CHAPTER - XI

SUMMARY AND CONCLUSION

1. Pesticide pollution has been recognised as an emerging ecological factor in our environment. Accumulation of pesticides in soil environment demands the evaluation of their effects on ecological processes like decomposition of organic matter, mineral cycling and soil ecosystem components such as plants, animals and microbes. Role of soil organisms, particularly responsible for litter breakdown, material cycling and thereby soil fertility is briefly narrated in Chapter I. Relevant studies of other workers has been reviewed and the perspectives of the present study are discussed.

2. Methods for preparation of soil litter system, pesticide treatment and analyses of Organic Carbon Depletion (OCD), Ammonical Nitrogen (AN), Nitrate Nitrogen (NR), Abundance of Bacteria, Fungi and Actinomycetes (AB, AF and AA respectively), residue levels and biomagnification factor (BMF) employed and material used in various experiments are detailed in Chapter II. Chemical names, formulae and functional nature of the various pesticide formulations are also presented in this Chapter. Method on the impacts of pesticides on the soil invertebrate fauna is also described here. Procedures for statistical analysis of the various observations recorded in pesticide treated as well as untreated samples and the mode of presentation of data are also briefly narrated.
3. Observations on impacts of pesticides on litter decomposition in a paddy litter-soil microecosystem are narrated in Chapter III. The organic carbon depletion (OCD) in the system, an index for decomposition of organic matter indicated that the trends in various treatments differ. In organochlorine group of pesticides treatments (Figs. 3 to 5) maximum inhibition of OCD is noticed, whereas in carbamates and organophosphates after initial inhibitions, the increase in OCD levels as compared to control are significant. However, a trend of decrease in OCD level with the increase in treatment concentration is observed.

4. Pesticides effects on two important soil process viz. ammonification and nitrification responsible for converting nitrogen into an available form in the soil are recorded in Chapter IV. An increase in AN levels has been recorded in most of the observations at the concentration of 4 and 40 ppm. On the other hand, a reverse trend in AN levels in 400 ppm treatments is noticed.

5. NH levels lower than control in carbamate treatments differ with the levels observed in other pesticides treatments, like OCD, in AN and NH, a trend of decrease in level with the increase in treatment concentration is revealed.

6. Changes due to pesticides treatments observed in bacterial populations are reported in Chapter V. Organochlorine treated samples as compared to control exhibited inhibition of AB in most of the observations. At 400 ppm level
of treatment AB is found to be inhibited with minor exceptions. Increase over control to some extent is many times observed in carbamate and organophosphate at 4 and 400 ppm levels of treatments. However a general trend of decrease in AB with the increase in concentration is noticed.

7. Influence of various pesticides studied on fungal population is reported in Chapter VI. The observations reveal that the increase in concentration of organochlorine and carbamate pesticides could be correlated with an increase in AF. The organophosphates do not show this trend.

8. Pesticides effects on actinomycetes population are recorded in Chapter VII. Remarkably significant inhibition of AA in all the treatments on 3rd day was observed. Later on, except in carbamate treatments where inhibition was noticed throughout the period of study, higher AF levels were observed.

9. Toxicological effects of pesticides on selected invertebrates viz. earthworms, slugs and millipedes are reported. Considering mortality period as an index of toxicity, carbamates were most toxic to the soil fauna while the organochlorines produced least toxic effects. However, the observations on morphometric behavioural changes reveal that in field conditions reduction in population number by different treatments will have similar effects.

10. Lindane residue levels of soil invertebrates such as earthworms, slugs etc. are reported in Chapter IX. The biomagnification factor (BIF) for these organisms is calculated.
The highest BMF was observed in earthworms (10.99) in 40 ppm treatment while its lowest level was found in slugs (3.41) at the same concentration. An increase in organic residues was observed with the increase in Lindane treatment level. For example, in earthworms treated with 4, 40 and 400 ppm concentration the residue analysed was 31.92, 354.6 and 2660.0 ppm respectively.

11. Results of pesticides treatments on various ecological processes and microbial as well as macrobial populations are discussed in Chapter X. Response of microbial population and variation in CODB, AN etc. to the various kind of treatments could be interpreted in terms of soil dynamics and soil fertility. It has been observed that the effects of pesticides on different parameters are of varied nature. Pesticides exhibit both enhancing and inhibitory action on the populations and ecological processes. They also affect the macrofauna adversely. However, further information is still required to enable us to know the exact nature of various complicated interactions.