



STUDIES ON ENDOMYCORRHIZAL ASSOCIATIONS OF CASUARINA FROM MAHARASHTRA

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ABSTRACT:

The Casuarinas are grown as plantations under Agroforestry on large scale in different regions of Maharashtra. *Casuarina* plants are useful as fuel and fodder tree, helps to stabilize sand dunes and also act as wind breakers. A survey was conducted to study the endomycorrhizal associations in *Casuarina* from the parts of Maharashtra. The soils of *Casuarina* were found to be abundant in endomycorrhiza with species of *Glomus*, *Gigaspora*, *Scutellospora* and *Sclerocystis*. The soil types ranged from clayey to sandy. The success and adaptation of these plants is due to their strong symbiotic associations.

Key words : *Casuarina*, Endomycorrhiza.

INTRODUCTION:

The tree *Casuarina equisetifolia* Forst and Forst (*Casuarina litorea* L.) is the important nitrogen fixing, ornamental, non leguminous multipurpose tree species which is important in Agroforestry. It is mostly grown as plantations. It provides fuel and fodder, improves soil fertility, plays an important role in colonization of bare soils, improves physical and chemical properties of soil, act as wind breakers, stabilizes sand dunes and thrives in all conditions. They are resistant to drought and salinity (Halbe S., 1995). *Casuarina* plantations are found growing luxuriantly along the coastal peninsula having sandy loam soils and less rainfall.

The ability of *Casuarinas* to grow vigorously on poor soil due to their symbiotic association with several microorganisms (Jasper 1994). The most important are mycorrhizal fungi. They are of two types- Ectomycorrhiza and Endomycorrhiza. The endomycorrhizal associations also called as arbuscular mycorrhiza help in improving soil fertility, nutrient cycling and uptake of Phosphorus. A survey was undertaken to study the endomycorrhizal associations of *Casuarina* plantations from coastal and interior regions of Maharashtra.

MATERIALS AND METHODS :

The *Casuarina* plantations from different regions of Maharashtra were surveyed for their endomycorrhizal associations. The soil samples were collected from rhizosphere soils of *Casuarina* from different localities at interior and coastal sites of Ahmednagar, Deogadh, Pune, Baramati, Kamshet, Lonavala, Mahabaleshwar, Panchgani, Alibaug, Murud, Kihim, Ganpatipule, Dapoli and Ratnagiri of Maharashtra.

The soil samples were collected randomly, dried and sieved before use. The soil was used for isolation of AM spores was done using Wet Seiving and Decanting Method (Gerdemann and done using standard Manuals and photos.

The percentage infectivity and assessment of Mycorrhizal Infection in roots was also calculated using the Phillips and Hayman's method (1979) and Gridline intersect method (Giovannette and Mosse, 1980). The observations were recorded in the Table I.

RESULT & DISCUSSION :

The present study revealed that naturally the soils of *Casuarina* contained AM propagules in abundance . The soils were mostly acidic to neutral. The plant showed fungal infectivity in

roots upto 20-60% that helped in stabilizing the plant under different conditions. The AM fungi also help to increase the uptake of nutrients for the plant. The fungus was widespread in the secondary and tertiary roots. The roots showed presence of vesicles and arbuscules which were stained blue and were easily seen under the microscope

The collected samples showed a range of 6-34 spores from different localities of Maharashtra like Ahmednagar, Deogadh, Lonavala, Mahabaleshwar, Panchgani, Kihim, Alibaug, Ratnagiri, Dapoli and Ganpatipule. The study of soil samples have revealed that the clayey and sandy soils were rich in Arbuscular mycorrhizal fungi like *Glomus*, *Gigaspora*, *Scutellospora* and *Sclerocystis* species. A total of 8 *Glomus* species, 4 *Gigaspora* species, 4 *Sclerocystis* species and 3 *Scutellospora* species were identified upto species level. Some of the genera were identified but their further classification till species level could not be followed based on the given standards.

The success of plantations in the different localities of Maharashtra is due to their endomycorrhizal symbiotic associations. Thus, the endomycorrhizal fungi are potentially

beneficial for *Casuarina* plantations which make them healthy and evergreen.

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Observation Table I

Sr. No.	Name of the Locality	Region	No. of spores/10 gms soil	% Infectivity	Soil pH & type	AM Species recorded
1.	Ahmednagar	Interior	11	40	7.0 loam	<i>Glomus botryoides</i> <i>Glomus macrocarpum</i> <i>Glomus hoi</i> <i>Gigaspora decipiens</i> <i>Sclerocystis species</i>
2.	Deogadh	Interior	7	30	6.5 loam	<i>Glomus multicaule</i> <i>Glomus macrocarpum</i> <i>Glomus hoi</i> <i>Sclerocystis microcarpa</i> <i>Scutellospora fasciculatum</i>
3.	Pune	Interior	13	40	6.5 clayey	<i>Glomus botryoides</i> <i>Glomus constrictum</i> <i>Gigaspora decipiens</i> <i>Sclerocystis species</i>
4.	Baramati	Interior	8	30	6.5 loam	<i>Glomus botryoides</i> <i>Sclerocystis microcarpa</i> <i>Gigaspora decipiens</i> <i>Sclerocystis cunninghamia</i> <i>Scutellospora fasciculatum</i>
5.	Kamshet	Interior	8	20	6.5 clayey	<i>Glomus constrictum</i> <i>Gigaspora species</i> <i>Scutellospora fasciculatum</i> <i>Scutellospora species</i>
6.	Lonavala	Interior	8	20	7.5 Clayey	<i>Glomus sp.</i> <i>Gigaspora candida</i> <i>Gigaspora species</i> <i>Sclerocystis species</i> <i>Sclerocystis cunninghamia</i>
7.	Mahabaleshwar	Interior	10	30	7.0 Clayey	<i>Glomus multicaule</i> <i>Glomus macrocarpum</i> <i>Gigaspora species</i> <i>Sclerocystis microcarpa</i> <i>Scutellospora species</i>
8.	Panchgani	Interior	6	10	7.0 Clayey	<i>Glomus species</i> <i>Glomus botryoides</i> <i>Gigaspora species</i> <i>Scutellospora species</i>
9.	Alibaug	Coastal	26	40	6.5 Sandy	<i>Glomus constrictum</i> <i>Sclerocystis taiwanensis</i> <i>Sclerocystis microcarpa</i> <i>Scutellospora species</i>
10.	Murud	Coastal	34	60	5.5 Sandy	<i>Glomus multicaule</i> <i>Gigaspora species</i> <i>Sclerocystis microcarpa</i> <i>Sclerocystis cunninghamia</i>
11.	Kihim	Coastal	20	30	6.5 Loam	<i>Glomus constrictum</i> <i>Glomus multicaule</i> <i>Glomus constrictum</i> <i>Gigaspora candida</i> <i>Sclerocystis cunninghamia</i>
12.	Ganpatipule	Coastal	22	40	5.5 Sandy	<i>Gigaspora species</i> <i>Gigaspora candida</i> <i>Sclerocystis cunninghamia</i> <i>Scutellospora species</i>
13.	Dapoli	Coastal	16	50	6.0 Sandy	<i>Glomus manihot</i> <i>Gigaspora species</i> <i>Gigaspora candida</i> <i>Sclerocystis taiwanensis</i> <i>Sclerocystis microcarpa</i>
14.	Ratnagiri	Coastal	24	50	6.0 Sandy	<i>Glomus manihot</i> <i>Gigaspora candida</i> <i>Sclerocystis species</i> <i>Scutellospora species</i>