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Summary and conclusions

An experiment was conducted to estimate the contamination of plant, soil and water after plant treatment using the recommended pesticides at the recommended dosages for pest control.

Two popular vegetable crops were used in this study i.e. green bean (*Phaseolus vulgaris*) and green peas (*Pisum sativum*). Green bean and peas seeds were planted at menofia governorate on February 26th, 2005 in plots 0.01 of feddan each. Every 3-randomized plots were treated on May 11th, 2005 with one of the following pesticides.

1: fenitrothion 50% EC formulation at the rate of 1 L/feddan.

2: Etoxazole 10% SC formulation at the rate of 40 ml/feddan.

A knapsack sprayer, was used for applying the previous doses after it had been diluted with 200 liters of water per feddan.

Chemical Study Of Pesticides Residues.

A- In plant tissues.

Representative leaves for each replicate were picked at random one hour after treatment. The following samples were taken 1, 3, 6, 9, 12, 15 and 21 days after application. Representative samples of green bean pods and green peas seeds were taken at the same previous intervals. All samples were kept in polyethylene bags at -20C° in deep freezer.

Samples were processed and cleaned up. residues of fenitrothion were subjected to GC analysis, while residues of etoxazole were subjected to HPLC analysis.

Residues of the two previous pesticides were subjected to GC-MS analysis.

B- In soil

Soil samples were taken randomly from the upper 0-10cm layer of the treated plots. Initial samples were taken one hour after application. Subsequent samples were taken 1, 3, 6, 12, 19 and 35 days after treatment. Then samples were kept and stored at -20C° in deep freezer until time of analysis.

Samples were extracted then fenitrothion and etoxazole residues were subjected to the analysis previously used for plant samples.

C- In water

Water samples were collected from the drainage beside the treated field in clean containers. Samples were collected at 20cm below the water surface. Samples were taken one and 24 hours after treatment. Following samples were taken 6, 12, 19, and 35 days after treatment. Fenitrothion and etoxazole residues were extracted from water according to the method developed by EPA (1983). No cleaning up process was needed. Pesticides residues were subjected to the analysis previously used for plant samples.

Effect of certain environmental condition on the fate of fenitrothion and etoxazole pesticides.

This investigation aimed to study the effect of temperature and UV-rays on the degradation of fenitrothion and etoxazole.

Results obtained could be summarized as follows:

Pesticides Residues On and In Plant Tissues.

The initial deposits of fenitrothion and etoxazole in and on green bean pods were 21.728 and 2.389ppm, respectively. Residues detected decreased gradually during the experimental period. Fenitrothion and etoxazole residues were undetectable on and in green peas seeds one hour after application. So, green peas seeds could be consumed safely at any time after application.

According to sumitomo chemical company (1999) the maximum residues limit (MRL) of etoxazole on green bean was 1.0ppm. The recommended pre harvest interval for etoxazole on green bean pods was 4-days.

According to Codex Alimentarius Commission (1997) the MRL of fenitrothion on green bean pods was 1ppm. The results obtained confirm that the recommended pre harvest interval (PHI) was 13days after application of fenitrothion on green bean plants.

The initial deposits of etoxazole on and in leaves of green bean and green peas as determined one hour after application were 18.470 and 15.60ppm, respectively. The initial deposits of fenitrothion residues on and in green bean and peas leaves were

80.04 and 58.76ppm., respectively. Leaves of green bean and peas taken 21 days after application of fenitrothion or etoxazole contained undetectable amount of pesticides residues. GC-MS analysis indicated that no degraded compound founded, this may be due to the low limit of the detected amounts of derivatives or to the sensitivity of the instrument.

Pesticides Residues On Soil

The data obtained showed that the residues level of etoxazole in soil under green bean and green peas plants were 1.366 and 1.773ppm. one hour after treatment, respectively. Residues decreased gradually and reached 0.032 and 0.016ppm in soil under treated green bean and green peas plants, 35 days after treatment, respectively.

The data obtained also showed that fenitrothion residues were 2.882 and 5.96ppm in soil under green bean and peas treated plant at zero time (one hour after application)

Soil samples under green bean and peas treated plants taken 35 days after application were free from any detectable amounts of fenitrothion residues.

GC-MS analysis of extracts of etoxazole on soil under bean and peas plant showed that, at zero time unchanged etoxazole was found. The proportion of etoxazole in soil extracts detected by GC decreased with the time. The total ion chromatogram and mass spectrum at figure (20) show a molecular ion peak (M^{+}) at m/z 238 and fragment 224, 216, 207, 198, 191, 178, 166, 159, 151, 143, 135, 124, 11, 104, 97, 85, 78, 71, 64, 57 which corresponding to the formula $C_{14}H_{23}NO_2$ which suggested to be 2-amino-2(4-tertbutyl-2-ethoxyphenyl) ethanol, which is the major degradates of etoxazole in the soil. The other founded compound are of $M-2$ at m/z 220 and fragment 205, 189, 183, 177, 167, 161, 155, 145, 139, 133, 127, 119, 111, 105, 97, 91, 81, 73, 67, 57, 51 which corresponding to the formula $C_{13}H_{18}O_3$ which suggested to be 4-tertbutyl-2-ethoxybenzoic acid figure(21).

At zero time unchanged fenitrothion were found when analyzed by GC-MS figure (10). The proportion of fenitrothion in soil extracts detected by GC-MS decreased with the time. The mass spectrum figure (11) show a molecular ion peak (M^{+}) at m/z

153 and fragment 136, 108, 90, 77, 63, 53 and 46 which corresponding to the formula $C_7H_7NO_3$ which are suggested to be 3-methyl-4-nitrophenol which is the major degrades of fenitrothion in soil.

Pesticide residues in the drainage water

Analysis of water samples taken from the drainage water beside the treated field at different intervals showed that no detectable amount of the tested pesticides was found at all intervals after application.

Effect of certain environmental factors on the fate of the tested pesticides.

The data indicated that the persistence of etoxazole and fenitrothion was influenced by temperature and exposure period.

It is clearly evident that the photodecomposition was positively correlated to the exposure period.