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IMPACT OF PESTICIDES ON AGRICULTURE SOIL MICROBIAL BIO-MASS CARBON Of SAMASTIPUR DISTRICT (BIHAR) INDIA

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ABSTRACT:

Animals and plants are degraded by soil microorganisms. The activities of microorganisms in soil are essential to the recycling of nutrients. Pesticides are degrade the biologically activity of soil microflora, which may lead to maintain the soil fertility. The effect of three pesticides i.e., Cypermethrin, Malathion and Profenofos on soil microbial biomass carbon was measured under laboratory conditions. Soil was treated with pesticide for short transient period i.e., 2 days for knowing the effect on soil microbial biomass carbon. The microbial biomass carbon content of soil increased which has a good role in agriculture crop production. In case of pesticides treated soil, a drastic decrease in microbial biomass carbon was observed in different group of pesticides.

KEY WORDS: Profenofos, Microbial Biomass, Microorganisms, Pesticides

INTRODUCTION:

Pesticides are toxic agrochemicals, which is used for prevention of crops from pests. During the last few decades it has been used frequently. During the foliar spray, these pesticides drop on soil and destroy the microflora. The indiscriminate use of pesticides disturbs the soil environment by affecting flora and fauna including microflora of soil and also the physico-chemical properties of soil like pH, alkalinity leading to infertility of soil and salinity, (Sarnaik, *et al.*, 2006). When pesticides are used, the possibilities of these chemicals may exert certain effects on non-target organisms, including soil microorganisms (Simon-Sylvestre and Fournier, 1979). The microbial biomass plays an important role in the soil ecosystem, where they play a crucial role in nutrient cycling and decomposition (De Lorenzo, *et al.*, 2001). Microorganisms are the primary soil decomposers of organic compounds and nutrient cycling and (Pandey and Singh, 2004; Devare, *et al.*, 2007). Large number of pesticides

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i.e., insecticides, nematicides, herbicides and fungicides are used to optimize the crop production in modern agriculture (Lo pez, *et al.*, 2002; Cycon, *et al.*, 2006). However, continuous uses of pesticides may cause soil pollution, threatening of soil microor 2002). Non-target effects of pesticides on soil microorganisms were shown to depend on soil abiotic factors (Monkiedje and Spiteller, 2002), however, interaction between pesticides and biotic factors may little attention. Pesticides in the soil may harm to the non-target and beneficial microorganisms (Bhuyan, *et al.*, 1992) and their activities which are essential for maintaining soil fertility (Schuster and Schroder, 1990). Microbial biomass in soil is an important feature of soil quality (Doran Parkin, 1994). Soil microbial biomass measurements have been indication of long-term changes in soil organic compound content (Hart and Brookes, 1996). However, soil microorganism also help in balancing the soil ecosystem, healthy agricultural management must be practiced and maintained microbial biomass (Nannipieri, *et al.*, 2003 & Jones and Ananyeva, 2001). Over years, chemical pesticides are frequently used against pests and diseases. However, their long term use resulted in insecticide resistance of insecticides, which is resulted in restrictions on their export. Microbial and biochemical parameters of soil are indicators of soil quality of the physical and chemical parameters (Winding, *et al.*, 2005). The present study was therefore initiated to evaluate the effect of pesticides on Samastipur district agriculture soil microbial biomass carbon in Samastipur district soil.

MATERIALS AND METHODS:

Soil sampling: Pesticides free 5 cm depth soil samples were collected from agriculture areas of Samastipur district of Bihar, India. The soil samples were sieved through a 2.0 mm mesh size to remove stones and plant debris.

Pesticides: Cypermethrin, Malathion and Profenofos were used and purchased from a local agricultural dealer store of Samastipur (Bihar), India and spray different pesticides on different soil samples.

Determination of Soil Biomass Carbon: Chloroform fumigation incubation method by was used to determine the soil biomass carbon (Jenkinson and Powlson, 1976). Soil samples were collected and pass through 0.5 mm sieve. One gram of each soil sample was dissolved in 10 ml of $K_2Cr_2O_7$ solution into separate 250ml flask and swirled gently to disperse soil. 20ml of conc. H_2SO_4 was rapidly added by using automatic pipette and swirled gently until the soil and reagents were mixed vigorously. The flasks were rotated and allowed to stand in a sheet of asbestos for about 30 min. 100ml of distilled water was added to each flask and 3 - 4 drops of indicator (Di Phenyl Amine) was added then filtrated with 0.5 N ferrous sulphate solution to the end point with brilliant green color. Microbial biomass C percent was calculated by measuring the difference in ex-

tractable organic C between the fumigated and unfumigated soils.

RESULTS AND DISCUSSION:

Agriculture areas soil samples from Samastipur district of Bihar were collected and pesticides were used in different soil sample. Microbial biomass of carbon percentage was measured by Chloroform fumigation incubation method. Microbial biomass of carbon percentage was analysed that soil treated with profenofos had the lowest percentage organic matter content of 0.17 of all the pesticides treated soil. Crypermetrin treated soil had the highest microbial biomass carbon content of 0.5 after the treatment. All the pesticides used showed reduction in the soil biomass carbon when compared to the control (Table 1).

Table 1: Impact of Pesticides on soil microbial biomass carbon (%C) without fumigation (WOF) and with fumigation (WF).

Sample	WOF	WF	% C
Blank with soil	33	17.5	3.2
Cypermethrin	28	13.9	0.5
Profenofos	16.8	6	0.17
Malathion	28	14.8	0.4

Similar results were also reported by earlier scientist (Ayansina and Oso, 2006; Ali, 1990; Rath *et al.*, 1998 and Tu, *et al.*, 2005). There are also other reports on the activity of different pesticides in relation to biomass carbon. This result proves that due to profenofos, malation and cypermethrin microbial biomass carbon percentage reduced. Although the use of pesticides has been proven beneficial for crops but decrease the overall fertility of the soil and has also polluted the environment.

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