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Assessment Effect of Gamma Radiation on the Flight Ability of the Peach Fruit Fly, *Bactrocera zonata* (Saunders)

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Abstract: The sterile insect technique is one of the most methods of fruit flies control. Flight ability of the Peach Fruit Fly (PFF), *Bactrocera zonata* was conducted under laboratory conditions to evaluate the effect of gamma radiation on flight ability of PFF, *B. zonata*. Pupae of PFF, *B. zonata*, were irradiated in an air atmosphere at 24, 48 and 72 h before adult emergence with three doses of Cobalt^{60} (10, 30 and 50 Gray) and tested against 6, 12 and 20 cm tube heights. Flight Ability Percentage (FAP) of PFF was carried out for newly emerged flies and six-days-old of adult flies. FAP of newly emerged-and six- days-old of adult flies was inversely proportional to the tube heights, doses of gamma rays and with progress the age of flies. The FAP value was significantly higher at 6 cm tube height, followed by 12 cm then 20 cm tube heights for all tested levels of gamma rays, respectively.

Key words: Peach fruit flies, *Bactrocera zonata*, gamma radiation, flight ability

INTRODUCTION

The Peach Fruit Fly (PFF), *Bactrocera zonata* (Saunders) (Diptera: tephritidae), is one of the most important pests of fruit flies which was recorded in Egypt. It has become widespread over different locations in Egypt such as Alexandria (El-Minshawy *et al*., 1999), Kalubia (Hashem *et al*., 2001) and El-Beheira (Draz *et al*., 2002) governorates.

PFF is a polyphagous insect, it attacks a large host range of fruit and vegetables hosts; such as mango, peach, fig, guava, citrus, tomato and apple (Kapoor and Agarwall, 1982; White and Elson-Harris, 1994).

Traditional control of PFF in Egypt is based primarily on insecticides by application of cover spray for host trees or bait application technique (insecticides mixed with protein baits) as a partial spray (El-Aw *et al*., 2008), which leads to contaminate the eco-systems. The Sterile Insect Technique (SIT) is one of the most important modern methods of the integrated pest management which is safe for the environment and public health. Quality control parameters are important for evaluating the performance of mass reared insects for use in the Sterile Insect Technique (SIT) (Boller *et al*., 1981) and to evaluate the performance of mass reared insects for use in the SIT, quality control tests on egg hatchability, pupal weight and its size, percent of adult emergence, longevity, flight dispersal and mating ability are used (Resilva *et al*., 2007). As well as, effect of Gamma ray dose on adult emergence, deformed pupae, sex ratio and sterility of male and female flies of PFF *B. zonata* (Draz *et al*., 2008). So, female fecundity, pupal size, flight ability, male sterility and mating competitiveness of PFF *B. zonata* (Mahmoud and Barta, 2011).

The aim of the present study is to evaluate effect of gamma radiation on flight ability of PFF under laboratory conditions as a kind of quality control aspects, as so to application of Sterile Insect Technique (SIT) for suppression and eradication and/or control of the PFF, *B. zonata,* under field conditions away from contamination to the ecosystems.

MATERIALS AND METHODS

Laboratory rearing technique: The initial culture of PFF, *B. zonata*, has been obtained from infested mango fruits which were collected from a farm at Kom-Hamada district (60 km southward of Damanhour City) in August 2004. The insect was reared in the laboratory according to the rearing method described by El-Aw *et al*. (2003).

Mass rearing technique: PFF was kept under the laboratory conditions (25 ±2 °C and 60-70% RH). The newly emerged flies were provided with

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adult food (sugar mixed with hydrolyzate protein (3:1w/w) and wet cotton as a source of water. The deposited eggs were collected every 24 h and washed with tape water. The collected eggs were placed on an artificial diet as described by El-Aw *et al*. (2003) and maintained until pupation, as described by El-Gendy (2002).

After complete pupation the sand was sieved and the collected pupae were placed in a petri dish inside the rearing cages to start a new generation following the above-mentioned methods.

Pupal irradiation: About 300 Pupae of PFF were irradiated in an air atmosphere at each 24, 48 and 72 h before adult emergence with three different doses of $Cobalt^{60}$ (10, 30 and 50 Gray (Gy)) as a source of gamma radiation using a Cobalt unit (model 3500) at dose rate 3.3 r/sec, at Middle Eastern Regional Radioisotope Centre for the Arab Countries, Giza, Egypt and the samples were replicated three times.

Flight ability (FAP) of the PFF

FAP for newly emerged flies: The irradiated pupae were transferred to petri dishes furnished with black papers. Irradiated pupae by each dose were placed inside three black plastic tubes differed in their heights (6, 12 and 20 cm) and the inner tube surfaces were coated with talcum powder except one cm at the tube bottom. Each of the three tested heights of the tubes was replicated three times and each treatment was kept in a separate cage.

After the third day of adult emergence, flier flies (flies escaping from the black plastic tubes) in the cages were collected and counted for all tubes. The remaining-, deformed- as well as uneclosed- flies, in petri dishes were counted and recorded. This technique was conducted on irradiated and unirradiated flies.

FAP of adult flies: The above-mentioned technique was performed on adult flies at two different ages (newly emerged and 6-day-old flies) to evaluate the effect of adult age on the flight ability.

The flies were transferred using an aspirator to above mentioned tube heights. The tubes were covered at the bottom with a black paper which has a small hole. Then the flies were transferred to the tube via this small hole in the black paper. Each treatment was replicated three times. Such technique was conducted on both irradiated and unirradiated flies.

Statistical analysis: All data obtained in all experiments were tested in a complete randomized design with three replications, evaluated and subjected to an Analysis of Variance (ANOVA) and least significant differences (L.S.Ds) by CoStat Software (1990).

RESULTS

The Flight Ability Percentage (FAP) was conducted on adult flies of newly emerged flies and six- days-old flies for irradiated pupae at 24, 48 and 72 h before adult emergence with 10, 30 and 50 Gy using three tube height levels, i.e., 6, 12 and 20 cm in an attempt to determine the maximum height can reach insect in the allowable limits of the ability to fly according to laboratory tests.

FAP of newly emerged flies of PFF, *B. zonata*: Irradiated pupae 24 h (8-days-old pupae) before adult emergence were tested just flies emerged. Present results in Table 1 revealed that the overall mean of FAP for both male and female adults at all tube heights was higher 84.90% for irradiated flies with 10 Gy, followed by irradiated flies with 30 and 50 Gy, respectively and this was corresponding with the statistical analysis which indicated that FAP values were significantly increased in adult flies of PFF, *B. zonata* irradiated at pupae with 10 and 30 Gy compared with unirradiated ones. In contrast, Such FAP values were significantly decreased in flies when pupae were irradiated with 50 Gy. However, no significant differences were obtained between mean FAP for both sexes (males and females). While, the overall mean of FAP values when pupae were irradiated 48 h before adult emergence (Table 2) for both sexes at all tested tube heights for irradiated flies with 10 Gy was significantly higher (82.90%) than those recorded for the other tested doses; 80.49 and 73.99% at 30 and 50 Gy, respectively, compared with 79.41% for unirradiated flies. Highly significant differences at overall mean values were observed not only between all tested doses, but also between FAP for male and female flies; 79.52 and 78.87% for males and females, respectively. On the other hand, the statistical analysis as showed in Table 3 of irradiated pupae 72 h before adult emergence revealed that there is no significant difference in the overall mean values of FAP for adult flies of unirradiated and irradiated flies with 10 Gy, while significant differences in FAP were observed between three tested doses of gamma rays. Also, no significant difference was found in FAP between both sexes.

In general, results of FAP Table 4 indicated that FAP values were slightly decreased with increasing the exposure time before adult emergence. However FAP values were 1.02, 1.05 and 1.03-folds higher for irradiated flies at 24 h than those irradiated at 48 h before adult emergence with 10, 30 and 50 Gy, respectively. While FAP values were 1.03, 1.05 and 1.03-folds higher irradiated flies at 48 h than those irradiated at 72 h before adult emergence with 10, 30 and 50 Gy, respectively.

Table 1: Percentages of flight ability of newly emerged flies PFF, *B. zonata*, irradiated at 24 h before adult's emergence with different doses of gamma radiation

		Flight ability (%)				
		Radiation dose (Gy)				
Sex	Tube heights (cm)	Control	10	30	50	Means±SD
Male	6	80.67± 0.76	90.00±0.01	90.02±1.00	88.20±1.03	87.14± 4.36
	12	78.03±0.03	86.50±1.38	84.41±1.02	75.40±2.00	81.09 ±4.82
	20	75.49±2.40	81.26±1.09	77.63±1.04	65.43±3.01	75.20±5.2
Mean±SD		78.06±2.78	85.82±3.77	84.01±5.41	76.68±6.20	81.14±6.89[a]
Female	6	86.53±1.04	90.02±1.00	90.46±0.83	85.76±0.85	87.9±2.41
	12	83.2±1.26	84.40±1.02	82.60±1.18	79.56±0.67	82.28±2.40
	20	72.53±0.23	77.63±1.04	77.13±0.94	63.75±0.97	74.32±7.62
Mean±SD		80.76±6.40	84.94±5.18	83.39±5.49	76.36±9.68	81.50±7.34[a]
Overall mean±SD		79.41±4.12 [b]	84.90±4.66 [a]	84.58±4.68 [a]	76.40±9.34 [c]	81.33±7.08

Means followed by the same letter(s) are not significantly different according to LSD$^{0.05}$. LSD $^{0.05}$ for tube height = 0.75, LSD$^{0.05}$ for sex = 0.61. LSD $^{0.05}$ for dose = 0.86, LSD $^{0.05}$ for tube height x sex x dose = 3.67

Table 2: Percentages of flight ability of newly emerged flies PFF, *B. zonata*, irradiated at 48 h before adult's emergence with different doses of gamma radiation

		Flight ability (%)				
		Radiation dose (Gy)				
Sex	Tube heights (cm)	Control	10	30	50	Mean±SD
Male	6	80.67±0.76	90.00±0.01	87.40±0.14	85.35±1.03	86.10±3.77
	12	78.03±0.03	86.50±1.38	81.85±0.07	75.56±1.03	80.48±4.37
	20	75.49±2.40	74.70±1.10	75.43±1.04	62.32±2.04	71.98±5.88
Mean±SD		78.06±2.78	83.73±6.97	81.89±5.65	74.41±3.37	79.52±7.48[a]
Female	6	86.53±1.04	88.10±0.10	85.00±1.00	82.00±0.70	85.41±2.47
	12	83.2±1.26	83.06±0.20	82.00±1.30	75.13±1.30	80.84±3.57
	20	72.53±0.23	75.00±1.01	70.31±0.22	62.63±0.97	70.36±4.51
Mean±SD		80.76±6.40	82.07±5.60	79.10±6.75	73.58±5.08	78.87±7.28[b]
Overall mean±SD		79.41±4.12 [c]	82.90±6.28[a]	80.49±6.22[b]	73.99±8.85[d]	79.20±7.31

Means followed by the same letter(s) are not significantly different according to LSD$^{0.05}$. LSD $^{0.05}$ for tube height = 0. 54, LSD $^{0.05}$ for sex = 0.44. LSD $^{0.05}$ for dose = 0.62, LSD $^{0.05}$ for tube height x sex x dose = 2.66

Table 3: Percentages of flight ability of newly emerged flies PFF, *B. zonata*, irradiated at 72 h before adult's emergence with different doses of gamma radiation

		Flight ability (%)				
		Radiation dose (Gy)				
Sex	Tube heights (cm)	Control	10	30	50	Mean±SD
Male	6	80.67±0.76	88.15±0.07	87.30±0.28	85.35±0.07	85.36±3.13
	12	78.03±0.03	80.49±0.19	77.26±0.05	75.12±0.04	77.72±2.14
	20	75.49±2.40	71.93±0.42	64.44±0.02	57.42±0.22	67.32±7.32
Mean±SD		78.06±2.78	80.19±7.25	76.33±4.25	72.63±6.20	76.80±3.08[a]
Female	6	86.53±1.04	87.03±0.57	87.30±1.03	85.40±3.67	86.80±1.34
	12	83.2±1.26	80.70±0.20	76.27±1.02	70.13±0.07	77.57±5.25
	20	72.53±0.23	66.33±1.20	65.42±0.90	57.43±0.72	66.18±6.02
Mean±SD		80.76±6.40	79.35±7.32	76.32±9.52	70.98±5.65	76.85±3.93[a]
Overall mean±SD		79.41±4.12[a]	79.77±7.45[a]	76.33±9.46[b]	71.80±8.87[c]	76.82±9.19

Means followed by the same letter(s) are not significantly different according to LSD$^{0.05}$. LSD $^{0.05}$ for tube height = 0.61, LSD $^{0.05}$ for sex = 0.49. LSD $^{0.05}$ for dose = 0.70, LSD $^{0.05}$ for tube height x sex x dose = 3.0

Table 4: Overall mean percentages of flight ability for newly emerged flies PFF, B. zonata, irradiated at 24, 48 and 72 h before adult's emergence different doses of gamma rays

	Flight ability (%)			
	Radiation dose rays (Gy)			
Irradiation time (Hours)	Control	10	30	50
24	79.41±4.12[c]	84.90±4.66[a]	84.58±4.68[a]	76.40±9.34[c]
48	79.41±4.12[c]	82.90±6.28[a]	80.49±6.22[b]	73.99±8.85[d]
72	79.41±4.12[a]	79.77±7.45[a]	76.33±9.46[b]	71.80±8.87[c]

Means followed by the same letter(s) are not significantly different according to LSD.$^{0.05}$

FAP of PFF adults, *B. zonata* at six-days-old: Results Determination of FAP values of PFF, *B. zonata* for irradiated pupae at 24 h before adults emergence in Table 5 revealed that no significant differences were recorded between both male and female adults of *B. zonata* in the general means of FAP for all tested doses and tubes heights. The statistical analysis revealed also that the overall mean values of FAP were significantly different than unirradiated flies and three tested dose rays, whereas, no significant differences in FAP values were obtained between irradiated flies with 10 and 30 Gy. So, significant differences in FAP values were between such two values and the values recorded for irradiated flies with 50 Gy. While, the results for irradiated flies as pupae at 48 h before adults emergence with different doses of gamma rays were presented in Table 6 showed that there was significant difference in FAP values not only between males and females, but also between overall mean values for unirradiated flies and irradiated flies with 10 Gy. Whereas both of them were significantly different when compared with FAP for irradiated flies with 30 Gy, while the lowest significant difference was recorded for irradiated flies with 50 Gy. On the other hand, the results for irradiated flies as pupae at 72 h before adults emergence with different doses of gamma rays were presented in Table 7 revealed that a significant difference was found between FAP values females and males, while no significant differences were obtained between FAP percentage for unirradiated flies and irradiated flies with 10 Gy, whereas both of them was significantly different than FAP for irradiated flies with 30 Gy, while irradiated flies with 50 Gy revealed significant difference compared with the other tested doses of gamma rays.

It is observed that the highest value of FAP values was 76.95% for irradiated flies with 10 Gy at 8-days-old pupae, followed by 76.52 and 68.53% for irradiated flies with 30 and 50 Gy, respectively. However, the mean values of FAP were decreased for irradiated flies as pupae at 7-days-old. Such values were 79.99, 78.05 and 73.27% for irradiated flies with 10, 30 and 50 Gy, respectively, compared with 80.59% for unirradiated flies. The FAP values (Table 8) were slightly decreased with increasing the exposure time before PF; 79.86, 76.03 and 68.4% for irradiated flies as pupae with 10, 30 and 50 Gy, respectively, at 6-days-old. The FAP values were 0.96, 1.06 and 1.00-folds higher for irradiated flies at 8-days-old pupae than those recorded at 7-days-old pupae with 10, 30 and 50 Gy, respectively. The FAP values were

Table 5: Percentages of flight ability of six-days-old PFF, *B. zonata,* irradiated at 24 h before adult's emergence different doses of gamma radiation

		Flight ability (%)				
		Radiation dose (Gy)				
Sex	Tube heights (cm)	Control	10	30	50	Mean±SD
Male	6	85.88±1.44	85.86±1.04	90.00±1.00	80.00±0.03	85.43±3.79
	12	80.59±1.21	74.63±1.01	75.00±1.02	70.36±1.02	75.19±3.50
	20	75.60±1.00	70.63±1.02	64.90±0.04	54.53±1.01	66.41±7.932
Mean±SD		80.69±4.57	77.10±3.77	76.63±6.86	68.29±5.17	75.68±5.59[a]
Female	6	89.56±0.03	84.86±1.04	90.00±0.83	80.00±1.85	86.10±4.41
	12	79.76±1.00	74.90±1.02	77.10±1.13	72.56±0.99	76.08±2.88
	20	73.16±0.20	70.63±0.88	62.13±2.02	53.76±1.07	64.67±7.70
Mean±SD		80.49±7.16	76.79±6.43	76.41±10.43	68.87±9.68	75.61±7.34[a]
Over all mean±SD		80.59±5.99[a]	76.95±6.43[b]	76.52±7.43[b]	68.53±9.34[c]	75.65±7.82

Means followed by the same letter(s) are not significantly different according to LSD$^{0.05}$. LSD $^{0.05}$ for tube height = 0.53, LSD $^{0.05}$ for sex = 0.43. LSD $^{0.05}$ for dose = 0.61, LSD $^{0.05}$ for tube height x sex x dose = 2.62

Table 6: Percentages of flight ability of six-days-old PFF, *B. zonata,* irradiated at 48 h before adult's emergence different doses of gamma radiation

		Flight ability (%)				
		Radiation dose (Gy)				
Sex	Tube heights (cm)	Control	10	30	50	Mean±SD
Male	6	85.88±1.44	90.00±0.01	90.00±1.00	90.00±1.53	89.05± 3.06
	12	80.59±1.21	76.33±0.59	75.00±0.99	72.96±1.09	76.22±3.82
	20	75.60±1.00	70.33±1.09	68.06±1.01	59.24±2.01	68.31±5.89
Mean±SD		80.69±4.57	78.88±8.77	77.68±7.41	75.50±7.20	77.85±9.46[a]
Female	6	89.56±0.03	90.02±1.00	90.46±0.83	85.36±1.85	88.73±2.07
	12	79.76±1.00	80.20±1.02	81.86±1.08	74.33±2.67	79.04±2.49
	20	73.16±0.20	73.12±1.06	63.40±1.90	57.43±1.97	66.77±6.80
Mean±SD		80.49±7.16	81.11±7.42	78.42±8.49	72.74±9.68	78.18±10.1[a]
Over all mean±SD		80.59±5.99[a]	79.99±6.99[b]	78.05±4.68[c]	73.27±4.97[d]	78.02±9.67

Means followed by the same letter(s) are not significantly different according to LSD$^{0.05}$. LSD $^{0.05}$ for tube height = 0.48, LSD $^{0.05}$ for sex = 0.39. LSD $^{0.05}$ for dose = 0.55, LSD $^{0.05}$ for tube height x sex x dose = 2.45

Table 7: Percentages of flight ability of six-days-old PFF, *B. zonata*, irradiated at 72 h before adult's emergence different doses of gamma radiation

		Flight ability (%)				
		Radiation dose (Gy)				
Sex	Tube heights (cm)	Control	10	30	50	Mean±SD
Male	6	85.88±1.44	88.03±1.01	83.81±1.00	80.23±1.00	84.48±3.12
	12	79.55±1.21	77.56±1.30	73.55±1.12	69.76±1.20	75.10±4.00
	20	75.60±1.00	70.26±1.02	68.60±1.02	53.61±2.63	66.76±8.30
Mean±SD		80.01±4.57	78.61±7.77	75.32±6.77	67.86±11.63	75.45±8.14^{b}
Female	6	89.56±0.03	90.00±1.00	86.26±0.84	81.74±0.74	86.64±3.42
	12	79.76±1.00	81.13±1.12	80.56±1.28	73.03±0.65	78.62±3.48
	20	73.16±0.20	72.23±1.40	63.43±1.04	52.36±0.97	56.04±8.55
Mean±SD		80.16±7.16	81.12±6.18	76.75±10.35	69.04±9.98	76.76±10.5^{a}
Over all mean±SD		80.59±5.99^{a}	79.86±7.63^{a}	76.03 ±8.52^{b}	68.46±9.34^{c}	76.11±9.80

Means followed by the same letter(s) are not significantly different according to LSD$^{0.05}$, LSD $^{0.05}$ for tube height = 0.58, LSD $^{0.05}$ for sex = 0.47. LSD $^{0.05}$ for dose = 0.67. LSD $^{0.05}$ for tube height x sex x dose = 2.86

Table 8: Overall mean percentages of flight ability of six-days-old PFF, *B. zonata*, adults irradiated at 24, 48 and 72 h before adult's emergence with different doses of gamma rays

	Flight ability (%)			
	Dose (Gy)			
Irradiation time (Hours)	Control	10	30	50
24	80.59±5.99^{a}	76.95±6.43^{b}	76.52±7.43^{b}	68.53±9.34^{c}
48	80.59±5.99^{a}	79.99±6.99^{a}	78.05±4.68^{b}	73.27±4.97^{c}
72	80.59±5.99^{a}	79.86±7.63^{a}	76.03 ±8.52^{b}	68.46±9.34^{c}

Means followed by the same letter(s) are not significantly different according to LSD$^{0.05}$

1.00, 1.03 and 1.07-folds higher for irradiated flies at 7-days-old pupae than those recorded at 6-days-old pupae with 10, 30 and 50 Gy, respectively. Generally, the above mentioned data revealed clearly FAP of PFF adults irradiated as pupae before adult's emergence with 50 Gy at 48 h for achieve high capability of FAP for PFF. Accordingly, it may be used in field experiments as flight range, field distribution, adult longevity, hence using SIT as a control method of PFF throughout the field in the future.

DISCUSSION

The FAP value f PFF is in inverse to dose of gamma rays. Where, the FAP values were significantly higher at 6 cm tube height, followed by 12 cm then 20 cm tube heights for all tested levels of gamma rays, respectively. Thus the FAP of PFF, *B. zonata*, for newly emerged flies and six- days-old adults were inversely proportional not only to the tube heights at all tested doses of gamma rays, but also with progress the age of flies. These results agree with Draz and Calkins (1989) and Mahmoud and Barta, (2011) on Caribbean fruit fly, *A. suspensa* and peach fruit fly, *B. zonata*, respectively. In general, the FAP for all tested ages were decreased gradually by increasing the tube heights (6, 12 and 20 cm) at all tested doses. The same test was conducted by Draz *et al.* (1997) and Shoukry *et al.* (1997) on Mediterranean fruit fly, *C. capitata*. Similarly, Mahmoud and Barta (2011) on peach fruit fly, *B. zonata*. Present results gave evidence that flight ability of PFF, *B. zonata* decreased with increasing irradiation dose of gamma rays. This result supported by results of Mahmoud and Barta (2011). The ability of mass-reared fruit flies to fly and to disperse normally essential for success of any SIT program (Calkins, 1989). In the context, our results revealed mean FAP at 12 cm tube height at all tested ages was ranged between 75.10 to 82.28%. Our obtained result is in rage of standard measurements of quality control testes of fruit fly i.e., minimum percent fliers should range from 60-85% at 10 cm tubes (FAO/IAEA/USDA 2003), despite of the difference in the tested tube height and this may be due to the strength of this insect and its ability to fly. So, Resilva *et al.* (2007) on *Bactrocera philippinensis*. While it is in contrast with Mahmoud and Barta (2011) on peach fruit fly, *B. zonata*.

Present results indicated that flight ability of PFF, *B. zonata* is affected by the exposure time of gamma rays on pupae before adult emergence. However, the timing of irradiation also appears to be critical. Sharp and Chambers (1976) showed that the Mediterranean fruit fly, *C. capitata* had less ability to fly if irradiated as pupae than as adult. Calkins (1989) discovered the Mediterranean fruit fly, *C. capitata*, irradiated as pupae 3-days before eclosion had significantly less ability to disperse. So, flight ability percentages for newly emerged

flies were higher than flight ability percentages at six-days-old flies for all treated pupae at 10, 30 and 50 Gy. These results agree with Sharp (1976), observed that the flight ability of females of *A. suspensa* was significantly greater than males and flight propensity was decreased by increasing the age of flies, Draz and Calkins (1989) stated that the younger flies of Caribbean fruit fly, *A. suspensa* were more active and the flight ability decreased gradually by increasing the age of flies and Shoukry *et al.* (1997) mentioned that The higher percentage of flier males of Mediterranean fruit fly, *C. capitata*, was recorded for newly emerged flies (2 days old) than others at 2 weeks old at all tested tubes heights (6, 8, 12, 16 and 20 cm).

The highest FAP values were achieved for newly emerged flies, followed by six- days-old adult flies, respectively. The PFF irradiated as pupae at 72 h before adults emergence was less flight ability than irradiated flies as pupae at 24 and 48 h before adult emergence and this agrees with Calkins (1989), discovered that the med flies irradiated as pupae three days before eclosion had significantly less ability to disperse than flies that were irradiated one-day prior to eclosion.

So far, the SIT of PFF did not use for suppression and eradication and/or control of the PFF, *B. zonata,* under field conditions, the FA is one of quality control parameters, which leads to success application of SIT, so we evaluated the quality control parameters attempting application it in integrated pest management. Orankanok *et al.* (2005) using Sterile Insect Technique (SIT) has been implemented in two distinct areas of Ratchaburi (western) and Pichit (northern) Provinces in order to control *B. dorsalis* and *B. correcta.* In 1999 a Sterile Insect Technique (SIT) programme against Medfly and Natal fruit fly (*C. rosa* Karsch) marula fruit fly, *C. cosyra* (Walker) (Barnes and Venter, 2006).

CONCLUSION

Our results revealed recommended that irradiated flies with 30 or 50 Gy at 24 or 48 h before adult's emergence for achieved high capability of FAP for PFF.

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