

EFFECT OF SOME HERBICIDES ON SOIL MICROFLORA IN THE WHEAT CROP FIELD

BY

B. B. MANDAL, S. BANDYOPADHYAY, P. K. JANA, N. MUKHERJEE
AND P. BANDYOPADHYAYA

*Faculty of Agriculture, Bidhan Chandra Krishi Viswavidyalaya,
Kalyani, Nadia, West Bengal, India*

Studies were made on the effect of pre and post-emergence application of herbicides like Tok E-25, Modown, Fernoxone and Weeder-96 on soil microflora in wheat crop field at Kalyani, Nadia. The herbicides in general showed an initial depressive effect on total and particularly bacterial flora of soil, which, however, recovered within a few days. No prolonged effect of the herbicides on the microflora was observed.

INTRODUCTION

Herbicides applied in crop fields for weed control are likely and reported to have effects on the microorganisms living in the rhizosphere of crops, weeds and in soil (Cullimore, 1969, Lozano-Galle, 1970, Nelson and Hendrick, 1976, Schreven *et al.* 1970). The findings in this regard have been reviewed by Audus, (1964) some time back. Since newer chemicals are being introduced as herbicides in different crop fields, the assay of the effects of such compounds needs to be continued.

An experiment was conducted with the objective of understanding the effects of four herbicides on soil microflora in the wheat crop field following microbial techniques of analysis.

MATERIALS AND METHODS

Sonalika variety of wheat (*Triticum aestivum*) crop was grown in the winter of 1977-78 in the District Seed Multiplication Farm of Bidhan Chandra Krishi Viswavidyalaya, Kalyani, Nadia, West Bengal and treated with herbicides like Tok E-15 (25% of 2, 4-dichlorophenyl-4-nitrophenyl ether) and Modown (80% of methyl-5-(2, 4-dichlorophenoxy)-2-nitrobenzoate) one day after sowing as preemergence treatment and Fernoxone (80% of sodium salt of 2, 4-dichlorophenoxy acetic acid) and Weeder-96 (72% of amine derivative of 2, 4-dichlorophenoxy acetic acid) 33 days after sowing as post-emergence treatment at the rate of 8.0·1, 2.5 kg, 750 g and 750 ml/ha respectively.

For microbiological analysis soil samples collected following standard procedure were analysed following usual dilution plating procedures (Roy *et al.* 1977) using soil extract agar (Lochhead and Chase, 1943) for estimating population of bacteria and actinomycetes and Martin Rose Bengal Agar (Chattopadhyay and Mukhopadhyay, 1967) for fungi. Plates were incubated at $30^{\circ} \pm 1^{\circ}\text{C}$ for definite periods for each type of organisms and colony numbers per plate counted.

RESULTS AND DISCUSSION

The results of effect of herbicides application on soil microflora in wheat field as presented in Table 1 showed the following effects :

(a) Effect on total flora of soil :

In cases of herbicides applied as pre-emergence treatments, both the herbicides resulted in a fall in flora 4 days after application and staged a continuous recovery upto 18 days or more. However, the recovery was faster in case of Tok E-25 than Modown and surpassed the original level on the 18th day after treatment. The increase in soil microflora to a level higher than the original one might be due to favourable utilization of the affected soil situation by the survivors in this particular treatment.

Herbicides like Fernoxone and Weeder—96 applied post—emergence showed a similar fall in microbial number but a slow recovery, and either failed to reach or reached near the original level only.

The total microbial population in weed free check and unweeded control treatments showed generally an increasing trend throughout as evident from the successive observations.

b) Effects on differential flora of soil :

While the pattern of effect on bacterial flora was similar to that of total flora, not much consistent effect was discernible in case of actinomycete flora. However, there was an increasing trend in case of fungal flora throughout.

The above findings indicate that the four herbicides tried in this experiment do not have prolonged toxic effect on the soil microflora.

REFERENCES

- Audus, L. J. (1964). Herbicide behaviour in the soil. II. *Interaction with soil micro-organisms*. In : *The Physiology and Biochemistry of Herbicides*. Acad. Press. London and N. York. pp. 163-206.
- Chattopadhyay, S. B. and Mukhopadhyay, N. (1967). Investigations on disease complex of rice in West Bengal (India). I. Study of rhizosphere microflora of the affected plants. *Int. Rice Comm. News Let.* 16 : 31-37.
- Cullimore, D. R. (1969). Initial studies on the effect of 2, 4-D on soil microflora. *Soil Biol.* 11 : 24-26.

- Lochhead, A. G. and Chase, F. E. (1943). Quantitative studies of soil micro-organisms. V. Nutritional requirement of the predominant bacterial flora. *Soil Sci.* 55 : 185-195.
- Lozano-Calle, J. M. (1970). Effects of 2, 4-D and 2, 4, 5-T ethyl ester on the microflora of a sandy and clay soil. *Meded Rijksf. Landbouw. Gent.* 35 : 599-614.
- Nelson, L. M. (Jr) and Hendrick, H. G. (1976). Influence of an experimental herbicide on soil nitrogen fixing bacteria and other micro-organisms. *Soil Sci.* 122 : 206-215.
- Roy, P., Sinha, P. K. and Mukherjee, N. (1977). Effect of granular insecticides in rice microflora. *Ind. J. Ent.*, 37 (1) : 93-95.
- Schreven, D. A. Van, Lindenbergh, D. J. and Koridon, A. (1970). Effect of several herbicides on bacterial population and activity and persistence of these herbicides in soil. *Pl. Soil.* 33 : 513-532.

REFERENCES

- Anders, J. J. (1964). Microbial behavior in the soil. II. Interaction with soil micro-organisms. In: *The Physiology and Biochemistry of Microbes*, Fred W. Ooster and W. J. B. van der Zant, pp. 183-208.
- Chakrabarty, S. B. and Mukherjee, N. (1967). Investigations on the effect of herbicides on the microflora of soil. *Indian J. Microbiol.* 6 : 31-37.
- Callaway, D. E. (1968). Initial studies on the effect of 2, 4-D on soil microflora. *Soil Biol. Biochem.* 1 : 24-28.