SUMMARY
Ecological studies of *Phaseolus mungo* Linn.

in relation to pesticides.

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**SUMMARY**

Agriculture sector is an important sector amongst all sectors in Indian Economy. Pesticides have played a significant role in modern agriculture. Amongst many benefits, Pesticides have harmful effects on man and his environment as well as plants physiology, growth and yield and they should be used according to prescription and recommended doses. One can not use pesticides indiscriminately. Pesticides have to be used judiciously. Some people have taken for granted that the pesticides are harmful as they have fetal residues, this attitude only which is harming more out of their ignorance. In fact much of unavoidable damages of pesticides are done through incorrect or overuse or due to incorrect application and not so much from correct use.

Extensive work has been carried out in India on pesticide residue in variety of foods but there are several aspects of pesticide research other than residues which are of equal concern to us, one of them is pesticide-plant relationship which involves the study at physiological and ecological level. This area offers a tremendous opportunity for fruitful research.
The present study is a systematic investigation of various concentrations of endosulfan and malathion on *Phaseolus mungo* Linn. in relation to seed germination, seedling growth, plant growth, development and yield, protein, chlorophyll and mineral contents in leaves, stem and in leaves.

The synoptic account of work done is discussed below:

1. The seeds of *Phaseolus mungo* Linn. var. T-9 were obtained from IARI, New Delhi.

2. The endosulfan obtained from Hoechst India Limited and malathion from Ravi Organics Pvt. Ltd., Bagraipur, Muzaffarnagar.

3. Endosulfan is an organochlorine chemically known as 6, 7, 8, 9, 10, 10a hexachloro-1, 5, 5, 9, 6, 9, 9a hexahydro 6, 9, methano-2, 3, 4- benzodioxathiepin-3-oxide. Malathion is an organo phosphate insecticide. Its chemical name is Diethyl (Dimethoxy thiophosphorphorylthio) succinate and I.U.P.A.C. Name is Diethyl -2 [(dimethoxy phosphorothioyl) sulfany] Butanedioate

4. Laboratory and field experiments were conducted in botany department, D.A.V. (P.G.) College, Muzaffarnagar.

5. Meteorological data for experimental period were collected from U.P. Council of Sugarcane Research Station, Muzaffarnagar.

6. For field study of crop *Phaseolus mungo* Linn. were grown in pots at botanical garden, D.A.V. (P.G.) College, Muzaffarnagar.

7. Endosulfan and malathion were used in three concentrations viz 0.01%, 0.25% and 1.00% for seedling studies the seeds were treated in these concentrations for 24 hrs, control with distilled
water was raised simultaneously. Pesticide on *Phaseolus mungo Linn.* lack was sprayed fortnightly with the help of sprayer.

8. For seedling studies the treated and control seeds were kept for germination in sterilized petridishes.

9. Seed germination in the crops was inhibited by both the pesticides except lowest concentration of malathion which slightly stimulated the seed germination.

10. Length of radicle was measured at 1, 3 and 5 days after germination, length of plumule was measured at 4 and 6 days of the germination. Every used concentration of the both the pesticide inhibited length of radicle and plumule but lowest concentration of malathion accelerated length of radicle and plumule. The inhibition of radicle was more than that of plumule but plumule stimulation was more than that of radicle.

11. Rootlet development stimulated by low concentration endosulfan and malathion but inhibited by high concentration of endosulfan.

12. In general there was a concentration dependent inhibition by the pesticide; endosulfan was found more toxic at higher concentration.

13. Growth parameters like height of plants, number of leaves, leaf area were studied three times. The sampling for this purpose was done after 20, 40 and 60 days of sowing of both crops i.e. *Phaseolus mungo Linn.* The sampling to study the number of flower/plant was done after 70 days in *Phaseolus mungo Linn.*

14. Every parameter of growth was found maximum of third sampling of both the crops.
15. All the growth parameters were influenced even by single spray i.e. at the stage of first sampling.

16. Endosulfan inhibited every growth parameter in each used concentration. Malathion was slightly stimulatory in low concentration and inhibitory in other concentration. Concentration dependent inhibition and more toxicity of endosulfan than malathion towards *Phaseolus mungo* Linn. are main feature.

17. Yield parameters like number of pods/plant, pod size, average seeds/pod, average seeds/plant, 100 seeds weight, fresh and dry weight were measured at the time of harvesting of crop.

18. Endosulfan in all the used concentration and malathion in higher concentrations (0.01%, 0.25% and 1%) inhibited yield parameters of the crop. Malathion in lowest concentration slightly stimulated the yield of *Phaseolus mungo* Linn. Endosulfan was more toxic than malathion and both the pesticides were toxic to *Phaseolus mungo* Linn. in higher concentration.

19. The estimation of chlorophyll, protein and mineral was done at three different stages of phenology i.e. vegetative (i) flowering, (ii) young fruits (iii). It means 30, 50 and 70 days after sowing of *Phaseolus mungo* Linn.

20. Chlorophyll contents were found maximum at 11nd stage. Both pesticide in every used concentration inhibited chlorophyll 'a', 'b' and total chlorophyll. Malathion in lowest concentration stimulated chlorophyll contents but other concentrations were toxic. More inhibition or stimulation of chlorophyll 'a' than chlorophyll 'b' was observed. Endosulfan was more toxic than malathion
21. Chlorophyll 'a', 'b' and total chlorophyll (a + b) was maximum in control and minimum at higher concentration of pesticide.

22. Protein contents were estimated in leaves and fresh fruits. In leaves, protein was maximum at IInd state. Lowest concentration of malathion stimulated protein in leaves and fruits but other concentration along with every concentration of endosulfan were toxic. Endosulfan was more toxic than malathion.

23. Mineral contents were estimated in leaves & stem of *Phaseolus mungo* Linn. treated with both the pesticides. All minerals were found maximum in control and at IInd stage of phenology except phosphorus.

24. All the minerals (N, P, K, Ca) were influenced by pesticides.

25. Nitrogen was inhibited by all the used concentration of endosulfan and higher concentration of malathion, lowest concentration of malathion stimulated nitrogen contents. Endosulfan was found more toxic than malathion.

26. Potassium and calcium also showed the same trend i.e. stimulation at lowest concentration of malathion and inhibition at all the other concentrations along with endosulfan at every used concentrations.

27. Phosphorus was more than control in every used concentration of malathion. The promotion was concentration dependent. Endosulfan in every used concentration inhibited phosphorus.

28. Reduction in chlorophyll and mineral contents by higher concentration of endosulfan and malathion result in poor yields with low protein contents in *Phaseolus mungo* Linn. leguminous plants.
29. The results were compared with distilled water treated control and analysed at P 0.05 level (Fisher's 't' test).

30. In general endosulfan was more toxic at higher concentration than malathion, lowest concentration of malathion was slightly stimulatory for every parameter considered. There was a concentration dependent inhibition by all the used concentrations of endosulfan and higher concentration of malathion *Phaseolus mungo* Linn. was less affected by all the concentration of both pesticides.