Anthelmintic Efficacy of Jackfruit (Artocarpus Heterophyllus) and Ampalaya (Momordica Charantia) Leaves Decoction Against Intestinal Roundworms of Goat

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ABSTRACT The study on "Anthelmintic Efficacy of Jackfruit(Artocarpus Heterophyllus) and Ampalaya (Momordica Charantia) leaves decoction Against Intestinal Roundworms of Goat" was conducted on February 07, 2016 to March 17, 2016 in the Municipality of San Lorenzo, Province of Guimaras with the following objectives: (1) To determine different parasites present and the percentage of roundworms in the fecal samples of goat.(2)To evaluate the anthelmintic efficacy of jackfruit and ampalaya leaves decoction against intestinal roundworms of goat. (3)To determine the differences on the levels of decoctions in the reduction of intestinal parasites. (4) To determine the mean effective dose of the different concentrations against intestinal roundworms in goats. Based on the analysis of variance there was no significant effect of the different treatments to the reduction of the eggs of the nematodes after the administration. This implies that different concentrations of jackfruit, ampalaya and combined decoctions have similar effect in the reduction of eggs per gram of the fecal samples of goats. The effective dose of jackfruit leaves decoction is 64.29 using probit analysis. Therefore lethality of the dose can be reached using 64.29 concentration jackfruit decoction. The effective dose of ampalaya leaves decoction is 20.27 using probit analysis. This implies that only 20.27 concentration of ampalaya leaves is needed to attain the lethality of the herbal dewormer preparation. The effective dose of using different combinations of jackfruit and ampalaya decoctions can be attained in 60:40 ratio of concentration. This implies that the lethality of the dose can be attained using 60:40 concentration of jackfruit and ampalaya combinations of decoctions. Analysis of Variance showed significant effect of the different concentrations of jackfruit and ampalaya to the larval development of intestinal nematodes of goats. The concentration of both jackfruit and ampalaya decoctions will increase, number of larval that will be killed in the culture will increase also.

Keywords: Anthelmintic, Jackfruit, Ampalaya Decoction, Intestinal Roundworms, and Goat.

INTRODUCTION

Background of the Study

Goats are considered as a rural asset. The contributions of goats to rural farming communities are well recognized. Goats have the potential for increased production in a relatively short period of time. They require little capital investments, can utilize local feed resources, and provide opportunities for women and children to participate in building a sustainable livestock enterprise while ensuring food security for the family.

Comparative baseline data on goats' technical performance indicate that major problems in goat production are high mortality rates, due to parasitism and diseases, slow growth of kids resulting to goats getting smaller, which result in marketing problems. (Nayga et.al.,2010). Chemical dewormers are currently being used to decrease these effects but there have been increasing reports of anthelmintic resistance to these chemical dewormers in Southeast Asia particularly in the Philippines, where studies in different regions e.g. Luzon, Visayas, and Mindanao confirmed that resistance of different roundworms to different chemical dewormers among sheep and goats farms with possible widespread distribution (Venturina, 2003).

Jackfruit (Artocarpus heterophyllus L.) leaves are being used as alternative anthelminthic in ruminants. However, the anthelmintic efficacy has not been extensively evaluated against nematodes in goats. (Hurtada, Divina and Ducusin, UPLB, 2012). Bitter Melon is a Tropical vegetable, is a common food in Indian cuisine and has been used extensively in folk medicine as a remedy for diabetes. The fruit juice and/or a leaf tea is employed for the treatments of diabetes, malaria, colic, sores and wounds, infections, worms, and parasites, as an emmenagogue, and for measles, hepatitis, and fevers (Kumar et.al., 2010). Thus, this study was conducted to develop an alternative of chemical dewormers using jackfruit and ampalaya decoctions. This is helpful in controlling intestinal roundworms of goat without developing anthelmintic resistance and at a lesser expense.

Objectives of the Study

1. To determine different parasites present and the percentage of roundworms in the fecal samples of the goat.
2. To evaluate the anthelmintic efficacy of jackfruit and ampalaya leaves decoction against intestinal roundworms of the goat.
3. To determine the differences in the levels of decoctions in the reduction of intestinal parasites.
4. To determine the mean effective dose of the different concentrations against intestinal roundworms in goats.

MATERIALS AND METHODS

STUDY 1: "IN VIVO ADMINISTRATION OF JACKFRUIT AND AMPALAYA LEAVES DECOCTION AGAINST INTESTINAL ROUNDWORMS OF GOAT."

Materials

The following are the materials were used in the conduct of the study. The following are as follows: ice candy wrapper, surgical gloves, ice pop stick, tissue paper, rubbing alcohol, ice, ice box, ink marker, bond paper, and notebook were used during the collection of fecal samples.

Plastic bags, beakers or plastic containers, tea strainer(preferably nylon) or double layer cheesecloth, measuring cylinder or other container graded by volume, fork, tongue blades or other type of stirring rod, test tube, test tube rack or a stand, microscope, slides, coverslips, balance or teaspoon and floatation fluid were used in conducting fecal examination or fecalysis.

Fresh leaves of jackfruit and ampalaya, gas stove, knife, disposable syringe, beaker, empty plastic bottles and cooking utensils for decoction.

Methods

Source of Experimental Samples and Procedure

Fresh and mature leaves from jackfruit and ampalaya were obtained from Brgy. M. Chavez, San Lorenzo, Guimaras. The leaves were washed with tap water. One (1) kilogram leaves (Jackfruit or Ampalaya) were chopped finely and allowed to boil in one (1) liter of water for 15-20 minutes from the time the water started to boil and until the original volume was reduced to half. The decoction allowed to cool, then strained using cheesecloth and was placed in a container. Separate containers were provided for different mixtures of jackfruit and ampalaya decoctions.

Dosage and Administration of Decoction

Before the start of the study, experimental goats were dewormed with a commercial anthelmintic (levamisole HCL) and were allowed to graze in the pasture area for one (1) month to allow reinfestation of intestinal parasites.

Fecal samples were collected from the experimental goats (disregarding the sex, age, and breed) for fecalysis after one (1) month from the date of administration of levamisole. This is to identify the roundworms present and the estimated parasitic population as to the number of egg that will be seen under the microscope per animal.

After taking those data the decoction was administered orally with the following concentrations: T1- 100% jackfruit decoction; T2- 80% jackfruit decoction + 20% water; T3- 60% jackfruit decoction + 40% water; T4- 40% jackfruit decoction + 60% water; T5- 20% jackfruit decoction + 80% water; T6- 100% ampalaya decoction; T7- 80% ampalaya decoction + 20% water; T8- 60% ampalaya decoction + 40% waterT9- 40% ampalaya decoction + 60% water; T10- 20% ampalaya decoction + 80% water; T11- 80% jackfruit decoction + 20% ampalaya decoction; T12- 60% jackfruit decoction + 40% ampalaya decoction; T13- 40% jackfruit decoction + 60% ampalaya decoction; and T14- 20% jackfruit decoction + 80% ampalaya decoction.

Fecal samples were collected for fecalysis after one (1) week of administration to take data for record purposes.

Collection of Fecal Samples

Fecal samples for parasitological examination were collected from the rectum of goats from Brgy. Constancia, Cabano, Sebario, and Igcawayan of San Lorenzo, Guimaras. Some of the fresh fecal samples were collected from the pasture.

After the collection, samples were dispatched immediately to the Regional Animal Disease Diagnostic Laboratory of DA RFU 6 in Parola Iloilo City. Each sample was placed inside an ice candy wrapper labeled with animal identification. Samples were placed inside an icebox to cool them and to avoid the eggs to develop and hatch.

Fecal Testing

Fecal samples were submitted to the Regional Animal Disease Diagnostic Laboratory (RADDL) of the Department of Agriculture Regional Field Unit 6 (DA-RFU 6) for fecalysis. Fecal sample obtained before and after the administration was tested using the floatation method and was conducted by the laboratory clinician of the said laboratory. Different types of nematodes were identified through the presence of parasitic eggs in the samples. Eggs were counted per gram of the fecal matter.

Experimental Design and Treatments

A Completely Randomized Design (CRD) will be used in the study. There will be fourteen (14) treatments to be replicated three (3) times with a total of forty-two (42) variates. One goat will represent each variate. A total of forty-two (42) goats of varying sex, ages and breed were utilized in the study as experimental animals.

The following treatments are as follows: T1- 100% jackfruit decoction; T2- 80% jackfruit decoction + 20% water; T3- 60% jackfruit decoction + 40% water; T4- 40% jackfruit decoction + 60% water; T5- 20% jackfruit decoction + 80% water; T6- 100% ampalaya decoction; T7- 80% ampalaya decoction + 20% water; T8- 60% ampalaya decoction + 40% water

T9- 40% ampalaya decoction + 60% water; T10- 20% ampalaya decoction + 80% water; T11- 80% jackfruit decoction + 20% ampalaya decoction; T12- 60% jackfruit decoction + 40% ampalaya decoction; T13- 40% jackfruit decoction + 60% ampalaya decoction; and T14- 20% jackfruit decoction + 80% ampalaya decoction.

Table 3.Experimental Layout.

T2	T14	T6
T12	T4	T12
T7	T13	T8
T14	T9	T1
T5	T2	T11
T13	T7	T6
T1	T14	T12
T10	T11	T13
T3	T3	T2
T8	T9	T5
T11	T9	T8
T10	T5	T7
T1	T10	T4
T6	T3	T4

Statistical Analysis

The results were analyzed using Analysis of Variance (ANOVA). Data were subjected to 5% and 1% level of significance to determine the difference between means using Duncan's Multiple Range Test (DMRT). Identification of effective dose was analyzed using probit analysis.

STUDY 2: "IN VITRO ADMINISTRATION OF JACKFRUIT AND AMPALAYA LEAVES DECOCTION AGAINST INTESTINAL ROUNDWORMS OF GOAT."

Materials

The following are the materials were used in the conduct of the study. The following are as follows: ice candy wrapper, surgical gloves, ice pop stick, tissue paper, rubbing alcohol, ice, ice box, ink marker, bond paper, and notebook were used during the collection of fecal sample

Plastic bags, beakers or plastic containers, tea strainer(preferably nylon) or double layer cheesecloth, measuring

cylinder or other container graded by volume, fork, tongue blades or other type of stirring rod, test tube, test tube rack or a stand, microscope, slides, coverslips, balance or teaspoon and floatation fluid were used in conducting fecal examination or fecalysis. Fresh leaves of jackfruit and ampalaya, gas stove, knife, disposable syringe, beaker, empty plastic bottles and cooking utensils for decoction.

Methods

Source of Experimental Samples and Procedures

Fresh and mature leaves from jackfruit and ampalaya were obtained from Brgy. M. Chavez, San Lorenzo, Guimaras. The leaves were washed with tap water. One (1) kilogram leaves (Jackfruit or Ampalaya) were chopped finely and allowed to boil in one (1) liter of water for 15-20 minutes from the time the water started to boil and until the original volume was reduced to half. The decoction allowed to cool, then strained using cheesecloth and was placed in a container. Separate containers were provided for different mixtures of jackfruit and ampalaya decoctions.

Collection of eggs of intestinal roundworms of goats

Eggs were collected from fecal samples after the fecalysis conducted in study 1. Each of the treatment has ten (10) eggs for larval culture. There were four hundred twenty (420) eggs utilized in the study.

Larval culture

Eggs collected from the fecal samples were utilized for larval culture. The culture was conducted in the Regional Animal Disease Diagnostic Laboratory (RADDL) of the Department of Agriculture Regional Field Unit 6 (DA-RFU 6) located at Parola, Iloilo City.

The collected eggs of roundworms were incubated for seven (7) days inside the test tube. The types and the number of larval worms present after incubation period was counted, from each of the treatment and data was kept for record purposes.

Treatments and Experimental Layout

There were ten (10) ml of the following treatments will be added to a fecal slurry during the larval culture: T1- 100% jackfruit decoction; T2- 80% jackfruit decoction + 20% water; T3- 60% jackfruit decoction + 40% water; T4- 40% jackfruit decoction + 60% water; T5- 20% jackfruit decoction + 80% water; T6- 100% ampalaya decoction; T7- 80% ampalaya decoction + 20% water; T8- 60% ampalaya decoction + 40% water

T9- 40% ampalaya decoction + 60% water; T10- 20% ampalaya decoction + 80% water; T11- 80% jackfruit decoction + 20% ampalaya decoction; T12- 60% jackfruit decoction + 40% ampalaya decoction; T13- 40% jackfruit decoction + 60% ampalaya decoction; and T14- 20% jackfruit decoction + 80% ampalaya decoction.

Table 4.Layout/Arrangement of Test tubes.

T2	T14	T6
T12	T4	T12
T7	T13	T8
T14	T9	T1
T5	T2	T11
T13	T7	T6
T1	T14	T12
T10	T11	T13
T3	T3	T2
T8	T9	T5
T11	T9	T8
T10	T5	T7
T1	T10	T4
T6	T3	T4

Statistical Analysis

The results were analyzed using Analysis of Variance (ANOVA). Data were subjected to 5% and 1% level of significance to determine the difference between means using Duncan's Multiple Range Test (DMRT).

RESULTS AND DISCUSSION

STUDY 1: "IN VIVO ADMINISTRATION OF JACKFRUIT AND AMPALAYA LEAVES DECOCTION AGAINST INTESTINAL ROUNDWORMS OF GOAT."

Table 5 shows the reduction of eggs per gram (epg) of the fecal samples after the administration of the decoctions. Among the means Treatment 4(40% jackfruit decoction + 60% water) got the highest mean of 1478.67 epg, followed by Treatment 1 (100% jackfruit decoction) with 1263.33 epg, Treatment 14 (20% jackfruit decoction + 80% ampalaya decoction) 670 epg, and Treatment 10 (20% ampalaya decoction + 80% water) with 385 epg. Next are Treatment 13 (40% jackfruit decoction + 60% ampalaya decoction) with a mean of 378 epg, Treatment 3 (60% jackfruit decoction + 40% water) with 163 epg, Treatment 12 (60% jackfruit decoction + 40% ampalaya decoction) with 151.67 epg, Treatment 7 (80% ampalaya decoction + 20% water) with 135 epg, Treatment 6 (100% ampalaya decoction) with 118.33 epg, Treatment 9 (40% ampalaya decoction + 60% water) with 111.67, Treatment 2 (80% jackfruit decoction + 20% water) with 78.33 epg, Treatment 5 (20% jackfruit decoction + 80% water) and Treatment 11 (80% jackfruit decoction + 20% ampalaya decoction) both have 73.33 epg and the lowest mean is Treatment 8(60% ampalaya decoction + 40% water T9- 40% ampalaya decoction + 60% water) with a mean of 45.00 epg respectively.

Based on the analysis of variance there was no significant effect of the different treatments on the reduction of the eggs of the nematodes after the administration.

This implies that different concentrations of jackfruit, ampalaya and combined decoctions have a similar effect in the reduction of eggs per gram of the fecal samples of goats.

Table 5.Egg reduction (epg) on fecal samples after deworming.

Treatments	r1	r2	r3	Total	Mean
T1	50	2200	1540	3790	1263.3
T2	150	50	35	235	78.33
T3	150	200	140	490	163.33
T4	50	2580	1806	4436	1478.7
T5	50	100	70	220	73.33
T6	100	150	105	355	118.33
T7	150	150	105	405	135
T8	50	50	35	135	45
T9	250	50	35	335	11.67
T10	50	650	455	1155	385
T11	50	100	70	220	73.33
T12	200	150	105	455	151.67
T13	200	550	385	1135	378.33
T14	1500	300	210	2010	670
Grand total					15376
Grand mean					366.1

Table 6 shows the effective dose of jackfruit leaves decoction is 64.29 using probit analysis. Therefore lethality of the dose can be reached using 64.29 concentration jackfruit decoction. This implies that using pure jackfruit leaves decoction can be useful in the reduction of the parasitic nematode infestation of goats as indicated by the number of eggs per gram of the fecal samples after the administration of decoctions. The effective dose is 20.27 using probit analysis. This implies that only 20.27 concentration of ampalaya leaves are needed to attain the lethality of the herbal dewormer preparation.

The probit analysis of the reduction of parasitic eggs of roundworms in the fecal samples using combinations of jackfruit and ampalaya leaves decoctions. Based on the analysis, the effective dose can be attained in 60:40 ratio of concentration. This implies that the lethality of the dose can be attained using 60:40 concentration of jackfruit and ampalaya combinations of decoctions.

Table 6. Probit Analysis on the reduction of eggs in the fecal samples using jackfruit, ampalaya, and combination of jackfruit and ampalaya leaves decoction.

Treatment	Lethal Dose 99 (LD99)
Jackfruit leaves	64.29
Ampalaya leaves	72.03
Jackfruit and Amplaya	60:40

STUDY 2: "IN VITRO ADMINISTRATION OF JACKFRUIT AND AMPALAYA LEAVES DECOCTION AGAINST INTESTINAL ROUNDWORMS OF GOAT."

Table 7 reveals the number of larvae developed in a slurry during the culture. For the different concentrations of jackfruit decoctions least larval counts was observed in Treatment 1 (100%) with a mean of 0.33, followed by treatment 2 (80%) with a mean of 1.00, next is Treatment 3 (60%) with 2.33 larval count, followed by Treatment 4 (40%) with a mean of 2.67 and Treatment 5 (20%) with a mean of 3.00 larval counts respectively.

For different concentrations of ampalaya least larval count was also observed in Treatment 6 (100%) with a mean of 0.33, next is treatment Treatment 7 (80%) with 1.00 larval count, followed by Treatment 8 (60%) and Treatment 9 (40%) with 1.67, and Treatment 10 (20%) with 2.67 larval counts.

For the combination of jackfruit and ampalaya concentrations, least larval count was observed in Treatment 12 (60% J + 40% A) with a mean of 1.67, followed by Treatment 14 (20% J + 80% A) with a mean of 2.00 larval counts, and next were treatments 11 (80% J + 20% A) and 13 (40% J + 60 A) with a mean of 3.00 respectively.

Analysis of Variance showed a significant effect of the different concentrations of jackfruit and ampalaya to the larval development of intestinal nematodes of goats.

DMRT shows that the pure concentrations of jackfruit and ampalaya have an effect on the larval development compared to combinations of the two stated decoctions. The R square value is 0.303 0r 30.3%. The larval development was affected by the different level of concentration at 30.3%.

The result implies that as the concentration of both jackfruit and ampalaya decoctions will increase, the number of larval that will be killed in the culture will increase also.

CONCLUSION

1. Twenty-one percent (21%) of the fecal samples of goats have eggs of Fasciola species (trematodes), seven percent (7%) were found to have eggs of monieza species (cestodes), but one hundred percent (100%) of the fecal samples with eggs of intestinal nematodes such as trichuris and strongyles species.
2. There was no significant effect of the different treatments on the reduction of the eggs of the nematodes after the administration of decoctions to goats.
3. The effective dose of jackfruit leaves decoction is 64.29 using probit analysis. Therefore lethality of the dose can be reached using 64.29 concentration jackfruit decoction.
4. The effective dose of ampalaya leaves decoction is 20.27 using probit analysis. This implies that only 20.27 concentration of ampalaya leaves are needed to attain the lethality of the herbal dewormer preparation.
5. The effective dose of using different combinations of jackfruit and ampalaya decoctions can be attained in 60:40 ratio of concentration. This implies that the lethality of the dose can be attained using 60:40 concentration of jackfruit and ampalaya combinations of decoctions.
6. The pure concentrations of jackfruit and ampalaya have an effect on the larval development compared to combinations of the two stated decoctions. As the concentration of both jackfruit and ampalaya decoctions will increase, the number of larval that will be killed in the culture will increase also.
7. Jackfruit and ampalaya decoctions can be separately used with the same results, but it will depend on the availability of the leaves that will be used for decoctions.

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