

PESTICIDAL ACTIVITIES OF FORMULATED FISHPOND BIOFERTILIZER AND ITS EFFECT ON GROWTH PARAMETERS OF *PHASEOLUS VULGARIS* L. (RED KIDNEY BEANS)

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خلاصہ

فالتو نامیاتی مادوں میں ایسے اہم غذائی اجزاء پائے جاتے ہیں جو پودوں کی نشوونما کے لیے ضروری ہیں۔ یہ فالتو مادے نباتاتی کھاد کے مرکب میں تبدیل ہو جاتے ہیں جو پودوں کی نشوونما کے لیے فائدہ مند ہیں اس کو نامیاتی کھاد بنانے کا عمل کہا جاتا ہے۔ فالتو مادوں سے نامیاتی کھاد بنانے کی وجہ سے ماحول کی آلودگی میں کمی آتی ہے اور مٹی کی زرخیزی میں بھی اضافہ ہوتا ہے۔ موجودہ تحقیقی مقالہ میں پھل اور سبزیوں کے چھلکوں کو سیر شدہ غذائی مادوں کے طور پر استعمال کیا گیا ہے۔ اس کے ساتھ اس میں مچھلی کے تالاب کی تلچھٹ کو شامل کر کے سرخ لوبیا کے پودوں کی افزائش میں اضافہ اور حملہ آور حشرات کے حملوں سے بچاؤ کے لیے استعمال کیا گیا ہے۔ تین مختلف اقسام کی کھادیں تین مختلف تناسب کے ساتھ [3:1، 1:1، 1:3] تیار کی گئیں۔ ان تینوں اقسام کی کھادوں میں سے ایک حیاتیاتی کھاد، دوسرا تیار شدہ حیاتیاتی کھاد مچھلی کے تالاب کی تلچھٹ اور تیسرا انضباطی گروپ شامل تھا۔ یہ تحقیق چار مہینوں (جون تا ستمبر) پر مشتمل تھی اس میں پودے کی سب سے تیز افزائش تیار شدہ حیاتیاتی کھاد مچھلی کے تالاب کی تلچھٹ میں دیکھی گئی ہے اور اس کے ساتھ اس میں حشرات کی افزائش بھی کم دیکھی گئی۔

Abstract

Waste of organic material contains essential nutrients for plants growth, these organic wastes is converted biologically into humus compound which act as a suitable plants growth media that is known as composting process. Composting technique is one of the best systems to reduce pollution from the environment and improve soil fertility. In the present study, use the fruits and vegetables waste as valuable nutrients rich organic compost with fishpond sediment on the growth and productivity of red kidney bean plants as well as to control the infestation of its pest. Growth and development of red kidney bean plants was observed to measure plant height. Three different products were used with three different ratios (3:1, 1:1, 1:3) of biofertilizer (organic compost) with formulated fishpond biofertilizer (organic compost + fishpond sediment) and one control was included. Each treatment contains three replicates. Observations of red kidney bean plants were taken of four months (June to September). The highest treatment ratio of formulated fishpond biofertilizer i.e., 3:1 shows significant result in the comparison of other treatments of biofertilizer and control. According to the study, the formulated fishpond biofertilizer are effected significantly on growth rate of plants and also inhibited the pest infestation.

Keyword: Nutrients, Red kidney beans, composting, fish pond sediments.

Introduction

The potential of agriculture products in Pakistan is not being exploited adequately due to many restrictions. The most important restrictions among these are improper supply of nutrients. Balance and sufficient amount of nutrients are necessary for the best growth and development of plants but release of these natural reserves is too slow to meet the need of plants so biofertilizers and synthetic fertilizers are use to enhance the growth of plant and also maintain the soil fertility which is suitable for plants growth. (Singh et al. 2016). Use of both fertilizers have some advantages and disadvantages with regard to soil fertility and plants growth (Singh et al. 2016). Chemical fertilizers are recognized as inorganic fertilizers and the nutrients in chemical fertilizers are comparatively high and discharge of these residues is rapid due to low degradability nature (Sharma et al. 2017). On the other side, the stage and timing of nutrient uptake by plants be able to predict sensibly very well thus chemical fertilizers are recognized for their lofty cost and their harmful environmental result due to exploit misuse (Wang et al. 2018). The term Bio-fertilizers, in firm sense, is not a manure (fertilizer), which openly provide nourishment to plants (Igiehon et al. 2017). Biofertilizer is basically a culture of microbes which helps to make healthy soil. Recycling process of Composting is a process in which natural substance or resources are changed biologically into an formless humus like material that is capable of handling, store up and useful to soil lacking of ecological impact (Igiehon et al. 2017). Fishes in the pond convert their feed into high quality of proteins and the soil of pond also improve through the activity of fishes, so this soil used as biofertilizer in agricultural field (Soumare et al. 2020)

The aim of the present study is to observe the effects of formulated fishpond biofertilizer on the growth parameters of red kidney bean (*Phaseolusvulgaris* L.) plant and its pestinfestation.

Table. 1 Growth of red bean kidney treated and untreated replicates

Duration (Weeks)	Different Replicates of treated red kidney beans plant and control									
	3:1(Formulated fishpond biofertilizer: biofertilizer)			1:1(Formulated fishpond biofertilizer: biofertilizer)			1:3(Formulated fishpond biofertilizer: biofertilizer)			Control
	<u>R₁</u>	<u>R₂</u>	<u>R₃</u>	<u>R₁</u>	<u>R₂</u>	<u>R₃</u>	<u>R₁</u>	<u>R₂</u>	<u>R₃</u>	
1 st	7	8	6.3	3.5	5	6.5	5.5	6	6	7
2 nd	11	13	12	8	12	13	10	13	10	14
3 rd	17	19	16	15	19	17	14	15	13	16
4 th	24	27	23	21	22	20	20	23	21	24
5 th	27	28	24	23	23	21	21	25	23	26
6 th	30	31	26	25	25	23	23	26	24	27
7 th	34	35	27.3	27	27	24	25	29	27	29
8 th	36	41	28	28	27.8	25	28	30	29	29.8
9 th	37.5	47	30	31	31.6	27	30	33	30.6	-
10 th	39	50	33	32.4	33	28	32	33.4	31	-
11 th	41	52	37	33.2	34	29.7	30	34 cm	-	-
12 th	42	53	51	34	35	33	33	-	-	-
13 th	42.4	53.3	51.6	35	35.3	33.7	-	-	-	-

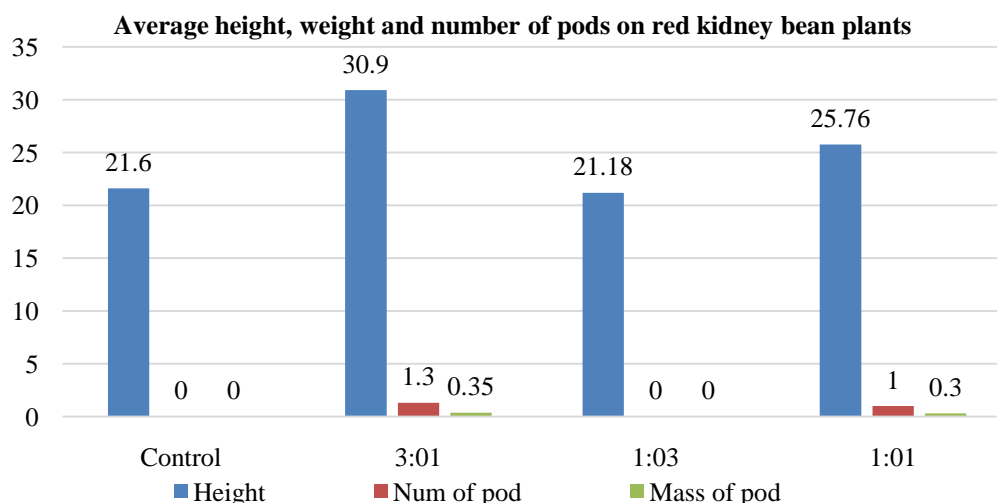


Fig. 1. Average height, weight and number of pods on treated replicates of red bean kidney plant

Materials and Methods

The present study has been conducted in the Western region of Karachi, during May to September 2018. At the beginning of test the temperature and humidity was recorded 34°C at 32% respectively, whereas at the end of test temperature was recorded 23°C and humidity was 22%. First step of the experiment was to collect the waste and ripen fruits, vegetables in the month of May, weighing approximately 3000grams, and then it was dump into a plastic container size 8 inches in diameter and 15 inches in height. Next step of the present study was to add 900grams of fish pond sediments in it. All the waste was converted into humus by the microbes within 20-25 days. The prepared compost has been used with dry fish pond sediments weighing approximate 1500gram. Both biofertilizers were used in drying condition with weight of 4500gram. Next step of the experiment is to prepare the pots. Weighing the sand soil (Balumitti) with 3 different fertilizer treatment, i. e., formulated fishpond biofertilizer and for control. Quantity of sand soil for all three treatments with their replicates were: 500gram for control, 750 grams for 1:3 ratio, 500grams for 1:1 treatment ratio and 250grams for 3:1 treatment ratio. Weighing all three fertilizers i. e., biofertilizer, formulated fishpond biofertilizer and cow dung for all replicates were,

750grams for 3:1 treatment ratio, 250grams for 1:3 treatment ratio and 500grams for 1:1 treatment ratio. In the meantime, *Phaseolus vulgaris* (Red Kidney Beans) were soaked into small quantity of water over night by covered a piece of soft cloth. After treatment the soaked seeds were sowed into the prepared pots. The pH level of soil sample was examined by soil pH testing kit. 15 grams of soil sample was taken with in 10ml distilled water to examine the pH level.

Results and Discussion

In this study the production of red kidney bean plants with their growth were observed. After a week in 3:1 ratio of biofertilizer and controlled, the growth of seedlings were observed, which is almost 7cm, 8cm, 6.3cm and 7cm respectively (Table.1). In the same week other 2 treatments of biofertilizer, i. e., 1:1, 1:3 ratio, and seedlings were also observed but it was slower than 3:1 ratio of biofertilizer (Table.1).

After completion of experiment highest growth of red kidney bean plants in biofertilizer in 3:1 treatment ratio was about 42cm-53cm as in comparison of other treatments of biofertilizer and controlled. After 11th week flowers on 1:1 and 3:1 treatment ratio, were observed but not in controlled and 1:3 biofertilizer (Table.1).

Infestation was occurred in 1:3 treatment ratio of biofertilizer and controlled. After 2 months, growth was discontinued in controlled. Pest infestation damaged all controlled plants. Pest infestation was not detected in any plant of 1:1 and 3:1 treatment ratio of formulated fishpond biofertilizer, whereas these plants grow large number of red kidney beans pods.

The consequences of biofertilizer has been recorded on different crops by a number of researchers and availed different results. In the earlier work -Tahir *et al.* (2006) treated organic compost along with 50% chemical fertilizer to produce tomato and revealed that amalgamate use of biofertilizer and synthetic fertilizer was more productive on tomato crop as compare to synthetic fertilizer separately, but in this research formulated fishpond biofertilizer produced highest rate on growth parameter of red kidney beans as compared to other treatments. Najar (2017) has used vermicompost as biofertilizer to obtain significant results, according to him, the vermicompost act as a appropriate plant growth medium and availed highest plant growth. Pathak *et al.* (2011) worked on French bean and identified that the combination of vermicompost and organic fertilizer has the significant effect on growth parameter to avail maximum weight, size of pods in comparison of synthetic fertilizer. In existing research use of formulated fishpond biofertilizer showed highest length of twigs, highest pods quantity and their weight instead of controlled and biofertilizer results. Kumar *et al.* (2012) discussed that the application of organic fertilizer gave higher productivity of crops and also improve the physical and chemical composition of soil because it enhance the nutrient supply to plants.

Conclusion

The respective study was directed to examine the pesticidal and nutritional importance of fish pond sediment compost. The results indicated the efficacy of formulated fish pond sediment fertilizer against major pests of tomato plant. Formulated fertilizer can be a good replacement of synthetic fertilizer and normal organic fertilizer. As per respective study, kitchen and garden waste can be easily convert into efficient fertilizer by using fish pond sediment and show efficient results on plant growth by enhancing Nitrogen and phosphorus in the treated soil. Formulated fish pond biofertilizer is the good alternative source of synthetic fertilizer due to their beneficial impacts on soil, crop and ecosystem for long lasting duration.

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