Plantae Scientia – An International Research Journal in Botany Publishing Bimonthly Open Access Journal

Plantae Scientia: Volume 07, Issue 06, 2024

ISSN 2581-589X

RESEARCH ARTICLE

Arbuscular Mycorrhizal Fungal Associations with *Ricinus communis* L. in Dharashiv District

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Manuscript Details

Manuscript Submitted : 22/10/2024
Manuscript Revised : 12/11/2024
Manuscript Accepted : 14/11/2024
Manuscript Published : 15/11/2024

Available On
https://plantaescientia.com/ojs

Cite This Article As

Sarwade P.P., Gaisamudre (Sarwade) K.N. & Gaikwad R.S. (2024). Arbuscular Mycorrhizal Fungal Associations with *Ricinus communis* L. in Dharashiv District *Pla. Sci.* 2024; Vol. 07 Iss. 6:62-65

DOI-

https://doi.org/10.32439/ps.v7i6.62-65

Indexed In

CrossRef, Scientific Indexing Services (SIS), Google Scholar, Index Copernicus International (ICI), Directory of Research Journal Indexing (DRJI), CiteFactor, Scientific Journal Impact Factor (SJIF), General Impact Factor, Journal Factor, Cosmos Impact Factor, AJIFACTOR Indexing, etc.

ABSTRACT

An examination of the Arbuscular mycorrhizal (AM) associations in *Ricinus communis* L. plants was conducted across various locations in Maharashtra's Dharashiv district. The findings revealed that *R. communis* L. plants at all sites exhibited AM fungal root colonization and spore presence in the surrounding soil. The highest percentage of AM fungal root colonization was found in Paranda (98%), while Omerga showed the lowest at 65%. Spore density was highest in Paranda (345) and lowest in Kallam (104). Five AM fungal genera were identified, with *Acaulospora* spp. and *Glomus* spp. being predominant, while *Sclerocystis* spp. and *Gigaspora* spp. were less common.

Keywords: *Ricinus communis* L., Root colonization, AM fungi

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 capsules with soft spines (Jombo & 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 Dharashiv district in Marathwada region, where the plant is grown throughout the year to observe AM fungal genera and species that are associated with plants.

MATERIALS AND METHODS

Rhizosphere soil and roots samples of *R. communis* plants were collected from different locations of Osmanabad district (Viz. Kallam,Omerga, Paranda, Dharashiv, Tuljapur, and Bhoom) and in each plant three replications were taken. 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 Schenck and Perez (1990).

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 Omerga sites (58%). 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, Dharashiv, 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 poorely distributed. The data of percent of colonization and spore number associated with *R. communis* plants different Dharashiv sites are presented in table 1.

CONCLUSION

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.

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.

ACKNOWLEDGEMENTS

Authors are grateful to Principal, Shikshan Maharshi Guruvarya R. G. Shinde Mahavidyalaya, Paranda for providing laboratory & library facilities and constant encouragement.

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Table 1 - Percent Root Colonization and Spore Number in *Ricinus communis* L.

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	Dharashiv	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**