STUDY OF THE EFFECT OF SOME PESTICIDES ON SOIL MICROORGANISMS

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Abstract

The objective of this investigation was to determine the effects of three pesticides on soil microbiota (total viable bacteria). Pesticides were applied at recommended dosages. The effects of these pesticides on total viable bacteria were investigated in laboratory experiments.

In the soil sample treated with Decis (insecticide), the total viable bacteria number was found to be higher than that of the control soil during incubation. The Bavistin (fungicide) and SDMA (herbicide) pesticides were had no inhibitory effect on the number of total microorganisms.

Key words: soil, microorganism, pesticides.

INTRODUCTION

The use of pesticides has become an integral essential part of modern agriculture. Pesticides are often applied several times during one crop season and a part always reaches the soil.

The wide use of pesticides has created numerous problems, including the pollution of the environment. The influence of pesticides on soil microorganisms is dependent on physical, chemical and biochemical conditions, in addition to nature and concentration of the pesticides.

In many studies was demonstrate the fact that microorganisms are capable to grow in the presence of several commercial pesticides. Catabolism and detoxification metabolism occur when a soil microorganism uses the pesticide as a carbon and energy source.

MATERIAL AND METHODS

In this study was examined the response of microbial populations in soil after the application of several pesticides.

The soil samples were collected from experimental plots field at village Cauaceu, localized at 10 kilometers from Oradea, on March 15-19.2009. The soil was collected from upper 10 cm of the preluvosoil profile. The soil had the following properties: pH 6,15; cation exchange capacity, 22,49 meq/100 g; organic matter, 2,38% and total nitrogen, 0,09%.

In the laboratory plant material and soil macro fauna were removed and the soil samples were sieved (<2mm) and mixed.

Each soil sample was treated with one of the following pesticides at recommended dosages: Decis at the rate of 0,0025g/, Bavistin at the rate of 0,01g/ and SDMA at the rate of 0,01 ml. Controls, consisting of soil only, were included within all tests.

The numbers of total microorganisms were determined using the dilution method. On different days (0, 5, 10, 15 and 20) during the incubation period, 10-gram test samples were taken from both the treated and control samples.

These soil samples (10g), were suspended in 90 ml distilled water. Dilutions (of 10^{-6}) were prepared from the soil samples using distilled water and these were dispersed with a top drive macerator for 5 min.

The soil samples taken from suitable dilution were planted in or on the solid feeding medium as required. Plate-count agar was used to estimate the total number of microorganisms.

The cells of microorganisms were counted with counting chamber and the results were evaluated as the number of microorganisms in 1 g oven-dried soil.

RESULTS AND DISCUSSION

Table 1

Effect of Decis (insecticide) on the number of total microorganisms per gram of dry soil

Incubation days		Total microorganisms
0	Martor	$7,5x10^6$
	Decis	$7,5x10^6$
5	Martor	$2,13x10^7$
	Decis	$4,6x10^7$
10	Martor	$3,7x10^7$
	Decis	$5,8x10^7$
15	Martor	$1,1x10^6$
	Decis	$1,6x10^7$
20	Martor	$0,8x10^6$
	Decis	$5,6x10^6$

The microbial number determination (Table 1) indicate that soils on which enhanced Decis had been applied contained populations of microorganisms capable of metabolizing this insecticide.

In the control soil, decreases in the number of total viable bacteria occurred during the incubation periods.

Table 2

Effect of Bavistin (fungicide) on the number of total microorganisms per gram of dry soil

Incubation days		Total microorganisms
0	Martor	$7,5x10^6$
	Bavistin	$7,5x10^6$
5	Martor	$3,8x10^7$
	Bavistin	$5,0x10^7$
10	Martor	$4,0x10^7$
	Bavistin	$1,9x10^8$
15	Martor	$2,6x10^6$
	Bavistin	$2,0x10^8$
20	Martor	$1,7x10^6$
	Bavistin	$3,2x10^7$

As it can be seen from table 2, in control soil, decrease of total microorganisms had occured by day 15 of the incubation period. In Bavistin-treated soil the counts of microorganisms show that number of total viable bacteria grow on the presence of Bavistin.

Table 3

Effect of SDMA (herbicide) on the number of total microorganisms per gram of dry soil

Incubation days	Total microorganisms
Martor	$7,5x10^6$
0	
SDMA	$7,5x10^6$
Martor	$1,9x10^5$
5	
SDMA	$4,4x10^7$
Martor	$3,5x10^6$
10	
SDMA	$4,9x10^7$
Martor	$7,9x10^6$
15	
SDMA	$2,7x10^7$
Martor	$6,4x10^6$
20	
SDMA	$2,0x10^7$

The effects of SDMA on the number of total microorganisms per gram of dry soil are presented in Table 3. It can be observed that normal doses of SDMA has only slight effects on soil miroflora and decrease of total microorganisms had occurred by day 15 of the incubation period.

CONCLUSIONS

As it can be seen from this study, normal doses of pesticides has only slight effects on soil microflora and microorganisms are capable to recover rapidly.

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