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EFFICIENCY OF THREE BIOINSECTICIDES SPRAY IN PREHARVEST TO CONTROL PEACH FRUIT FLY DURING POSTHARVEST OF GUAVA SEEDLESS FRUITS

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ABSTRACT

This experiment was carried out during 2013 and 2014 seasons on guava seedless fruits to study the effect of spray of three bioinsecticides; Biozeid 2.5%, Pritecto 9.4% and Bioarc 6% three levels each (300, 250 and 200g/100 l water) at preharvest to control peach fruit fly during postharvest of guava fruits. Stored fruits at 8°C and RH.85-90%. Weight loss,firmness,total soluble solides, carotenoids, acidity and vitamin C, were determind. The highest effect for controlling peach fruit fly observed with Bioarc 6% treatments of guava fruits in both seasons. The results indicated that, there was lower weight loss with fruits which were treated by Biozeid 2.5% and by Pritecto 9.4%. Firmness, carotenoids and vitamin C. were significantly higher with fruits treated by Bioarc 6%, but total soluble solid was significantly higher in fruits treated by Biozeid 2.5% in both seasons. In both seasons, weight loss percentage, total soluble solid contents (TSS) and carotenoids were increased significantly by the advancing of storage periods but firmness, total acidity and vitamin C. decreased during storage.

Key words: Bioinsecticides, peach fruits fly, biozeid, pritecto, bioarc.

INTRODUCTION

Guava (*Psidium guajava* L.) is an important resource in the domestic economy of many countries in the tropics (Yavada, 1996). Guava is a very popular fruit, it is, generally a good source of lycopene, beta carotene, vitamin C, protein, fats, carbohydrate, fibers, minerals and vitamin B. In Egypt, guava trees are widely planted especially in Beheira, Elsharkia, around Alexandria and newly reclaimed lands. In Egypt guava occupy about 38000 faddans, yielded about 314000 tons as annual fruit production with an exported range about 16.312.38 metric tons to many countries (Cheaour *et al.*, 1990). Guava exports from Egypt are increased through air flight as the main transport system. The limiting factor for export is the high costs that reduce the profit level to the grower. Refrigeration appears to be a suitable way for sea transport. The guava is highly perishable, susceptible to mechanical damage and chilling injury and has a limited postharvest shelf life. The peach fruit fly *Bacterocero zonata (saunders)* in damagerous pest for many fruit crops in different countries. Control depends upon bioinsecticides (Mahmoud, 2009). The insect feeds on the internal fruit contents. Al l damaged fruit must be destroyed to break the cycle of infection. Remove any fruit from the tree with dimples or weeping clear sap as this is a sign that egges have already been laid in the fruit (Rahmann and Akhsoy, 2014). The aim of this investigation was to study the effects of bio insecticied spray on preharvest and postharvest guava fruits to control the peach fruit flies.

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MATERIALS AND METHODS

The investigation was carried out during 2013 and 2014 seasons on seedless guava fruits (*Psidium guajava* L.). Fruits were harvested from plants grown in Sabahia station, Alexandria. The experiment was conducted in four feddans contained of guava. It harvested at mature stage, according to Robert and Ching (2014). Fruits were immediately transported to the laboratory of handling and postharvest at sabahia station Alexandria, horticulture research of Giza, Egypt. Fruits were sorted for size uniformity and absence defects. Sound selected fruits were washed using fresh tap water, and air dried. Then fruits divided into four groups each group contained six fruits. Guava fruits were received the following treatments at preharvest and postharvest as follows:

At preharvest, three bioinscticides were used Biozeid 2.5%, Pritecto 9.4% and Bioarc 6% and sprayed with three concentrations 300, 250 and 200 g/100l water, each separately.

A week beforharvest, fruits were spraied with bioinscticides, then all treatments stored at 8°C and RH. (85-90%).

Each treatments were packed in three carton boxes at dimension of (50 × 30 × 20 cm) each box contain six fruits represented one replicate and all treatments stored at 8°C. The changes in physical and chemical properties of fruits were followed up each seven days interval through the experimental period as following:

Physical Characteristics

Weight loss percentage (%): It was calculated according to the following equation:

$$\text{Weight loss (\%)} = \frac{\text{Initial weight- weight at sampling date}}{\text{Initial weight}} \times 100$$

Three fruits were labeled in every replicate and initially weighted to calculate the fruits weight loss percentage during the cold storage in relation to its original weight.

Firmness (g/cm^2)

Pulp texture: was determined by Lifra texture analyzer instrument using a penetrating cylinder of 1 mm in diameter, to a constant distance (2 mm) inside the pulp of fruits, and by a constant speed 2 mm per sec., and the peak of resistance was recorded per g.

Determining the Infestation of Fruits by Peach Flies

Is known by the number of holes in the fruit itself were recorded the more number of holes means the more infestation percentage and the number of eggs increase.

Chemical Properties

Total soluble solids content (TSS)

The obtained juice was used to determine the percentage of Total soluble solids content (TSS) by the use of a hand refractometer according to Chen and Mellenthin (1981)

Titratable acidity (%)

Total acidity was determined by titrating 5 ml of the extracted juice against 0.1 N of NaOH using phenol phethalin indicator, titratable acidity was expressed as percentage of citric acid (g citric acid/100 ml juice) according to (AOAC, 2005).

Ascorbic acid content

Five ml of sample of fruit juice + 5 ml metaphosphric acid were added to each sample, which was titrated with 2.6 dichlorophenol indophenol solution. Ascorbic acid content was expressed as milligrams of ascorbic acid per 100 ml of fruits juice, according to (AOAC, 2005).

Carotenoids content

Carotenoids content of fruits pulp was extracted by direct dipping of 10 g of blended fruit pulp into solution containing (40 ml acetone, 60 ml hexane and 0.1 g Mg $C0_3$ and blended for 5 min. to determined by colorimeter according to (AOAC, 2005).

Decay percentage

Determined by count the number of fruits decayed and expressed as percentage from sound fruits.

Statistical Analysis

The experimental design was factorial Randomized complete bloch design (RCBD) with three replicates, and all the obtained data were statistically analyzed according to Snedecor and Cochran (1980). The individual

comparisons were carried out by using the least significant difference (LSD) according to SAS Institute (1985).

The experiment was distributed in split –split design and the means were compared by LSD at 0.05 according to Steel and Torrie (1980).

RESULTS

Mean of Three Replicates + SE

The data was recorded in Table 1 reveal that There were highly significant differences between the three bio-insecticides and the means can be arranged according to their effects as follows at first season 23.11 flies for Biozeid 2.5%, 22.55 flies for Pritecto 9.4% and (17.66) for Bioarc 6%. The second season was highly significant 43.56 for Biozeid 2.5%, 7.56 for Bio arc 6% and 5.56 for Pritecto 9.4% this result are in line with Hanafy *et al.* (2009).

Grand Mean of Replicates + SE

The result shown in Table 2 clear that low grand means of peach fruit fly at first season (33.92 flies) and (32.44 flies) for second season at first concentration; at second concentration first season recorded 39.50 flies while 39.17 flies were recorded for second season and the third concentration in first season were 44.41 flies and 42.75 flies for second season. These results agreed with those reported by Hanafy *et al.* (2009).

Physical Characteristics

Fruit weight loss percentage

Data presented in Table 3 show that, the two seasons, weight loss percentage had lower in fruits were treated (Biozeid 2.5%, Pritecto 9.4% and Bioarc 6%) with concentration 200g/100 l water compared with untreated fruits in both seasons these results were agree with Khyber (2014).

The weight loss percentage was gradually increased as an average for all treatments, by increasing the storage period. The differences among all storage periods were significant in both seasons of study. The weight loss attributed respiration and the higher storage temperature. The later result agree with those reported by El-Yaten and Kader (1984), El-Saedy and El-Naggar (2005).

Fruit firmness

From the tabulated data in Table 4, it was noticed that fruits treated with Bioarc 6% (300g/ l water) had the highest value of firmness compared with all treatments in both seasons. This result agree with Singh and Pal (2009). Fruit firmness of all treated fruits was decreased with the duration in this really cold storage in both seasons. Similar, results were found by Rippon and Trochoulias, (2007) and Yassin and Tayel (2011). As a conclusion, loss in fruits firmness with the decomposition progress of storage period is mainly due to, enzymatic degredation of insoluble protopectins to more simple soluble pectin, solubilization of cell and cell wall contents as a result of the increasing in pectin esterase activity and subsequent development of juiciness and loss in peel and pulp hardness. These results were in agreement with those previously found by many researches such as Ponomarev (1968) and Siddiqui *et al.* (1996).

Chemical Characteristics

Total soluble solids contents (TSS)

The data illustrated in Table 5 show that soluble solids contents TSS in (untreated) fruits control and fruits were treated Bioarc 6% were significantly higher compared with all treatments in both seasons. Esam Eldin and Osman (2014). TSS in the fruits by the storage periods was more than three folds its initial value at beginning of the storage period. The above finidings are in harmony with those of Lopez *et al.* (2003) on cactus pear and David and Whyte (2009).

Carotenoids content

The changes in carotenoids content of guava fruits in the two seasons of the study are presented in Table 6. Generally, there were higher significant differences between fruits were treated with Biozeid 2.5%, Pritecto 9.4%, and Bioarc 6% compared with untreated fruits.

These results agreed with Pen *et al.* (1999). It was noticed that carotenoids content were significantly increased during storage periods in both seasons. Similar results were found by Nurul and Mosharraf (2012) on banana.

Table 1. Efficiency of certain biological insecticides spray on guava trees against Peach fruit fly *Bacterocera zonata* at two seasons (2013 and 2014)

Bio-insecticide	Concentrations g/100 l water	The mean number of B.Z. flies in traps		Grand mean
		First season (2013)	Second season (2014)	
Biozeid 2.5%	300	15.67	38.00	26.84
	250	21.67	44.33	33.00
	200	32.00	48.33	40.17
	Mean	23.11	43.56	33.34b
Pritecto 9.4%	300	16.33	1.67	9.00
	250	23.00	6.33	14.67
	200	28.33	8.67	18.50
	Mean	22.55	5.56	14.06c
Bioarc 6%	300	11.33	4.00	7.67
	250	19.33	6.00	12.67
	200	22.33	12.67	17.50
	Mean	17.66	7.56	12.61d
Control		92.33	98.00	95.17
		94.00	99.67	96.84
		95.67	101.33	98.50
	Mean	94.00	99.67	96.84a
Grand mean		39.33a	39.09b	

LSD 0.05 for seasons = 0.12, LSD 0.05 for bioinsecticide=1.00

Table 2. Evaluation of three bioinsecticides against Peach fruit fly *Bacterocera zonata* at two seasons in the field

Season	Bioinsecticide	Concentration			Grand mean
		300 g	250 g	200 g	
First season (2013)	Biozeid 2.5%	15.67	21.67	32.00	23.11
	Pritecto 9.4%	16.33	23.00	28.33	22.56
	Bioarc 6%	11.33	19.33	22.33	17.67
	Control	92.33	94.00	95.00	94.00
	Mean	33.92	39.50	44.41	39.28a
Second season (2014)	Biozeid 2.5%	38.00	44.33	48.33	43.56
	Pritecto 9.4%	1.67	6.33	8.67	5.56
	Bioarc 6%	4.00	6.33	12.67	7.67
	Control	98.00	99.67	101.33	99.67
	Mean	32.44	39.17	42.75	39.11b
Grand mean		34.67c	39.34b	43.58a	

LSD 0.05 for concentration = 0.92, LSD 0.05 for seasons=0.12

Table 3. Effect of three bioinsecticides spray in preharvest to control peach fruit fly during postharvest on weight loss (%) of guava fruits during 2013 and 2014 season

Treatment g/100 l water	Storage period (week)				
	1	2	3	4	Means (B)
			Season 2013		
Biozeid 2.5% 300	0	3.9	4.77	8.10	4.19a
Biozeid 2.5% 250	0	3.5	4.60	8.0	4.03b
Biozeid 2.5% 200	0	3.0	4.5	7.8	3.83c
Pritecto 9.4% 300	0	4.10	4.83	7.50	4.18a
Pritecto 9.4% 250	0	4.00	4.50	7.00	3.88a
Pritecto 9.4% 200	0	3.90	4.30	6.80	3.75b
Bioarc 6% 300	0	4.50	5.43	8.61	4.64a
Bioarc 6% 250	0	4.00	5.00	8.30	4.33a
Bioarc 6% 200	0	3.80	4.80	7.80	4.10b
Control	0	5.56	6.93	11.98	6.11a
Means (A)	0a	3.76b	4.97c	8.19d	
			Season 2014		
Biozeid 2.5% 300	0	3.50	3.79	6.84	3.53a
Biozeid 2.5% 250	0	3.20	3.10	6.20	3.13b
Biozeid 2.5% 200	0	3.00	2.90	6.00	3.00c
Pritecto 9.4% 300	0	3.73	4.28	6.70	3.68a
Pritecto 9.4% 250	0	3.20	4.00	6.20	3.35a
Pritecto 9.4% 200	0	3.00	3.70	5.80	3.13b
Bioarc 6% 300	0	3.73	4.12	8.98	4.21a
Bioarc 6% 250	0	3.50	4.00	8.50	4.00b
Bioarc 6% 200	0	3.30	3.50	8.30	3.78c
Control	0	5.20	5.00	10.90	5.28a
Means (A)	0a	3.53b	4.19c	7.44d	

LSD 0.05 2013 A=1.22,B=0.25 LSD 0.05 2014 A=1.00, B=0.32

Table 4. Effect of three bioinsecticides spray in preharvest to control peach fruit fly during postharvest on firmness of guava fruits during 2013 and 2014 season

Treatment g/100 l water	Storage period (week)				
	1	2	3	4	Means (B)
			Season 2013		
Biozeid 2.5% 300	2.50	1.50	1.45	1.00	1.61a
Biozeid 2.5% 250	2.50	1.20	1.20	0.95	1.46b
Biozeid 2.5% 200	2.50	1.10	1.10	0.93	1.40c
Pritecto 9.4% 300	2.50	1.27	1.85	1.30	1.73a
Pritecto 9.4% 250	2.50	1.10	1.50	1.10	1.55a
Pritecto 9.4% 200	2.50	0.98	1.30	0.95	1.43b
Bioarc 6% 300	2.50	2.33	1.73	1.50	2.02a
Bioarc 6% 250	2.50	2.10	1.30	1.20	1.78a
Bioarc 6% 200	2.50	0.98	1.20	1.10	1.45a
Control	2.50	2.05	2.03	1.20	1.95a
Means (A)	2.50	1.46b	1.56c	1.12d	
			Season 2014		
Biozeid 2.5% 300	1.80	1.23	1.20	1.00	1.31a
Biozeid 2.5% 250	1.80	1.00	0.98	0.97	1.19b
Biozeid 2.5% 200	1.80	0.95	0.93	0.95	1.16b
Pritecto 9.4% 300	1.80	1.20	1.30	1.05	1.34a
Pritecto 9.4% 250	1.80	1.10	0.98	0.97	1.21a
Pritecto 9.4% 200	1.80	0.98	0.95	0.93	1.17b
Bioarc 6% 300	1.80	1.78	1.72	1.30	1.65a
Bioarc 6% 250	1.80	1.30	1.40	1.00	1.38b
Bioarc 6% 200	1.80	1.20	1.20	0.98	1.29b
Control	1.80	1.28	1.70	1.00	1.45a
Means(A)	1.80a	1.20b	1.21c	1.02d	

LSD 0.05 2013 A=1.50, B=0.18 LSD 0.05 2014 A=0.75, B = 0.20

Table 5. Effect of three bioinsecticides spray in pre harvest to control peach fruit fly during postharvest on total soluble solids (%) of guava fruits during 2013 and 2014 season

Treatment g/100 l water	Storage period (week)				
	1	2	3	4	Means (B)
			Season 2013		
Biozeid 2.5% 300	8.50	13.33	13.60	14.53	12.49a
Biozeid 2.5% 250	8.50	13.20	13.20	14.30	12.3b
Biozeid 2.5% 200	8.50	13.00	13.10	14.10	12.18
Pritecto 9.4% 300	8.50	9.37	12.67	15.96	11.63a
Pritecto 9.4% 250	8.50	9.10	12.40	15.50	11.38a
Pritecto 9.4% 200	8.50	9.00	12.20	15.20	11.22b
Bioarc 6% 300	8.50	12.00	13.80	15.70	12.50a
Bioarc 6% 250	8.50	11.98	13.50	15.50	12.37b
Bioarc 6% 200	8.50	11.50	13.30	15.30	12.15b
Control	8.50	14.13	15.97	16.73	13.83a
Means(A)	8.50a	11.66b	13.37c	15.28d	
			Season 2014		
Biozeid 2.5% 300	14.20	15.26	15.97	16.43	15.46a
Biozeid 2.5% 250	14.20	14.90	15.50	16.20	15.20a
Biozeid 2.5% 200	14.20	14.80	15.30	16.10	15.10b
Pritecto 9.4% 300	14.20	10.33	15.07	16.03	13.91a
Pritecto 9.4% 250	14.20	10.10	15.02	16.00	13.83b
Pritecto 9.4% 200	14.20	10.00	14.98	15.98	13.79c
Bioarc 6% 300	14.20	12.90	13.87	15.33	14.08a
Bioarc 6% 250	14.20	12.50	13.50	15.10	13.83b
Bioarc 6% 200	14.20	12.20	13.20	15.00	13.65b
Control	14.20	14.73	16.20	16.80	15.48a
Means (A)	14.20a	13.77b	15.89c	15.89c	

LSD 0.05 2013 A=4.01 , B=0.25 LSD 0.05 2014 A=6.50, B=0.28

Table 6. Effect of three bioinsecticides spray in preharvest to control peach fruit fly during postharvest on carotenoids 100mg/ml of guava fruits during 2013 and 2014 season

Treatment g/100 l water	Storage period (week)				
	1	2	3	4	Means (B)
			Season 2013		
Biozeid 2.5% 300	2.50	3.58	4.22	4.71	3.75a
Biozeid 2.5% 250	2.50	3.20	4.00	4.50	3.55b
Biozeid 2.5% 200	2.50	3.00	3.98	4.40	3.47c
Pritecto 9.4% 300	2.50	3.48	4.18	4.95	3.78a
Pritecto 9.4% 250	2.50	3.20	4.00	4.50	3.55b
Pritecto 9.4% 200	2.50	3.00	4.40	4.40	3.47c
Bioarc 6% 300	2.50	3.84	4.89	4.89	3.91a
Bioarc 6% 250	2.50	3.50	4.50	4.50	3.68b
Bioarc 6% 200	2.50	3.20	4.30	4.30	3.00c
Control	2.50	2.71	3.87	4.40	3.37a
Means(A)	2.50a	3.27b	4.08c	4.56d	
			Season 2014		
Biozeid 2.5% 300	2.90	3.37	4.47	4.38	3.78a
Biozeid 2.5% 250	2.90	3.20	4.30	4.00	3.70a
Biozeid 2.5% 200	2.90	3.10	4.20	3.98	3.55b
Pritecto 9.4% 300	2.90	3.66	4.52	4.70	3.95a
Pritecto 9.4% 250	2.90	3.50	4.30	4.50	3.80a
Pritecto 9.4% 200	2.90	3.20	4.00	4.20	3.58b
Bioarc 6% 300	2.90	3.32	4.12	4.90	3.81a
Bioarc 6% 250	2.90	3.00	4.00	4.50	3.60b
Bioarc 6% 200	2.90	2.99	3.98	4.20	3.52c
Control	2.90	2.72	3.79	4.37	3.45c
Means (A)	2.90a	3.24b	4.17c	4.37d	

LSD 0.05 2013 A=0.82,B= 0.35 LSD 0.05 2014 A=0.38 ,B= 0.27

Titratable acidity (TA)

The data presented in Table 7 indicated that titratable acidity percentages in treated guava in both seasons were significantly higher than untreated fruits. The obtained results are in agreement with Rosario *et al.* (2013). Reported that TA were higher than treatments on guava. The data pointed out also that there was slight decreased in TA percentage with the increase of storage period. Data could be attributed due to the increase of its consumption in respiration activities as an organic substrate. This result agreed with those reported by El-Seidy (2000) on peach, Nurul and Mosharraf (2012) on banana and Muhammad *et al.* (2012) on peach.

Vitamin C

The obtained data in Table 8 showed that ascorbic acid content value of guava, which treated with (Biozeid 2.5%, Pritecto 9.4% and Bioarc 6%) and concentration 300g/100l water were higher significantly than untreated fruits. The above mentioned results agree with those Rahmann and Akhsoy (2014). On the other hand, ascorbic acid content was decreased from the beginning and the end of experiment. These results are in good line with those observed by Nurul and Mosharraf (2012) on banana fruits. The reduction in vitamin c contents during ripening might be attributed to the oxidation of ascorbic acid as ripening proceeded in the untreated fruits.

Decay of fruits

Data pointed out in both seasons Table 9 clear, in both seasons, that untreated fruits had higher significantly values compared with all treatments and Preticto 9.4% treatment had higher value of decay compared with Biozeid 2.5% and Bioarc 6% this results agree with Michael and Palmateer (2 013). Advanced with storage period, all treatments increased, significantly. Omayma *et al.* (2010) came to similar results.

Table 7. Effect of three bioinsecticides spray in preharvest to control peach fruit fly during postharvest on titratable acidity (%) of guava fruits during 2013 and 2014 season

Treatment g/100 l water	Storage period (week)				
	1	2	3	4	Means (B)
			Season 2013		
Biozeid 2.5% 300	0.72	0.42	0.38	0.30	0.46a
Biozeid 2.5% 250	0.72	0.41	0.37	0.28	0.45b
Biozeid 2.5% 200	0.72	0.40	0.36	0.27	0.44c
Pritecto 9.4% 300	0.72	0.40	0.32	0.26	0.43a
Pritecto 9.4% 250	0.72	0.39	0.30	0.25	0.42b
Pritecto 9.4% 200	0.72	0.38	0.29	0.22	0.40c
Bioarc 6% 300	0.72	0.37	0.27	0.24	0.40a
Bioarc 6% 250	0.72	0.35	0.26	0.22	0.39b
Bioarc 6% 200	0.72	0.32	0.24	0.20	0.37c
Control	0.72	0.70	0.54	0.46	0.61a
Means(A)	0.72a	0.41b	0.48c	0.27d	
			Season 2014		
Biozeid 2.5%300	0.60	0.37	0.35	0.30	0.41a
Biozeid 2.5% 250	0.60	0.35	0.31	0.29	0.39b
Biozeid 2.5% 200	0.60	0.32	0.30	0.27	0.37c
Pritecto 9.4% 300	0.60	0.42	0.36	0.32	0.43a
Pritecto 9.4% 250	0.60	0.40	0.35	0.30	0.41b
Pritecto 9.4% 200	0.60	0.38	0.32	0.27	0.39c
Bioarc 6% 300	0.60	0.37	0.30	0.25	0.38a
Bioarc 6% 250	0.60	0.31	0.29	0.22	0.36b
Bioarc 6% 200	0.60	0.30	0.25	0.20	0.34c
Control	0.60	0.56	0.42	0.40	0.50a
Means (A)	0.60a	0.38b	0.33c	0.28d	

LSD 0.05 2013 A=0.35, B=0.03 LSD 0.05 2014 A= 0.25, B=0.04

Table 8. Effect of three bioinsecticides spray in preharvest to control peach fruit fly during postharvest on vitamin C of guava fruits during 2013 and 2014 season

Treatment g/100 l water	Storage period (week)				
	1	2	3	4	Means (B)
			Season 2013		
Biozeid 2.5% 300	72.00	60.50	57.00	54.67	61.17a
Biozeid 2.5% 250	72.00	60.20	56.90	52.67	60.44b
Biozeid 2.5% 200	72.00	60.00	56.80	51.50	60.08c
Pritecto 9.4% 300	72.00	63.48	60.50	52.83	62.42a
Pritecto 9.4% 250	72.00	63.50	60.20	52.50	62.05a
Pritecto 9.4% 200	72.00	63.20	60.00	52.00	61.80b
Bioarc 6%300	72.00	69.40	64.38	57.38	65.92a
Bioarc 6% 250	72.00	68.40	64.20	57.30	65.48a
Bioarc 6% 200	72.00	68.20	64.00	57.20	65.35a
Control	72.00	59.83	55.03	52.50	59.96b
Means (A)	72.00a	63.71b	59.90c	54.06d	
			Season 2014		
Biozeid 2.5% 300	70.25	66.58	61.90	56.90	63.91a
Biozeid 2.5% 250	70.25	66.40	61.50	55.90	63.51b
Biozeid 2.5% 200	70.25	66.20	61.20	54.80	63.11c
Pritecto 9.4% 300	70.25	67.03	57.63	54.30	62.30a
Pritecto 9.4% 250	70.25	65.02	57.50	54.00	61.69a
Pritecto 9.4% 200	70.25	65.00	57.30	53.90	61.61b
Bioarc 6% 300	70.25	62.92	66.43	64.75	66.08a
Bioarc 6% 250	70.25	62.70	66.20	64.00	65.79b
Bioarc 6% 200	70.25	62.50	66.00	63.98	65.68c
Control	70.25	60.83	57.38	53.43	60.47b
Means(A)	70.25a	64.52b	61.40c	57.59d	

LSD 0.05 2013 A=8.50, B=0.80 LSD 0.05 2014 A=5.80, B=0.50

Table 9. Effect of three bioinsecticides spray in preharvest to control peach fruit fly during postharvest on decay (%) of guava fruits during 2013 and 2014 season

Treatment g/100 l water	Storage period (week)				
	1	2	3	4	Means (B)
			Season 2013		
Biozeid 2.5% 300	6	7	8	8	7.25a
Biozeid 2.5% 250	5	6	6	7	6.00b
Biozeid 2.5% 200	5	6	7	8	6.50c
Pritecto 9.4% 300	8	9	9	10	9.00a
Pritecto 9.4% 250	5	9	10	10	8.50b
Pritecto 9.4% 200	6	7	8	9	7.50c
Bioarc 6% 300	5	6	6	7	6a
Bioarc 6% 250	4	5	5	6	5b
Bioarc 6% 200	3	4	4	5	4c
Control	10	15	18	24	16.75a
Means (A)	5.90a	7.40	8.10c	9.40d	
			Season 2014		
Biozeid 2.5% 300	7	8	9	10	8.50a
Biozeid 2.5% 250	6	7	7	8	7.00b
Biozeid 2.5% 200	5	6	7	8	6.50c
Pritecto 9.4% 300	9	10	11	12	10.50a
Pritecto 9.4% 250	8	9	10	10	9.22b
Pritecto 9.4% 200	8	10	11	12	10.25c
Bioarc 6% 300	5	6	7	8	6.50a
Bioarc 6% 250	4	5	7	7	5.75b
Bioarc 6% 200	2	4	5	6	4.25c
Control	12	17	23	28	20a
Means (A)	6.60a	8.20b	9.70c	10.90d	

LSD 0.05 2013 A=2.00, B=1.50 LSD 0.05 2014 A=2.10 , B =2.20

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كفاءة الرش بثلاثة مبيدات حشرية حيوية قبل الحصاد للتحكم فى حشرة ذبابة الخوخ على ثمار الجوافة البناتي أثناء تداولها

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أجريت التجربة خلال موسمى ٢٠١٣و٢٠١٤ على أشجار الجوافة البناتى لدراسة تأثير رش ثلاث مبيدات حيوية بيوزيد ٢,٥% وبريتكتو ٩,٤% وبيوارك ٦% (٣٠٠-٢٥٠-٢٠٠جم/١٠٠لتر ماء) قبل الحصاد، خزنت الثمار على درجة ٨م ورطوبة نسبية ٨٥-٩٠%، تم تقدير كلا من نسبة الفقد فى الوزن والصلابة ونسبة المواد الصلبة الكلية ومحتوى الثمار من الكاروتينويدات والحموضة وكذلك فيتامين ج، أشارت النتائج أن بيوارك ٦% أعطى أعلى تأثير فى مكافحة حشرة ذبابة الخوخ على أشجار الجوافة خلال موسمى التجربة كما وجد خلال فترة تخزين الثمار انخفاض نسبة الفقد فى الوزن للثمار المعاملة بمبيد بيوزيد ٢,٥% والثمار المعاملة بمبيد بريتكتو ٩,٤% ٣٠٠جم / ١٠٠ لتر ماء كما وجد أن أعلى نسبة معنوية نسبة الصلابة الثمار والكاروتينويدات وفيتامين ج من الثمار المعاملة بمبيد بيوراك ٦% بينما كانت أعلى نسبة معنوية للمواد الصلبة الكلية فى الثمار المعاملة بمبيد بيوزيد ٢,٥% وذلك فى كلا الموسمين، كما وجد زيادة معنوية فى نسبة الفقد فى الوزن ونسبة المواد الصلبة الكلية ومحتوي الكاروتينيات مع طول فترات التخزين خلال موسمى التجربة بينما وجد انخفاض معنوى فى نسبة الصلابة والحموضة وفيتامين ج أثناء التخزين.

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