Journal of Entomology and Zoology Studies

Available online at www.entomoljournal.com

Journal of Entomology and Zoology Studies

E-ISSN: 2320-7078
P-ISSN: 2349-6800
www.entomoljournal.com
JEZS 2021; 9(6): 176-179

Received: 07-09-2021
Accepted: 09-10-2021

Yasir Ali
Department of Entomology, The University of Agriculture Peshawar, Pakistan

Muhammad Younas
Entomology Section, Agricultural Research Institute Tarnab Peshawar, Pakistan

Muhammad Israr
Government of Khyber Pakhtunkhwa Agriculture, Livestock and cooperation department, Peshawar

Sana Ullah
Department of Entomology, The University of Agriculture Peshawar, Pakistan

Corresponding Author:
Yasir Ali
Department of Entomology, The University of Agriculture Peshawar, Pakistan

Efficacy of different insecticides against *Bactrocera cucurbitae in vitro* condition

Yasir Ali, Muhammad Younas, Muhammad Israr and Sana Ullah

Abstract
The study was conducted at the Fruit fly rearing laboratory in Agricultural Research Institute Tarnab, Peshawar during 2020. Aim of the study was to evaluate some synthetic insecticides against` fruit fly to find the most effective one. The study showed the percent mortality of adult's *B. cucurbitae* exposed to a series of concentration of some selected neonicotinoids insecticides. Numbers of dead fruit flies were counted and observed percent mortality of adults flies calculated after 24 and 48 hrs post treatment at 2ppm, 4ppm and 8ppm. Among all treatments, Trichlrofon showed highest mortality rate followed by Acetamiprid while minimum percent mortality was observed by Imidacloprid.

Keywords: acetamiprid, *B. cucurbitae*, imidacloprid, neonicotinoids, Trichlrofon

Introduction
Melon (*Cucumis melo*) locally called Khatakay in Pashto and Kharboza in Urdu and Dari languages, is one of the most important fruit and cash crop of summer season in Pakistan and Afghanistan. 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 [1]. Fruit flies (Diptera: Tephritidae) are considered the main fruit pest throughout the world [2]. Cucurbit fruit fly belonged to tropical Asia and present in many tropical countries of Asia. Cucurbit fruit fly (*Bactrocera cucurbitae*) is a serious pest of pumpkin, bitter gourd, sponge gourd and squash and extensive damage is caused by this pest [3]. Yield losses of 90 to 100% can occur due to this pest in vegetables and fruits. Most preferred hosts of fruit flies in Pakistan are melon (*Cucumis melo*), apple (*Pyrusmalus*), mango (*Mangifera indica*) and bitter gourd *(Momordica charantia*) [4, 5]. Fruit flies are not only the production restrainer of many potential fruits and vegetables, but certainly act as export barrier for a potential multimillion dollar worldwide trade. Philippines and Malaysia faced a strict quarantine regulation while exporting fruits and vegetables to worldwide market due to the fruit flies [6, 7]. In Pakistan vegetables growers randomly use a mixture of pesticides on vegetables to reduce/suppress fruit flies. Repeated application of pesticides has resulted in losses destruction on human health and the environment, water, wild life and soil [8]. Generally the female fruit flies prefer young, soft and tender fruits for egg laying at 2 to 4 mm depth inside with its sharp ovipositor. Larval feeding in the fruits is the most damaging; as a result young fruits become distorted and usually dropped. The larval tunnels provide entry points for bacteria and fungi that cause the fruit to rot. Because of the high egg laying capacity and mobility, each female is capable of destroying large numbers of fruit in her lifetime [9]. 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 this pest the current study was conducted to evaluate some synthetic insecticides against fruit fly to find the most effective one.

Materials and Methods

Laboratory evaluation of some selected insecticides against adults of *B. cucurbitae*

The study was conducted to evaluate the toxicity of selected insecticides against male and female adults of *B. cucurbitae* in fruitfly laboratory of Entomology Section, Agriculture Research Institute Tarnab, Peshawar during 2020.

Rearing of *B. cucurbitae* in laboratory

The initial culture of *B. cucurbitae* has been obtained from infested melon fruits which were collected from fruit market (district Peshawar, Pakistan) during 2020. These collected infested fruits were kept under the laboratory conditions (26.0 ± 2.0 °C and 70.0 ± 5.0% R.H.) inside the plastic trays which were filled by sterilized sand, until pupation. Pupae were collected daily and transferred to adult rearing cages (18 x 16 x 16 inches) having muslin cloth on the two opposite sides and the other two sides, top and bottom were made of transparent glass sheet.

Mass rearing of *B. cucurbitae*

Pupae of *B. cucurbitae* were kept under laboratory conditions (26.0 ± 2.0 °C and 70.0 ± 5.0% R.H.) and newly emerged flies were provided with adult food consists of sugar, egg yolk, Vit B complex, yeast and water. The adults of both sexes were mated in the cages.

Melon fruits were also placed in the cages as an oviposition site. Then these infested melon which containing the grown larvae were put inside large plastic jars furnished with sand. The matured larvae were jumped out and pupated in the sand.

After complete pupation the sand was sieved and the pupae collected, then placed in petri dishes and transferred to the rearing cages to start a new generation. The newly emerged flies were used for evaluating the toxicity of various insecticides against male and female adults of *B. cucurbitae*.

Insecticide treatments

The experiment was laid out in Completely Randomized Design (CRD). There were three treatments *viz.*, Acetamiprid 50% WDG, Imidacloprid25% WP, Trichlorfon 80% SP and Malathion along with control. These insecticides were obtained from registered pesticide dealers located in the local grain market of (district Peshawar KP, Pakistan) and were used in baits for knowing their efficacy against fruit flies.

Ten (male + female) *B. cucurbitae* (5 days old) were confined separately in plastic jar with muslin cloth on its mouth, without food, for 12 hrs and provided with water. 10 ml bait plus specific concentration of insecticide solution were kept in petri dishes and offered to fruit flies in plastic jars. 2, 4 and 8ppm concentrations are made of each insecticide and each concentration replicated thrice. Mortality was recorded after24 and 48 hrs.

Statistical analysis

Data regarding percent mortality of *B. cucurbitae* were analyzed statistically by using Graphpad Prism software.

Results and Discussions

Mean percent mortality of *B. cucurbitae* after feeding on different concentrations at 2ppm

The Figure-1 showed the percent mortality of adult's *B. cucurbitae* exposed to a series of concentration of some selected neonicotinoids insecticides. Numbers of dead fruit flies were counted and observed percent mortality of adults flies calculated after 24 and 48 hrs post treatment. Among all treatment, Trichlrofon showed highest mortality rate i.e. 68.00% followed by Acetamiprid (58.00%) while minimum percent mortality was observed by Imidacloprid (53.00%) after 24 hrs of observation over the control treated cage (13.00%). Similarly the highest mortality was recorded after 48 hrs by Trichlrofon (78.66%) then Acetamiprid (63.00%) while lowest mortality was observed by Imidacloprid (56.00%) over the control treatment (15.00%).

Mean percent mortality of *B. cucurbitae* after feeding on different concentrations at 4ppm

Similarly, after 4ppm the numbers of dead flies were recorded higher when applied Trichlrofon (77.00%) against when added with bait. The second superior mortality was observed by Acetamiprid (67.00%) and minimum mortality in adult fruit flies was recorded by Imidacloprid (60.00%) after 24 hrs of observation over control treatment (14.33%). The similar observations were recorded by Trichlrofon, Acetamiprid and Imidacloprid (87.00, 71.33 and 61.00%) respectively, after 48 hrs of observation over control treatment (14.00%) (Figure-2).

Mean percent mortality of *B. cucurbitae* after feeding on different concentrations at 8ppm

Figure-3 represented the mortality percentages of all tested insecticides after treatment. At 8ppm post treatment significantly highest mortality was showed by Trichlrofon (86.00%) followed by Acetamiprid (75.00%) while lowest mortality was observed when applied Imidacloprid (68.00%) at field concentration of 4ppm in *vitro* condition after 24 hrs of observation as compared with control treatment (11.33%). Similarly, after 48 hrs of observation the numbers of highest dead flies were counted at Trichlrofon (95.00%) followed by Acetamiprid (80.00%) applied as tested treatment, beside these the lowest number of dead flies were noticed by Imidacloprid (69.33%) over the control treatment (14.33%).

The present findings is in line with Ahmad *et al.* (2005) stated that Bait (molasses @ 5% + dipterex 100 gm / acre) used for control of fruit fly on ber fruit showed highest yield with least damage [5] whereas, Khan and Musakhel (1999) revealed that dipterex plus molasses instead of dipterex alone, showed best result in musk-melon yield against infestation of *B. cucurbitae* Coq [10]. Suhail *et al.* (2000) revealed that application of Diptrex 80% SP (Trichlorfon) and installment of 4 pheromone (methyl eugenol) traps/ha in mango orchard gave best control against fruit fly [11]. Three sprays of Dipterex 80 SP on cucumber reducing the fruit fly infestation [12].

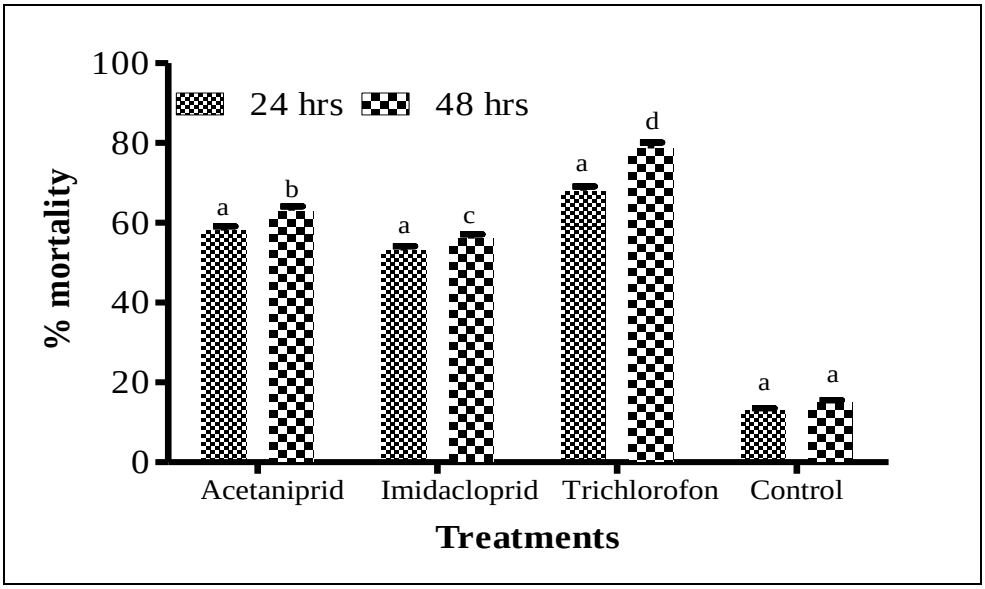

Fig 1: Mean% mortality of *B. cucurbitae* after feeding on different concentrations of insecticides bait in vitro conditions at 2ppm

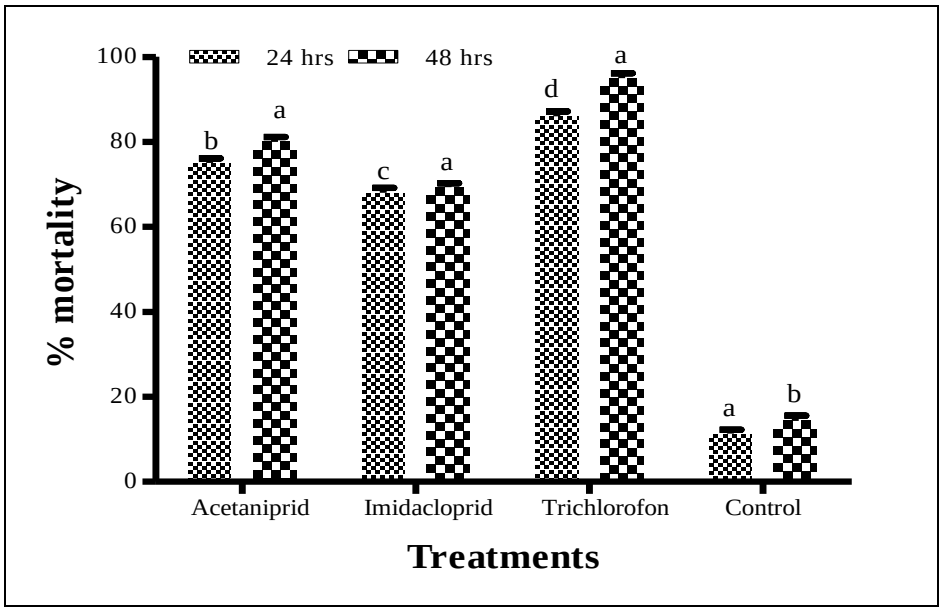

Fig 2: Mean% mortality of *B. cucurbitae* after feeding on different concentrations of insecticides bait in vitro conditions at 4ppm

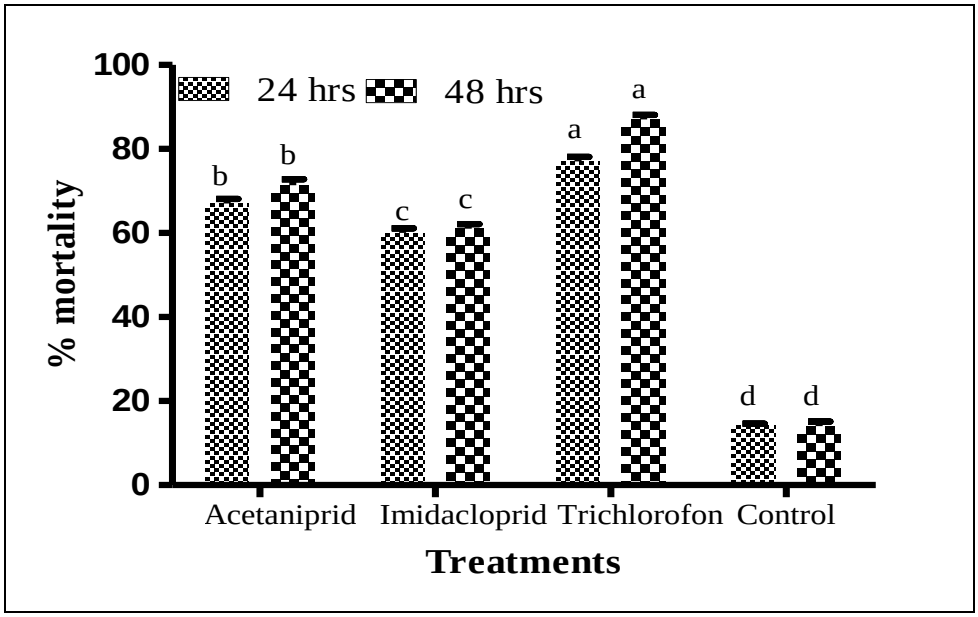

Fig 3: Mean% mortality of *B. cucurbitae* after feeding on different concentrations of insecticides bait in vitro conditions at 8ppm

Conclusions

From the results, it can be concluded that Trichlorofon and Acetamiprid are recorded best control measure of *B. cucurbitae*. Moreover, Seasons long use of a single pesticide is discouraged in most resistance management tactics. Both test compounds have novel, different modes of action.

Recommendations

Among all treatment, Trichlrofon showed highest mortality rate followed by Acetamiprid at the field concentrations.

References

1. Mcquate GT, Sylva CD, Jang EB. Mediterranean fruit fly (Diptera: Tephritidae) suppression in persimmon through bait sprays in adjacent coffee plantings. J of App. Ento 2005;129(2):110-117.
2. Ruiz MJ, Juárez MI, Alzogaray RA, Arrighi F, Arroyo I, Gastaminza G *et al*. Toxic effect of citrus peel constituents on *Anastrepha fraterculus* Wiedemann and *Ceratitis capitata* Wiedemann immature stages. J. of Agri. and Food Chem 2014;62(41):10084-10091.
3. Sapkota R. Damage assessment and management of cucurbit fruit flies in spring-summer squash''. J. of Ento. and Nema 2014;2:7-12.
4. Sultan MJ, Sabri A, Tariq M. Different control measures against the insect pests of bitter gourd (*Momordica charantia* L.). Pak. J. Biol. Sci 2000;3:1054-1055.
5. Ahmad B, Anjum R, Ahmad A, Yousaf MM, Hussain M, Muhammad W. Comparison of different methods to control fruit fly (*Carpomyia vesuviana*) on ber (*Zizyphus mauritiana*). Pak. Entomol 2005;27:1-2.
6. Rejesus RS, Baltazar CR, Manoto EC. Fruit flies in the Philippines: current status and future prospects. In: Proceedings First International Symposium on Fruit flies in the Tropics (eds. S. Vijaysegaran and A.G. Ibrahim), Kuala Lumpur, 1988. Malaysian Agricultural Research and Development Institute, Kuala Lumpur 1991, 108-124.
7. Singh RB. Significance of fruit flies in fruit and vegetable production in the Asia-Pacific region. In: Proceedings First International Symposium on Fruit flies in the Tropics (eds. S. Vijaysegaran and A.G. Ibrahim), Kuala Lumpur, 1988. Malaysian Agricultural Research and Development Institute, Kuala Lumpur 1991, 11-29.
8. GoP. The economic situation in Pakistan. Ministry of Finance, Government of Pakistan 2013-14.
9. Akhtaruzzaman M, Alam MZ, Sardar MA. Identification and distribution of fruit flies infesting cucurbits in Bangladesh. Bangladesh J. Entomol 1999;9(3):93-101.
10. Khan SM, Musakhel MK. Resistance in musk-melon (*Cucumis melo* L.) against melon fruit fly (*Bactrocera cucurbitae coq*.) and its chemical control in Dera Ismail Khan. Pak. J. Biol. Sci 1999;2:1481-1483.
11. Suhail A, Razaq M, Yazadni MS. Studies on seasonal activity and control of fruit flies (*Dacus* spp.) on mango (*Mangifera indica* L.) at Faisalabad, Pakistan. Arab J. of P. Pro 2000;18(2):121-123.
12. Qureshi MZ, Hussain SAS, Khan L, Khattak MK. Varietal resistance and the effect of number of sprays of dipterex 80sp against fruit fly complex on cucumber (*Cucumis sativus* L.). Pak. J of Bio. Sci 2000;5(1):45-50.