Response of *Moringa oleifera* Lam. (Drumstick) plant on inoculation with *Frateuria aurentia (*Potassium mobilizer) and Plant Growth Promoting Rhizomicrorganisms (PGPR.)

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Abstract: Besides the raw material available remains of fruits and vegetables which can be used as raw material for the composting. Moringa oleifera (Drumstick) belongs to family Moringaceae. It is a nature's most nutritious vegetable tree with high medicinal value. Despite of this, little has been done on the agronomic requirements for this crop. Twelve treatments arranged in complete randomized block production design. From the results it was found that treatment T2A-(K.m.+P.f.) +V.C.and T2C-(K.m.+P.s.b.)+V. C. shows better result compare to T1C-(K.m.+P.s.b.+T.v.) +V. C. Frateuria aurentia a potassium mobilizer along with PGPR shows better results.

Key words: Frateuria aurentia, Azospirillum brazillense, microbial inoculants, Moringa oleifera, vermicompost.

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Introduction

Moringa oleifera Lam. (Synptery gosperma, Gaert.) is commonly known as "Horseradish tree", from the taste of the roots, which can serve as arough substitute for horseradish or Drumstick belongs to the family Moringaceae. The best known species is *M. oleifera* indigenous to North West India. The soil is enriched with the bioinoculants, which increases the soil fertility and in turn crop yield. Considerable efforts have been made in recent past in composting organic putricible fruit and vegetable market waste and enriching with bioinoculants has been demonstrated to some extent in the biofertilizer production technology and has been reported as an efficient tool for increasing the trees and plant productivity (Jamaluddin, 2002).

It is estimated that organic resources available in our country can produce about 20 million tons of plant nutrient. Further it is estimated that 4.5 million tons of food and fruit producing waste is generated every year. Organic amendments are sustainable, relatively cheap material of plant and animal origin that are incorporated into the soil before seeding to increase the productivity and crop yield.

Vermi-compost is an eco-friendly, non-toxic consume with low energy input for composting and is recycled as an biological product viz., market waste (fruits and vegetable) and amended with beneficial microorganisms like potassium mobilizer, free living nitrogen fixers and phosphate solubilizing bacteria. The use of fertilizers boosts the quality of agricultural products including nutritional composition.

The present study is aimed at finding the role of earthworm in composting the organic puticible market waste (fruits and vegetable) and enriching with microbial inoculants and the combined effect of vermi-compost and microbial inoculants on growth and nutrient uptake of *Moringa olifera.*

Materials and Methods

The pot experiment was laid out in a completely randomized block design with twelve replicates with the aim of investigating the effect of organic amendments(fruits and vegetable waste) along with vermi-compost enriched with microbial inoculants. The treatments consisted of composted organic waste are as follows:

T1A -(K.m.+P.f.+T.v.) +V. C. C1-(K.m. alone)+V. C.

T1B-(K.m.+Azo+T.v.) +V. C. C2-(Azo alone)+V. C.

T1C-(K.m.+P.s.b.+T.v.) +V. C. C3-(P.f. alone) +V. C.

T2A-(K.m.+P.f.) +V. C. C4-(P.s.b alone)+V. C.

T2B-(K.m.+Azo) +V. C. C5-(T.v. alone)+V. C.

T2C-(K.m.+P.s.b.)+V. C.

Frateuria aurentia(K.m.)*, Azospirillum bracillens (*Azo), *Trichoderma viride* (T.v.)*,* Phosphate solubilizing Bacteria (P.s.b.), *Pseudomonas fluorescens* (P.f.), Vermicompost (V.C.).

Data on vegetative growth parameter:

Growth parameter like plant height, number of compound leaves, number of secondary rachis, length of the leaflets, dry and fresh weight of the leaves were collected and recorded after one month of planting. Five seedlings per replica were uprooted at seven weeks after planting and separated and fresh weight was recorded. Plants were later dried in oven at 75^0c for 48h, dry weight was recorded. The dried stem and leaves were grounded to determine the mineral nutrient content.

The study was conducted under green house condition at Department of Botany, Bangalore University, Bengaluru. Drumstick seeds were collected from Thanjavoor and soaked in water for 12h before sowing. The nursery mix used in the study was soil:sand and sieved fruits and vegetable waste vermicompost with consortia of microbes. Poly bags of size 24.5x15.5cm holding.8.5kg of unsterilized nursery mix were used. Plant growth promoting rhizomicro-organisms viz., *Pseudomonas fluorescens, Fraturia* aurentia (Potassium mobilizer) containing 10^9

Results and Discussion

The growth parameters obtained in this study are represented in the table. Among the twelve treatments performed, **T1C-(K.m.+P.s.b.+T.v.) +V. C., T2A-(K.m.+P.f. +) +V. C**.and **T2C-(K.m.+P.s.b.)+V. C. combination** showed better result. Out of these three treatment, **T2A-(K.m.+P.f .+T.v.) +V.C.and T2C-(K.m.+P.s.b.)+V. C.** are best when compare to T1C-(K.m.+P.s.b.+Tv) +V. C. . This shows *Fraturia* aurentia(Potassium mobilizer) along with Phosphate solubilizer Bacteria and *Pseudomonas fluorescens is* highly potential and hence this combination of treatments can be recommended. Trichoderma enriched biofertilizer could save atleast 50% N fertilizer uses for mustard and tomato and could reduce excessive uses of NPK for crop reported by Md. Manjurul Haque et,al(2012) Ashwini ,et.al 2007, reported that application of organic manure like vermi compost 500g with Phosphate solubilizingr Bacteria 25g|pot recorded good growth of Dahlia in respect to height of the plant, number of the leaves/plant.

Table 1. Response of enriched V. C. on growth parameter of Drumstick

Treatment	Ht.of 1month old in ft	No. of Compound Leaves	No. of Secondary rachis	F.W. of Leaves in g	D.W.of Leaves in g	Length of the Leaves in ft
T1A	4	17	171	280	220	2
T1B	4	16	161	410	355	2.08
T1C	4	**18**	**188**	**850**	440	**2.50**
T2A	**5**	**18**	**197**	**1900**	**1065**	1.90
T2B	3	15	105	480	90	2.20
T2C	**5**	**18**	**198**	**1600**	**915**	**2.70**
T2D	3	16	165	270	266	2.03
T3	4	16	150	360	230	2.03
C_1	1-	11	175	435	335	1.50
C_2	-1	11	160	375	175	1.75
C_3	-1	10	50	40	20	1.25
C_4	-1	10	**198**	509	323	1.50

T1A -(K.m.+P.f.+T.v.) +V. C.

T1B-(K.m.+Azo+T.v.) +V. C.

T1C-(K.m.+P.s.b.+T.v.) +V. C.

T2A-(K.m.+P.f.) +V. C.

T2B-(K.m.+Azo) +V. C.

T2C-(K.m.+P.s.b.)+V. C.

C1-(K.m. alone)+V. C.

C2-(Azo alone)+V. C.

C3-(P.f. alone) +V. C.

C4-(P.s.b. alone)+V. C.

C5-(T.v. alone)+V. C.

F.W(fresh weight),D.W(dry weight)

*Fraturia aurentia,(*K.m.*)Azospirillum brazillense,*(Azo.) *Trichoderma viride,*(T.v..)Phosphate solubilizing Bacteria(P.s.b.)*Pseudomonas fluorescens* (P.f.)

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