SUMMARY AND CONCLUSION

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Egyptian soils are a good source for isolating the microorganisms, which are potent in pesticides decomposition. Soil samples were randomly collected from farm in Agriculture Research Center. Samples were taken from location as a profile of (10-15cm) soil depth. Pesticide residues were determineted in the tested soil [Carbamate oxime compound (Methomyl), Organophosphorus compound (Profenofos) and Pyrazole compound (Fenpyroximate)]. These samples were mixed with five biofertilizers which produced by General Organization belongs to the Egyptian Ministry of Agriculture. These biofertilizers are: (Cerialin, Rizobacterin, Microbin, Nitrobin and phosphorin). Three soil replicates for each biofertilizers were used by recommended dose (13.4 g biofertilizer rer 1 kg soil). Sample was analyzed before mixed with biofertilizers. This sample was stored in plastic jars under laboratory condition and protected from any contamination with any pesticide. Samples were taken 30, 60, 90, 120, 150 and 180 days after treatment.

I-Effect of biofertilizers on pesticide residues:

This sample was extracted, cleaned up and then determined by HPLC . This sample was analyzed before mixed with biofertilizers.These samples were stored in plastic jars under laboratory condition and protected from any contamination with any pesticide. Samples were taken after 30, 60, 90, 120, 150, 180 days of treatment.

Data concerning the existence of detected Methomyl in initial of treatment was (10.13 ppm). Methomyl was detected in the soil samples after 30 days of treatment. Methomyl

concentrations were (7.27, 9.16, 7.15, 8.38 and 7.64 ppm) due to the treatment of soil samples by Cerialin, Rizobacterin, Microbin, Nitrobin and Phosphorin. While the concentration of pesticide residues decreased after 60 days of treatment to be (6.16,6.33, 5.20, 5.55 and 5.54 ppm). The concentration of methomyl in the soil samples after 90 days were (4.89, 4.97, 3.91, 4.81 and 4.77 ppm) respectively. The degradation after 120 days of treatment methomyl residues were (4.81, 4.77, 2.69, 4.64 and 3.91 ppm) respectively. While after 150 days the concentration were (4.53, 4.46, 2.46, 4.43 and 2.69 ppm). And after 180 days the methomyl residues decreased to be (3.38, 3.75, 1.47, 3.61and 2.46 ppm) respectively, in the soil samples which were treated with Cerialin, Rizobacterin, Microbin, Nitrobin and phosphorin respectively while the concentrations in control soil were (9.38, 8.16,7.09, 4.09, 4.81 and 3.97 ppm) after 30, 60, 90, 120, 150 and 180 days of treatment respectively.

Data concerning the existence of detected Profenofos in initial of treatment was (4.38 ppm). Profenofos was detected in the soil samples after 30 days of treatment. Profenofos concentrations were (3.19, 3.24, 3.06, 3.29 and 3.05 ppm) due to the treatment of soil samples by Cerialin, Rizobacterin, Microbin, Nitrobin and Phosphorin respectively. While the concentration of pesticide residues decreased after 60 days of treatment to be 2.18, 1.88, 1.25, 1.34 and 1.20 ppm). The concentration of profenofos in the soil samples after 90 days were (1.48, 1.24, 0.85, 1.27 and 0.84 ppm) respectively. The residue levels after 120 days of treatment profenofos residues were (0.86, 0.87, 0.42, 0.40 and 0.12 ppm) respectively . while after 150 days the concentration were (0.47, 0.44, 0.12, 0.35 and

0.08 ppm). And after180 days the profenofos residues were (N.D, 0.39, N.D, 0.09, and N.D ppm) respectively, in the soil samples treated with Cerialin, Rizobacterin, Microbin, Nitrobin and phosphorin respectively while the concentrations in control soil were (3.92, 2.39, 1.81, 1.49, 1.30 and 0.91 ppm) after 30, 60, 90, 120, 150 and 180 days of treatment respectively.

Data concerning the existence of detected Fenpyroximate in initial of treatment was (9 ppm). Fenpyroximate was detected in the soil samples after 30 days of treatment Fenpyroximate concentrations were (4.20, 6.21, 4.82, 4.59 and 5.37 ppm) due to the treatment of soil samples by Cerialin, Rizobacterin, Microbin, Nitrobin and Phosphorin. While the concentrations of pesticide residues decreased after 60 days of treatment to be (3.52, 4.72, 2.87, 3.67 and 4.45 ppm). The concentrations of fenpyroximate in the soil samples after 90 days were (2.49, 4.41, 2.57, 3.52 and 3.57 ppm) respectively. The degradation after 120 days of treatment fenpyroximate residues were (2.35, 4.19, 2.45, 3.52 and 3.19 ppm) respectively . While after 150 days the concentrations were (2.06, 3.69, 2.12, 2.99 and 2.63 ppm). And after 180 days the fenpyroximate residues were ((1.35, 3.00, 2.09, 2.73 and 2.26 ppm) respectively, in the soil samples treated with Cerialin, Rizobacterin, Microbin, Nitrobin and phosphorin respectively while the concentrations in control soil were (6.43 , 5.67 , 5.50 , 5.48, 4.67 and 4.34 ppm) after 30, 60, 90, 120, 150 and 180 days of treatment respectively.

II-Biodegradation of pesticide residues by biofertilizers.

Data on the effect of Cerialin which contains *Bacillus polymyxa* and others on tested pesticides, show that the

percentages of degradation of pesticides residues were lower in profenofos than fenpyroximate than methomyl. Data on the effect of Rizobacterin which contains *Rizobium sp.* and others on tested pesticides, show that the percentages of degradation of pesticides residues were lower in profenofos than fenpyroximate than methomyl. Data on the effect of Microbin which contains *Pseudomonas sp.* and others on tested pesticides, show that the percentages of degradation of pesticides residues were lower in profenofos than methomyl than fenpyroximate. Data on the effect of Nitrobin which contains *Azotobacter sp.* and others on tested pesticides, show that the percentages of degradation of pesticides residues were lower in profenofos than fenpyroximate than methomyl. Data on the effect of Phosphorin which contains *Bacillus megaterium* and others on tested pesticides, show that the percentages of degradation of pesticides residues were lower in profenofos than methomyl than fenpyroximate.

Edwards 1985 reported that many factors influencing the persistence of pesticides residues in soil. About 33 factors affecting the persistence of pesticides residues in soil. The most important factors are :- soil microorganisms, soil temperature, types of soil, water content ,organic matter, nutrients, pH, temperature, cultivation .....etc.

Data concerning the breakdown in control sample resulting in the microorganisms which founded in this soil .While breakdown in soil sample which treated with biofertilizers resulting in microorganisms in this soil and microorganisms which were found in biofertilizers.

The biofertilizers become very active through first 90 days of treatment. The biofertilizers increased activity of microorganisms which work to increase degradation of pesticide residues in the soil.

All the break down or degradation of methomyl in the control soil sample which had no biofertilizers, is due to natural biodegradation and physical degradation. Many authors reported that more than 33 factors play role in the breaked down of pesticide residues in soil. Natural bioremediation was clear in the case of the samples which were not treated with biofertilizers. During the 180 days 60.8 % of the methomyl residues were degraded or break down naturally without adding any quantity of biofertilizers. While only 30% was degraded or break down after 90 days. In the soil which was treated by the tested biofertilizers, the percentage of biodegradation and break down was increased to be the double of break down in control (61.4% in the case of soil treated with microbin while in the case of soil treated with cerialin, nitrobin and phosphorin the percentage of biodegradation was 52.7%, 52.5% and 52.9 % respectively. That means according to the content of these biofertilizers from microorganisms, the biodegradation or the bioremediation of methomyl increased.

The degradation of profenofos in the control soil sample which had no biofertilizers , is due to natural biodegradation and physical degradation. Natural bioremediation of profenofos was clear in the case of the samples which were not treated with biofertilizers. During the 180 days 79.2 % of the profenofos

residues were degraded or break down naturally without adding any quantity of biofertilizers. While only 58.6 % was degraded or break down after 90 days.

But in the soil which was treated by the tested biofertilizers, the percentages of biodegradation and break down were increased to be (80.6 % and 80.0 % in the case of soil treated with microbin and phosphorin respectively , while in the case of soil treated with cerialin, rizobacterin and nitrobin the percentage of biodegradation was 66.3 %, 71.7 % and 71.0 % respectively. That means according to the content of these biofertilizers from microorganisms, the biodegradation or the bioremediation of profenofos increased.

Nearly same results were obtained in the case of fenpyroximate in soil treated with the same five biofertilizers. Natural biodegradation and break down in the untreated soil with biofertilizers was 38.9 % after 90 days while it was 51.8 % after 180 days.

Biodegradation of all pesticide residues tested by cerialin and microbin was nearly the double in control after 90 days of treatment. While it was 51.0 and 60.9 and 60.3 % in the case of rizobacterin , nitrobin and phosphorin respectively.

Cerialin headed all the tested biofertilizers in biodegradation of fenpyroximate after 180 days (followed by microbin 76.8 % and phosphorin 74.9 %. In the recent experiment it is clear that the pesticides residues in the tested soil

cleary in their concentration in the soil and also in their chemical contents.

The concentration of pesticide residues in the tested soil varied between 4.38 ppm profenofos, 9.00 ppm fenpyroximate and 10.13 ppm methomyl in all the tested soils in control and in the soil samples which treated with one of the following biofertilizers (cerialin , rizobacterin , microbin , nitrobin and phosphorin).

The Natural biodegradation and break down of pesticides was clear in the samples which were not treated with biofertilizers and the percentage of this natural remediation was clear from the first 30 days of treatment to the end of treatment. It was slowly after the begining of the experiment but increased at the end of the experiment.

The effect of biofertlizers tested was very clear on the biodegradation of pesticide residues.

Microbin, phosphorin and nitrobin headed all the tested biofertilizers in biodegradation of profenofos. The percentage of remediation was 100 % , 100 % and 98.0 % respectively at the end of experiment (after 180 days).

Cerialin gave 92.7 % remediation of profenofos after 180 days of treatment., It was responsible for 85.0 % bioremediation of fenpyroximate and only 66.6 % bioremediation of methomyl residues in the tested soil.

While rizobacterin gave 91.1 % remediation of profenofos after 180 days of treatment. It was responsible for 66.7 % bioremediation of fenpyroximate and only 63.0 % bioremediation of methomyl residues in the tested soil.

The results indicate that all biofertilizers tested play good role on the biodegradation of the tested pesticide residues due to their contents of microorganisms or due to their side good effects on the living organisms which are available in the tested soil.