ISSN PRINT 2319 1775 Online 2320 7876

Research paper

 UGC CARE Listed (Group -I) Journal Volume 11, Iss 1, 2022

"The Impact of Chemical and Biofertilizers on Geranium (PeLARGONIUM GRAVEOLENS L.) Growth Comparison."

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ABSTRACT

The present study deals with the effect of Biofertilizers and Chemical Fertilizer on growth of Pelargonium graveolens L. (Geranium). This experiment conducted for farmers because now a day there is vast use of chemical fertilizers. Using chemical fertilizers soil becomes infertile within few years, excess use of chemical fertilizer also harmful to human beings. The parameters like height, branches and number of leaves are counted after two months. The result shows that plants grow faster and taller in Azotobacter Biofertilizers applied plants as compared to chemical fertilizer. The Biofertilizers shows positive impact in height, number of leaves and number of branches in Pelargonium graveolens L. (Geranium).

Keywords: Biofertilizers, Chemical Fertilizer, Geranium and Pelargonium graveolens.

INTRODUCTION

Bio-fertilizers are not only the alternative to chemical fertilizers but also tend to increase the soil and plant productivity They play an important role in the nutrient mobilization and development of soil by accelerating microbial processes which supports the entire plant growth system, (Kumar, 2001) and (Sivakumar *et al*, 2013). Bio-fertilizers are broadly classified into three categories, i.e. Nitrogenous bio-fertilizers, Phosphatic bio-fertilizers and Organic matter decomposers Nitrogen fixers such as Rhizobium (Rhizobium is soil Rhizoba which means that it consist of bacteria with the ability to fix nitrogen. A symbiotic Rhizobium bacterium which is the most important nitrogen fixing organism. This organism have the ability to drive atmospheric nitrogen to provide it to plants.) While others (Azospirillum, Azotobacter, BGA) can

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independently fix nitrogen independently. Phosphate solubilising microorganisms such as *Bacillus*, *Pseudomonas*, *Aspergillus* etc. secrete organic acids which enhance the uptake of phosphorus by plants by dissolving rock phosphate. Azotobacter fix nitrogen elaborate plant hormones solubilize phosphate and also suppress phytopathogens or reduce their deleterious effect. Azatobacter improves seed germination and has beneficial response on crop growth rate [CGR]. It helps to increase nutrient availability and to restore soil fertility for better crop response. Some others are phosphate mobilizers and Zinc Solubilizers (Kawalekar, 2013). But their effectiveness varies greatly, depending largely on soil condition, temperature and farming practices.

A need in 21th century organic farming. Chemical fertilizers are harmful to human being, plants, animals, soil and our environment. Chemical fertilizers quite expensive and production cost is high. In a situation the role of biofertilizers may be explored as alternative source for enhancing soil fertility. Biofertilizers available in very cheap prices in market, Various types of biofertilizers available in market like- Azatobacter, Rhizobium, BGA, Azolla, etc. some liquid biofertilizers also available in market. Biofertilizer improve plant growth directly by producing plant growth regulators. Biofertilizers are the formulation of living microorganisms, which are able to fix atmospheric nitrogen in the available form to plant, either by living freely in the soil or being associated symbiotically with plants. (Chandrasekar *et al*., 2005). They are capable of mobilizing nutritive elements from non -usable form to usable form through biological processes (Tien *et al*., 1979). Biofertilizers are preparations containing live or latent cells of efficient microorganisms that are used for seed or soil applications with the goal of increasing the number of such microorganisms in the soil or rhizosphere and, as a result, improving the extent of microbiologically fixed nitrogen and other nutrients for plant growth and development. A bio-fertilizer is simply a product that contains living microorganisms that colonise the rhizosphere and stimulate development by increasing the supply or availability of nutrients to the host plant when applied to the soil, a seed or plant surface. A bio-fertilizer is a contemporary version of organic fertiliser that contains helpful microorganisms. Present study aims to provide knowledge, importance about Biofertilizers to farmers, to prove Biofertilizers is a more affordable than

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chemical fertilizers, Demonstrating maximum productivity at minimum price and Improve quantity and quality of Geranium

MATERIAL AND METHOD

Plant material: The required Geranium cuttings procured from Vaibhav Kale Geranium farm, Dehere. 20 cms long healthy cutting were used for preparation of Geranium sapling. 100 plants of each treatment were planted in RBD design .The biofrertilizers, Azotobacter, Rhizobium, Phosphate solubilising bacterial formulation etc. Were procured from MPKV Rahuri. Standard cultural practices as per crop requirement were maintained. This experiment conducted in Nursery of Padmashri Vikhe Patil College of Arts, Science and CommercePravaranagar, LoniKd. Use total field for single treatment 20 ft by 40 ft.

Sr. No	Fertilizers	Contents	Dose Per Acre
1	Chemical Fertilizer (kg)	Nitrogen	80 kg
		Phosphorus	15 kg
		Potash	15 kg.
2	Farm Yard Manure (tones)		5 tons

The cost of biofertilizers in market-

1. The Azotobacter – 50 Rs/ kg and 1250Rs / acre [one acre need 25 kg]
2. Rhizobium – 50 Rs / kg and 1250 Rs/ Acre [one acre need 25 kg]
3. Phosphate solubilizing bacterial formulation (Liquid biofertilizer)- 250 Rs / kg and 500 Rs / acre [one acre need 2 lit]

Table.1 Application of Different fertilizers

Sr. No	Type of Fertilizers	Name Of Fertilizer	Quantity Applied Per Plant
1	Chemical Fertilizer	Nitrogen	20 gm
		Phosphorus	12 gm
		Potash	12 gm
2	Biofertilizer	Azotobacter	18 gm
		Rhizobium	20gm
		Phosphate solubilising bacterial formulation (liquid biofertilizer)	9 ml

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RESULT AND DISCUSSION

In a present study we have given a application of a Phosphate solubilising bacterial formulation (liquid biofertilizer), Rhizobium, Azotobacter and Chemical fertilizer.

As compared to control resulting the treated plant with Azotobacter was given a better height, leaves numbers as well as branching. In Rhizobium biofertilizer shows also more growth than control but less than treated with Azotobacter plant of geranium. As shown in result table the treatment of the liquid biofertilizer given better result as compared to control replication of geranium.But as compared to all replication chemical fertilizer shown better result, more height, branching, rhizomes and leaves. But it's more susceptible to environmental damage as compared to biofertilizer treated plant of Geranium.

Table No.2: Height of Plants of Geranium (cm) before application of fertilizers.

Sr. No.	**Fertilizer**	**Height of Plants (cm)**									
1	Chemical	13	12	11	18	18	10	8	15	10	11
2	Rhizobium	12	11	9.5	12	15	05	05	11	08	04
3	Azotobacter	17*	14	16*	11.5	09	10	09	09	03	07
4	Phosphate solubilising bacterial formulation	12	08	09	13	12	07	11	07	10	10
5	Control	04	05	11	14	12	11	12	16	09	13

Table No.3: Height of Plants (cm) of Geranium after application of different fertilizers.

Sr. No	**Fertilizers**	**Height of Plants (cm)**									
1	Chemical	41	40	37	40	29	38	43	38	44	30
2	Rhizobium	35	45	45	35	42	47	35	39	41	42
3	Azotobacter	38	45	44	40	50*	32	47*	44	30	50
4	Phosphate solubilising bacterial formulation	30	40	26	39	40	41	30	23	30	29
5	Control	37	30	40	24	39	45	34	37	25	22

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Table No.4: Number of Leaves of Geranium plants before application of different fertilizers.

Sr. No	Fertilizer	Number of Leaves									
1	Chemical	26	26	23	34	41	18	23	12	15	30
2	Rhizobium	34	26	16	17	21	9	21	8	14	15
3	Azotobacter	32	40	45	21	17	9	32	25	20	25
4	Phosphate solubilising bacterial formulation	20	25	22	14	30	40	12	30	20	12
5	Control	20	15	16	19	25	21	18	20	21	8

Table No.5: Number of Leavesof Geraniumplants after application of different fertilizers.

Sr. No	Fertilizers	Number of Leaves									
1	Chemical	85	100	110	100	55	90	98	105	135	115
2	Rhizobium	100	110	120	60	95	150	105	100	149	162
3	Azotobacter	110	150*	135*	100	200*	108	170*	130*	119	175*
4	Phosphate solubilising bacterial formulation	60	55	48	100	90	79	60	85	40	92
5	Control	70	88	105	108	70	105	120	100	50	48

Table No.6: Number of branches of Geraniumplants after application of different fertilizers.

Sr. No	Fertilizers	Number of branches									
1	Chemical	5	4	8	7	3	4	6	3	4	3
2	Rhizobium	8	4	3	4	4	5	3	3	3	4
3	Azotobacter	5	8	6	3	6	5	7	6	4	3
4	Phosphate solubilising bacterial formulation	2	1	2	5	5	6	3	4	2	3
5	Control	3	6	5	2	2	4	3	4	4	3

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Geranium plant after application of Chemical fertilizer	**Geranium plant after application of Azotobacter**
	
Geranium plants before application of fertilizers	**Geranium plants after applications offertilizers**

SUMMARY AND CONCLUSION:

In this study biofertilizers are most effective, renewable and eco-friendly and it can be alternavtive to chemical fertilizers. Integrated nutrient management and organic farming both need the use of the biofertilizers. In today agriculture operations, these technologies are becoming increasingly important. In the coming years, the shifting land scape of agriculture practices and the environmental risks connected with chemical fertilizers will need a greater role

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for biofertilizers. In minimum production cost having a maximum yield. In a Azotobacter biofertilizer we conclude that from this study it is best for the geranium crop for increasing the yield without damaging environment and soil fertility. Chemical fertilizer also giving more yield but it more expensive also and some hazardous to environment.

ACKNOWLEDGEMENTS: Authors are thankful to Dr. P. M. Dighe, Principal and Dr. A. S. Wabale, Vice-Principal and Head of the Botany department of Padmashri Vikhe Patil College of Arts, Science and Commerce Pravaranagar, Loni Kd.- 413713 for providing research facilities during this work.

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ISSN PRINT 2319 1775 Online 2320 7876

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