



Full Length Research Article

EFFECT OF VAM FUNGI ON ENHANCEMENT OF CALCIUM IN OKRA

*Darade, M. S.

Department of Botany, Govt. Science College, Gadchiroli, India

ARTICLE INFO

Article History:

Received 27th May, 2014
Received in revised form 06th June, 2014
Accepted 24th July, 2014
Published online 31st August, 2014

Keywords:

Okra (Bhindi),
VAM Fungi, Calcium.

ABSTRACT

The effect of VAM fungi on Calcium uptake in three cultivars of Okra was recorded by giving inoculation treatment of *Glomus fasciculatum* and *Gigaspora gigantea*. The data revealed that in cultivar Parbhani kranti, non-mycorrhizal plant has shown less amount of calcium uptake in mg per 100 gm, while the plants inoculated by *Glomus fasciculatum* and *Gigaspora gigantea* shown maximum uptake. In Arkanamika and Selection-51 also the high amount of calcium was noted in mycorrhizal plants than in non mycorrhizal plant.

Copyright © 2014 Darade. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

The mycorrhizal fungi are members of the microbial population of the root region and they can compete with other members of that population sufficiently to have a unique niche. Enhancement of Phosphorus uptake and other nutrients by fungal hyphae is the primary mechanism responsible for plant growth stimulation by VAMycorrhiza (Bolan, 1991). Considering the importance of Okra as a vegetable and role of VAM fungi in uptake of soil nutrients especially Calcium, the present paper is attempted.

MATERIALS AND METHODS

Selection of plant

Three important local crop varieties of Bhindi Viz, Parbhani kranti, Arkanamica, Selection-51 were used to study the response of VAM fungi. Pot culture experiments were conducted and various parameters were recorded.

Inoculation of endomycorrhizae (VAM fungi)

Fungal inoculum containing extramatrical chlamydospores, infected root segments and hyphae having the uniform infective propagules were prepared.

Inoculation of VAM fungi was done by the layering method (Jackson *et al.*, 1972). Mycorrhizal 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 surfaces 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 / pot.

Estimation of calcium (Ca)

25 ml Aliquot of the acid soluble ash portion was diluted to about 150 ml with distilled water. Few drops of methyl red were added and the mixture was neutralized with ammonia (NH₃) solution till the pink colour changes to yellow. The solution was heated to boiling and 10 ml ammonium oxalate solution was added. The mixture was allowed to boil for a few minutes. Glacial acetic acid was then added till distinctly pink colour reappears. The mixture was then kept aside for 12 to 24 hours at room temperature. When the precipitate of calcium oxalate settles down, it was then filtered thorough Whatman filter paper No. 42. The precipitate was washed several times with water to make it free from acid. It was then transferred in a small beaker by piercing a hole in the filter paper and by pouring over it about 15 ml 2NH₂ SO₄. This was heated to above 40°C and titrated against 0.01 N KMnO₄ solution until the first drop, that gives the solution a pink colouration persisting for at least 30 second. The amount of Ca was calculated as 1 ml of KMnO₄ = 0.2004 mg of Ca.

*Corresponding authors: M. S. Darade

Department of Botany, Govt. Science College, Gadchiroli, India.

Table 1. Effect of VAM fungi on Calcium uptake in three cultivars of Bhindi

Treatment	Parbhani kranti (cv ₁)	Arkanamika (cv ₂)	Selection - 51 (cv ₃)
	Ca mg/100 gm Ash	Ca mg/100 gm Ash	Ca mg/100 gm Ash
Control	669.2	745.4	717.4
<i>Glomus fasciculatum</i>	781	793	753
<i>Gigaspora gigantea</i>	769	757	729
SE	35.44	14.33	10.48
CD at 5%	91.08	36.83	26.93

RESULTS AND DISCUSSION

The cultivar Parbhani kranti, Arkanamika and Selection – 51 was assayed against the two VAM fungi *Glomus fasciculatum* and *Gigaspora gigantea* in terms of calcium content and their uptake. The experimental data revealed (Table 1) that in cultivar Parbhani kranti the non inoculated control plant shown 669.2 mg of calcium per 100 gm soluble ash which is less as compared to the plants inoculated. The plant inoculated by *Glomus fasciculatum* shown maximum uptake of calcium (781 mg) over the plant inoculated with *Gigaspora gigantea*. In cultivar Arkanamika the calcium uptake content in control plant was 745.4 mg while the plant inoculated with *Glomus fasciculatum* shows maximum (793) calcium content over to the control and plant inoculated by *Gigaspora gigantea*. While in Selection – 51 the control plant shows the minimum amount of calcium uptake (717.4) as compared to the VAM inoculated plant. By comparing all the three cultivars it was found that, maximum calcium uptake due to VAM fungal inoculation was in Arkanamika and minimum in Selection – 51. The data revealed that in Parbhani kranti, the non-mycorrhizal control plant has shown less amount of calcium uptake in mg per 100 gm but the plants inoculated by *Glomus fasciculatum* and *Gigaspora gigantea*. The uptake of Calcium may be attributed to polyphosphate granules that serve as means for hyphal transport. The similar results were recorded (Jadhav and Patil, 1992) in Groundnut plant.

The inoculation of VAM fungi significantly increased Calcium uptake. In Arkanamika the high amount of calcium was noted in mycorrhizal plants inoculated with *Glomus fasciculatum* and *Gigaspora gigantea* while in Selection – 51 the content of calcium was less in control plant while maximum in mycorrhizal plants. By comparing three cultivars Arkanamika has shown maximum calcium uptake due to the inoculation of VAM fungi but the effect of *Glomus fasciculatum* was significant than the *Gigaspora gigantea*. The values of the cultivars and treatments given are significant at 5 % level.

REFERENCES

- Bolan, N.S. 1991. A critical review on the role of mycorrhizal fungi in the uptake of Phosphorus by plants. *Plant and Soil* 143 : 189 – 207
- Jackson, N.E; Franklin, R.E. and Miller, R.H. 1972. Effects of vesicular-arbuscular mycorrhizal fungi on growth and phosphorus content of three agronomic crops. *Soil Sci. Soc. Amer. Proc.* 86: 64-67.
- Jadhav and Patil, 1992. Jadhav, D.N. and Patil, M.S. 1992. Effect of native VA mycorrhizal fungi inoculation on growth and mineral nutrient uptake of groundnut (*Arachis hypogea* L.) cv. JL.24, *Proc. Indian Sci. Congr. Ass. Baroda, Vol. 79, Pt. III, Sect. VIII, pp.* 38.
- Mungikar A.M. 1999. *Intercropping fodder crops*. Saraswati publishing, Aurangabad. pp. 140 – 147.
