

Effect of VAM fungi on enhancement of chlorophyll pigment in *Abelmoschus esculentus* L.

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Abstract : The effect of VAM fungi on enhancement of chlorophyll pigment in three cultivars of Okra was studied . The experimental data revealed that, in Parbhani Kranti variety less amount of total chlorophyll content (0.317 mg) was recorded in control plant while the maximum chlorophyll content (0.501 and 0.382) was noted in plants inoculated with *Glomus fasciculatum* . In Arkanamika the total chlorophyll content was maximum in plants inoculated with *Glomus fasciculatum* and *Gigaspora gigantea*, which was much more than the non-inoculated plants. In Selection – 51, the total chlorophyll content was maximum in plants inoculated by VAM fungi., In Parbhani kranti *Glomus fasciculatum* was found effective in enhancement of total chlorophyll content as compared to *Gigaspora gigantea*. while in Arkanamika and Selection – 51, *Gigaspora gigantea* was found to be most effective than the *Glomus fasciculatum* in enhancement of total chlorophyll content.

Index Terms : *Abelmoschus esculentus* L., VAM fungi (*Glomus fasciculatum* and *Gigaspora, gigantea*), Chlorophyll pigment

1 INTRODUCTION :

Okra (Bhindi) is an annual vegetable crop, its tender green fruits are used as vegetable and are generally marketed in the fresh state. It's all plant parts are used for various purposes. The chlorophyll pigment plays an important role in overall growth of plants. The VA mycorrhizal fungi are members of the microbial population of the root region. Its association with roots of plant help to maintain the general plant vigour under a variety of adverse and inhospitable ecological conditions.

By considering the role of VAM fungi in growth of plants and importance of Okra as a vegetable crop present work was attempted .

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2 MATERIALS AND METHODS

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

2.2 Inoculation of VAM fungi : Fungal inoculums containing extramatrical chlamydospores, infected root segments and hyphae having the uniform infective propagules were prepared .Inoculation with VAM fungi was done by the layering method (Jackson et al [3]. 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 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 / pot.

2.3 Estimation of Chlorophyll :Chlorophyll content was estimated with method suggested by (Arnon, [1].One gm of finely cut leaf were taken, washed by distilled water, blotted to dry and kept into a clean mortar and pestle, later on it was made to a fine pulp with the addition of 20 ml of 80% acetone. It was then centrifuged at 5000 rpm for 5 minutes, The supernatant was then transferred to a 100 ml volumetric flask. Same procedure was repeated until the pulp

residue becomes colourless. The mortar and pestle was thoroughly washed with 80% acetone and clear washing was transferred to the volumetric flask. Total 100 ml Volume extract was made in flask with addition of 80% acetone. Then absorbance was measured at 645 nm 663 nm and 652 nm against the 80% acetone as blank. The amount of chlorophyll pigment present in the extract was estimated as mg chlorophyll per gram plant tissues and calculated by the formula.

$$\text{Chlorophyll a} = 12.7 (A_{663}) - 2.69 (A_{645}) \times \frac{V}{1000 \times W}$$

$$\text{Chlorophyll b} = 22.9 (A_{645}) - 4.68 (A_{663}) \times \frac{V}{1000 \times W}$$

$$\text{Total Chlorophyll (a+b)} = 20.2 (A_{645}) + 8.02 (A_{663}) \times \frac{V}{1000 \times W}$$

Here , A= Absorbance at specific wavelength,
V= Final volume of chlorophyll extract in 80% acetone.

W = Fresh weight of the tissue extracted.

3 RESULTS AND DISCUSSION

The effect of *Glomus fasciculatum* and *Gigaspora gigantea* was assessed on cultivars(cv) of Okra viz. Parbhani kranti, Arkanamika and Selection – 51 (Table 1). The experimental data revealed that in Parbhani kranti variety less amount of total chlorophyll content (0.317 mg) was recorded in control plant, while the maximum chlorophyll content (0.501 and 0.382) was noted in plants inoculated with *Glomus fasciculatum* and *Gigaspora gigantea*. In Arkanamika, the chlorophyll content was more (0.701 and 0.721) in plants inoculated by VAM fungi than the control plant not inoculated by these fungi. In selection – 51, the less amount of total chlorophyll was 0.491 mg found in the plant not inoculated by the treatment fungi it was less as compared to the plant inoculated by *Glomus fasciculatum* and *Gigaspora gigantea* showing the total chlorophyll content 0.544 and 0.556 mg per gram of fresh plant leaves.

Table 1. Effect of VAM fungi on enhancement of chlorophyll pigment in three cultivars of Okra (See at the end)**

In cultivar cv₁ the chlorophyll a content was minimum (0.122) as compared to the VAM inoculated plants (0.178 and 0.155) the chlorophyll b pigment was maximum as compared to chl. a in control as well as test plant. In cultivar cv₂ the chlorophyll was minimum in control plant (0.202) than the plants inoculated by *Glomus fasciculatum* and *Gigaspora gigantea*. While the chlorophyll b content was maximum than the ch. a content in control as well as VAM inoculated plants. In cultivar cv₃ the chl. a was less (0.154) than the plants inoculated with VAM fungi showing maximum chlorophyll pigment a (0.203 and 0.187). In this variety also the chlorophyll b pigment was maximum in control and test plants as compared to chlorophyll a. By comparing the three cultivars of okra cv₁, cv₂ and cv₃ the maximum amount of total chlorophyll pigment was recorded in cv₂ (Arkanamika) and minimum in Parbhani kranti. The values of chlorophyll a, b and total chlorophyll along with treatments of VAM fungi are not significant at 5 % level.

The effect of *Glomus fasciculatum* and *Gigaspora gigantea* was studied on three different cultivars (Parbhani kranti, Arkanamika and Selection – 51) of okra. The data revealed that in Parbhani kranti the content of Chl. a chl.b are less as compared to the plants inoculated by VAM fungi. The total chlorophyll content was maximum in plants inoculated by *Glomus fasciculatum* as compared to the control non-inoculated plants. The effect of inoculation of *Gigaspora gigantea* was much more than the control plant by less than the plant inoculated by *Glomus fasciculatum*. Similar types of results were obtained in Onion plants. The response of *Glomus mosseae*, *Glomus fasciculatum*, *Acaulospora laevis* was studied in Onion plants. In this *Glomus mosseae* found to be the most efficient in colonizing the roots and improved

the plant height and showed high content of chlorophyll (Haripriya and Sekharan, [2]

In Arkanamika also the total chlorophyll content was maximum in plants inoculated with *Glomus fasciculatum* and *Gigaspora gigantea*, which was much more than the control non-inoculated plants. In Selection – 51 the total chlorophyll content was maximum in plants inoculated by VAM fungi. By comparing all the three cultivars Chl. a Content was maximum in Arkanamika and Chl. b was maximum also in Arkanamika and by comparing two VAM fungi, it was found that in Parbhani kranti *Glomus fasciculatum* was found effective in total chlorophyll content than *Gigaspora gigantea*. While in Arkanamika and Selection – 51 *Gigaspora gigantea* was found to be most effective than the *Glomus fasciculatum* in enhancement of total chlorophyll content. The data revealed that the treatments are not significant at 5 % level.

4 CONCLUSION

The VAM fungi viz *Glomus fasciculatum* and *Gigaspora gigantea* present in soil plays an important role as biofertilizer and biocontrol agent . It helps in absorption of mineral nutrients from the soil and provide to the growing plant due to which there is an increase in growth parameters and photosynthetic pigments .

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**** Table 1. Effect of VAM fungi on enhancement of chlorophyll pigment in three cultivars of Okra**

Treatment	Parbhani kranti (cv ₁)			Arkanamika (cv ₂)			Selection - 51 (cv ₃)		
	Chl. a mg / gm	Chl. b mg / gm	Total Chl. mg / gm	Chl. a mg / gm	Chl. b mg / gm	Total Chl. mg / gm	Chl. a mg / gm	Chl. b mg / gm	Total Chl. mg / gm
Control	0.122	0.195	0.317	0.202	0.451	0.653	0.154	0.337	0.491
<i>lomus fasciculatum</i>	0.178	0.323	0.501	0.209	0.492	0.701	0.203	0.341	0.544
<i>Gigaspora gigantea</i>	0.155	0.227	0.382	0.257	0.464	0.721	0.187	0.369	0.556
SE	0.02	0.04	0.05	0.02	0.01	0.02	0.01	0.01	0.02
CD at 5%	0.05	0.10	0.13	0.05	0.03	0.05	0.03	0.03	0.05