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TOXICITY OF SOME CONVENTIONAL INSECTICIDES AGAINST MANGO MEALYBUGS, DROSICHA MANGIFERAE

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ABSTRACT: *Mango mealybug (Drosicha mangiferae) is a polyphagous insect, which has been recorded to feed on large number of plant species. Insecticides are considered to be the rapid method for the control of insect pests to overcome losses. In the current study, five different insecticides i-e Chlorpyriphos, Lambda cyalothrin, bifenthrin, deltamethrin and profenophos were evaluated against adult female of mango mealy bug using a leaf dip method. The data were recorded after 24, 48, 72, 96 and 120h. The Results indicated that profenophos was the most effective insecticide against adult female mealybug. Chloropyrifos* was least effective among all the tested insecticides in the laboratory.

INTRODUCTION

Mango, *Mangifera indica* L., is one of the most important fruit trees in Pakistan and is now eaten worldwide. It is also known as "king of fruits" [1]. It is rich source of carbohydrates, vitamins and minerals [2]. It is the 2nd major fruit crop of Pakistan and stands at 5th place in the world's mango production [3]. In 2013, the total mango production in Pakistan was 1680 thousand tons with the export of 718 thousands tons [4]. This production is 50% of the potential yield. The main reasons for this low yield are diseases and insect pest attack. The mango tree is attacked by a number of insect pests [5-9] among them mango mealy (Drosicha mangiferae Green) is the most destructive pest.

Mangomealy bugs belong to family Pseudococcidae (Hemiptera) is the most important pest of mango in Indo-Pak [2,10,11]. It is a polyphagous insect feed on many plant species [1]. Female lays eggs in the soils around the infested plant. Both nymph and adult female suck the cell sap from the plant as a result the affected inflorescence shriveled and ultimately dried [2]. They also secretes the honey dew that causes the sooty mould to develop which affecting photosynthetic activity of the plant. Ants feed on honey dew protect the mealybug from predator and parasitoids. Insecticides are considered to be the rapid method for the control of insect pests to overcome losses. Insecticides are always in ready form, easily accessible and a wide range of insecticides are available in the market for the control of insect pest. Intensive, high agricultural production systems have traditionally used synthetic pesticides to eliminate pests as the main tool and sustain the lowest amount of economic damage to the crop. In the advanced countries, three percent of the market value of crops is spent on insecticides and in Pakistan chemicals worth more than 10 billion rupees are imported to control the insect pests [12]. The aim of the present research was to evaluate the efficacy of the conventional insecticides against mango mealybug for better control.

MATERIALS AND METHODS

Insect Collection

The insects were collected from the mango plants and brought to the laboratory for toxicity experiment.

Insecticides

Five insecticides Chlorpyriphos, (Lorsban 40 EC, Dow AgroSciences, Pvt Pakistan) Lambda cyalothrin, (Karate, 2.5 EC, Syngenta, Pvt Pakistan), bifenthrin, (Tallstar, 10 EC, FMC Pvt Pakistan), deltamethrin, (Decis 25 EC, Bayer Crop Sciences, Pvt Pakistan) and profenophos, (Curacron, 50 EC, Syngenta, Pvt Pakistan) were used to evaluate the toxicity.

Toxicity Bioassay

Leaf dip Bioassays were conducted with adult females of *D. mangiferae*. Mango leaves were collected washed and air dried. Leaves were cut into 5 cm diameter disc with the help of cutter. Different concentrations of insecticides were prepared in distilled water with Triton X-100 (50 µg/ml) with respect to their recommended field doses. Leaf discs were immersed in each concentration for 10 s, allowed to dry at room temperature for 30 min and placed in Petri dishes (5 cm dia.) containing a moistened filter paper. Leaf discs immersed in distilled water with Triton X-100 used as control. Five insects were placed in each dish, and each treatment was replicated ten times including control. The mortality was assessed after 24 h, 48h, 72h, 96h and 120 h.

Data Analysis

The percent corrected mortality of mango mealy bug was calculated by using Abbott's formula [13].

RESULTS AND DISCUSSION

Fig 1: Corrected mortality (%) of mango mealy bug against different insecticides after 24 h.

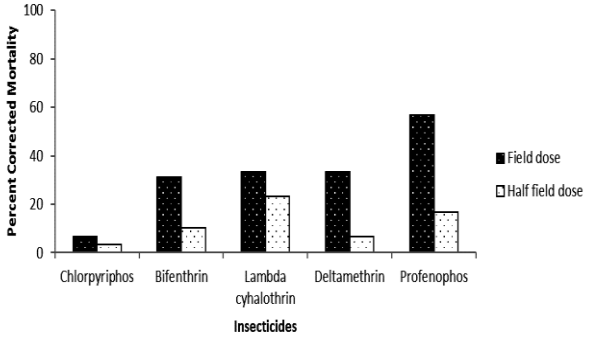


Fig 2 Corrected mortality (%) of adult female mango mealy bug against different insecticides after 48 h.

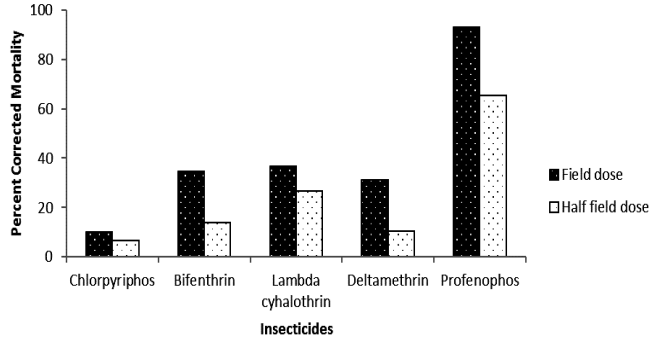


Fig 3 Corrected mortality (%) o adult female f mango mealy bug against different insecticides after 72 h.

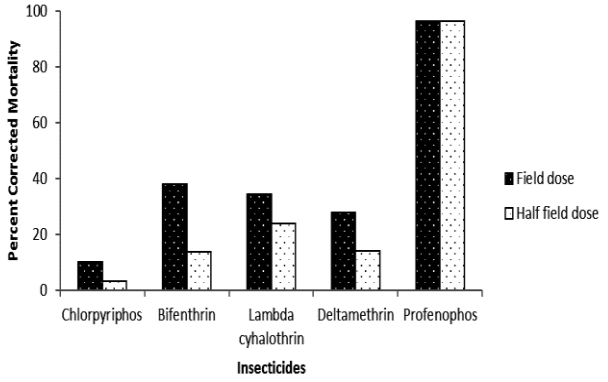
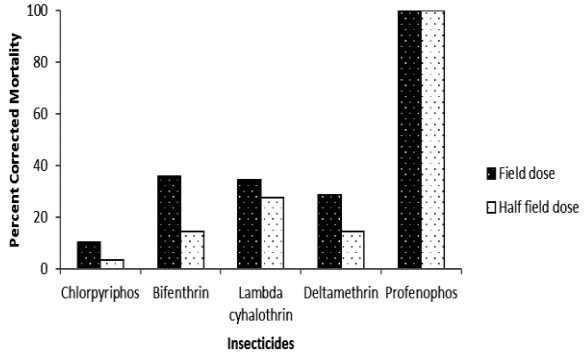


Fig 4 Corrected mortality (%) of adult female mango mealy bug against different insecticides after 96 h.



Toxicity Of Insecticides After 24h Against Adult Female Of Mango Mealy Bug

The results indicated that profenofos was the most effective insecticide after 24h with 56.66% mortality of adult female of mango mealy bug at the field dose followed by deltamethrin (33.33%), bifenthrin (33.33%) and lambda cyhalothrin (33.33%). Chloropyrifos (6.66%) was the least effect to control the adult female mealy bug (Fig 1). Similarly application of half of the field dose the mortality (Fig 1) after 24h was profenopos (16.67%), deltamethrin (6.67%), bifenthrin (10.34%) and lambda cyhalothrin (23.33%). Chloropyrifos (3.33%).

Toxicity Of Insecticides After 48h Against Adult Female Of Mango Mealy Bug

The results revealed (Fig. 2) that profenofos was also very effective after 48h of treatment with 93.10% mortality of adult female of mango mealy bug at the field dose followed by lambda cyhalothrin (36.67%), bifenthrin (34.48%), deltamethrin (31.03%) and chlorpyrifos (10%). Similarly application of half of the field dose the mortality (Fig 2) after 48h was profenopos (65.52%), deltamethrin (10.34%), bifenthrin (13.78%) and lambda cyhalothrin (26.67%). Chloropyrifos (6.67%).

Toxicity Of Insecticides After 72h Against Adult Female Of Mango Mealy Bug

The percent corrected mortality of adult female of mango mealy bug was higher (96.55%) when treated with field dose of profenofos. Deltamethrin, bifenthrin, lambda cyhalothrin and chlorpyrifos showed 27.8, 37.93, 34.48 and 10.34% mortality respectively (Fig. 3). Similarly application of half of the field dose the mortality (Fig. 3) after 72h was profenopos (96.55%), deltamethrin (14.8%), bifenthrin (13.78%) and lambda cyhalothrin (24.14%). Chloropyrifos (3.48%).

Toxicity Of Insecticides After 96h Against Adult Females Of Mango Mealy Bug

The profenofos showed 96.55% mortality of adult female of mango mealy bug followed by bifenthrin (37.93%), lambda cyhalothrin (34.48%), deltamethrin (28.56%) and chlorpyrifos (10.34%) at field dose (Fig. 4). Similarly application of half of the field dose the mortality (Fig 4) after 24h was profenopos (96.55%), deltamethrin (14.28%), bifenthrin (13.78%) and lambda cyhalothrin (27.58%). Chloropyrifos (3.48%).

Toxicity Of Insecticides After 120h Against Adult Females Of Mango Mealy Bug

The results indicated that profenofos showed 100% mortality of adult female of mango mealy bug followed by bifenthrin (35.71%), lambda cyhalothrin (34.48%), deltamethrin (28.56%) and chlorpyrifos (10.34%) at field dose (Fig. 5). Similarly application of half of the field dose the mortality (Fig 5) after 24h was profenopos (100%), deltamethrin (14.28%), bifenthrin (14.28%) and lambda cyhalothrin (27.58%). Chloropyrifos (3.48%).

DISCUSSION

Damage caused by insects is the major reason for crop failure. Chemical control is important for insect pest management. Determination of effective dose of insecticide is important factor for insect control. Organophosphate and pyrethroid are the most common insecticide used to control this pest. Farmers are familiar with the rapid action of these insecticides. Many researchers evaluated the toxicity of different insecticide against mango mealy bug [1,2,14,15]. Pyrethroids and organophosphates are among the major insecticides to control the different insect pests. Pyrethroids and organophosphates have different mode of action. In the present study, bioassays were carried out to evaluate the insecticidal activities of representative of organophosphate

and pyrethroids at their field and half of the field dose against adult female of mango mealy bug.

The present results revealed that profenofos was the most effect insecticide for the control of adult female mealy bug followed by bifenthrin, lambdacyhalothrin, deltamethrin and chloropyrifos after 120h of application at field and half of the field dose in the lab conditions. These results are in confirmatory with Hussain *et al*. [2] who reported that profenofos was the most effective insecticide to control 1st and 2nd instar of mango mealy bug. Similarly, Karar *et al*. [1] evaluated eleven different insecticides viz., acetamiprid, bifenthrin, buprofezin, chlorpyrifos, cypermethrin, deltamethrin, lambdacyhalothrin, profenofos, triazophos, imidacloprid, and methidathion were tested for the control mango mealybug under field conditions on mango trees against 1st , 2nd , 3rd instar nymph and adult female and reported that profenofos gave maximum mortality against 2nd and 3rd instar. Supracide was the most effective insecticide for the control of adult females. Our results reported that chloropyrifos was the least effect for the control of adult females. This result was similar to karar *et al*. [1], who reported that chloropyrifos was not as effective as profenofos to control the adult females but Srivastava and Tandon [14] reported that chlorpyrifos was more toxic to mango mealy bug compared with other insecticides.

The current results suggest that insecticides have important role in the management of mango mealy bug. However, a field experiment would be helpful to investigate the field efficacy and to determine their compatibility in integrated pest management.

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