Preliminary Screening for Anthelmintic Potential of *Sesbania grandiflora* Leaves for Parasitic Infected Goats in Short-Term Trial

Mohd Azrul Lokman[1],[2], Kanokporn Phetdee [2], Sathaporn Jittapalapong[3] and Somkiert Prasanpanich[2]

[1]Department of Agrotechnology, School of Food Science and Technology,
Universiti Malaysia Terengganu, 21030 Kuala Nerus, Terengganu, Malaysia
[2]Department of Animal Science, Faculty of Agriculture, Kasetsart University,
Bangkhen Campus, 10900 Bangkok, Thailand
[3]Department of Parasitology, Faculty of Veterinary Medicine, Kasetsart University,
Bangkhen Campus, 10900 Bangkok, Thailand
Corresponding email: azrullokman@umt.edu.my

ABSTRACT : In this study, local legume plant; *Sesbania grandiflora* was chose as experimental plant. Eighteen goats with natural infection of gastrointestinal parasites were equally divided into three groups, where two groups were orally treated with fresh and dried leaves of *S. grandiflora* respectively, while the third group was untreated as a control. Treatment was conducted daily for short-term 14 days and was examined for another 14 days for post treatment observation. Normal goat's pellet was fed to the goats and grass was fed with cut and carry system according to scheduled time-feeding; morning and afternoon, and water was given ad libitum. Fecal samples were collected every seven days during the experimental period and subjected to modified McMaster assay for fecal egg count. Results for this short-term preliminary anthelmintic trial had showed only limited effect on parasite eggs reduction in goats. Helminths eggs reduction after 14days in goats treated with fresh leaves was 42% and 40% for the goats treated with dried leaves with no significant difference between these two treatments ($P > 0.05$). Control goats did not showed reduction. For post-treatment period, there were no abnormalities on physiological observation of the goats from all groups. In conclusion, eventhough the reduction rate is not achieved more than 50% but there is still a potential for this plant to be use as a natural and safe dewormer for ruminant. Further studies are required and the treatment period should be extended to examine the anthelmintic efficacy of this plant.

Keywords: *Sesbania grandiflora* leaves, Modified McMaster assay, Helminths eggs reduction, Anthelmintic ability

INTRODUCTION

Goat is one of the important animal in livestock industry worldwide (Waller 1997; Wahab, 2003). However, a range of diseases become a major problem that can affect goats' production. There are a lot of problems and diseases in goats. Bacterial infection such as pasteurellosis and gastrointestinal parasitic infection such as haemonchosis are major cause for production decreasing in livestock industry. Vaccines for bacterial infection are produced efficiently (Zamri-Saad *et al.,* 1992). For helminth infection problem, anthelmintic drugs normally used to control the disease. Sani and Gray (2004) had summarized the parasites species found in ruminants in Southeast Asia region. There are *Haemonchus contortus* and *Trichostrongylus spp.* with huge percentage and other species are detected with small percentage; namely *Oesophagostomum spp., Moniezia spp.,*

Trichuris spp., Cooperia spp., Fasciola spp. and Eimeria spp. A report by McLeod (2004) has been discussed about the economic losses evaluation for Southeast Asia countries and stated that in 1999, the most affected country is Indonesia followed by Philippines, Malaysia, Vietnam and Thailand.

The conventional method for gastrointestinal parasitic infection is using anthelmintic drugs such as closantel, oxfendazole and ivermectin (Wahab, 2003). However, according to Hammond *et al*. (1997), these anthelmintic drugs are reported to have some disadvantages. Local farmers in developing countries were not able to buy all classes of the drugs. Thus, they bought only one or two drugs and kept repeating used it without simultaneously administered the drugs according to the right procedure. Many species of worms were successfully developed the resistance in their gene allele due to the repeatable usage of drugs. Based on this situation, local plant traditionally used to treat parasite problem could offer an alternative. Besides that, the use of plant as anthelmintic is both sustainable and environmentally acceptable (Hammond *et al.,* 1997). Traditional practices using local plants that believe containing anthelmintic properties become the reference for scientific evaluation (Hoste *et al*., 2008). Currently, there is increasing of the interest in the exploration of potential local plants or their products for helminths control in small ruminants (Hammond *et al.,* 1997). In tropical countries, there are variety of local plants which successfully tested for their efficacy on controlling parasitic infection for ruminant. Plant leaves such as cassava (*Manihot esculenta*) and neem (*Azadirachta indica*) were successfully used for helminth control (Chandrawathani *et al.,* 2002, 2006; Nurulaini *et al.,* 2007). Up to now, more local plants should be explored to provide scientific proof to the local farmers. Based on the ethnoveterinary medicine, Agati or *Sesbania grandiflora* also have anthelmintic properties and can be used to treat the parasitic infection (Gutteridge and Shelton, 1997).

Thus, the objective of this preliminary short-term study was to scientifically determine the anthelmintic potential of Agati (*S. grandiflora*) leaves in short-term daily-feeding trial.

MATERIALS AND METHODS

Plant materials. Plant used in this study was available and naturally grown in tropical region. The healthy *S. grandiflora* leaves were freshly collected using standard agronomic practices and bring up to the animal house every morning during the trial period.

Experimental animal. Experimental animals used in this study were Katjang goats breed. Goats with natural infection of gastrointestinal parasites were chose from local farm. Eighteen male goats, 2-4 months of age, and weighing approximately 10 kg were equally divided into three groups. Once the goats were bringing up to the animals house, they were let free for acclimatization at least a week before the experiment started. Goats were fed with normal goat's pellet and water was given ad libitum.

Experimental design. Before started the trial, fecal samples were freshly collected from all goats and fecal egg count (FEC) were done to obtain the mean number of egg per gram (EPG) from all three groups. Then, from day-1 until day-14, goats from group 1 and group 2 were treated with fresh and dried S. grandiflora leaves respectively. Meanwhile for the goats in group 3, there were left untreated. Leaves were weighed specifically with the daily allowance of 300 g/day. During the trial period, normal goat's pellet was given to all the animals only after the treated animals finished eating the experimental plant. Water was provided to all goats ad libitum.

Parasitological analysis. Fecal samples were freshly collected from the goat's rectum once every seven days. This fecal sampling was done for each animal in the morning and was continued for four weeks. These samples were subjected to the modified McMaster fecal egg count technique,

using 3 g individual fecal samples (Christopher *et al.,* 1992).

Statistical analysis. Fecal egg count (FEC) values during the experimental period were analyzed using ANOVA one-way and Dunnett's Test as post-hoc test.

RESULTS AND DISCUSSION

Results. For short-term preliminary test, *S. grandiflora* gave limited effect on reduction of internal parasites egg. The reduction percentage is range between 40% to 42% for both treatment groups. Mean of egg reduction was showed in Fig. 1 as below.

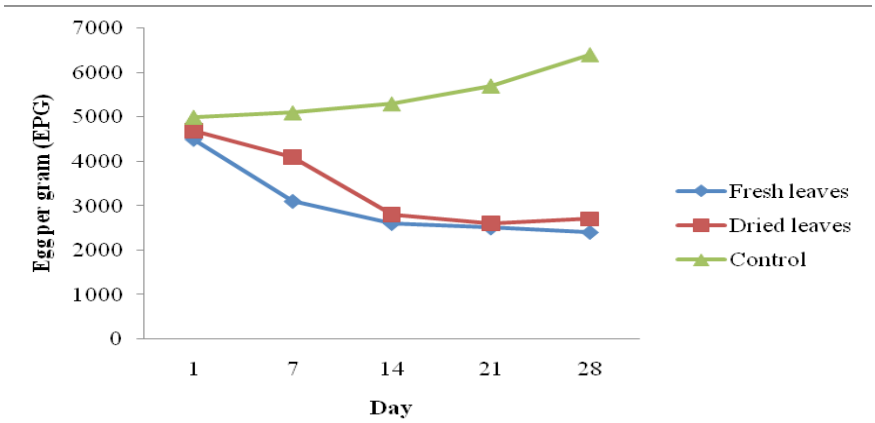

Figure 1. Mean of fecal egg count; egg per gram (epg) for treatment and control group

Discussion. From Fig. 1, percentage of reduction for number of gastrointestinal parasite eggs can be obtained by comparing the pre and post values. Reduction trend can be observed for two phases; the first one is after 14 days treatment period and next is summary of the reduction after post-treatment period on day-28. For goats treated with fresh leaves, reduction percentage after 14 days was 42% and for group treated with dried leaves was 40% reduction. Then, after another 14 days post-treatment period, the summary of egg reduction for both groups was slightly same. The percentage of reduction for the group treated with fresh leaves was slightly higher than the percentage of the reduction for the group treated with dried leaves. However, there is no significant difference among these two treated groups ($P > 0.05$).

In this preliminary study, it's reported that both groups treated with fresh and dried *S. grandiflora* leaves respectively could not reduced the eggs up to 50%. When compared to previous studies using variety of plants, many of them are successfully reduced the parasites eggs more than 50% and some of them even can achieve 90% reduction. This limited effect might be happened due to the short experimental period. However this 14 days feeding trial was already gave more than 30% egg reduction. From previous reports, it's found that plant secondary metabolites (PSM) such as tannins, alkaloids, glycosides and terpenes are involved in the anthelmintic properties that responsible to the anthelmintic potential of that various plants (Chadwick, 1992; Seigler, 1998; Hoste *et al.*, 2008).

There are ranges of previous studies focusing on detection of tannins in *S. grandiflora* (Wagh, 2009; Bahera *et al.,* 2012; Renji and Alphonse, 2013). It's proven that they have found similar results which *S. grandiflora* contain tannins. In this short-term preliminary study, both groups treated with fresh and dried *S. grandiflora* leaves showed reduction of gastrointestinal parasites eggs more than 30% respectively. As concerned, the reduction values could achieve up to 60% until 80% if the feeding trial conducted longer in the future as compared with previous studies.

CONCLUSIONS

According to the results observed in this short-term preliminary study, it can be concluded that *S. grandiflora* leaves are proven to have anthelmintic efficacy against parasites infection in goats. Both fresh and dried leaves have a potential to be use as a natural anthelmintic for goats. This abundantly available tropical local plant can be use as alternative approach for controlling gastrointestinal nematodes infection in goats and can be widely promoted to the local farmers as natural anthelmintic. Future works are needed to be conducted with extension of the feeding period.

ACKNOWLEDGEMENT

This short-term work was personally funded and conducted with the help of local farmers nearby. Only limited fund and skills were involved in this works to obtain preliminary data.

REFERENCES

Bahera, B., R. Karki, and C. Shekar. 2012. Preliminary phytochemical analysis of leaf and bark methanolic extract of Sesbania grandiflora. The Journal of Phytopharmaology, volume 1, Issue 2.

Chadwick, D. 1992. Secondary metabolites: their function and evolution, Vol. 171, Ciba Foundation, John Wiley & Sons, England.

Chandrawathani, P., D. Brelin, S. Nor Fasihah, M. Adnan, O. Jamnah, and R. A. Sani, *et al*. 2002. Evaluation of the neem tree (Azadirachta indica) as a herbal anthelmintic for nematode parasite control in small ruminants in Malaysia, Tropical Biomedicine 19, pp. 41-48.

Chandrawathani, P., K. W. Chang, R. Nurulaini, P. J. Waller, M. Adnan, C. M. Zaini, *et al*. 2006. Daily feeding of fresh neem leaves (Azadirachta indica) for worm control in sheep. Tropical Biomedicine 23, pp. 23-30.

Christopher, R., P. Chandrawathani, and T. S. Cheah. 1992. Manual on parasitology. In: P. Loganathan (Ed.), Department of Veterinary Services, Malaysia, pp. 12-14.

Gutteridge, R. C., and C. M. Shelton. 1994. Forage, Tree Legumes in Tropical Agriculture. CAB International, Wallingford, UK, 1994.

Hammond, J. A., D. Fielding, and S. C. Bishop. 1997. Prospects for plant anthelmintics in tropical veterinary medicine, review article. Veterinary Research Communications 21, pp. 213-228.

Hoste, H., J. F. Torres-Acosta, M. A. Alonso-Diaz, S. Brunet, C. Sandoval-Castro, and S. Houzangbe-Adote. 2008. Identification and validation of bioactive plants for the control of gastrointestinal nematodes in small ruminants," In: Proceedings of the 5th International Workshop: Novel Approaches to the Control of Helminth Parasites of Livestock 2008, Ipoh, Malaysia, pp. 56-72.

McLeod, R. S. 2004. The economic impact of worm infections in small ruminants in Southeast Asia, India and Australia. In: R. A. Sani, G. D. Gray and R. L. Baker (Eds.), Worm control for small rumiants in Tropical Asia, ACIAR Monograph 113, pp. 23-33.

Nurulaini, R., S. Khadijah, M. Adnan, C. M. Zaini, O. Jamnah, P. J. Waller, *et al*. 2007. Potential use of cassava (Manihot esculenta) leaves for worm control for small ruminants in the tropics. In: Proceedings of the 21st International Conference of the World Association for the Advancement of Veterinary Parasitology, Belgium.

Renji A. F., and N. R. Alphonse. 2013. Phytochemical study on Sesbania grandiflora," Journal of Chemical and Pharmaceutical Research 5(2), pp. 196-201.

Sani, R. A., and G. D. Gray. 2004. Worm control for small ruminants in Southeast Asia. In: R. A. Sani, G. D. Gray, and R. L. Baker (Eds.), Worm control for small rumiants in Tropical Asia, ACIAR Monograph 113, pp. 3-21.

Seigler, D. S. 1998. Plant secondary metabolism. Kluwer Academic Publisher, United States.

Wagh V. D. 2009. Phytochemical pharmacological and phytopharmaceutics aspects of Sesbania grandiflora (Hadga): a review," Journal of Pharmacy Research, Vol. 2, Issue 5, pp. 889-892.

Wahab, A. R. 2003. *Cacing dalam kambing, masalah dan penyelesaian.* Siri Syarahan Umum Pelantikan Profesor Univesiti Sains Malaysia, (In Malay).

Waller, P. J. 1997. Sustainable helminth control of ruminants in developing countries, Vet Parasitol. 71, pp. 195-207.

Zamri-Saad, M., A. K. Arifah, A. Norizah, N. Salim, M. S. Ismail, and A. R. Sheikh Omar. 1992. An evaluation of an oil adjuvant vaccine in controlling pneumonic pasteurellosis in sheep. In: Proceedings of ACIAR Symposium on Pasteurellosis in Production Animals, No. 43, pp. 177-217.