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Study of the genus *glomus* associated with some important medicinal plants

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Abstract

The present study was focused to Collect Spores of Arbuscular mycorrhizal fungi (*Glomus*) for identification of indigenous species associated to establish pot cultures of prominent species. The motive of this Study is also to commercially utilize the superior strains of *Glomus* and to exploit them for their beneficial effects with other important rhizospheric microflora in establishment of seedlings.

Keywords: Genus *Glomus* and Medicinal Plants

Introduction

Arbuscular Mycorrhizal fungi (AMF) form obligate symbiotic association with many horticultural, agricultural, fibrous ornamentals, herbs, shrubs, medicinal plants and tropical trees. This association is not restricted to the roots of plants only but it is also found in all those organs of plants which are concerned with the absorption of substances from the soil (Srivastava *et al.*, 1996) [2, 4].

The fungus also forms vesicles, swollen structures. The soil or the plant types were found to be more or less important factors contributing to such an existence of *Glomus*. This is conformity with finding of Schenck and Kinlock (1980) [3, 7], Vyas and Srivastava (1988) [2, 4]. Similarly, Narolia *et al.*, (2008) [5] recorded the dominance of *Glomus* species from rhizospheric soil of *Pennisetum glaucum* and *Sorghum bicolor*. Twenty eight species of AM fungi, which belong to the genus *Glomus* were screened in crop land ecosystem.

In the present investigation, some species of AM fungi, which belong to genus *Glomus* were studied. *Glomus* species reproduce asexually and spores are formed at the tip of growing hyphae either in the host or in the soil. Thought to be chlamyospores, germinate in the soil until it comes in contact with roots of the host plant. Then it penetrates the coat and grows between the root cells. Inside the coat, the fungus forms arbuscules which are highly branched.

Materials and Methods

Composite soil samples from rhizospheric soil of some medicinal plants of Darlihana were collected. It was done by digging out a small amount of soil close to the plant roots up to the depth of 15-30 cm.

Isolation of *Glomus* spores were done by using wet sieving and decanting technique of Gerdemann and Nicolson (1963). In this technique, 50g of soil was soaked in 500ml. of water for 24 hours. The supernatant was then passed through a gradient of sieves with pore size ranging from 150 μ m to 45 μ m arranged one above the other in an ascending order. Each sieve was then washed in water and filtered through Whatmann No. 1 filter paper. This filter paper was then observed under stereo binocular microscope for the presence of various kinds of spores.

Results and Discussion

The occurrence of various AM fungal (*Glomus*) propagules per 50g of rhizospheric soil sample was examined. *Glomus* (a ball of yarn), possibly in reference to the sometime rounded and cottony appearance of species for which the Tulasne proposed the genus. Some of the characteristic features of all the isolates on the basis of which the AM fungi were identified are given below:-

Glomus caledonium (Nicolson & Gerdemann) Trappe & Gerdemann (Plate A, fig 1)

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Spores formed singly, slightly oval, yellowish to brown in colour, outer wall of spore at the point of hyphal attachment is thick, inner wall extending in to the hyphal attachment, hyphae colourless.

Glomus constrictum Trappe (Plate A, fig 2)

Chlamyospore light brown to dark brown, shape oblong to ellipsoidal, outermost wall layer coloured, outer spore wall layer extending down subtending hyphae, wide subtending hyphae but narrow at the point of attachment.

Glomus epigaeum Daniels & Trappe (Plate A, fig 3a, 3b)

Spore dark brown to light blackish in colour, shape oval to oblong, subtending hyphae inserted in to the spore wall, pore

at point of attachment of subtending hyphae occluded by a septum like plug, spore borne singly.

Glomus fragile (Berkeley & Broome) Trappe & Gerdemann (Plate A, fig 4)

Chlamyospore yellowish brown, shape oval, subtending hyphae simple, always hyaline and fragile.

Glomus fuegianum (Spegazzini) Trappe & Gerdemann (Plate A, fig 5a, 5b)

Chlamyospore sessile or almost sessile, in cluster of 2 or more, outer wall is much thicker than inner, spore colour varies from light yellowish brown to dark brown.

Plate A

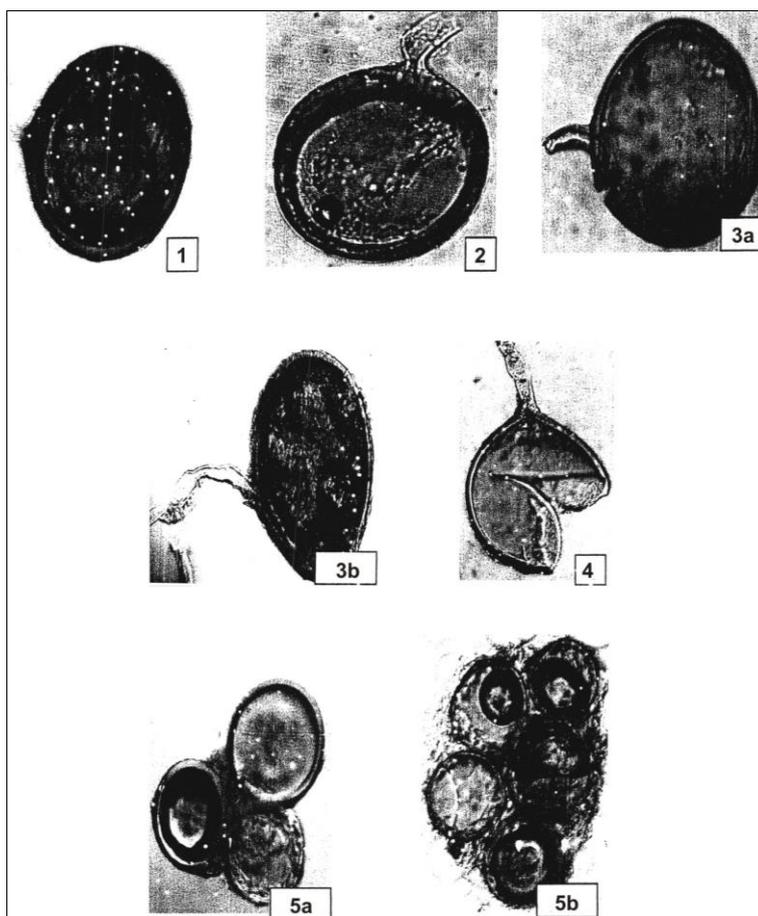


Fig 1: *Glomus caledonium* 400X, **Fig 2:** *Glomus constrictum* 400X, **Fig 3a:** *Glomus epigaeum* 400X, **Fig 3b:** *Glomus epigaeum* 400X, **Fig 4:** *Glomus fragile* 400X, **Fig 5a:** *Glomus fuegianum* 400X, **Fig 5b:** *Glomus fuegianum* 400X

Glomus fulvum (Berkeley & Broome) Trappe & Gerdemann (Plate B fig 6)

Yellow, brown coloured sporocarp surrounded by peridium, spore oblong to irregular, subtending hyphae with thick walls and occluded by spore wall.

Glomus geosporum (Nicolson & Gerdemann) Walker (Plate B fig 7)

Chlamyospore formed singly, globose to subglobose or broadly ellipsoid, smooth and shiny, three layered, simple to slightly funnel shaped subtending hyphae.

Glomus macrocarpum Tulasne & Tulasne (Plate B fig 8a, 8b)

Chlamyospore formed singly, globose to subglobose,

yellowish brown to dark brown, subtending hyphae not inserted, pore without a plug. Spore wall layers show striated walls.

Glomus merredum Porter & Hall (Plate B fig 9)

Spore oblong or globose, light brown to dark brown, subtending hyphal wall two layered, inner wall of spore striated.

Glomus microcarpum Tulasne & Tulasne (Plate B fig 10)

Spore orange to reddish in colour shape of spore oval to globose, hyphal attachment] pore at the point of attachment, inner layer of spore wall near the hyphal attachment different.

Glomus monosporum Gerdemann & Trappe (Plate B fig 11d, 11b)

Spores ranging in colour from yellowish to brown. Sporocarps containing 1-3 spores, outer surface of inner wall ornamented with minute echinulate projections and thin outer wall not always obvious, delicate and branched subtending hyphae.

Glomus mousseae (Nicolson & Gerdemann) Gerdemann & Trappe (Plate B fig 12)

Chlamydospore yellowish to brown, globose to ovoid, sometimes ellipsoid to irregular. Outer surface of inner wall not ornamented, funnel shaped subtending hyphae.

Glomus pubescens (Saccardo & Ellis) Trappe & Gerdemann (Plate B fig 13)

Sporocarps covered with pubescent hyphae, number of spores in the sporocarps generally greater than 12, shape slightly irregular, light yellow to reddish brown, subtending hyphae always hyaline.

Glomus segmentatum Trappe, Spooner & Ivory (Plate B fig 14)

Spores formed in sporocarp enclosed in peridium, spore pale yellow to dark brown, tightly packed, radially segmented (spores) separable as polyhedrons, hyphal attachment present.

Glomus tenue (Greenhall) Hall (Plate B fig 15)

Spores dark brown with subtending hyphae, ellipsoidal to oblong, outer wall thick, subtending hyphae extending on outer wall.

Plate B

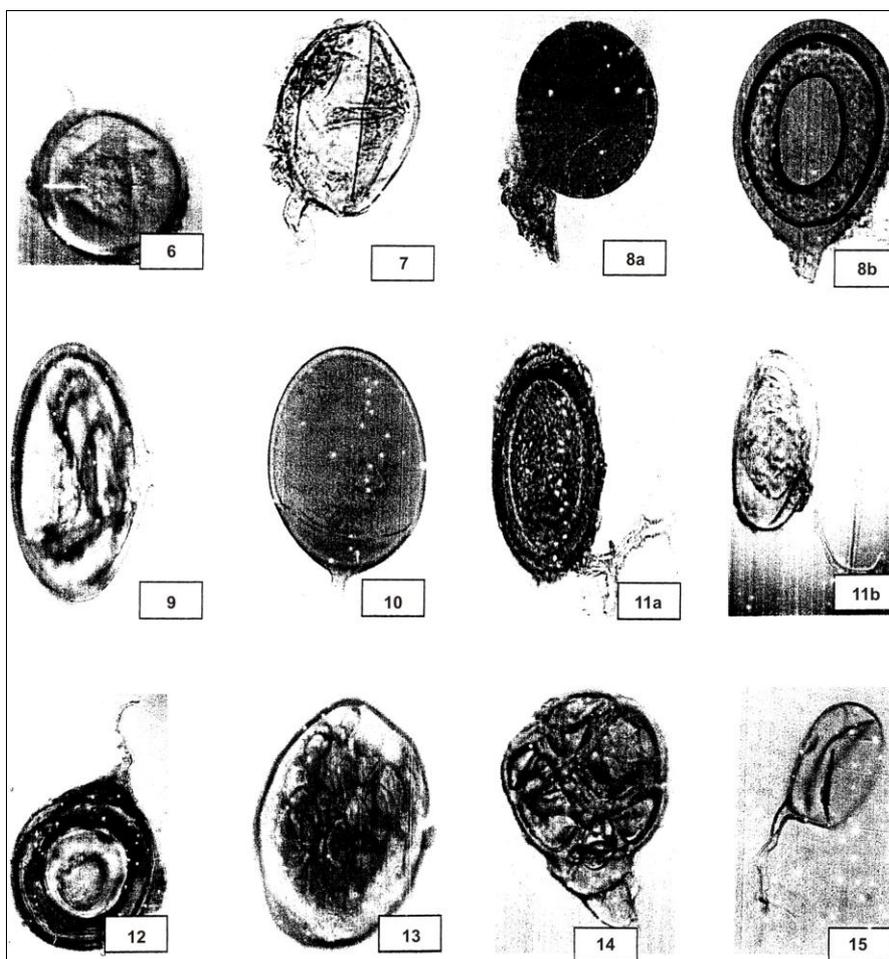


Fig 6: *Glomus fulvum* 400X, **Fig 7:** *Glomus geosporum* 400X, **Fig 8a:** *Glomus macrocarpum* 400X, **Fig 8b:** *Glomus macrocarpum* 400X, **Fig 9:** *Glomus merredum* 400X, **Fig 10:** *Glomus microcarpum* 400X, **Fig 11a:** *Glomus monosporum* 400X, **Fig 11b:** *Glomus monosporum* 400 X, **Fig 12:** *Glomus mousseae* 400X, **Fig 13:** *Glomus pubescens* 400X, **Fig 14:** *Glomus segmentatum* 400X, **Fig 15:** *Glomus tenue* 100X

Conclusion

AM fungi are an important component of the soil in all types of environments and are beneficial for plant growth and development. Therefore, in the present study a wide variety of AM fungi have been reported in the vicinity of important medicinal plants. The result indicated that about 70% of the AM species composition is made by genus *Glomus* (Nasim and Bajwa, 2005) ^[1, 6]. Iqbal and Nasim (1991) ^[1, 6] also recorded the finding on the same line.

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