

THE EFFICIENCY OF NEW NATURAL COMPOUND AS INSECTICIDES AGAINST PEACH FRUIT FLIES *Bactrocera zonata* (Saunders).

Hanafy, A. H. A.; Anas A. Ahmed; A. M. Z. Mosallm and M.G.M. El-Sherief

Central Pesticide Laboratory, Plant Protection Inst., Agric. Res. Center

ABSTRACT

This study was carried out to investigate the effect of five compounds (Baicao I, Baicao II, Baicao III, Spentor 24 SC. and Neem oil) at different concentrations against Peach fly *Bactrocera zonata* under laboratory and field conditions. The obtained results indicated that percentage of adults mortality had significantly high value with Baicao I treatment (74.17 %) while the lowest significantly value was (65.28 %) with Spentor 24 SC. treatments. On the other hand the percentage of pupae mortality was increased with Neem oil treatment (35.82 %) while, Baicao I gave the lowest significantly effect (27.28 %).

The Baicao I, Baicao II and Baicao III treatments were significantly decreased the attraction flies as compared with Buminal control. While, there were no significant difference between Neem oil treatment and Spentor by Arina olfactometer instrument. Also, there were the highest value was attained of flies attracted was after 48, 72 hr. from application but the lowest one was recorded after 24 hr.

The mean number of captured flies traps in the field were high significantly by Baicao III treatment while. The Neem oil treatment gave the lowest significantly as compared with Buminal control.

INTRODUCTION

The Peach fruit fly *Bactrocera zonata* (Saunders) is a serious pest on fruit orchards in Egypt now.

This fly is active throughout the year except cold winter Grewal (1981) and Abdel – Salam *et al* (1993) studied the toxicity evaluation of certain insecticides against the mediterranean fruit fly *Ceratits capitata* (Wied.) (Diptera : Tephritidae). White & Elson – Harris (1994) maintained the right information of ecology, biology, control methods and identification of species of *Bactrocera*.

Drew and Hancock (1994) studied the *Bactrocera dorsalis* complex of fruit flies (Piptera: Dacinac) in Asia. El-Minshawy *et al* (1999) reported the ecology, biology, morphological about *B. zonata* and maintained recently in Egypt. Hanafy *et al*. (2001) evaluated different compounds for attracting *B.zonata*. Al - Eryan (2008) studying the control of Peach fruit fly *Bactrocera zonata* (Saunders) is based on two strategies, one is the Bait Application Technique (BAT) relies on protein baits. The second is the male annihilation technique the commercial bait. Field trial was conducted at Alexandria house backyards during August and September 2005. The present investigation indicated that the mixture of beef extract, molasses, borax and malathion can be recommended to be used in the formulation for monitoring and control of the Peach fruit fly, *B. zonata*.

Hanafy *et al.* (2008) studied the efficiency of certain plant extracts against *Ceratitis capitata* and *Bacterocera zonata*.

The aim of this study is to evaluate some natural compounds against Peach fruit flies under laboratory and field conditions for product high marketing quality crops.

MATERIALS AND METHODS

1- Insect Culture.

The laboratory strain of Peach fruit fly *Bacterocera zonata* (Diptera : tephritidae) (from Guava fruits) was reared in wooden cages covered with a piece of cloth until the adults emerge. It was provided with water and solid adult food (sugar : hydrolyzed yeast, 3:1). One side of these cages was covered with red muslin for allowing the females to lay eggs under laboratory conditions at approximately from 23 to 25° C and from 65 to 75 % relative humidity in Integrated control laboratory conditions during season 2007. El – Minshawy *et al.* (1999).

Insecticide Used

Five new natural compounds used as Insecticides against adults and pupae of Peach fruit fly. Four concentrations were used for each compound according to the recommendation of Ministry Agriculture of Egypt .

A- Baicao (I) : 0.36 % matrine aqueous solution ,was supplied by Henan in china Institute of

Pesticide Insepection in 1998.The adults were sprayed at the rate of 360, 540, 720 and 900

ppm while, pupae were sprayed by 540, 720, 900 and 1800 ppm, respectively.

B- Baicao (II) : 0.1 % matrine aqueous solution , was supplied by Institute of plant Protection of Shanghai Academy of Agriculture Science in 2002. The adults were sprayed at the rate of 100, 150, 200 and 250 ppm while, pupae were sprayed at rate of 150, 200, 250 and 500 ppm, respectively .

C- Baicao (III) : 0.45 % matrine + Emamectin benzoate compound slight emulsionwas supplied by Institute of plant Protection of Shanghai Academy of Agriculture Science in 2002.The adults were sprayed at the rate of 450, 675, 900 and 1125 ppm while , pupae were sprayed at the rate of 675, 900, 1125 and 2250 ppm, respectively .

D- Spintor 24 SC.(NAF.315) : 22.1 % Spino Syn (A) and 23.5 % Spino Syn (D) supplied by Institute of plant Protection of Shanghai Academy of Agriculture Science .The flies were sprayed at the rate of 456, 684, 912 and 1140 ppm while, pupae were sprayed at the rate of 684, 912, 1140 and 2280 ppm, respectively .

E- Neem oil :90 % pure neem oil ,Agrisense,Treforest Industial Estae ,Co. product .The adults were sprayed at the rate of 900, 1350, 1800 and 2250 ppm while, pupae were sprayed at the rate of 1350, 1800, 2250 and 4500 ppm, respectively.

One of the treatments done were by Atomizer sprayed experiments on three replicates of adults and pupae each replicate contains ten insects.

1- Arina Olfactometer Instrument

The instrument was consist of big wooden cage in the center contained 50 insects of Peach fruit flies with medium (suger, water and protein hudrolyzate).The big cage has five Calic paper arms (1metertall) distributed and the end of each arm was joined with a cylindrical plastic contained the compound was tested (Hanafy ,2000) fig (1) In this case, six materials were used in the cylindrical blastic containers of Arina olfactometer the third solution (1 liter compound : 1 L. Buminal food attractant :18 L. water) was tested from each compound and compared with Buminal food attractant only (used as control).The dead and attractant flies were recorded after 1, 2, and 3 days with three repeated three time and the treatments with three replicates .

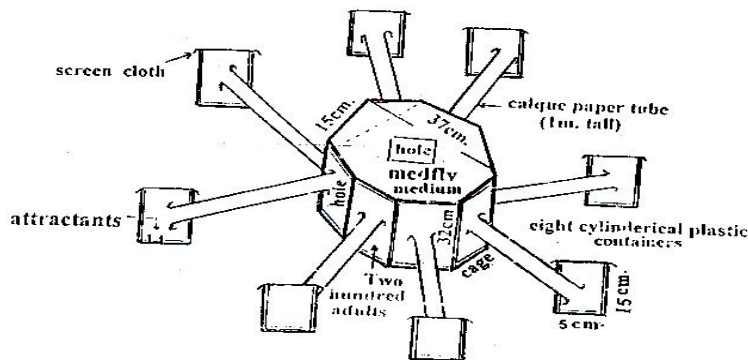


Fig- () : Arina Olfactometer

2- Field Experiment

The Mcphel traps were used in Guava orchards, Mamorh district during 2007, Alex. Governorate. The traps were baited with different solutions of toxic bait for each compound according to the recommendation of Ministry Agricultural of Egypt [1L.insecticides: 1L.Buminal food attractant : 18 L.water] in traps. In this experiment we used different four attraction toxic bait solutions for each compound in the trapin the field. The solutions were applied as follows: the first solution (0.5 L. compound: 1 L. food attractant: 18.5 L. water); the second solution (1 L. compound: 1L. food attractant: 18 L. water); the third solution (1L. compound Neem oil treatment,: 2L. food attractant: 17 L. water) and the forth solution (2L. compound: 1L. food attractant: 17 L. water).

Methyl Euginol six attractant for males only was used to compare between food attractant and six attractant. The mean numbers of males attracted in traps were (107) after 10 days,(111) after 20 days, (150) after 30 days and (155) flies with attractive mean (130.75) flies for all time intervals. The traps were examined after 10, 20, 30 and 40 days from application and the compounds and its concentrations were changed in traps every examination. The population followed and calculated the attracted flies and dead flies in all traps of treatments in the experiment.

Statistical Analysis:-

The obtained results were statically analyzed according to Steel and Torrie (1980) using a split – split design while the treatment means were compared via L.S.D at 0.05 probability level.

RESULTS AND DISCUSSION

1- Effect of tested compounds on Adults and Pupae:

The effect of different compounds against peach fruit flies is given in table (1). It is clear that the tested compounds had high significantly effect on the percentage of adults mortality. The highest significantly effect was obtained from Baicao (1) treatment (74.17%) while, the lowest significantly effect was obtained from Spintor treatment (65.58%). On the hand, the successful mortality percentage occurred after 72 hrs. (79.49%).

Table (1): Efficacy of certain compounds as insecticides against adults of *Bactrocera zonata* (Sunders) in laboratory.

Treatments	Concentration	Percentages of Adults mortality after different time of treatment .			Mean
		24 hr.	48 hr.	72 hr.	
Baicao(1)	360	13.3	66.7	96.7	91.9
	540	23.3	83.3	93.3	96.63
	720	50	96.7	100	99.23
	900	66.7	100	100	98.9
	Mean	38.33	86.68	97.5	94.17a
Baicao(11)	100	16.7	70	80	55.57
	150	20	76.7	93.3	63.33
	200	30	80	100	70
	250	33.3	96.7	100	76.67
	Mean	25	80.85	93.33	66.39 c
Baicao(111)	450	10	36.7	90	45.56
	675	40	80	86.7	68.9
	900	66.7	90	93.3	83.33
	1125	70	96.7	100	88.9
	Mean	46.67	75.85	92.5	71.68b
Neem oil	900	10	56.7	100	55.56
	1350	2303	80	100	67.76
	1800	36.7	90	100	75.56
	2250	86.7	96.7	100	94.46
	Mean	39.18	80.85	100	73.34 ab
Spintor (24 Sc.)	456	16.7	50	86.7	51.13
	684	16.7	80	90	62.26
	912	23.3	90	96.7	70
	1140	33.3	100	100	77.76
	Mean	22.5	80	93.35	65.28 cd
Mean		28.61 c	67.37 b	79.45 a	
L.S.D. 0.05 (A) : between treatment = 2.07					
L.S.D. 0.05 (B) : between intervals = 0.67					

Results in table (2) show that the tested compounds had significantly effect on percentage of pupae mortality. The results can be arranged as follows: 35.32, 33.62, 33.05, 27.78 and 25.28% for Baicao II treatment,

Baicao III treatment, Spintor treatment and Baicao I treatment respectively. It is well known that the percentage of pupae mortality through different time of exposure were 79.45, 67.37 and 28.61 % after 72, 48 and 24 hrs. of application, respectively.

Table (2): Efficacy of certain compounds as insecticides against pupae of *B. zonata* (Sun.) in laboratory .

Insecticides	Concentration ppm	Percentages of pupae mortality after different time of exposure			Mean
		24 hr.	48 hr.	72 hr.	
Baicao(1)	540	0.00	16.7	43.3	20.00
	720	0.00	16.7	46.7	21.13
	900	0.00	30.0	56.7	28.90
	1800	0.00	30.0	63.3	31.10
	Mean	0.00	23.35	52.50	25.28 d
Baicao(11)	150	00.0	20.0	50.0	23.33
	200	00.0	30.0	60.0	30.10
	250	3.3	33.3	70.0	35.53
	500	10.0	43.3	83.3	45.53
	Mean	3.33	31.66	65.83	33.62 b
Baicao(111)	675	00.0	13.3	50.0	21.10
	900	00.0	23.3	53.3	25.53
	1125	00.0	26.7	73.3	33.33
	2250	6.7	50.0	100.0	52.23
	Mean	1.68	28.33	69.15	33.05 b
Neem oil	1350	00.0	10.0	43.3	17.76
	1800	00.0	20.0	53.3	24.43
	2250	3.3	43.3	100.0	48.87
	4500	3.3	53.3	100.0	52.20
	Mean	1.65	31.65	74.15	35.82 a
Spintor (24 Sc.)	684	00.0	10.0	36.7	15.56
	912	00.0	10.0	46.7	18.90
	1140	00.0	13.3	50.0	21.10
	2280	10.0	56.7	100.0	55.56
	Mean	2.50	22.50	58.35	27.78 c
Mean		1.53 c	22.92 b	53.40 a	

L.S.D.0.05 (A): between treatment = 1.19

L.S.D.0.05 (B): between intervals = 0.48

The present results were paralleled with those reported by Hanafy et al (2008), they found that the leaves extract of *N.oleander* was the most effective against adults of *B. zonata*. While the extracts of *R. gallica* leaves and *A.sativum* buibils were the most effective against pupae of *B. zonata*.

1- Effect of tested compounds on attracted adults by Arina olfactometer instrument :

The efficacy of the tested compounds on attracted adults in table (3) show that Baicao I; Baicao II and Baicao III treatments were decreased significantly effect on attracted adults (25.5 ;19.5 and 50.9 %) as compared with food attracted (46.5 %) while , there were no significant effect for Neem oil treatment and Spentor 24 SC..Also, there were significant differences between time intervals on the attraction of flies where the highest value was obtained after 48 hr, 72 hr from application but the lowest one was recorded after 24 hr.

Table (3) The effect of tested compounds on the attraction of adults of *Bactrocera zonata* (Sunders) by Arina olfactometer instrument

Treatments	Adults percentages at different intervals.				Mean
	24 hr.	48 hr.	72 hr.	One Week	
Control (Standard Buminal)	18.0	54.0	54.0	60.0	46.50 a
Baicao (I)	6.0	36.0	36.0	24.0	25.50 b
Baicao (II)	00.0	30.0	30.0	18.0	19.50 c
Baicao (III)	00.0	12.0	12.0	12.0	9.00 d
Neem oil	00.0	00.0	00.0	00.0	00.00 e
Spintor(24SC.)	00.0	00.0	00.0	00.0	00.00 e
Mean	4.00 c	22.00 a	22.00 a	19.00 b	

L.S.D. 0.05 between treatment = 0.31 . L.S.D. 0.05 between intervals = 0.98

These results are agreement with those obtained by White *et al.* (1994); Talib *et al.* (1995); Hanafy *et al.* (2001) and Basant (2008) .

2- The efficiency of tested compounds and their attraction toxic bait solution against Peach fruit flies in the field :

The efficiency of different compounds and their mixtures solution in Mcphail glass traps respented in table (4) .

Table (4): The effect of tested compound and their attraction toxic bait solution against *Bactrocera Zonata* (Sunders) in the field .

Treatments	Maixture solution	Mean numbers after different time of attractant flies on machpte trap.				Mean
		10 days.	20 days.	30 days.	40 days	
Control with Standard Buminal (ml)	1	16.00	71.00	47.00	40.00	43.50
	2	3.00	6.00	59.00	63.00	32.75
	3	44.00	55.00	70.00	66.00	58.75
	4	19.00	35.33	56.00	48.00	39.58
	Mean	20.50	41.83	58.00	54.25	43.65b
Baicao(1)	1	8.00	12.00	13.00	9.00	10.50
	2	ε, . . .	15.00	13.00	17.00	12.25
	3	γ, . . .	9.00	22.00	17.00	13.75
	4	δ, . . .	20.00	41.00	35.00	26.75
	Mean	γ, . . .	14.00	22.25	19.50	15.81 d
Baicao(11)	1	14.00	69.00	45.00	38.00	41.50
	2	2.00	5.00	58.00	62.00	31.75
	3	41.00	52.00	69.00	63.00	56.25
	4	17.00	33.00	56.00	47.00	38.25
	Mean	18.50	39.75	57.00	52.50	41.94 c
Baicao(11I)	1	32.00	42.00	44.00	43.00	40.25
	2	89.00	100.00	131.00	115.00	108.75
	3	78.00	143.00	98.00	101.00	105.00
	4	45.00	63.00	102.00	89.00	74.75
	Mean	61.00	87.00	93.75	87.00	82.19 a
Neem	1	2.00	13.00	9.00	7.67	7.92
	2	1.00	1.00	2.00	3.33	1.83
	3	1.00	2.00	11.00	4.67	4.67
	4	1.00	2.00	7.33	1.67	3.75
	Mean	1.25	4.50	7.33	5.09	4.54 f
Spintor (24 Sc.)	1	6.00	10.00	11.00	7.00	8.50
	2	3.00	14.00	12.00	16.00	11.25
	3	6.00	8.00	21.00	16.00	12.75
	4	9.00	18.00	39.00	32.00	24.50
	Mean	6.00	12.50	20.75	17.75	14.25 e
Mean		19.13 d	33.26 c	43.18 a	39.35 b	

L.S.D. 0.05 (A) : between treatments = 0.66 .

L.S.D. 0.05 (B) : between intervals = 0.24 .

First solution (1) Second solution (2) Third solution (3) Fourth solution (4)

The mean number of captured flies in traps were significantly increased by Baicao III treatment (82.19) flies as compared with Buminal control (43.65). The Neem oil treatment gave the lowest significantly decreased of these characters (4.54) flies. On the other hand there were highly significantly differences between the four time intervals and can be arranged as follows :43.18; 39.35; 33.26 and 19.13 flies for 30; 40; 20 and 10 days, respectively.

These results are in harmony with those obtained by Hanafy (2000) who demonstrated that local food attractants methyl eugnol by Arina olfactometer instrument gave the highest attraction (6.22) flies but the lowest attraction (2.33) flies of *Ceratits capitata* as compared with Buminal control.

REFERNCES

- Abdel –Salam A.L., El-Okda M.K., Shain A.I. and Hanafy A.H. (1993):Toxicity evaluation on certain insecticides against the Mediterranean fruit fly *Ceratits capitata* (Wied.) Diptera : Tephritidae. *Egypt. J. Appl. Sci*, 8 (11) 518 -530 .
- Al-Eryen M.A.S. (2008) : Beef extract as a protein bait for monitoring and control of the Peach fruit fly *Bactrocera zonata* (Saunders)(Diptera: Tephritidae) *Egyption J. of Biologicl Pest Control* ,18(1),71-74.
- Basant S.M. (2008) :Seasonal abundance and laboratory rearing of Guava Fruit fly ,*Bactrocera zonata* (Saunders)(Diptera :Tephritidae).MS.c. ThesisAlex. Univ.
- Drew and Hancock (1994) : The *Bectrocera dorsalis* complex of fruit flies (Diptera :Dacinac)in Asia .*Bull Entomol Res.* 2 :68.
- El –Minshawy A. M., Al-Eryan M. A. and Awad A. L. (1999) : Biological and morphological studies on the Guava fruit fly *Bactrocera zonata* (Saunders) (Diptera : Tephritidae)found recently in Egypt -8 th. *Nat. Conf. of Peses &Fruits in Ismailia* .
- Gómez-Caravaca AM, Cerretani L, Bendini A, Segura-Carretero A, Fernández-Gutiérrez A, Del Carlo M, Compagnone D, Cichelli A.(2008) : Effects of fly attack (*Bactrocera oleae*) on the phenolic profile and selected chemical parameters of olive oil. *Department of Analytical Chemistry, Faculty of Sciences, University of Granada, C/Fuentenueva s/n, E-18071 Granada, Spain.*25;56 (12): 4577-83.
- Grewal J.S. (1981): Relative incidence of infestation by two species of fruit fly in Luhnians , Pungab , *Indian Journal of Ecobgy* 8: 123 – 125.
- Hanafy A. H. (2000) :Laboratory evaluation of some local food attraction of the medfly *Ceratits capitata* (Wied.) .*Annals of Agric. Sc. Moshtohor* Vol. 38 (4) : 2517 -2527 .
- Hanafy J. S., Awad A. L. and Abo –Sheasha M. (2001) : Field evaluation of different compounds for attraction adults of peach fruit fly *Bacterocera zonata* (Saunders) and Mediterranean fruit fly *Ceratits capitata* (Wied.) Diptera : Tephritidae in Guava orchards .*J. Agric. Sci. Mansoura univ.* , 26 (7) : 4537 -4546 .

- Hanafy A.H.,Anas A.AHMED, Mosallam A.M.Z. and Ibrahim A.M. (2008) : Efficiency of certain plant extracts against *Ceratitits Capitata* (Wied .) and *Bactracera Zonata* (Saunders) (Diptera : Tephritidae) Egypt . J . Agric . Res.,86(3) .
- Steel,R.G.D.and J.H.Torrie (1980): Principals and procedures of statistics. A biometrical approach.2nd McGrow-Hill Kogakusha Ltd.,p. 633.
- Talib – Hussain , Siddiqui – QH ,Qureshi – ZA , Hussain T. ,Ahmed M. and Shakoori – AR (1995) :Visual responses of *Bacterocera zonata* (Saunders)to traps of different colours .Congress of Zoology , 15 : 313 – 318 .
- White I.M. and Elson – Harris M.M. (1994) : Fruit flies of economic significanc their identification and bionomics . Printed and bound in the UK. By Redwood press Ltd Melksham UK. .

كفاءة بعض المواد التي تستعمل كمبيدات لمكافحة ذبابة الخوخ

احمد حسين احمد حنفي، اناس عبد العزيز احمد، احمد محمود زكى مسلم و
مدوح جلال محمود الشريف
معهد بحوث وقاية النباتات – المعمل المركزي للمبيدات – مركز البحوث الزراعية

أستهدف هذا البحث دراسة تأثير خمس من المركبات الطبيعية الجديدة (بيكو ١، بيكو ٢، بيكو ٣، زيت النيم ، سينتور) بتركيزات مختلفة ضد حشرة ذبابة الخوخ في المعمل و في الحقل و قد أظهرت النتائج أن النسبة المئوية لموت الحشرات الكاملة أعطت زيادة معنوية مع معاملة بيكو ١ (٧٤,١٧ %) بينما معاملة الأسينتور كانت أقل معنوية (٦٥,٢٨ %) بالإضافة الى أن النسبة المئوية لموت العذارى أعطت زيادة معنوية مع معاملة زيت النيم (٣٥,٨٢ %) بينما معاملة البيكو ١ كانت أقل معنوية (٢٥,٢٨ %) . أوضحت الدراسة أيضا ان معاملات البيكو ١، البيكو ٢، البيكو ٣ أعطت نقصا معنويا على جذب الحشرات الكاملة و ذلك بالمقارنة بمعاملة البيومينال (الكنترول) وفي حين لا يوجد أى فروق معنوية بين معاملات زيت النيم و الأسينتور و ذلك باستخدام جهاز الأرنيا أولفاكتومييتد . أيضا أظهرت النتائج أن أعلى قيم متحصل عليها لجذب الذباب كانت بعد ٤٨ ساعة الى ٧٢ ساعة من التطبيق و أقل قيمة كانت بعد ٢٤ ساعة من التطبيق . و أشارت النتائج أن عدد الحشرات الكاملة المنجذب في المصائد في الحقل أعطى زيادة معنوية باستخدام معاملة البيكو ٣ بينما معاملة زيت النيم أعطت أقل تأثير معنوى و ذلك بالمقارنة بمعاملة مادة البومينتال (الكنترول) .