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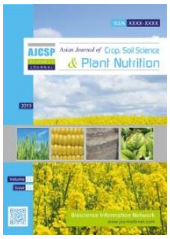

Study on the effects of six pesticides on soil bacteria in laboratory

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ABSTRACT

The laboratory studies were conducted to determine the effects of six Pesticides at 3 concentrations (25%, 50% and 100%) respectively on total number of bacteria isolated from the soilin Dhale district, Yemen. The study included isolating and identifying the bacteria form the soil and the tolerance of these bacteria to common pesticides. Nutrient agar medium was used for the count of bacterial. The results showed a lack of numbers of all bacteria in the Nutrient Agar medium treated with Supermectin, Agrinate and Novacron to all (25%, 50% and 100%) concentrations, while the Shahin and Mores no inhibitory effect of 25% concentration, on the bacterial counts. Results showed that pesticides in the laboratory showed its effect on types bacteria in the Nutrient Agar medium and has been associated it effect by quantity additive concentration.

Key Words: *Bacterial counts, Pesticides and Nutrient agar medium*

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I. Introduction

Pesticides are widely used against a range of pests infesting agricultural crops. With the growing use of pesticides in contemporary agriculture, the issue of the impact of these chemicals on the composition of soil microorganisms and the processes they direct have received more attention. The processes they direct have received more attention (Baxter and Cummings, 2008). Different types of pesticides have been characterized in many ways by randomness, resulting in a defect in the components of the ecosystem (soil - plant – microorganisms). It would be useful that a pesticide has to be in a degree of stability that is enough to make the intended impact, then disappear; or a pesticide quantity is less that it does not affect agricultural crops (Carole and Nesheimo, 1988).

The effect of pesticides on microorganisms in soil varies depending on the type of pesticide, the dose used, the period of time the pesticide was used and the period after treating (Alexander, 1994), use of phosphoric insecticides such as Dursban and Cardona led to the revitalization of soil microbes, especially those responsible for the Nitrogen transformations. Other types of phosphoric insecticide

have shown an increase in the numbers of fungi and a decrease in the numbers of bacteria, and it was found that the role of microbes in the dismantling of pesticides depends on the type of pesticide and its added concentration (Jerzy and Bollag, 2001).

Experiments were conducted to examine the impact of the phosphoric insecticide Chloropyrifos, it has been found that its use led to a change in the functions and composition of microorganisms (Mohammad et al. 2001). Also, some pesticides led to domination of microbial species and groups at the expense of other groups (Bollag, 1974). Despite of this, a number of microorganisms could adapt to different types of pesticides while others are affected (EL-Shahawy et al. 1986; Dickrell, 1989; Ashour, 2005).

Pesticides can accumulate in the soil to high enough levels to have adverse effects on the activity of soil microorganisms (Somada et al. 1991). Most pesticides are soil toxic ingredients affects different groups of organisms in the soil such as: nematodes, fungi, bacteria, azotobacter, actinomycetes and arthropods (Sinha et al. 1993). Chemical pesticides and soil-additive chemicals affect soil organisms and lead to changes in organisms and therefore affect their activity and lead to accumulation of these ingredients in agricultural soils (Dickrell, 1989; Ashour, 2005). Many species and various genera of microorganisms, including phosphate soluble bacteria, are spread in the soil around the rhizosphere near the roots of the plant and are therefore the most affected by pesticides (Alexander, 1977). Here, we attempt to describe how pesticide (most commonly used by farmers) exposure at different concentrations and its affect on bacterial numbers in the laboratory.

II. Materials and Methods

Laboratory experiment

The experiment was carried at the laboratory of the Bacteriological tests were carried out in the Microbiology Laboratory at the National Drug Authority in khormaksar, which belongs to the Ministry of Health, Aden Governorate, Yemen. Five soil samples were collected from Corn crop fields Al dhale'e city. Soil was collected at a depth of 15 cm and samples were passed through a sieve of 2 mm to remove stones and plant debris. The five samples were mixed together. One gram of samples soil was mixed with 99 ml of sterilized water and mixed by shaking for even distribution of soil in water. The suspense was done by using a sterile pipette. And 1 ml of solution from this test tube was then added to another test tube with 9 ml sterilized water. This gives a dilution of 10^{-1} and in the same pattern dilutions 2 to 4 were prepared. Nutrient medium was fused to 113 °C then cooled in 45 °C. Pour the food medium into dishes in the insulation chamber. The dishes stirred a circular motion with and counterclockwise to ensure the soil suspension was mixed with the Agar medium. Agar was frozen. Colonies of bacteria were isolated. And 100 µl of solution from 1– 4 dilution was spread on nutrient medium containing different concentration (25%, 50%, and 100%) of pesticides. These dishes were incubated at 37°C for 48 h. After incubation, bacterial colonies were counted using colony counter and results were expressed as the number of bacteria in g of soil. To find zero value used the law links: under root x+0.5.

III. Results and Discussion

In the laboratory studies was applied the test of pesticides on soil bacteria. In the present study, the injection pesticide Shahin for treated agar medium at 25% and 50% concentration showed increase growth of bacteria compared to other pesticides. Results showed not significant increase in bacterial counts with both concentrations (25% and 50%) when compared to control.

The injection pesticide Mores for treated agar medium at 25% concentration showed increase growth of bacteria compared to other but these increases were low, while at 50% and 100% there was a disincentive effect on growth of bacteria.

A gradual increase in bacterial count is observed with decrease in concentration of pesticides, with maximum count reported at concentration 25%. Similar results were reported in a study involving pesticides in the study the effect of insecticides on bacteria in soil involving a gradual decrease in bacterial count is observed with increase in concentration, while increase bacterial count is observed with low concentration of pesticides (AL Sadek and Al Hammadi, 2015). Another study showed a decrease in the number of bacteria in the cultivars treated with low concentration, while high

concentration was stimulating the growth of bacteria (Al-Gohary, 2014). It is suggested that response to low concentrations induces growth of bacteria.

The higher and lower the preparation of the bacteria was reported in similar studies (EL-Shahawy et al. 1986; Alexander, 1982), which explained that bacteria which decompose the cellulose need nitrogen. On the other hand, the added pesticides containing nitrogen leads to helps in the speed of decomposition and thus the higher the preparation of these bacteria, which grow using of carbon organic matter.

Decomposition of nitrogen thus leads to decrease of organic matter which causes decreases in numbers of bacteria, but after three weeks from the addition of pesticides. These confirm the high concentrations of pesticides used had an inhibitory effect on bacteria counts. The different studies have shown that the impact of pesticides application microorganisms present in soil is variable. The impact depends on interaction between microorganisms and active substances and formulation. It also depends on surfacing of specific group of microorganisms (Nowak et al. 1999). The microorganisms can develop the ability to use an applied pesticide as a source of energy and growth (Johansen et al. 2001).

Injection the agar medium with pesticides of Supermectin, Agrinate and Novacron to all concentrations (25%, 50% and 100%) of pesticides, there was a disincentive effect on growth of bacteria in general by detecting their numbers. The present study revealed that the pesticides of Supermectin, Agrinate and Novacron to all concentrations (25%, 50% and 100%) of was a disincentive effect on growth of bacteria. The effect of pesticides may be due to their containment of chlorine and bromine atoms. As a result of degradation, these elements, some of which may be poisonous, and sometimes emit ammonia gas that is supposed to decompose into nitrate, may be decomposed. However, due to the effect of the pesticide on nitrite bacteria, ammonia gas is collected, and then which may be poisonous (Mohammad et al. 2001). Reduction in microbial count is also reported in studies involving different pesticides such as endosulphan, cypermirithin, thiodan, etc. (Ekundayo, 2006; Adebayo et al. 2007). The results of the laboratory study are given in Table 01, Figure 1 and 2.

Table 01. Effect from number pesticides used on (*Catha edulis)* in study area (Al- Hasein district, Dhale Governorate) on the bacterial colonies grown from the soil study area

Active Ingredients	Trade Name	Concentrations mL /L.				Concentration mL./L.
		Control	25%	50%	100%	
Abamectin	Supermectin	214	1	0.7	0.71	Supermectin 18 EC
Triazophos	Novacron	196.3	36	0.7	0.71	Novacron 40 WSC
Enamectin Benzoate	Mores	226.8	81	0.7	0.71	Mores 1.6 EC
Methomyl	Agrinate	229.3	1	0.7	0.71	Agrinate 90% SP
Abamectin	Shahin	228.5	122	69.2	0.71	Shahin 1.8% EC
Imidacloprid	Mark	213.8	1	0.7	0.71	Imidacloprid 20%SL
(4+ = Grown Abundant , 2+ = Grown Medium , 1+ = Grown Little & - = Not Grown)						

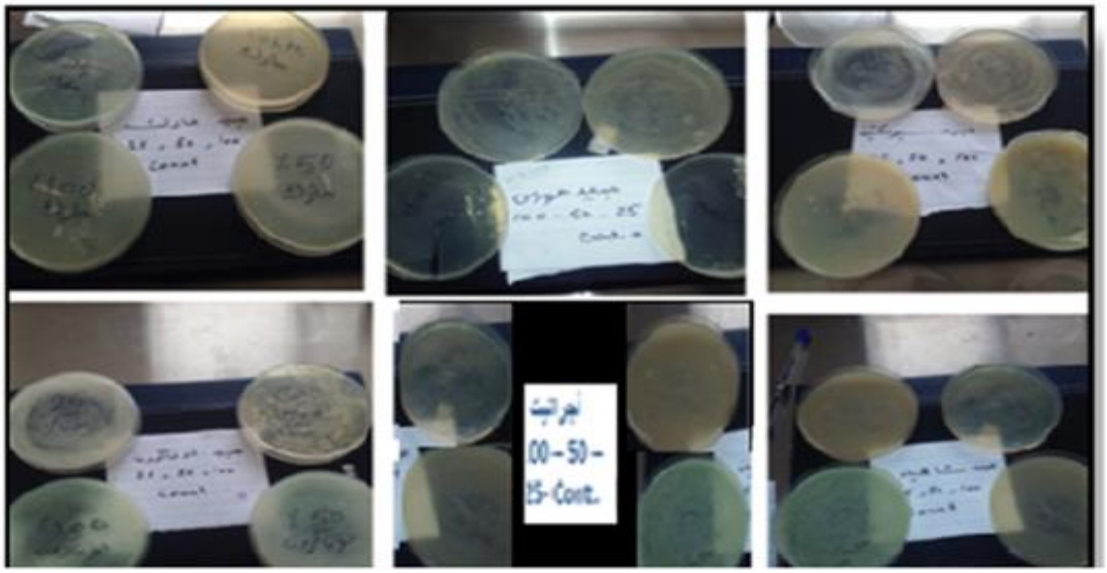

Figure 01. Effect from number pesticides used on (Catha edulis) tree in study area (Al- Hasein district, Dhale Governorate) on the bacterial colonies grown from the soil study area.

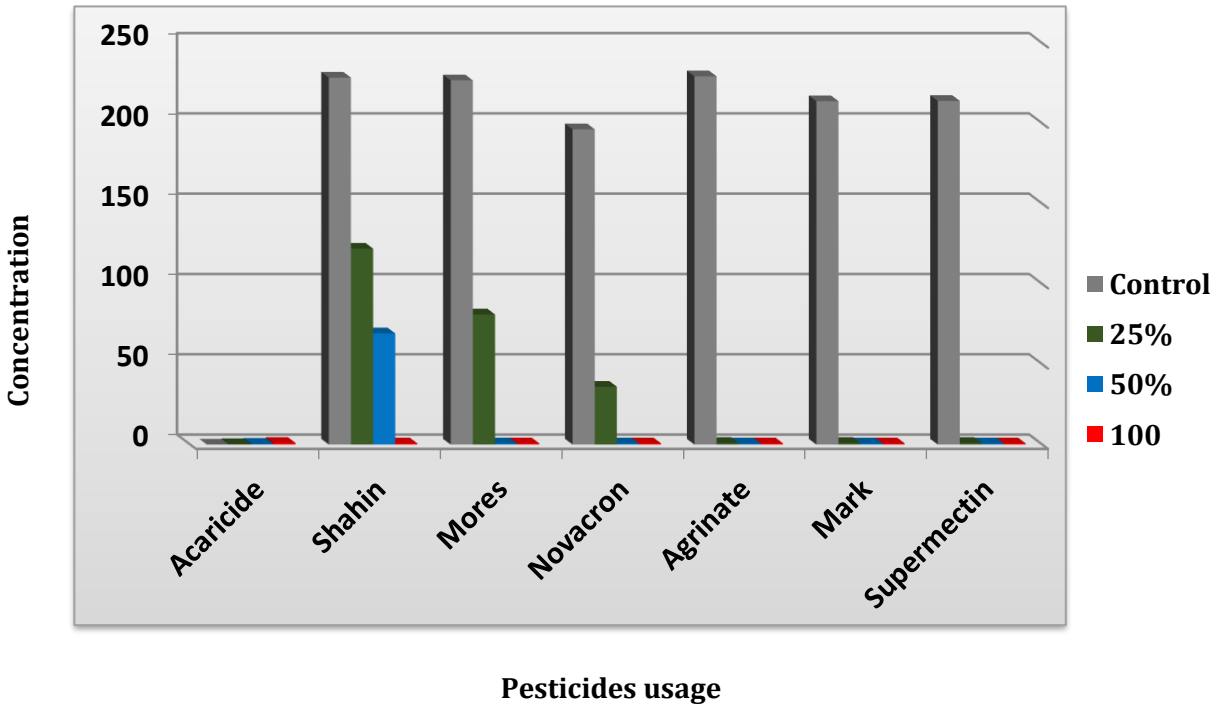

Figure 02. Pesticides usage in the experiments.

IV. Conclusion

Present investigation was carried out to find the effect of six pesticides used on soil in the laboratory. This study revealed that the all pesticides used for high concentration have generally led to an inhibitory in the growth of bacteria in the soil and activity increased of bacterial counts with a decrease in the concentration of pesticides. Therefore, it is evident that the inhibitory effect is concentration-dependent.

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