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ADVERSE EFFECT OF *SORGHUM BICOLOR*, SEA ANEMONE, *CYANOBACTERIA* AND *SIMMONDSIA CHINENSIS* (HOHOBA) EXTRACTS ON THE REPRODUCTIVE PHYSIOLOGY OF THE ADULT FEMALE TICK, *BOOPHILUS ANNULATUS*

(With 3 Tables and 1 Figure)

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التأثير الضار لمستخلصات الذرة ، شقائق النعمان ، والطحالب الزرقاء ، والهوهوبا على فسيولوجياء التكاثر لأناث القراد بوفيلس انيولاتس

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أدى تطبيق التركيزات المختلفة لمستخلصات شقائق النعمان، وزيت الهوهوبا والذرة والطحالب الزرقاء إلى تأثيرات سامة على إناث القراد بوفيلس انيولاتس. حيث كانت الجرعة المميتة عند ٥٠% هى ١,٢٤، ٥,٤، ١٧,٣، ٤٥,٦ ملجم لكل من مستخلصات شقائق النعمان، الهوهوبا، والطحالب الزرقاء، نبات الذرة على التوالى. وقد كان مستخلص شقائق النعمان هو الأكثر فاعلية ثم الهوهوبا، والطحالب الزرقاء وفى النهاية كان مستخلص نبات الذرة الأقل فاعلية. وقد أدى استخدام هذه المستخلصات إلى حدوث تأثير وتثبيط لعملية وضع البيض والنمو الجنينى فى الإناث وخاصة عند استخدام مستخلصات شقائق النعمان والهوهوبا. كذلك كان لاستخدام المستخلصات تأثير واضح فى تثبيط وتشكيل البروتين لإناث القراد بوفيلس انيولاتس.

SUMMARY

Topical application of different concentrations of sea anemone, *Simmondisa chinensis* (Hohoba), *Sorghum bicolor* leaves and *Cyanobacteria* (Blue green algae) extracts had lethal effect on adult

Boophilus annulatus female. The LD_{50} values reached 1.24, 5.4, 17.3 and 45.6 µg. of sea anemone, *Hohoba, Cyanobacteria* and *S. bicolor* respectively. The sea anemone was the most active extract followed by *Hohoba, Cyanobacteria* and finally the least active was *S.bicolor* extracts. Post embryonic development, oviposition and hatching of eggs were inhibited particularly after treatment of female *B.annulatus* with sea anemone and *S.chinensis* extracts. The sequestration of proteins were inhibited in the treated adult female ticks with different extracts.

Key words: *Boophilus annulatus- Sorghum bicolor- Sea anemone- Cyanobacteria - Simmondisa chinensis (Hohoba)-* Ovi position

INTRODUCTION

Cattle ticks *(Boophilus annulatus)* pose a serious threat to live stock farmers in the tropics. In the common wealth Caribbean itself, the losses due to the acarids are estimated to be about USS 62 million (Rawlins and Mansingh, 1987). *Boophilus annulatus* is the fam on vector of *Babesia bigemina,* Crimean Congo hemorrhagic fever virus Bunyaviridae, Nairovirus) was isolated from this tick (Hoogstraal, 1979).

As the global quest for new environmentally safer insecticides, acaricides, nematocides, researchers have screened several natural extracts such as *Sorghum bicolor*, marine toxins (sea anemone), *Simmondsia chinensis* (Hohoba) and *Cyanobacteria* (blue green algae) extracts. Grainge et al. (1986) assessed many plant species that have insecticidal and acaricidal activities. Pradhan et al., (1963), and Jotwani and Sicar (1965), evaluated the insect repellent properties of some plant materials. Radwanski, (1980) pleaded for an international neem tree research and development programme. Schmutterer et al. (1980), Schmutterer and Ascher (1984 and 1987) have reviewed the pesticidal and toxicological properties of the plant origin. William et al. (1996) and Khalaf-Allah (1996), found that there is acaricidal efficacy of cypermethrin against *Boophilus annulatus* ticks.

The aim of this work is to assess the acaricidal actions of different crude extracts from *Simmondsia chinensis* (Hohoba), *Sea* anemone polypeptide, *Cyanobacteria* and *Sorghum bicolor* on reproductive physiology of cattle tick, *Boophilus annulatus*. The change of protein of the whole body ticks was studied by electrophoresis.

MATERIAL and METHODS

Tested biological material:

Plant leaves extracts of *Sorghum bicolor* were extracted in water according to Nassar et al. (1997). Sea anemone was obtained from red sea and prepared according to Akmal, (1998). Sea anemone is polypeptides in nature affecting action potentials are of considerable interest as probes of sodium channel (Michael et al., 1990). *Cyanobacteria* (blue green algae) were collected from fresh water brackish on rocks and water plants, extraction followed the same methods by Carmichael et al., (1990). *Simmondsia chinensis* (Hohoba), provided from Agriculture research center as oil (96% + 4% emulsion).

II- Ticks, *Boophilus annulatus:*

Fully engorged female ticks were collected from the cattle farms in the Faculty of Agriculture Cairo University. Identification of ticks was done according to Hoogstraal et al. (1979) and rearing technique according to the method of Robert and Williams (1991).

III- Bioassay:

Female ticks were topically treated with different extracts, 30 ticks in three replicates ten of each. Ticks received different concentrations (1.25, 2.5, 5, 7.5 and 10 µg) of each extracts and the control individuals were immersed in distilled water. Female treated ticks and the control were kept in plastic match boxes at 29°C and 70-80% RH. Every two days, the eggs were collected from each box then weighed and kept in a test tube for three weeks till embryonic development and hatching. Adult mortality percent was recorded daily for seven days. LC_{50} was estimated based upon probability analysis within 95% confidence limit according to Finny (1971).

IV- Electrophoresis:

Polyacrylamide gel electrophoresis (PAGE) was done to determine the protein values before and after treating females of *Boophilus annulatus* with the extracts according to Cartstrom and Johnson (1983).

RESULTS

Results are obtained at Tables 1, 2 & 3 and Figure 1.

DISCUSSION

1- Lethal effect of *S.bicolor*, Sea anemone, *Cyanobacteria* and *Hohoba* extracts on *Boophilus annulatus* female.

Adverse effects of different extracts on *B.annulatus* were recorded in Table (1). The recorded data indicated that aqueous extracts of sea anemone and *Hohoba* are higher in their acaricidal effect than *S.bicolor* and *Cyanobacteria*. Adult mortality was (100, 100, 96.7, 90 and 53.3%) after treatment ticks with the concentrations of (10, 7.5, 5, 2.5 and 1.25 µg) of sea anemone respectively. While at the same previous concentrations the adult mortality was (98.9, 98.9, 98.9, 30 and 20%) as affected by *Hohoba* extracts. Lowest effect of adult mortalities occurred after treating the female of *Boophilus annulatus* with *Cyanobacteria* and *S. bicolor* extracts. On the other hand, the mortality percent increased by increasing concentrations.

In order of toxicity the LC_{50} was 1.24, 5.4, 17.3 and 45.6 ug for Sea anemone, *Hohoba, Cyanobacteria* and *S.bicolor* respectively. This means that Sea anemone was the most active extract followed by *Hohoba, Cyanobacteria* and finally the least effective was *S.bicolor* extracts. These results are similar to the results obtained by Mansingh and Rawlins (1979) after using different plant neem extracts on cattle tick *B.annulatus.*

II- Effect of Sea anemone, *Hohoba Cyanobacteria S. bicolor* extracts on reproductive potential of *B.annulatus.*

Data recorded in Table (1) reveal that different extracts had inhibition of oviposition. Sea anemone was the most active extract for reducing the egg weight (0.007, 0.15 and 0.18 mg) at concentrations of 5, (2.5 and 1.25 ug) respectively. The percent of egg hatching was 15.7 and 58.7 at the lower concentrations (2.5 and 1.25 ug respectively) of sea anemone extract. In case of *Hohoba* the mean egg weight was 0.007, 0.02 and 0.123 at concentration of (5, 2.5 and 1.25 ug) respectively. The percent of hatching egg was 16.7 and 55 at concentration of 2.5 and 1.25 ug respectively. Moderate effect of inhibition of oviposition and hatching of eggs occurred after treatment of the female of *B. annulatus* by *Cyanobacteria* extracts. The least effect of inhibition of oviposition and percent of the egg hatching was obtained when females were treated by *S. bicolor* extracts. The efficacy order of the effective extracts were sea anemone > *Hohoba* > *Cyanobacteria* > *S. bicolor* (Table 1). The present study revealed that, egg oviposition by the treated female cattle ticks with different crude extracts, usually wrinkled non agglutinated and

dark brown in color, eggs were usually infertile. These results are similar to the finding by Williams and Mansingh (1989 a) after treatment of cattle ticks with different Neem extracts; and Rambold et al. (1987 a) and Williams (1993).

The treated females of *B.annulatus* with different crude extracts (sea anemone, *Hohoba, Cyanobacteria* and *S. bicolor*) which lead to congestion of vitellogenin, this congestion resulted in reduced fecundity and inhibited synthesis of vitellogenin. These results agree with the finding of Rembold and Sieber (1980); and Rembold et al. (1987 a).

III- Effect of different extracts of Sea anemone, *Hohoba, Cyanobacteria* and *S. bicolor* on the total protein of adult females of *Boophilus annulatus*.

Comparative study of the total proteins of adult female *Boophilus annulatus* which were treated by biological agents and control was recorded in Table (2). Recorded results, indicated that protein pattern form adult female of *Boophilus annulatus* represented 4 protein bands when treated with sea anemone, *Hohoba* and *Sorghum bicolor*. While those treated with *Cyanobacteria* have represented 5 protein bands. The electrophoretic patterns of adult *Boophilus annulatus* treated with *Hohoba* varied between 172.44 and 57.563 Kda. While it varied between 189.3 & 61.217, 186.66 & 51.950 and 202.07 & 58.355 Kda after treating female ticks with sea anemone, *Cyanobacteria* and *S. bicolor* respectively. Moreover, electrophoretic patterns had 5 bands which varied from 205 to 59.974 Kda (Table 3). The present study, showed, that sequestration of proteins was inhibited in the treated female ticks with the different extracts These results are similar to the finding of Willliams (1992 and 1993) and Williams and Ajai (1996).

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Table 1: Effect of different extracts of *Sorghum Bicolor*, sea anemone, cyanobacteria and *Simmondisa* chinensis on the survival and reproduction potential of the female tick *Boophilus annulatus*.

Extracts	Concent. µg/tick	Mortalit. % + S.E	LC 50	Mean egg Wt (mg) + SE	Hatchi µg %
Control		0		0.73	95
S.bicolor	1.0	10 (1)		0.3 (0.02)	95
	7.5	6.7 (.58)		0.43 (0.12)	95
	5	6.7 (1.2)	45.6	0.58 (2.3)	95
	2.5	0 (0)		0.56 (1.7)	95
	1.25	0 (0)		0.72 (0.9)	95
S. anemone	10	100 (0)		0 (0)	0
	7.5	100 (0)		0 (0)	0
	5	96.7 (0.01)	1.24	0.007 (0.0)	0
	2.5	97 (0.2)		0.15 (0.03)	15.7
	1.25	53.3 (1.3)		0.18 (0.03)	58.7
Cyanobact	10	20 (0.4)		0.1 (0.02)	30
	7.5	13.3 (0.3)		0.2 (0.02)	58.3
	5	13.3 (0.3)	17.3	0.17 (0.01)	33.3
	2.5	10 (0)		0.17 (0.01)	45
	1.25	0 (1)		0.3 (0.0)	68.3
S. chinensis	10	98.9 (1.7)		0 (0)	0
	7.5	98.9 (0.17)		0 (0)	0
	5	98.9 (1.7)	5.4	0.007 (0)	0
	2.5	30 (0.02)		0.02 (0)	16.7
	1.25	20 (0.1)		0.123 (0.01)	55

Table 2: Effect of *S. bicolor*, sea anemone, *Cyanobacteria* and *Simmondsia* chinensis on the total protion of Boophilus annulatus.

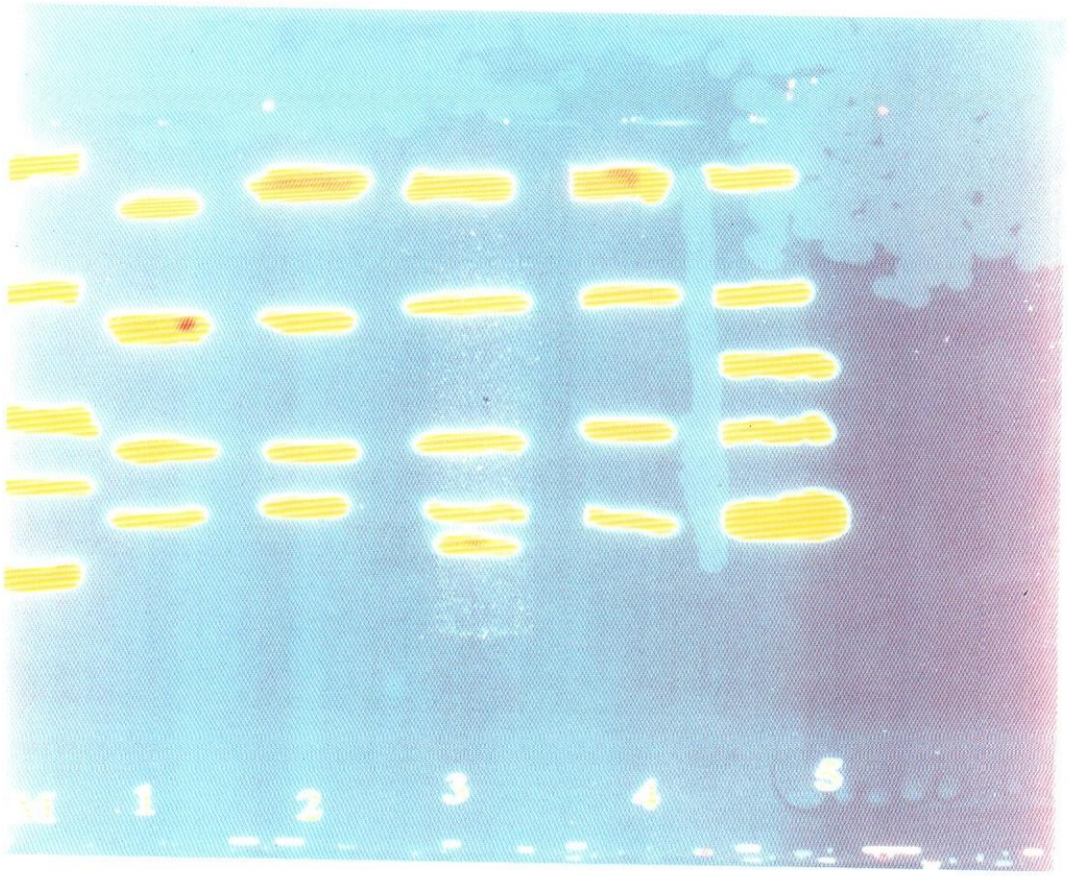
Tested materials	Total protein
1. Sea anemone	2.968
2. *Cyanobacteria* (blue green algae)	2.989
3. *S. bicolor*	2.493
4. *S. chinensis Hohoba)*	3.053
5. Control	2.218

Table 3: Effect of different crude extracts on different protein bands of *Booplilus annulals.*

Lanes Bands	M.W					
	M	Hohoba (*S.chinen)*	Seaane	Cyanob	S.bicol	Control
1	205	172.44	189.37	186.66	202.07	205
2	116	110.84	112.48	114.81	116.84	119.39
3	97	83.684	84.478	89.633	97.40	106.18
4	66	57.563	61.217	59.974	58.355	97.4
5	45	-	-	51.950	-	54.974

M: stander.

Effect of different extracts on the total protein of adult females of *Boophilus annulatus*



M. Stander

1. **Hohoba.**
2. **Sea anemone.**
3. **Cyanobacteria.**
4. **S. bicolor.**
5. **Control.**