Journal of Entomology and Zoology Studies

Available online at www.entomoljournal.com

E-ISSN: 2320-7078
P-ISSN: 2349-6800
JEZS 2015; 3(4): 24-27

Received: 10-06-2015
Accepted: 11-07-2015

Farman Ullah
Department of Plant Protection, The University of Agriculture Peshawar-Pakistan.

Ahmad Ullah Andar
Department of Plant Protection, The University of Agriculture Peshawar-Pakistan.

Hayat Badshah
Entomology Section, Agricultural Research Institute Tarnab Peshawar Pakistan.

Muhammad younus
Entomology Section, Agricultural Research Institute Tarnab Peshawar Pakistan.

Correspondence:
Farman Ullah
Department of Plant Protection, The University of Agriculture Peshawar-Pakistan.

Management of Melon fruit fly (*Myopardalis Pardalina* Bigot) In Badghis, Afghanistan

Farman Ullah, Ahmad Ullah Andar, Hayat Badshah, Muhammad younus

Abstract
Field studies were carried out on the management of Melon fly (*Myiopardalis Pardalina* Bigot) in Badghis, Afghanistan during 2014. This study comprises of three different experiments. In the first experiment five different insecticides were tested for their efficacy. In the 2nd experiment the effect of pupae removal and bagging were compared for effectiveness against the melon fly. In the 3rd experiment, Cue lure, Methyl Eugenol, Protein Hydorlysate (GF120) and PPr product were evaluated in the baited traps against the fly. Results showed a reduction of 61.38% and 76.84% in the fly population in comparison with the control in experiment 1st and 2nd respectively. While result of the 3rd experiment was not prominent where no Melon fly was recorded in any of the baited trap. All the used attractants are failed against the Afghan Melon fly and I propose that there will be a difference in the race of *M. Pardalina* of Baluchistan and Afghanistan, so it may need further studies to confirm the prevalence of any difference exist.

Keywords: Melon fly, *Myopardalis pardalina*, Insecticides, pupae collection, management.

1. Introduction
Melon (*Cucumis melo*) locally called Khatakay in Pashto and Kharboza in Dari languages, is one of the most important fruit and cash crop of summer season in Afghanistan, About 35000 ha, area is under melon cultivation throughout the country with 640 thousand tons production and cash value about $126, million USD [1]. After the grapes, melons are the most cultivated fruit in Afghanistan which are not only produced for domestic requirements but also exported to Asia, Middle East and Europe (Ehsan, 2009) [2].

This important crop is harmed by different insect pests. One of the most serious pests is Baluchistan melon fly (*Myiopardalis Pardalina* Bigot) which causes huge damage to melon fruits (Mcquate 2005) [3].

Mature melon fly is smaller than the Oriental fruit fly or mango fruits fly (*Bactrocera dorsalis* Hend) and house fly (*Musca domestica*) in size. Freshly laid eggs are white and 1.2 x 2mm long; larvae ought to creamy color and 10 mm in length, pupae is about 7.2 mm long and with brown color. The larval period is 10-13 days depending on the temperature. When fully grown, they make an exit hole and drop to the soil for pupation. Pupation takes place inside the fruit (personal observation). Mellon fly *M. Pardalina* produces 2-3 generations per year in the North and central region and four in the South and East of Iran (Carroll *et al*., 2002; Hussain *et al*., 1983; Christenson *et al*., 1960) [4, 5].

The pest is distributed in Turkey, Cyprus, Iraq, Israel, Lebanon, Syria, India, Pakistan, Afghanistan, and Iran (EPPO, 2013; Assadullah *et al*., 2012) [6, 7].

The melon fly was first reported as a destructive pest of melon in western Afghanistan however, in eastern part of the country it was not a problem since 1980 (Ullah, 1987) [8].

Fruit damage is caused by maggots living inside the fruit on fleshy tissue and seeds. Infested fruits are also usually affected through secondary contamination (bacterial and fungal) which make them unfit for human consumption. In numerous countries (Afghanistan, Turkmenistan, Uzbekistan), losses in melon crops up to 80-90% have been reported by local farmers. Due to lack of control measures, the yield can be entirely lost although people are trying to suppress the pest, but they couldn't because there are no effective chemicals, no other specific and easy methods to use against it (EPPO, 2013) [7]. Melon growers use different group of insecticides i.e. Diazinon, Danadium, Confidor, Methamedophose, Carboryle, Super top, Deltamethrine, Cypermethrin, Diptrex for the control of this fly. Among farmers some use mixture of 3-4 insecticides simply to get rid of the pest which has proved effective results but it has increased

the production cost as well as health hazards. Still there is a need to evaluate some insecticides to find the most effective one and coupled with other mechanical methods to control this pest. Keeping in view the overall importance of the crop and this pest the current study was conducted with these objectives; to investigate the effect of commonly used and recommended insecticides against this pest, to study the impact of fruit bagging and pupae removal on pest infestation and to evaluate the efficiency of different attractant for the effective management of melon fruit fly.

2. Material and Methods

Three villages of the Muqur district, Badghis were selected for this study. Melons (a local variety Nazukana) were grown from seeds directly in the plan field without any ridges; with the approximate plant to plant and row-to-row distance of 2m and 3 m respectively. Each site was comprised of melon field with about 50 m x 80 m = 4000 m^2 area. Buffer area of 200m-500m was left in between the treatments to avoid any border/treatment effect or insecticide drift. For Blocking, three villages were selected at least a kilometer apart. Standard agronomic practices were applied in all the selected fields equally.

2.1. Experiment I: To evaluate the insecticides efficacy in comparison with control five common used insecticides were used as per recommended dose (table 1). This experiment was conducted in randomized complete block design with six treatments including untreated check with three replications in three villages, all these insecticides were sprayed by knapsack sprayers as a cover spray once/two weeks when the fruits became small ball size and continued till harvest. To avoid contamination, a separate knapsack sprayer and a measuring cup for each insecticide was used.

The infestation data was recorded at 7 days intervals. Data was recorded by taking a sample from a random selection of fruits in an area of 500 m^{-2} in each replication. Fruits in the selected area were counted and carefully examined for larvae exit hole and marked as infested fruits. The selected / infested fruits were cut to confirm the presence of any maggots' inside and thus percent fruit infestation was recorded till the last fruit harvest by the following formula.

$$\text{Percent of fruit infestation (\%)} = \frac{\text{No. of infested fruits}}{\text{Total number of fruits}} \times 100$$

Table 1: List of insecticides and dose used in the experiment against.

Treatments	Trade Name	Common Name	Dosage/litter
T_1	Diazinon ^{R}	Diazinon - OP	2 ml/liter
T_2	Monitor ^{R}	Methamedophose - OP	2 ml/liter
T_3	Danadium ^{R} progress	Dimethoate - OP	2 ml/liter
T_4	Laser ^{R}	Cypermethrin+ Dimethoate	3 ml/liter
T_5	Confidor ^{R}	Imidachloprid	2 ml/liter
T_6	Control	-----	Only water used

2.2. Experiment II: In this experiment two mechanical practices i.e. fruit bagging and pupae collection were carried out, details given below.

2.3. Fruit bagging

For fruit bagging muslin cloths prepared bags (30 x 35 cm) were used to know the bagging effect. To reduce the statistical error we supposed three treatments of fruit bagging replicated three times in each village. First treatment (T1) was done by an expert, where 100 small newly developed melons (Apricot size) were bagged. The 2nd treatment (T2) was done through the farmer who was trained for one day on fruit bagging. The 3rd treatment (T3) was done through the untrained labor; they were selected for each three villages. One hundred melons were bagged/replication and totally 2700 melons were covered in all three villages for comparison. Data were recorded once/week for three weeks and checked all the covered fruits in each plot.

2.4. Pupae Removal: For this experiment 10 acre area at least a kilometer a part from the farmer's' field was selected then divided into three experimental plots or units. Generally, these plots were checked twice/week for pupae removal and the infested melons were fed to Animals (Cows, Sheep's and goats) to avoid further spreading of larvae or pupae inside fruits. Data was recorded on 500 m^2 area and in each plot all healthy and infested melon fruits were counted, converted to percentages, this process was continued till the final fruit harvesting.

2.5. Experiment III: This experiment was consisting of four attractants i.e. Methyl Eugenol, Cue lure, GF 120, and PPr-Product for efficient management of melon fruit fly in the field by using normal traps. A mixture of attractant, sugar and insecticide (Diptrex) (85:10:5) was prepared for each treatment. Three traps per plot were installed in each experimental field. Traps were hanged at height of 1.5 m from the ground with the help of a wooden stick. To avoid direct sunlight on the traps, each trap was covered by a plastic container (3 L). After day 7 each trap was examined and trapped insects and infested fruits were recorded. The process was repeated till the final fruit picking. The trials were laid out in randomized complete block design replicated three times. For block effect, three villages were selected. In each village 3-5 acre piece of land was selected for three replications with 200-500 m buffer between treatments. The first three commercials attractants (Methyl Eugenol, Cue lure and GF 120) were purchased from the local market at Peshawar-Pakistan while the PPR product was taken from the Department of Plant Protection, The University of Agriculture Peshawar-Pakistan.

2.6. Protein Bait (PPr product) Preparation (Yeast Auto lysate):

The common yeast that is used for cooking purpose was taken from local market and 100 g of that dry yeast was mixed with one litter semi warm water, added 100g powdered sugar per liter, 5 ml multivitamins with minerals (first dissolved in some water), five gram (first dissolve in water) of NPK fertilizer and kept it over night. It caused the degree of yeast cell autolysis and a release of cellular contents. Then mixed 5ml water, 10 ml cooking oil (corn oil), 3 grams of Aerial- detergent, 5ml of Coke in a 50 ml beaker and added this mixture to the yeast solution.

The solution was again kept for a night and heated the aqueous suspension of live yeast cells to 60 °C for 6 hours and also Stirred continuously with a wooden tablespoon till complete evaporation and recovering a yeast autolysate. Then added some water and let it to cool. Then added 2% preserving agent (Sodium benzoate) and was allowed to settle and then few

drops of 10% glycerin was also added to increase its persistency

2.7. Statistical Analysis
The data were analyzed statistically by using ANOVA for RCBD. The significant means were compared by using LSD test. Statistics 8.1 packages were used for analysis of variance.

3. Results and Discussion
Results in table 2 showed that in insecticides treated plots, the mean infestation decreased up to 14.698 % and the maximum infestation shows by Danadium (15.35 %) followed by Methamedophose (15.04%) while the lowest infestation was recorded in Confidor (13.65 %) followed by laser 15.01 %. The main aim of this experiment was to compare the recommended pesticides (Confidor and Laser) with three others (Methamedophose and Danadium) which were already used by farmers against melon fly. Our studies shows that there is no significant difference between the above used insecticides for the best control of *Myiopardalis pardalina*, but according to the comparison of these insecticides with the control plots we found that by the use of insecticides once per two weeks, we could reduce the melon fly infestation up to 61.68% which is economically and environmentally better than the farmers method who sprayed at least twice per week. Our results are in line with these scientists Hussain *et al*. (1983); Abdullah and Latif (2001) and Khalid Abdullah (2008) [5, 9, 10] who used Carboryle, Dicrotophose, Trichlorofon and Diptrex and stated that these insecticides could be used to control *Myiopardalis pardalina* in Pakistan. Moreover, Ullah *et al.* (2012); Anjum *et al.* (2000); Marwat *et al*. (1992) [11, 12, 13] also reported that Diptrix (Saprofan–sp) and Decis D 2.5% gave good results in pheromone traps for the control of *Bactrocera dorsalis* in mango orchards. Similarly, Mahmood *et al*. (1995) [14] demonstrated that Fyfanon (Malathion), when used in baited trap, significantly reduced *Bactrocera dorslis* population. While Logiswaran (1993) and Cheng (1996) [15, 16] reported that DDVP is more effective against fruit fly.

Results of the second experiment i.e. bagging of fruits by the expert, by a farmer, by labor and pupal removal are presented in table 3, which indicated a significant reduction of fruit fly infestation over control. The highest mean infestation was noted in control plots 39.19%, but in melon bagged through expert showed lowest infestation 4.89%, followed by farmer bagged plot 10.56%, labor bagged plot 11.78% and pupal removal plot had 13.06% infestation. Generally in this experiment the treated plots significantly decreased the melon fly infestation over the control plot, but the 1st treatment shows more significance difference 4.89% and had better result among the treated plots (10.56%, 11.78% and 13.06%). Through these results we proposed that before bagging the fruits farmers must be trained for the purpose to decrease fly infestation.

The third experiment was consisted of four treatments of different attractants (Cue lure, Methyl Euginol, PPr Product and GF 120, and the recorded data are presented in table 4. No melon fly (*Myiopardalis pardalina*) was attracted, however a few *Bactrocera zonata*, muscide fly and small wasps were trapped to both methyl Eugenol and PPr baited traps (data not generated). The different lures combination in single trap also showed that no melon fly (*Myiopardalis pardalina*) was attracted table 5, except of some unknown Bactrocera spp trapped in M.E + 10 % C.L), along with some hopper, bark beetles, seed bugs, weevils, assassin bugs. It indicates two issues; 1) It strongly confirms that the *Myiopardalis pardalina* is not attracted to any of the mentioned attracts. 2) It shows that the population of *Bactrocera zonata* is very less and other fruit fly species do not exist in the vicinity. Abdullah Khalid [19] considered that the (Protein Hydrolyzate) bait application technique (BAT) and crop hygiene (CH) indicated equal result as synthetic insecticide in the management of melon fruit flies *Myiopardalis pardalina* in torrent-spate-irrigation (Rod Kohi) area.

Over all the effects of synthetic insecticide, melon fruit bagging and digging out of pupae underneath of infested melons, all the treatments brought a significant decline in fruit infestation, when compared with untreated plots. However the lowest Melon infestation was observed in plots where the fruits were bagged by expert (4.89 %), intermediates pupae removing 13.6 % and Confidor 13.65 % while the highest recorded in Danadium 15.35% and Methamedophose 15.04% when used as cover spray once per two weeks. though the Confidor is systemic and effective against many insects it seems, it is not working against the *Myiopardalis pardalina*, also the highest average infestation in both check plots is around 38.71% which is low as compared to the untreated field, where infestation may result in total loss. This low rate (38.71) may be attributed to the facts, that farmer in the vicinity use insecticides for their melon protection.

Since there were no significant difference among the recommended and already in practices insecticides also there is no considerable difference between synthetic insecticides and pupae removal, Similar findings with different insecticides have been reported by Stride *et al*., (2002) [17] who studied that the currently, no reliable variances among insecticides seem and the present recommendation in Afghanistan is to use ecologically the least damaging and safest products and their early usage during the flowering and fruit setting stage and three early off season applications is effective. Usually these control recommendations are improved when coupled with other cultural practices.

Table 2: Comparison of infested Melon fruits in various pesticide treatments in the selected three villages of Badghis.

No Village	Treatments						Mean
	1	2	3	4	5	6	
	Diazinon	Methamedophose	Danadium	Laser	Conifedor	Control	
Cheshma-e- Duzdak Balla	13.44 c	16 c	16.4 c	15.9 c	14.7 c	36.5 ab	18.84 a
Cheshma-e- Duzdak paein	14.2 c	14.6 c	14.5 c	14.1 c	13.2 c	40.6 a	18.56 a
Sangge Khirs	15.7 c	14.5 c	15.09 c	14.9 c	13.02 c	35.4 b	18.12 a
Mean	14.44 b	15.04 b	15.35 b	15.01b	13.65 b	37.52 a	

Treatment LSD (0.05) = 2.8363
Village LSD (0.05) = 2.0056
Treatments*Village LSD (0.05) = 4.9126

Table 3: Influence of the Melon bagging and pupae removal treatments on the % fruit damage of Melon.

No	Village	Treatments					Mean
		1	2	3	4	5	
		Bagging by Expert	Bagging by Farmer	Bagging by Labor	Pupae Removal	Control	
1	Cheshma-e- Duzdake Balla	3.67 e	9.67 cd	12.33 c	12.29 c	36.74b	14.94 b
2	Cheshma-e- Duzdake Paein	6 de	11 c	13.33 c	13.14 c	42.11 a	17.12 a
3	Sangge Khirs	5 e	11 c	9.67 cd	13.75 c	38.71 ab	15.63 ab
	Mean	4.89 d	10.56 c	11.78 bc	13.06 b	39.19 a	15.896

Treatment LSD (0.05) = 2.4250
Village LSD (0.05) = 1.8784
Treatment*Village LSD (0.05) 4.2003

Table 4: Means of trapped insects into different attractants traps from 1st July to 15th September 2013 in Shogofan Farm Qala – e- Naw Badghis.

No	Treatments	Mean number of trapped insects/ treatment
1	Cue lure (C.L)	6.67
2	Methyl Eugenol (M.E)	2.33
3	C.L +10% M.E	2.33
4	M.E + 10% C.L	2
5	GF 120	0.33
6	GF 120 + 5% WM Ex	0
7	GF 120 + 10% WM Ex	1.67
8	GF 120 + 15% WM Ex	0
	Total	15

4. Conclusion and Recommendations

It is concluded that all the treatments showed significant reduction of Melon fly population and fruit damage in comparison with control. However there was no difference among different insecticides used against *M. pardalina*) and pupae removal, the *M. pardalina* is not attracted to any baited traps. It was recommended that the fruit bagging is environmentally safe, economically cheap because farmers can use these bags up to three years. But it must be remembered that farmers should be trained prior to commence fruit bagging. Cover spray of insecticides once per two weeks and the pupae collection underneath infested fruits twice per week. To prevent the spreading of *M. pardalina* larvae and pupae, infested melons should be fed directly to animals or buried deep in the soil.

5. Acknowledgment

First author thanked to his Departmental colleagues whose suggestions were helpful in preparation of this manuscript. Moreover, author also thanked to Mr. Sameen Jan Lab Assistant, Department of Plant Protection for his cooperation throughout the author's study period in the Department.

6. References

1. Ehsanullah Ehsan. Power point Lecture Notes for PPQD staff training, (un published), 2009.
2. Mcquate GT, Sylva CD, Jang EB. Mediterranean fruit fly (Diptera: Tephritidae) suppression in persimmon through bait sprays in adjacent coffee plantings. Journal of Applied Entomology. 2005; 129(2):110-117.
3. Carroll LE, White IM, Friedberg A, Norborne AL, Dallwitz MJ, Thompson FC. Pest fruit flies of the world. Description, illustrations, identifications, and information retrieval Version 8th, 2002.
4. Carroll FT, Lynn E, Evenhuis Neal L. Fair man, Jennifer E. Friedberg, Amnon Norrbom, Allen L. Pankhurst, Richard J White, Ian M., 1998.
5. Christenson LD. RH Foote Biology of fruit flies. Annual review of entomology (Eds. EA Steinhus and R F Smith), 19605, 171-193.
6. Hussain G, Khan C, Liaqatullah. Studied on the biology and chemical control of melon fly Myiopardalis pardalina Bigot, 1983, 1-2.
7. EPPO Reporting Service–Pests and Diseases Outbreaks of *Myiopardalis pardalina* (Baluchistan melon fly) in Central Asia: addition to the EPPO Alert List, 2013, 128
8. Asadullah SJ, Sajjad A, Moeen-ud-Din S, Muhammad A. Management of melon fruit fly, Myiopardalis Pardalina Bigot (Diptera: Tephritidae) in Kunduz, Afghanistan. Proceedings of the International Conference on Agricultural, Environmental and Biological Sciences (Phuket, TH 2012; 5(5):26-27.
9. Ullah M. Economic insect pests and phytophagous mites associated with Melon crops in Afghanistan. Tropical Pest Management 1987; 33:29-31.
10. Abdullah K, Latif A, Khan SM, Khan MA. Field test of the bait spray on periphery of host plants for the control of the fruit fly, Myiopardalis Pardalina Bigot (Tephritidae: Diptera). Pakistan Entomologist 2007; 29(2):91-94.
11. Abdullah K. Studies on behavioral responses of adult fruit flies to food and sex lures in relation to their management, 2008.
12. Ullah F, Badshah H, Alam K, Khan A, Zeb Q, Mashwani MA. Evaluation of various insecticides as lure toxicants for fruit fly management in Guava Orchards. Sarhad Journal of Agriculture. 2012; 28(4):617-620.
13. Anjum S, Razaq M, yazadni MS. Studies on Seasonal activity and insecticidal control of fruit flies (Dacus sp.) on mango (*Mangifera indica* L.) at Faisalabad, Pakistan. Arab Journal of Plant Protection. 2000; 18(2):121-123.
14. Marwat NK, Husain N, Khan A. Suppression of population and Infestation of *Dacus spp*. By male annihilation in guava orchard. Pakistan Journal of Zoology. 1992; 24(1):82-84.
15. Mahmood Z, Ullah F, Iqbal M. Efficacy of various insecticides used in pheromone traps for the control of oriental fruit fly *Bactrocera dorsalis* (Diptera; tephritidea) in Bannu (KPK) Pakistan. Sarhad Journal of Agriculture. 1995; 11(2):181-187.
16. Logiswaran G. Evaluation of insecticides for the management of moringa fruit fly. Madras Agriculture Journal. 1993; 80(12):698-699.
17. Cheng YE, TY KU Kao, Hunang YB. Instability of the currently used poison baits for the oriental fruit fly and melon fly: the study un documentation of naled and cuelure. Journal of Agricultural Research of China. 1996; 45(4):422-435.
18. Stride B, Habibi Z, Ahmad G. Control of melon flies (*Bactrocera Cucurbitae* Diptera: Tephritidae) with insecticidal baits, in Afghanistan International Pest Control 2002; 44(6):304-306.