



## Appraisal role of some Bio-Control agent, botanical oils and a traditional insecticide against onion thrips *Thrips Tabaci* (Lindeman)

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### Abstract

Thrips raid a number of crops mainly thrips of onion producing large economic destruction on onion yields. Typically young leaves are preferred, and then buds and flowers too get infected. Botanical insecticides, entomopathogenic fungal and two plant oils (*Moringa*, *Moringa oleifera* L. and bitter almond, *Prunus amygdalus* var *amara*) are highly effective toward Thrips *Thrips*, beside it safe and ecologically acceptable. *Beauveria bassiana*, *Metarhizium anisopliae* and *Paecilomyces lilicanus* produced moderately the same effect on *Thrips tabaci* however the best one was *Beauveria bassiana* was recorded 90% death at  $10^8$  spores/ ml. conc. Typically, the great concentration  $10^8$  spores/ ml. produced the best death percentage particularly after 2 days of dealing all tried fungi. But both *Metarhizium anisopliae* and *Paecilomyces lilicanus* have the same mortality which recorded 82% and 82% at  $10^8$  spores/ ml. Concentrations of two tested oils (bitter almond and moringa) were caused mortality to thrips after 48 hr. of exposure reaching to 73 % in bitter almond but moringa recorded 17 %. On the other hand the concentrations of a conventional insecticides Pleo<sup>®</sup> were caused mortality approximately equal mortality to Entomopathogenic Fungi and botanical oils. The aim of this research was to assess the efficacy of Entomopathogenic fungi and botanical oils against onion thrips *T. tabaci* and compare it with a conventional insecticide under laboratory conditions.

**Keywords:** onion, thrips *t. tabaci* entomopathogenic fungi, moringa *oleifera* l. bitter almond, pesticide, pleo<sup>®</sup>, pyridaly

### Introduction

Onion thrips, *Thrips tabaci* Lindeman (Thysanoptera: Thripidae), is a major polyphagous pest that causes significant yield loss globally especially toward production of onion crop *Allium cepa* (Lewis 1997) <sup>[9]</sup>. General nurturing by onion thrips not only results in plant inhibiting and compact corm weight, nonetheless it too bids onion plants to various viruses, fungal and bacterial pathogens that further reduction quality and quantity of yield. To overcome and limitation the eruptions of onion thrips in onion fields, insecticides have been the primary style to manager this pest (Morse and Hoddle 2006, Nault and Shelton 2010) <sup>[12, 14]</sup>. Extensive usage of chemical insecticides caused in appearance resistance thrips strains and pollution the crop yield (Jensen, 2000) <sup>[7]</sup>. So recently several researches were encouraged usage biocontrol agent to lesser the risks or usage of chemical control. Botanical insecticides, and entomopathogenic fungal (EPF) are highly effective toward various pests, beside it safe and ecologically acceptable (Nathan *et al.*, 2004) <sup>[10]</sup>. EPFs have stayed used successfully as another to traditional pesticides in controlling several pests localized in soil, caterpillars, leaf miners, Moawad *et al.*, 2017 <sup>[10]</sup>.

EPF, particularly *Metarhizium anisopliae* and *Beauveria bassiana* are striking as bio-pesticides for use in integrated pest management, as they syndicate with host specificity and established safety (Bateman *et al.*, 1993 and Moawad *et al.*, 2017) <sup>[3, 10]</sup>. The aim of this research was to assess the efficacy of EPF and botanical oils against onion thrips *T. tabaci* and compare it with a conventional insecticides under laboratory conditions.

### Material and Methods

#### Thrips Culture

To start rearing onion of thrips were planted seedling of onion (*Allium cepa* var *cepa*) at plastic pots under semi field condition. After one week of plantation was made artificial infestation to plant by liberate thrips from infested shoot which were collected from field. Before starting test, the target materials insure that thrips were transferred to tested onion pots (10 replicate) and Plants receiving thrips were infested with one adult thrips/leaf (ten thrips per plant) and after that spraying it by prepared concentrations. The methods of preparing tested materials as follows: -

#### Preparation of Entomopathogenic Fungi (EPFs)

There were three sources of tested fungi: First source, (S1) isolate of *B. bassiana* (Balsamo) AUMC NO (5133), *M. anisopliae* (Metschnik off) Sorokin AUMC NO (5130) and AUMC NO (10620) *Paecilomyces*., were obtained from Assiut University, Mycological Centre Faculty of Science. Isolates of *B. bassiana* (Balsamo), *M. anisopliae* (Metschnikoff) Sorokin and *P. lilicanus* (Thom) was cultivated on Sabouraud dextrose yeast agar (SDYA) Mould extract and 1000 ml. of water in flasks. Flasks were autoclaved at 21 for 15-20 min. The three fungoid sources were set as solution as follows:

Fungal cultures were full-grown on (SDYA) medium g/l, (Sabouraud, 1892) <sup>[17]</sup> the mix was stimulated for 10 min the hyphal debris was detached by sifting the mixture through fine mesh sieve. The conidial concentration of final suspension was resolute by direct count using Haemocytometer and Sequential thinning was ready in

Water with 0.1% Tween-80 and preserved at 5°C till used. Tested concentration was sprayed on infested onion plant and after two days the plant investigated to count the number of dead individuals of thrips.

**Preparation the Botanicals Oils Concentrations**

The tests were continued to measure efficacy of two plant oils (Moringa, *M. oleifera* L. and bitter almond, *P. amygdalus* var *amara*) achieved from Company (Luna), Egypt. Preparation 50% oils suspension was with some alteration by dissolve 50ml of tested oils in 40ml distilled water + 8ml Arabicgum (20%) +2ml Tween 80 (20%) with add two drops from glycerin., from standard oil solution serial of concentrations (10, 7.5, 5 and 2.5 %) was prepared Moawad and Sadek, 2018 tested concentration was sprayed on infested onion plant and after two days the plant investigated to count the number of dead individuals from thrips.

**Preparation the Insecticide Concentrations**

The experiments were preceded to efficacy of conventional insecticides, (Pyridalyl 50% EC), the trade name is Pleo®, obtained from Sumitomo Chemical Co., Ltd. Egypt. Solution serial of concentrations (1, 0.5, 0.25 and 0.125 ppm.) was prepared Abo El-Ghar *et al.* (1994) [2]. Tested concentration was sprayed on infested onion plant and after two days the plant investigated to count the number of dead individuals from thrips.

The same plant was considered as a control in which plant were sprayed of sterile distilled water.

**Statistical Analysis**

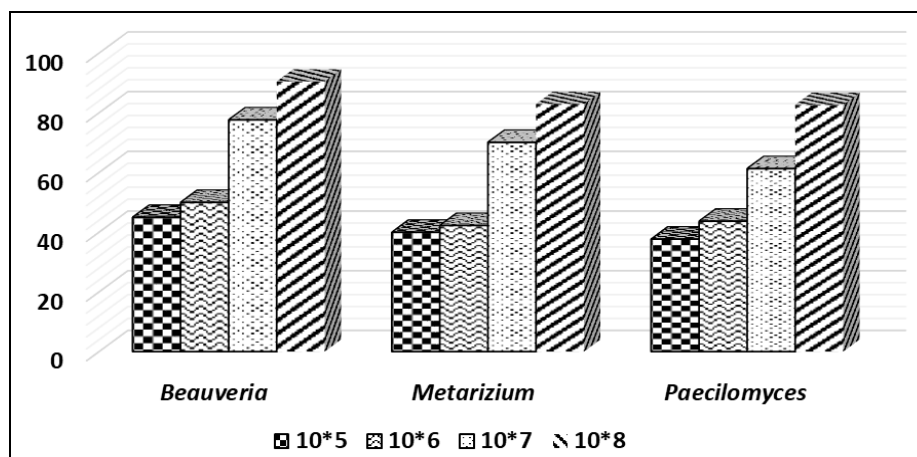
Mortality was calculated using the Abbott formula (Abbott, 1925) [1] and subjected to probit analysis according to Finney (1971) [5] using "LdP Line®" software.

**Results and Discussions**

The data obtainable in Table (1) and Fig. (1) Revealed that the three fungi with dissimilar sources produced relatively the same impact on *Thrips tabaci* however the best one was *B. bassiana* was recorded 90 % death at 10<sup>8</sup> spores/ ml. conc. The high concentration 10<sup>8</sup> spores/ ml. produced the top death percentage especially after two days of treatment of all tried molds. But both *M. anisopliae* and *P. lilicanus* have the same mortality which recorded 82% and 82% at 10<sup>8</sup> spores/ ml. conc. respectively. A number of authors detected that the influence of *B. bassiana* in contradiction of best was meaningfully enlarged after two days whereas the effect of *Metarhizium* against the onion of thrips was protracted unlikely declining trend resultant unacceptable control of the pest (Shiberu, *et al.*, 2013) [18]. Entomopathogenic fungi re a major component of many pest control programs (Moawad *et al.*, 2017) [10] *B. bassiana* recorded 94.4% and 92.2% mortality in 5<sup>th</sup> larval instar and pupal stage of *S. thraustica* at (1x10<sup>8</sup> conidial/ml).

**Table 1:** Effect of different concentrations of three entomopathogenic fungi on onion thrips *T. tabaci* mortality % under laboratory condition after two days.

Entomopathogenic fungi Concentration	Mortality %			
	10 <sup>5</sup> spores/ ml	10 <sup>6</sup> spores/ ml	10 <sup>7</sup> spores/ ml	10 <sup>8</sup> spores/ ml
<i>B. bassiana</i>	45	50	77	90
<i>M. anisopliae</i>	40	42	70	82
<i>P. lilicanus</i>	37	43	61	82
Control	0	0	0	0



**Fig 1:** Effect of different concentrations of three entomopathogenic fungi on onion thrips *T. tabaci* mortality% under laboratory condition after two days.

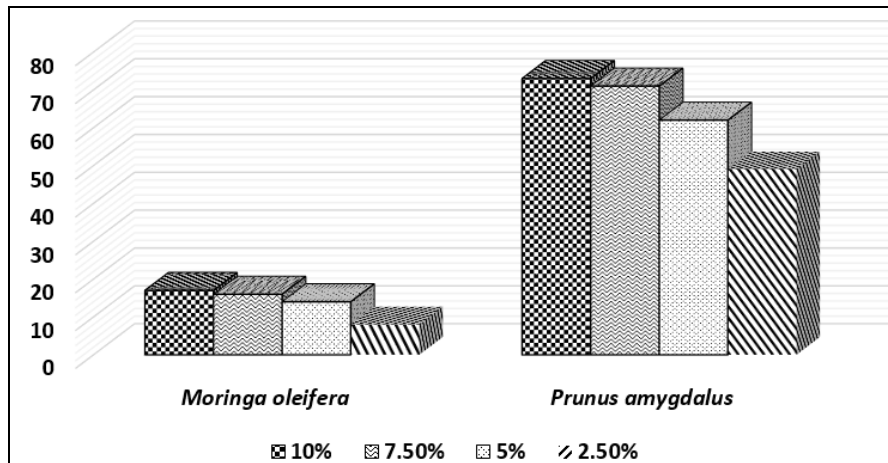
The data presented in Table (2) and Fig. (2) Revealed that the concentrations of two tested plant oils were caused mortality to thrips after 48 hr. of exposure reaching to 73 % in bitter almond but moringa recorded 17%. Meanwhile the lowest concentration 2.5% recorded % mortality, 4% and 49% for *M. oleifera* and *P. amygdalus* var *amara*, respectively. Klein *et al.* (1993) [8] establish that

(*Azadirachata indica*) seed excerpt delayed the growing of the pest. Onu and Aliyu, (1995) [15] effectively used as *Capsicum* sp. Powder compared to the same pest. Bekele *et al.*, (1996) [4] used fresh leaves, the inflorescence and juicy stems of *Ocimum suave* for thrips control. Hazara *et al.*, (1999) [6] used a neem extract together with onion of thrips successfully. *Parthenium hysterophorous* root extract was

reduced onion thrips at 1st day but lengthy to decline within 7 days (Shiberu *et al.*, 2013) [18].

**Table 2:** Influence of two plant oils *M. oleifera* L. and *P. amygdalus var amara* on onion thrips *T. tabaci* mortality% under laboratory condition after two days.

Treatments Concentration	Mortality %			
	10%	7.5 %	5 %	2.5 %
<i>Moringa oleifera</i>	17	14	9	4
<i>Prunus amygdalus var amara</i>	73	71	62	49
Control	0	0	0	0



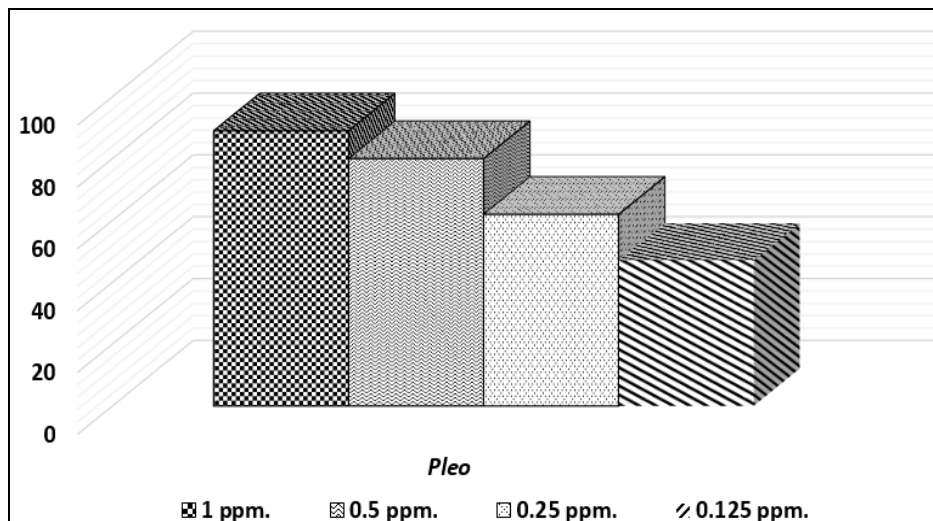
**Fig 2:** Effect of different concentrations two plant oils on onion thrips *T. tabaci* mortality% under laboratory condition after two days.

The results in table (3) and Fig. (2). The data showed that, the mortality percentage in thrips after 48 hr. increased with increasing the concentrations elapsed post treatment. Pleo® 1 ppm. Produces approximately 90% mortality percentage at 48 hr. On the other hand the concentration 0.125 ppm. Was

record 47% mortality. These results agreed with those of Refat *et al.* (2020) [16] who treated black vine thrips, *Retithrips syriacus* (Mayet) with a conventional insecticides Pleo®.

**Table 3:** Effect of a conventional insecticides Pleo® on onion thrips *T. tabaci* mortality under laboratory condition after two days.

Treatments Concentration	Mortality %			
	1 ppm.	0.5 ppm.	0.25 ppm.	0.125 ppm.
Pleo®	89	80	62	47
Control	0	0	0	0



**Fig 3:** Effect of different concentrations of a conventional insecticides Pleo® on onion thrips *T. tabaci* mortality% under laboratory condition after two days.

Data presented in Table (4), show the efficacies of tested compounds represented as LC<sub>50</sub>'s and LC<sub>90</sub>'s against onion thrips *T. tabaci*, from the demonstrated results, it could be shown that the LC<sub>50</sub> for entomopathogenic fungi *B.*

*bassiana*, *M. anisopliae* and *P. lilicanus* 3507468, 8454231 and 12718166, spores/ ml., respectively. On the other hand the tested oils recorded LC<sub>50</sub>, 50.4567% and 2.6066% for *M. oleifera* and *P. amygdalus var. amara*, respectively,

Meanwhile the LC<sub>50</sub> and LC<sub>90</sub> of a conventional insecticides Pleo®, 0.1446 and 1.0662 ppm., separately, The present results are confirmed with the results of Refat *et al.* (2020)

<sup>[16]</sup> who treated black vine thrips, *Retithrips syriacus* (Mayet) with certain pesticides and their alternatives.

**Table 4:** Efficacy of the tested compounds against the onion thrips *T. tabaci* mortality under laboratory condition

Treatments	Unit	LC <sub>50</sub>	Lower limit	Upper limit	Slope	LC <sub>90</sub>
<i>B. bassiana</i>	spores/ ml	3507468	1359911	7022246	0.4828	1.58E+09
<i>M. anisopliae</i>		8454231	3403887	17300163	0.42	9.52E+09
<i>P. lilicanus</i>		12718166	5406455	26056527	0.4115	1.65E+10
<i>Moringa oleifera</i>	%	50.4567	22.1439	1576.047	1.3329	461.8085
<i>P. amygdalus var. amara</i>		2.6066	1.1369	3.63	1.1054	37.6261
Pleo®	Ppm.	0.1446	0.0986	0.186	1.4768	1.0662

## Conclusion

The current study was conducted in order to evaluate the susceptibility of onion thrips *T. tabaci* (Lindeman) to three entomopathogenic fungi, two plant oils and a conventional insecticide, under laboratory conditions. Obtained results proved the suitability of examined compounds and they can have a priority as safe and reliable alternatives for conventional insecticides. Consequently, we recommend the application of the tested compounds against onion thrips and should be considered in integrated pest management (IPM) programs of onion thrips *T. tabaci* (Lindeman).

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