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Efficiency Comparison of Two Acaricides, Mycetism *Boletus satanas* (Lenz) and Plant Extract (Eucalypts) Converted to Nano Particles Images on *Tetranychus urticae* (Koch)

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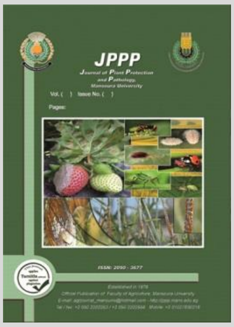

ABSTRACT

Laboratory and field experiments were carried out to evaluate the toxic effect and also the bioactivity of certain recently conventional pesticides (acarmite nano, acarmite common, Spirodiclofen nano, Spirodiclofen common, eucalypts extract nano eucalypts extract common, *boletus satanas* nano and *boletus satanas* common) against females adult and eggs for two spotted "spider mite" *Tetranychus urticae,* Koch. Moreover, to evaluate the sub lethal doses side effects of compounds tested on several bio-aspects of *T. urticae*, and evaluates of these toxicological actions of these compounds aginst tested pest *T. urticae,* on infested cottons under the field condition. Data obtained cleared that, the acarmite nanoparticles was the biggest toxic against females adult of *T. urticae* followed by common solution of acarmite.While nanoparticles of each eucalypts extract and *boletus satanas* give intermediate toxic to tested femoles of *T.urticae* .Common solution of eucalypts extract and *boletus satanas* were lowest action of toxic against *T.urticae* females.

Keywords: Acaricides, Mycetism, *Boletus satanas*, Nano Particles and *Tetranychus urticae*.

INTRODUCTION

Tetranychus urticae have piercing and sucking mouthpart, feed on plant tissues using these mouthparts by insert them inside plant and prefer the lower surface of leaf, Attia *et al*., 2013, and the mite inject of substances "phyto-toxic" lead to highly destructions for plant plastids and production of spots necrotic on surface of leaf. Commonly controlling of spider mites used measure of pesticides, and the extensive using of chemical pesticide for controlling of *T. urticae;* highly reproductive potential; the short life table and mating system led to more resistance for the spider mites, Van leeuwen *et al.,* 2009. The major of resistant of arthropods depinding on chemical pesticide numbers that has developed their resistance. Used of synthetic pesticides, and associated issues of pollution environment and resistance led to more demands for development of more pesticides selectivety, also mode of action devolopment, less hazard on environment, keep to natural enemies and agents of biological control, Steiner *et al.*, 2011. Thanks for newly ways of mites controlling, the nature products is wonderful and characterized by lower level pollution, lower toxic to mammals and suitable to safety of environments than synthetic pesticides, liu *et al*., 2000. Nanotechnology has the potential to revolutionize (develop) the current technologies utilized in numerous sections as agricultural. From unconventional methods "nanotechnology", maybe the perfect way and solution of the control pest management and these materials of nanotochnology different way and will be useing of insect management and pesticides formulation.

Therefore, it can be also, claimed that nanotechnology one of ecofriendly without negative impacts on environments, Rai and Ingle, 2012. The emulsions of nano have an identical and intensely little drop size, usually, in range of 1-100nm. On the other hand, nano emulsion characterized by stability, viscosity is lowest and optical transparency and appealing system in some industrial applications, i.g., in field of pharmacy "delivery system"; cosmetics formulations and agro-chemicals for delivery of pesticides, Wang *et al.,* 2007.

This study was administered to evaluate effects of some compounds and their nanoparticles against *T. urticae* *in vitro* and *in vivo* conditions on cotton plants.

MATERRIALS AND METHODS

1. Culture techniques :

The prey special, *Tetranychus urticae*, Koch., was reared according to Dittrich, *et al* (1962).

2- Tested Compounds:

Eight formulated compounds were used; the doses were calculated on basis of "ppm" of a.i. "active ingredient".

a- Acarmite nanoparticals:It was supplied by EL-Help Pesticide and Chemicals Company, Egypt.
b- Acarmite common
c- Spirodiclofendiclofen nano particals: it had been supplied by EL-Help Pesticide and Chemicals Company, Egypt.
d- Spirodiclofendiclofen common
e- Eucalypts extract nano particals :(95 %) was provided by Centeral Agricultural Pesticides Laboratory-Natural oil was applied at rate of 0.5 L / fedan.
f- Eucalypts extract common
g- *Boletus satanas* nanoparticles :(95 %) was provided by Centeral Agricultural Pesticides Laboratory-Natural oil was applied at rate of 0.5 L / fedan.
h- *Boletus satanas* common

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3. Preparation of tested compounds in nano size .

The solutions containing nanoparticles compounds were made by the laboratory of nanotechnology, Faculty of Science, Kafrelsheikh University. The concentrations of those compounds were identical concentrations of common solutions and it were colloidal suspension form.

The tested pesticide formulations and extracted were synthesized by mechanical methods according to strategies represented by P. Heera and S. Shanmugam. (2015). These compounds kept their stability in cultural medium. The precipitate was washed with ethanol and was dried in vacuum El-Kemary *et al.,* (2010).

Characterization of commercial and prepared nanoparticles.

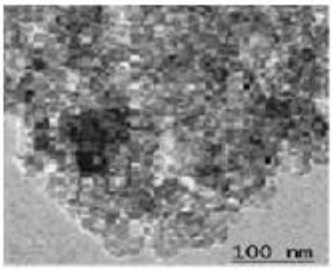

Figure 1. shows the TEM image of Acarmite nanoparticals.

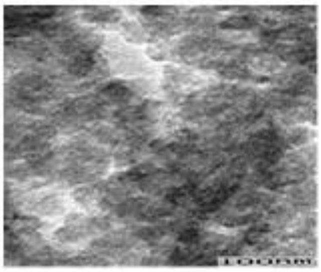

Figure 2. shows the TEM image of Spirodiclofen nanoparticals.

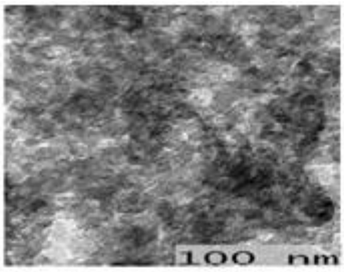

Figure 3. shows the TEM image of Eucalypts extract nanoparticals.

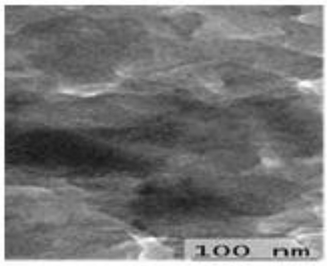

Figure 4. shows the TEM image of *Boletus satana*s nanoparticals.

4. Advantages of leaf discs as experimental arenas:

Leaf discs are convenient means for providing experimental arenas of ordinary size. Standardization of arena size has the advantage that providing a known number of prey automatically provides those preys at a set density (number/unit area). Discs can be cut to provide a more uniform surface with respect to feeding and oviposition sites than whole leaves.

5- Discs Preparation:

The discs of cottons were cuting by use of cork-borer. In order that they were bisected by midrib and place lower surface to upper on the water soaked cottons wool bad in Petri-dishes. In predation experiments, the required number of *T. urticae* eggs was then arranged out on every disc. Discs were left for one hour after which they were checked in case any prey eggs had been damaged throughout transfer. Also, replaced the infested eggs to discs before treatments. Unless otherwise stated, experiments of leaf discs were done with 25±2°C for photoperiod 16 hrs.

6. Production of prey eggs:

The obtained on Mite's eggs were collected by 10 females adult putting on cleaned cottons leaf discs putted on water soaked cottons wool pad in Petri-dishes. Set up of sufficient discs to provide a sufficient egg numbers in preparation for the next day of experiment. Spider mites allowed to oviposition in the night and then were removing. The removed eggs were transmited as require to experiments. The prey-eggs not longer than 24 hrs., old from experiment beginning, this secured that, not hatching during period of experiments, which was not more than 72 hrs. The prey eggs were used rather than other stages, firstly because they are easily collected and handled, secondly because a proportion of mobile stages might walk off the experimental arenas making an accurate assessment of the numbers of prey eaten difficult, and thirdly because eggs and larvae have been shown to be the prey stages preferred by the predator (Burnett, 1971; Giboney, 1981).

Then, account was made of "a" unhatched "b" total numbers of eggs were recorded before treated treatments by toxicants. Unhatchability eggs were recorded occording to; unhatchability eggs = a/bx100. Data were corrected according to Abbott's formula 1925, for control unhatchability.

7-Fungi extract

Fungal culture of isolate was prepared and inoculat in broth-media of 300ml potato-dextrose, then incubated in shaking incubator at (28°C), for 10 days, then, the culture of fungy was filtered and subjected to extraction in ethyl-acetate 1:1 triple. Crude extract was dried in a evaporator rotary and pott in Freezer until using according to Wang. 2016, method.

8- Plant extracts preparation:

An amount of 80gm of clean seeds was washed with warm water then with tab water.The seeds were dried in the open air for three hours then they were put into the oven at 40C for four hours. The seeds were milled, then readded to 300 ml acetone and methanol (1:1), the seeds were shaked for two hours a day, for three days using an electric shaker.The extract was filtrerd and evaporated using a rotary evaportor until they were dried zero and were left in the instrument after that 300ml acetone were added to go out the pure substance A count was then made of (Ismail and Ahmed 2000).

9- Techniques for the assessment of tested compounds:

The susceptibility of test organisms is given by Busvine 1971.

10. Toxicity of the tested chemicals to female's adult of *T. urticae*.

Evaluated by leaf discs dip technique according to Siegler, 1947.

11. Toxicity of the tested compounds to *T. urticae,* eggs.

This technique according to Burnett, 1971 and Giboney, 1981.

12. Residual effect of tested compounds on egg deposition and egg- hatching of *T. Urticae*.

Assay of residual effects of tested chemicals were calculated with "LC_{25}" on adult of prey mites and the technique advised by Keratum *et al.* 1994.

2- Field experiments:

In sakha farm, Agric. Research station, Kafr El-Sheikh Egypt in the summer seasons 2019 and 2020 to evaluate the efficiency of the tested compounds against *Tetranychs urticae* infesting cotton plants (Sakha 94) was consider as a plot laid out a completely randomized blocks design. Each treatment and control was replicated 4 times. All tasted compounds were applied at their recommended rates using a knapsack sprayer (20L/volume) with one nozzle. Water rate used for diluting compounds (200 liter/Fadden). The samples of 10 leaves of cotton were collected randomly from each plot. Percentage of reduction calculated for treatments according to equation, Henderson and Tilton 1955.

All presented data were subjected to one way analysis of variance (ANOVA),(SPSS) and means were separated by Duncan´s multiple range test Duncan *et al* 1955.

RESULTS AND DISCUSSION

1-Toxicity of tested compounds on adult female of two-spotted spider mite *T. urticae* on cotton leaf discs:

The present investigation was carried out to evaluate some compounds (Acarmite common, Acarmite nanoparticles, Spirodiclofen common, Spirodiclofen nano, Eucalypts extract common, Eucalypts extract nano particles,*Boletus satana*s common and *Boletus satana*s nano particles) against adult females of *T.urticae*. data in Table (1) showed that acarmite nanoparticles was the most toxic compound to adult females of *T.urticae* ,followed by common solution of acarmite, Spirodiclofen common and Spirodiclofen nanoparticles with LC_{50} values of 2.0, 2.57, 47.45 and 30.66 ppm, respectively. whereas nanoparticles of both eucalypts extract and *boletus satanas* have a moderate toxic effect to adult females of *T.urticae* with LC_{50} values as 593.46 and 1566.88 ppm, respectively.

Common solution of eucalypts extract and *boletus satanas* were the least toxic to adult females of *T.urticae* with LC_{50} values as 838.26 and 2423.22 ppm, respectively.

Table 1. Toxicity of tested compounds on adult female of two-spotted spider mite *T. urticae* on cotton leaf discs

Compound	Common solution (CS)				Nano solution (NS)			
	LC_{50} (PPM)	C.L.forLC_{50} lower	C.L.forLC_{50} Upper	Toxicity index	LC_{50} (PPM)	C.L.forLC_{50} lower	C.L.forLC_{50} upper	Toxicity index
Acarmite	2.57	1.5	3.75	100	2.00	1.02	3.4	100
Spirodiclofen	47.45	30.88	56.22	5.26	30.66	24.76	38.54	6.52
Eucalypts extract	838.26	735.85	966.26	0.29	593.46	437.73	675.95	0.33
Boletus satanas	2423.22	1865.64	3112.47	0.10	1566.88	1254.64	2156.48	0.12

Concerning the toxicity index at LC_{50} level, the results of Table (1) showed that nano solution and common solutions of acarmite waer the most toxic compounds to adult females of *T.urticae* with toxicity index of 100,while nano solution and common solutions of , Spirodiclofen have amoderate toxic effect to adult stage of *T.urticae* with toxicity indexes of 6.52 and 5.26 respectively. Nano solutions of eucalypts extract and *boletus satanas* an common solutions of eucalypts extract and *boletus satanas* were the least toxic compounds to adult females of *T.urticae* with toxicity indexes of 0.33, 0.12, 0.29 and 0.10 respectively.. Ismail *et al*. (2006) found that abamectin was the most toxic compound followed by fenpyroximate to adult females of *T.urticae* with LC_{50} value of 0.003 and 103.59 ppm, respectively. Shubhreet Kaur.*et al* .(2019) found that Eucalyptus has been used as a medicinal plant from ages as a result of its varied properties. The phytochemical content of Eucalyptus leaves was analyzed by soxhlet extraction of the dried leaves using methanol and acetone.

2-Toxicity of tested compounds on eggs of two-spotted spider mite *T. urticae* on cotton leaf discs:

Data conferred in Table (2) indicated that acarmite nano solution was the most toxic compound, followed by acarmite common, Spirodiclofen nano and Spirodiclofen common against the egg stage of *T.urtecae* with LC_{50} values of 2.5, 3.22, 23.13 and 44.35 ppm respectively. whereas eucalypts extract nano and common have a moderate toxicity to egg stage of *T.utricae* with LC_{50} values of 453.28 and 884.26 ppm respectively. *Boletus satanas* nano and common were the least toxic to eggs of *T.urtecae* of LC_{50} values 1339.65 and 2842.64 ppm respectively. Based on LC_{50} values in Table (2), the data cleared that acarmite nano and common and Spirodiclofen nano and common were more toxic to eggs of *T. urticae* than other compounds. However *boletus satanas* nano and common were the least toxic compounds

Table 2. Toxicity of tested compounds on eggs of two-spotted spider mite *T.urticae* on cotton leaf discs:

Compound	Common solution (CS)				Nano solution (NS)			
	LC_{50} (PPM)	C.L.forLC_{50} lower	C.L.forLC_{50} Upper	Toxicity index	LC_{50} (PPM)	C.L.forLC_{50} lower	C.L.forLC_{50} upper	Toxicity index
Acarmite	3.22	2.05	3.25	100	2.5	0.12	0.19	100
Spirodiclofen	44.35	29.99	48.02	7.26	23.13	14.13	18.69	10.80
Eucalypts extract	884.26	679.41	839.39	0.36	453.28	543.63	782.42	0.55
Boletus satanas	2842.64	666.77	779.07	0.11	1339.65	645.52	727.46	0.18

Results obtained in Table (2) confirmed that acarmite nano and common waer the most toxic compound to *T. urticae* egg with toxicity index of 100 followed by Spirodiclofen nano and common have a moderate toxic effect to egg stage of *T. urticae* with toxicity indexes 10.80 and 7.26 respectively. eucalypts extract nano and common, *boletus satanas* nano and common have low toxic effect to egg stage of *T. urticae* with toxicity indexes 0.55, 0.36, 0.18 and 0.11respectively

Derbalah *et al.,* (2013) found that cyhalothrin and fenpynoximate were the highest toxicity to egg stages of *T.urticae*, whereas wormseed extract was the least toxic compound to egg stage of *T.urticae.*Seliman and Abd El-Rahman (2015) evaluated the relative toxicity of six chemicals completely different mode action, four pesticides (fenpyroximate, ethion, chlorfenapyr and cyhalothin), one mineral oil (Nat-1) and one plant extract (Wormseed extract). Against egg stages using standardized technique for bioassay. the results showed that cyhalothrin was the foremost toxic ovicide, followed by fenpyroximate against the egg stage of *T. urticae*. Nelson *et al*. (2017), studied the toxicity, anti-feedant and repellence potential of the crude methanol extract of the mushroom on *Sitophilus zeamais* in stored maize grains the result showed that The methanol extract at 0.5% w/w concentration showed highest toxicity 21 days after treatment killing 61.7% of the pest. while, 68.6% inhibition of F1 progeny was observed at 0.5% w/w 42 days after treatment whereas the reduction in grain damage was up to 86.0% compared to the negative control. The extract incontestible a pest repellency of up to 96.7% after 24 hours of exposure.

3. Effect of tested compound's residues on egg deposition by the adult females of *T. urticae:*

The data in Table (3 and 4), suggested that acarmite nano and Spirodiclofen nano were the foremost effective compounds on egg deposition followed by acarmite common and Spirodiclofen common had a moderate effect on 62.56 % , 48.45 %, 43.49 % and 35.77 % respectively. eucalypts extract common and *boletus satanas* common had a low effect on that character and were concerning similary effective in reducing mite fecundity (12.39 % and 8.91) respectively. In general the effect of different compounds can be organized descendingly as follows: 62.56 % , 48.45 %, 43.49 % , 35.77 %,12.39 % and 8.91 respectively. acarmite nano and Spirodiclofen nano are the most effective compounds tested on egg deposition.

Eucalypts extract and *boletus satanas* common have the least effect on egg deposition.Spirodiclofen common and acarmite common are considered ideal from the biological point of view since they decreased egg deposition to a suitable level and the character is needed for any integrated mite management program.

Several studies were carried out the effect of different compounds on mite biology indicted that compounds invariably showed positive effect on egg deposition of the prey. Stafford and Fukushima (1970) indicated that oviposition of *T. pacificus* decreased with increasing concentration of the acaricide, fungicide.

Table 3. Effect of tested compound's residues on egg deposition by the adult females of *T.urticae*

Compounds	No. of eggs deposited /5 adults					Mean
	1st day	2nd day	3rd day	4th day	5th day	
Control	19.05±0.35[a]	22.25±0.77[a]	26.5±0.45[a]	28.25±0.36[a]	32.5±0.21[a]	25.71±0.42[a]
Acarmite nano	6.5±0.43[dh]	7.50±0.84[gh]	8.50±0.22[fg]	12.05±0.73[f]	14.50±0.32[h]	9.81±0.50[h]
Acarmite common	8.25±0.23[g]	10.25±0.35[g]	14.50±0.25[f]	19.75±0.228[d]	22.25±0.52[e]	15.00±0.31[fg]
Spirodiclofen nano	9.55±0.13[f]	10.86±0.35[f]	12.25±0.55[fg]	15.50±0.64[e]	18.75±0.86[g]	13.38±0.50[g]
Spirodiclofen common	12.25±0.99[e]	14.25±0.73[e]	16.75±0.25[e]	19.00±0.22[de]	20.25±0.62[f]	16.5±0.56[f]
Eucalypts extract nano	13.25±0.34[d]	15.25±0.53[d]	18.75±0.63[d]	22.25±0.53[cd]	23.25±0.43[d]	18.55±49[e]
Eucalypts extract common	17.75±0.54[bc]	19.25±0.44[c]	22.75±0.87[c]	25.25±0.84[bc]	27.00±0.83b[bc]	22.4±0.70[c]
Boletus satanas nano	15.75±0.63[c]	17.50±0.34[cd]	19.75±0.54[cd]	23.50±0.24[c]	25.25±0.13[c]	20.35±0.37[d]
Boletus satanas common	18.25±0.15[b]	21.25±0.53[b]	23.50±0.43[b]	25.00±0.66[b]	28.25±0.45[b]	23.25±0.44[b]

Table 4. Reduction percentage in eggs laying capacity of T.urticae 5 femal due to comounds

Compounds	Reduction%					Mean
	1st day	2nd day	3ndday	4thday	5thday	
Acarmite nano	65.87	66.29	67.92	57.34	55.38	62.56
Acarmite common	56.69	53.93	45.28	30.08	31.51	43.49
Spirodiclofen nano	49.86	51.19	53.77	45.13	42.30	48.45
Spirodiclofen common	35.69	35.95	36.79	32.74	37.69	35.77
Eucalypts extract nano	30.44	31.46	29.24	21.23	28.46	28.16
Eucalypts extract common	6.82	13.48	14.15	10.61	16.92	12.39
Boletus satanas nano	17.32	21.34	25.47	16.81	22.30	20.64
Boletus satanas common	4.19	4.49	11.32	11.50	13.07	8.91

On the the opposite, Singer *et al.,* (1988) suggested that oviposition preference and larval performance was also correlated within populations and may vary among individuals such that females prefer the plant species on which their larvae should have the greatest chance of surviving during their first 10 days of growth. Nelson *et al* .(2017).Showed that boletus satanas Lenz (Boletaceae) is a basidiomycete fungus reported to contain monomeric glycoproteins (lectins) which are known to possess insecticidal, larvicidal, ovicidal and anti-nutritional activities.

Mousavi and Rezaei (2011) demonstrated that nanotechnology had many applications in all stages of production, processing, storing, packaging and transport of agricultural products. Jaqueline.*et al* .(2018) suggested that a reduction in the efficiency of mite control by up to 42% was observed when the mites were exposed to a combination of acaricide with other insecticides.Kang *et al.* (2012) investigated that, the effect of two nano forms of pyrifluquinazon and a nano-nano type of pyrifluquinazon on mortality of the green peach aphid, *Myzus persicae*, using concentrations (25, 50 and 100ppm) and found that nano forms of pyrifluquinazon were formulated with a different molecular weight (CS 30,000 0.1% and CS 3000 0.3%), both types of pyrifluquinazon at all concentrations were effective for controlling *M. persicae*. Koh *et al*. (2013) summarized that term nano pesticide covers a wide variety of products and cannot be considered to represents a single category.

4- Effect of tested compound's residues on eggs hatchability of *T. urticae*:

The data arranged in Table (5) indicated that all compounds caused a decrease in egg hatchability comparable to the control treatment.

Tabel 5. Effect of tested compound's residues on egg hatchability of *T. urticae*.

Compounds	Unhatched eggs at indicated day					Mean	Hatchability %
	1st day	2rdday	3ndday	4thday	5thday		
Control	14.50±0.23^{e}	9.25±0.66^{e}	5.50±0.26^{f}	2.05±0.53^{f}	0.75±0.74^{e}	6.41±0.48^{g}	74.36
Acarmite nano	26.75±0.34^{a}	22.50±0.23^{a}	17.25±0.88^{a}	13.50±0.49^{b}	10.05±0.55^{a}	18.01±0.49^{a}	27.96
Acarmite common	24.00±0.75^{b}	20.25±58^{b}	14.27±0.84^{cd}	13.25±0.94 ^{bc}	12.25±0.26^{a}	16.80±0.67^{c}	32.80
Spirodiclofen nano	22.75±0.74^{bc}	22.00±0.54^{ab}	15.75±0.34^{b}	14.00±0.32^{ab}	5.25±0.64^{d}	15.95±0.51^{d}	36.20
Spirodiclofen common	24.50±0.75^{ab}	19.75±72^{bc}	11.25±0.12^{d}	7.75±0.63^{d}	10.25±76^{b}	14.7±0.59^{b}	41.20
Eucalypts extract nano	23.75±0.93^{b}	20.00±0.62 ^{b}	15.25±88^{bc}	14.75±0.62^{a}	10.25±75^{bc}	16.8±0.76^{b}	32.80
Eucalypts extract common	21.00±0.44^{c}	17.25±0.47^{c}	14.75±0.22^{c}	11.75±0.43^{c}	8.00±0.58^{c}	14.55±0.42^{d}	41.80
Boletus satanas nano	16.75±1.29^{de}	12.00±2.63^{d}	9.25±1.26^{e}	6.27±1.15^{e}	4.50±0.82^{e}	9.75±1.10^{e}	61.00
Boletus satanas common	19.05±0.96^{d}	11.75±0.96^{de}	5.25±1.73^{fg}	2.05±0.60^{f}	0.50±0.82^{f}	7.72±0.25^{f}	69.12

From the percent hatchability as shown in Table (5), results cleared that acarmite nano was the most effective compound on egg hatchability (27.96 %) followed by acarmite commen, eucalypts extract nano and Spirodiclofen nano (32.80,32.80 and 36.20) had a moderate effect respectively.while *boletus satanas* nano and common were the least effective in egg hatchability (61.00 and 69.12).

Jaqueline.*et al.* (2018) Analysised that using Spirodiclofendiclofe alone had 97.22% efficiency in the control of *B. yothersi* on day 7 after application. A combination of Spirodiclofen with either phosmet or imidacloprid resulted in 55% and 59% efficiency, respectively.

Keratum and Ibrahim (2016) evaluated the effects of sub lethal doses of six chemicals (abamectin, ethion, chlorfenapyn, cyhalothin, Nat-1 and black cumin extract on some biological aspect of the mite *T. urticae.* The results suggested that cyhalothrin was the most effective on egg deposition followed by ethion and abamectin by adult females of *T. urticae*, while black cumin extract was the least effective one. Also, the data indicated that cyhalothrin and abamectin were the highest effective compounds which decreased egg hatchability of T.urticae followed by ethion; black cumin extract was the least effective on egg hatchability.

Habashy (2018) and Hosam *et al.,* (2019) determined the direct and residual effects of some natural plant extracts 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.

Field studies:

Field experiments on cotton plants were carried out in the farm sakha Agric. Research station ,Kafr El-Sheikh Egypt in the summer seasons 2019 and 2020 to evaluate the relative susceptibility of motile stages of mites *T. urticae* to different tested compounds .All tested compounds were applied at half of their recommended rates. Samples of 10 cotton leaves were randomly collected from each plot before and after treatment at intervals of four weeks .the percentage reduction of infestation was calculated for each treatment according to Handerson and Tilton equation (1955). All date recorded were analyzed according to the method of Duncan's multiple range test (Duncan, 1955).

Effect of tested compounds on motile staged of spider mite, *T.urticae* on treated cotton plants in the field:

The data in Table (6 and 7), showed that acarmite nano, acarmite commen, Spirodiclofen nano and Spirodiclofen commen were the most effective compounds in reducing the population density of motile stages of mite, whereas eucalypts extract nano and common were the moderate effective compounds in reducing the population density of motile stages of *T.urticae*. followed by *boletus satanas* nano and *boletus satanas* commen. The average percent reduction ranged between (6.45– 66.49 %) for all compounds in the summer seasons 2019 and 2020.

Table 6. Effect of tested compounds on motile staged of spider mite, *T.urticae* on treated cotton plants in the field.

Compound	No. of mites before treatment		No. of mites after treatment (weeks)							
			1st week		2nd week		3rd week		4th week	
	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020
Control	222.6	231.5	133.5	137.50	156.8	154.50	168.50	162.00	175.50	178.50
Acarmite nano	210.2	224.1	38.75	32.75	46..00	44..00	64.25	60.25	70.50	73.00
Acarmite common	209.9	228.5	46.25	41.25	58.00	57.00	73.75	74.75	86.00	87.00
Spirodiclofen nano	205.2	222.3	42.75	47.75	66..00	68..00	74.25	72.25	84.50	85.50
Spirodiclofen common	210.0	228.9	65..50	53..50	72.50	75.50	87.25	83.25	98.00	97.00
Eucalypts extract nano	218.8	230.9	96.50	88.50	110.00	99.00	121.50	122.50	134.50	135.50
Eucalypts extract common	228.2	229.5	105.00	109.00	122.00	118.25	133.50	138.50	146.00	157.00
Boletus satanas nano	223.7	220.7	111.50	117.00	125.25	128.50	136.50	133.00	148.25	144.00
Boletus satanas common	226.6	232.2	124.25	125.00	148.00	142.5	161.5	148.5	173.00	160.5

Table 7. Reduction percentage of motile staged of spider mite, *T.urticae* on cotton plant in the field.

Compound	% reduction								General mean	
	1st week		2nd week		3rd week		4th week			
	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020
Acarmite nano	69.39	75.44	69.14	70.74	59.65	61.82	57.74	57.97	63.98	66.49
Acarmite common	63.43	69.67	61.03	62.83	53.62	53.54	48.37	50.88	56.61	59.23
Spirodiclofen nano	65.41	63.91	54.64	54.42	52.23	53.84	48.11	50.38	55.09	55.63
Spirodiclofen common	48.22	60.07	51.32	50.85	45.15	48.35	41.20	45.33	46.47	51.15
Eucalypts extract nano	26.78	35.60	29.11	36.11	26.70	24.66	22.54	24.29	26.28	30.16
Eucalypts extract common	23.61	20.20	24.61	23.22	22.77	14.30	19.38	11.75	22.59	17.36
Boletus satanas nano	17.25	10.93	21.05	13.24	19.45	14.42	16.49	15.83	18.56	13.60
Boletus satanas common	8.97	9.56	7.90	8.55	5.92	4.70	3.80	2.99	6.64	6.45

Wael and Mohamed.(2019) showed that the overall reduction percentages within 4 weeks posttreatments were ordered as follows; Spirodiclofendiclofen = pyridaben > abamectin > hexythiazox in season of 2017. However, varied data was recognized as abamectin > Spirodiclofendiclofen = pyridaben > hexythiazox in season of 2018. The efficacy of selective acaricides with their distinctive modes of action against the TSSM *T.urticae* on strawberries in the potting trial from 1 to 3 weeks posttreatment. reductions in immature stages treated with Spirodiclofendiclofen ranged from 61% to 91% and also pyridaben decreased the adults by 41% to 64% and the immatures up to 67%. Moreover, abamectin reduced the immatures by 59% within the first 2 weeks posttreatment (Niu et al., 2016).

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مقارنة الكفاءة لتأثيرمبيدين أكاروس ومستخلص فطري ونباتي وصورهم النانوتكنولوجيه على الأكاروس الاحمر ذو البقعتين

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اجريت هذه الدراسه لتقييم التأثير السام لثمان مركبات ،اثنين مبيدات اكاروسيه (acarmite nano, acarmite common, Spirodiclofen nano, Spirodiclofen common, euucalypts extract nano euucalypts extract common, *boletus satana*s nano and *boletus satana*s common)(أكرميت وسبيرو) ومستخلص نباتى (مستخلص الكافور) و مستخلص فطري (الماشروم) ضد البيض و الاناث البالغة للاكاروس النباتى (تترانيكس اورتيكا) بأستخدام تكنيك غمر القطاعات النباتية. كما تقييم الأثيرات الجانبيه لهذه المركبات على بعض الصفات البيولوجيه لكل من الاكاروس النباتى. كما تم تقييم التأثير السام لهذه المركبات للأكاروس النباتى على نباتات القطن تحت الظروف المعمليه و الحقليه. وقد أوضحت نتائج الدراسة أن مركب أكرميت نانو كان افضل المركبات المستخدمة في التأثير السام على البيض والحيوان الكامل لأكاروس العنكبوت الأحمر.وكان لمركب أكرميت نانو وسبيرو نانو أعلى تأثيرا على وضع البيض ولذلك يمكن التوصية باستخدامهما في برنامج المكافحة المتكاملة.كما أظهرت معظم المركبات المختبرة على نباتات القطن خفضاً عالياً في اعداد الاطوار المتحركة بينما أعطى مركب المستخلص الفطري تأثيراً اقل.و أظهر الأكريميت والسبيرو في صورتيه النانو و العادية أفضل وأعلى النتائج.