



Occurrence of AM fungi in *Phyllanthus amarus* plants of Osmanabad District

Prakash. P. Sarwade¹, Kavita N. Gaisamudre (Sarwade)² Shahaji S. Chandanshive¹ and Vikas P. Sarwade³

¹Shikshan Maharshi Guruvarya R. G. Shinde Mahavidyalaya, Paranda Dist. Osmanabad. Pin Code. 413 502, (M.S.) India.

²Department of Botany, Shriman Bhausaheb Zadbuke Mahavidyalaya Barshi Tal. Barshi, Dist- Solapur 413 401. (M.S.), India.

³School of Sciences, Sandip University, Mahiravani, Tal., Dist. Nashik-422213 (M.S.), India.

ARTICLE INFO

Keywords:

AM fungi
Phyllanthus amarus
Root colonization

*Corresponding author.

E-mail addresses:
ppsarwade@gmail.com

ABSTRACT

A survey of the arbuscular mycorrhizal (AM) status associated with *Phyllanthus amarus* plants growing and distributed in Osmanabad district of Marathwada region in Maharashtra state was conducted. The result showed that at all the different sites *P. amarus* plants had AM fungal association in the roots and spore population in the rhizosphere soil. However, maximum percent root colonization of AM fungi was observed in Paranda sites (99%) followed by others, while minimum in Omerga sites (62%). Paranda sites (290) showed more spore density whereas less in Kallam sites (60). Total five genera of AMF were identified up to species level in which *Acaulospora* spp and *Glomus* spp were found dominated followed by *Sclerocystis* spp, and *Gigaspora* spp were found poorly distributed.

1. Introduction

More than 80% of all plants are associated with arbuscular mycorrhizal fungi (AMF) in their root system (Smith and Read, 1997). These well-established AMF contribute to the phosphorus nutrition of plants by enhancing phosphorus uptake from the soil (Draft and Nicolson, 1966). *Phyllanthus amarus* Schum. & Thonn. belongs to the family Euphorbiaceae is a small herb well known for its medicinal properties and widely used worldwide. *P. amarus* is an important plant of Indian Ayurvedic system of medicine which is used in the problems of stomach, genitourinary system, liver, kidney and spleen. It is bitter, astringent, stomachic, diuretic, febrifuge and antiseptic. The whole plant is used in gonorrhoea, menorrhagia and other genital affections. It is useful in gastropathy, diarrhoea, dysentery, intermittent fevers, ophthalmopathy, scabies, ulcers and wounds (Patel et al. 2011). This herb is used in Ayurveda for treatment of swellings. Hence a study survey was conducted around Osmanabad district in Marathwada region, where the plant is grown throughout the year to observe AM fungal genera and species that are associated with plants.

2. Materials and Methods

Rhizosphere soil and roots samples of *P. amarus* plants

were collected from different locations of Osmanabad district (Viz. Kallam, Omerga, Paranda, Osmanabad, Tuljapur and Bhoom) from each plant in three replications. Root samples were brought to the laboratory which were then washed in tap water and cut in to 1 cm 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. Hundred grams of rhizosphere soil samples were analyzed for their spore isolation by wet sieving and decanting method Gerdemann and Nicolson, (1963). Identification of AM fungal genera up to species level by using the Manual for identification by Schenck and Perez (1990).

3. Results and Discussion

The result shows that all the *P. amarus* plants were colonized by AMF. Maximum percent of colonization were found in Paranda sites (99 %) than other five sites whereas, minimum percentage was found in Omerga sites (62%). Hyphal and vesicular types of colonization were found in roots of different *P. amarus* plants. More number of spores (290) was observed in rhizosphere soil of Paranda sites. Than Kallam, Omerga, Osmanabad, Tuljapur, and Bhoom sites. Total five genera were observed viz., *Acaulospora* spp *Glomus* spp, *Sclerocystis* spp, *Entrophosphora* spp and *Gigaspora* spp. Highest number of AMF genera and species was associated with Paranda sites while the lowest number of AM fungal genera and species were recorded in

This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

Cite this article as Prakash. P. Sarwade, Kavita N. Gaisamudre, Shahaji S. Chandanshive and Vikas P. Sarwade. 2021. Occurrence of AM fungi in *Phyllanthus amarus* plants of Osmanabad District. World J. Cur. Sci. Res.,1(3):203-205.

Table1. Percent root colonization and spore number in *Phyllanthus amarus* Schum. & Thonn. Plants

Sr. No.	Plant species	Colonization (%)	Types of colonization	*Spore population	AM fungal genera
1	Kallam	77	H	60	<i>Glomus</i> spp <i>Acaulospora</i> spp
2	Omerga	62	HV	199	<i>Glomus</i> spp <i>Acaulospora</i> spp <i>Gigaspora</i> spp
3	Paranda	99	HV	290	<i>Glomus</i> spp <i>Acaulospora</i> spp <i>Sclerocystis</i> spp, <i>Entrophosphora</i> spp
4	Osmanabad	76	HV	165	<i>Glomus</i> spp <i>Entrophosphora</i> spp <i>Acaulospora</i> spp
5	Tuljapur	64	H	197	<i>Glomus</i> spp <i>Acaulospora</i> spp
6	Bhoom	65	HV	150	<i>Glomus</i> spp <i>Acaulospora</i> spp

*Mean of three samples, H- Hyphae V- Vesicular

other five locations. Among AM fungal species *Acaulospora* spp and *Glomus* spp were found dominate followed by *Sclerocystis* spp, *Entrophosphora* spp and *Gigaspora* spp were found poorly distributed. The data of percent of colonization and spore number associated with *P. amarus* plants different Osmanabad sites are presented in table 1.

The occurrence of AMF in plants has reported earlier by Taber and Trappe (1982), Udea et al., (1992), Muthukumar and Udaiyan (2001), Selvaraj et al., (2001) and Rani and Bhaduria (2001). Recently, Bukhari et al., (2003), Muthukumar et al., (2006) and Prakash et al., (2012) reported the occurrence of AMF in different plants from India. The highest number of mycorrhizal spores in rhizosphere soil and AM fungal infection in the roots of *P. amarus* indicated that these plant species might be considered good host for AMF under natural conditions.

4. Conclusion

Therefore, here concluded that, occurrence or distribution of AMF varies with different Osmanabad sites associated with *P. amarus* plants.

Acknowledgements

Authors are greatly thankful to Principal S. G. R. G. Shinde College Paranda, for their constant encouragement.

Conflicts of Interest

The author declares that there are no conflicts of interest.

References

- Bukhari, M.J., Khade, S.W., Jaiswal, V.J., Gaonkar, U.C. and Rodrigues, B.F. 2003. Arbuscular mycorrhizal (AM) status of Tropical Medicinal plants: A field survey of Arbuscular mycorrhizal fungal association in Herbs. Plant Archives. 3(2): 167-174.
- Draft, M.J. and Nicolson, T.H. 1966. The effect of endogone mycorrhizae on plant growth. New Phytologist.65:343-350.
- Gerdemann, J.W. and Nicolson, T.H. 1963. Spores of mycorrhizal *endogone* species extracted from soil by wet sieving and decanting. Trans. Br. Mycol. Soc. 46:235-244.
- Giovannetti, M. and Mosse, B. 1980. An evaluation of techniques of measuring vesicular arbuscular mycorrhizal infection in roots. New Phytol. 84:489-500.
- Jay, Ram, Patel, Priyanka, Tripathib., Vikas, Sharma., Nagendra, Singh, Chauhana., Vinod, Kumar, Dixita. 2011. *Phyllanthus amarus*: Ethnomedicinal uses, phytochemistry and pharmacology. Journal of Ethnopharmacology. 138: 286- 313.
- Muthukumar, T. and Udaiyan, K. 2001. Vesicular arbuscular mycorrhizal association in medicinal plants of Maruthamalai Hills,Western Ghats,Southern India. J. Mycol.Pl.Pathol. 31(2):180-184.
- Muthukumar, T., Senthilkumar, M., Rajangam, M. 2006. Arbuscular mycorrhizal morphology and dark septate fungal associations in medicinal and aromatic plants of Western Ghats, Southern India. Mycorrhiza. 17:11-24.

Phillips, J.M. and Hayman, D.S. 1970. Improved procedures for clearing root and staining parasitic and vesicular arbuscular mycorrhizal fungi for rapid assessment of infection. Tans. Bri. Mycol. Soc.55(1):158-161.

Prakash, P. Sarwade., 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.

Rani, V. and Bhaduria, S. 2001. Vesicular arbuscular mycorrhizal association with some medicinal plants growing on alkaline soil of Manipuri District, Uttar Pradesh. Mycorrhiza News. 13(2):12-14.

Schenck, N. C. and Perez, Y. 1990. Manual for the identification of vesicular arbuscular mycorrhizal fungi. Synergistic Publications:Gainesville,FL,U.S.A.,1-286.

Selvoraj, T.R., Murugan and Bhaskaran, C. 2001. Arbuscular mycorrhizal association of kashini (*Cichorium intybus* L.) in relation to Physicochemical characters. Mycorrhiza News.13 (2):14-16.

Smith, S.E. and Read, D.J. 1997. Mycorrhizal symbiosis, 2nd Ed. Academic, San Diego, CA.

Taber, T.A. and Trappe, J.M. 1982. Vesicular arbuscular mycorrhiza in rhizomes, scale like leaves, roots and xylem of ginger. Mycologia.74:156-161.

Udea,T., Husope,T., Kubo, S. and Nakawashi, I. 1992. Vesicular arbuscular mycorrhizal fungi (Glomales) in Japan II. A field survey of vesicular arbuscular mycorrhizal association with medicinal plants in Japan. Trans. Br. Mycol. Soc. 33:77-86.