

## SHORT COMMUNICATION

## Effect of VAM fungi on enhancement of Phosphorus in Okra

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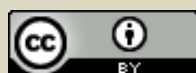
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**ABSTRACT**

The effect of VAM fungi on phosphorus uptake in three cultivars of okra were studied. The experimental data revealed that in cultivar Parbhani kranti the phosphorus content per 100 gm ash was found less in control plant as compared to the plants inoculated by *Glomus fasciculatum* and *Gigaspora gigantea*. In Arkanamika, the maximum phosphorus content was found in plants, inoculated by *Glomus fasciculatum* and *Gigaspora gigantea*. While in selection - 51, the less amount of phosphorus was noted in control plants than mycorrhizal plant.

**Key words :** Okra ( Bhindi) , VAM fungi , Phosphorus

**INTRODUCTION**

Okra (Bhindi) is an annual crop used as a vegetable and marketed in the fresh state. It is now well established that VA mycorrhizae increases uptake of phosphorus from the soil and provides to the growing plant (Bolan, 1991). Mycorrhizal roots take up more phosphorus than non-mycorrhizal plants. The improved growth of mycorrhizal plant is the result of increase of Phosphate uptake. The enhancement of Phosphorus and other nutrients by AM fungal hyphae is the primary mechanism responsible for plant growth stimulation which includes root and shoot length (Hayman, 1980) Considering the importance of Okra as an important vegetable in daily life and role of VAM fungi in enhancement of phosphorus and vigorous plant growth, present paper is attempted

**MATERIALS AND METHODS**

**Selection of plant:** Three important local crop varieties of Bhindi Viz, parbhani kranti, Arkanamika, selection-51 were used to study the response of VAM fungi. Pot culture experiments were conducted. Various parameters were recorded.

**Inoculation of endomycorrhizae:** Endomycorrhizal fungal inoculum containing extramatrical chlamydospores, infected root segments and hyphae having the uniform infective propagules were prepared.

Inoculation was done by the layering method (Jackson et al 1972). Endomycorrhizal inoculum 100 gm was spread over the soil surface by hand to form a thin layer and over which 2 cm soil was added. Five surface sterilized seeds were placed on the surface and pushed down to 1 cm depth. Five days after germination the seedlings were thinned leaving 2 seedlings per pot.

**Estimation of Dry matter:** The dry matter was calculated by weighing the sampling after drying to a constant weight in an oven at  $95 \pm 5^\circ\text{C}$  for this 100 gm of sample was taken in a clean dry pre-weighed tray and was kept in oven for 48 hours till constant weight. The dried samples were usually ground to a fine powder and stored in sealed container for further analysis.

**Preparation of acid soluble ash:** The solution of 5 N HCl were prepared by taking 41.7 ml concentrated HCl. It was added in 100 ml distilled water. From the 5 N HCl 50 ml solution was taken and added in crucible containing ash. The mixture was heated for 30 minutes in a water bath. It was cooled and filtered through Whatman No.42 filter paper. The filter paper was washed with water until washings are free from acid. It was made to 100 ml by adding distilled water. It was then used for estimation of phosphorus and calcium.

**Estimation of phosphorus (P):** 0.5 ml of acid soluble portion of ash was taken in a test tube. It was diluted to a volume of 10 ml with distilled water. Simultaneously a blank was taken containing 10 ml distilled water. Then 1 ml molybdate solution were added to each test tube and mixed thoroughly. Then added 0.4 ml ANSA reagent and again mixed well. It was then allowed to stand for 5 minutes and read optical density (O.D.) at 660 nm using colorimeter by setting it to zero with the blank. Later on O.D. of standard phosphorus solution was established by preparing a standard graph containing 0 to 1 ml standard phosphorus solutions in series of test tubes. The amount of phosphorus in an

aliquot was determined with the help of standard graph and calculated the phosphorus content in the plant sample considering its amount taken for ashing volume of the acid soluble ash and amount of aliquot used for the reaction (Mungikar, 1999).

## RESULTS AND DISCUSSION

The response of three cultivars Parbhani kranti, Arkanamika and selection - 51 was tested in terms of phosphorus uptake by *Glomus fasciculatum* and *Gigaspora gigantea*. (Table 1) The results revealed that in Parbhani kranti the phosphorus content was found less (78.95 mg) in control plant as compared to the plants inoculated by VAM fungi. The uptake of phosphorus was 103.5 mg per 100 gm of ash in plant inoculated by *Glomus fasciculatum*. The less (98.25) amount of uptake was noted in plant inoculated by *Gigaspora gigantea*. In cultivar Arkanamika, the amount of phosphorus uptake was minimum (70.2) in plant not inoculated by VAM fungi. The phosphorus uptake was found to be 87.75 mg in plants inoculated by *Glomus fasciculatum*. The *Gigaspora gigantea* inoculated plant showed 84.2 phosphorus content uptake.

In cultivar selection - 51 the control (non-inoculated) plant shows minimum (52.65) amount of phosphorus uptake as compared to test plants. The plant inoculated by *Glomus fasciculatum* shows maximum (56.15) uptake as compared to control plant and it is minimum as compared to plant inoculated by *Gigaspora gigantea*. By comparing the data of all three varieties Parbhani kranti was showing maximum enhancement and uptake of phosphorus mg per 100 gm of soluble ash and minimum in selection -51. By comparing the phosphorus uptake content it can be concluded that *Glomus fasciculatum* found most effective in enhancement. The phosphorus content was (98.25) in plants inoculated by *Gigaspora gigantea* similar results

**Table 1. Effect of VAM fungi on phosphorous uptake in three cultivars of okra**

Treatment	Parbhani kranti (cv <sub>1</sub> )	Arkanamika (cv <sub>2</sub> )	Selection - 51 (cv <sub>3</sub> )
	P mg/100 gm Ash	P mg/100 gm Ash	P mg/100 gm Ash
Control	78.95	70.2	52.65
<i>Glomus fasciculatum</i>	103.5	87.75	56.15
<i>Gigaspora gigantea</i>	98.25	84.2	63.15
SE	7.47	5.36	3.09
CD at 5%	19.20	13.78	7.94

are recorded in *Mentha piperata* in which enhancement and significant rise in phosphorus uptake was recorded more in plants inoculated with *Glomus fasciculatum* than the *Glomus mosseae* and control plant, so the *Glomus mosseae* can be used efficiently for improving the growth and productivity. The increase of nutrient phosphorus was attributed to increase root colonization (Umadevi and Sitaramaiah, 1998). The VA mycorrhizal fungi increase the absorption of relatively immobile elements as phosphorus by increasing the absorptive area beyond the root hairs. In Arkanamika, the maximum phosphorus content was found in plants, which was inoculated by *Glomus fasciculatum* and *Gigaspora gigantea*. In cultivar selection - 51 the less amount of phosphorus was noted in control plants not inoculated by VAM fungi and maximum in plants inoculated by VAM fungi. By comparing all the three cultivars Parbhani kranti was found more susceptible to VAM fungi and *Glomus fasciculatum* as effective in enhancement of phosphorus content. The probable reasons for the enhanced phosphate uptake rate by mycorrhizal plants may be due to better distribution of the absorbing net work, more favourable geometry of hyphae as compared to the roots occupying greater surface area and faster extension rate, increased functional longevity, chemical alteration of rhizosphere and uptake kinetics. The values of phosphorus uptake was significant at 5 % level.

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