



## DIVERSITY OF AM FUNGI IN EUPHORBIACEAE PLANTS

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### ABSTRACT

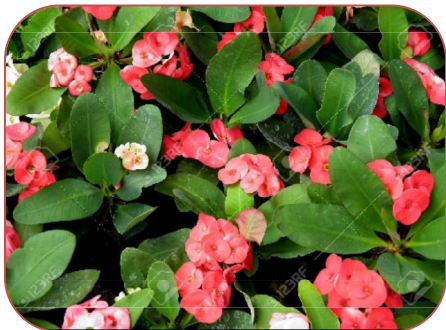
The present investigation was mainly concerned with the seasonal survey done during 2015-16 & 2016-17 for "Studies on diversity of arbuscular mycorrhizal fungi in some plants of the family Euphorbiaceae in Solapur District (MS)". The sites selected were falling under eleven talukas of Solapur district of Maharashtra. The sites selected for the study purpose were, viz. Kurnur of Akkalkot, Pangri of Barshi, Pande of Karmala, Laul of Madha, Pisewadi of Malshiras, Mangalwedha, Penur of Mohol, Bibidarpal of North Solapur, Khardi of Pandharpur, Anakdhal of Sangola and Boramani of South Solapur.

Survey of plants belonging to family Euphorbiaceae was done and 18 genera and 44 species were reported at these sites. In the Flora of Solapur district' 19 genera and 62 species were reported (Gaikwad and Garad, 2015). In 2015-16, frequent visits were arranged to survey the plant species of the family Euphorbiaceae during their flowering seasons. Plant specimens were collected in triplicates; herbaria were prepared and identification of the collected plants was done using 'Flora of the Presidency of Bombay' (Cooke, 1901-1908), 'Flora of Osmanabad District' (Naik, 1979), 'Flora of Ahmednagar District' (Pradhan and Singh, 1999) and 'Flora of Solapur District' (Gaikwad and Garad, 2015). Ambiguity in identification of plants was cleared with consultation of taxonomists.

**KEYWORDS:** Survey of plants, identification of plants, family Euphorbiaceae, spreading root system.

### INTRODUCTION

The roots of 44 plant species of family Euphorbiaceae were screened for AM fungal colonization during three seasons' namely rainy, winter and summer from eleven selected sites of Solapur district. Out of these, 32 plant species were positive for AM colonization viz. *Acalypha ciliata* Forssk., *Acalypha hispida* Burm., *Acalypha indica* L., *Acalypha wilkesiana* Muell., *Bridelia retusa* (L.) Juss., *Chrozophora plicata* (Vahl) Juss. ex Spreng.,



*Chrozophora rottleri* (Geisel.) Juss., *Croton bonplandianus* Baill., *Emblica officinalis* Gaertn, *Euphorbia antiquorum* L.,

*Euphorbia caducifolia* Haines., *Euphorbia dracunculoides* Lam., *Euphorbia granulata* Forssk., *Euphorbia heterophylla* L., *Euphorbia hirta* L., *Euphorbia neriifolia* L., *Euphorbia prostrata* Ait., *Euphorbia pulcherrima* Willd. ex Klotzsch., *Euphorbia rothiana* Spreng., *Euphorbia thymifolia* L., *Euphorbia tirucalli* L., *Flueggea*

Chart 2: AM fungal colonisation in members of Family Euphorbiaceae in Solapur district



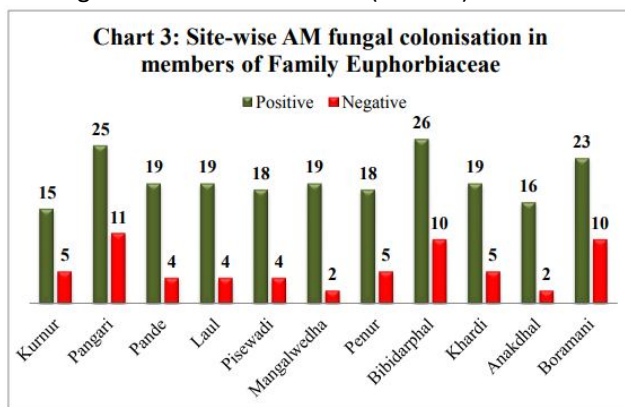
leucopyrus Willd., *Jatropha curcas* L., *Jatropha gossypifolia* L., *Manihot esculenta* Crantz., *Phyllanthus acidus* (L.) Skeels., *Phyllanthus amarus* Schumach & Thong., *Phyllanthus maderaspatensis* L., *Phyllanthus simplex* Retz., *Putranjiva roxburghii* Wall., *Ricinus communis* L., *Tragia involucrata* L (Chart-2).

The remaining 12 species of family Euphorbiaceae were negative for AM fungal colonisation, viz. *Acalypha lanceolata* Willd., *Acalypha malabarica* Muell., *Baliospermum solanifolium* (Burm.) Suresh., *Breynia disticha* Forst. & Forst., *Codiaeum variegatum* (L.) Rumph. ex Juss., *Euphorbia clarkeana* Hook., *Euphorbia cyathophora* Murr., *Euphorbia elegans* Spreng., *Euphorbia indica* Lam., *Pedilanthus tithymaloides* (L.) Poit., *Phyllanthus debilis* Klein ex Willd., *Synadenium grantii* Hook (Chart-2).

Maximum hosts were available during the winter season and it was also found that these hosts showed high colonization. Thus, among all the native hosts of family Euphorbiaceae were screened, about 8 species like- *Chrozophora rottleri* (Geisel.) Juss., *Croton bonplandianus* Baill., *Emblca officinalis* Gaertn., *Euphorbia dracunculoides* Lam., *Euphorbia heterophylla* L., *Euphorbia hirta* L., *Jatropha gossypifolia* L., *Ricinus communis* L., showed 100 percent root colonization. Mohan and Natarajan (1988) studied 26 plant species of 16 families growing in the sandy coast of Tamilnadu and found 20 plant species positive for VAM colonization. Mohankumar and Mahadevan (1988b) reported a higher colonization rate during summer than in the rainy season. This may be due to the comparatively low temperature in a tropical forest than the open plateaus which are exposed to direct sunlight and heat.

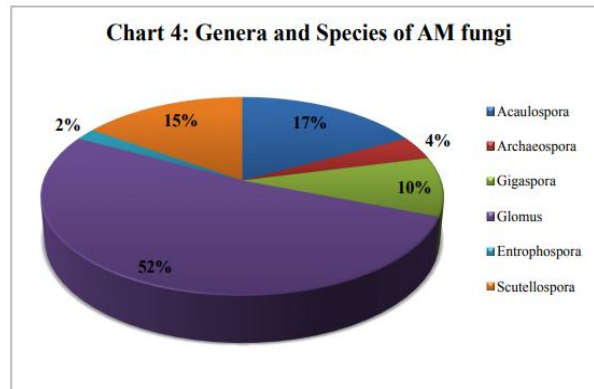
Number of annual herbs observed from these sites have profuse and spreading root systems and as they are growing in a soil with very less depth, shallow rooting is observed. This favours maximum mycorrhizal colonization in the roots of plants growing in the crevices. Similar observations have been reported earlier in some of the annual herbs (Jha et al., 1988; Crush, 1974). These plants start sporulation on the onset of winter due to decrease in moisture content in the soil. The number of AM fungal spores in rhizospheric soil was not found to be correlated with colonisation rate which has been reported by Mathur and Vyas (1994), while screening the rhizospheric soil of *Simonnesia chinensis*.

The maximum numbers of species of family Euphorbiaceae were reported from Pangari of taluka Barshi and Bibidarpal of taluka North Solapur i.e. 36. These two sites were found covered with a large number of grass species and more population of other types of vegetation. Out of 36 species screened at these two sites, 25 species at Pangari and 26 species at Bibi Darphal were positive for AM colonization. Similarly, out of 33 plant species 23 were positive at Boramani, 19 out of 24 at Khardi, 19 out of 23 at Laul and Pande, 19 out of 21 at Mangalwedha, 18 out of 23 at Penur, 18 out of 22 at Pisewadi; 16 out of 18 at Anakdhal; and 15 out of 20 at Kurnur. Least number of species was observed at Anakdhal of taluka Sangola i.e. 18. Out of these, 16 were found positive for AM fungal colonization during winter. This site was characterized by rocky crevices having efficient aeration of soil (Chart-3).



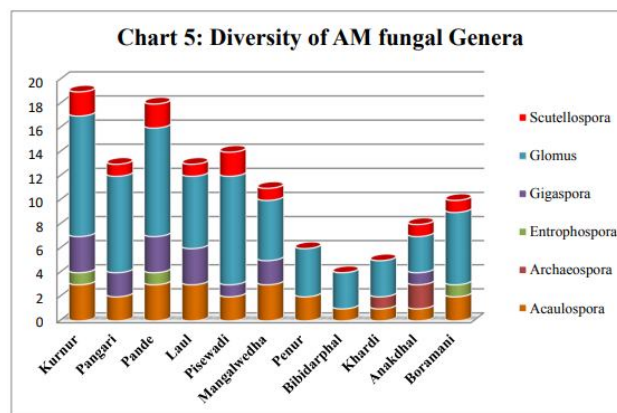
The AM fungal spores isolated from the eleven selected sites were represented by six genera with fifty-two species. The genus *Acaulospora* is represented with nine species, *Archaeospora* with two species;

Entrophospora with one species, Gigaspora with five species, Glomus with maximum twenty-seven species and Scutellospora is represented with eight species (Chart-4).



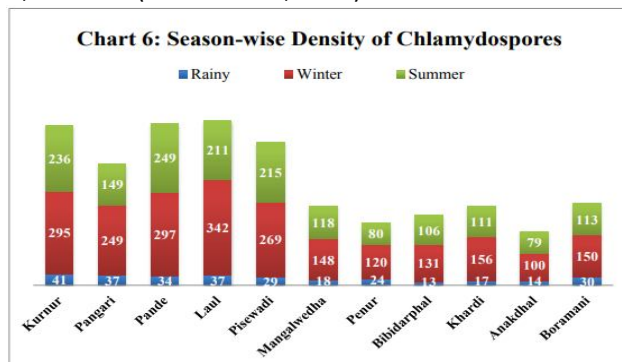
Highest diversity of AM fungal genera was found in Kurnur, Pande and Anakdhul with 5 genera each. Among these Kurnur showed the highest number of AM fungal species diversity with 19 species; followed by Pande with 18 species and lastly Anakdhul showed 8 species. Barshi, Laul, Pisewadi, Manghalwedha and Boramani showed 4 genera while Khardi with 3 genera only. Least diversity of AM fungal genera was found in Penur and Bibi Darphal with 2 genera. The number of species reported from these sites were 6 at Penur and 4 at Bibi Darphal (Chart- 5).

The propagules showed variation with seasonal changes. The reason for such variation could be variation in photoperiod. Similar observations have been made by various workers (Ekwebelam and reid, 1983; Suhardi and Darmawan, 1990; McGee, 1990). Even good aeration during winter and summer season (Tacon et al., 1979; Ikram et al., 1992; Nemeč 1987; Menge et al., 1979), low phosphorus, average pH and high organic carbon content (Cade-Menun et al., 1991; Verma and Arya, 1998; Wei et al., 1987), favours AM fungal colonization.



The presence of chlamydo-spore density in the rhizospheric soil collected from different sites of Solapur district of Maharashtra, was found to be high during winter season at all the sites, this is mainly due to the germination of dormant spores, less moisture, moderate temperature and high porosity of soil, where the hyphae produce large number of spores outside the host tissue. Highest spore density in winter season was followed by summer season and less count was observed at all sites during rainy season. Spore density was highest reported from Laul of taluka Madha (342 chlamydo-spores) during winter season and lowest spore density reported from Bibi- darphal of taluka North Solapur (13 chlamydo-spores) during rainy season (Chart-6).

High spore density during the winter season was also observed by many workers (Harinikumar and Bagyaraj, 1988; Bagyaraj, 1995). High population variations in mycorrhizal spores were observed from the Sanjay Gandhi National Park, Mumbai (Mulani et al., 2002).



## CONCLUSION

The roots of 44 plant species of family Euphorbiaceae were screened for AM fungal colonization during three seasons' namely rainy, winter and summer from eleven selected sites of Solapur district.

*Euphorbia caducifolia* Haines., *Euphorbia dracunculoides* Lam., *Euphorbia granulata* Forssk., *Euphorbia heterophylla* L., *Euphorbia hirta* L., *Euphorbia neriifolia* L., *Euphorbia prostrata* Ait., *Euphorbia pulcherrima* Willd.

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The genus *Acaulospora* is represented with nine species, *Archaeospora* with two species; *Entrophospora* with one species, *Gigaspora* with five species, *Glomus* with maximum twenty-seven species and *Scutellospora* is represented with eight species.

Among these Kurnur showed the highest number of AM fungal species diversity with 19 species; followed by Pande with 18 species and lastly Anakhthal showed 8 species.

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