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A PRELIMINARY SURVEY OF THE VESICULAR ARBUSCULAR MYCORRHIZAL STATUS OF VEGETABLE AND FRUIT YIELDING PLANTS IN EASTERN U.P.

NAVEEN KRISHNA SRIVASTAVA[a1], DEEPAK KUMAR SRIVASTAVA[b] AND POONAM SINGH[c]

[a]Department of Botany, S.D.J. (P.G.) College, Chandeshwar, Azamgarh, U.P., India
E-mail : naveen.srivastava15@yahoo.com
Department of Botany, A.B.R.P.G. College, Anpara, Sonebhadra, U.P., India
[b]E-mail: drdeepak76@gmail.com
[c]E-mail: drps.india@gmail.com

ABSTRACT

Ten vegetable and fruit yielding plants were investigated for VAM fungal association. The vegetables were ash gourd, water melon, ivy gourd, musk melon, cucumber, pumpkin, bottle gourd, ridged gourd, bitter gourd and snake gourd. Presence of 23 VAM fungi associated with these plants were identified up to species level. Data on qualitative composition and specific association with host plants has been generated. *Glomus* was represented by 10 species, *Acaulospora* by six species, *Scutellospora* by three species, *Gigaspora* by three species and *Entrophospora* was represented by one species.

KEYWORDS: Vesicular Arbuscular Mycorrahiza, Vegetable and fruit yielding plants

Mycorrhizal fungi are key components of soil microbiota and obviously interact with other microorganisms in rhizosphere. Mycorrhizal association changes several aspects of plant physiology, nutritional and physical properties of the rhizosphere soil. Different types of mycorrhizal association have been observed in a wide range of land plants. Endomycorrhizae (arbuscular mycorrahizal fungi) belong to phylum Glomeromycota. The plant symbionts range from bryophytes to angiosperms. Septate hyphae enter the root cortical cells and form characteristic arbuscules and vesicles but, they do not enter the vascular system. VAM fungi colonize the fine absorbing roots of plants, invade into the cytosol of cortical cells and form specialized structures intracellular and intercelluarly known as arbuscules and vesicles, respectively. VAM fungi act as soil conditioner and play an important role in preventing rapid degradation of environment (Gosal et al., 2000). It is well known that VAM fungi enhance the plant growth by providing extra absorptive surface which takes up relatively immobile compounds in the soil (Bagyaraj, 1992). Mycorrhizal association benefits higher plants by improving water and nutrient uptake storage of carbohydrates and oils. VAM fungal association protects the plants from soil-borne diseases and detoxifies soil contaminants of certain metals. The spore count, root colonization, species diversity and dominant species, varies with the region and soil nutrient conditions. VAM fungi increases tolerance to heavy metals, salinity and drought (Henning 1993). VAM fungi have been proved to increase the productivity of several cereals, pulses, oilseed crops, vegetable crops, medicinal plants and also ornamental plants. The VAM fungi are obligate symbionts and not host specific (Bonfonte-Fasolo, 1987). In the present work VAM fungi associated with vegetable and fruit yielding plants were investigated to understand their qualitative composition.

MATERIALS AND METHODS

The plant materials used for the present study were collected from different fields of Azamgarh, Jaunpur, Akbarpur and Mau districts of eastern U.P. Vegetable and Fruit yielding plants were *Benincasa hispida* (Thunb.) Cogn., *Citrullus lanatus* (Thunb.) Manf., *Coccinia indica* W.LA., *Cucumis melo* L., *Cucumis sativus* L., *Cucurbita maxima* Duch., *Lagenaria vulgaris* Ser., *Luffa acutangula* (L.) Roxb., *Momordica charantia* L., and *Trichosanthes anguina* L.

Root samples were rinsed with tap water, cleared in 10% KOH (30 min, 900C), acidified in lactic acid (10 min) and stained with 0.5% Trypan blue (Phillips and Hayman, 1970). Fifty pieces of 0.5-to-1-cm root segments were examined per sample for their vesicular arbuscular mycorrahizal status and presence of fungal structures under a compound microscope.

Rhizosphere soil samples of some vegetable and fruit yielding plants were collected from different fields of Azamgarh, Jaunpur, Akbarpur and Mau districts of Eastern U.P. VAM fungal propagules were isolated from the soils by

[1]**Corresponding author**

wet-sieving and decanting method (Gerdemann and Nicolson ,1963). The identification was based on morphotaxonomic criteria (Schenck and Perez, 1990).

RESULTS AND DISCUSSION

VAM fungal structures, i.e. arbuscules vesicles intra radical aseptate hyphae and appressoria were observed in all plant species (Table-1). However, the colonization patteren and rate varried among the plant species. Vesicles and aseptate hyphae were the most frequent structures present in the plants studies. Vesicles were observed in the roots of all species, where as, arbuscules were observed only in 6 plant species.

The results are represented as per Schubler et al., (2001). Altogether 23 VAM fungal species belonging to five genera were isolated from the rhizosphere soils of 10 vegetable and fruit yielding plants (Table -2). The rhizosphere soils of all these plants were supported by a good number of VAMF propagules. A maximum level of propagules was recorded in the samples of *Momordica charantia* followed by *Coccinia indica* and the minimum of propagules were in the soil samples of *Benincasa hispida.* Among 23 VAM fungal species which were isolated in this study, *Glomus* was represented by 10 species, *Acaulospora* by 6 species, *Scutellospora* by 3 species, *Gigaspora* by 3 species each. This data shows the predominance of Glomus and *Acaulospora* species in the rhizosphere soils of plants.

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Table 1:Vesicular Arbuscular Mycorrhizal fungus status in the roots of vegetable and fruit yielding plants

S.N.	Host Plants	Fungal Structure	Colonization rate (%)	Spore density (number per 20gm)
1.	*Benincasa hispida* (Thunb.) Cogn. (Ash gourd)	ap, ar,v,h	27.0	26
2.	*Citrullus lanatus* (Thunb.) Manf. (Water melon)	v, h	13.1	6
3.	*Coccinia indica* W. I. A. (lvy gourd)	v, h	10.1	8
4.	*Cucumis melo* L. (Musk melon)	ar, r, h	21.5	66
5.	*Cucumis sativus* L. (Cucumber)	ar, r, h	31.6	28
6.	*Cucurbita maxima* Duch. (Pumpkin)	v, h	41.2	60
7.	*Lagenaria vulgaris* Ser. (Bottle gourd)	ar, r, h	43.2	38
8.	*Luffa acutangula* (L.) Roxb. (Ridged gourd)	ap, ar, r, h	40.5	44
9.	*Momordica charantia* L. (Bitter gourd)	v, h	12	10
10.	*Trichosanthes anguina* L. (Snake gourd)	ar, r, h	31.7	50

ap- Appressoria, ar- arbuscules, h- hyphae, v-vesicle

Table 2: Vesicular Arbuscular Mycorrhizal fungi associated with vegetable and fruit yielding plants

Host Plants	VAM fungal species (No.)
Benincasa hispida (Thunb.) Cogn. (Ash gourd)	*Acaulospora foveata, A. laevia, Gigaspora candida, Glomus fasciculatum, Gl. multisubtensum and Scutellospora heterogama* (6)
Citrullus lanatus (Thunb.) Manf. (Water melon)	*Acaulospora bireticulata, A. gerdemannii, A. nicolsonii, Gigaspora margarita, Glomus fasciculatum, Gl. glomeratum, Gl. multicaule and Gl. rubiformis* (8)
Coccinia indica W. I. A. (lvy gourd)	*Acaulospora bireticulata, A. mellea, A. nicolsonii, Gigaspora candida, G. margarita, Glomus constrictum, Gl. fasciculatum, Gl. heterosporum, Gl. macrocarpum, Gl. minuta, Scutellospora calospora and S. scutata* (12)
Cucumis melo L. (Musk melon)	*Acaulospora bireticulata, A. gerdemannii, Entrophospora columbiana, Glomus fasciculatum, Gl. glomeratum, Gl. multicaule and Gl. multisubtensum* (7)
Cucsativus L. (Cucumber)	*Acaulospora laevis, A. nicolsonii, Gigaspora gigantea, Glomus fasciculatum, Gl. fistulosum, Gl. macrocarpum, Gl. multicaule and Gl. sinuosa* (8)
Cucurbita maxima Duch. (Pumpkin)	*Acaulospora mellea, Gigaspora margarita, Glomus citricola, Gl. macrocarpum and Gl. minuta* (5)
Lagenaria vulgaris Ser.(Bottle gourd)	*Acaulospora dilatata, A. laevis, A. nicolsonii, Gl. fasciculatum, and Scutellospora heterogama* (5)
Luffa acutangula (L.) Roxb. (Ridged gourd)	*Acaulospora bireticulata, Entrophospora columbiana, Gigaspora candida, Glomus fasciculatum, Gl. macrocarpum, Gl. minuta and Gl. sinuosa* (6)
Momordica charantia L. (Bitter gourd)	*Acaulospora bireticulata, A. mellea, A. nicolsonii, A. spinosa, Glomus citricola, Gl. fasciculatum, Gl. fistulosum, Gl. glomeratum, Gl. heterosporum, Gl. macrocarpum, Gl. rubiformis, Gl. sinuosa and Scutellospora scutata* (13)
Trichosanthes anguina L. (Snake gourd)	*Acaulospora elegans, A. foveata, Gigaspora gigantea, Glomus fasciculatum, Gl. glomeratum, Gl. macrocarpum, Gl. multisubtensum, Scutellospora calospora and S. scutata* (9)

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