African Journal of Biotechnology Vol. 8 (17) pp. 4134-4136, 1 September, 2009
Available online at http://www.academicjournals.org/AJB
ISSN 1684–5315 © 2009 Academic Journals

Short Communication

Utilization of *Tephrosia vogelii* in controlling ticks in dairy cows by small-scale commercial farmers in Zimbabwe

Christopher T. Gadzirayi[1]*, Edward Mutandwa[1], Marizvikuru Mwale[1] and Tembinkosi Chindundu[2]

[1]Department of Agriculture, Bindura University of Science Education, P Bag 1020, Bindura, Zimbabwe.
[2]Research Assistant, Department of Agriculture, Bindura University of Science Education, Zimbabwe.

Accepted 2 November, 2007

The study sought to evaluate the effectiveness of *Tephrosia vogelii* in controlling ticks on dairy cows among small-scale dairy farmers in Mashonaland Central Province of Zimbabwe. *T. vogelii* treatment concentrations and Triatix D acaricide dip were randomly administered to 40 dairy cows. The experiment was carried out for 5 months in summer when there is high tick challenge. Counting of ticks was done on a weekly basis after every application. It was observed that *T. vogelii* could effectively reduce tick numbers on dairy cows. The results indicated that there was no significant difference between *T. vogelli* and the conventional Triatix dip at 5% level. The indigenous practices are, therefore, recommended to the smallholder dairy production farmers where modern veterinary drugs are not easily accessible.

Key words: *Tephrosia vogelli*, smallholder dairy farmers, ticks, acaricide.

INTRODUCTION

Most of the Southern African rangelands are inhabited by agro-pastoralists who depend on subsistence production (Teer, 1986). They are always at the mercy of insects, diseases, predators, drought, floods and other natural disasters. Their livelihoods are mostly dependent on livestock. Among the major constraints to livestock productivity in agro-pastoral areas are ticks and tick borne diseases (TBDs) (Ocaido et al., 1996) and tsetse flies and trypanosomes. Of the diseases caused by ticks and TBDs, East Coast Fever (ECF, theileriosis), anaplasmosis, babesiosis and cowdriosis are among the most important and widespread (Otim, 2000). This, therefore, calls for the need to come up with solutions that are cost effective to the resource-poor farmers. Herbal medicine use and importance is steadily rising and spreading throughout the world.

*Corresponding author. E-mail: gadzirayichris@yahoo.co.uk. Tel: 263-71-7531/4, Fax: 263-71-7534.

Abbreviations: I.T.K: Indigenous Technical Knowledge; **FAO**: Food and Agriculture Organization; **M.V.D**: Modern Veterinary Drugs.

Tephrosia is a genus of leguminous shrubby plants and herbs (Figure 1), mostly found in tropical countries (Blommaert, 1950). The plant is established easily from seeds (Barnes and Freyre, 1969). The foliage is often ashy-pubescent, hence the name *Tephrosia*. The herb comes in various species that include *Tephrosia virginiana* (L.) pers. (Fabaceae), *Tephrosia purpurea, Tephrosia candida, Tephrosia vogelii* and *Tephrosia toxicaria*. The rotenone is the chemical responsible for the pesticidal property of *T. vogelii*. The chemical has an acute oral toxicity of 132 -1500 mg/kg, which is capable of killing fish and vegetable pests. *T. vogelii* can also be used for the protection of stored grain against pests since rotenone breaks down within 3 - 5 days after application thereby leaving no residues unlike most synthetic pesticides (Blommaert, 1950). The plant can, therefore, be used to control ticks, which are causing marked economic losses in dairy animals.

Ticks are a problem in dairy production causing significant economic losses mainly in dairy cows (Jittapalapong et al., 2004). The teats are damaged resulting in a reduction in milk yield, which is a cheaper source of protein to rural resource-poor farmers. Milk losses are also due to reduced feed intake due to tick worry. The

Figure 1. *Tephrosia vogelii* plant.

loss is more pronounced in the hot humid areas of tropical regions especially during the summer-wet season. Ticks damage the skin thereby reducing hide quality and creating room for the secondary source of infection (Jittapalapong et al., 2004). The smallholder farmers, being resource-poor, find it difficult and expensive to control ticks using the conventional acaricides. It is, therefore, imperative to establish the effectiveness of using *T. vogelli* in controlling ticks. However, there is little documentary evidence demonstrating the potency of *T. Vogelli* utilization in tick control.

The main objective of this investigation is to determine the effectiveness of using *T. vogelii* in controlling ticks in dairy cows among smallholder farmers as well as the optimum dilution levels that can effectively control ticks.

MATERIALS AND METHODS

Study site

Matepatepa district in Mashonaland Central Province lies within 25 - 33 longitudes east of the Greenwich and 15 - 22 latitude south of the equator. The altitude ranges from 700 to 900 m above sea level with an annual rainfall of 600 mm to 900 mm and the temperature range of 15 – 36^{O}C. It is therefore, within the sub-tropical and the tropical zones. The land is plain surrounded by the mountain and uncultivated lowlands and covered with grassland dominated with panicum species shrubs and some leguminous plants. The major production activities in the area are crops and dairy. Dairy cows get most of their feed from the crop residues to supplement the limited grazing areas available.

Extraction methods and application procedure of *T. Vogelli*

The *T.* vogelii fresh leaves were collected from the plant and grounded into 3 sets of poultice paste of 50 g each. The *T. vogelii* leaf extract was obtained in the serial extraction method of which 50 g of *T. vogelii* pastes were soaked in 100 ml water, 150 ml and to 200 ml water. This process came up with different dilution levels. Soaking was done for 12 h before the paste was used. The paste was sieved through a 10 mm sieve and the extracted water was then used to spray the dairy cows. The treatment application was done on weekly basis. A control acaricide Triatix D dip was applied as per the manufacturer's recommendation.

Experimental design

A completely randomized design was used. Treatment concentrations were randomly applied to 40 animals of which 30 were treated with *T. vogelli* water mixture and the other 10 were treated with Triatix Dip.

Data analysis

The data collected was analyzed for differences between the treatments from the control treatment using the Statistical Package for the Social Sciences. The differences between treatment means were analyzed for using the General Linear Model GLM explained below.

$Y_{ij} = \mu + T_i + e_{ij}$

Y_{ij} = the j^{th} observation for the i^{th} dilution treatment, where j = 1, 2, 3; μ = overall mean; Ti = effect due to treatment dilution, where I = 1, 2, 3, and 4; e_{ij} = residual error.

RESULTS AND DISCUSSION

The results show that there was a decline in the number of engorged ticks from 1st month to the 5th month of treatment ($P < 0.05$). The experiment indicated that there was no significant difference in the number of engorged ticks from different dilution levels ($P < 0.05$) as shown in Table 1.

Table 1. Tick count after spraying dairy cows with *Tephrosia vogelii* soaked in different amount of water.

Counting interval (months)	50 g/100 ml water	50 g/150 ml water	50 g/200 ml water	Triatix D
1	7	10	9	11
2	7	10	9	11
3	6	7	8	7
4	4	7	8	7
5	3	7	6	6
Grand mean	5	8	8	8

The study indicated a reduction in tick number from all the treatments; high tick reduction from initial average count of 21 ticks per dairy cow were shown in the first dilution level where 50 g *T. vogelii* was mixed to 100 ml water. In the other treatments, there were reduction in ticks, but the reduction was relatively small when compared to the first treatment, which had a low dilution level. The cause for the higher reduction in tick numbers in the first treatment can be attributed to the fact that during subsequent spraying, the chemical might have been still active on the body of the animal. Comparing the control treatment with the other two treatments of 50 g to 150 ml and 50 g to 200 ml, the tick count was the same. This might mean that *T. vogelli* is just as effective as Triatix Dip in controlling ticks.

The research demonstrated that *T. vogelii* can effectively control ticks in dairy cattle at dilution levels of 50 g per 100 - 200 ml of water. The smallholder farmers can use *T. vogelii* as it proved to be effective in controlling ticks in general. It is cheap and easy to propagate and matures within 2 - 3 months and can be used throughout the year. However, care must be taken in the use of *T. Vogelli* because of its highly toxic properties that may end up killing non-target animal organisms such as fish. Further research can be done to align use of *T. Vogelli* to modern medicine by isolation of the active ingredient, rotenone, in order to come up with the dose response curve necessary. Such studies will provide scientific rationality for the use of *T. vogelii* in future.

REFERENCES

Barnes DK, Freyre RH (1969). Seed Production Potential of *Tephrosia vogelii* in Puerto Rico. Puerto Rico Univ. J. Agr. 53(3): 207-212.

Blommaert KLJ (1950). The Plant *Tephrosia Vogelii* Hooker, As a Fresh Water Fish Poison. Roy. Soc. So. Afr. Trans. 32: 247-263.

Jittapalapong S, Jansawan W, Barriga OO, Stich RW (2004). Reduced incidences of *Babesia bigemina* Infections in Cattle immunized against the Cattle tick, *Boophilus microplus*, Ann. N. Y. Acad. Sci. 1026: 312-318.

Ocaido M, Siefert L, Baranga J (1996). Disease surveillance in mixed livestock and game areas around Lake Mburo National Park in Uganda.

Otim CP (2000). Advance in Disease Control: Ticks and Tick borne diseases. Uganda j. agric. Sci. 579-85

Teer JG (1986). Compatibility and conflicts in uses of rangeland resources. In wildlife/livestock interfaces on rangelands, p. 1-7.