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Effectiveness of different pesticides on bollworm insect, *Helicoverpa spp.* which attacking okra crop and determination of pesticide residues in fresh and processing okra fruits

Mahmoud Soliman

South Valley University, Egypt

Abstract

The efficacy of five insecticides i.e., diazinon, malathion, methoxyfenozide, pyriproxyfen and tolfenpyrad against *Helicoverpa armigera* on okra plants were studied. In addition to determining the levels of two pesticide residues, i.e. dazinon and malathion on and in okra fruits, diazinon found to be the highly potent insecticide. The LC_{50} and LC_{90} values were 9.78 and 133.74 ppm. The other tested insecticides were arranged according to their LC_{50}'s in descending order as follow: malathion; methoxyfenozide; pyriproxyfen and tolfenpyrad. The corresponding values of the LC_{50} were 26.06; 66.81; 75.96 and 82.35 ppm. The toxic effect of diazinon insecticide was 4.163 folds as toxic as that of tolfenpyrad at LC_{50} level.

There were differences between the control and treatments at the mean numbers of larvae. Mean numbers of live *H. armigera* larval stages were decreased post treatment from 55, 52, 46, 44 and 40 to 20.00, 23.87, 25.60, 28.13 and 29.00, with diazinon, malathion, methoxyfenozide, pyriproxyfen and tolfenpyrad, respectively. Considering the general mean number of *H. armigera* larval stages after the end of experiment, diazinon and malathion were the most efficient insecticides followed by methoxyfenozide, pyriproxyfen and tolfenpyrad, respectively.

The efficacy of the tested insecticides was also, expressed as a percent reduction in live larval stage of bollworm insect 1, 3, 7, 10 and 15 days post spraying three times. The tested insecticides, diazinon, malathion, methoxyfenozide, pyriproxyfen and tolfenpyrad against H. armigera larval stage reducing the percent infestation on okra plants. It could be concluded that diazinon and malathion were the most effective treatment at all periods after the three spraying with mean reduction percentages being 72.65, 86.18, 91.16 and 65.70, 81.02, 89.67 %, for diazinon and malathion, respectively.

The amounts of diazinon and malathion residues detected on unwashed and washed okra fruits. The initial deposit of diazinon was 8.816 ppm in okra fruits. The residue of diazinon decreased to 4.576 ppm within 24 hours after application, showing 48.09 % loss. The residues of diazinon continuously deteriorated to different degrees where no residues detected after fifteen days of application. The initial deposit of malathion was 16.453 ppm. The residual level reached to 0.002 ppm after 15 days of application. The dissipation was high after five and seven days after application, were 1.168 and 0.436 ppm, respectively.

Washing and different processing steps process significantly reduced the residues of diazinon and malathion insecticides to a clear extent. The initial deposits of diazinon and malathion on okra pods reduced from 8.816 and 16.453 ppm to 4.365 and 6.248 ppm at the initial deposited after washing revealing a rate of removing of 50.49 and 62.03 %. Freezing and storage processing caused complete removal of diazinon residues on okra fruits after four months where after six months for malathion. Draying process resulted in removal of 93.94 and 93.55 % of diazinon and malathion on okra fruits.

Keywords: Insecticides, diazinon, malathion, methoxyfenozide, pyriproxyfen and tolfenpyrad, effectiveness, *Helicoverpa armigera* and residue in and on okra fruits