

PRIMARY ARTICLE

Seasonal Changes Of Arbuscular Mycorrhizal (AM) Fungi In Euphorbiaceae Plants From Ramling, Balaghat Plateau Of Maharashtra, India.

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ABSTRACT

Seven plants belonging to family Euphorbiaceae were studied for their AM association during the three seasons. The result showed that all the plants viz *Euphorbia hirta*, *Euphorbia geniculata*, *Euphorbia heterophylla*, *Euphorbia microphylla*, *Euphorbia prostrata*, *Euphorbia pulcherrima* and *Euphorbia tirucali* had AM fungal association in the roots and spore population in the rhizosphere soil. During rainy season only two genera *Acaulospora* (1 species) and *Glomus* (2 species) were recorded. During winter season four genera were observed namely *Acaulospora* (3 species), *Gigaspora* (2 species), *Glomus* (5 species) and *Scutellospora* (1 species). During summer season three genera were identified *Gigaspora* (1 species), *Glomus* (2 species) and *Scutellospora* (1 species). The chlamydospore count was highest during winter season and lowest during rainy season. *Euphorbia tirucali* was found highest root colonization in winter as compared to other native hosts screened during the three seasons, whereas *Euphorbia microphylla* was found negative for arbuscular mycorrhizal fungal colonization.

Keywords: Euphorbiaceae Plants, Root colonization, AM fungi, Ramling.

Introduction :

German Botanist Frank (1885[1]) coined the term mycorrhizae for the first time to designate the symbiotic relationship between the fungi and plant roots. 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 being considered as a "functionally distinct organ" involved in mineral nutrient uptake from the soil (Kar, 1993[2]).

A major part of the Osmanabad district lies on the Balaghat plateau which is narrow and high in the North-West border and high in the South-East. The interfluvies between the streams are rocky with poor stony soils while the valleys have richer soil, where rabi crops, wheat and jowar are grown. The barren rocky plateau surface is not dissected by many streams. Hence season wise study survey was conducted around Ramling hills of Balaghat district Osmanabad in Marathwada region, where the plant is grown throughout the year to observe AM fungal genera and species that are associated with seven plants.

MATERIALS AND METHODS

Rhizosphere soil and root samples of seven plants (viz. *Euphorbia hirta*, L., *Euphorbia geniculata*, Orted., *Euphorbia heterophylla*, L., *Euphorbia microphylla*, Heyne ex Roth., *Euphorbia prostrata*, Ait. Hort. Kew. Ed., *Euphorbia pulcherrima*, Willd. and *Euphorbia tirucali*, L.) were collected during the three seasons i.e. rainy, winter and summer season 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) [4] technique. Root colonization was measured according to the Giovannetti and Mosse (1980) [5] method. Hundred grams of rhizosphere soil samples were analyzed for their

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spore isolation by wet sieving and decanting method Gerdmann and Nicolson, (1963) Identification of AM fungal genera up to species level by using the Manual for identification Schenck and Perez (1990) [6].

RESULTS AND DISCUSSION

The data of percent of colonization and spore number associated with seven different plants are presented in table 1 and 2. The result shows that all the seven native hosts screened during all the three seasons were from family Euphorbiaceae namely *Euphorbia hirta*, *Euphorbia geniculata*, *Euphorbia heterophylla*, *Euphorbia microphylla*, *Euphorbia prostrata*., *Euphorbia pulcherrima*, *Euphorbia tirucali*.

Mycorrhizal genera found at this site in the soil samples collected during the three seasons were *Acaulospora*, *Gigaspora*, *Glomus* and *Scutellospora*. *A. bireticulata* Rothwell & Trappe, *A. gdanskensis* Blaszkowski and *A. lacunosa* Morton, were three species recorded which belong to *Acaulospora*. *Gigaspora* was represented by two species namely *G. margarita* Becker & Hall and *G. rosea* Nicolson & Schenck. Five species of *Glomus* were recorded. These were *G. aggregatum* Schenck & Smith emend. Koske, *G. citricola* Tang & Zang, *G. globiferum* Koske & Walker, *G. magnicaule* Hall, *G. mosseae* Gerdemann & Trappe and only one species of *Scutellospora* was *S. alborosea* Walker & Sanders.

During rainy season only two genera *Acaulospora*(1 species) and *Glomus*(2 species) were recorded. During winter season four genera observed were namely *Acaulospora*(3 species), *Gigaspora*(2 species), *Glomus*(5 species) and *Scutellospora*(1 species). During summer season three genera were identified *Gigaspora*(1 species), *Glomus*(2 species) and *Scutellospora*(1 species)(Table 1).

The chlamydospore count was highest (148)during winter season, Summer (118) and lowest(18) during rainy season

Euphorbia tirucali. showed highest root colonization in winter as compared to other native hosts screened during the three seasons, whereas *Euphorbia microphylla*, *Heyne ex Roth.* was found negative for arbuscular mycorrhizal fungal colonization. (Table 2)

Occurrence of AMF in Euphorbiaceae plants has reported earlier by Mohanand Natrajan (1988) [3], Raja et al., (1991) [7], Raghupathy et al., (1988) [8], Parmeshwaran et al., (1998). Recently, Mulani and Prabhu (2002) reported the occurrence of AMF in Euphorbiaceae plants from India.

The result obtained from the study suggests that the colonization percentage and number of AM fungal spores differ with different season. The mycelial colonization, arbuscules and vesicles in the host tissue were found high during winter season followed by summer and low in rainy season. The chlamydospore formation was high during summer season. Most of the members of the family Euphorbiaceae were found positive for arbuscular mycorrhizal fungal colonization. From the above results it is concluded that during summer season the soil is exposed to direct sunlight, heating and without perennial supply of water the vegetation dies off. This brings down the mycorrhizal count in the rhizospheric soil. But still the mycorrhizal propagules remains intact and during summer season associated with the organic matter of the remnant root system of native vegetation of previous season mostly in the form of chlamydospores and rarely vesicles.

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Table No. 1
Seasonwise genera and species of mycorrhizal spores recorded from Ramling Hills of Balaghat

| Sr. No | Season | Spores | | | | | |
|--------|--------|-------------------------|---------------------|----------------------|------------------|---|----------------------|
| | | <i>Acaulospora</i> | <i>Archaeospora</i> | <i>Entrophospora</i> | <i>Gigaspora</i> | <i>Glomus</i> | <i>Scutellospora</i> |
| 1. | Rainy | ALCN | - | - | - | LCTC, LMSS. | - |
| 2. | Winter | ABRT, AGDN, ALCN. | - | - | GMRG, GRSA. | LAGR, LCTC, LGBF, LMGC, LMSS. | CALR |
| 3. | Summer | - | - | - | GMRG | LGBF, LMSS. | CALR |

Acaulospora - ABRT - *A. bireticulata*, AGDN - *A. gdanskensis*, ALCN - *A. lacunose*.

Gigaspora - GMRG - *G. margarita*, GRSA - *G. rosea*.

Glomus - AGR - *G. aggregatum*, LCTC - *G. citricola*, LGBF - *G. globiferum*, LMGC - *G. magnicaule*, LMSS - *G. mosseae*, LCBF - *G. cerebriforme*.

Scutellospora - CALR - *S. alborosea*.

Table No. 2
Seasonal survey for Arbuscular Mycorrhizal Colonization in native hosts collected from Ramling Hills of Balaghat of Maharashtra

| Sr. No. | Plant | Season | | | | | | | | | | | |
|---------|--|---------|---|---|---|--------|----|----|---|--------|----|---|----|
| | | Monsoon | | | | Winter | | | | Summer | | | |
| | | M | V | A | C | M | V | A | C | M | V | A | C |
| 1 | <i>Euphorbia hirta</i> , L. | 05 | - | - | - | 17 | - | - | - | - | - | - | - |
| 2 | <i>Euphorbia geniculata</i> , Orted. | 04 | - | - | - | 12 | - | - | - | - | - | - | - |
| 3 | <i>Euphorbia heterophylla</i> , L. | - | - | - | - | 26 | 13 | 02 | - | - | - | - | - |
| 4 | <i>Euphorbia microphylla</i> , Heyne ex Roth. | - | - | - | - | - | - | - | - | - | - | - | - |
| 5 | <i>Euphorbia prostrate</i> , Ait. Hort. Kew. ed. | - | - | - | - | 17 | 05 | - | - | - | - | - | - |
| 6 | <i>Euphorbia pulcherrima</i> , Willd. | - | - | - | - | 17 | 06 | 01 | - | 29 | 15 | - | 03 |
| 7 | <i>Euphorbia tirucali</i> , L. | - | - | - | - | 36 | 21 | - | - | - | - | - | - |

(Colonization figures in percent) M = Mycelium, V = Vesicle, A = Arbuscle, C=Chlamyospore

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