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Full Length Research Paper

Effect of Malathion and Sevin on Radish growth

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This study was conducted at College of Agricultural studies, Sudan university of Science and Technology Farm to evaluate the residual effect of the recommended dose of Malathion, an organophosphate insecticide, and Sevin, a carbamate insecticide on the dry weight and length of radish. The results showed that, the recommended dose of Sevin has positively affected both variables; the average length and weight of the treated plants were 5.2 cm and 13.2g higher than their counterpart values of the control, respectively. However, when an over dose was administered it negatively affected both variables; the average length and weight of the treated plants were decreased by 6.6 cm and 26.9 g, respectively. On the other hand, the recommended dose of Malathion adversely affected the weight and length of radish. The average lengths of the treated plants were decreased by 6.6 cm and 26.9 g, respectively. Similary, the recommended dose of Malathion adversely affected the weight and length of radish. The average length of the treated plants was 11.7 cm shorter than that; of control where as the average weight was 7.9 g lighter than the control. Compared with control, the average length and the weight of the treated plants were reduced by 20 cm and 17.2g, respectively. Being a key component of the chemical structure of Sevin as well as a crucial element in soil fertility, the nitrogen seemed to have played a major role in the favorable results obtained the by recommended dose of Sevin or opposed to those of Malathion.

Keywords: Growth, malathion, radish, sevin.

INTRODUCTION

The fact that, the world population is rapidly increasing necessitates 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 studies (Zakki, 1978) have shown that the residues of certain pesticides in soil lead to either increase or decrease in the nutritional element in soil depending on many interacting factors. Shihu (1980) studied the relationship between the concentration of different pesticides in the soil and their concentration in the plant. The results showed that the ratio fluctuates between1:1 to 1:6.

Haworth (1983) demonstrated that, the type of soil has

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Table1. Average length of plants treated with Sevin

Rep.	Plant length (in cm)using recommended dose	Plant length following overdose treatment (cm)	Control cm	LSD (5 %)
1	89.9	80.1	87.7	
2	92.3	76.3	85.0	
3	87.6	78.0	81.4	
Average length	89.9	78.1	84.7	5.3

a great impact on the resides detected in plants. He found out that the amount of lindane detected in carrot (*Daucus carota L*.) grown on sand, silt an clay soils was 5.99 ppm, 2.41 ppm and 0.156 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 through out these years. In fact the results of soil analysis showed that 0.156 ppm of Sevin was detected at the end of the 7th 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 a high degree of acidity.

Dennis (1999) observed that tomato (*Lycopersicon esculentum L*.) suffered from dwarfism when treated with an over dose of Sevin. He ascribed this phenomenon to the deformation of roots accompanied by its incapability to absorb water and nutritional elements. When the same experiment was conducted using carrot (*Daucus carota L*.), the vegetative part was greatly increased. Abdalgawad (2001) performed an experiment to investigate the effect of Sevin on carrots. He noticed that the weight of carrot treated with Sevin was significantly increased. This could be related to the fact that Sevin acts as growth hormone in certain plants. This study aims to investigate the effect of Malathion and Sevin on Radish growth.

MATERIAL AND METHODS

Radish seeds were obtained from the department of horticulture at the Sudan University of science and technology. The experiment was conducted in the experimental Farm of the faculty of Agricultural studies at Shambat. The experimental Farm is characterized by its clay soil and a pH of 7.5. A total of 18 plots were used 6 as a control; 6 plots were treated with Sevin and 6 plots were treated with Malathion. Out of the 6 plots treated with Sevin 3plots were treated with the recommended dose (Dose recommended for the farmers by specialists) which is 2000 cm 3/450 liter/ha which is equivalent to 14.4 cm 3/2.4liter/72m2of the experimental area. The other 3plots were treated with a dose of 21.6 cm 3/3.4liter/72m2 which is equivalent to 150 % of the recommended dose. 3plots were used as a control.

A similar layout was used for the Malathion experiment 3plots were treated with the recommended does which is 1.9 kg/ha which is equivalent to, 14/72/m² of the experimental area. The other plots were treated with a dose of 12 kg/72m² which is equivalent to 150 % of the recommended dose. 3plots were used as a control.

Seeds were placed 15 cm apart and they were irrigated every 3 days throughout the experimental periods. In order to meet the plant nitrogen requirement which is critical for both roots and vegetative growth, 0.86 kg of urea was added 2 weeks after sowing. Experimental plots were separated by sacks to avoid overlapping of pesticides between adjacent plots. Spraying was applied 3 weeks after sowing using hand sprayer to ensure an even converage of the sprayed area. Plants were transferred immediately after the harvest to the laboratory where they were carefully cleaned (eliminate) from soil and dirt. Length and weight of the plants were measured, recorded, and statistically analysied using MSTATC program.

RESULTS AND DISCUSSION

As seen in table 1 the average length of the plants treated with the recommended dose of Sevin is 5.2 cm greater than that of the control. Similarly, table 3 shows that the average.

Weight of the plant treated with the recommended dose of Sevin is 13.2 g heavier than that, of the control. Also figure 1 clearly illustrates that the vegetative part of treated plants is denser and appears much healthier than that of the control. Nitrogen seems to have played a major role in the results obtained by the virtue of the fact that it is an essential element in the soil fertility. It could have been set free upon the decomposition of Sevin by the microbial action of soil microorganisms and hence enriched the soil with nitrogen. In fact the nitrogen which is an essential element in soil fertility as well as in the composition of Sevin was set free upon its decomposition by the microbial action of soil microorganisms and hence enriches the soil with nitrogen. The released nitrogen could have then been utilized by plants for both vegetative and root growth (Dennis, 1999). According to Yuhins (1979) Sevin acted as a nitrogenous fertilizer when sprayed on leaves of lettuce and lead to noticeable increase in the length and density of the plant after two weeks of treatment. On the other hand, table 1 showed that the average length of

Table 2. Average length of plants treated with Malathion

Rep.	Plant length (in cm)using recommended dose	Plant length using 150 % over dose	Control	LSD (5 %)
1	70.6	63.1	87.7	
2	75.4	66.2	85.0	
3	73.1	64.9	81.4	
Average length	73.0	64.7	84.7	11.2

Figure 1. Comparative illustration of the length and condition of plants treated with the recommended dose of Sevin and the control

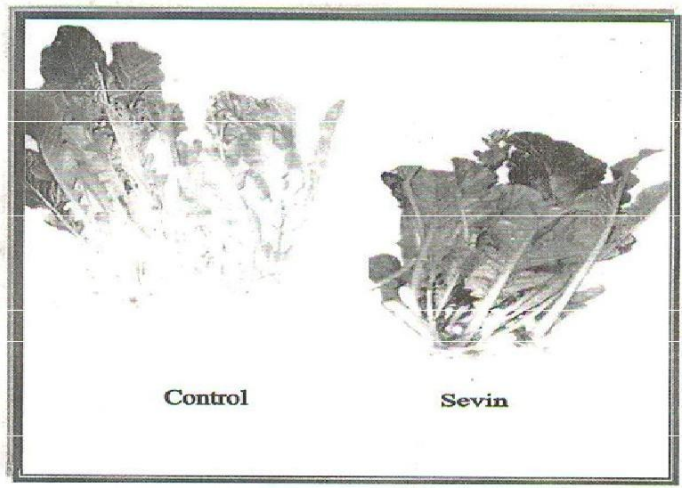

Figure 2. Comparative illustration of the length and condition of plants treated with an over dose of Sevin and the control

the plants treated with an over dose of Sevin is 6.6 cm shorter than that of the control where as Figure 2 shows that the roots are clearly deformed indicating that the over dose of Sevin could have interfered with vital functions namely, absorption of water and nutrients.

As for Malathion as seen in table 2, the average length of the plants treated with the recommended dose and those treated with the over dose are 11.7 cm and 20 cm shorter than that of the control respectively. Similarly the results exhibited in table 4 shows that the average weight of the plants treated with the recommended dose and those treated with the over dose are 7.9 g and 17.2 g less than that of the control respectively. Generally, the results of average weight of the treated plants exhibited in table 4 show a similar pattern to results of the average length of the treated plants shown in table 2.

Table 3. Average Dry weight of plants treated with Sevin

Rep.	weight of plants treated recommended dose	plants weight of treated over dose	Control	LSD (5 %)
1	180.1	150.4	170.1	
2	199.3	146.7	178.3	
3	186.0	148.1	177.3	
Average wt(g)	188.5	148.4	175.3	13.0

Table 4. Average dry of weight of plants treated with Malathion

Rep.	weight of plants treated with recommended dose	weight of plants treated with an over dose	Control	LSD (5 %)
1	167.4	155.7	170.1	
2	165.2	157.9	178.3	
3	169.7	160.8	177.3	
Average wt in g	167.4	158.1	175.3	7.5

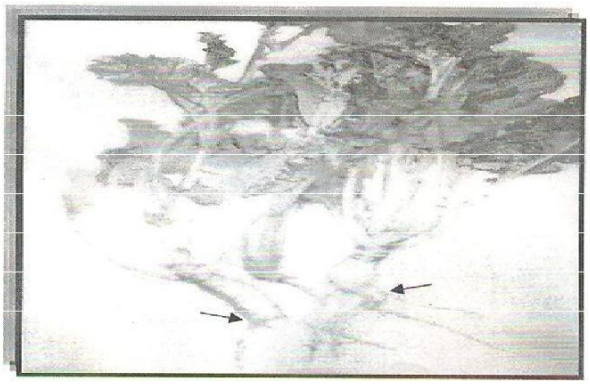

Figure 3. Illustration of the malformation, distortion and general deformities of the roots of the plants treated with an over dose of Malathion.

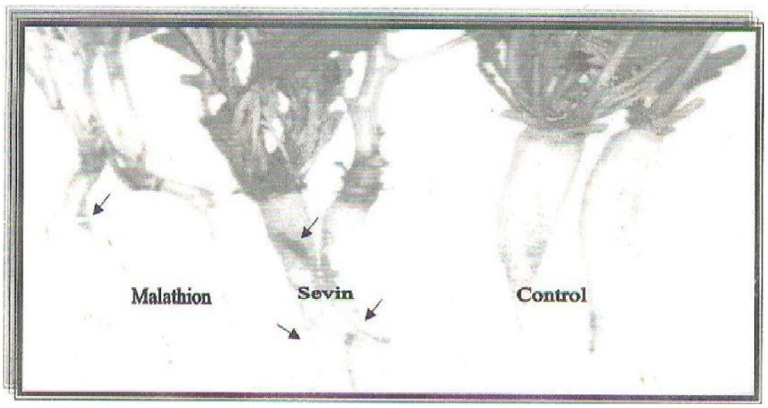

Figure 4. Illustration of the malformation, distortion and general deformities of the roots of the plants treated with an over dose of Malathion and an over dose of Sevin as compared to the control.

It is evident that, Malathion has a negative effect on both, the growth rate and weight of radish. In fact the effect of Malathion is more profound in the plants treated with an over dose than those treated with the recommended dose.

As seen in Figure 3 and Figure 4 the roots of the treaded

plants are severely distorted with obvious deformities at the edges of the roots. Additionally the root hairs were also severely damaged and some of them were torn off. Undoubtedly, such severe damage would have affected their absorption of water and nutrients. Hinshin (1980) conducted a similar experiment to evaluate the effect of different concentration of Malathion on carrots and concluded that Malathion has negatively affected the length of the plants. He ascribed this to the malformation of the roots that render them incapable of absorption of water and nutrients. In a previous study by Yuhnis (1979) to test the effect of Malathion on tomato he noticed that it did not affect the length of the plant significantly. Similarly, Gilot-Delhalle (1983) reported that the average weight of beans was affected when treated with Malathion. It can be concluded that the effect of Malathion is more profound on root crops compared to other crops.

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