

Occurrence of AM fungi in *Xanthium strumarium* L. plants of Osmanabad District

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Abstract

A survey of the arbuscularmycorrhizal (AM) status associated with *Xanthium strumarium* L. plants growing and distributed in Osmanabad district of Marathwada region in Maharashtra state. The result showed that all the different sites *Xanthium strumarium* L. 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 Omerga sites (58 %). Paranda sites (300) showed more spore density whereas less in Kallam sites (59). Total five genera of AMF was identified up to species level in which *Acaulosporaspp* and *Glomusspp* were found dominate followed by, *Sclerocystisspp*, *Entrophosporaspp* and *Gigasporaspp* were found poorly distributed.

Keywords: *Xanthium strumarium* L., Root colonization, AM fungi and Osmanabad District.

INTRODUCTION

More than 80% of all plants are associated with AMF in their root system (Smith and Read, 1997 [17]). These well established AMF contribute to the phosphorus nutrition of plants by enhancing phosphorus uptake from the soil (Draft and Nicolson, 1966[4]). *Xanthium strumarium* L. is a species of annual plants belonging to the family Asteraceae. It is a common weed found in India (Oudhia 2001 [9]; Oudhia and Dixit 1994 [10]). The genus *Xanthium* includes 25 species, all of American origin *X. spinosum* Linn and *X. strumarium* Linn are used medicinally in Europe, North America and Brazil; *X. canadens* Mill. is used in North America and Brazil and *X. strumarium* Linn in China, India and Malaya (Caius 1986[3]). Two species of *Xanthium*, *X. indicum* and *X. strumarium* have been reported in India. The origin of *X. strumarium* is North America. It was introduced in India and spread like weed. *X. strumarium* is an annual herb with a short, stout, hairy stem. Leaves broadly triangular-ovate or suborbicular; flower heads in terminal and axillary racemes; white or green; numerous; male upper most; female ovoid, covered with hooked bristles; Fruit obovoid, enclosed in the hardened involucre, with 2 hooked beaks and hooked bristles. Flowering time in India is August-September. It can be propagated through seeds. This weed is easily dispersed through animals as the fruits have hooked bristles and 2 strong hooked beaks (Agharkar 1991[1]).

The whole plant, specially root and fruit, is used as medicine. According to Ayurveda, *X. strumarium* is cooling, laxative, fattening, anthelmintic, alexiteric, tonic, digestive, antipyretic, and improves

appetite, voice, complexion, and memory. It cures leucoderma, biliousness, and poisonous bites of insects, epilepsy, salivation and fever. The plant of *Xanthium* yields xanthinin which acts as a plant growth regulator. Antibacterial activity of xanthinin has also been reported. Seed yields semi-drying edible oil (30-35%) which resembles sunflower oil and used in bladder infection, herpes, and erysipelas. Cake can be used as manure whereas shell can be used as activated carbon (Oudhia and Tripathi 1998 [11]; Sastry and Kavathekar 1990 [14]). The plant has been reported as fatal to cattle and pigs.

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.

MATERIALS AND METHODS

Rhizosphere soil and roots samples of *X. strumarium* plants were collected from different locations of Osmanabad district (Viz. Kallam, Omerga, Paranda, Osmanabad, Tuljapur, and Bhoom) and in each plant three replications were taken. 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) [12] technique. Root colonization was measured according to the Giovannetti and Mosse (1980) [5] method. Hundred grams of rhizosphere soil samples were analyzed for their spore isolation by wet sieving and decanting method Gerdemann and Nicolson, (1963) [6]. Identification of AM fungal genera up to species level by using the Manual for identification Schenck and Perez (1990) [15].

RESULTS AND DISCUSSION

The result shows that all the *X. strumarium* plants were colonized. 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

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colonization were found in roots of different *X. strumarium* plants. More number of spores (300) was observed in rhizosphere soil of Paranda sites. than Kallam, Omerga, Osmanabad, Tuljapur, and Bhoom sites. Total five genera were observed viz., *Acaulosporaspp*, *Glomus*spp, *Sclerocystis*spp, *Entrophosphoraspp* 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 other five locations. Among AM fungal species *Acaulosporaspp* and *Glomus*spp were found dominate followed by *Sclerocystis*spp, *Entrophosphoraspp* and *Gigasporaspp* were found poorly distributed. The data of percent of colonization and spore number associated with *X. strumarium* plants different Osmanabad sites are presented in table 1.

The occurrence of AMF in plants has reported earlier by Taber and Trappe (1982) [19], Udea et al., (1992) [20], Muthukumar and Udaiyan (2001) [7], Selvaraj et al., (2001) [16] and Rani and Bhaduria (2001) [13]. Recently, Bukhari et al., (2003)[2], Muthukumar et al., (2006) [8] and Swapna and Ammani (2009) [18], 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 *X. strumarium* 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 *X. strumarium* plants.

Table1. Percent root colonization and spore number in *Xanthium strumarium* L. Plants.

Sr No.	Plant species	Colonization (%)	Types of colonization	*Spore population	AM fungal genera
1	Kallam	73	H	70	<i>Glomus</i> spp <i>Acaulospora</i> spp
2	Omerga	58	HV	201	<i>Glomus</i> spp <i>Acaulospora</i> spp <i>Gigaspora</i> spp
3	Paranda	98	HV	300	<i>Glomus</i> spp <i>Acaulospora</i> spp <i>Sclerocystis</i> spp, <i>Entrophosphora</i> spp
4	Osmanabad	72	HV	175	<i>Glomus</i> spp <i>Entrophosphora</i> spp <i>Acaulospora</i> spp
5	Tuljapur	60	H	202	<i>Glomus</i> spp <i>Acaulospora</i> spp
6	Bhoom	65	HV	160	<i>Glomus</i> spp <i>Acaulospora</i> spp

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

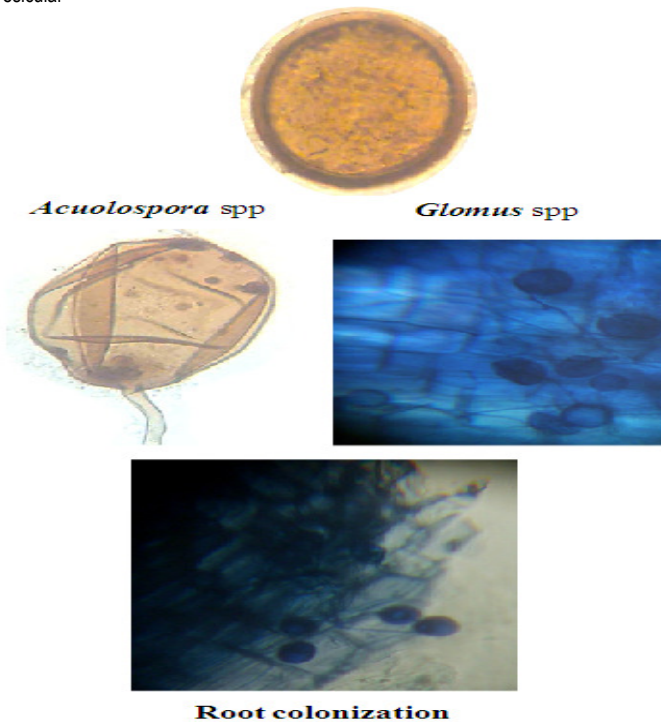


Fig 1. Some AM fungal spores and root colonization associated with *Xanthium strumarium* L.plants.

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