was conducted in the identified eight (8) selected SUCs in region VI. The respondents were the randomly selected faculty and staff of the different SUCs in Region VI for AY 2016-2017 and determined by using Slovin's formula. A modified instrument was used based from the Gender Mainstreaming Evaluation Framework in gathering the data that undergone experts' validation using the Good and Scates Eight- Point Criteria for Validation and was subjected to pilot testing. Finally, the data were tallied, tabulated, and prepared for statistical evaluations and interpretations. The responses were encoded, tallied, tabulated, and be subjected for data analysis using SPSS v.17. Appropriate statistical tools were used to answer every specific stated problem. Frequency, percentages, mean, t-test, ANOVA, and Pearson r were utilized.

## RESULTS AND DISCUSSION

Table 1 presents the level of awareness on GAD among SUCs when grouped according to SUC level, type of school, population, age, sex, civil status, religion, category, employment status, length of service, and educational attainment. The entire mean was 3.96, indicating strong awareness. All of these SUCs have a well-established GAD program, in such, SUC level 4 was classified as very highly aware, while levels 1, 2, and 3 were described as highly aware with M=3.87, M=3.61 and M=4.15 accordingly. In terms of school type,College and University are classified as very aware (M=3.59 and M=4.15). The population mean results showed that big (5,000 and above) and small (5,000 an below) are highly aware, with M=4.15 and M=3.60 respectively. The classification of age 3.96 was described as highly aware. M=4.06 in young (36 years and under) and M=3.36 in old (37 years and over). Regarding sex, females and males are equally aware, with M=4.06 and 3.76. In terms of civil status, the results showed that individuals who were single, married, or widowed had M=4.09, M=3.9, and M=3.76. Regarding religion, catholics and non-Catholics had M=4.02 and M=3.69. Furthermore, the results show that both faculty and staff have the same level, M=3.99 and M=3.92. In terms of employment status, both casual and permanent have M=4.06 and are described as highly aware. Those short (10 yrs. and below) and long (11 yrs. and above) have the same level and got the M=3.95 and M=3.97 respectively and described as highly aware in terms of educational attainment, the global mean was 3.96. All bachelor's, master's, PhD/EdD/DM, and other degrees received M=4.00, M=3.97, M=3.85, and M=3.93 accordingly.

Table 1. Awareness on GAD when Classified According to SUC Level, Type of School, Population, Age, Sex, Civil Status, Religion, Category, Employment Status, Length of Service, and Educational Attainment

| Profile | Mean | Interpretation |
|---|---|---|
| SUC Level | | |
| Level 1 | 3.87 | Highly Aware |
| Level 2 | 3.61 | Highly Aware |
| Level 3 | 4.15 | Highly Aware |
| Level 4 | 4.35 | Very Highly Aware |
| Type of School | | |
| College | 3.59 | Highly Aware |
| University | 4.17 | Highly Aware |
| Population | | |
| Small (less than 5000) | 3.6 | Highly Aware |
| Big (5000 and above) | 4.15 | Highly Aware |
| Age | | |
| Young (36 yrs. and below) | 4.06 | Highly Aware |
| Old (37 yrs. and above) | 3.36 | Highly Aware |
| Sex | | |
| Male | 3.76 | Highly Aware |
| Female | 4.06 | Highly Aware |
| Civil Status | | |
| Single | 4.09 | Highly Aware |
| Married | 3.9 | Highly Aware |
| Widow/er | 3.76 | Highly Aware |
| Religion | | |
| Catholic | 4.02 | Highly Aware |
| Non Catholic | 3.69 | Highly Aware |
| Category | | |
| Faculty | 3.99 | Highly Aware |
| Staff | 3.92 | Highly Aware |
| Employment Status | | |
| Casual | 4.06 | Highly Aware |
| Permanent | 3.91 | Highly Aware |
| Length of Service | | |
| Short (10 yrs. and below) | 3.95 | Highly Aware |
| Long (11 yrs. and above) | 3.97 | Highly Aware |
| Educational Attainment | | |
| Bachelor's Degree | 4.00 | Highly Aware |
| Master's Degree | 3.97 | Highly Aware |
| PhD/ Ed.D/ DM | 3.85 | Highly Aware |
| Others | 3.93 | Highly Aware |
| Overall Mean | 3.96 | Highly Aware |

*Scale: 1.00 to 1.80 (Not Aware) 1.81 to 2.60 (Less Aware) 2.61 to 3.40 (Moderately Aware) 3.41 to 4.20 (Highly Aware) 4.21 to 5.00 (Very Highly Aware)*

Table 2 presents the level of awareness on the key areas of GAD such as policy, people, enabling mechanisms, and programs/activities/projects. The level of awareness on the key area of GAD policy taken as a whole had a mean M=4.07, described as highly aware. It shows that they were very highly aware (M=4.26) on the policy/s articulating support to GAD mandate. In terms of the key area of people, it shows that they were highly aware (M=3.84). As to the key of GAD Enabling Mechanisms, the mean (M=3.86) determined them to be highly aware. Lastly, as to the programs, activities, and projects, they were also highly aware, (M=3.96).

Understanding how gender roles influence organizational settings can help Velasco & Alicar-Cadorna (2014) deliver gender responsive services (Aspiras et.al, 2017). To which human rights, gender equality, and gender sensitivity will be incorporated into fundamental education and governance (Llego, 2017). Even PH Women's Commission (2011) clarify the GFPS's roles and responsibilities, composition, and structure to enable it to act as a mechanism for promoting Gender Equality and Women's Empowerment.

Table 2. Awareness on the Key Areas of GAD such as Policy, People, Enabling Mechanisms, and Programs/Activities/Projects

| Key Area of GAD | Mean | Interpretation |
|---|---|---|
| 1. GAD Policies | 4.10 | Highly Aware |
| 2. GAD People | 3.84 | Highly Aware |
| 3. Enabling Mechanisms | 3.86 | Highly Aware |
| 4. GAD Programs/Activities/Projects | 3.96 | Highly Aware |
| Awareness on GAD | 4.07 | Highly Aware |

*Scale: 1.00 to 1.80 (Not Aware) 1.81 to 2.60 (Less Aware) 2.61 to 3.40 (Moderately Aware) 3.41 to 4.20 (Highly Aware) 4.21 to 5.00 (Very Highly Aware)*

Table 3 presents the practices on GAD among SUCs when grouped according to SUC level, type of school, population, age, sex, civil status, religion, category, employment status, length of service, and educational attainment. The level of practice on GAD had an overall mean of 3.79 and it means that they often practiced. As to SUC level, those in level 1, 3 and 4 often practiced with a mean of M=3.74, M=4.03 and M=4.04 while level 2 sometimes practiced with a mean M=3.35. In terms of type of school, those in college and university often practiced and had M=3.37 and M=4.03 of means. In terms of population, it revealed that majority of big (5,000 and above) were often practice with the mean of 4.02, and small (less than 5,000) were often practiced it too with the mean of 3.36. In terms of age, the overall mean was 3.79 described as often practiced. Those young (36 yrs. and below) and old (37 yrs. and above) have the same level with different means, M=3.91 and M=3.68 respectively and they had often practiced. In terms of sex, both male and female have the same description, as often practiced and got M=3.56 and M=3.91 respectively. In terms of civil status, those single, married and widow/er got M=3.95, M=3.72 and 3.50 respectively and all described as often practiced. In terms of religion, both catholic and non catholic have often practiced, M=3.85 and M=3.53 respectively. In terms of employment status, those casual and permanent have the same scale of means, M=3.89 and M=3.74 respectively and they often practiced it. In terms of length of service, Those short (10 yrs and below) and long (11 yrs and above) have the same level described as often practiced with M=3.78 and M=3.80 respectively. Lastly, in terms of educational attainment, those bachelor's degree, master's degree, PhD/EdD/DM have often practiced with M=3.81, M=3.80, M=3.68, and M=3.99.

Table 3. Practices on GAD when Classified According to SUC Level, Type of School, Population, Age, Sex, Civil Status, Religion, Category, Employment Status, Length of Service, and Educational Attainment

| Profile | Mean | Interpretation |
|---|---|---|
| SUC Level | | |
| Level 1 | 3.74 | Often Practiced |
| Level 2 | 3.35 | Sometimes Practiced |
| Level 3 | 4.03 | Often Practiced |
| Level 4 | 4.04 | Often Practiced |
| Type of School | | |
| College | 3.37 | Often Practiced |
| University | 4.03 | Often Practiced |
| Population | | |
| Small (less than 5000) | 3.36 | Often Practiced |
| Big (5000 and above) | 4.02 | Often Practiced |
| Age | | |
| Young (36 yrs. and below) | 3.91 | Often Practiced |
| Old (37 yrs. and above) | 3.68 | Often Practiced |

| | | |
|---|---|---|
| Sex | | |
| Male | 3.56 | Often Practiced |
| Female | 3.91 | Often Practiced |
| Civil Status | | |
| Single | 3.95 | Often Practiced |
| Married | 3.72 | Often Practiced |
| Widow/er | 3.5 | Often Practiced |
| Religion | | |
| Catholic | 3.85 | Often Practiced |
| Non Catholic | 3.53 | Often Practiced |
| Category | | |
| Faculty | 3.85 | Often Practiced |
| Staff | 3.73 | Often Practiced |
| Employment Status | | |
| Casual | 3.89 | Often Practiced |
| Permanent | 3.74 | Often Practiced |
| Length of Service | | |
| Short (10 yrs. and below) | 3.78 | Often Practiced |
| Long (11 yrs. and above) | 3.8 | Often Practiced |
| Educational Attainment | | |
| Bachelor's Degree | 3.81 | Often Practiced |
| Master's Degree | 3.8 | Often Practiced |
| PhD/ Ed.D/ DM | 3.68 | Often Practiced |
| Others | 3.99 | Often Practiced |
| Overall Mean | 3.79 | Often Practiced |

*Scale: 1.00 to 1.80 (Never Practice) 1.81 to 2.60 (Rarely Practice) 2.61 to 3.40 (Sometimes Practice) 3.41 to 4.20 (Often Practice) 4.21 to 5.00 (Always Practice)*

Table 4 presents the practices on the key areas of GAD such as policy, people, enabling mechanisms, and programs/activities/projects. In the area of GAD policy, the overall mean was M=3.81 and were described to be often practices. Adopting a GAD Agenda/Strategic Framework was the mostly practiced (M=3.89) and the least practices was reviewing and revising some existing policies pertaining to GAD (M=3.74), yet these practices was did often times. As to key of GAD people, they were often practice it based on the mean (M=3.86). Creating of GAD Focal Point System (GFPS) whose members attended appropriate and relevant training on GAD was mostly practiced often, (M=4.02) while having staff members who are recognized as GAD experts by other organizations was the least practiced (M=3.66). As to the particulars on GAD Enabling Mechanisms, they often practiced it with a mean of 3.72. It shows that creating/reconstituting the GAD Focal Point System or similar GAD mechanism in accordance with MCW and pertinent policies issued by concerned oversight agencies (M=3.80), as the highest mean and establishing other GAD mechanisms contribute to the attainment of desired impact/s (M=3.65) as the lowest mean, were the most and least practices that they did oftentimes. Lastly, the mean of 3.79 on key area of Programs/Activities /Projects determined that they often practiced it. Observing GAD-related events by the organization was one of the particulars that most of them agreed that they often practiced, (M=3.91). Conducting capacity development on GAD to develop internal GAD experts and developing and disseminating IEC materials on GAD for clients (internal and external) had the lowest mean of 3.72 and it speaks that they often practiced it too.

For example, the Asian Development Bank (2017) notes that while the number of gender- mainstreamed initiatives has increased across all sectors, the fraction of successful programs has increased dramatically. While GABRIELA and its member organizations thrived, other national democrat mass organizations withered (Hega et.al, 2017). Unlike David et al. (2017), this study assesses the country's performance on important gender-related variables. So it addresses gender equality, economic opportunity, political voice and leadership, as well as female safety. Also identified are policy priorities for gender equality and women's empowerment. According to Ampong (2017), engage employees and empower them to constantly improve service delivery by identifying gaps in work areas and developing plans to accomplish goals.

Table 4. Practices on the Key Areas of GAD such as Policy, People, Enabling Mechanisms, and Programs/Activities/Projects

| Key Area of GAD | Mean | Interpretation |
|---|---|---|
| 1. GAD Policies | 3.81 | Often Practice |
| 2. GAD People | 3.86 | Often Practice |
| 3. Enabling Mechanisms | 3.72 | Often Practice |
| 4. GAD Programs/Activities/Projects | 3.79 | Often Practice |
| Practices on GAD | 3.80 | Often Practice |

*Scale: 1.00 - 1.80 (Never Practice) 1.81 - 2.60 (Rarely Practice) 2.61 - 3.40 (Sometimes Practice) 3.41 - 4.20 (Often Practice) 4.21 - 5.00 (Always Practice)*

Table 5 presents the extent of implementation on GAD among SUCs when grouped according to SUC level, type of school, population, age, sex, civil status, religion, category, employment status, length of service, and educational attainment. It shows the degree of GAD implementation in the entire group (M=2.15) described as implemented. In terms of SUC level, level 4 was fully implemented with a mean M=2.47. Levels 1, 2, and 3 have M=2.06, M=1.94, and M=2.27 accordingly, and were all implemented. College and university have the same level implemented with M=1.93 and M=2.27 respectively. In terms of population, both small (under 5,000) and large (5,000 and above) have the same level with M=1.93 and M=2.27. Young (36 years and under) and old (37 years and beyond) have the same level of implementation with M=2.21 and M=2.1. Male and female have implemented the same with M=2.04 and M=2.21. Single, married, and widow/er have the same level specified with M=2.23, M=2.12, and M=2.00. With M=2.19 and M=2.00 for religion, both Catholics and non- Catholics have the same level mentioned. M=2.18 for academics and M=2.12 for employees. In terms of employment status, M=2.23 for casual and M=2.11 for permanent are applied. Short (10 years or less) and long (11 years or more) service levels are implemented using M=2.16 and M=2.11, respectively. The overall mean for educational attainment was 2.15. These are implemented as M=2.15, M=2.17, M=2.14 and M=2.00 for the bachelor's, master's, PhD/EdD/DM, and othersTable 5 presents the extent of implementation on GAD among SUCs when grouped according to SUC level, type of school, population, age, sex, civil status, religion, category, employment status, length of service, and educational attainment.

It shows the degree of GAD implementation in the entire group (M=2.15) described as implemented. In terms of SUC level, level 4 was fully implemented with a mean M=2.47. Levels 1, 2, and 3 have M=2.06, M=1.94, and M=2.27 accordingly, and were all implemented. College and university have the same level implemented with M=1.93 and M=2.27 respectively. In terms of population, both small (under 5,000) and large (5,000 and above) have the same level with M=1.93 and M=2.27. Young (36 years and under) and old (37 years and beyond) have the same level of implementation with M=2.21 and M=2.1. Male and female have implemented the same with M=2.04 and M=2.21. Single, married, and widow/er have the same level specified with M=2.23, M=2.12, and M=2.00. With M=2.19 and M=2.00 for religion, both Catholics and non- Catholics have the same level mentioned. M=2.18 for academics and M=2.12 for employees. In terms of employment status, M=2.23 for casual and M=2.11 for permanent are applied. Short (10 years or less) and long (11 years or more) service levels are implemented using M=2.16 and M=2.11, respectively. The overall mean for educational attainment was 2.15. These are implemented as M=2.15, M=2.17, M=2.14 and M=2.00 for the bachelor's, master's, PhD/EdD/DM, and others.

Table 5. Implementation on GAD when Classified According to SUC Level, Type of School, Population, Age, Sex, Civil Status, Religion, Category, Employment Status, Length of Service, and Educational Attainment

| Profile | Mean | Interpretation |
|---|---|---|
| SUC Level | | |
| Level 1 | 2.06 | Implemented |
| Level 2 | 1.94 | Implemented |
| Level 3 | 2.27 | Implemented |
| Level 4 | 2.47 | Fully Implemented |
| Type of School | | |
| College | 1.93 | Implemented |
| University | 2.27 | Implemented |
| Population | | |
| Small (less than 5,000) | 1.93 | Implemented |
| Big (5,000 and above) | 2.27 | Implemented |
| Age | | |
| Young (36 yrs and below) | 2.21 | Implemented |
| Old (37 yrs and above) | 2.1 | Implemented |
| Sex | | |
| Male | 2.04 | Implemented |
| Female | 2.21 | Implemented |
| Civil Status | | |
| Single | 2.23 | Implemented |
| Married | 2.12 | Implemented |
| Widow/er | 2 | Implemented |
| Religion | | |
| Catholic | 2.19 | Implemented |
| Non Catholic | 2 | Implemented |
| Category | | |
| Faculty | 2.18 | Implemented |
| Staff | 2.12 | Implemented |

| | | |
|---|---|---|
| Employment Status | | |
| Casual | 2.23 | Implemented |
| Permanent | 2.11 | Implemented |
| Length of Service | | |
| Short (10 yrs and below) | 2.16 | Implemented |
| Long (11 yrs and above) | 2.15 | Implemented |
| Educational Attainment | | |
| Bachelor's Degree | 2.15 | Implemented |
| Master's Degree | 2.17 | Implemented |
| PhD/ Ed.D/ DM | 2.14 | Implemented |
| Others | 2 | Implemented |
| Overall Mean | 2.15 | Implemented |

*Scale: 1.00 to 1.66 (Not Implemented) 1.67 to 2.33 (Implemented) 2.34 to 3.00 (Fully Implemented)*

Table 6 presents the extent of implementation on the key areas of GAD such as policy, people, enabling mechanisms, and programs/activities/projects. As to the GAD policy, the indicators was implemented when taken into entire group (M=2.18). Implementing the policy/policies articulating support to GAD mandates was the highest extent of implementation, (M=2.33) while the least extent of implementation was Has reviewed and revised of some existing policies pertaining to GAD (M=2.08). As to GAD people, the indicators described as implemented when the entire group was taken. Executing the GAD Development Program by sending its top management to the Basic GAD Orientation or Gender Sensitivity Training (GST) with a mean of 2.23, was highest extent of implementation and recognized the Staff members as GAD experts by other organizations with a mean of 2.09 was the least extent of implementation. As to GAD enabling mechanisms, the mean of 2.14 among the entire group was described the indicators as implemented. The highest extent of implementation was Utilized the GAD budget judiciously, (M=2.17) and Engaged in established agencies/lgus, institutions and/or individuals towards the strategic implementation of GAD paps was the least extent of implemention. Lastly, in terms of GAD programs/activities /projects, the mean of 2.15 had described the indicators as implemented. The held of GAD-related events/activities had the highest mean (M=2.26) and described the indicator as implemented. However, implementing the setting-up of GAD corner was the least extent of implementaion (M=2.05), though it described as implemented.

There is even a toolkit from the Department of Energy (2016) that aims to help DOE and its departments as well as other organizations better understand how to deal with the gender issues of their own employees and clients. In connection with this, people who work for the government need to learn more about gender issues and be willing to talk about them in order to appreciate GAD and fight for it in the long run. Like the Commission on Audit kept an eye on government operations to make sure that gender-sensitive policies, programs, projects, and activities are part of the government's everyday work (Castillo, 2017). Meanwhile, an early project by the Galilea Center for Educational Development (2011) shows how gender affects women and men's roles in society, especially in development, as well as how it affects their relationships with each other. It is given to people who don't think about gender very much. There have been a lot of good changes in the Philippine educational system, but this study looked at how gender equality is promoted in higher education (HEI). Gender equality at a Philippine HEI was looked at in this study (Gavino-Gumba, 2013).

Table 6. Implementation on the Key Areas of GAD such as Policy, People, Enabling Mechanisms, and Programs/Activities/Projects

| Key Area of GAD | Mean | Interpretation |
|---|---|---|
| 1. GAD Policies | 2.18 | Implemented |
| 2. GAD People | 2.17 | Implemented |
| 3. Enabling Mechanisms | 2.14 | Implemented |
| 4. GAD Programs/Activities/Projects | 2.15 | Implemented |
| Implementation on GAD | 2.16 | Implemented |

*Scale: 1.00 to 1.66 (Not Implemented) 1.67 to 2.33 (Implemented) 2.34 to 3.00 (Fully Implemented)*

Table 7 presents differences in the level of awareness on GAD among SUCs when grouped according to type of SUC, population, age, sex, religion, category, employment status, and length of service. Results showed that there were significant differences in the level of awareness on GAD among SUCs when grouped according to type of SUC, population, age, sex, religion, and employment status. As to SUC type, it computed t-ratio=-8.903, df=333 and t-probability=0.000. A computed t-ratio=-8.18, df=338 and t-probability=0.000 was determined to the SUC population. As to age, it had computed t-ratio=2.775, df=338 and t- probability=0.006. In terms of sex, it computed t-ratio=-4.011, df=338 and t-probability=0.000 while t-ratio=-4.011, df=338 and t-probability=0.000 for the religion. Lastly, the computed t- ratio=2.095, df=338, t-probability=.037 was determined by employment status, thus indicated that the type of SUC, population, age, sex, religion, and employment status observed significant level which was lower than 0.05 alpha. The null hypothesis which states that there were no significant difference between the levels of awareness on GAD among SUC's when grouped according to type of SUC, population, age, sex, religion, and employment status,

in terms of the key areas of GAD such as policy, people, enabling mechanism, and programs/activities/projects was rejected. On the other hand, as to the category and length of service, the t-test computation showed that there were no significant differences in the level of awareness between faculty and staff. The computed t-ratio=1.003, df=338, t-probability=0.316 was determined from the category while for length of service had a computed t-ratio=.295, df=338, t-probability=0.768 indicated that the observed significant level was more than 0.05 alpha.

Table 7. Difference on the Awareness on GAD when Classified According to Type of School, Population, Age, Sex, Religion, Category, Employment Status, and Length of Service

| | N | Mean | T-Ratio | df | Two-tailed probability | Remarks |
|---|---|---|---|---|---|---|
| SUC Type | | | | | | |
| College | 124 | 3.5905 | -8.903 | 338 | 0 | Significant |
| University | 216 | 4.172 | | | | |
| SUC Population | | | | | | |
| Small (less than 5,00) | 118 | 3.6018 | -8.18 | 338 | 0 | Significant |
| Big (5,000 and above | 222 | 4.1503 | | | | |
| Age | | | | | | |
| Young (36 yrs. old and below) | 162 | 4.0604 | | | | |
| | | | 2.775 | 338 | 0.006 | Significant |
| Old (37 years old and above) | 178 | 3.8685 | | | | |
| Sex | | | | | | |
| Male | 112 | 3.7646 | | | | |
| Female | 228 | 4.0559 | -4.011 | 338 | 0 | Significant |
| Religion | | | | | | |
| Catholic | 277 | 4.0178 | 3.683 | 338 | 0 | Significant |
| Non-Catholic | 60 | 3.6852 | 0.69205 | | | |
| Category | | | | | | |
| Faculty | 178 | 3.9933 | 1.003 | 338 | 0.316 | Not Significant |
| Staff | 162 | 3.9232 | | | | |
| Employment Status | | | | | | |
| Casual | 120 | 4.0584 | 2.095 | 338 | 0.037 | Significant |
| Permanent | 220 | 3.9062 | | | | |
| Length of Service | | | | | | |
| Short (10 yrs. and below) | 149 | 3.9482 | 0.295 | 338 | 0.768 | Not Significant |
| Long (11 yrs. and above) | 191 | 3.96 | | | | |

*p<0.05*

Table 8 presents the differences in the level of awareness on GAD among SUCs when grouped according to SUC level, civil status, and educational attainment. Results showed that there were significant differences in level of awareness on GAD among SUCs when classified as to SUC level and civil status. As to SUC level, it had computed F-ratio=20.309, df=3, P- value=.000. As to civil status, the computed was F-ratio=19.301, df=3, P-value=.0 indicated that the observed significant level were lower than 0.05 alpha, thus, the null hypothesis which states that there were no significant difference in the level of awareness on GAD among SUCs when grouped according to their educational attainment was rejected. However, there were no significant differences in level of awareness on GAD among SUCs when classified as to educational attainment. The computed F-ratio=.691, df=2, P-value=.558 indicated that the observed significant level was not lower than 0.05 alpha, thus, the null hypothesis which states that there were no significant difference in the level of awareness on GAD among SUCs when grouped according to their educational attainment was accepted.

Table 8. Differences on the Awareness on GAD when Classified According to SUC Level, Civil Status, and Educational Attainment

| | Sum of Squares | Df | Mean Square | F-Ratio | p-Value | Remarks |
|---|---|---|---|---|---|---|
| SUC Level | | | | | | |
| Between Groups | 21.528 | 3 | 7.176 | 20.309 | 0 | Significant |
| Within Groups | 118.722 | 336 | 0.353 | | | |
| Total | 140.250 | 339 | | | | |
| Civil Status | | | | | | |
| Between Groups | 24.448 | 3 | 6.065 | 19.301 | 0 | Significant |
| Within Groups | 115.227 | 344 | 0.353 | | | |
| Total | 150.25 | 346 | | | | |
| Educational Attainment | | | | | | |
| Between Groups | 3.315 | 2 | 1.658 | 0.691 | 0.558 | Not Significant |
| Within Groups | 136.935 | 337 | 0.406 | | | |
| Total | 140.25 | 339 | | | | |

*p<0.05*

Table 9 presents the differences in the level practices on GAD among SUCs when grouped according to type of SUC, population, age, sex, religion, category, employment status, and length of service. Results showed that there were significant differences in the level of practices on GAD among SUCs when grouped according to type of SUC, population, age, sex, and religion. As to type of school, it had the computed t-ratio=-8.316, df=338, t-probability=0.000, The computed t-ratio=-8.160, df=338, t-probability=0.00 was observed from the population profile. As to age, it showed a computed t-ratio= 2.74, df=338, t-probability=.006. The sex classification had computed t-ratio=-3.975, df=338, t-probability=0.00. As to religion, the computation showed that the t-ratio=2.91, df=335, t-probability=0.004, indicated that the observed significant level from the profile above was lower than 0.05 alpha. This meant that there were significant difference in levels of practices on GAD among SUCs when grouped according to type of SUC, population, age, sex, and religion. On the other hand, there were no significant differences in the level of practices on GAD among SUCs when grouped according to category, employment status, and length of service. As to category, the t-test computation showed t- ratio=1.353, df=338, t-probability=0.177. As to employment status, the computed was t- ratio=1.704, df=388, t-probability=0.089. Lastly, as to length of service, computed t- ratio=-.226, df=388, t-probability=0.821, indicated that the significant level of category, employment status, and length of service were more than 0.05 alpha. This meant that there were no significant difference in levels of practices on GAD among SUCs classified as to category, employment status, and length of service.

Table 9. Difference on the Practices on GAD when Classified According to Type of School, Population, Age, Sex, Religion, Category, Employment Status, and Length of Service

| | N | Mean | Standard Deviation | T-Ratio | df | P-Value | Remarks |
|---|---|---|---|---|---|---|---|
| SUC Type | | | | | | | |
| College | 124 | 3.3732 | 0.901 | -8.316 | 338 | 0 | Significant |
| University | 216 | 4.0312 | 0.5576 | | | | |
| Population | | | | | | | |
| Small (less than 5,00) | 118 | 3.6635 | 0.921 | -8.16 | 338 | 0 | Significant |
| Big (5,000 and above) | 222 | 4.0185 | 0.5569 | | | | |
| Age | | | | | | | |
| Young (36 yrs. old and below) | 162 | 3.9101 | 0.6925 | 2.743 | 338 | 0.006 | Significant |
| Old (37 yrs. old and above) | 178 | 3.683 | 0.8208 | | | | |
| Sex | | | | | | | |
| Male | 112 | 3.5595 | 0.74303 | -3.975 | 338 | 0 | Significant |
| Female | 228 | 3.905 | 0.75845 | | | | |
| Religion | | | | | | | |
| Catholic | 277 | 3.8482 | 0.7632 | 2.915 | 335 | 0.004 | Significant |
| Non-Catholic | 60 | 3.5309 | 0.7706 | | | | |
| Category | | | | | | | |
| Faculty | 178 | 3.845 | 0.7771 | 1.353 | 338 | 0.177 | Not Significant |
| Staff | 162 | 3.7321 | 0.7595 | | | | |
| Employment Status | | | | | | | |
| Casual | 120 | 3.8872 | 0.5389 | 1.704 | 388 | 0.089 | Not Significant |
| Permanent | 220 | 3.7388 | 0.8669 | | | | |
| Length of Service | | | | | | | |
| Short (10 yrs. and below) | 149 | 3.7805 | 0.8022 | -0.226 | 338 | 0.821 | Not Significant |
| Long (11 yrs. and above) | 191 | 3.7995 | 0.7454 | | | | |

*p<0.05*

Table 10 presents the differences in the level of practices on GAD among SUCs when grouped according to SUC level, civil status, and educational attainment. Results showed that there were significant differences in level of awareness on GAD among SUCs when classified as to SUC level and civil status. As to SUC level, it had computed F-ratio=21.258, df=3, P- value=.000. As to civil status, the computed was F-ratio=4.396, df=2, P-value=.013 indicated that the observed significant level were lower than 0.05 alpha. However, there were no significant differences in level of practices on GAD among SUCs when classified as to educational attainment. The computed F-ratio=.610, df=3, P-value=.609 indicated that the observed significant level was not lower than 0.05 alpha.

Table 10. Differences on the Practices on GAD when Classified According to SUC Level, Civil Status, and Educational Attainment

| | Sum of Squares | Df | Mean Square | F-Ratio | p-Value | Remarks |
|---|---|---|---|---|---|---|
| SUC Level | | | | | | |
| Between Groups | 32.037 | 3 | 7.176 | 21.258 | .000 | Significant |
| Within Groups | 168.792 | 336 | .353 | | | |
| Total | 200.829 | 339 | | | | |
| Civil Status | | | | | | |
| Between Groups | 5.107 | 2 | 2.553 | 4.396 | .013 | Significant |
| Within Groups | 195.722 | 337 | .581 | | | |
| Total | 200.829 | 339 | | | | |
| Educational Attainment | | | | | | |
| Between Groups | 1.088 | 3 | .363 | .610 | .609 | Not Significant |
| Within Groups | 199.740 | 336 | .594 | | | |
| Total | 200.829 | 339 | | | | |

*p<0.05*

Table 11 presents the differences in the extent of implementation on GAD among SUCs when grouped according to type of SUC, population, age, sex, religion, category, employment status, and length of service. Results showed that there were significant differences in the extent of implementation on GAD among SUCs when grouped according to type of SUC, population, age, sex, religion, and employment status. As to SUC type, it computed t-ratio=-7.337, df=338, t- probability=0.000. A computed t-ratio=-7.337, df=338, t-probability=.000 was determined to the SUC population. As to age, it had computed t-ratio=2.44, df=338, t-probability=0.15. In terms of sex, it computed t-ratio=-3.315, df=338, t-probability=0.001 while t-ratio=3.013, df=335,t-probability=0.003 for the religion. Lastly, the computed t-ratio=2.374, df=338, t- probability=0.018 was determined by employment status, thus indicated that the type of SUC, population, age, sex, religion, and employment status observed significant level which was lower than 0.05 alpha. On the other hand, as to the category and length of service, the t-test computation showed that there were no significant differences in the extent of implementation between faculty and staff. The computed t-ratio=131, df=338, t-probability=.259 was determined from the category while for length of service had a computed of t-ratio=0.079, df=338, t-probability=0.937 indicated that the observed significant level was more than 0.05 alpha.

Table 11. Difference on the Implementation on GAD when Classified According to Type of School, Population, Age, Sex, Religion, Category, Employment Status, and Length of Service

| | N | Mean | Standard Deviation | T-Ratio | df | P-Value | Remarks |
|---|---|---|---|---|---|---|---|
| Type of School | | | | | | | |
| College | 124 | 1.9345 | 0.4546 | - 7.337 | 338 | 0 | Significant |
| University | 216 | 2.2783 | 0.3921 | | | | |
| Population | | | | | | | |
| Small (less than 5,00) | 118 | 1.9318 | 0.4598 | - 7.118 | 338 | 0 | Significant |
| Big (5,000 and above) | 222 | 2.2705 | 0.3935 | | | | |
| Age | | | | | | | |
| Young (36 yrs. old and below) | 162 | 2.2147 | 0.4173 | 2.446 | 338 | 0.015 | Significant |
| Old (37 yrs. old and above) | 178 | 2.0968 | 0.4668 | | | | |
| Sex | | | | | | | |
| Male | 112 | 2.04 | 0.388 | - 3.315 | 338 | 0.001 | Significant |
| Female | 226 | 2.2085 | 0.4643 | | | | |
| Religion | | | | | | | |
| Catholic | 277 | 2.1854 | 0.448 | 3.013 | 335 | 0.003 | Significant |
| Non-Catholic | 60 | 1.9953 | 0.4199 | | | | |
| Category | | | | | | | |
| Faculty | 178 | 2.1791 | 0.4274 | 1.131 | 338 | 0.259 | Not Significant |
| Staff | 162 | 2.1242 | 0.4676 | | | | |
| Employment Status | | | | | | | |
| Casual | 120 | 2.2304 | 0.3277 | 2.374 | 338 | 0.018 | Significant |
| Permanent | 220 | 2.1107 | 0.4961 | | | | |
| Length of Service | | | | | | | |
| Short (10 yrs. and below) | 149 | 2.1551 | 0.4571 | 0.079 | 338 | 0.937 | Not Significant |
| Long (11 yrs. and above) | 191 | 2.1513 | 0.4405 | | | | |

*p<0.05*

Table 12 presents the differences in the extent of implementation on GAD among SUCs when grouped according to SUC level, civil status, and educational attainment. Results showed that there were significant differences in extent of implementation on GAD among SUCs when classified as to SUC level and civil status. As to SUC level, it had computed F-ratio=16.090, df=3, P-value=.000. As to civil status, the computed was F-ratio=3.154, df=2, P-value=.044 indicated that the observed significant level were lower than 0.05 alpha. However, there were no significant differences in extent of implementation on GAD among SUCs when classified as to educational attainment. The computed F-ratio=.506, df=3, P-value=.678 indicated that the observed significant level was not lower than 0.05 alpha.

Table 12. Differences on the Extent of Implementation on GAD when Classified According to SUC Level, Civil Status, and Educational Attainment

| | Sum of Squares | Df | Mean Square | F-Ratio | p-Value | Remarks |
|---|---|---|---|---|---|---|
| SUC Level | | | | | | |
| Between Groups | 8.516 | 3 | 2.839 | 16.090 | .000 | Significant |
| Within Groups | 59.276 | 336 | .176 | | | |
| Total | 67.791 | 339 | | | | |
| Civil Status | | | | | | |
| Between Groups | 1.246 | 2 | .623 | 3.154 | .044 | Significant |
| Within Groups | 66.546 | 337 | .197 | | | |
| Total | 67.791 | 339 | | | | |
| Educational Attainment | | | | | | |
| Between Groups | .305 | 3 | .102 | .506 | .678 | Not Significant |
| Within Groups | 67.486 | 336 | .201 | | | |
| Total | 67.791 | 339 | | | | |

*p<0.05*

Table 13 showed the relationship between level of awareness, practices, and implementation of GAD among SUC's in Region VI. A significant relationship was found among level of awareness, level of practices and extent of implementation of the respondents on GAD. A positive correlation among these variables was observed which means that as the level of awareness of the SUC on GAD is high, correspondingly the level of practice is high and the extent of implementation is likewise high.

Table 13. Relationships between the Levels of Awareness, Practices, and Implementation on GAD among SUCs

| | | Awareness on GAD | Practices on GAD | Implementation on GAD |
|---|---|---|---|---|
| Awareness on GAD | Pearson Correlation | 1 | .945 | .870 |
| | Sig.(2-tailed) | | .000 | .000 |
| | N | 340 | 340 | 349 |
| Practices on GAD | Pearson Correlation | .915 | 1 | .844 |
| | Sig.(2-tailed) | | | |
| | N | .000 | 340 | .000 |
| | | 340 | | 340 |
| Implementation on GAD | Pearson Correlation | .870 | .844 | 1 |
| | Sig.(2-tailed) | | | |
| | N | .000 | .000 | 340 |
| | | 340 | 340 | |

## CONCLUSION

Gender roles have an impact on organizational settings, and it becomes responsive to which aspects of human rights have been incorporated into such core education and governance. There is a sense of responsibility, composition, and structure, allowing it to function as a tool for advancing Gender and Development awareness, practices, and implementation. These gender-mainstreamed initiatives had documented successful programs that thrived to perform critical gender-related characteristics. Policies in key areas prioritize gender development, empowering them to constantly improve service delivery by identifying gaps in work areas and developing plans to achieve goals. As a result, government employees learnt more about gender issues and were more willing to discuss and accept GAD programs at school. The respondents' awareness of GAD Key areas concentrated on informing their teachers and staff so that it became a style and practice that was extremely relevant to their personal profile. The extent of implementation resulted in informing the faculty and staff in order to better the Gender and Development goals. As a

result, the distinctions in the profile and link between awareness, practices, and implementation indicated that when the SUC's awareness of GAD was high, so were the practices and level of implementation. Such programs, activities, and initiatives raised the awareness of faculty and staff in state colleges and universities, with an emphasis on the formation of GAD plans and budgets; and funds were provided to trainings, seminars, and workshops that equipped GAD implementers. Finally, the college's administration, or the Gender and Development Focal Point System (GFPS), guaranteed that men and women had equal opportunities to participate in Gender and Development Programs.

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# CROP PRODUCTION MANAGEMENT PRACTICES: ITS IMPLICATIONS TO SOIL FERTILITY ON A RICE-BASED PRODUCTION SYSTEM IN GUIMARAS

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**ABSTRACT** Soil fertility is primarily a problem in rice-based production systems resulting in reduced yields. There are various factors affecting soil fertility problems and crop production practices are seen to have a major contribution. Hence, the study was conducted last December 2018 within the Bureau of Soil and Water Management (BSWM) clustered soil fertility assessment sites in the whole Province of Guimaras. The study utilized 500 respondents equally distributed to the five (5) municipalities. Based on the study, most of the respondents have ages ranging from 61 years old and above, males, married, elementary graduates, have 0-1 dependents, and owned their farm. The majority of them managed a farm with a total area of 0-1 hectare, with rice farms of 1 hectare, have their farms close to their household (0-1 km), with farming as their primary source of income. They have payments of PhP 5,001 to PhP 10,000. They generally stay in the community for more than 26 years, were members of the rice cluster association, and were Roman Catholics. Most of them managed their farms under rainfed conditions, inbred rice varieties for planting, used certified seeds and used hand tractors to prepare their farms. They plow their farms twice and practice less than 7 days between the last harrowing and crop establishment. Most of them observed a fallow period of 3-4 months do not have any bases for fertilizer application while others rely on rice crop managers. All respondents practiced chemical application for weeding and pests and diseases. The majority of the respondents said they convert rice straws into composts and others said they incorporate them during land preparation. Among the problems identified were pests and diseases, followed by capital and adverse climatic condition. Other problems included the high cost of farm inputs, and very few responded that they have problems with fertilizer sources. In terms of soil fertility, the majority of the respondents' farms were low in nitrogen (N), low in Phosphorus (95 or 95%), moderately high in Potassium (K) (84 o 84%), and high in soil pH (66 or 66%). In terms of general fertility, 94 of 94% of the farms were moderately low.

**Keywords**: soil fertility, soil fertility management, soil fertility status, soil fertility evaluation

## INTRODUCTION

The productivity of the rice-based cropping system is poor and continuously declines due to the worsening soil-related constraints (Chaudhury, Mandal, Sharma, Ghosh & Mandal, 2005). Continuous cropping and inappropriate replenishment of nutrients removed in harvested materials or lost through erosion, leaching, or gaseous emissions deplete soil fertility and cause soil organic matter levels to decline (Matson, P. A., Naylor, R. & Ortiz-Monasterio, 1998; Bationo, Kihara, Vanlauwe, Waswa, & Kimetu, 2007). Vegetated land has undergone human-induced soil degradation and loss of productivity that resulted from poor fertilizer and water management, soil erosion, and shortened fallow periods (Tilman, Cassman, Matson, Naylor & Polasky, 2002). These management practices include inappropriate use of fertilizers, irrigation, and improper cultural management practices (Takankhar & Salve, 2012; Ilagan, Tablizo, Barba, & Marquez, 2014). However, the use of cover crops, manure and compost applications, and reduction or elimination of synthetic fertilizers and pesticides affect nutrient availability to crops either directly by contributing to nutrient pools or indirectly by affecting the soil chemical and physical environment (Clark, Horwath, Shennan, & Scow, 1998; Kavitha & Sujatha, 2015). Hence, maintaining or enhancing soil fertility depends on understanding how the soil responds to agricultural land use (Gregorich, Carter, Angers, Monreal & Elert, 1994; Roming, Garlynd, Harris & McSweeney, 1995). Soil nutrient depletion is still one of the most serious global problems threatening food production (Hartemink, 2006). Hence, it is imperative to understand the interrelated factors to improve management practices necessary to sustain food production (Mowo, Janssen, Oenema, German, Mrema, & Shemdoe, 2006).

Crop productivity must be enhanced per unit of land area to meet future food and fiber demand increases soil nutrient removal and the importance of replenishing soil fertility through efficient nutrient management practices (Havlin & Heiniger, 2020). Any agricultural activity disturbs the ecological balance of a given environment. Methods such as plowing and hoeing enhance organic matter decomposition and losses of nutrients and soil particles through increased erosion, leaching, export of harvest products, and burning of crop residues. Cropping systems are no longer stable as losses of nutrients and organic matter during the cropping period exceed the gains under natural vegetation during the fallow period. Cropping systems are no longer stable as losses of nutrients and organic matter during the cropping period exceed the gains under natural vegetation during the fallow period. The nutrient balance of cropping systems has turned negative inducing deterioration of soil physical properties, thereby affecting soil fertility. Good crop production practices and an improved cropping system, therefore, the restitution of mineralizable organic matter together with an elevated level of soil nutrients, including, if possible, a positive nutrient balance allowing for sustained or increased yields.

The Province of Guimaras, renowned for being the "producer of the sweetest mangoes in the world" also produces rice for the Guimarasnons, as rice is their staple food. The province has a total rice production area in 2017 of around 19,864 hectares with a yield of 55,322 MT. In 2016 and 2015, it has production areas of 15,377 and 15,531 with yields of 42,649 MT and 40,154 MT, respectively (PSA, 2018). If we look at the figures, rice production areas and yield increased in the three years. However, if you look at the average rice production, it only ranges from 2.6 to 2.8 MT per hectare, which is much lower than the national averages of 3.91 MT (2015), 3.96 MT (2016), 4.09 MT (2017). Rice production could have been higher than the national average if crop production management practices were appropriate and soil fertility improved. With these, the need to determine the management practices rice production is necessary to assess soil fertility that might have affected rice productivity in the province.

The study aims to evaluate the crop production management practices and their implication to soil fertility on a rice-based production system in Guimaras. Specifically, it aims to determine the profile of the farmer-respondents, crop production practices, and soil fertility status.

## METHODOLOGY

A Descriptive Research design was used to gather information. The study evaluates soil fertility status by determining farmers' profiles, crop production management practices, and soil nutrient status. It utilized a structured questionnaire. The questionnaire had close-ended questions. The survey was conducted in all clustered rice farms in Guimaras Province. Cluster sampling technique was utilized in this study. One hundred respondents were chosen from among the clustered farms that were soil sampled during the soil survey conducted by the Bureau of Soils and Water Management (BSWM), Manila last 2017. The result of the STK analysis from the soil survey of the Bureau of Soils and Water Management, Manila was used to support the soil fertility data of the study. The STK determines the pH, Nitrogen, Phosphorus, and Potassium. It is a qualitative type of testing and through color comparison, the deficiency or sufficiency of the element can be assessed. A preliminary interview was facilitated to gather data from rice respondents, agricultural instructors/professors, and researchers concerning soil fertility and soil fertility management practices. To answer the stated specific objectives the frequency and means of the profile of respondents, crop production management practices, and soil fertility status were determined using Microsoft Excel.

## RESULTS AND DISCUSSION

### Demographic profile of the respondents

Respondents' demographic profiles were categorized according to age, sex, civil status, educational attainment, number of dependents, farm ownership, farm size, distance from household to farm, number of years in rice farming, the main source of income, an alternative source of income, monthly income, number of years in the community, group affiliation, and religion. There were a total of 100 respondents in this study.

Figure 1 shows the age of the respondents. Results show that most of the respondents (41%) in the Municipality of San Lorenzo were 61 years old and above. The same trend was also observed in the Municipality of Jordan with 44%. On the other hand, ages ranging from 51-60 years old were the most numbered in the Municipalities of Sibunag (40%), Nueva Valencia (48%), and Buenavista (39%). This shows that majority of the respondents were elderly.

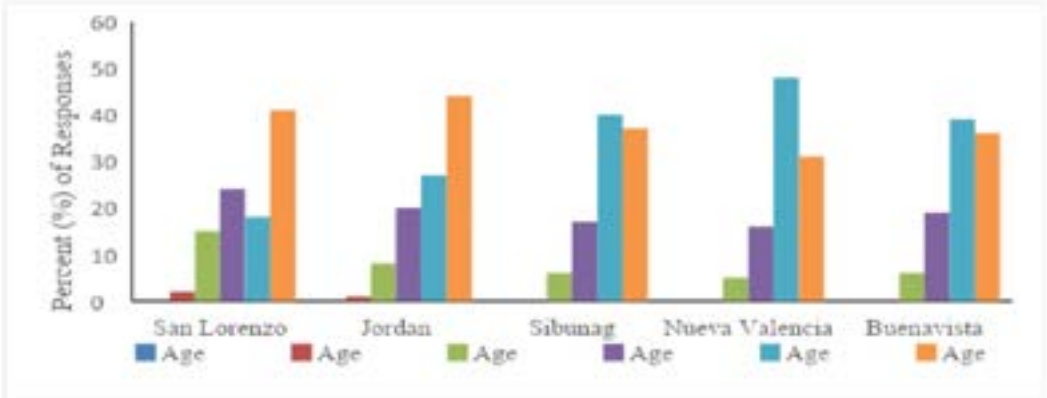


Figure 1. Age of respondents

The respondents were males, with 55% in San Lorenzo, 63% in Jordan, 61% in Sibunag, 57% in Nueva Valencia, and 76% in Buenavista (Figure 2). This indicates a male predominance among the respondents. Buenavista has the highest percentage of males involved in rice farming among the municipalities. It is expected since agriculture had traditionally been dominated by males.

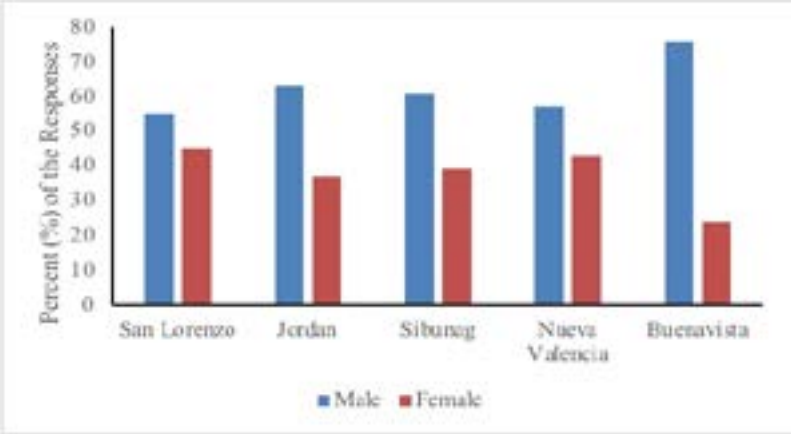


Figure 2. Gender of respondents

As to civil status, most of the respondents were married with 85% responses in San Lorenzo, 85% in Jordan, 86% in Sibunag, 78% in Nueva Valencia, and 85% in Buenavista.

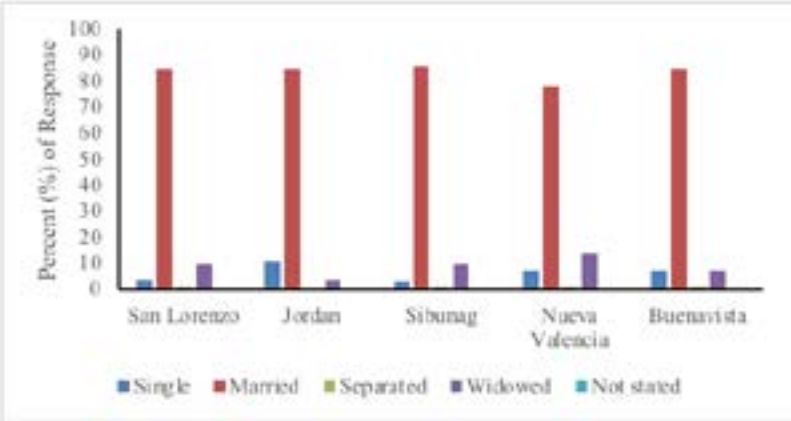


Figure 3. Civil Status

As to educational attainment (Figure 3), it was observed that most respondents in San Lorenzo, Jordan, and Buenavista were elementary graduates with 38%, 30%, and 28%, respectively. On the other hand, most respondents in Sibunag (33%) and Nueva Valencia (40%) were high graduates. This indicates that most of the respondents were not able to reach even vocational or college level. This is probably because the respondents, being sons and daughters of farmers themselves, already consider agriculture as an adequate source of income and subsistence. Therefore, education is not considered a priority as land and work are passed on from parents to offspring (Lu, 2007).

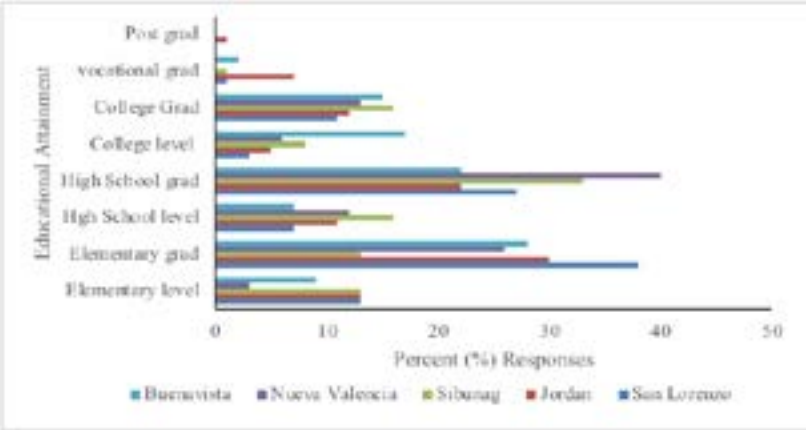


Figure 4. Educational Attainment

As to the number of dependents, most of the respondents in San Lorenzo have 0-1 dependents (39%), and 4-5 dependents in Jordan (32%). While in Sibunag, Nueva Valencia, and Buenavista, most dependents in the household were 4-5 heads with 52%, 37%, and 43%, respectively.

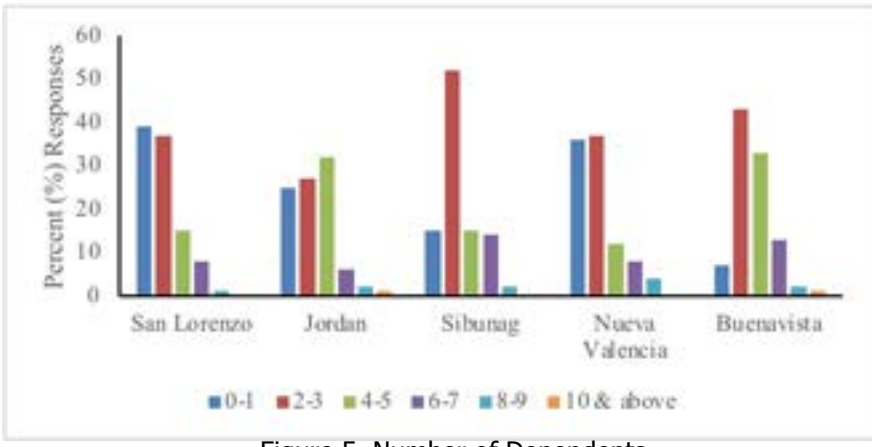


Figure 5. Number of Dependents

In terms of farm ownership, the majority of the respondents in all five (5) municipalities owned the farm (Figure 6). Very few of the respondents managed a farm by inheritance and under a memorandum of agreement. This shows that the majority of the respondents owned their farm as most households owned agricultural land acquired through the Comprehensive Agrarian Reform Program (CARP) or were Agrarian Reform Beneficiaries (ARB).

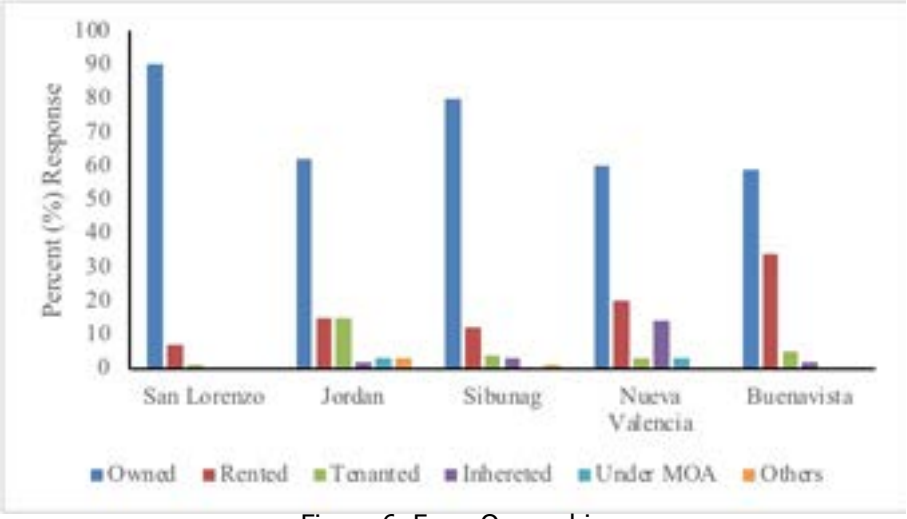


Figure 6. Farm Ownership

As to farm size, the majority of the respondents across five (5) municipalities managed a farm with a total area of 0-1 hectare (Figure 7). Likewise, the results also show that most respondents in all municipalities devoted 1 ha and above of their farms for rice production (Figure 8). This only shows that most farmers allocate most of their farms for rice production.

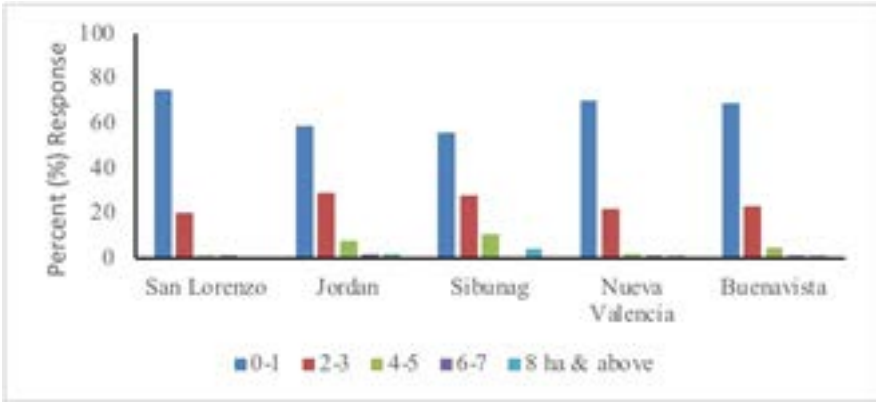


Figure 7. Size of the Whole Farm

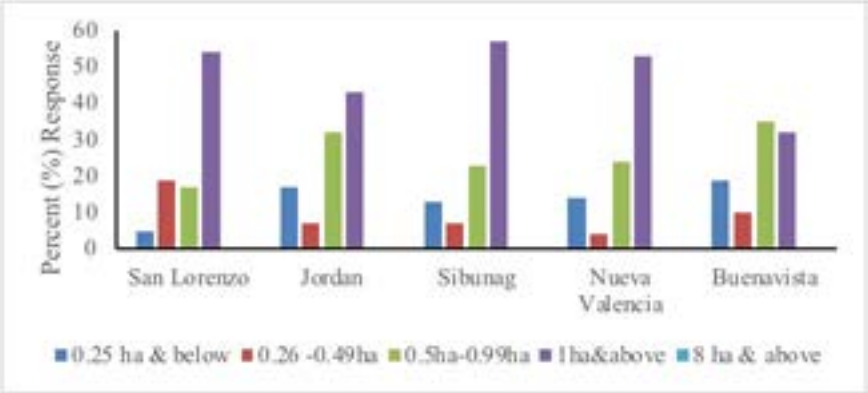


Figure 8. Farm size devoted to rice

As to distance from household to farm, almost all of the respondents in five (5) municipalities were living within or close to their farms (Figure 9). This indicates that most farmers have easy access and monitoring in their farms due to the proximity of their households to the farm.

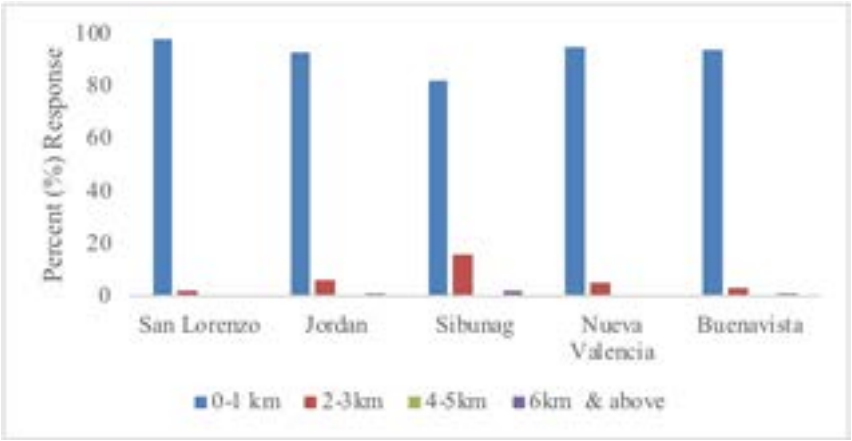


Figure 9. Distance of household from the farm

When the respondents were asked about the number of years they had been in the community, most of them across all municipalities responded that they had been in the community for 26 years and above (Figure 10). This only indicates that most of the respondents were natives of the Province of Guimaras.

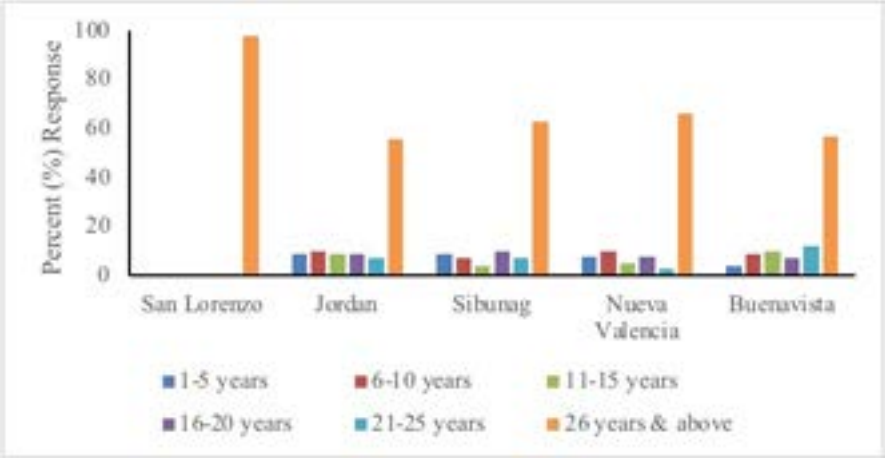


Figure 10. Number of years in the community

Figure 11 reflects that the majority of the respondents rely on farming as their main source of income. The result shows that almost all of the respondents solely rely on farming to generate income. Only very few have other income sources. This is probably because, despite the challenges in rice production, the respondents still viewed farming as a promising enterprise.

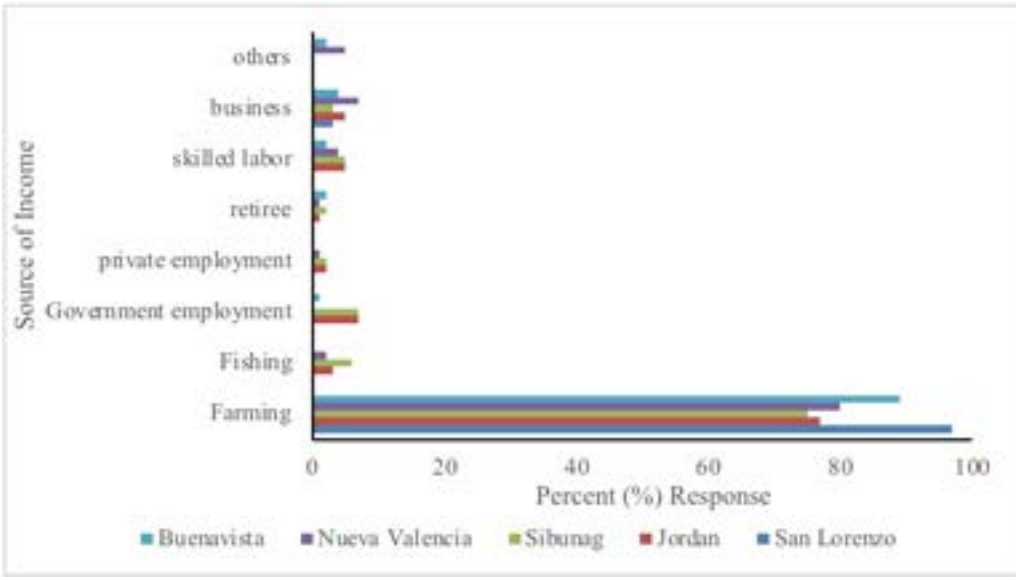


Figure 11. The main source of income

When asked about their monthly income per month, the majority of the respondents from the five (5) municipalities said that they were earning PhP5,000 and below from their main source of income (Figure 12). Most of the respondents earn an income of less than PhP10,000.00. This indicates that the respondents with generally 1-5 dependents were mostly poor as they could not suffice even the basic needs of the family considering the escalating prices of basic commodities. This is supported by the Philippine Statistics Authority (2016b) which set a monthly poverty threshold income of PhP 9,064.00. For a family of five, the family needed at least PhP 9,064.00 to meet basic food and non-food needs. That was only in 2015 when the price hikes for basic commodities is not so much. This means, these recent years, the respondents may hardly meet their basic needs.

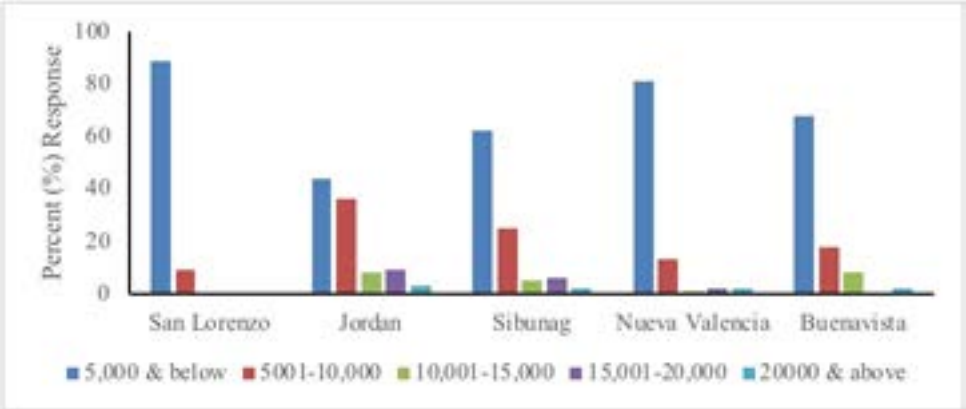


Figure 12. Monthly Income

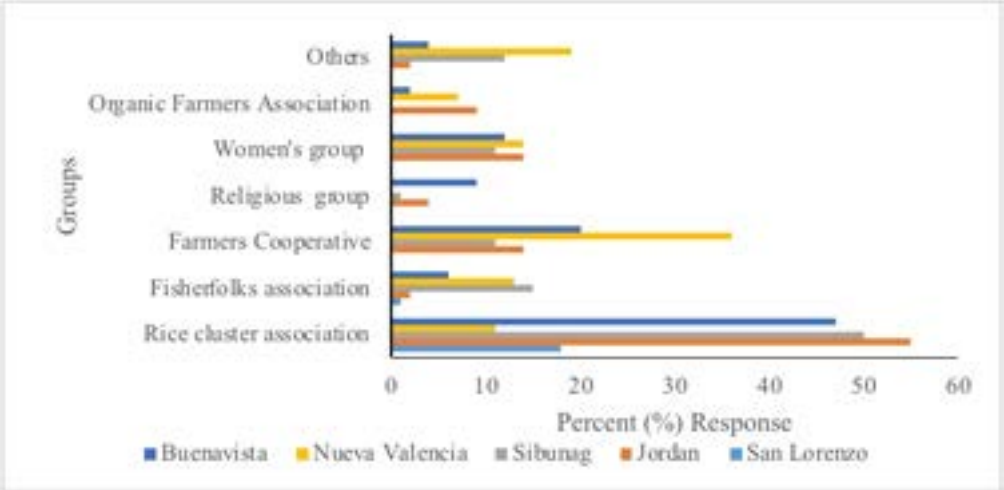


Figure 13. Group Affiliation

Relative to group affiliation, it was noted that most of the respondents from four (4) municipalities namely San Lorenzo, Jordan, Sibunag, and Buenavista were members of the rice cluster associations of their respective municipalities with 18%, 55%, 50%, and 47% responses respectively (Figure 13). Only in Nueva Valencia, the majority of the respondents were affiliated with a cooperative. The membership of most of the respondents to the cluster associations is indicative of the successful drive of the Department of Agriculture to form rice farmers into an association. All projects of the Department of Agriculture are channeled to the associations. Non-membership to any rice cluster association will deprive the farmers to avail of the benefits that the members of the association enjoy from the association. Therefore, the farmers are encouraged to join the association.

In terms of religion, the majority of the respondents in all municipalities were Roman Catholics (Figure 14). Very few percentages were distributed across various religious organizations. This is understandable as 75% of the people in the Province are Roman Catholics (NSO, 2000).

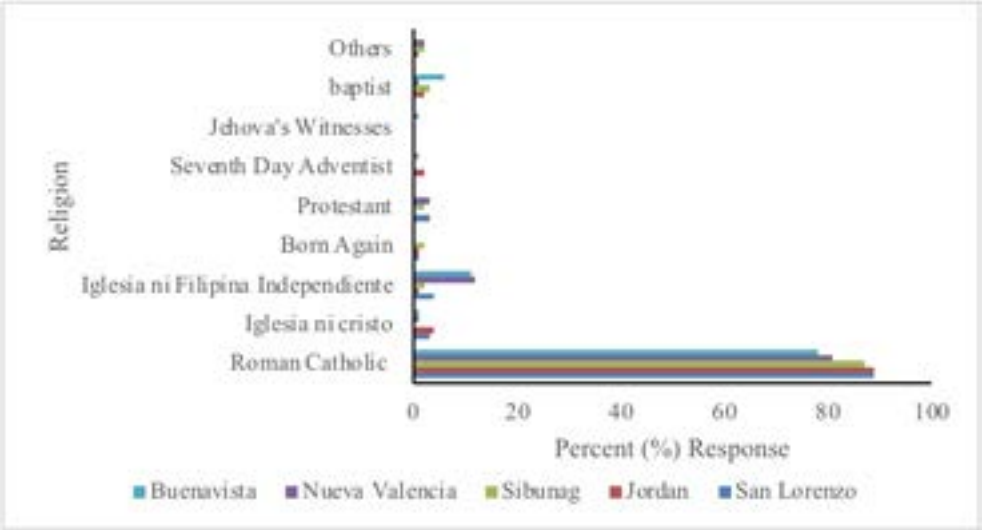

Figure 14. Religious Affiliation

**Rice Production Management Practices**

Rice production management practices were categorized according to rice ecosystem, rice varieties, land preparation, fertilizer management, crop establishment, water management, weed management, pest and disease management, harvesting, production, residue management, and cropping pattern.

**Rice ecosystem**

Figure 15 shows the distribution of respondents according to the rice ecosystem. It was noted that most of the respondents in all municipalities managed their farms under rainfed conditions. Among the five municipalities, Sibunag has the highest number of respondents with farms under rainfed conditions with 97%. Jordan had the lowest number of responses as to farming under rainfed conditions.

**Rice varieties**

As to rice varieties used, the majority of the respondents from all municipalities used inbred rice varieties for production (Figure 16). Only very few of the respondents used traditional varieties and hybrids. Despite the promotion of the Department of Agriculture to use hybrid rice, still respondents opted to use inbred rice varieties even if the farm is irrigated. This is probably because hybrid rice is much more expensive than inbred and can be planted only once. The variety also requires intensive management. According to Casiwan, et al. (2003) labor in seedbed preparation and crop establishment was found to be higher for hybrids than for inbreds. Further, early hybrid varieties were deemed inferior in terms of grain quality compared with best inbreds. The low adoption of hybrid over inbred is that high yield is not always the main consideration of farmers in choosing a variety to grow (Laborte et al., 2015).

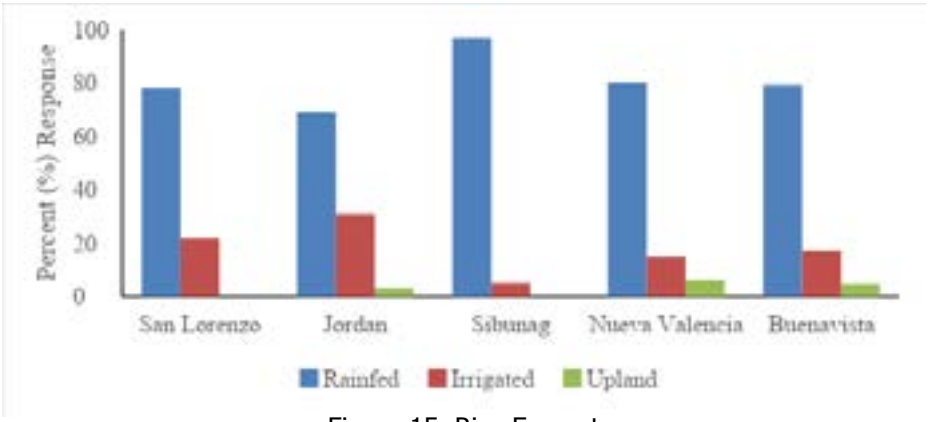


Figure 15. Rice Ecosystem

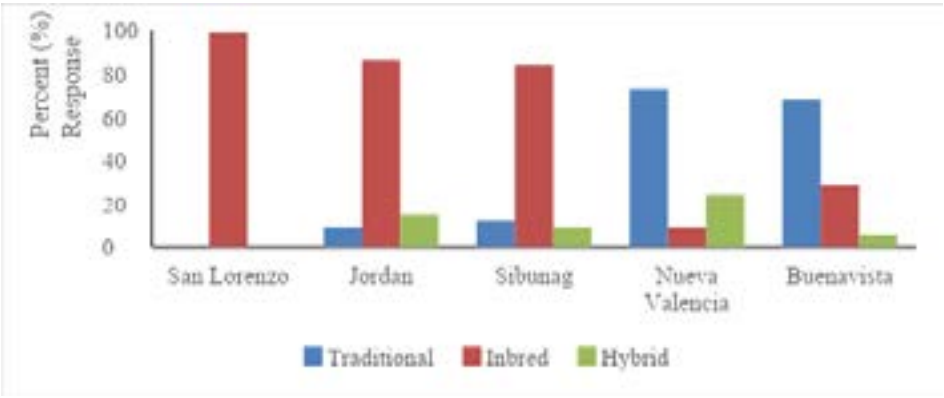


Figure 16. Rice varieties used

**Types of Seeds**

The majority of the respondents in three (3) municipalities used certified seeds that including San Lorenzo being the highest certified seed user with 99% responses, Jordan with 57% responses, and Sibunag with 74% responses. The other two (2) municipalities like Nueva Valencia and Buenavista mostly rely on good seeds with 67% and 87% responses, respectively (Figure 17). For the three municipalities, this is an excellent indication that the Department of Agriculture through the Municipal Agriculture Office as its counterpart was successful in the promotion of the utilization of certified seeds. This implies that respondents were well-informed of the benefits of using certified seeds. Further, the presence of the Rice Seed Growers in the Municipality of San Lorenzo contributed to encouraging the farmers on utilizing certified seeds.

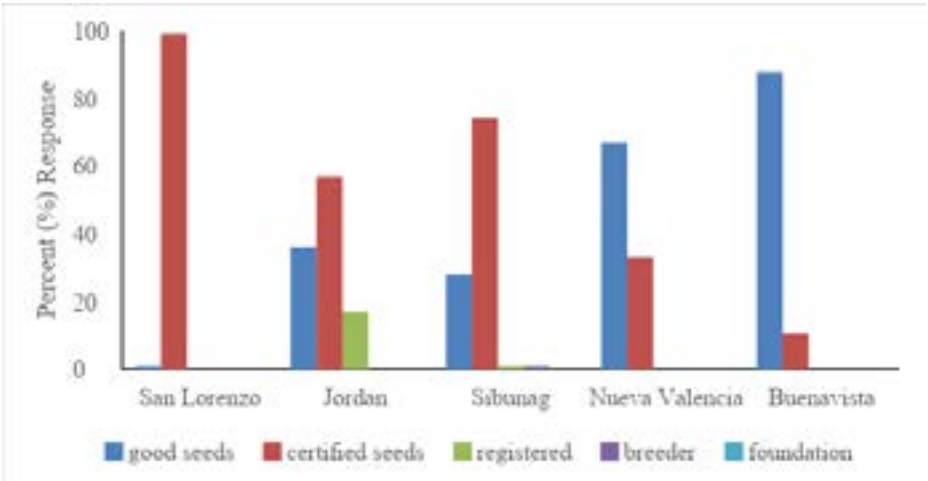


Figure 17. Types of seeds

**Land preparation**

Inland preparation, some farmers used both mechanical and manual methods. Due to the availability of farm machinery, it can be noted in the three municipalities that include San Lorenzo, Sibunag, and Nueva Valencia, where most of the respondents employ mechanical hand tractors in land preparation with 73%, 78%, and 95% responses, respectively. However, for Jordan and Buenavista, most of the respondents still rely on the manual method of land preparation with 90% and 73% responses, respectively. Only 10% in San Lorenzo and 1% in Sibunag use a 4-wheeled tractor (Figure 18). Respondents are now gradually relying on mechanical hand tractors than the animal-drawn plow. This is probably because tractors (4-wheel or hand tractors) can do plowing, harrowing, leveling, and even hauling of farm inputs and outputs. Likewise, farmers appear to consider machines as these work faster than manual and reduce production costs (Baustista, Kim, Kim& Panganiban, 2017).

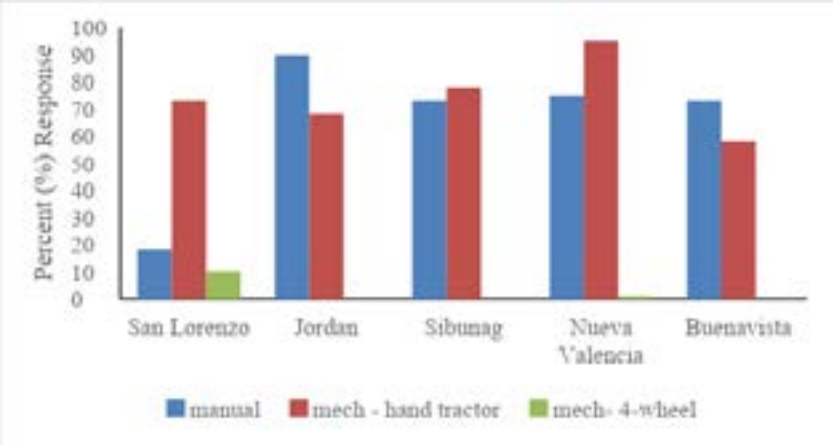


Figure 18. Method of land preparation

In terms of the frequency of plowing and harrowing, the majority of the respondents from four (4) municipalities such as Jordan, Sibunag, Nueva Valencia, and Buenavista practice plowing and harrowing their field twice with 60%, 65%, 90%, and 60% responses, respectively. While almost all respondents in San Lorenzo only plow and harrow their field once with 96% responses (Figure 19). The result indicates that the respondents were not following the recommended frequency of plowing and harrowing in rice production. Farmers generally employed the practice as they wanted to catch up with the rain, particularly those farming under rainfed conditions. Their practice is not in consonance with PhilRice (2016) recommending plowing and harrowing once a week for three times before final leveling to prevent weeds and seeds from germinating.

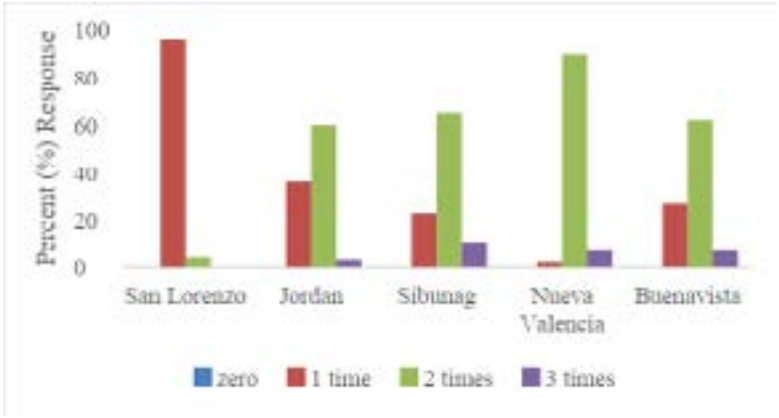


Figure 19. Frequency of plowing

As to following, the five municipalities practices different periods for the activity. It was noted that respondents from San Lorenzo and Buenavista practice a fallow period of 3-4 months with 100% and 81% responses, respectively. On the other hand, respondents from Sibunag and Jordan said they practice a 1-2 months fallow period with 54% and 69% responses, respectively. Further, most of the respondents from Nueva Valencia employ a fallow period of 6 months and above with 49% responses (Figure 20).


Figure 20. Fallow period

**Fertilizer application**

The respondents from five (5) municipalities have varying responses to their fertilizer application bases. All respondents from San Lorenzo (100% responses) and 95% of the respondents in Nueva Valencia said that they have no basis for fertilizer application. For Jordan and Sibunag, most of the respondents said that they base their fertilizer application on the result of the rice crop manager with 51% and 83% responses, respectively. However, in Buenavista, 96% of its respondents based their fertilizer application on soil analysis (Figure 21). The result implies that respondents from San Lorenzo and Nueva Valencia are applying fertilizers without any basis. Despite the free soil analysis offered by the Regional Soil Laboratory in Iloilo City, the respondents were not yet able to send their soil for analysis. This may be because the soils laboratory is far from their respective places. Others were able to utilize rice crop manager probably because of the assistance from their Municipal Agricultural Technologists/ Technicians, particularly in Jordan and Sibunag, Buenavista respondents probably have their soil analyzed because, according to the farmers, they used the recommended fertilizer application by the Bureau of Soils and Water Management.

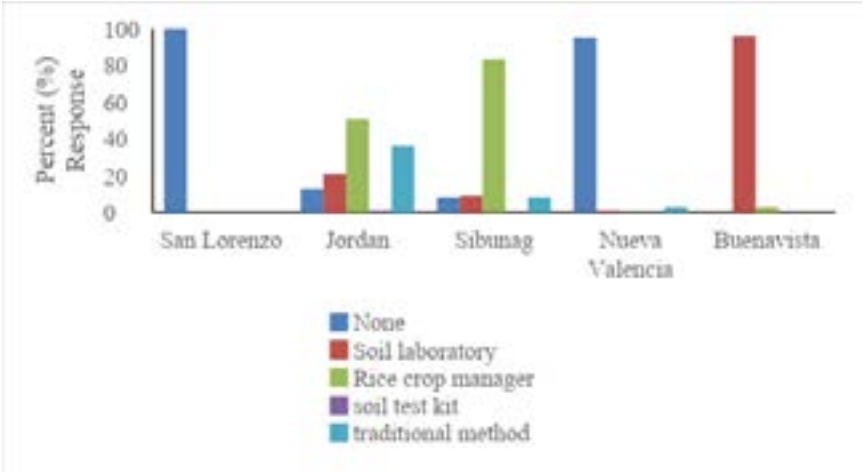


Figure 21. Bases for fertilizer application

Generally, the respondents from four (4) municipalities (Jordan, Sibunag, Nueva Valencia, and Buenavista) used combinations of organic and inorganic fertilizers in their farms. The majority of the fertilizers across all municipalities used inorganic fertilizers. No respondents in San Lorenzo use organic and commercial organic fertilizers. Jordan got the highest number of respondents combining organic fertilizers with inorganic fertilizers with 45% responses (Figure 22). This implies that the majority of the respondents solely supply their farms with chemical fertilizers as these fertilizers are easily acquired from the market. Likewise, they probably lack knowledge on the importance of organic fertilizers or composts in improving soil fertility

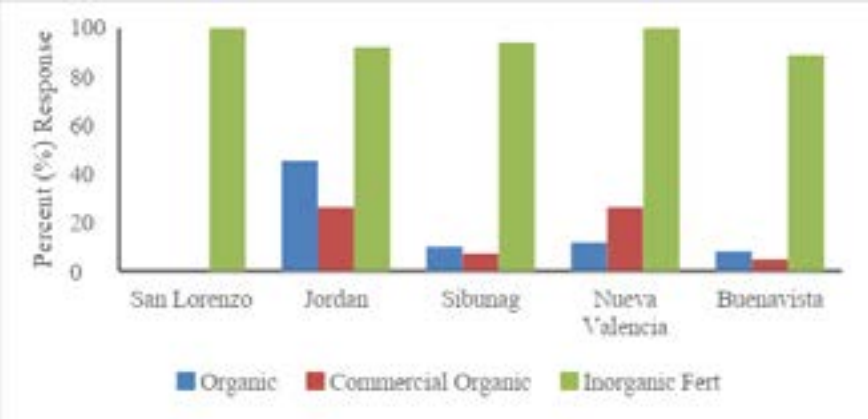


Figure 22. Types of fertilizers used

**Crop establishment**

When respondents were asked about their practice in terms of the interval between harrowing and crop establishment, most of the respondents from all municipalities replied that they establish crops within 7 days after harrowing (Figure 23). The interval indicated that farmers prepare the field for a very short period considering that they only prepare their land for only a maximum of 14 days. PhilRice (2016) recommends that land should be prepared for 21 days to prevent weeds and dropped seeds from germinating. This period also allows weeds and crop residues to decompose and the soil to be exposed under the sun to kill weed seeds and soil-borne pathogens (Fajardo et al. 2000).

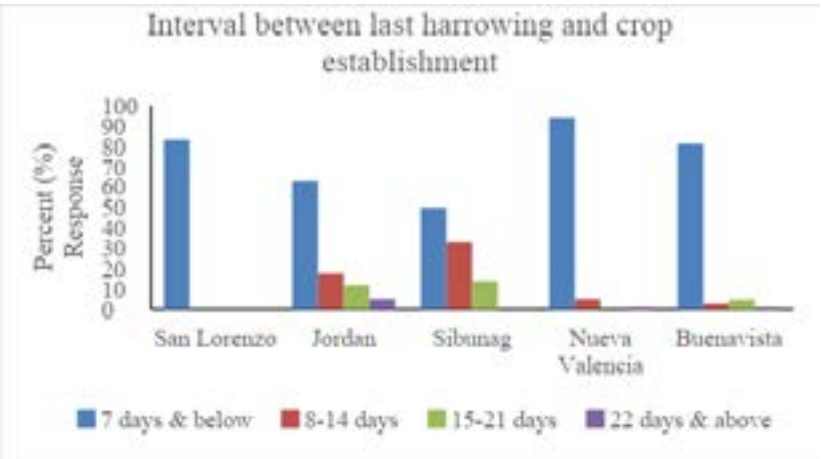


Figure 23. The interval between last harrowing and crop establishment

**Water management**

In four (4) municipalities, water management relies on rainfall for irrigation, including San Lorenzo, Sibunag, Nueva Valencia, and Buenavista with 79%, 27%, 78%, and 39% responses respectively (Figure 24). Only the majority of the respondents in Jordan rely on rivers and streams for irrigation. This is true as Guimaras generally had ricefields operated under rainfed conditions.

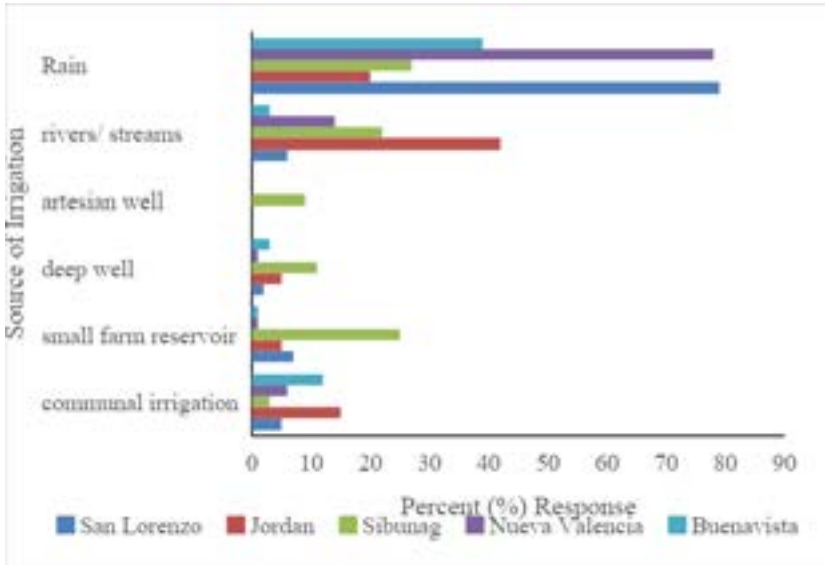


Figure 24. Source of Irrigation

**Weed management, and pest and disease management**

As to weed management and pests and diseases, the majority of the respondents from all municipalities rely on chemical inputs to control weeds (Figures 25 and 26). Only a few respondents employ manual weeding and combinations of manual and chemical control of weeds. This implies that all respondents solely rely on chemicals to control weeds, pests, and diseases as these materials are easily acquired from the market. The rampant use of chemicals could be due to their effectiveness in the speedy removal of weeds and controlling pests and diseases on the field.

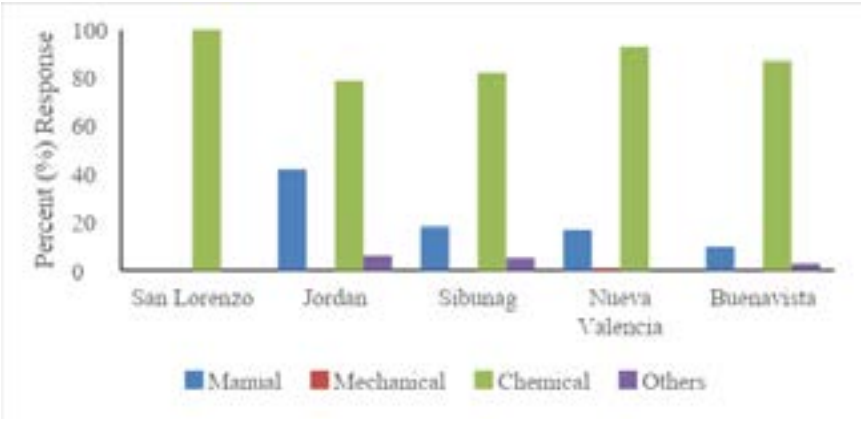


Figure 25. Weed management

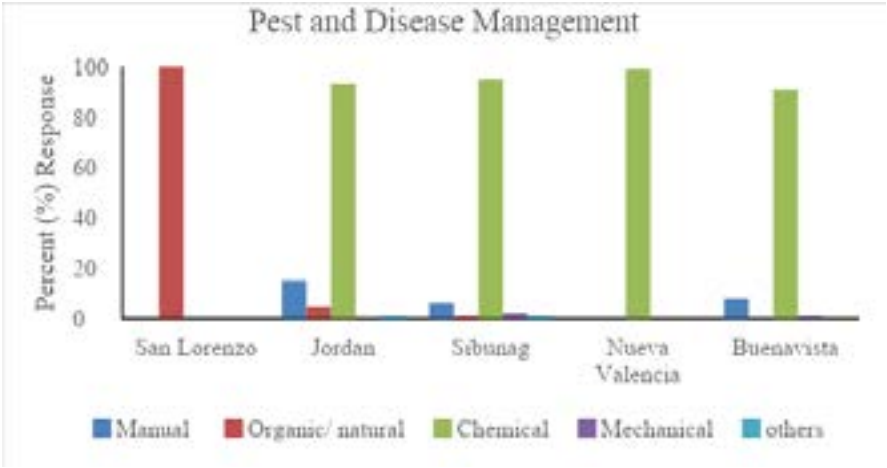


Figure 26. Pests and Disease management

**Residue management**

Most of the respondents in the Municipalities of San Lorenzo, Jordan, and Sibunag composted their residue while Nueva Valencia and in Buenavista, most of the respondents rely on soil incorporation and composting (Figure 27). The result indicates that almost all respondents turned their rice straw residues into composts. They probably learned the importance of rice straws for fertilizer. However, going back to fertilizer application, it was noted there that farmers were not applying organic fertilizers to include composts. The respondents probably apply their composted materials to other crops. In terms of rice stubbles, it is understandable that most rice stubbles are normally incorporated in the field.

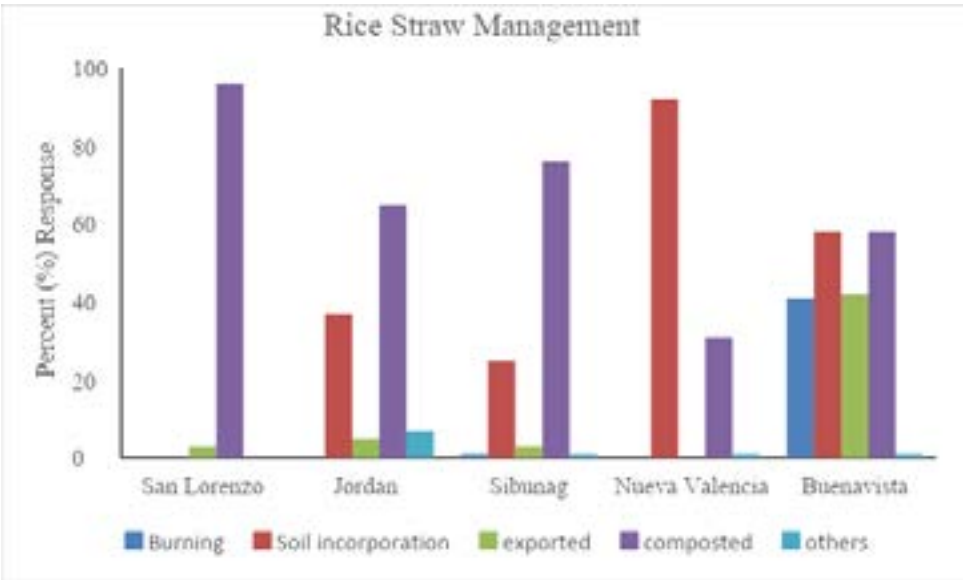


Figure 27. Rice straw management

**Soil Nutrient Status**

Based on the soil analysis provided by the Bureau of Agriculture and Water Management (BSWM), nitrogen status in the whole five municipalities is low, P is generally low, and K is moderately low (Figure 28). The result implies that the lowland rice soils are generally poor as to nutrient status. Poor soil nutrient conditions might be due to fertilizer application, and pest and disease management. Most farmers applied fertilizers without soil analysis, which means that fertilizers were not appropriately supplied. Likewise, the majority of the farmers applied synthetic fertilizers on the farm. According to Tripathi et al., 2020 excessive fertilizer and pesticide applications in crop production negatively affect the environment including soil degradation, enhanced greenhouse gas emissions, accumulation of pesticides, and decline in the availability and quality of water. Synthetic fertilizer application destroys soil biodiversity by suppressing the role of nitrogen-fixing bacteria and enhancing the role of everything that feeds on nitrogen. These feeders then amplify organic matter and humus decomposition, thereby reducing soil fertility. The indiscriminate use of synthetic fertilizers affects the soil properties and also causes water pollution through runoff in the rainy season. The inappropriate use of chemical fertilizers, especially in paddy fields may affect the growth-inhibiting microorganisms. The extensive applications of synthetic fertilizers from the last several years have caused soil degradation and pollution of soil and water with health implications in population. In agriculture, chemical fertilizers are used extensively, but they are costly and also have various adverse effects on soils, i.e., depletes water holding capacity, soil fertility, and disparity in soil nutrients. Insufficient uptake of these fertilizers by plants results in the leaching away from soil (Rai and Shukla, 2020).

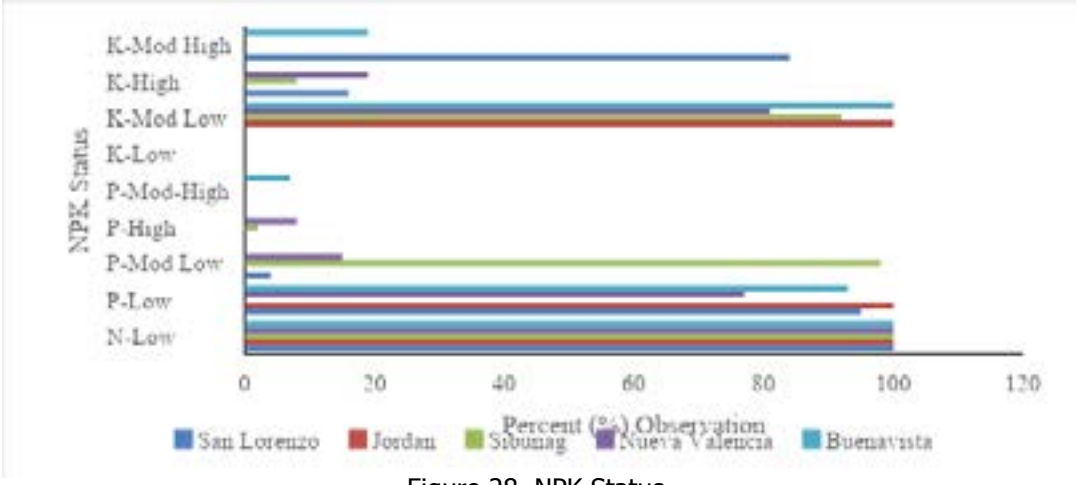


Figure 28. NPK Status

The soil pH is generally high in the five municipalities and the general soil fertility rating of the farms considered in the study was generally moderately low (Figure 29). This implies that the application of synthetic fertilizers and pesticides less likely affected soil pH value but have an overall implication to moderately low soil fertility rating. Synthetic fertilization caused soil acidification and salinization (Zhang et al., 2015). This is supported by Muktamar et al., 2016 who reported that nitrogen fertilizer application for a long time significantly decreased soil pH, exchangeable Ca, Mg, and K, and Cation Exchange Capacity (CEC). Fertilizers and pesticides tend to have long persistence in the soil, so they are bound to affect the soil microflora, thereby disturbing soil health. Fertilizer and pesticide applications strongly influence a range of soil functions and properties. These include rhizodeposition, nutrient content, bulk, rhizospheric soil, soil organic carbon, pH, moisture, soil enzymes, and many others. These factors indirectly affect the changes in the population dynamics of soil microflora along with the direct effects of fertilizers and pesticides (Prashar, and Shah 2016).

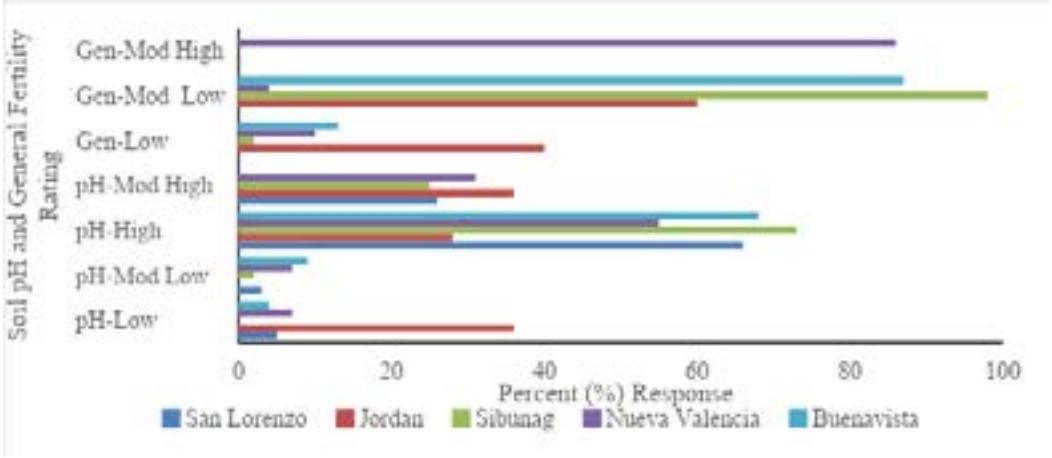


Figure 29. Soil pH and General Fertility Rating

## CONCLUSION

Majority of the respondents have ages ranging from 61 years old and above, males, married, elementary graduates, have 0-1 dependents, and owned their farm. The majority of the respondents managed a farm with a total area of 0-1 hectare, with rice farms of 1 hectare, have their farms close to their household (0-1 km), with farming as their main source of income. Majority of the respondents said they have incomes of PhP 5,001 to PhP 10,000. They generally stay in the community for more than 26 years, were members of the rice cluster association, and were Roman Catholics.

Most of them managed their farms under rainfed conditions, inbred rice varieties for planting, used certified seeds, and used handtractor to prepare their farms. They plow their farms twice and observed an last harrowing and crop establishment. Most of the respondents observed a fallow period of 3-4 months. Respondents do not have any bases for fertilizer application other rely on rice crop manager. All respondents responded that they practiced chemical weeding, and chemical application to control pests and diseases. Majority of the respondents said they convert rice straws into composts and other said they incorporate during land preparation. Among the problems identified were pests and diseases, followed by capital and adverse climatic condition. Other problems included high cost of farm inputs and very few responded that they have problems on fertilizer sources. In terms of soil fertility, majority of the respondents' farm were low in nitrogen (N), low in Phosphorus (95 or 95%), moderately high in Potassium (K) (84 o 84%), and high in soil pH (66 or 66%). In terms of general fertility, the 94 of 94% of the farms were moderately low.

In order to make study more comprehensive, researchers may further determine problems on the different crop management practices relating soil fertility depletion. The LGUs may develop organic agriculture policies based on the study results.

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