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The Use of Maggot Fly Larvae as a Soil Biofertilizer

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Introduction

Efforts are being devoted to ensuring food security, it is equally important to ensure food safety for consumption. Biofertilizers are cost-effective and ecofriendly in nature, and their continuous usage enriches soil fertility with essential nutrients. Searching for sustainable alternative fertilizer sources has become crucial. Insects are rich in protein, fiber, useful fats, vitamins, and minerals. The aim of this research is to develop an easy and sustainable method for producing biofertilizer based on rearing maggots on organic waste. Maggot powder is rich in essential nutrients such as nitrogen, phosphorus, and potassium, so we are improving soil fertility by using insect powder as natural fertilizing.

Materials and Methods

1. *Preparation of biofertilizer (maggot powder)*

Figure 1. Organic waste collected and the arrival of flies to lay their eggs.

Figure 2. Egg hatching, larval development and maggots harvesting.

Figure 3. Drying maggots to obtain powder.

2. *Physical and chemical analysis and some biological parameters were studied at the Biotechnology Research Center (CRBT)*

3 . *Use of maggot powder as a biofertilizer*

Insect powder, particularly maggot, was used to enrich the soil with essential nutrients. Lentils, beans, and other plants were subjected to investigation of the efficiency of using the obtained biofertilizer; 100 g were used for each pot. The measurements and processing of plant parameters were measured.

Figure 4. Start of experiment on 18/05/2024, 4 pots: 2 pots of white beans, 2 pots of lentils (control and treated with maggot pawder).

Results

1. *Identified fly species*

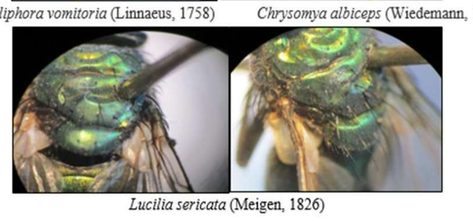
Seven species of necrophagous flies were identified in our experiment are listed in Table (1).

Table (1). Species of necrophagous flies identified.

Order	Family	Genus	Species
Diptera	Calliphoridae	*Calliphora*	*Calliphora vicina* (Robineau Desvoidy, 1830)
			Calliphora vomitoria (Linnaeus, 1758)
			Calliphora subalpina (Ringdahl, 1931)
		Lucilia	*Lucilia sericata* (Meigen, 1826)
			Lucilia illustris (Meigen, 1826)
			Lucilia silvarum (Meigen, 1826)
		Chrysomya	*Chrysomya albiceps* (Wiedemann, 1819)

Calliphora vicina (Robineau Desvoidy, 1830)

Calliphora vomitoria (Linnaeus, 1758) *Chrysomya albiceps* (Wiedemann, 1819)



Lucilia sericata (Meigen, 1826)

2 . *Use of maggot powder as a biofertilizer*

Lentils, beans, and other plants were subjected to investigation by using maggot powder as a biofertiliser. After 15 days of soil treatments, there is a direct influence on the size and color of the plants and also on the number of branches and leaves. The results of our experiment on lentils and beans are shown in Figure (5) and Table (2).

Figure 5. Treated plant with maggot powder (A) in comparison with untreated (B).

Table (2). Plant parameters of treated with maggot's poweder compared to untreated control.

Plant	Lentil		White bean	
Date	31/05/2024			
Parameter	Treated	Control	Treated	Control
Size	21 cm	18 cm	20 cm	13 cm
N.of branches	28	10	7	3
No. of leaves	8-10	6-8	10-12	5-7
Plant color	Green	Light green	Green Large	Average Light green

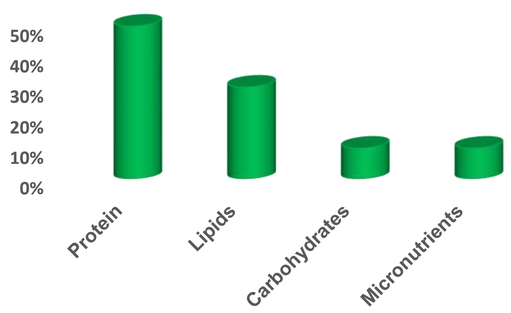


Figure 6. Nutritional composition of maggot's poweder.

Conclusion

Insect larvae could help to solve the world's growing shortage of food for humans and animals. They are rich in nutrients and can be produced sustainably. Using biofertilizer for crop nutrition could reduce pressure on traditional agricultural resources and improve food safety. Ecologically and economically, maggot powder is low in greenhouse gas emissions. They showed very rapid growth and were easy and inexpensive to raise.

As maggots are natural proteins, rich in amino acids and minerals, their production in a controlled system provides the farmer with a constant supply of cheaper organic supplements for crop production. This contributes directly or indirectly to food security and safety.

The study provides a new biotechnology for plant nutrition by using maggot's powder as a biofertilizer. Further research needs to be done to explore the potential benefits of using maggots in animal and plant production.

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