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Studies on *Glomus* species in the rhizosphere of some ornamental plants of family Asteraceae

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Seven species of *Glomus* are studied on the basis of the morphological characters. The spores were extracted from the rhizosphere of some ornamental plants belonging to family Asteraceae

Key words: *Glomus*, spores, VAM fungi, rhizosphere, Asteraceae

VAM fungi are a group of endomycorrhizae which develop a network of microscopic filaments in soil. They become established in plant root cortical cells by forming hyphae, arbuscules and vesicles whereas spores are differentiated in the rhizosphere. Besides the reserve and propagating structures, they also act as a reference structure in species identification of VAM fungi. *Glomus* (Family, Glomaceae) shows the most diverse spore morphology.

Few workers have studied VAM fungi in ornamental plants. Asteraceae is one of the important families of ornamental plants. With this objective, a survey of rhizosphere of some ornamental plants of Asteraceae has been conducted to isolate and identify the species of *Glomus*. It is the most important mycorrhizal fungus for increasing the biomass of crop plants in agriculture and forest management. Soil samples were collected from the rhizosphere of *Chrysanthemum indicum* and *Tagetes erecta* from different gardens of Allahabad. Spores of VAM fungi were extracted from the soil by wet sieving and decanting technique (Gerdemann and Nicolson, 1963). Seven species of *Glomus* are studied on the basis of the morphological characters. For taxonomic purpose, spores were mounted in PVLG medium.

Seven species of the genus *Glomus* were isolated and identified by using manuals of Trappe (1982),

Walker (1983), Morton and Benny (1990), and Schenck and Perez (1990).

Glomus

The genus includes both sporocarpic and non sporocarpic species. Spores are borne terminally on a single undifferentiated hypha; spores attached with one or more subtending hyphae; spores produced singly or in loose or tight aggregates or in sporocarps in soil. The spores are formed at the end of hyphae which may be constricted at the point of attachment to the spore. The spore wall can have one to many layers, without ornamentation. The taxonomy of spores of *Glomus* species that encountered during this survey is as under:

Glomus aggregatum Schenck and Smith emend. Koske

Spores are pale yellow to yellowish-brown, globose to subglobose, pyriform to irregular, 70-92 μm x 75-106 μm . Spores are formed inside of spores by internal proliferation. Some spores are with lignituber-like ingrowths. Spore wall is consisting of one or two walls; outer wall yellowish-brown, laminated and smooth; inner wall pale yellow to yellowish-brown, flexible and laminated. Subtending hyphae are straight, curved, occasionally infundibuliform, constricted, swollen or irregular at the spore attachment. (Fig.1a). Spores were ex-

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tracted from the rhizosphere of *Tagetes erecta* Linn.

Glomus claroideum Schenck and Smith

Spores are yellow to yellow-brown, globose, 78-86 μm or subglobose, 78-89 x 92 μm . Spore wall is consisting of two walls; outer wall yellow to yellowish-brown laminated and thicker than the inner one; inner wall hyaline to yellow, membranous.

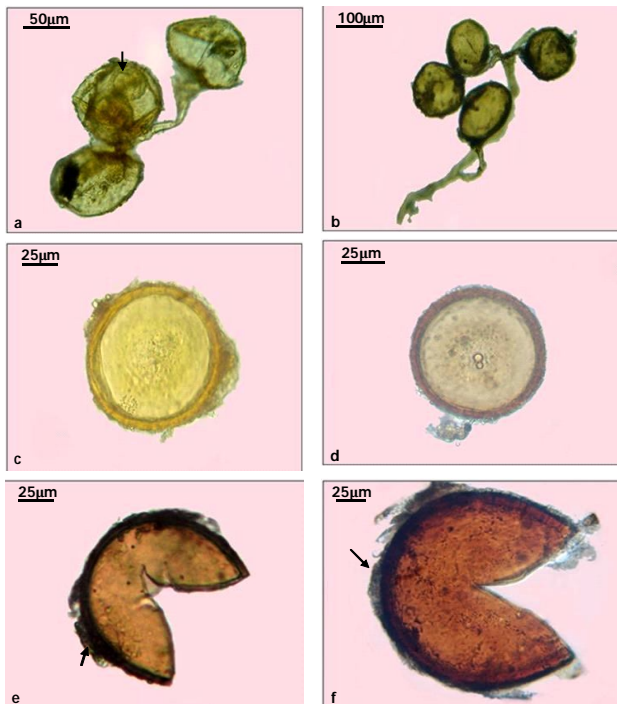


Fig. 1 : (a) Spores of *Glomus aggregatum* extracted from rhizosphere of *Tagetes erecta*, (b) Spores of *G. fasciculatum* extracted from *Tagetes erecta*, (c) and (d) Spores of *G. claroideum* extracted from rhizosphere of *Chrysanthemum indicum* and *T. erecta*, (e) and (f) Spores of *G. etunicatum* extracted from rhizosphere of *C. indicum* and *T. erecta*

Spore content is globular, hyaline to light yellow. Subtending hypha is yellow and flared. (Fig. 1c and d). Spores were extracted from the rhizosphere of *Chrysanthemum indicum* L. and *Tagetes erecta* Linn.

Glomus etunicatum Becker and Gerdemann

Spores are yellowish-brown to orange brown, globose to subglobose, 80-160 μm , smooth or roughened due to decomposition of outer wall and adherent debris. Spore wall is consisting of two walls; outer wall hyaline, ephemeral; inner wall yellowish-brown to dark brown, persistent, laminated. (Fig. 1e and f). Spores were extracted from the

rhizosphere of *Chrysanthemum indicum* L. and *Tagetes erecta* Linn.

Glomus fasciculatum (Thaxter) Gerdemann and Trappe emend. Walker and Koske

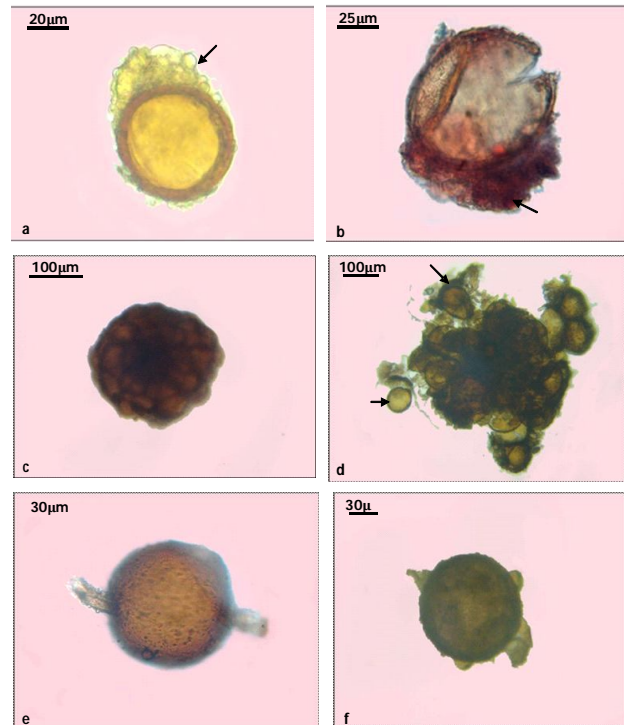


Fig. 2: (a) and (b) Spores of *Glomus globiferum* extracted from rhizosphere of *Chrysanthemum indicum*, (c) Sporocarp of *G. heterosporum*, (d) Spores of *G. heterosporum* extracted from rhizosphere of *C. indicum*, (e) and (f) Spores of *G. multicaule* extracted from rhizosphere of *Tagetes erecta*.

Sporocarps are hypogeous, 120-140 μm . Spores are globose, subglobose, ellipsoid, smooth or seem roughened from adherent debris, yellow, 94-116 μm x 111-144 μm . Spore wall is consisting of three walls; outer wall hyaline unit wall, middle yellowish-brown, laminated, inner wall thick and often minutely perforated with thickened inward projections. (Fig. 1b). Spores were extracted from the rhizosphere of *Tagetes erecta* Linn.

Glomus globiferum Koske and Walker

Spores are yellowish-brown surrounded by peridial hyphae, globose to subglobose, 53-84 μm x 56-98 μm excluding the peridium. The outer peridium may be of loosely interwoven hyaline to yellowish-brown sparsely septate or coenocytic hyphae surrounding the spore with debris, 5-26 μm broad bearing numerous terminal globose to ovoid pale yellowish-brown or hyaline vesiculate swellings of 4-10

μm diameter. Spore wall is consisting of 3-4 walls; outer one hyaline to yellowish-brown unit wall, wall 2 yellowish-brown to orange brown, laminated. Inner walls 3 and 4 are hyaline and membranous. (Fig. 2a and b). Spores were extracted from the rhizosphere of *Chrysanthemum indicum* L.

***Glomus heterosporum* Smith and Schenck**

Sporocarps are light to dark brown, globose to subglobose, $239 \mu\text{m} \times 250 \mu\text{m}$, consisting of a single ordered layer of spores originating from a central core of thick interwoven hyphae, peridium absent. Yellowish brown spores are of two different types and produced in single sporocarp (Fig. 2c).

First spore type is globose to subglobose, $61-68 \mu\text{m} \times 65-70 \mu\text{m}$; consisting of two walls, outer is hyaline, smooth and evanescent; inner laminated. Second spore type is obovoid to ellipsoid, $30-102 \mu\text{m} \times 27-68 \mu\text{m}$; consisting of three walls, outer hyaline and evanescent; middle one unit; inner wall hyaline membranous and flexible. Subtending hyphae are multiple and branched (Fig. 2d). Spores were extracted from the rhizosphere of *Chrysanthemum indicum* L.

***Glomus multicaule* Gerdemann and Bakshi**

Spores are dark brown, globose, $94-109 \mu\text{m}$. Spore wall is consisting of a single wall, orange brown to deep brown, laminated with rounded projections regularly distributed over wall surface. Subtending

hyphae are 1-3, cylindrical, curved or straight. (Fig. 2e and f). Spores were extracted from the rhizosphere of *Tagetes erecta* Linn.

According to Dkhar (2007) knowledge of microbial diversity is important because of their role in regulating the population of other organisms and ecosystem processes and of equal importance of microbial diversity itself and variations in their own population that affect host plant diversity.

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