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Association of AM fungi in *Ricinus communis* plants of Osmanabad

Kavita N. Gaisamudre (Sarwade)[1], Prakash. P. Sarwade[2] and Vikas P. Sarwade[3]

[1]*Shriman Bhausaheb Zadbuke Mahavidyalaya, Zadbuke Marg, Jamgaon Road, Barshi Tal. Barshi, Dist- Solapur 413 401. (M.S.), India.*
[2]*Shikshan Maharshi Guruvarya R. G. Shinde Mahavidyalaya, Paranda Dist. Osmanabad. Pin Code. 413 502, (M.S.) India.*
[3]*School of Science, Sandip University, Mahiravani, Tal & Dist. Nashik-422213 (M.S.), India.*

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*Corresponding author.
E-mail addresses:
ppsarwade@gmail.com

ABSTRACT

A survey of the arbuscular mycorrhizal (AM) status associated with *Ricinus communis* plants growing and distributed in Osmanabad district of Maharashtra state was conducted. The result showed that all the different sites *R. communis* 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 (98 %) followed by others, while minimum in Tuljapur (62%). Paranda sites (345) showed more spore density whereas less in Kallam sites (104). Total five genera of AMF were identified in which *Acaulospora spp* and *Glomus spp* were found dominate followed by *Sclerocystis spp* and *Gigaspora spp* were found poorly distributed.

1. Introduction

Arbuscular mycorrhizal fungi (AMF) form a symbiotic association with majority of land plants improving plant growth. More than 80 percent of all plants are associated with 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). *Ricinus communis* L. (Castor oil plant) is an annual or perennial shrub belonging to the family Euphorbiaceae. Leaves have long petiole and palm like lobed blades. Inflorescence consists of unisexual flowers which are arranged at the top of the axis in the form of panicles; male flowers lie towards the base and female flowers towards the apex; perianth leaves (sepals and petals) are inconspicuous and caducous. Fruit is three chambered, globose capsule with soft spines (Jombo and Enenebeaku, 2007). The chemical constituents showed the presence of amino acids (Onwuliri and Anekwe, 2001), fatty acids (Salimon et al., 2010), flavonoids (Ramos-Lopaz et al., 2010), phenolic compounds (Singh et al., 2009), phytosterol (Zhang et al., 2007), terpenoids (Darmanin et al., 2009), and other compounds (Ross, 2003) such as alkaloids, etc (Jena and Gupta, 2012). *R. communis* exhibits various biological and pharmacological activities such as abortifacient effect, acid phosphatase inhibition, acid phosphatase stimulation, agglutin activity, alkaline phosphatase inhibition (Ross, 2003), anticonceptive activity (Okwuasaba et al., 1997), antidiabetic activity (Shokeen, 2008), antifertility effects (Sandhyakumary et al., 2003), anti-inflammatory activity (Singh et al., 2009), antimicrobial activity (Garcia et al., 2009), antioxidant activity (Singh et al., 2009), free radical scavenging activity (Ilavarasan et al., 2006), hepatoprotective activity (Visen et al., 1992), Insecticidal activity (Upasani et al., 2003), and repellent Properties (Grant, 2012).

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 *R. communis* plants were collected from different locations of Osmanabad district (Viz. Kallam, Omerga, Paranda, Osmanabad, Tuljapur, and Bhoom) from each plant with three replications. 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

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Table1. Percent root colonization and spore number in *Ricinus communis* Plants

Sr No.	Plant species	Colonization (%)	Types of colonization	*Spore population	AM fungal genera
1	Kallam	80	H	104	*Glomus* spp *Acaulospora* spp
2	Omerga	65	HV	245	*Glomus* spp *Acaulospora* spp *Gigaspora* spp
3	Paranda	98	HV	345	*Glomus* spp *Acaulospora* spp *Sclerocystis* spp, *Entrophosphora* spp
4	Osmanabad	74	HV	225	*Glomus* spp *Entrophosphora* spp *Acaulospora* spp
5	Tuljapur	62	H	252	*Glomus* spp *Acaulospora* spp
6	Bhoom	67	HV	210	*Glomus* spp *Acaulospora* spp

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

using the Manual for identification by Schenck and Perez (1990).

3. Results and Discussion

The result shows that, maximum percent of colonization were found in Paranda sites (98 %) than other five sites whereas, minimum percentage was found in Tuljapur (62%). Hyphal and vesicular types of colonization were found in roots of different *R. communis* plants. Maximum number of spores (345) 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 was associated with Paranda sites while the less number of AM fungal genera were recorded in other five locations. Among AM fungal genera *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 *R. communis* plants different Osmanabad sites are presented in Table 1.

The occurrence of AMF in plants has reported earlier by Udea et al., (1992), Muthukumar and Udaiyan (2001). Recently Muthukumar et al., (2006) and Prakash et al., (2012) reported the occurrence of AMF in different plants from India.

4. Conclusion

The highest number of mycorrhizal spores in rhizosphere soil and AM fungal infection in the roots of *R. communis* indicated that these plant species might be considered good host for AMF under natural conditions. Therefore, here concluded that, occurrence or distribution of AMF varies with different Osmanabad sites associated with *R. communis* plants.

Conflicts of Interest

The author declares that there are no conflicts of interest.

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