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LIST OF ABBREVIATIONS

A.caliginosa* = *Aporrectoda caliginosa.

ALT = Alanine Transaminase.

AST = Aspertate Transaminase

EC : Emulsifable concentrate.

EPA : Environment Protection Agency.

EW : Emulasion, oil in water.

GOT : Glutamic Oxaloacetic Transaminase.

GPT : Glutamic Pyruvic Transaminase

GR : Granules.

IGI : Insect growth Inhibators.

IPM : Integrated pest management.

M.A.P. : Mono ammonium phosphate.

Mol. F. : Molecular Formula.

Mol. Wt : Molecular Weight.

OP's : Organophosphates.

Pi : Inorganic phosphorous.

R. : Recommended rate.

R.H. : Relative humidity.

2. R. dose : Two fold Recommended rate.

TTC : Triphenyl tetrazolium Chloride.

TPF : Triphenyl Formazan.

U/L/P : International Unit per liter.

WG : Granules water dispersible.

WHC : Water holding capacity.

WP : Wettable Powder

Chapter Five

SUMMARY

The aim of the present work is to estimate the residual effect of certain agrochemicals (pesticides via different rates of application and certain fertilizer on the earthworm, *Aporrectoda caliginosa;* the adult and immature stages. Furthermore to study the biological processes and some enzymatic activities occurred in sandy loam soil. It is also, an attempt to explore the best range of these agrochemicals that could be compatible with IPM program.

The effect of these agrochemicals at the recommended and the 2-fold recommended rates of abamectin, fluazifop-P-butyl, lufenuron , (metalaxyl –M) mefenoxam plus and pymetrozine, in addition to the effect of the recommended rate of the inorganic fertilizer "Monoammonium phosphate" Microbine was investigated.

The obtained results indicated that there were no evidence that the application of these agrochemicals had any adverse effect on the mortality percent of the two stages of earthworm, using the two rates of application except a slightly effect was obtained in the treatments of pymetrozine and M.A.P. on the immature stage of earthworm [pymetrozine at the 2-fold R.rate (5.3%) while M.A.P. was (4.3%) which clearly similar to that obtained with pymetrozine but pymetrozine at R.rate was (3.3%) $\geq$ check. The finding results indicated that all studied agrochemicals suppressed the growth rate of earthworm in both the adult and immature stages.

One another fact showed that, the reduction percent of the earthworm body weight caused by the pesticide mainly depend on the rate of application. On the other hand, body weight reduction% value recorded

in the case of mineral fertilizer was higher than that occurred via the biofertilizer. The herbicide; fluazifop-P-butyl, at the high rate recorded the highest reduction% while. lufenuron (the insecticide) at the R.rate caused the lowest reduction percent. The comparison could be arranged as follows: fluazifop-P-butyl (51.95% at the double rate> lufenuron (51.50%) at 2-fold R.rate> mefenoxam plus (45.53%) at double rate> abamectin (43.91%) at the 2-fold R.rate>M.A.P. (42.23%)> pymetrozine (38.44%) at double rate > Microbine (26.35%)> mefenoxam plus at lower rate (22.91%)> abamectin at recommended rate (21.69%)> fluazifop-P-butyl at recommended rate (18.34%)> pymetrozine at the normal rate (16.58%)> lufenuron at R.rate (13.73%) as for the adult stage of earthworm.

The same trend was obtained for the immature stage where pymetrozine at the double rate caused the highest body weight reduction% while, lufenuron at recommended rate caused the lowest body weight reduction%. The values could be arranged as follows: pymetrozine at the highest rate> abamectin at the 2-fold R.rate> mefenoxam plus at the double rate>lufenuron at the high rate > M.A.P.> pymetrozine at the R.rate = fluazifop-P-butyl at the 2-fold R.rate> abamectin at R.rate = mefenoxam plus at the lower rate> Microbine> lufenuron at the lower rate = fluazifop-P-butyl at the R.ratee.

The residual effect of the agrochemicals on the total soluble protein content of adult stage was estimated where, the double rate of fluazifop-P-butyl gave the highest reduction in total soluble protein content of earthworm tissue while, lufenuron and pymetrozine caused lower reduction in total soluble protein of earthworm using the recommended rate.The finding results of the total soluble protein reduction percent may be arranged as follows: fluazifop-P-butyl at double rate> lufenuron at 2-fold

recommended rate> mefenoxam plus at the greatest rate> M.A.P.= abamectin at the highest rate> pymetrozine at the 2-fold R.rate >Microbine> mefenoxam plus at the lower rate> abamectin at R.rate> fluazifop-P-butyl at normal rate> pymetrozine at R.rate> lufenuron at the recommended rate.

In addition to, the residual effect of the agrochemicals showed that the compounds suppressed the total protein content in immature stage of earthworm where. pymetrozine caused the highest decrease using the 2-fold recommended rate while, Microbine recorded the lowest decrease of the total soluble protein content, showing that the immature stages were more sensitive to these agrochemicals than the adult one.

It is clear that all the agrochemicals elevated the GOT and the GPT transaminases specific activity of adult stage. The highest increase was obtained by fluazifop-P-butyl for GOT specific activity using the 2-fold recommended rate while, Microbine recorded the lowest increase of GOT specific activity. At the same trend, it was found that lufenuron and abamectin caused the highest stimulation of GPT specific activity while, the recommended rates of the previous pesticides gave the lowest increase of GPT specific activity.

On the other hand, the GOT and GPT specific activity of immature stage was elevated by the application of the agrochemicals where, lufenuron and pymetrozine at the 2-fold R.rates recorded the highest increase of GOT specific activity whereas, Microbine gave the lowest enhancing of GOT specific activity. The obtained results, exhibited that, pymetrozine lufenuron and abamectin increased the GPT specific activity which recorded the highest increase using the double rate. However, Microbine and abamectin

(at the R.rate) gave the lowest enhancing of GPT specific activity. It was concluded that the reduction of soluble protein content in earthworm tissue refer to the treatment with agrochemicals was accompanied by decrease of earthworm body weight and elevation of the assessed GOT and GPT transaminases enzymes activity.

Moreover, the highest increase of GOT and GPT transaminases activity, the highest decrease of growth rate and the highest decline of total soluble protein depend on the rate of application (2-fold R.rate) while, the recommended rate of application caused little increase of transaminases and simple decrease on both soluble protein content and body weight of the earthworm. The adult stages are more tolerant to these agrochemicals than the immature stages.

According to the finding results obtained from the effect of agrochemical treatments on dehydrogenase enzyme activity expressed as formazan, ppm, it was cleared that no significant changes in the activity of dehydrogenase enzyme was recorded. One other fact (with little exception) these agrochemicals did not affect dehydrogenase activity in soil where, M.A.P. (mineral fertilizer) caused slight effect on the activity of dehydrogenase as follows: check (11.57) $\geq$ Microbine (10.37) $\geq$ M.A.P. (7.64) ppm.

As regards the effect of agrochemicals on the production of available phosphorous (Pi) in soil, the results indicated that lufenuron at the 2 rates and abamectin at the 2-fold R.rate did not affect Pi formation, whereas stimulation effect was obtained by the two fertilizers while. pymetrozine, fluazifop-P-butyl and mefenoxam plus recorded harmful effect on phosphorous production.

These finding results could significantly be arranged as follows: M.A.P (255.87) ≥ Microbine (205.87)>check (193.88)=lufenuron at the R.rate (182.44) = abamectin at the double rate (181.54)= lufenuron at 2-fold R.rate (173.20) > pymetrozine at the high rate (164.73) = pymetrozine at the low rate (163.25) = fluazifop-P-butyl at 2-fold R.rate (161.20) = abamectin at R.rate (156.12) = fluazifop-P-butyl at R.rate (155.42) = mefenoxam plus (144.15) and (136.97) ppm at the R.rate and 2-fold R.rate, respectively.

In accordance with the impact of the tested agrochemicals on urease enzyme activity in soil, the finding results exhibited that there was no evidence that the application of these agrochemicals had any adverse effect on urease activity percent in sandy loam soil. From the obtained results, it could be concluded that to maintain soil fertility and productivity, rationalization the use of both pesticides and mineral fertilizers provided that the use only at the requisite. As well as the recommended rate of these agrochemicals must be applied accurately and through IPM program to avoid soil contamination and their side effects on beneficial soil organisms.