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The Residual Effect of Malathion (Organophosphate) and Sevin (Carbyl) application on Soil and *Impomoea batatas* (Convoivulaceae) Growth

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ABSTRACT

An experiment was conducted at Shambat Agricultural Farm College (320m) above Sea level, Sudan University of Science and Technology, to study the effect of Sevin and Malathion residues on soil and impomoes batatas growth. Both pesticides were added at the concentrations of 1.09 kg/ha (recommended dose) and 1.78 Kg/ha, (excessive dose) in addition to a control to evaluate their effect on plant and soil. The measurements taken were from plant and soil. The measurements taken were plant height, (cm), leaf area (cm^2), Fresh and dry weights (gm), pH, total nitrogen%, phosphorus (ppm), CO_3^{2}, HCO_3^{-}, cl Ca^{2+}+ M g^{2+} (meg/L) and electrical Conductively (ECe (ds/m) of the soil solution.

The results revealed that, both chemicals affected positively impomoes batatas vegetable growth at the recommended dose but negatively at the excessive dose. Both pesticides reduced the measured soil characteristics.

INTRODUCTION

The world population is rapidly increasing; delibrilitly needs further research to help increase food production in order to avoid famines, malnutrition and critical shortage in food supply. During the past few decades pesticides were intensively used to increase agricultural production; however the lack of awareness of the risk involved in using pesticides has lead to environmental pollution and contamination of agricultural resources namely soil and underground water. Previous study (Zakki, 1978) has shown that the residues of certain pesticides in soil lead to either increase or decrease in nutritional element in soil depending on many interacting factors. Studies the relationship between the concentration of different pesticides in the soil and their concentration of different pesticides in the soil and their concentration in the plant. The result showed that the ratio fluctuates between 1:1 to 1:6. The type of soil has a great impact on the residues detected in plants, and that the amount of lindane detected in carrot (Daucus Crota L.) grown on sand, silt and clay soils was 5.99, 0.156

and 2.41 ppm respectively. Omer (2001) investigated the possibility of contamination of soil with Sevin after 7 years had elapsed and documented that, the soil remained contaminated throughout these years. In fact the results of soil analysis showed that 0.156 ppm of Sevin was detected at the end of the 7 years. The fate of pesticides in soils is greatly determined by soil pH. According to Hagar (2002) most soils have a pH that ranges between 4.5 and 8. However the adsorption of pesticides is usually greater in soil with high degree of acidity.

Denis in (1999) observed that tomato (lycopersion Esculentum L.) suffered from dwarfism when treated with an over dose of Sevin. He ascribed this phenomenon to the deformation of roots accampaned by its incapability to absop water and nutritional elements.

Abedalgwad (2001) performed an experiment to investigate the effect of Sevin on carrots. He found that, the weight of carrot treated with Sevin was significantly increased. This could be related to the fact that, the Sevin acts as growing hormone in certain plants.

Ashraf (2007) stated that, Sevin pesticide reduce the activity of micro-organism which lead to the reduction of the absorption of some minerals. He also found that the stability of pesticides in soil depends on the character of the pesticides especially their concentration, solubility and evolution in the air.

Nahla (2011) found that, the pesticides reduce negatively the absorption of some trace element (Fe, Zu) and affect the viruses found at the root zone which reduce their tolerance to some disease. Gafar *et al.,* (2011, 2012 and 2014) showed the adverse effects of both Malathion and Sevin in both crops and soil. Cases, (2004) and Pimentel (2005) stated that crops loss from pest's decline 35% to 42% when pesticides are used.

This study, aims to investigate the effect of Malathion and Sevin application on soil and Impomoea batatas growth.

MATERIALS AND METHODS

A field experiment was conducted at the college of Agricultural studies Farm (380) m, above sea level to study the effect of two pesticides on impomoea batatas growth and soil the treatment Viz control, (Convoivulaceae) Sevin and Malathion were used in six plots each. Two concentrations of both Malathion and Sevin at the recommended dose (1.09 Kg/ha) and high dose (1.78 Kg/ha) were used. Impomoea batates seeds were soon on October 2012 on ridges 70 cm apart and 10 cm. between plants. Urea and phosphorus fertilizers were used at the rate of 150 Kg/ha and 120 Kg/ha, respectively Design.

The pesticides were sprayed one month after planting; plots were separated by sacks to prevent lateral movement of pesticides (Gafar *et al.,* 2013).

The whole plants were pulled and then washed for different measurements. Soil samples were taken, before and after planting from 30 cm. depth for all measurements.

Measurements taken wee plant height, (cm) fresh and dry weight (g), leaf area (cm^2), pH, total nitrogen %, phosphorus (ppm), $Co3 + HCo3$, cl, Ca + Mg, and FCe ds/m. The collected data were subjected to statistical analysis.

RESULTS AND DISCUSSION

As in table (1) and (2) both Malathion and Sevin pesticides affected positively growth of impomoea batatas plant at the recommended dose but the growth decreased at the excessive dose. Such positive effect was attributed to the effect of Sevin as foliar fertilizes. However no significant differences were noticed between the recommended dose and control. Similar results were obtained by Zakki (1978) on

tomoto and Traul (1981) on alfalfa, maize and watermelon.

The biological activity of some trace elements (their solubility and exchangeability) related not only to acidity of the soil solution, but also to the concentrations of ions Ca^{++}, Mg^{++} and phosphorus as well as the consumption of organic fractions of the soil. So excessive concentrations of the ions in the soil not only inhibit the uptake of the other nutrients from the soil but also block their transport inside plants and utilization in metabolic processes (Gafar *et al.,* 2013).

As shown in table (3) there is a decrease in all soil parameters during the addition of both pesticides before and after planting were with both excessive and recommended dose due to the heavey clay soil and the ionic effect of both pesticides which hinder the uptake of soil nutrients and their distribution through the Impomoea batatas roots. Traul (1987), Abedlegwad (2001) and Mulder and Barbered (2010), are online with these results.

Table 1: Effect of Malathion on the vegetative growth of Impomoea batatas (plant height, leaf area dry and fresh weights)

Malathion dose	Plant height (cm)	Leaf area/plant (cm^2)	Fresh weight (gm)	Dry weight (gm)
Control	55.00	13.00	45.00	10.00
Recommended dose (1.09/kg.h)	41.00	10.00	52.00	8.00
50% higher (1.78 Kg/ha)	22.00	5.00	24.00	6.00
LSD.	14.60	4.30	9.45	2.30

Table 2: Effect of Sevin on the vegetative growth of Impomoea batatas (Plant height, leaf area/ plant, fresh weight and dry weight)

Sevin dose	Plant height (cm)	Leaf area/plant (cm^2)	Fresh weight (gm)	Dry weight (gm)
Control	56.00	11.00	56.00	10.00
Recommended (1.09 Kg/ha)	53.00	10.00	51.00	8.00
50%hihger dose 1.78 Kg/ha	35.00	7.00	32.00	6.00
LSD.	5.50	2.80	7.20	2.29

Table 3: The Effect of Sevin and Malathion pesticides on some of Soil Characteristics Soil depth (0-30 cm)

Pesticides dose	pH paste	E.Ce ds/m	p. PPM	Total nitrogen %	Ca^{++}+ Mg^{++} meg/L	CO_3. meg/L	HCO_3 meg/L	CL meg/L
Recmmomended Malathion Before	8.0	1.3	6.2	0.04	1.3	2.9	Traces	6.5

planting								
After planting	8.00	1.0	6.0	0.04	1.2	2.8	Traces	6.4
Excess dose before planting	7.4	0.08	4.1	0.03	1.0	1.06	Traces	4.2
After planting	7.1	0.07	4.0	0.02	0.9	1.5	Traces	4.1
Sevin dose (Recommended)								
Before planting	8.4	1.2	6.0	0.04	1.2	2.8	Traces	6.2
After planting	8.3	1.1	6.1	0.04	1.0	2.6	Traces	6.0
Sevin dose (Excesses dose)								
Before planting	7.3	0.08	4.2	0.02	0.9	1.2	Traces	4.1
After planting	7.2	0.07	4.1	0.01	0.8	1.1	Traces	4.0

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