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Study on the effect of xenobiotic (Agro chemicals) on the activity of soil enzymes

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SUMMARY

A pot culture experiment was carried out in the Department of Soil Science and Agricultural Chemistry, College of Agriculture, Vellayani during 2000 to study the effect of xenobiotics (agrochemicals) on enzyme activities.The enzymes selected were urease, phosphates,protease,dehydrogenase and cellulase.Thirteen chemicals *viz.*, phorate, carbofuran, quinalphos, monocrotophos, chlorpyriphos, hinosan, bavistin, streptocyline, benthiocarb,2,4 –D, butachlor, oxyflourfen were used for the study which can be categorized as insecticide,fungicide,antibiotic and herbicide. The experiment was carried out using rice (var. Kanchana) as a test crop.The results revealed that the antibiotics impart maximum inhibition on the enzyme activities followed by fungicides, insecticides and herbicides.

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Based on the multidisciplinary studies on biology, chemistry, and physics of soil in the last 100 years, which in themselves are a reflection of complexity and heterogeneity of the system, soil can be regarded as a living tissue on an inorganic and organic support. Enzyme activities in this environment have been the topic of intensive research since the middle of this centuary, excellent reviews are available as comprehensive introductions and surveys.Despite the beneficial impact of pesticides in improving and stabilizing agricultural productivity by obnoxious weeds, fungi and insects these allocthonous organic chemicals have been in the center of debates about the contamination of environmental ecosystems for a long time. It is, however, fair to state that pesticides represent a class of industrial chemicals with extensively studied and controlled ecological and eco-toxicological profiles. During the last few decades the number of commercial agrochemicals declined as a result of enormous difficulties in meeting both biologically and environmentally favourable behavior. Strategies such as integrated pest management (IPM) represent significant improvements in well-balanced and sound usage of pesticides, as they are based on chemicals with optimized ratios of bio-specificity and dosage, favour the use of as little as possible and only as much as necessary, and recommend the supplementary utilization of non chemical alternatives for pest control. The behavior of pesticides is governed by various parameters. Of primary importance are chemical, structural and physical properties of molecules themselves (Jones *et al*., 1991).Pesticide degradation in soil the result of the result of combination of physical, chemical and biological events abolishing microbial activity in soil by soil sterilization gives some mechanistic indication of the extent to which the pesticide is transformed abiologically. However, depending on the methodology applied the residual activity of accumulated enzymes may still contribute to observed degradation (Nannipieri *et al*., 1990).The effects of pesticides on microbially mediated activities of soil enzymes comprise a narrow range of general response a lag before changes in enzyme activities are detected may indicate that degradation products of xenobiotics are the actual inhibitors. The disturbance of microbial equilibria in soil by the introduction of toxins are reflected in the activity of enzymes.

Pesticides are found to impose direct effects on enzyme activities due to their interaction with microbial population. The microbial activity of soil is far too complex to be described by a single parameter. Thus, the assay of an enzyme activity alone is of more value for assessing the side effects of pesticides in soil and it should be considered as a supplementary tool to obtain functional information on specific aspects of the bio- activity of the soil. Pesticides may affect soil enzyme activities either

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