Print ISSN: 0976-2876 Online ISSN: 2250-0138

Available online at: http://www.ijsr.in

INDIAN JOURNAL OF SCIENTIFIC RESEARCH

DOI:10.32606/IJSR.V16.I1.00008

Received: 15-03-2025 Accepted: 27-05-2025 Publication: 31-08-2025

Indian J.Sci.Res. 16 (1): 49-51, 2025 Original Research Article

STUDIES ON MYCORRHIZAL STATUS OF SOME HORTICULTURAL PLANTS IN AMBEDKARNAGAR (AKBARPUR) INDIA

SEEMA PATEL[a1], R.K. PANDEY[b] AND N.K. SRIVASTAVA[c]

[abc]Department of Botany, S.D.J. P.G. College, Chandeshwar, Azamgarh, U.P., India

ABSTRACT

Horticulture encompasses the cultivation of a wide array of plants including fruits, vegetables, ornamental plants, and flowers. Some examples of plants grown in horticulture include Mango, Coconut, Banana, Arecanut, Sapota, Pomegranate, Tomato, Brinjal, Chilli, Aster, Jasmine, Litchi, Apple, Bitter gourd, Rose, Croton and Chrysanthemum etc. Mycorrhiza is a mutualistic association between fungi and higher plants. The term 'Mycorrhiza' in its broadest sense in the non-pathogenic association of fungi and the roots of higher plants. It has been observed that VAM fungal inoculatia provides beneficial results in the plant growth both in controlled and open field condition. The present study was conducted in Akbarpur district where the plants are grown throughout the year to observe VAM fungal genera that are associated with 16 plants.

KEYWORDS: VAM Fungi, Horticultural Plants and Akbarpur

Mycorrhiza is a mutualistic association between fungi and higher plants (Menge 1983). Frank (1885) coined the term mycorrhizae. The Term 'mycorrhiza' in its broadest sense is the non-pathogenic association of fungi and the roots of higher plants. The root fungus association is symbiotic, and the whole association is considered as a 'functionally district organ' involved in mineral nutrient uptake from the soil (Kar 1993).

Horticulture, the branch of plant agriculture dealing with garden crops, generally fruits, vegetables and ornamental plants. The word is derived from the Latin Hortis = garden and colere = to cultivate. As a general term, if covers all forms of garden management, but in ordinary use it refers to intensive commercial production. In terms of scale, horticulture falls between domestic gardening and field agriculture, though all forms of cultivation have close links.

Horticulture is divided into the cultivation of plants for food (Pomology & Oliriculture) and plants for Ornamental (Floriculture and Landscape horticulture). Pomology deals with fruit and nut crop. Oliriculture deals with herbaceous plants for the Kitchen, including. For example Carrots (edible root), Asparagus (edible stem), Lettuce (Edible leaf), Cauliflower (Edible flower buds), Tomatoes (edible fruit) and Pea (edible seed). Floriculture deals with the production of flowers and ornamental plants, generally, cut flowers, pot plants and greenery. Landscape horticulture is a broad category that including plants for the landscape shrubs, trees and vines.

Different types of important horticultural crops are Fruits (Mango, Banana, Apple, Grapes, Citrus, Berries etc), Vegetables (Tomatoes, Peppers, Carrots, Potato, Onion and Lettuce etc.), Flowers (Roses, Orchids, Chrysanthemums, Jasmine and many other), Nuts (Almonds, Cashews, Walnuts etc.), Ornamental plants (Trees, Shrubs and ground cover used for landscaping and decoration), Spices (Black Papper, Cardamum, Chilli, Cinnamon etc.), Medicinal plants and Plantation crops. Hence, a study survey was conducted in Akbarpur district, where the vesicular plants are grown throughout the year to observed vesicular arbuscular mycorrhizal (VAM) fungal genera that are associated with 16 plants.

MATERIALS AND METHODS

District Ambedkarnagar (Akbarpur) situated in the eastern part of Uttar Pradesh. Ambedkarnagar district covers 2350 Squar Km. Geographical area, lying between latitude 26^0 09' N and 26^0 40' and longitude 82^0 13' N and 83^0 09' N with its head quarters at Akbarpur. It was carved out as spate district from Faizabad district in 1995 and bounded in the south and south east by Faizabad and Sultanpur districts respectively. Azamgarh district lies to the south east and west. Northern boundary is flanked by Ghaghra Rives, across which lies Basti and Sant Kabirnagar district. Gorakhpur district shares the boundary with the district in the northwest corner. Its located on the fertile Gangetic plains, near the Tamsa (Tons) River. The region experience a subtropical climate with hot, humid summers and cool winters.

[1]Corresponding author

Collection of different plants with their roots and soil were done randomly around Akbarpur in three replications. Root samples were washed in tap water and cut into one centimeter pieces in length. Root samples were cleared and stained using Phillips and Hayman (1970) technique. Root colonization was measured according to the Giovannetti and Mosse (1980) method. 100 Gram of rhizosphere soil samples were analyzed for their spore isolation by wet sieving and decanting method Gerdmann and Nicolson (1963). Identification of VAM fungal genera up to species level was done using the Manual for Identification by Schenck and Perez (1990).

RESULTS AND DISCUSSION

Plants species along with their VAM fungi characterizations are presented in the Table 1. All the tested plants were colonized by VAM fungi. The percentage of colonization was highest in *P. guajava* (94%), than other plants whereas, lowest percentage found in *L. erecta* (34%). Hyphal and vesicular types of colonization were found in roots of different plant. Hyphae were almost common in all tested plants. Maximum number of spores (309) was observed in rhizosphere soil of *P. guajava*. Minimum number of spores (20) was observed in rhizosphere soil of *C. officinalis*. Four genera were observed, viz. *Acaulospora* spp., Gigaspora spp., *Glomus* spp. and *Scutellospora* spp. Highest number of VAM fungal genera and species were associated with *P. guajava* while the lowest number was associated with *L. erecta*. Among VAM fungal species, *Acaulospora* spp were found dominating followed by *Glomus* spp; *Scutellospora* spp and *Gigaspora* spp were found poorly distributed.

Table 1: Mycorrhizal status of root colonization, spore population and VAM fungal genera in horticultural plants in Akbarpur

Sr. No.	Botanical Name	Local Name	Colonization (%)	Types of colonization	Spore population	VAM fungal genera
1.	*Abelmoschus esculentus*	Bhindi	48	H	57	*Glomus spp Acaulospora spp*
2.	*Allium cepa*	Oninon	64	H	80	*Glomus spp Acaulospora spp Gigaspora spp*
3.	*Calendula ofticinalis*	Calendula	35	H	20	*Glomus spp Acaulospora spp*
4.	*Capsicum annum*	Chillies	87	HV	281	*Acaulospora spp*
5.	*Carica papaya*	Papaya	53	HV	134	*Glomus spp Acaulospora spp Gigaspora spp*
6.	*Citrus limon*	Citrus (Nibu)	87	HV	142	*Glomus spp Acaulospora spp*
7.	*Cucumis mela*	Muskmelon	56	HV	184	*Glomus spp Acaulospora spp*
8.	*Dahlia pinnata*	Dahlia	85	H	138	*Glomus spp Acaulospora spp*
9.	*Lactuca erecta*	Lettuce	34	H	84	*Glomus spp Acaulospora spp*
10.	*Musa acuminate*	Banana	65	HV	93	*Glomus spp Acaulospora spp Gigaspora spp*
11.	*Phaseolus vulgaris*	Beans	38	HV	234	*Glomus spp Acaulospora spp*
12.	*Psidium guajava*	Guava	94	HV	309	*Glomus spp Acaulospora spp Gigaspora spp*
13.	*Rosa spp.*	Rose	89	HV	145	*Glomus spp Acaulospora spp*
14.	*Solanum lycopersicum*	Tomato	38	HV	163	*Glomus spp Acaulospora spp Gigaspora spp Scutellospora spp*
15.	*Solanum melanogena*	Brinjal	54	HV	183	*Glomus spp Acaulospora spp*
16	*Tagtes erecta*	Genda	57	H	138	*Glomus spp Acaulospora spp*

VAM association is the most frequently observed symbiosis found in nature because of their broad association with plants and cosmopolitan distribution (Harely and Smith 1983). Recently, Gaikwad *et al.* (2013) reported the occurrence of VAM fungi in Euphorbiaceae plants from India. VAM spore population also showed variation in the rhizosphere soils of selected plants. Variations of spore number have been reported recently by Sarwade *et al.* (2011) and recorded difference in spore numbers between plant species.

Present study revealed the occurrence of four VAM fungal genera vis., *Glomus*, *Acaulospora*,

Gigaspora, and *Scutellospora*, *Acaulospora* were most dominant with plants growing in soils of Akbarpur. Recently, it has been confirmed by Sarwade *et al.* (2011). This contrast with the report by Sarwade *et al.* (2012) that *Glomus* species is dominant.

The root colonization by VAM fungi is a dynamic process. The results obtained from the present study suggest that all the test plants showed good colonization. However, percentage of root colonization varied plant to plant (Table 1). Variation in extent of medicinal plant species were observed and confirm earlier findings of Muthukumar and Udaiyan (2000).

CONCLUSION

The study suggests that the colonization percentage and number of VAM fungal spores differ between 16 plants. Highest number of mycorrhizal spores and root colonization of indicated that these plants species might be considered good host for VAM fungi under natural conditions. In conclusion, occurrence or distribution of VAM fungi varies with host ranges. Studies on distribution and mycorrhizal status of plants should enable us to understand the influence of these mycobionts on plant species diversity and distribution.

ACKNOWLEDGEMENTS

We are thankful to Dr. Brijesh Kumar, Principal, S.D.J.P.G. College, Chandeshwar, Azamgarh providing library and laboratory facilities.

REFERENCES

Frank A.B., 1885. Uber die auf Wurzelsymbiose beruhende Eranahrung gewisser Baume durchunerirdische Pilze. Berichte der Deutschen. Botanischen Gesellschaft, **3**: 128-145.

Gaikwad S.S., Gaikwad S.P., Gaisamudre K.N. and Sarwade P.P., 2013. Seasonal changes of arbuscular mycorrhizal (AM) fungi in Euphorbiaceae plants from Ramling, Balaghat Plateau of Maharashtra, India. Science Park Research Journal, **1**(18): 1–4.

Gerdemann J.W. and Nicolson T.H., 1963. Spores of mycorrhizal endogone species extracted from the soil by wet sieving and decanting. Transactions of the British Mycological Society, **46**: 235-244.

Giovannetti M. and Mosse B., 1980. An evaluation of techniques for measuring vesicular arbuscular mycorrhizal infection in roots. New Phytologist, **84**: 489–500.

Harley J.L. and Smith S.E., 1983. *Mycorrhizal symbiosis*, London, UK : Academic Press; 483 pp.

Kar A.K., 1993. College Botany: II, Calcutta: New Central Book Agency; 507 pp.

Menge J.A., 1983. Utilization of vesicular arbuscular mycorrhizal fungi in agriculture. Canadian Journal of Botany, **61**: 1015-1024.

Muthukumar T. and Udaiyan K., 2000. Arbuscular mycorrhizas of plant growing in the Western Ghats region, Southern India. Mycorrhiza, **9**(6): 297-313.

Phillips J.M. and Hayman D.S., 1970. Improved procedures for clearing and staining parasitic and vesicular arbuscular mycorrhizal fungi for rapid assessment of infection. Transactions of the British Mycological Society, **55**: 158-161.

Sarwade P.P., Kanade M.B., Ambuse M.G. and Bhale U.N., 2012. Association of arbuscular mycorrhizal fungi in some angiospermic plants of Maharashtra, India. International Multidisciplinary Research Journal, **2**(4): 18–19.

Sarwade P.P., Sawant V.S. and Bhale U.N., 2011. Diversity of arbuscular mycorhizal (AM) fungi in some common plants of Marathawada Region. International Multidisciplinary Research Journal, **1**(12): 11–12.

Schenck N.C. and Perez Y., 1990. Manual for the Identification of VA Mycorrhizal Fungi. Gainesville, USA: Syneregistic Publication, 19–36 pp.