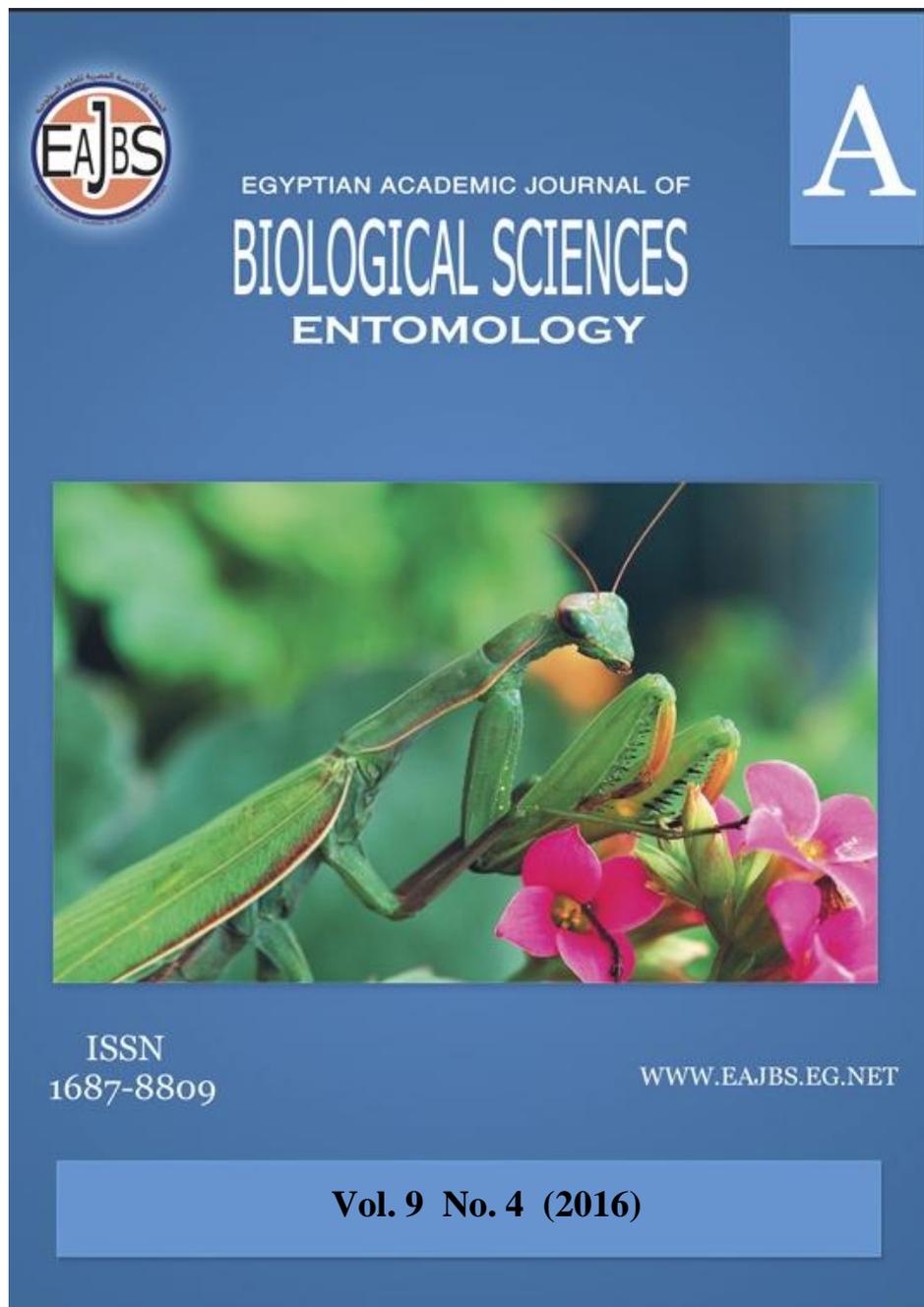


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Efficacy of Some Plant Extracts on the Biological Aspects of the Two Spotted Spider Mite *Tetranychus urticae* Koch (Acari: Prostigmata: Tetranychidae)

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ABSTRACT

Our local traditional herbal and medical plant may be interduce alternative bio material alter the biology of the red spider mite *Tetranychus urticae* Koch. The present study was conducted to determine the direct and residual effects of the two natural plant extracts, aerial parts of *Artemisia vulgaris* L. and the seeds of *Acacia concinna* (Willd.) using soxhelt extractor, against the two spotted spider mite, *Tetranychus urticae* Koch, at the laboratory controlled conditions, $30\pm 2^{\circ}\text{C}$ and $70\pm 5\%$ RH. Two concentrations, 0.25% & 0.5% were utilized to study its effects on the biological aspects of *T. urticae*. The results confirmed the effective influence of these extracts on mite life aspects, which altered and prolonged the mite life cycle, and that reduced the number of generation/year. Moreover, the used extracts also achieved of high mortality percentages, reached 65.52% and 51.72% in pre-oviposition period and oviposition period respectively, when treated with the highest concentration of *Artemisia* extract. Reduction in hatchability achieved 61.11%, 57.11%, 54.11% and 52.11% for *Artemisia* 0.25% & 0.5% and *Acacia* 0.25% & 0.5% respectively.

INTRODUCTION

The two-spotted spider mite, *Tetranychus urticae* Koch is one of the most economically important pests in a wide range of outdoor and protected crops (fruit, vegetables, and ornamental plants) worldwide. This mite usually feed on leaves and fruits, consequently, causing reduction in both quantity and quality of the crops (Hosny and Isshak, 1967; Helle and Sabelis, 1985; Russell *et al.*, 1993). Due to its short life cycle, abundant progeny and arrhenotokous reproduction, *T. urticae* can develop resistance to acaricides very rapidly. As a result, it is considered one of the “most resistant species” in terms of the total number of pesticides to which populations have become resistant, and its control has become problematic in many areas worldwide. In Addition, chemical control can cause environmental and food contamination and toxicity to non-target organisms (Pimentel *et al.*, 2009; Tavares *et al.*, 2010). The development of mite resistance to acaricides may be forced the farmers to use extensive doses of acaricides, (Pimentel *et al.*, 1992). The main problem with the development of pesticide resistance and the resurgence of mite populations is the use of non-selective synthetic pesticides that have negatively effective on the natural enemies (Cranhamj & Helle, 1985). Attention has been focused on the use of natural pesticides and plant extracts in the IPM programs

because of their selectivity, biodegradability and few side effects on non-target organisms and the environment (Singh and Upadhyay, 1993; Isman, 2000; Isman *et al.*, 2001; Chiasson *et al.*, 2001; Basta & Spooner-Hart, 2002; Rasikari *et al.*, 2005). Many publications were showed that using plant extracts with high bio-activity in developing new biogenic acaricide or producing new pesticides had already been one of the hot spots of pesticide research and developing science. Plants produce secondary metabolites many of which can have insecticidal properties, as an alternative to synthetic insecticides (Potenza *et al.*, 2004). The aim of the present work is to study the effect of the two types of plant extracts *Acacia concinna* (commonly known as Karad) and the aerial parts of *Artemisia vulgaris* (commonly known as Sheeh) on life cycle of *T. urticae*.

MATERIAL AND METHODS

Material:

Plant material:

Essential oil was extracted from the seeds of *A. concinna*, due to the seeds richness of fruiting bodies over leaves in different plants, considering their contents of secondary metabolites (El-Tayeb *et al.*, 2009; El Kamali, 2001), and the aerial parts of *A. vulgaris*. They were collected from the Shandaweel research station geographical area, Sohag Governorate, Egypt. The selection of plant species was based on previous work and on the use of plant products in local traditional medicine. Plants were identified by Dr. Yassin M. Soliman, Faculty of Agriculture Sohag University.

Preparation for extraction:

The collected plant materials were dried for about 15 days in a shady room. After that, the dried samples were grinded by grinding mixer (Thomas-wiley Laboratory mill, Model 4). Then, sieved by 40 meshes to give equal particle size. The powder was stored in polythene bags at room temperature before extraction. Organic solvent extraction of the plant material was done using the soxhlet extractor (Hot Continuous Extraction) using standard procedures as outlined by Cseke *et al.* (2006). Powder (20 g) was filled in the thimble and extracted successively with 70% methanol, until the eluting solvent turned colorless in the thimble (about 48 hours). After that, the solvent was evaporated using rotary evaporator and crude extracts were weighed and stored in refrigerator. The operation was repeated to collect the appropriate amounts of extracts.

Preparation of the test concentrations from the crude extract:

A known amount of crude extract was dissolved in respective solvent in 1:1 proportion and serially diluted with water to obtain the target concentrations of 0.25 and 0.5%. The selection of concentrations was based on previous works (Deepa and Remadevi, 2011 & Edriss *et al.*, 2012).

Two-spotted spider mite, *T. urticae* rearing technique:

The original colony of spider mite *T. urticae* Koch was supplied from heavily infested castor leaves which we got from the farm of Shandaweel Research Station and reared on it during 2016. It was maintained in laboratory conditions at 30 ± 2 C° and 70 ± 5 % R.H.

Methods:

Thirty replicate castor leaf discs were dipped in the two concentrations from each extract for around 1 min. (Ladhari *et al.*, 2013). Control leaf discs were immersed in distilled water and let to dry at room temperature. Leaf discs were put on a cotton

wool bed in Petri dishes (10 cm diameter) the cotton bed was supplied with water when is needed to maintain the leaf discs fresh. Leaf discs were replaced with fresh ones when needed.

Ten females transferred to leaf discs and incubated for 24 hours to deposit eggs, then adults were transferred from discs. The obtained eggs were incubated in laboratory conditions at 30 ± 2 C° and 70 ± 5 % RH., until hatching. One newly hatched larva was transferred to lower surface of each castor leaf discs (2 cm. diam.) kept separately on a disc for recording duration of different biological aspects. The same former steps were followed with untreated leaf discs as a control. Just before female emergency, two males from the main colony were added to each leaf disc to assure mating. While the number of hatched eggs was recorded. The percentage of hatchability was calculated. While each concentration was represented by 30 eggs and similar number was used as a control.

Data analysis:

Percentage of mite mortality was calculated and the mortality in the control was corrected using Abbott's formula (Abbott, 1925).

The data was subjected to analysis of variance (ANOVA) and the means were separated using Least Significant Difference (LSD). (only 14 replications, that continued alive for the end of the experiment)

RESULTS AND DISCUSSION

The effect of plant extracts on the two-spotted spider mite *T. urticae* has been discussed as Irregular life cycle, mortality and reduction of some phases.

Irregular life cycle:

The obtained results in Table (1) revealed that, the tested plant essential oils affected on the incubation period; immature stages and life cycle of the two-spotted spider mite *T. urticae* as follows:

Incubation period:

The results from this study indicated that, tested concentration of *Acacia* and *Artemisia* elongated the all different stages. In Table (1) the incubation period increased by all tested concentrations of *Artemisia* (0.25 & 0.5%), which was 5.25 & 5.18 days, respectively. These periods slightly decreased insignificantly to reach 5.21 & 4.89 when treated with *Acacia* at the same concentration, respectively. These treatments were differed significantly with control (4.07 days). These results agree with Khedr and El-Kawas (2013) who demonstrated that major of tested concentration of *coriander* oil elongated the incubation period of tested eggs of *T. urticae*.

Total immature stages:

Each active developmental stage of two-spotted spider mite before reaching adult (one larval and two nymphal stages, each active stage is followed by quiescent one). Results in Table (1) revealed that the total immature stages which treated with *Acacia* 0.25% elongated the time lasted to reach adult stage (8.68 days), with significant differences with all treatments and control, followed by *Acacia* 0.50% (7.14 days), which in turn, showed significant differences with the rest of treatments and control. *Artemisia* extract comes in second place in terms of impact on duration without significant differences between its concentrations (0.25 & 0.50%), where they achieved 5.97 & 5.71 days respectively. Meanwhile, control located the lowest number of days (5.2 days) without significant differences with *Artemisia* 0.50%. These results can be interpreted in accordance with Regnault-Roger and Hamraoui

(1995) and Ahn *et al.* (1998) who indicated that, the insecticidal constituents of many plant extracts and essential oils are mainly monoterpenoids, which are typically volatile and rather lipophilic compounds that can penetrate insects rapidly and interfere with their physiological functions (Lee *et al.*, 2002). In addition, differences between the used extracts can explained in Craveiro *et al.*, (1983), they mentioned that, each compound has a chemical structure allows the compound to penetrate and go directly to the active site to make its action and depend on the differences of the chemical structure of the compounds.

Table 1: Effects of different concentrations of plant extracts on mean duration (in days) of the immature stages and life cycle of the two-spotted spider mite *T. urticae*.

	Control	<i>Artemisia vulgaris</i>		<i>Acacia concinna</i>		LSD	F	
		0.25%	0.5%	0.25%	0.5%			
Inc. period	4.07 ^B ±0.089	5.18 ^A ±0.232	5.25 ^A ±0.164	5.21 ^A ±0.164	4.89 ^A ±0.13	0.4364	10.3817	
Total immature	5.20 ^D ±0.172	5.97 ^C ±0.259	5.71 ^{CD} ±0.194	8.68 ^A ±0.295	7.14 ^B ±0.338	0.6664	35.155	
Larva	A	0.75 ^C ±0.069	1.68 ^A ±0.1	1.79 ^A ±0.125	1.82 ^A ±0.1	1.32 ^B ±0.085	0.2703	22.2576
	Q	0.71 ^B ±0.069	0.68 ^B ±0.066	1.00 ^A ±0.105	0.68 ^B ±0.118	0.43 ^C ±0.055	0.2492	5.3388
Protonymph	A	1.02 ^C ±0.119	0.89 ^{CD} ±0.107	0.71 ^D ±0.069	2.11 ^A ±0.107	1.57 ^B ±0.103	0.2766	34.3557
	Q	0.70 ^A ±0.075	0.68 ^A ±0.066	0.64 ^A ±0.063	0.71 ^A ±0.069	0.68 ^A ±0.066	0.1978	0.1434
Deutonymph	A	0.88 ^{CD} ±0.125	1.04 ^C ±0.111	0.64 ^D ±0.063	1.89 ^A ±0.077	1.50 ^B ±0.148	0.2986	22.8204
	Q	1.14 ^{BC} ±0.082	1.00 ^C ±0.091	0.93 ^C ±0.089	1.46 ^{AB} ±0.192	1.64 ^A ±0.206	0.4063	4.5904
Life cycle	9.27 ^D ±0.192	11.14 ^C ±0.275	10.96 ^C ±0.213	13.89 ^A ±0.368	12.04 ^B ±0.388	0.7694	38.7908	

Means (± Standard error) in the same letters are not significantly different by LSD Test at P=0.05.

Larval stage:

Statistical analysis showed insignificant differences between the treatment of *Acacia* 0.25%; *Artemisia* 0.5% and 0.25% concentrations (1.82, 1.79 & 1.68) days respectively, and differed significantly with the treatment of *Acacia* 0.50% (1.32 days), finally, control recorded 0.75 day with significant differences with all treatments and concentrations for the active larval stage of the red spider mite. Regarding the quiescent larvae, *Artemisia* 0.5% recorded the longest time (one day) with significant difference with all treatments and concentrations, then control, *Artemisia* 0.25% and *Acacia* 0.25% were ranked the second statistically group, without significant differences among them by 0.71; 0.68 and 0.68 days respectively, finally, *Acacia* 0.50% recorded 0.43 day with significant decrease (Table 1).

Protonymphal stage:

Statistical analysis of the data revealed that *Acacia* 0.25% caused high prolonged day effect on the active protonymphal stage of *T. urticae* by 2.11 days, followed with significant differences by *Acacia* 0.25% (1.57 days), followed with significant differences by untreated mites (1.02 days), followed by insignificant differences with *Artemisia* 0.25% (0.89 day) and significantly with *Artemisia* 0.5% (0.71 day). The quiescent protonymphal phase was arranged in ascending order in terms of duration without significant differences among them i.e. *Acacia* 0.25; control; *Acacia* 0.5%; *Artemisia* 0.25 and 0.5% by 0.71; 0.70; 0.68; 0.68 and 0.64 days, respectively.

Deutonymphal stage:

The same trend of results has been received during statistical analysis of deutonymphal stage, which *Acacia* 0.25% caused high prolonged the period to 1.89 days, followed with significant differences by *Acacia* 0.25% (1.50 days), followed with significant differences of *Artemisia* 0.25% (1.04 days) followed by untreated mites (0.88 day) without significant differences, and differ significantly with *Artemisia* 0.5% (0.64 day). Regarding to quiescent deutonymph phase, control treatment brokered between the impact of both extracts by 1.14 days, where it insignificantly differs with *Acacia* 0.25% (1.46 days) and significantly differs with *Acacia* 0.5% (1.64 days); on the other hand, control was differed significantly with *Artemisia* at both concentrations 0.25 & 0.5% (1.00 & 0.93 day respectively), which insignificantly differ among each.

Life cycle:

Concerning to life cycle duration of egg, larva, proto and deutonymphal stages, the extract of *Artemisia* achieves the high prolonged periods with significant differences among the two concentrations (0.25 & 0.5%) whereas, the life cycle lasted 13.89 & 12.04 days, respectively. Then both concentration of *Artemisia* (0.25 & 0.5%) came in the third significant level without insignificant difference with each other by 11.14 & 10.96 days respectively. Finally, untreated mites recorded 9.27 days as the shortest life cycle.

Effect of different concentrations of *Acacia* and *Artemisia* extracts on female longevity:**Longevity:**

In respect of longevity (as aggregate of preoviposition; oviposition and post oviposition periods), treatments - including control - can be arranged in a descending order in terms their longevity/days, *i.e.* *Artemisia* (0.5 & 0.25%); *Acacia* 0.25%; control and *Acacia* 0.5% (significant different among themselves) by 22.14; 17.89; 16.14; 14.29 and 11.18 respectively. These results are in harmony with the finding of El-Sharabasy (2010) who mentioned that, adults are more susceptible to the leaf extracts than immatures.

Pre-oviposition period:

Data in Table (2) showed that *Acacia* extract (0.25%) caused elongation of the pre-oviposition period; it was recorded 1.79 days and 1.04 at 0.5% concentration with significant differences with *Artemisia* extract 0.5% (1.43 days), which also has significant differences with *Artemisia* 0.25% (1.04 days) compared with untreated (0.86 day).

Oviposition period:

From the same results, it is also clear that *Artemisia* 0.5% caused elongation of the oviposition period, it was recorded 17.00 days with significant differences with *Artemisia* 0.25% (14.43 days) which also has significant differences with *Acacia* 0.25% and control by 12.43 and 11.50 days respectively, followed with significantly difference with *Acacia* 0.5% (8.64 days).

Post-oviposition period:

Obtained results also indicated that, *Artemisia* 0.5% caused elongation of the post-oviposition period, it was recorded 3.71 days with significant differences with *Artemisia* 0.25% (2.43 days) which also has significant differences with *Acacia* 0.25%; control and *Acacia* 0.5% by 1.93, 1.93 and 1.50 days respectively, without significant differences among them. Our results are in agreement with that obtained by Ibrahim and Amer (1992) who demonstrated that essential oil from *Callistemon lanceolatus* DC. had a strong effect on some biological aspects of *T. urticae* pre-oviposition females was prolonged.

Generation period:

The mean days spent by *T. urticae* to complete the generation reach 15.86 days for *Acacia* 0.25% treatment followed with significant difference by *Acacia* 0.5% (13.07 days) followed insignificantly by *Artemisia* 0.5% (12.39 days) and significantly by *Artemisia* 0.25% (12.18 days) then, control located the last significant group by 10.13 days.

Table 2: Effects of different concentrations of plant extracts on mean duration (in days) of the adult females of the two-spotted spider mite *T. urticae*.

	Control	<i>Artemisiavulgaris</i>		<i>Acacia concinna</i>		LSD	F
		0.25%	0.5%	0.25%	0.5%		
Longevity	14.29 ^D ±0.456	17.89 ^B ±0.436	22.14 ^A ±0.619	16.14 ^C ±0.536	11.18 ^E ±0.536	1.515	58.7414
Pre-oviposition	0.86 ^C ±0.097	1.04 ^C ±0.082	1.43 ^B ±0.156	1.79 ^A ±0.069	1.04 ^C ±0.082	0.2937	13.095
Oviposition period	11.50 ^C ±0.454	14.43 ^B ±0.416	17.00 ^A ±0.419	12.43 ^C ±0.416	8.64 ^D ±0.487	1.253	50.5114
Post oviposition	1.93 ^C ±0.103	2.43 ^B ±0.137	3.71 ^A ±0.146	1.93 ^C ±0.245	1.50 ^C ±0.105	0.4576	28.1765
Generation	10.13 ^D ±0.199	12.18 ^C ±0.321	12.39 ^{BC} ±0.263	15.68 ^A ±0.389	13.07 ^B ±0.38	0.8041	49.8486
Life span	24.41 ^D ±0.482	30.07 ^C ±0.508	34.54 ^A ±0.764	31.82 ^B ±0.626	24.25 ^D ±0.645	1.73	56.1126
Fecundity	128.6 ^A ±3.075	75.50 ^C ±4.534	95.14 ^B ±4.68	84.14 ^{BC} ±5.877	79.14 ^C ± ^{3.351}	12.4	24.1742
Hatchability	126.8 ^A ±3.18	63.00 ^C ±3.705	85.57 ^B ±5.627	65.71 ^C ±4.769	63.93 ^C ±2.111	11.2	47.6329
Daily Rate	11.34 ^A ±0.403	5.28 ^D ±0.336	5.62 ^D ±0.281	6.66 ^C ±0.32	9.35 ^B ±0.362	1	54.7973

Means (± Standard error) in the same letters are not significantly different by LSD Test at P=0.05

Life span:

Data in Table (2) showed that *Artemisia* 0.5% caused high effect on the elongation of the red spider mite, *T. urticae* life span which was 34.54 days. These days decreased significantly when *T. urticae* was treated with low concentration of *Acacia* 0.25% which was 31.82 days, followed by significant differences by *T. urticae* treated with low concentration of *Artemisia* 0.25% which was 30.07 days, then control and the highest concentration of *Acacia* 0.5% were placed in late significant group by 24.41 and 24.25 days respectively. Adult female of *T. urticae* was more susceptible to plant extracts (devil's apple, lupine, black pepper, caraway, fenugreek, canna, turnip, garlic and onion), than the egg stage Amer (1984), as well as the plant *Conyzea dioscoridis* (Farag *et al.*, 1989).

Fecundity:

All treatments caused a significant lack in fecundity (total number of eggs laid per female) comparing with control which recorded average number of 128.6 eggs/female, with significant difference (shortage = 33.46 eggs) from the nearest other treatment (*Artemisia* 0.5% by 95.14 eggs) followed insignificantly by *Acacia* 0.25% (84.14 eggs) and significantly differed with the rest treatments (*Acacia* 0.5% by 79.14 eggs and *Artemisia* 0.25% by 75.50 eggs).

Hatchability:

The mean numbers of hatched eggs in each treatment were estimated in Table (2), it's clear that control superior dramatically over all treatments 126.8 hatched eggs, hatchability is a measure inseparable from fecundity and is often followed in terms of the arrangement and significant differences. This issue will discuss in

following part.

Daily Egg Rate:

Data shown in Table (2) clearly indicated the promising effect of this extract. Statistically, control occupied the highest eggs laid per day (11.34 eggs) with significant differences with all treatments, *Acacia* 0.5 & 0.25% by 9.35 & 6.66 eggs/day respectively, while *Artemisia* 0.5 & 0.25% occupied the lowest mean numbers of eggs laid per day by 5.28 & 5.62 eggs/day. These results are in agreement with published literature (El-Gengaihi *et al.*, 1996; Amer *et al.*, 2001; Momen *et al.*, 2001; Refaat *et al.*, 2002; Omar *et al.*, 2009) who demonstrated that oils from *T. vulgaris*, *M. viridis*, *M. piperita*, *R. officinalis*, *M. hortensis*, *L. officinalis*, and *M. spicata* caused a reduction in the total number of eggs laid by females of *T. urticae*. Daily Rate affected by *Artemisia* 0.25% and 0.5% which was (5.276 & 5.621) eggs, respectively, less than *Acacia* 0.25% and 0.5% which was (6.659 & 9.35) eggs, respectively. These are compared with control which was 11.34 eggs.

The mortality and reduction of some phases:

Immature stages:

Table (3) showed the relation between the percentages of mortality and concentrations of plant extracts of *A. vulgaris* and *A. concinna* on eggs and adult females of *T. urticae*. It is important to point out that the mortality and reduction of different stages on *T. urticae* were affected with plant extracts. The forgoing results indicate that the extracts of *Acacia* and *Artemisia* oils have properties which cause mortality of *T. urticae*. Total immatures and the immature mortalities of two-spotted spider mite were recorded by *Acacia* treatment reached to 10.34% at 0.5% concentration. This percentage decreased to reach 3.45% when treated with 0.25% *Artemisia*. While *Artemisia* 0.5% and *Acacia* 0.25% were the same result 3.45% have no effect on the total immature. These, when compared with control which was zero (Attia, *et al.*, 2011a; 2011b; and 2012), demonstrated that plant extracts produce a significant mortality of the two-spotted spider mite at low concentrations.

Longevity:

Longevity of *T. urticae* recorded (51.72 & 31.03%), respectively, when treated with *Artemisia* at concentration 0.25 and 0.5%, respectively. While these percentages decreased to reach 20.69 & 10.34%), respectively, when treated with *Acacia* at the same concentrations, respectively. Essential oils can affect insects in several ways: they may disrupt major metabolic pathways and cause rapid death, act as contact insecticides (Saxena *et al.* 1992), fumigants (Shaaya *et al.*, 1997), and repellents (Plarre *et al.*, 1997). Our results agree with El-Sharabasy (2010) who demonstrated that the adults are more susceptible to the leaf extracts than immatures. El-Sharabasy (2010) reported that ethanolic leaf extraction of *Artemisia judaica* L. was effective as toxic and repellent against adult females and immature stage of *T. urticae*.

Fecundity:

Meanwhile, *Artemisia* reduced the red spider mite fecundity percentage which was (53.02 % & 52.59 %) at the same concentration, respectively. These percentages decreased to reach (42.16 % & 43.69 %) when treated with *Acacia* at the same concentration, respectively. Furthermore, the essential oil of *Mentha longifolia*, *Salvia officinalis*, and *Dracocephalum moldaviacea* showed toxic and biological effects against eggs of *T. urticae* (Amer *et al.*, 2011). Moreover, the essential oils are known to reduce growth and fecundity of insects and act as antifeedants and molting inhibitors (Arnason *et al.*, 1989).

Table 3: Percentages of mortality and reductions of different stages of *T. urticae* when fed on plant treated with *A. vulgaris* and *A. concinna*.

Stages	Mortality and reduction%			
	Artemisia 0.25%	Artemisia 0.5%	Acacia 0.25%	Acacia 0.5%
Inc. period	0.00	0.00	0.00	0.00
larva A	6.67	0.00	0.00	0.00
larva Q	6.67	0.00	0.00	0.00
Protonymph A	6.67	0.00	0.00	13.33
Protonymph Q	6.67	0.00	0.00	13.33
Deutonymph A	6.67	0.00	0.00	13.33
Deutonymph Q	6.67	0.00	0.00	13.33
Total immature	3.45	-3.45	-3.45	10.34
Life cycle	3.45	-3.45	-3.45	10.34
Pre-oviposition period	3.45	65.52	-3.45	10.34
Oviposition period	31.03	48.28	20.69	10.34
Post-oviposition period	31.03	51.72	20.69	10.34
Longevity	31.03	51.72	20.69	10.34
Generation	31.03	51.72	20.69	10.34
Life span	31.03	51.72	20.69	10.34
Fecundity	53.02	52.59	42.16	43.69
Hatchability	60.43	57.61	56.11	54.50

Hatchability:

On the other hand, *Artemisia* affected on the percentages of egg hatchability of red spider mite to reach 60.43 & 57.61 % at concentration 0.25 and 0.5%, respectively. These percentages decreased to reach 56.11 & 54.50 % when treated with *Acacia* at the same concentrations, respectively. The marked decline in egg hatchability resulting from diffuse of oil vapors into eggs and affected the physiological and biochemical process associated with embryonic development (Raja *et al.*, 2001). Each compound has a chemical structure allows the compound to penetrate and go directly to the active site to make its action. Differences of biological activity of oils depend on the differences of the chemical structure of the compounds (Craveiro *et al.*, 1983).

CONCLUSION

The present study revealed that the *A. vulgaris* and *A. concinna* have acaricidal activities against *T. urticae*. They were suppressing the population of *T. urticae* through their effects on different biological aspects. We can conclude that, the extracted essential oil from the aerial parts of *Artemisia* were found to have an acaricidal effective against *T. urticae* on the adult more than the extracted essential oil from the seeds of *Acacia* when compared with control. Moreover, *Acacia* has prolonged effect and mortality on immature stages. While *Artemisia* has high effect on the elongation, mortality, reduction of fecundity, and hatchability. On the other hand, the extracted essential oil is safe to use for humans and the environment, and it slow in the development of resistance. So, we recommended that, *Artemisia vulgaris* and *Acacia concinna* essential oils can use as a promising tool for the two spotted spider mite *T. urticae* in IPM program.

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ARABIC SUMMERY

تأثير بعض المستخلصات النباتية على المظاهر البيولوجية للعنكبوت الاحمر ذو البقعتين *Tetranychus urticae* Koch (Acari: Prostigmata: Tetranychidae)

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تذخر بينتنا المحلية بالعديد من النباتات والاعشاب الطبية التي تستخدم منذ القديم في مختلف الاغراض. تستهدف هذه الدراسة قياس تأثير مستخلصات الميثانول لتركيزين (٠,٢٥% و ٠,٥٠%) من اثنين من هذه النباتات, الاجزاء الهوائية من الشيح *Artemisia vulgaris* L. وبذور السنط (*Acacia concinna* (Willd.) (باستخدام جهاز سوكلست) علي المظاهر البيولوجية ونسبة موت العنكبوت الاحمر ذو البقعتين *Tetranychus urticae* Koch. اجريت هذه التجارب معمليا تحت ظروف متحكم بها (٣٠±٢°م & ٧٠±٥% رطوبة نسبية). اكدت النتائج أثر هذه المستخلصات علي إطالة أطوار العنكبوت الأحمر مما ينعكس علي دورة حياته وبالتالي تقليل عدد الأجيال في السنة, حيث كان لبذور السنط تأثير قاتل وسبب إطالة للأطوار غير الكاملة, بينما كان للشيح تأثير كبير علي إطالة العمر ونسبة الموت وخفض الحيوية وخفض نسبة الفقس للعنكبوت الأحمر. أوضحت البيانات التأثير القوي للمستخلصات علي نسبة فقس بيض العنكبوت الأحمر. وصلت نسبة الخفض إلي ٦٠,٤٣% و ٥٧,٦١% لمستخلص الشيح ٠,٢٥% و ٠,٥٠% علي التوالي, وكان هذا الخفض ٥٦,١١% و ٥٤,٥٠% لمستخلص بذور السنط ٠,٢٥% و ٠,٥٠% علي التوالي.