© 2017 IJSRST | Volume 3 | Issue 9 | Print ISSN: 2395-6011 | Online ISSN: 2395-602X
National Conference on Green Approach towards Environment and Chemical Science

Ifluence of Vam (Glomus Fasciculum) Inoculation on Protein Content Of Black Gram (Vigna Mungo (L.) Hepper)

A. M. Kanade

Arts, Commerce and Science College, Narayangaon, Junnar, Pune, Savitribai Phule Pune University, Pune , Maharashtra, India

ABSTRACT

Result of experiments conducted on *Vigna mungo* (L.) Hepper. a legume crop to study the effect of VAM inoculation on protein content have been described in present research. The plants were grown in non sterilized and sterilized soil to obtain results of inoculated VAM, *Glomus fasciculatum* (Tha) Geared and Trap. along with native VAMs. Marked increase in protein content in VAM inoculated plants supplied with recommended phosphates in both sterilized and non sterilized soils were observed. There was visible increase in total grain Biomass per plant in VAM inoculated plants supplied with recommended phosphates in comparison with controlled set.

Keywords: VAM, Vigna mungo (L.) Hepper, Protein content

I. INTRODUCTION

During recent years VAM technology is getting increasing recognition as a potential Biofertilizer. Beneficial effects of VAM inoculation on trees, crops & ornamental plants at field condition are shown by various workers (Bagyaraj, *et.al.* 1979 and Bagyaraj, et.al. 1980) these studies indicate that plants shows response to inoculation with VAM with efficient strain of VA mycorrhiza.

The present paper aims at the effect of *Glomus fasciculatum* inoculation on protein content in *Vigna mungo* (L.) Hepper. Locally known as "UDAD" is valued for food. It is very popular in Punjabi cuisine, as used in dal makhani, In Bengal, it is used to prepare Biulir Dal and in Rajasthan it is used to prepare dal which is especially consumed with bati. In Maharashtra, especially in Satara district it used to make a curry called Udadach Ghuta. Black gram is also an coarse ingredient of papad a starter utilized all over India. Black gram is very nutritious as it contains high levels of protein (25g/100g), potassium (983 mg/100g), calcium (138 mg/100g), iron (7.57 mg/100g), niacin (1.447 mg/100g), Thiamine (0.273 mg/100g), and riboflavin (0.254 mg/100g), (USDA National Nutrient Database for Standard Reference)

II. Material and Method

Matured healthy seed of *Vigna mungo* (L.) Hepper were collect from Narayangaon, Taluka- Junnar, Dist- Pune, Maharashtra. Earthen pots with 25cm diameter and depth and with proper drainage were selected for planting filled with 3Kg of sterilized soil mixture containing Sand: Soil: FYM in 1:2:1 proportion. Pots were place in sunlight and watered till the capacity a day before planting. Further they were watered till the field capacity on alternate days for 60 days of growth. Phosphate was added at different levels as suggested in various treatments. In all there were six sets with six treatments in sterilized soil. The results were based on three replication of each treatment.

Treatments:

Set I UP00 (Control , un-inoculated, without phosphate & VAM)
Set II IP00 (VAM Inoculated, without phosphate)
Set III UP100 (VAM un-inoculated with 1gm phosphate per pot)
Set IV IP100 (VAM Inoculated with 1gm phosphate per pot)
Set V IP75 (VAM Inoculated with 0.75gm phosphate per pot)

Set VI IP50 (VAM Inoculated with 0.50gm phosphate per pot)

Same sets were made for non sterilized soil. Observations were recorded at the age of 60 days one plant from each replicate was harvested at the end of sixty days. Plants were removed carefully along with the roots. Roots were carefully and fixed with in F.A.A. for 24 hours and scrutinized for VAM colonization (Schenck and Perez, 1987) using following formula-

$$\%\, VAM\ colonization = \frac{Number\ of\ Mycorrhizal\ root\ segments}{Total\ no\ of\ root\ segments\ screened} \times 100$$

Extramatricular clamydospores produced by the VAM fungus in soil was estimated by wet sieving and decanting method (Gerdemann and Nicolson, 1963).further observation were recorded at flowering and fruiting period for reproductive parameters. Dry biomass of shoot and root was recorded after 60 days.

Protein was determined as per Lowry et al., (1951). The protein was measured by taking absorbance at 750 nm in the spectrophotometer. A standard curve was constructed on graph paper. From the standard curve coefficient was determined. Protein was determined by

$$\text{Concentration of protein} = \frac{R\ x\ co\ -\ eff.x\ V\ x\ D}{\text{F. Wt}}\text{mg/g}$$

Where,

R= Sample reading - blank reading,
Co-eff. = Calculated mean co-efficient,
V = Volume of the sample,
D = Dilution Factor,
F. Wt= Fresh weight of plant sample in g

III. Result and Discussion

The result of present investigation clearly indicates that *Vigna mungo* (L.) Hepper. responds well to the mycorrhizal inoculation under pot condition.

The total dry biomass was maximum in plants inoculated with VAM at 100 percent recommended phosphate and least in control in both sterilized and non sterilized soil. There was considerable increase in the biomass in inoculated plants as compared to control. Similar observations were reported by Wang, *et al.,* (1989) in *Phaseolus aureus.*

Plants showed double dry weight than control. Hayman and Mosse (1971) increased shoot dry weight in Onion and Coprosma. Bagyraj and Manjunath (1980) in Cotton, Cow pea and Finger millet. Bagyraj and Powell (1985) in Marigold.

Grain biomass was maximum in plants inoculated with VAM at 100 percent recommended phosphate 7.55gm in non sterilized soil and 8.45gm in sterilized soil. Increase in phosphate level was directly proportional to grain biomass. Following workers observed similar trend. Saif and Khan (1977) in Barley, Iqbal, et. al.(1980) in Rice, Costa, et. al.(1989) in Oat, Khadge et. al.(1992) in Sorgham and Bajra and Joseph et. al.(1997) in maize and pearl millet.

Protein content showed increase with increase in phosphate supplement and was recorded maximum in inoculated plants in both type of soils. Percent of protein content was higher in non sterilized soil than sterilized soil. Similar result was noted by Mesbaul *et al.,* (2015) Percentage of VAM colonization was higher in mycorrhizal plants with 50 percent recommended phosphate in sterilized and non sterilized soil. Similar observations were reported by Okon *et al.,* (1996) in *Gliricidia sepum* and *Senna siamea.* VAM with 50 percent recommended phosphate shows maximum number of Mycorrhizal spores in non sterilized soil. Clamydospores were not observed in uninoculated plants. This suggest that the number of infective propagules in the soil is low and the infectivity of native fungi lower than that of inoculant fungus. Further there is decrease in VAM colonization level at 100 percent recommended phosphate and higher soil phosphate levels. There is increase in VAM colonization level in nonsterilized soil inoculated with VAM also observed by Bagyraj and Manjunath (1980) in Cotton, Cowpea and Finger millet. Present investigation clearly indicates that *Vigna mungo* (L.) Hepper responds well to *Glomus fasciculatum*. VAM inoculation in combination with Phosphate at all levels increased Protein content and grain yield in both non sterilized and sterilized soil. Similar trend was observed by [Kanade A. M. and Bhosale R. S. (2010);(2013)a, (2013)b, (2013)c, (2013)d]

in *Elusine coracona, Dolichos lab-lab, Sida acuta and Casia tora.,* [Kanade A. M (2012)a, (2012)b, (2012)c] in *Sesbania grandiflora, Setaria italic and Punica indica;* Kanade, A.M. (2013) in *Spinaceae oleracea,* Kanade, A.M. (2014) in *Amaranthus blitum* and Kanade A. M (2015) in *Buchanania lanzan.*

Table 1: Growth performance of *Vigna mungo* (L.) Hepper in response to various levels of phosphate and VAM in non sterilized and sterilized soil.

Soil type	**Non sterilized**					
Set	I	II	III	IV	V	VI
Treatments	UP00	IP00	UP100	IP100	IP75	IP50
Parameters	*	*	*	*	*	*
Grain biomass /plant (gm)	7.0	7.45	7.50	7.55	7.43	7.40
Protein content (%)	25.2	25.5	25.8	25.9	25.4	25.3
% VAM Colonization	00	46	00	42	31	53
Spore count (Per 50 gm of soil)	00	16	00	29	33	38

Soil type	**Sterilized**					
Set	I	II	III	IV	V	VI
Treatments	UP00	IP00	UP100	IP100	IP75	IP50
Parameters	*	*	*	*	*	*
Grain biomass /plant (gm)	8.0	8.35	8.40	8.45	8.32	8.30
Protein content (%)	25.4	25.8	25.6	25.7	25.6	25.7
% VAM Colonization	00	13	00	62	30	40
Spore count (Per 50 gm of soil)	00	12	00	30	31	38

UP00 (Control , un-inoculated, without phosphate & VAM). **IP00** (VAM Inoculated, without phosphate). **UP100** (VAM un-inoculated with 1gm phosphate per pot). **IP100** (VAM Inoculated with 1gm phosphate per pot). **IP75** (VAM Inoculated with 0.75gm phosphate per pot). **IP50** (VAM Inoculated with 0.50gm phosphate per pot) Standard deviation (SD)

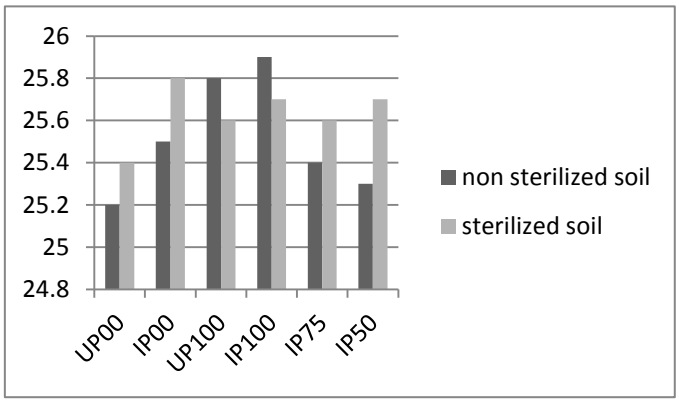

Figure 1. Influence of VAM on grain yield in sterilised and non sterilized soil at various levels of phosphates in *Vigna mungo* (L.) Hepper

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