

Isolation and Analyzing the effect of Rhizobium Enriched Manure in growth of Fenugreek

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Abstract- Today's agricultural engineering needs special and innovative Biofertilizers which plays a pivotal role in increasing yield, long term soil preservation and towards environment concern by increasing the supply or availability of micro and macro nutrients from natural sources. Rhizobium strains were isolated from root nodules of culinary variety of groundnut plants from Gudiyattam, Vellore district TamilNadu, India. The isolated strains were semi-cultured in YEMA medium. This culture was added to a mixture of kitchen waste compost and vermicompost. A comparative study was conducted with respect to growth of fenugreek plants in the soil and manure in the absence and presence of rhizobium. The study compared the parameters like shoot growth and time taken.

Index Terms- Biofertilizer, Compost, Fenugreek, Groundnut, Leguminous plants, Manure, Rhizobium

INTRODUCTION

Fenugreek (*Trigonella foenum-graecium* L.) is a dicotyledonous plant belonging to subfamily Papilionacea, family Leguminosae (=Fabaceae). It is native of mediterranean region and is grown as an important spice and annual legume crop in most part of the world (Petropoulos, 2002). Semiarid regions witness remarkable environmental stress mainly due to erratic rainfall and low soil fertility which result in low crop productivity with high uncertainty. However, fenugreek has emerged as one of the important crops of these areas and has attracted attention of producers to meet the manufacturing demands for "functional food" additives and natural health products. Rhizobium belongs to a well known group of bacteria that act as primary fixer of nitrogen in symbiotic relationship with legume plants. Microbes used as biofertilizers are generally regarded as plant growth promoting rhizobacteria (PGPR) that positively influence plant growth by colonizing the plant roots, increased multiplication in rhizosphere, competing with other microflora, counteracting soil borne plant pathogens, increasing the availability of nutrients (nitrogen, phosphorous), and production of plant growth regulators like IAA, gibberellins and cytokinins. Nitrogen supply plays an important role in crop production but under intensive agriculture use of chemical fertilizers alone for long period may deteriorate the soil fertility and produce quality. However, use of biofertilizers, in combination with chemical fertilizers, has been recommended for balancing soil fertility and crop productivity. In this study we have tried to conduct a comparative study of the shoot growth of fenugreek in the a soil with a combination of kitchen waste compost and vermicompost in the presence and absence of rhizobium. The study was conducted the soil with the manures in the absence of rhizobium and readings were taken. Rhizobium was isolated the root nodules of groundnut plants collected from Gudiyattam village, Vellore, TamilNadu, India and cultured in a YEMA medium. The extracted bacteria was added to the manure

and the plants were cultivated again. The readings were taken. Statistical analysis was conducted as well as morphological and biochemical identification was conducted and the results was inferred.

2 PROCEDURE

2.1 Isolation of Rhizobium strains

Rhizobium meliloti was isolated from the root nodules of *Arachis hypogaea* (groundnuts) grown in the fields of gudiyattam, Vellore, TamilNadu, India. The root nodules were detached from the root part of the procured groundnut plant. The nodules were then crushed using mortar and pestle to obtain a white suspension. This was later streaked on YEMA media and further was identified using Gram's Staining Technique.

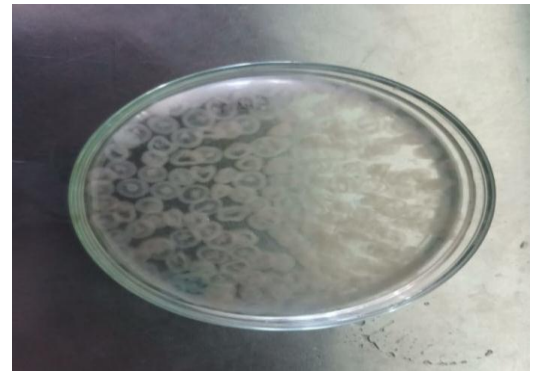
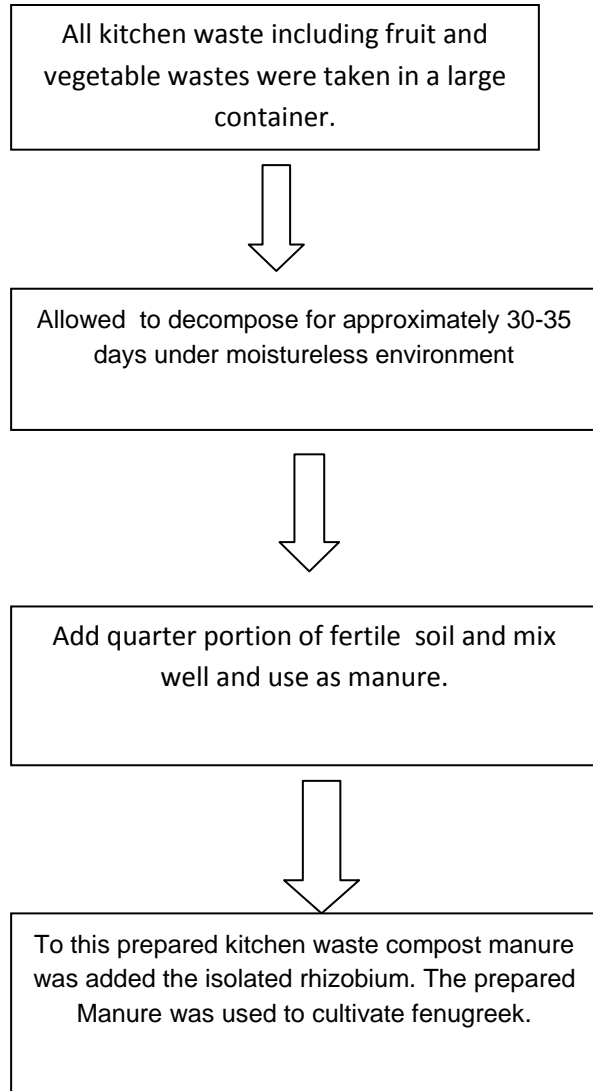
2.2 Preparation of Medium

A total of 3 litres of Yeast Mannitol Agar was made:

Agar	15.0g
Mannitol	10.0g
K ₂ HPO ₄	0.5g
Yeast extract	0.4g
Mg ₂ SO ₄ .7H ₂ O	0.2g
NaCl	0.1g

Components were poured into a large flask and the volume was brought to 1L by adding distilled water. The flask opening was covered with foil, and medium was gently heated to boiling with the stir bar mixing the solution. The flask was autoclaved for 15 minutes at 15 psi at 121°C. Plates were poured and incubated for 24-36 hours at 32°C. Bacterial culture was repeated for 2 times by single colony streaking on YEMA media. The culture was later sub-cultured and added to the prepared kitchen waste compost manure.

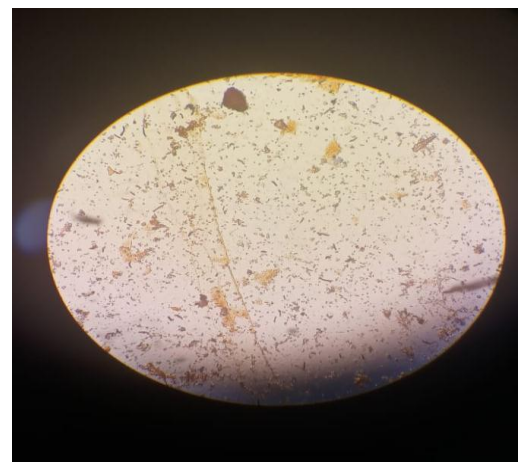
2.3 Preparation of Kitchen waste manure



2.4 Cultivation of Fenugreek Plants

Fenugreek seeds were soaked in water for 2 hours and then secured in a linen cloth for a night. The germinated seeds were divided into 2 portions. One portion was sown in plant pots with red soil. The other portion was sown in plant pots with 3/4th red soil and 1/4th prepared manure. Instead of chemical pesticides, the water obtained after soaking onion peels for 24 hours was sprayed on both the plants. The plants were regularly watered and the growth was observed and measured regularly.

2.5 Figures





India. This could be an effective and harmless substitute for chemical manures and fertilizers which are causing a lot of issues in the environment like biological magnification and subsequently pollution and degradation soil quality. The onion peel water is found to be an effective pesticide. This technique can also be used and tested on other small scale crop cultivations. This technique is also seen as a potential way of kitchen waste management.

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3 . RESULTS

Day no.	Plant pot without manure	Plant pot with manure
1	0.1cm	0.1cm
7	5.3cm	6.8cm
14	8.8cm	10.4cm

4. CONCLUSION

Thus we have concluded that the addition of Rhizobium enriched kitchen waste compost manure has a significant effect on the average shoot length growth in fenugreek plant in a stipulated time span. This manure would have no impact on the environment when compared commercially available chemical manures and fertilizers. Therefore isolation of this nitrogen fixing bacteria from groundnut plant and produce them as inoculums can improve the fenugreek production in India. Biological nitrogen fixation is very important for the development in the agricultural sector especially in a agriculture based developing country like