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Effect of *Asphedolus aestivus* Brot. As a Botanical Acaricide Against *Tetranychus cinnabarinus* Boisd. (Acari: Tetranychidae)

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Abstract: The study was conducted to evaluate the effect of *Asphedolus aestivus* Brot. as a biopesticide against *Tetranychus cinnabarinus* Boisd. on toxicity, oviposition and hatching under the laboratory conditions. In the study, the root and leaf of *A. aestivus* were used and compared with dicofol. The root extract was found to be more toxic than the leaf one and the dosage was obtained at 250 gL/0.5 L. The results showed that the root extract had 46.6% mortality rate in 24 h and reached 53 and 57.1% at 2nd and 6th days. There were not seen any eggs in extract trials whereas it was 43 eggs in the control during 24 h. At 6th days the total amount of eggs was 20 in the extract and 63 eggs in the control. In other words, the extract reduced the eggs three times more. The eggs did not hatche through 6th days. However, it started hatching at 7th days and 4 times lower in the extract plot and total amount of eggs were the same at 9th days. It is concluded that *A. aestivus* has potential acaricide activity and inhibited oviposition and egg hatching. Finally, it can be used against *T. cinnabarinus* in Integrated Pest Management to reduce synthetic pesticide.

Key words: *Asphedolus aestivus*, botanical acaricide, *Tetranychus cinnabarinus*

Introduction

Recently botanical pesticides increased on the management of *T. cinnabarinus* due to low costs, protecting the environment and human health. During the last years some plants have been tried to use as a botanical products to control *T. cinnabarinus* (Mansour *et al*., 1986). Mansour *et al*. (2004) evaluated twenty-nine plant extract for their potential as a source of bioactive ingredients and found that sixteen extracts showed significant repellency, the number of eggs laid and toxicity. Makundi and Kashenge (2002), Singh and Singh (1999) used the neem and they found that it showed ovipositional deterrence and suppressed the emergence of nymphs of *T. urticae*. Erler *et al*. (2004) evaluated four essential oil components, anethole, menthol, carvacrol and thymol for antifeeding and oviposition deterrent effects against *T. cinnabarinus*.

In the study *Asphedolus aestivus* Brot. was used against *T. cinnabarinus*. It is perennial weeds in pasture of Aydın province and have not been used against any pests in worldwide. However, it was found that it was toxic against sheep in the region (Personal communication with sheep growers). Consequently, the study was conducted to determine on the toxicity, oviposition and hatching of *T. cinnabarinus* under the laboratory conditions.

Materials and Methods

The study was conducted to evaluate the botanical effect of *A. aestivus* against *T. cinnabarinus* under the laboratory conditions. In the study, the root extract of *A. aeastivus* was used. The plant was digged by the shovel from the field without any damage the root and brought the laboratory. The root were then crushed into a fine powder and stored in an air-tight container until use. Different

amount of extracts were prepared by using different weights of crushed roots, 10, 50, 100, 200, 300, 400 and 500 g with five replicated. Each extract was made with 50 mL of distilled water and shaken for approximately one minute. The liquid was filtered and then diluted for application. The extract was left in a refrigerator overnight. The following morning the extract was filtered. The spray was applied using a hand compression sprayer. Leaf discs of 10 cm diameter were prepared from bean leaves (*Phaseolus vulgaris* L.) and were transferred to petri-dishes. Ten adults for toxicity, egg laid and hatching were released in each dishes and for the toxicity the adults were exposed for 6 days. However, for the hatching and oviposition the ten adults removed from the petri dishes after a day. Dicofol was used to compare the efficiency of the extract. Dishes were kept in the laboratory The mites were grown under controlled conditions at 26±2°C, 60±5% r.h. on the bean plant in a growth camber and transferred for bioassay tests by using a fine hairbrush.

All data were corrected for control mortality by the formula Abbott (1925) then statistically analyzed using SPSS software program (1999). Means were separated by DUNCAN's multiple range test ($p<0.05$) was used for means analysis.

Results and Discussion

The toxic effect of *A. aestivus* on the adults of *T. cinnabarinus* is shown in Table 1. The root extract of *A. aestivus* was highly toxic against the adults. The percentage mortality was 46.6% at 24 h after exposure and reached to the highest level with 57.1% at 72 h and did not more toxicity at 144 h (9th days). On the other hand, dicofol showed 90% toxicity at 24 h and reached to the highest level at 48 h after exposure. However, in control (non-treated) 2.0% of adults were died.

The mean numbers of eggs laid by *T. cinnabarinus* in the treatments are shown in Table 2. The study showed that the adult did not lay any eggs at 24 h and reached to the highest level with 2.0 eggs per adult at 144 h. In control the mean numbers of eggs laid by the mite was 4.3-4.5 per adult at 48 h. On the other hand, there was no egg laid in treatment with dicofol. The root extract of *A. aestivus* affected 3-4 times more compared to untreated-pesticide and statistically important at all exposure times.

Table 1: Toxicity effect of *Asphedolus aestivus* on adults of *T. cinnabarinus* (%)

	Hours after exposure			
Treatments	24	48	72	144
Extract	46.6±8.3b	53.3±9.1b	57.1±9.4b	57.1±9.1b
Dicofol	90.0±12.4a	100.0±15.4a	100.0±14.7a	100.0±14.7a
Control	1.0±0.1c	2.0±0.5c	2.0±0.6c	5.0±2.1c

Means±SE having different alphabet shows significantly different ($p<0.05$)

Table 2: Mean numbers of eggs laid per adult in the treatments

	Hours after exposure			
Treatments	24	48	72	144
Extract	0.0±0.0b	0.6±0.1b	0.3±0.1b	2.0±0.4b
Dicofol	0.0±0.0b	0.0±0.0b	0.0±0.0b	0.0±0.0c
Control	4.3±1.4a	4.5±1.4a	3.3a	6.3±1.7a

Means±SE followed by the same letter(s) are not significantly different ($p<0.05$)

Table 3: Mean number of hatching eggs in the treatments

	Hours after exposure								
Treatments	24	48	72	96	120	144	168	192	216
Extract	0	0	0	0	0	0	0.0±0.0b	0.0±0.0b	3.0±0.7a
Dicofol	0	0	0	0	0	0	0.0±0.0b	0.0±0.0b	0.0±0.0b
Control	0	0	0	0	0	0	1.6±0.4a	2.4±0.0a	3.0±0.7a

Means±SE followed by the same letter(s) are not significantly different ($p<0.05$)

The mean numbers of hatching eggs in treatments are shown in Table 3. The study showed that the eggs were hatched at 9th day in the treatment with extract. However, the mean numbers in the untreated with pesticide was observed with 1.6 eggs per adult at 7th day and reached to the highest level with 3.0 eggs per adult at 9th days. On the other hand, there were no eggs in treatment with dicofol.

The study showed that the root extract of *A. aestivus* was highly effective with more than 50% mortality over 48 h. The extract also reduced the eggs laid during the experiment by 8-10 times more. Also, it showed that the number of eggs delayed 2 days compared to the untreated experiment. Mansour *et al*. (2004) reported that four plant extracts caused at least 25% mortality and 22 plant extracts caused a significant reduction in the mean number of mites and 12 extracts caused at least 50% mite repellency and 20 extracts caused a significant reduction in the mean number of eggs. Also Mansour *et al*. (1993) found that three formulations from neem seeds had potential acaricide activity against *T. cinnbarinus* and caused least than 65% mortality and repellency and neem extracts have insecticide activity against nearly 200 species of insect (Saxena, 1989). Similar results were also obtained from other botanical pesticides (Roy *et al*., 2005). This is the first study with *A. aestivus* and no information has been available. Therefore, it is difficult to compare the results. Since the active compound is unknown. The result showed that the extract of *A. aestivus* was highly effective compared the other botanical pesticides. Control of the mite in the country is most commonly department upon using systemic acaricides even though much success have been obtained using systemic pesticides for the control of mites on the plants. They could cause some environment and human heath problems. Therefore, much attention has been focused on alternative management methods. Thus, the active compound could be used against *T. cinnabarinus* in greenhouse and fields to reduce the chemical effects on human and environment.

In conclusion, *A. aestivus* was effective in control of *T. cinnabarinus*. The botanical pesticide have potential for acaricidal activity in Integrated Pest Management. However, further research is needed to determine the efficacy levels of the extracts on wide range of common crop pests, naturel enemies and the modes of action of the active ingredients.

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