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# EFFECT OF BIOFERTILIZERS ON GROWTH OF *TRIGONELLA FOENUM-GRAECSUM* L.

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**ABSTRACT:**

*Trigonella foenum-graecum* L. (fenugreek) is a self-pollinating, annual leguminous crop, which is native to the Indian subcontinent. It is currently widely cultivated in central Asia, central Europe, Northern Africa, North America and parts of Australia. Methi has been used as both a food and a medicine in much different culture. Biofertilizers are ecofriendly and non- toxic. Biofertilizers consist of sealed and beneficial living microbes, which are added to soil as microbial inoculants. These microbes are known to improve plant health by secretion of growth promoting substances and by increasing the availability of inoculants. The inoculation of Mycorrhiza, Rhizobium and PSB together help in plant growth and increased biomass. Thus, in present study concluded that biofertilizers, Mycorrhiza, Rhizobium and PSB in associations enhance plant growth and productivity and show greater effects combination for plant than individual biofertilizer.

**Key words:** - *Trigonella foenum-graecum* L., Biofertilizers, Mycorrhiza, Rhizobium, PSB..

## INTRODUCTION

Fenugreek (*Trigonella foenum-graecum* L.) is a self-pollinating, annual leguminous crop which is native to the Indian subcontinent (S. K. Malhotra, 2011). It is currently widely cultivated in central Asia, central Europe, Northern Africa, North America and parts of Australia but India being the lead producer in the world (Petropoulas, 2002). It also has been used for over two thousand years as a medicinal plant in various parts of the world (Srinivasan, 2006). Plant has wide range of therapeutic applications Fenugreek (Trigonella foenum-graecum L.) leaves and seeds have been used extensively for medicinal purposes. Leaf of plant has antimicrobial as well as antioxidant activity (Ramya Premnath, 2011). Fenugreek seed is known to exhibit anti-diabetic and anti-nociceptive properties and effects such as anti-cancer and thyroxine-induced hyperglycaemia. Indian Ayurvedic and traditional Chinese, Medicines where it is recognized as a lactation stimulant in women after child birth as well as for its ability to treat wounds and sore muscles (Tiran, 2003).

Biofertilizers is an important component of integrated nutrient management in agricultural system and sustainable agriculture. It is a cost effective and renewable source of plant nutrients to supplement the chemical fertilizers (Subhash Chandra Santra, 2015). Biofertilizers are applied to plant surface or soil, colonize the rhizosphere and promotes growth by nutritionally imp elements (N, P) from unavailable to available from through biological process such as Nitrogen fixation and solubilization of rock phosphate (Rokhzadi et al, 2008). These are used for fixation of atmospheric nitrogen and solubilization of phosphate to enhance the uptake of phosphorous by plants. Rhizobium, Blue, Green Algae (BGA) and Azolla are crop specific, bio-inoculants like Azotobater, PSB (Phosphorus solubilizing bacteria). The AM fungi occur in 83% of dicotyledonous and 79% of Monocotyledonous plants (Trappe, 1987) except few families like Cruiferae, Chenopodiaceae and Cyperaceae. The use of

biological nitrogen fixation (BNF) technology in the form of Rhizobium inoculants in plants can be an alternative of expensive fertilizer, particularly for improving the production of food legumes in the country (Shashi kala, 2018). Due to several health hazards, consumer preferences shift towards the use of organic food grown without the use of any chemical. In India, the availability and affordability of fossil fuel based chemical fertilizers at the farm level have been ensured only through imports and subsidies (Garima Jain, 2019).

In present study effect of biofertilizers that is Mycorrhiza, Rhizobium and PSB Individually and in combination on Fenugreek plant studied. As it is commercially important plant result will help to improve yield and quality of plant in future. It also promotes the sustainable agricultural improvement. Measurement of success of inoculation and future scope of work have been critically assessed.

**MATERIAL AND METHODS:**

**Seed collection-** Seeds were collected from healthy crop of *Trigonella foenum-graecum* from the locality of Ahmednagar.

**Seed germination–**Seeds were kept on wet filter paper for two days but seeds were so hard it could not germinate on wet filter paper and in soil also. Hence seed treatment was given, seeds were dipped in concentrated Sulphuric acid ($H_2SO_4$) Solution for 5 mint. Then it washed and soared in water over night. Soften seeds were then germinated on filter paper.

**Soil sterilization –** Soil was collected from filed and sieved soil sterilized at 15 lbs. for 15 min and then it dried well.

**Collection of Biofertilizers** -

**Mycorrhiza** – Mycorrhiza was collected from the Ahmednagar Market.

**Rhizobium and PSB**-Rhizobium packets were collected from M.P.K.V. Rahuri.

**Pot filling-** Pots were filled with soil and different combination of biofertilizers were made. Each pot has a 500gm capacity collected and combination of Biofertilizer and soil is was done as below,

1) Control.
2) 20% Mycorrhiza + 80% soil.
3) 20% Rhizobium + 80% soil.
4) 20% PSB + 80% Soil.
5) 15% Mycorrhiza + 15% Rhizobium + 15% PSB + 55% soil.

**Seed sowing and watering –** Germinated seed s were sown in pots and watered daily. Pots were kept in full sunlight and observations observed. Observations were taken after

**Growth measurement–**Plants were picked out from glass. Root and shoot length were measured by scale separately in centimeter. Leaves were counted in number. Add fresh weight, plant materials were dried in mechanical drier at $40^0$c for a day and then weighed on electronic balance.

**RESULTS:**

The observation of 45 days and 75 days of fenugreek growth with different combinations have been taken. Fenugreek being a shows slow growth and development initially but later grows very fast. The use of biofertilizers has been found to be beneficial in both growth and yield. The biomass is also found to increase compared to uninoculated plants. The $5^{th}$ combination having15% Mycorrhiza +15% Rhizobium +15% Phosphate Solubilizing Bacteria (PSB) have given best results with increase in Root and shoot length, Number of leaves and biomass. Individual biofertilizers like Mycorrhiza, Rhizobium, or PSB have shown and light increase in growth than the combinations.

The combinations of Mycorrhiza + Rhizobium + PSB (Phosphate Solubilizing Bacteria) has market effect as the root length (22.8 cm), shoot length (13.3cm), Number of leave (15), fresh

weight of plant (0.482) and dry weight of plant (0.120 gms). The inoculation of Rhizobium should nodulation while those without Rhizobium inoculums did not have nodulation. Mycorrhizal, Rhizobium inoculated roots show more proliferation.

**CONCLUSION:**

*Trigonella foenum-graecum* L. is leguminous plant has medicinal value in India. The use of biofertilizers for this plant at the initial stages of plant growth can help it grow. Inoculation of Mycorrhiza, Rhizobium and PSB together helps in plant growth and increased biomass. The mycorrhiza helps in root proliferation, increasing root absorption area for more uptakes of nutrients and finally increases plant growth. Rhizobium helps in nitrogen fixation. It helps in root proliferation for uptake of nitrogen and help in increasing plant growth. Phosphorus solubilizing bacteria though does not help in nodulation but the phosphate present in soil make it available. Shoot or biomass compared to uninaculated plants even in combination with Rhizobium_they enhance plant growth. Thus it can be concluded that biofertilizers are associations which enhance plant growth and productivity and show greater effects combination for plant than individual.

**REFERENCES:**

Acharya, S., Srichamroen A., Basu S., Ooraikul B. and Basu, T. (2006): Nutraceutical and Functional Food Improvement in the Nutraceutical properties of fenugreek. Songklanakarin J. Sci. Technol. Vol.28 (1): pp1-9.

Denise Tiran (2003): The use of fenugreek for breast feeding women, Complementary Therapies in Nursing and Midwifery 9 (3): pp155-6.

Garima Jain (2019): Role of Biological Sciences in Organic Farming Biofertilizers - A way to organic agriculture. Journal of Pharmacognosy and Phytochemistry. SP4: pp49-52

K. Srinivasan (2007): Fenugreek (*Trigonella foenum-graecum*): A Review of Health Beneficial Physiological Effects. Food Reviews International .Vol 22 (2): pp 203-224

Monika, Shashikala and Leela Wati (2018): Biofertilizers: Potential Candidate for Sustainable Agriculture Int. J. Curr. Microbiol. App. Sci Vol.7 (3): pp2839-2851

Neeta M. Patil, Effect of Biofertilizers on Physiological Parameters in *Trigonella foenum –graecum.* Research Paper in Botany. vol. (4).

Nishant Mishra, Chandra Pal Singh and U. S. Mishra: (2011). Effect of a *Trigonella Foenum* Grbiofertilizers on a Bio nutrients Nitrogen, Total Protein, Extractable Lipid and Mineral Contents of a Cultivated Variety of Fenugreek. Journal of Phytology. Pp15-17.

P. Khosla, D. D. Gupta and R. K. Nagpal (1995): Effect of a *Trigonella foenum graecum* (fenugreek) on blood glucose in a normal and diabetic rat. Indian Journal of Physiol and Pharmacol. Pp173-174.

Petropoulos, G. A., (2002): Fenugreek: The genus *Trigonella.* Medicinal and Aromatic Plants - Industrial Profiles, Taylor & Francis.

Ramya Premanath, J. Sudisha, N. Lakshmi Devi and S.M. Aradhya (2011): Antibacterial and Anti-oxidant Activities of Fenugreek (*Trigonella foenum graecum* L.) Leaves. Research Journal of Medicinal Plants. Volume: 5 (6). Pp695-705.

Ritikika Bhattacharjee & Utpal Dey (2014): Biofertilizer A Way Towords Organic Agriculture; A Review, African Journal of microbiology Research. Pp233-2343.

Rokhzadi A, Asgharzadeh A, Darvish F, Nour-Muhammadi G, Majidi E (2008): Influence of plant growth promoting rhizobacteria on dry matter accumulation and yield of chickpea (Cicer arietinum L.) under field conditions. Am Eur J Agr Env Sci 3(2). Pp253–257.

Ruveyde Tuncturk, A. Esen celen, Murat Tuncturk (2011). The Effect of a Nitrogen snd Sulpher Fertilizers on the Yield and Quality of a Fenugreek (*Trigonella foenum- gracecum L.*) Turkish Journal of Field Crops. Pp69- 75.

S. K. Shukla (2011): Genetic Resources, Chromosome Engineering, and Crop Improvement. Pp801-846.

S. Singh, M. R. Choudhary, O. P. Garhwal, M. L. Jakhar, B. L. Yadav (2012): Effect of Biofertilizer and Inorganic Sources of Nitrogen and Phosphorous On Quality Production of Kasuri Methi. (*Trigonella corniculata*). International Journal, seed spices. Pp38-40.

Subash Chandra Santra, Anusaya Mallick and Alok Chandra Samal (2015): Biofertilizer for Bioremediation. Recent Trends in biofertilizers. Publisher: I K International Publishing House Pvt. Ltd. Pp205-234.

Trappe, J. M. (1987): Phylogenetic asnd Ecological Aspects of Mycotrophy in the Angiosperms from an Evolutionary Standpoint. In: G. R. Safir (ed.) Ecophysiology of VA Mycorrhizal Plants. Pp 5-25.

**OBSERVATIONS Table No. 1 (After 45 days)**

| Sr. No. | Combination of Biofertilizers | Root length in cm | Shoot Length in cm | No. of Leaves | Fresh Weight in gms | Dry Weight in gms |
|---|---|---|---|---|---|---|
| 1 | Control | 10.5 | 10.4 | 12 | 0.355 | 0.090 |
| 2 | 20% MYC | 6.6 | 11.1 | 17 | 0.246 | 0.071 |
| 3 | 20% PSB | 8.4 | 11.6 | 10 | 0.336 | 0.087 |
| 4 | 20% RHB | 12.3 | 7.3 | 10 | 0.384 | 0.099 |
| 5 | 15% PSB + 15% RHB + 15% MYC | **10.2** | **12.6** | **11** | **0.428** | **0.112** |

**Abbreviations-**MYC-Mycorrhiza, RZB- Rhizobium, PSB- Phosphate solubilizing Bacteria.

**Table No. 2 (After 7 days)**

| Sr. No. | Combination of Biofertilizers | Root length in cm | Shoot Length in cm | No. of Leaves | Fresh weight In gms | Dry Weight in gms |
|---|---|---|---|---|---|---|
| 1 | Control | 11.1 | 11.1 | 14 | 0.371 | 0.092 |
| 2 | 20% MYC | 8.3 | 14.7 | 27 | 0.278 | 0.077 |
| 3 | 20% PSB | 9.2 | 14.4 | 15 | 0.374 | 0.088 |
| 4 | 20% RHB | 12.7 | 13.9 | 14 | 0.405 | 0.100 |
| 5 | 15% PSB + 15% RHB + 15% MYC | **22.8** | **13.4** | **15** | **0.482** | **0.120** |

**Abbreviations-**MYC-Mycorrhiza, RZB- Rhizobium, PSB- Phosphate