

**EFFECTS OF CERTAIN BIO-PRODUCTS IN
COMPARISON WITH SOME INSECTICIDES
AGAINST *THRIPS TABACI* LIND. INFESTING
ONION AND GARLIC PLANTS.**

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ABSTRACT: The efficiency of bio and chemical insecticides, namely, Biofly (fungi), Bio-clean (fungi and bacteria), Jojoba oil (plant extract), Chemisol (mineral oil), MTI-446 neo-nicotinoid of nitroimino derivatives, Marshal & Aphox (carbamates) and Tokuthion & Malathion (organophosphorus) was evaluated at the recommended doses by twice sprays against onion thrips, *Thrips tabaci* Lind. on onion and garlic plants during two successive seasons of 2002 and 2003 at Kafr Abd El-Aziz, Zagazig region , Sharkia governorate.

The results revealed that Tokuthion was the most effective compound all over the trials reducing thrips numbers on onion plants by 86.13 & 83.16 and 87.46 & 88.77 % for 1st and 2nd spray at 2002 and 2003 seasons, respectively. On garlic plants Tokuthion compound reduced thrips numbers by 87.45 & 88.67 and 87.28 & 88.98 % for the two sprays at the two mentioned seasons, respectively. The other compounds could be arranged in descending order of effectiveness as: Marshal, MTI-446, Aphox & Malathion, Chemisol, Jojoba, Biofly and Bio-clean.

In rotation experiment, the extract of Jojoba gave an preeminent effect than other tested compounds in this trial reducing the thrips numbers by 71.6 and 74.45 % for the two tested seasons, respectively.

In respect to the yield of onion and garlic there were significant differences between the different treatments except these plots treated with Tokuthion which recorded the highest yield (11.45 & 11.83 ton/Fed. onion and 7.46 & 7.07 ton/Fed. garlic). Therefore, it could be decided that Tokuthion was the most efficient compound followed by rotation system of Marshal and Jojoba one spray of each. The rotation system was preferred to avoid the hazard of chemical insecticides on environment which represent the principal aim of IPM programs.

Key words: Biofly, Bioclean, Jojoba, Tokuthion, onion thrips, MTI-446, Aphox, Chemisol, Marshal, bio-products, *Thrips tabaci*, rotation system.

INTRODUCTION

Onion (*Allium cepa* L.) and garlic (*Allium sativum* L.) plants considered as most important crops for local consumption and export where the onion represents an cash crop in Egypt for national income and farmers. These plants liable to be attacked by number of pests. The onion thrips, *Thrips tabaci* Lind. considered as key pest of onion and garlic. It cause saver damage to infested plants especially at seedling stage tended to complete destruction. Many studies were carried out to manage thrips control, El-Maghraby *et al* (1998), El-Lebody. (1992), Abd-Alla (1999), Abd El-Wahab *et al*

(2001), Ibraheem (2001) and Omar and El-Kholy (2001)

The present work aimed to evaluate the efficacy of some bio-products in comparable with some chemical compounds against thrips infesting onion and garlic under Sharkia-field conditions, biofly, bio-clean (microbial compounds), jojoba (plant extract), chemisol (mineral oil), MTI-446 (neonicotinoid of nitroimino derivatives), marshal & aphox (carbamtes) and tokuthion, malathion (organophosphorus compounds).

MATERIALS AND METHODS

The experiments were conducted at Kafr Abd El-Aziz --

Zagazig district, Sharkia Governorate during 2002 and 2003 seasons.

The cultivated area was divided to plots of 21 m² each and labeled in completely randomized block design arrangement and received normal agricultural practices (treated and untreated areas). The treatments were replicated three times. Onion variety Giza and garlic variety Balady were sown at January, 17 during 2002 and January, 5 during 2003 seasons, respectively.

Used compounds:

- 1- Biofly, 30×10^6 cells/ml *Beauveria bassiana* (B.b) (entomopathogenic fungi) used at rate of 75 ml/100 litter water.
- 2- Bio-clean TH, (a biological mixture of *Beauveria bassiana* (B.b.) and *Bacillus thuringiensis* var. Kurstaki (BTK)- serotype H-32 3b contains 400 gm of B.b at 5×10^7 FCI spores/gm and 300 gm of BTK at 32.000 F.I v/mg.) applied at rate of 700 gm/fed..
- 3- Jojoba, Al-Kanz 2000, plant extract of *Simmondsia chinensis* (Link) (Buxaceae) used at 500 ml/100 litre water.
- 4- Chemisol (mineral oil, KZ) used at 1.5 litter/ 100Litrel water.

- 5- Malathion, KZ (malathion 57 %E.C.) used at 150 ml/100 litre water.
- 6- Marshal (carbosulfan, 25 % w.p) applied at rate of 750 gm/fed.
- 7- MTI-446 (dinotrofuram 20 % w.p.) (neo-nicotinoid of nitroimino derivatives) applied at rate of 100 gm/100 litre water.
- 8- Aphox (primicarb 50 % D.G) used at rate of 50 gm/100 litre water.
- 9- Tokuthion (prothiofose, 50 % E.C.) used at 250 ml/100 litre water..

A knapsack sprayer equipped with one nozzle was used with rate of 200 litter spraying solution /fed.. Ten plants were inspected in the field for every replicate in the morning. The obtained results subjected to compute the reduction percentages in according to Henderson and Tilton formula (1955). Data of % reduction and yield were analyzed statistically to determine the significant of variances between treatments in according to Little and Hill (1978).

RESULTS AND DISCUSSION

The obtained results showed that, all the tested

compounds reduced thrips numbers significantly in comparable with check treatment and increased yield up to that of untreated plots for onion and garlic plants.

1- Effect of Treatments Against Thrips Infesting Onion:

1st spray:

Data in Table (1) showed the effect of tested materials on thrips after 48 h. as initial effect and after 5 – 14 days as mean residual effect, prothiofos was the efficient compound all over the work trial with general thrips numbers reduction of 83.16 and 88.77 % for the two study seasons, respectively while primicarb recorded lower reduction percentages 58.71 and 66.89 % for the two seasons, respectively.

The initial effects of the different compounds of the 1st spray were 94.85, 88.84 & 88.22 % and 91.56, 76.52 & 82.26 % for prothiofos, dinotrofur and carbosulfan during the two successive seasons, respectively. The highest initial effects at second spray were, 95.67, 86.75, 86.35 and 82.95 % during 2nd season recorded for prothiofos, dinotrofur, carbosulfan and mineral oil, respectively, while

during the 2nd season 2003 the highest initial effects were 91.04, 83.03, 85.76 and 83.95 % recorded for prothiofos, dinotrofur, carbosulfan and malathion, respectively. The bio-clean and biofly compounds recorded relatively low initial effect with 68.32, 60.85 and 56.84, 45.66 % reduction for the 1st spray while during the 2nd one recorded 67.37, 57.40 and 60.41, 64.63 % during the two seasons, respectively.

The obtained results agree with those of EL-Maghraby, *et al.* (1998) who reported that the carbosulfan reduced thrips population by 74.33 % on onion and with Ibraheem (2001) who mentioned that bio-clean reduced thrips population with general effects ranged from 45.16 to 57.74 %, while carbosulfan recorded 84.2 and 72.44 % as general initial and residual effect on cotton plants.

On the other hand, the residual effect for bio-clean was 80.7 % reduction compared by 77.11 % for prothiofos after the first spray, while after the second one the prothiofos and biofly recorded relatively high residual effect by 70.66 and 69.63 % reduction, respectively. The relatively lower effective compounds were malathion and primicarb with 65.45 and 41.05 %

Table (1): Onion yield and percent reduction of onion thrips infesting onion plants as affected by certain pesticides during 2002 and 2003 seasons.

Treatment materials	Rate/100L water	2002							2003						
		First spray			Second spray			Y.	First spray			Second spray			Y.
		I.	R.	G.E.	I.	R.	G.E.		I.	R.	G.E.	I.	R.	G.E.	
Biofly	75 ml.	56.84	73.57	65.2	60.41	69.63	65.02	8.30	45.66	63.28	54.47	64.63	71.23	67.93	7.53
Chemisol	1.5 L.	78.43	66.28	72.35	82.45	52.45	67.45	9.51	73.49	56.01	64.75	73.43	67.23	70.33	7.19
Bio-clean	350 g	68.32	80.7	74.51	67.37	60.16	63.76	8.15	60.85	61.18	61.01	57.4	68.3	62.85	8.09
Jojoba	500ml	76.46	68.01	72.23	78.92	45.83	62.37	7.87	52.3	52.81	52.55	72.4	54.73	63.56	7.66
Malathion	150ml	78.38	65.43	71.9	76.54	49.85	63.19	8.04	81.15	61.34	71.24	83.95	72.11	78.03	8.22
Marshall	375g	88.22	76.86	82.54	86.75	53.93	70.34	9.95	82.26	77.51	79.88	85.76	71.63	78.69	9.3
MT1-446	100g	88.84	72.99	80.91	86.35	52.39	69.37	8.83	70.8	68.62	69.71	83.03	70.06	76.54	8.03
Aphox	50g	79.37	68.99	74.18	76.38	41.05	58.71	8.41	76.52	64.89	70.7	76.89	56.89	66.89	7.48
Tokuthron	250ml	94.85	77.11	86.13	95.67	70.66	83.16	11.45	91.56	83.36	87.46	91.04	86.5	88.77	11.83
Control								7.46							7.07
L.S.D 0.05		1.715	1.513	2.139	2.425	2.287	1.896	1.70	2.139	2.139	1.89	1.71	2.43	2.287	1.866
F.		112.45	391.98	80.65	168.31	169.9	121.868	4.31	429.6	184.5	313.5	347.8	127.8	122.3	4.73

I = Initial effect R= Residual effect G.E. = General effect Y= Yield

reductions for the 1st and 2nd spray, respectively. During the 2nd season the highest residual effects were 83.36 and 77.51 % reduction recorded by prothiofosse and carbosulfan at 1st spray while 2nd one were 86.5 and 72.11 recorded for prothiofosse and malathion, respectively, while relatively lower effective compounds were jojob recording 52.81 and 54.73 % reduction at the two sprays, respectively.

Regarding the general effects of the two sprays, it could be noted that the prothiofosse (Tokuthion) considered the efficient compound against thrips on onion recorded 86.13 and 83.16 % reduction during 2002 season, 87.46 and 88.77 % reduction during 2003 season. While relatively lower general effects recorded biofly at the 1st spray and primicarb at 2nd spray recorded, 65.2 and 58.71 % reduction for the two sprays, respectively. During the 2nd season 2003 the lowest general effects were 52.55 and 62.85 % recorded for jojoba and bio-clean for the two sprays, respectively.

2- Effect of Treatments Against Thrips on Garlic:

a- Season of 2002:

Data in Table (2) had the approximate trend of those on onion, where prothiofosse recorded highest reduction percentages through out the two sprays with 95.15, 93.20 % initial reduction and 79.76, 84.14 % residual effect followed by carbosulfan with 88.50, 92.42 and 95.61, 78.18 % reduction for initial and residual effects at 1st and 2nd sprays. The lowest reduction percentages were recorded for bio-clean (63.52 %) at 1st spray and biofly (60.10%) at 2nd spray as initial effect while the primicarb compound recorded lowest residual effect with 47.02 and 60.06 % for the two sprays, respectively. The general effects of tested compounds during the 1st and 2nd spray cleared that prothiofosse recorded the highest reduction percentages (87.45 and 88.67 %) while biofly recorded lowest percentages (55.42 and 65.57 %) for 1st and 2nd sprays, respectively.

b- Season of 2003

Data of the 2nd season recorded the same trend approximately, where prothiofosse reduced thrips population with 93.39, 94.27 and 81.17, 83.69 % as initial and residual effect at 1st and 2nd sprays, respectively, while bio-clean recorded lowest initial

Table (2): Garlic yield and percent reduction of onion thrips infesting garlic plants as affected by certain pesticides during 2002 and 2003 seasons.

Treatment materials	Rat/100L water	2002							2003						
		First spray			Second spray			Y.	First spray			Second spray			Y.
		I.	R.	G.E.	I.	R.	G.E.		I.	R.	G.E.	I.	R.	G.E.	
Biofly	75 ml.	68.31	47.54	55.42	60.1	71.05	65.57	6.81	69.8	73.19	71.49	63.18	64.33	63.75	7.65
Chemisol	1.5 L.	77.57	55.8	66.68	79.18	60.12	69.65	7.36	81.3	69.28	75.29	78.13	55.59	66.86	7.8
Bio-clear	350 g	63.52	57.24	60.38	65.74	69.56	67.65	6.96	64.72	67.47	66.09	67.39	71.19	69.29	7.7
Jojoba	500ml	74.27	56.29	65.28	77.32	70.26	73.79	7.3	71.21	71.12	71.16	75.22	67.85	71.53	6.81
Malathion	150ml	75	66.58	70.79	79.14	72.38	75.76	8.78	70.77	62.64	66.7	83.28	70.77	77.02	8.87
Marsha	375g	88.5	75.61	82.05	92.42	78.18	85.3	9.89	89.83	77.17	83.5	90.89	77.91	84.4	10.71
MTI-446	100g	82.22	58.2	70.21	80.3	71.62	75.96	8.9	85.17	72.81	78.94	87.01	79.79	83.4	9.82
Aphox	50g	79.92	47.02	63.47	78.1	60.06	69.08	7.64	77.93	64.12	71.02	76.76	71.02	73.89	9.22
Tokuthron	250ml	95.15	79.76	87.45	93.2	84.14	88.67	10.5	93.39	81.17	87.28	94.27	83.69	88.98	11.96
Control								6.66							6.62
L.S.D 0.05		2.139	2.287	1.81	1.62	1.513	1.5	1.70	1.617	1.89	1.617	2.49	1.98	1.8	1.7
F.		181.25	219.71	278.04	386.77	226.5	241.6	5.49	335.6	86.58	180.9	152.6	162.3	200.9	8.74

I = Initial effect R= Residual effect G.E. = General effect Y= Yield

reduction (64.72 %) for the 1st spray and biofly in the 2nd one (63.18 %). Primicarb and chemisol recorded lowest residual effects with 64.12 and 55.59 % reduction for the two sprays, respectively. The general effects of the two sprays revealed that the prothiofose recorded highest general effect showing 87.28 and 88.98 % while bio-clean and biofly recorded lowest general effect recorded 66.09 and 63.75 % for 1st and 2nd sprays, respectively.

The obtained results agree with those of EL-Lebody (1992) who found that prothiofose reducing thrips numbers by 82.72, 91.80 % and 79.16, 77.9 % as initial and residual effects during 1990 and 1991 seasons, respectively on onion and recorded 82.85, 96.12 and 92.59, 98.6 % during 1990 and 1991 seasons on garlic, respectively.

3- Effect of Treatments on Yield:

a- On onion: Data in Table (2) showed that the yield of all treated plots were increased significantly ($P < 0.05$) in comparable with untreated ones during the two seasons. It could be classified into three categories, the 1st for prothiofose with mean yield about 11.45 and 11.83 ton/fed. for the two seasons, respectively; the 2nd

which occupied carbofuran and chemisol treatments with about 9.95, 9.30 and 9.51, 8.90 ton/fed. for the two seasons, respectively; the last group had the rest treatments (between 6.81 – 7.8 ton /fed.).

b- On garlic: The relatively high yield of garlic was recorded for plot treated with prothiofose, MTI-446, carbofuran and malathion with yield values ranged between 8.78 – 10.5 ton/fed. compared with 6.66 – 6.62 ton/fed. for untreated plots during the two seasons, while insignificant differences were observed between biofly (6.81 ton/fed.) at the 1st season and jojoba (6.81 ton/fed.) at 2nd season.

4- Rotation Experiment:

In this trial each of biofly, bio-clean, jojoba and chemisol were sprayed after two weeks of spraying by carbofuran on onion plants to avoid the problems of chemical insecticides use, where, marshal was reduced thrips numbers significantly, then the bio-compounds will work on relatively low thrips numbers and gave good results than that if it sprayed on high numbers.

The results of 2002 season in Table (3) showed that, jojoba and chemisol had high effect against thrips and its plots produced high

Table (3): Efficiency of some bio pesticides sprayed after Marshal as a chemical insecticide on onion plants during seasons 2002 and 2003.

Treatment materials	Rat/100L water	2002				2003			
		I.	R.	G.E.	Y.	I.	R.	G.E.	Y.
Biofly	75 ml.	68.27	67.93	67.95	7.715	71.1	74.35	72.7	7.97
Chemisol	1.5 L	77.96	63.37	70.66	8.61	75.47	65.67	70.6	8.73
Bio-clean	350 g	67.1	68.24	67.67	7.65	73.03	78.81	75.9	9.4
Jojoba	500ml	79.76	63.44	71.6	9.84	79.69	69.21	74.5	10.15
CONTROL					7.46				7.07
LSD 0.05		2.49	1.88	2.49	1.819	2.491	1.88	2.82	1.8
F.		72.68	27.07	6.57	2.945	23.53	99.75	7.08	4.33

I = Initial effect R= Residual effect G.E. = General effect Y = yield

yield than control and other treatment where its reduced thrips numbers by 71.6 % and 70.6 % as general effects and the yield was 9.84 and 8.61 ton/fed.

At 2003 season, bio-clean and jojoba recorded relatively highest reduction percent, 75.92 and 74.45 % reduction and gave yield about 9.4 and 10.15 ton/fed.. The obtained results agree with that of Abd-Alla (1999) who reported that, naturals (*Beauveria bassiana*) gave poor control 40.75 % after 3 days of application but its residual effects reached to 75.34 %, while carbosulfan reduced thrips numbers with mean reduction percent 64.294 as general effect.

The present results were disagreed with Abd EL-Wahab, *et al.* (2001) they noticed that jojoba oil caused 89.02, 88.06 and 90.11, 88.5 % reduction as initial and residual effects during two study seasons, while in present work, jojoba was recorded maximum reduction percent 79.76 % when sprayed after two weeks on onion plant treated previously by carbosulfan.

Generally, it could be concluded that the prothiofos (tokuthion) compound was considered as efficient insecticide against thrips infesting onion and

garlic plants, when sprayed two applications through out growing season of plant.

To avoid insecticides problems or to reduce insecticide applications especially on food crops it gave a favorable to rotation system by spraying carbosulfan (marshal) (one spray) at early season when the thrips infestation reached to economic threshold level to suppression thrips numbers and followed that with one spray by bio-clean (microbial insecticide) or jojoba (plant extract).

Therefore, it could be recommended that the rotation system can be used successfully through an IPM program of onion and garlic crops, especially with interested observation, where the differences between yield quantity of onion plots treated with tokuthion and relation system were insignificant.

REFERENCES

- Abd-Alla, A. A. A. (1999): Effect of certain chemical and bio-control agents on whitefly, *Bemisia tabaci* (Genn.) infesting cucumber. Ph.D thesis, Fac. of Agric. Zagazig. Univ.; Egypt.

- Abd El-Wahab, H.; A. M. Taha; A. M. Zaky and M. S. Hassen (2001): Effect of controlling, *Thrips tabaci* (Lind.), and weeds in onion and garlic fields, on neighboring cotton fields. J. Agri. Sci. Mansoura Univ., 26(6): 3989-3997.
- El-Lebody, K. (1992): Efficiency of some pesticides against *Thrips tabaci* (Lind.) infesting onion and garlic, MSc. Thesis, Fac. of Agric. Zag. Univ.
- EL-Maghraby, H. M. (1998): Effect of knapsack sprayer and motor sprayer on efficiency of certain insecticides to control *Thrips tabaci* on onion plants, J.Agric.Sci. Mansoura Univ. 23(1): 461-465.
- Henderson, C. E. and E. T. Tilton, (1955): Tests with acaricides against the brown wheat mite. J. Econ. Ent., 48:157-161.
- Ibraheem, M. M. A. (2001): Studies on some piercing- sucking insect pests infesting cotton plants. Ph.D. Thesis, Fac. Agric. Zag. Univ..
- Little, T. M. and F. J. Hills (1978): statistical methods in agricultural research. Available from U.C.D. Book Store University of California, Davis : 241 pp.
- Omar, B. A. and M. I. El-Kholy (2001): Comparative bio-efficacy of certain traditional and non-traditional insecticides against *Thrips tabaci* infesting onion. J. Agric. Sci. Mansoura Univ., 26(4): 2373-2381.

تأثير بعض المنتجات الحيوية مقارنة ببعض المبيدات الحشرية ضد حشرة تريبس البصل التي تصيب نباتات البصل و الثوم

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تم تقييم بعض المركبات الحيوية و المبيدات الحشرية وهي البيوفلاي و البيوكلين (مركبات ميكروبية) ومستخلص نبات الجوجوبا *Simmondsia chinensis* (Link) (مستخلص نباتي) و الكيميسول (زيت معدني) مقارنة ببعض المبيدات الحشرية وهي المارشال و الافوكس (مجموعة الكريامات) و التوكثيون و الملاثيون (مجموعة الفوسفورية العضوية) و ال MTI-446 من (neo-nicotinoid) ضد حشرة التريبس على نباتات

البصل و الثوم فى قرية كفر عبد العزيز - مركز الزقازيق - شرقية . وقد تم رش المركبات رشتين لكل منها فى قطع تجريبية منفصلة بالإضافة الى نظام تعاقب منفصل برش المركبات الحيوية بعد اسبوعين من رش مركب المارشال فى نفس القطعة و ذلك خلال موسمين متتالين هما موسم ٢٠٠٢ ، ٢٠٠٣ .

اوضحت النتائج ان مركب التوكثيون هو افضل المركبات المختبرة عند رشه بالتركيز الموصى به حيث سجل ٨٦,١٣ ، ٨٣,١٦ ، % و ٨٧,٤٦ ، ٨٨,٧٧ % للرشتين الاولى و الثانية خلال موسم الدراسة على البصل و كانت على الثوم لا تختلف كثيرا مسجلا نسبة خفض ترواحت ما بين ٨٧,٤٥ - ٨٨,٩٨ % بينما جاءت باقى المركبات بعد ذلك فى ترتيب تنازلى يبدأ بالmarshal ثم يليه كل من ال MTI-446 ، الافوكس مع الملاثيون ، الكيمسول ثم الجوجويا يليها البيوفلاى و البيوكلين.

بالنسبة لتجربة التعاقب فقد اعطى كل من الجوجويا و البيوكلين نسبة خفض وصلت الى ٧٩,٧٦ % للجوجويا و ٧٨,٨١ % للبيوكلين وذلك عند رشها بعد اسبوعين من رش مركب المارشال لنفس القطعة.

اوضحت نتائج التحليل الاحصائى لبيانات المحصول وجود اختلافات معنوية بين متوسطات المحصول الناتج بين المعاملات و بعضها و بينها و القطع الغير معاملة حيث سجل اعلى محصول ١١,٤٥ ، ١١,٨٣ طن/فدان للبصل فى القطع التى تم رشها بالتوكثيون مقارنة بتلك الغير معاملة (٧,٤٦ ، ٧,٠٧ طن/ف) و بالنسبة لمحصول الثوم سجل اعلى محصول فى القطع التى تم رشها بالتوكثيون ايضا (١٠,٢ ، ١١,٩٦ طن/ف) بينما كانت القطع الغير معاملة ما بين ٦,٦٦ الى ٦,٦٢ طن/ف.

وسجل المحصول فى القطع التى تم تطبيق نظام التعاقب فيها اعلى معدل فى القطع التى تم رشها بالجوجويا و البيوكلين خلال موسم الدراسة حيث وصل المحصول فيها الى ١٠,١٥ طن/ف فى المعاملات الجوجويا عقب المارشال على البصل.

ولما تقدم يمكن التوصية باستخدام المستخلص النباتى الطبيعى جوجويا بالمعدل الموصى به رشة واحدة عقب رش المارشال باسبوعين ضمن برنامج مكافحة المتكاملة للترس على البصل.