AN AJSS

An Asian Journal of Soil Science

Volume 7 | Issue 2 | December, 2012 | 331-335

Research Article

Effect of acetamiprid on enzyme actvitiy in selected soils of Karnataka

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Received : 09.03.2012; **Revised :** 04.11.2012; **Accepted :** 20.11.2012

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Summary

The impact of acetamiprid on selected soil enzymes dehydrogenase, urease and phosphatase was studied using surface layer (0-15 cm) samples of movement studies. The samples were taken at different interval (10, 20, 30, 45 and 60 days) under field capacity and the enzyme activities were analyzed for Kodagu, Bangalore and Chamarajanagar soils of Karnataka. Highest inhibition was found on 10th day incubation compared to initial activity in all the enzymes. The increased activity of all the three enzymes was observed from 20th day incubation and reached maximum in 60th day incubation. The highest dehydrogenase activity was recorded in Bangalore soil (58.93 µg TPF g^{-1} soil h^{-1}) and the lowest activity was recorded in Kodagu soil (16.05ìg TPF g^{-1} soil h^{-1}). The highest urease activity was recorded in Bangalore soil (356.66 ìg urea g^{-1} soil h^{-1}) and the lowest activity was recorded in Kodagu soil (341.81 ìg urea g^{-1} soil h^{-1}). The highest activity of acid phosphatase activity was recorded in Kodagu soil of pH 5.32 (6.23 µg *p*-nitrophenol hydrolyzed g^{-1} soil h^{-1}) followed by Bangalore (4.86 µg *p*-nitrophenol hydrolyzed g^{-1} soil h^{-1}) and Chamarajanagar (4.63 µg *p*-nitrophenol hydrolyzed g^{-1} soil h^{-1}) ,respectively. The alkaline phosphatase activity in soil was also high in Chamarajanagar soil of pH 8.1 (7.05 p-NP hydrolyzed µg^{-1} soil h^{-1}), followed by Bangalore soil (5.29 µg p-NP hydrolyzed g^{-1} soil h^{-1}) and Kodagu soil (3.85 µg p-NP hydrolyzed g^{-1} soil h^{-1}).

Key words : Acetamiprid, Field capacity, Enzyme activities, Dehydrogenase, Urease, Phosphatase

How to cite this article : Punitha, B.C., Hanumantharaju, T.H., Jayaprakash, R.and Shilpashree, V.M. (2012). Effect of acetamiprid on enzyme actvitiy in selected soils of Karnataka. *Asian J. Soil Sci.*, **7**(2): 331-335.

Introduction

Crop protection is an integral part of agriculture with pesticide application as a major component. It is estimated that one third of the world's food crop is destroyed by the pests annually. It is well known that enzymes in soil contribute to the total biological activities in the soil environment because they are intimately involved in catalyzing reactions necessary for organic matter decomposition, nutrient cycling, energy transfer, and environmental quality (Dick, 1994). Despite the beneficial impacts of pesticides in improving and stabilizing agricultural productivity by control of obnoxious weeds, fungi and insects, these organic chemicals are known to contaminate soil ecosystem and pose threat to balance equilibrium among various groups of microorganisms in soil, which play an important role in mineralization, nitrification and phosphorus recycling are dependent much on the balanced equilibrium existing among various groups of organisms in the soil. The neonicotinoid insecticide acetamiprid (N-[(6– chloro-3- pyridyl) methyl]-N-cyano-N-methyl-acetamidine) is a new-generation insecticide with ground and aerial application against aphids, leafhoppers, whiteflies, thrips, leaf beetles, leafminer moth, termites etc. It is commonly used on leafy vegetables, fruiting vegetables, cole crops, citrus fruits, pome fruits, grapes, and ornamental plants and flowers. Acetamiprid poses low risks to the environment relative to most other insecticides and its use would pose minimal risk to non target plants (USEPA, 2002). With this in view, a study on effect of acetamiprid on enzyme activity in selected soils of Karnataka was conducted.