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## Acaricidal activity of *Annona squamosa* and *Azadirachta indica* extracts against *Boophilus microplus*

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### Abstract

Livestock living conditions are seriously threatened by tick infestation. *Boophilus microplus* is the most common type of tick detected in domestic animals in India. Several plants can prevent the development of ticks on domestic animals. The purpose of the present study was to assess the acaricidal efficacy of herbs against *Boophilus microplus*. To that end, leaf extracts from the *Annona squamosa* and *Azadirachta indica* species were synthesized and evaluated for their application in the tick growth inhibition and mortality rate. The results of the present study suggest that, in comparison to the individual use of these plant extracts, the combination of both herbals has a high mortality rate for ticks, and that response is rapid. It is discussed that employing herbal extracts in an Integrated Pest Management (IPM) manner could help manage tick counts.

**Keywords:** *Boophilus microplus*, *Annona squamosa*, *Azadirachta indica*

### Introduction

Tick-borne diseases have recently posed a serious danger to the way of life of live stock. This creates a need for the creation of a novel, cost-effective tick control method. The *Boophilus microplus* tick, which is widely present in India and infests a number of host species, cattle, horses, goats, donkeys, deer, dogs, pigs and some of the wild animals has a negative economic impact on the production of cattle by lowering milk output and weight increase as well as by spreading infections that cause babesiosis and anaplasmosis (Ghosh *et al.* 2006) [3]. The most harmful ticks stress the host and weaken it.

Chemical acaricide use has been ineffective in decreasing tick infestations and is frequently followed by adverse effects such as the emergence of acaricide-resistant ticks, environmental contamination, and even insecticide residues in meat and milk products (Graf *et al.* 2004) [5]. Acaricide use for tick population management is a severe issue that harms non-targeted species and pollutes the environment (Boeke *et al.*, 2004) [1]. According to the FAO (2004) [2] report, Indian ticks have developed resistance to the most commonly used acaricides. This situation demands the use of alternate tick management strategies that cause less environmental harm (Patel *et al.*, 2014) [9]. The biodegradability of botanicals for tick management is one of the commonly cited advantages (Liang *et al.*, 2003; Kaur *et al.*, 2017) [8, 7]. This will reduce the environmental and non-target species toxicity of botanical acaricides. In the present experiment, *in vitro* screening of *Azadirachta indica* and *Annona squamosa* leaf extracts against *B. microplus* was done that will be very important in preventing tick-borne illnesses and tick control.

### Materials and Methods

#### Preparation of Plant extracts

Two plants i.e, *Annona squamosa* *Azadirachta indica* leaves have been collected from different areas of Rangareddy district, Telangana, India. Based on the literature that was available and the ethnoveterinary knowledge of rural people, the following plants leaves were chosen for the study presented in Figure 1.

The chosen plant leaf components were ground into a powdery consistency after being shade-dried. 250 ml of ethanol heated to 80 °C and 100 grams of each of the crushed materials were placed separately in a columnar extraction system of a Soxhlet apparatus.

Twelve to fifteen cycles of the extraction procedure were completed. To get rid of the solvent, recovered extracts were run through a rotating evaporator. The extract was vacuum-dried at a temperature below 40 °C. The contents were gathered and weighed after being semi-dried and yields were noted.

**Collection of Ticks**

The Acaricidal activity was assessed using live *B. microplus* ticks. Female adult ticks with blood engorgement were removed, collected, and identified from the body of infected host cattle (Figure 2).

**Results and Discussion**

**In vitro study**

These ticks were washed completely thrice with double distilled water and kept for drying on the filter paper. Eight separate test series groups were created to test the anti acaricidal activity after being dried. Five ticks are present in each group. Seven groups served as the experimental groups, with other group serving as the control. Each plant's leaf powder extract various concentrations from 1-7% were prepared, individual tick group was subjected to tick immersion test, and 100% mortality data were recorded for *Azadirachta indica* and *Annona squamosa* separately and also with both plant extracts.



a) *Annona squamosa* b) *Azadirachta indica*

**Fig 1:** Images of leaf of *Annona squamosa* and *Azadirachta indica*



**Fig 2:** Macroscopic and microscopic image of *Boophilus microplus*

The time taken for 100% mortality in all the groups has been recorded and the results are presented in table 1, 2 and 3.

**Table 1:** Effect of *Azadirachta indica* plant extracts on acaricidal activity and Time of 100% mortality (Minute) at 1-7% concentration.

Groups	Concentration	Time of 100% mortality(minutes)
I	Distilled water	Zero mortality
II	7%	1±0.03
III	6%	7±0.02
IV	5%	15±0.04
V	4%	55±0.06
VI	3%	510±0.30
VII	2%	700±0.04
VIII	1%	1240±0.60

**Table 2:** Effect of *Annona squamosa* plant extracts on acaricidal activity and Time of 100% mortality (Minute) at 1-7% concentration.

Groups	Concentration	Time of 100% mortality(minutes)
I	Distilled water	Zero mortality
II	7%	0.8±0.01
III	6%	1.2±0.60
IV	5%	7±0.03
V	4%	30±0.01
VI	3%	175±0.30
VII	2%	650±0.04
VIII	1%	1200±0.60

**Table 3:** Effect of both *Azadirachta indica* and *Annona squamosa* plant extracts on acaricidal activity and Time of 100% mortality (Minute) at 1-7% concentration

Groups	Concentration	Time of 100% mortality(minutes)
I	Distilled water	Zero mortality
II	7%	0.5±0.03
III	6%	2±0.06
IV	5%	12±0.03
V	4%	21±0.05
VI	3%	150±0.20
VII	2%	710±0.01
VIII	1%	1120±0.30

The findings suggest that extracts from various combinations respond more quickly to tick mortality than extracts from a single plant. The combined extract of these plants demonstrates 100% mortality in 30 seconds at 7% concentration whereas separate extracts take 45 to 60 seconds at 7% concentration. These results were in concurrent with Varadharajan and Gnanasekar (2019) <sup>[10]</sup>, Kaur *et al.*, (2016) <sup>[6]</sup> and Ghosh *et al.*, (2015) <sup>[4]</sup>. Higher-dosed azadirachtin-treated animals experienced a decrease in the tick population as one of the natural plants that most farmers grow regularly is *A. indica*. It has been tested for acaricidal, insecticidal, and molluscicidal properties and contains a wide variety of physiologically active chemicals. The combined extracts of *Acacia indica* leaves and *Annona squamosa* seeds were found to be stating in antiacaricidal tests. Tick egg formation by *B. microplus* ticks is inhibited by *Azadirachta indica* and *Annona squamosa* extracts, and tick population is reduced by weekly application of these extracts.

### Conclusion

The combination of both the plant extracts, which have a rapid reaction to the tick mortality rate as compared to their individual usage, demonstrates an appreciable mortality rate for the ticks. In spite of anthelmintic resistance, a sustainable solution, such as an integrated tick control plan, is essential. This strategy includes a number of tick control techniques, such as routine grooming, the use of chemical acaricides, immunization by vaccines, and herbal treatments for livestock to get rid of ticks.

### References

1. Boeke SJ, Baumgart IR, Van Loon JJA, Van Huis A, Dicke M, Kossou DK. Toxicity and repellence of African plants traditionally used for the protection of stored cowpea against *Callosobruchus maculatus*. Journal of Stored Products Research. 2004;40:423-438.
2. FAO. Resistance management and integrated parasite control in ruminants. Guidelines. Animal Production and Health Division; c2004. p. 25-77.
3. Ghosh S, Azhahianambi P, De La Fuente J. Control of ticks of ruminants with special emphasis on livestock farming system in India-present and future possibilities for integrated control: a review. Experimental and Applied Acarology. 2006;40:49-66.
4. Ghosh S, Tiwari SS, Kumar B, Srivastava S, Sharma AK, Kumar S, *et al.* Identification of potential plant extracts for anti-tick activity against acaricide resistant cattle ticks, *Rhipicephalus Boophilus microplus* (Acari: Ixodidae). Experimental and Applied Acarology. 2015;66(1):159-71. DOI: 10.1007/s10493-015-9890-7.
5. Graf JF, Gogolewski R, Leach BN. Tick control: an industry point of view. Parasitology. 2004;129:S247-S442.
6. Kaur D, Jaiswal K, Mishra S. Methods of tick control: conventional and novel approaches. European Journal of Pharmaceutical and Medical Research. 2016;3(10):110-115.
7. Kaur D, Jaiswal K, Mishra S. Evaluation of Anti-Tick Activity of *Lantana Camara*: A Preliminary Study. Int. J Herb Med. 2017;5(4):136-139.
8. Liang GM, Chen W, Liu TX. Effects of three neem based insecticides on diamondback moth (Lepidoptera: Plutellidae). Crop Protection. 2003; 22:333-40.
9. Patel SG, Patil RD, Patil MA, Patel NS, Chavan JA. Utilization of herbals for the managements of cattle ticks. International Journal of Current Microbiology and Applied Sciences. 2014;3(10):228-232.
10. Varadharajan A, Gnanasekar R. Acaricidal activity of herbal extracts against cattle tick (*Rhipicephalus microplus*). The Pharma Innovation. Journal. 2019;8(1):609-611.