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COMPARATIVE EFFICACY OF BARBADOS LILAC, PINEAPPLE AND BENAZOL® AGAINST GASTROINTESTINAL NEMATODES IN CATTLE

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ABSTRACT

The effect of barbados lilac (*Melia azedarach*, Linn., @100 mg/kg bwt.), pineapple (*Ananas comosus*, Merr., @100mg/kg bwt.) and Benazol® (albendazole, @7.5 mg/kg bwt.) against natural gastrointestinal nematodes were studied in cattle. Their effect of TEC, Hb, PCV, TLC, ALT, AST and body weight were observed. Twenty four (24) naturally parasitized cattle of BAU Dairy Farm, Mymensingh were randomly divided into four groups, each consisting of six (6) cattle. Water extract of leaves of barbados lilac and pineapple were administered orally to the cattle of group A and B, respectively. Cattle of group C were treated with Benazol® orally. Cattle of group D was kept as infected control group. Fecal samples, body weight, hematological and biochemical parameters were examined before treatment and on 3rd, 10th, 17th and 28th day. A significant ($p<0.01$) reduction of EPG count was found following administration of barbados lilac (39.11-60.07%), pineapple (29.50-45.36%) and Benazol® (62.19-90.44%) in cattle. Whereas EPG increased significantly ($p<0.01$) in control group throughout the experimental period. After treatment with barbados lilac, pineapple and Benazol®, total erythrocyte count (TEC), hemoglobin (Hb) content and packed cell volume (PCV) were gradually increased significantly ($p<0.01$ and $p<0.05$) in cattle. Conversely, the total leukocyte count (TLC) were decreased significantly ($p<0.01$ and $p<0.05$) in treated cattle. The alanine aminotransferase (ALT) and aspartate aminotransferase (AST) level were not significantly changed in the cattle. The body weight was increased significantly ($p<0.01$ and $p<0.05$) in barbados lilac, pineapple and Benazol® treated cattle.In contrast, body weight was decreased in control group. The present study reveals that water extracts of barbados lilac leaves were moderately effective and pineapple leaves were relatively less effective against mixed gastrointestinal nematode infections in cattle.

Key words : Barbados lilac, Pineapple, Benazol®, Gastrointestinal nematodes, Cattle

INTRODUCTION

Medicinal plants are one of the most important natural resources of a country. World Health Organization (WHO, 1993) has recognized the necessity for investigation and mobilization of ancient medicinal practices to fulfill the primary health care systems of

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the man and animals, and realizes that the traditional system of medicine may play an important role in the development of livestock of the third world countries. Parasitism is an important limiting factor that responsible for deteriorating the health and productivity of livestock. The agro-ecological and geo-climatic conditions of Bangladesh are highly favorable for the growth and multiplication of parasites. As a result about 50% apparently healthy cattle population has been demonstrated to be affected with different species of parasites. Infections by gastrointestinal helminth parasites of livestock are among the most common which are considered as economically important diseases of grazing livestock (Perry *et al*., 2002). They are characterized by lower outputs of animal products (meat, milk, hides and skins), manure and traction, which all impact on the livelihood of small holder farmers (Perry and Randolph, 1999). The greatest losses associated with nematode infections are sub-clinical, and economic assessments have showed that financial costs of internal parasitism are enormous Control of parasitic diseases has been mainly based on regular anthelmintic treatment in Bangladesh. However, as these are very expensive livestock producers are not interested to use these anthelmintics. Furthermore, some serious disadvantages of using those anthelmintics, notably the development of resistance to helminth parasites (Waller and Prichard, 1985; Lans and Brown, 1998) against various anthelmintic compounds and classes, as well as their residues and toxicity problems posses hazards to livestock development. Conversely herbal medicine which are equally active but compatible to the economic status of our people and can be prepared by native technology very cheaply (Khalid *et al*., 2005). For these reasons, interest in the screening of medicinal plants for their anthelmintic activity has remained of great scientific interest despite clinical practices all over the world (Akhtar *et al*., 2000). The present study was undertaken to evaluate the efficacy of barbados lilac, pineapple and Benazol® against gastrointestinal nematodes. The effects of barbados lilac, pineapple and Benazol® on hematological parameters (TEC, Hb, PCV and TLC), biochemical parameters (ALT and AST) and clinical parameter (body weight) were also determined in this study.

MATERIALS AND METHODS

Bangladesh Agricultural University Dairy Farm, Mymensingh was selected as the site for this study. The research was carried out during the period from 1st June, 2005 to 28th June, 2005. The cattle were kept in door at night and part of the day. All the cattle were fed with balanced rations which were composed of roughages and concentrates. Examination of fecal samples for gastrointestinal nematodes egg counts by floatation method (Rahman *et al*., 1996) were carried out over a week prior to commencement of treatment. On the basis of fecal sample examination results, 24 cattle of both sexes were selected for this study and these cattle were confirmed cases infected with gastrointestinal nematodes.

The 24 cattle were divided into four groups

Group A:	Water extract of Barbados lilac (*Melia azedarach*, Linn.) leaves was administered @100 mg/kg bwt. orally
Group B:	Water extract of pineapple (*Ananas comosus*, Merr.) leaves was administered @100 mg/kg bwt. orally
Group C:	Benazol® (albendazole preparation, The ACME Lab. Ltd.) was administered @7.5 mg/kg bwt. orally
Group D:	Used as untreated control group.

The fecal sample from all groups were examined by egg counting McMaster method as described by Soulsby (1986) before treatment (day 0) and at 3rd, 10th, 17th and 28th day of post-treatment. Egg per gram (EPG) of feces were recorded. Blood samples were collected from the jugular vein of each cattle at different time intervals mentioned above. Various hematological parameters (TEC, Hb, PCV and TLC) were measured. Biochemical (ALT and AST) parameters were also examined by auto-analyzer Reflotron® Plus (Boehringer Mannheim) according to the method described by Deneke and Rittersdorf (1984 and 1985). To determine the body weight gain or loss of treated and untreated control groups, the body weight was taken on day 0 (pretreatment) and on 3rd, 10th, 17th and 28th day of experimental period of cattle (Samad, 2001). Collected data were statistically analyzed between normal and treated values by Student's t-test by using the computer statistical package programme of Microsoft Excel.

RESULTS AND DISCUSSION

The results of the efficacy of barbados lilac, pineapple and Benazol® against gastrointestinal nematodes in cattle are shown in Table 1. A significant ($p<0.01$) reduction of EPG count was found on 3rd, 10th, 17th and 28th day of barbados lilac (53.93%, 60.07%, 47.33% and 39.11%), pineapple (37.91%, 45.36%, 36.56% and 29.50%) and Benazol® (90.44%, 79.1%, 70.46% and 62.19%) treated cattle of group A, B and C, respectively. The EPG count of untreated control group (D) were significantly ($p<0.01$) increased about 4.76%, 15.33%, 28.57% and 42.86% on 3rd, 10th, 17th and 28th day, respectively. In conformity to the present findings, Akhtar and Riffat (1984) observed the efficacy of barbados lilac against gastrointestinal nematodes in goats and found that fecal egg counts fell by more than 99% within 15 days due to treatment with @30 mg/kg of powdered fruit. Khalid *et al*. (2005) stated that pineapple (10% water extract of leaves) reduced significantly EPG count 41.13%, 39.27%, 36.32% and 32.18% on 7th, 14th, 21st and 28th day, respectively in sheep. Likewise, Khatun *et al*. (1995) stated that water leaf extract of pineapple at a dose rate of 100 mg/kg, 150 mg/kg and 200 mg/kg were 53.0%, 57.0% and 59.4%, respectively against gastrointestinal nematodes in goats. Mostofa *et al.* (1983) also observed water extract of pineapple was 58% effective against gastrointestinal nematodiasis in cattle. Amin *et al*. (2005) investigated the effect of albendazole against gastrointestinal nematodiasis in sheep. A significant reduction of EPG count were found on 7th, 14th, 21st and 28th day of albendazole (83.61%, 82.35%, 79.73% and 77.25%, respectively) treated sheep. Khan *et al.* (2003) stated that albendazole was 93.75% effective against gastrointestinal nematodiasis in cattle. This findings supported by the earlier works of Rob *et al*. (2004), Keyyu *et al.* (2002) and Arslan and Mohammed (2001) in sheep. Islam *et al*. (2003) observed albendazole was 90.11% effective against gastrointestinal nematodiasis on day 28 post-treatment in goat. The present finding was also in agreement with the works of Bauer (2001); Waruiru *et al.* (1998); Charles *et al.* (1989) in goat. Similar findings also observed by Hanif *et al*. (2003) in calves and Qureshi *et al.* (1997) in buffalo.

Table 1. Comparative efficacy of Barbados lilac, Pineapple and Benazol® against gastrointestinal nematodes in cattle

Group	Treatment	Pre-treatment	Post-treatment							
		'0' day	3rd day		10th day		17th day		28th day	
		EPG Mean ± SD	EPG Mean ± SD	EPG increase/ Decrease (%)	EPG mean ± SD	EPG increase/ decrease (%)	EPG mean ± SD	EPG increase/ decrease (%)	EPG Mean ± SD	EPG increase/ decrease (%)
A	Barbados lilac	1350 ± 223.76	622** ± 127.72	+ 53.93	539** ± 112.30	+ 60.07	711** ± 112.99	+ 47.33	822** ± 131.22	+ 39.11
B	Pineapple	1261 ± 262.83	783** ± 102.65	+ 37.91	689** ± 93.41	+ 45.36	800** ± 135.17	+ 36.56	889** ± 157.12	+ 29.50
C	Benazol®	1161 ± 125.40	111** ± 54.58	+ 90.44	239** ± 49.05	+ 79.41	343** ± 47.32	+ 70.46	439** ± 49.05	+ 62.19
D	Control	1050 ± 269.81	1100** ± 279.91	- 4.76	1211** ± 276.99	- 15.33	1350** ± 236.20	- 28.57	1500** ± 237.67	- 42.86

The above values represent the mean ± standard deviation (SD) of 6 cattle

** = Significant at 1 per cent level ($p<0.01$); * = Significant at 5 per cent level ($p<0.05$)

'+' = Decrease, '-' = Increase

Table 2. Changes in hematological parameters in cattle at different intervals after treatment with Barbados lilac, Pineapple and Benazol®

Days after treatment	Barbados lilac treatment (group A)	Pineapple treatment (group B)	Benazol® treatment (group C)	Untreated infected control (group D)
Day 0 (Pretreatment)				
TEC (million/cu.mm.)	8.35 ± 0.72	8.61 ± 0.72	8.94 ± 0.49	9.31 ± 0.71
Hb content (gm %)	8.80 ± 0.96	9.37 ± 1.24	9.87 ± 0.84	10.43 ± 1.14
PCV (%)	30.50 ± 2.26	31.50 ± 2.26	32.67 ± 1.21	33.17 ± 1.94
TLC (thousand/cu.mm.)	10.26 ± 1.05	9.80 ± 1.25	9.27 ± 0.59	9.11 ± 1.16
Day 3				
TEC (million/cu.mm.)	8.41** ± 0.70	8.64** ± 0.72	9.00** ± 0.50	9.24** ± 0.67
Hb content (gm %)	8.93* ± 1.02	9.53* ± 1.11	10.03** ± 0.77	10.20** ± 1.13
PCV (%)	30.83 ± 1.94	31.83 ± 1.84	33.00 ± 0.89	32.67* ± 1.75
TLC (thousand/cu.mm.)	10.18** ± 1.00	9.72** ± 1.21	9.17* ± 0.56	9.19* ± 1.14
Day 10				
TEC (million/cu.mm.)	8.46 ± 0.91	8.81** ± 0.72	9.68** ± 9.68	9.06** ± 0.67
Hb content (gm %)	9.70** ± 0.93	9.97* ± 0.94	10.87** ± 0.59	9.50** ± 1.01
PCV (%)	31.67* ± 1.86	32.67** ± 1.75	34.17** ± 0.75	32.00* ± 1.67
TLC (thousand/cu.mm.)	9.99** ± 0.97	9.55** ± 1.18	8.63** ± 0.49	9.48** ± 1.12
Day 17				
TEC (million/cu.mm.)	8.77* ± 0.93	8.98** ± 0.72	10.19** ± 0.14	8.88** ± 0.64
Hb content (gm %)	10.6** ± 0.77	10.60** ± 0.89	11.97** ± 0.59	8.60** ± 0.65
PCV (%)	32.33** ± 1.75	33.33** ± 1.21	34.33** ± 0.82	30.83** ± 2.04
TLC (thousand/cu.mm.)	9.82** ± 0.96	9.40** ± 1.13	8.38** ± 0.44	9.79** ± 1.11
Day 28				
TEC (million/cu.mm.)	8.94** ± 0.92	9.08** ± 0.72	10.51** ± 0.11	8.64 ± 0.59
Hb content (gm %)	11.33** ± 0.70	11.27** ± 0.77	12.73** ± 0.48	8.13** ± 0.48
PCV (%)	32.67** ± 1.63	33.83** ± 1.17	35.33** ± 0.82	30.33** ± 1.75
TLC (thousand/cu.mm.)	9.64** ± 0.91	9.29** ± 1.20	8.14** ± 0.35	10.08** ± 1.04

The above values represent the mean ± standard deviation (SD) of 6 cattle
** = Significant at 1 per cent level ($p<0.01$); * = Significant at 5 per cent level ($p<0.05$)

The results of the effect of barbados lilac, pineapple and Benazol® on different hematological parameters are shown in the Table 2. After treatment with barbados lilac, pineapple and Benazol®, total erythrocyte count (TEC), hemoglobin (Hb) content and packed cell volume (PCV) were gradually increased significantly ($p<0.01$ and $p<0.05$) in cattle. Conversely, the total leukocyte count (TLC) were decreased significantly ($p<0.01$ and $p<0.05$) in treated cattle. The present finding was also in agreement with the work of Khalid *et al*. (2005) in sheep. They reported that pineapple (10% water extract of leaves) increased TEC and Hb content in sheep. Likewise, Khatun *et al*. (1995) found water leaf extract of pine-apple increased significantly TEC and Hb content at 21st day of post-

treatment in goats. Islam *et al*. (2003) reported that albendazole increased TEC and Hb content in goat. Khan *et al.* (2003) also observed albendazole was increased significantly TEC in cattle. In conformity to the present findings, Amin *et al*. (2005); Rob *et al*. (2004) and Gundlach *et al.* (1991) stated that hemoglobin (Hb) content was increased significantly in albendazole treated sheep. The improved level of TEC of blood in treated cattle might be due to elimination of blood sucking gastrointestinal nematodes. The increase in hemoglobin content in cattle might be due to the increase of total erythrocyte count (TEC). Khalid *et al*. (2005) reported that pineapple (10% water extract of leaves) increased PCV in sheep. Similar responses reported by Amin *et al*. (2005) and Rob *et al*. (2004) due to albendazole in sheep. Islam *et al*. (2003) also noted similar findings in goat. Likewise, Khalid *et al*. (2005) reported that pineapple (10% water extract of leaves) decreased TLC in sheep. Gundlach *et al.* (1991) reported that albendazole decreased total leukocyte count in sheep.

The results of the effect of barbados lilac, pineapple and Benazol® on biochemical parameters are shown in the Table 3. The alanine aminotransferase (ALT) and aspartate aminotransferase (AST) level were not significantly changed in the cattle. These findings cannot be compared due to lack of similar published reports.

Table 3. Changes in biochemical parameters in cattle at different intervals after treatment with Barbados lilac, Pineapple and Benazol®

Days after treatment	Barbados lilac treatment (group A)	Pineapple treatment (group B)	Benazol® treatment (group C)	Untreated infected control (group D)
Day 0 (Pretreatment)				
ALT (U/l)	20.52 ± .11	19.73 ± 2.68	18.60 ± 1.09	17.97 ± 2.21
AST (U/l)	32.43 ± 2.25	31.65 ± 2.57	30.62 ± 1.39	29.68 ± 2.60
Day 3				
ALT (U/l)	19.37 ± 2.60	19.30 ± 2.37	18.10 ± 1.75	18.22 ± 1.57
AST (U/l)	32.63 ± 3.43	33.20 ± 2.10	31.92 ± 2.04	29.67 ± 2.44
Day 10				
ALT (U/l)	20.97 ± 2.08	19.35 ± 2.60	18.20 ± 1.68	18.13 ± 2.25
AST (U/l)	31.78 ± 2.76	32.38 ± 1.36	32.02 ± 1.60	30.87 ± 2.02
Day 17				
ALT (U/l)	20.23 ± 2.93	19.20 ± 2.27	18.00 ± 1.54	17.33 ± 2.54
AST (U/l)	33.03 ± 2.61	31.35 ± 2.69	30.05 ± 2.67	29.27 ± 2.27
Day 28				
ALT (U/l)	19.37 ± 2.1	19.78 ± 1.65	17.65 ± 1.87	18.65 ± 1.96
AST (U/l)	31.25 ± 2.86	31.17 ± 2.41	29.57 ± 2.06	30.90 ± 2.16

The above values represent the mean ± standard deviation (SD) of 6 cattle
** = Significant at 1 per cent level ($p<0.01$); * = Significant at 5 per cent level ($p<0.05$)

The effects of barbados lilac, pineapple and Benazol® on body weight in cattle are shown in Table 4. Barbados lilac, pineapple and Benazol® significantly ($p<0.01$ and $p<0.05$) increased body weight in group A, B and C, respectively. In conformity to the present findings, Khalid *et al*. (2005) reported that body weight was increased significantly in pineapple treated sheep. On the other hand, body weight was decreased in untreated sheep. These results were agreeable with the findings of Khatun *et al*. (1995) for pineapple in goat. Likewise, Amin *et al*. (2005) observed that body weight was increased significantly in albendazole treated sheep. On the other hand, body weight was decreased in untreated sheep. Similar results also reported by Vassilev (1993) and Redl (1991) in cattle. Khan *et al.* (2003) also found that body weight was increased significantly due to albendazole in cattle. The parasitic infection might be responsible to arrest the growth. The body weight was increased might be due to removal of parasitic load which facilitate the weight regain through proper digestion, absorption and metabolism of feed nutrients in the parasite free gastrointestinal tract.

Table 4. Effects of Barbados lilac, Pineapple and Benazol® on body weight (Kg) in cattle

Group	Treatment	Pre-treatment	Post-treatment			
		'0' day	3rd day	10th day	17th day	28th day
A	Barbados lilac	124.67 ± 2.86	124.92 ± 3.01	125.92** ± 2.67	126.92** ± 2.97	127.83** ± 3.04
B	Pineapple	124.75 ± 3.01	124.92 ± 2.92	125.83** ± 2.58	127.15** ± 2.29	127.75** ± 1.97
C	Benazol®	123.67 ± 3.66	123.91* ± 3.76	125.17** ± 3.72	126.25** ± 3.40	127.08** ± 3.99
D	Untreated infected control	125.50 ± 2.65	125.25* ± 2.50	123.83* ± 3.24	123.17** ± 2.98	122.92** ± 2.63

The above values represent the mean ± standard deviation (SD) of 6 cattle
** = Significant at 1 per cent level ($p<0.01$); * = Significant at 5 per cent level ($p<0.05$)

It may be concluded that water extracts of barbados lilac leaves was moderately effective and pineapple leaves was relatively less effective against gastrointestinal nematode infections in cattle. Of course, the present study is a preliminary work on the medicinal plants in cattle in Bangladesh. However, further studies on its pharmacokinetic and toxic effects if any should be carried out before extensive field use in Bangladesh.

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