

skilled labour (93.33 per cent), more risk (66.66 per cent) and lack of credit (60.00 per cent) respectively.

The study revealed that majority of the farmers adopted the LCTs of paddy at medium level. Majority of the farmers perceived that lack of awareness, lack of knowledge, non-availability of inputs/resources in time and non-availability of skilled labour as the reasons for non-adoption of LCTs in paddy by the farmers.

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SURVEY OF ARBUSCULAR MYCORRHIZAL ASSOCIATION OF *Casuarina equisetifolia* Frost IN TAMIL NADU

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ABSTRACT

A survey was conducted to assess the natural AM colonization in rhizosphere of 2-3 years old *Casuarina equisetifolia* Frost seedling in different places of Tamil Nadu. High AM fungi spore was present in *Casuarina* rhizosphere soils of Cuddalore, followed by Marakkanam and Kanyakumari. AM fungi infection percentage was more in *Casuarina* roots of Kanyakumari followed by Cuddalore and Marakkanam. AM fungi colonization (both AM fungi spore number and AM fungi infection percentage) was fair P^{II} from 6.6 - 7.5. Among the AM fungal genus, *Glomus* spp. was present in all the ten places surveyed in Tamil Nadu. Root and shoot length, and dry weight was higher in *Casuarina* seedlings grown in soil of Kanyakumari followed by Cuddalore which recorded more AM fungi spore number and AM fungi infection percentage.

KEY WORDS: *Casuarina equisetifolia*, Survey, AM colonization, Rhizosphere.

Casuarina equisetifolia Frost is one of the most important species in coastal areas as well as in the arid and semi arid regions of India. Presently it is planted throughout the tropics for fuel wood production, land reclamation, sand dune stabilization and shelter belts. The species is salt tolerant, wind resistant and adaptable to poor soil. AM fungi are plant in natural communities (Gerdemann, 1968). The external fungal hyphae enable the plant to extract slow diffusing nutrients such as phosphorous and also water from a layer of soil volume that the plant root system, normally exploit. A survey was conducted at ten different places of Tamil Nadu to investigate the occurrence of AM fungal colonization in *Casuarina equisetifolia* rhizosphere.

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MATERIALS AND METHODS

Sample collection

The composite of roots and rhizosphere soil of *C. equisetifolia* was collected from ten *Casuarina* plantations located at Coimbatore, Neyveli, Mettupalayam, Kanyakumari, Rameshwaram, Cuddalore, Neyveli, Tambaram, kayalpattanam, Perundurai, and Marakkanam. At each site, five trees were randomly selected and their root materials and rhizosphere soil samples were collected following the methods of Koske and Halvorson (1981). AM fungal spore was recovered from the collected soil sample by wet sieving and decanting as described by Gerdemann and Nicolson (1963) and AM fungi infection percentage of root spores extracted from the soils

Table 1. Physical properties and AM fungal population and infection *Casuarina equisetifolia* at different places of Tamil Nadu.

Site of sample collection	Soil type	Soil pH	VAM spore no/ 100 g of soil	VAM infection %
Coimbatore	Black	6.6	250.0 (15.8) ^a	53.88 (47.2) ^a
Mettupalayam	Red	8.3	200.0 (14.2) ^a	51.70 (45.9) ^a
Kanyakumari	Red coastal sand	7.5	301.0 (17.3) ^a	85.50 (67.6) ^a
Rameshwaram	Coastal sand	7.7	137.0 (11.8) ^b	48.20 (43.9) ^b
Cuddalore	Sandy	7.3	380.0 (19.5) ^a	79.60 (63.2) ^a
Neyveli	Red	7.2	268.0 (16.4) ^d	71.80 (57.9) ^d
Tambaram	Red	7.3	266.0 (16.3) ^d	62.70 (52.4) ^c
Kayalpattanam	Coastal sand	8.0	185.0 (13.6) ^c	40.00 (39.3) ^d
Perundurai	Red	7.1	94.0 (9.7) ^e	44.40 (41.8) ^e
Marakkanam	River alluvium	6.9	340.0 (48.4) ^b	75.00 (60.0) ^b

In a column means followed by a common letter are not significantly different at the 5% level by DMRT. Values in parentheses are transformed values.

were identified according to the spore size, shape, colour, spore wall thickness, wall layering surface ornamentations and hyphal attachment based on monograph of Gerdemann and Trappe (1974).

An experiment was conducted to assess the role of AM fungal collected from different places in promoting the growth of *Casuarina* seedling. Polybags of 30 x 20 cm size filled with soil collected from different places. Fifteen days old sterile grown *Casuarina* seedlings were transplanted into

these polybags. Root length, shoot length, total dry weight and number of AM fungal spore and AM fungal infection percentage was recorded on 45 and 60 days after transplanting. The data were analysed statistically for testing significance ($P=0.05$) as per Panse and Sukhatme (1967).

RESULTS AND DISCUSSION

Among the ten places surveyed for AM fungal colonization in *Casuarina* rhizosphere, more AM fungi spore was observed in *Casuarina*

Table 2. The endogonaceae species recovered from *Casuarina equisetifolia* rhizosphere in Tamil Nadu

VAM fungi	<i>Glomus mossae</i>	<i>Glomus fasciculatum</i>	<i>Glomus etunicatum</i>	<i>Gigaspora calospora</i>	<i>Acaulospora</i> spp.
Coimbatore	+	+	+	+	-
Mettupalayam	+	+	-	+	-
Kanyakumari	+	+	+	-	+
Rameshwaram	+	+	+	-	+
Cuddalore	+	+	+	-	+
Neyveli	+	+	+	-	-
Tambaram	-	+	+	+	-
Kayalpattanam	-	+	-	-	+
Perundurai	+	+	-	+	-
Marakkanam	+	+	+	-	-

In a column means followed by a common letter are not significantly different at the 5% level by DMRT. Values in parentheses are transformed values.

Table 3. Influence of different AM fungal sources on the growth of *Casuarina equisetifolia* seedlings,

	Shoot length		Root length		Dry weight	
	45 DAP	60 DAP	45 DAP	60 DAP	45 DAP	60 DAP
Coimbatore	12.8 ^a	22.6 ^d	10.0 ^e	21.0 ^e	0.67 ^d	0.87 ^e
Mettupalayam	13.8 ^c	26.2 ^e	10.6 ^e	21.9 ^e	0.69 ^e	0.99 ^e
Kanyakumari	15.3 ^a	28.2 ^a	12.8 ^b	26.8 ^a	0.84 ^a	1.28 ^a
Rameshwaram	11.9 ^f	24.5 ^e	9.8 ^e	20.0 ^f	0.54 ^f	0.79 ^f
Cuddalore	14.4 ^b	27.0 ^b	11.5 ^b	24.2 ^b	0.73 ^b	1.05 ^b
Neyveli	13.0 ^d	26.0 ^e	9.2 ^e	21.2 ^d	0.61 ^e	0.93 ^d
Tambaram	10.1 ⁱ	23.1 ^f	8.0 ^f	18.1 ^j	0.44 ⁱ	0.68 ^h
Kayalpattanam	10.9 ^g	23.9 ^f	8.9 ^h	19.0 ⁱ	0.48 ⁱ	0.72 ^f
Perundurai	11.6 ^b	24.6 ^e	9.1 ^e	19.8 ^b	0.51 ^b	0.79 ^f
Marakkanam	11.8 ^e	24.7 ^e	9.5 ^f	20.9 ^f	0.58 ^f	0.80 ^f

In a column means followed by a common letter are not significantly different at the 5% level by DMRT.

rhizosphere soil of cuddalore (380.0) followed by Marakkanam (340) and Kanyakumari (301). AM fungi infection percentage was higher in *Casuarina* roots of Kanyakumari (85.5 per cent), followed by cuddalore (79.6 per cent) and Marakkanam (75.0 per cent) (Table 1). Both AM fungi spore and AM fungi infection percentage was found to be lesser in rhizosphere soil and roots of *Casuarina* from Kayalpattanam. From the survey, it is observed that AM fungi colonization

was fair with P^{II} range from 6.6 to 7.5 (Table 1) Wang *et al.*, (1993) reported that the percentage of AM fungi colonization was little affected by soil P^H from 4.5 - 7.5. Sparling and Tinker (1978) found no obvious effect of P^H on mycorrhizal infection in three grassland sites at P^H 4.9, 5.9 and 6.2. Soil P^H may affect the distribution of mycorrhiza in a subtle way. The uniformity of colonization with P^I was due to the mechanism operating within the host plant (Buwalda *et al.*, 1984). Among AM

Table 4. Influence of different AM fungal sources on AM fungal population and infection *Casuarina equisetifolia* in rhizosphere

	45 DAP		60 DAP	
	VAM spore No.	VAM infection %	VAM spore No.	VAM infection %
Coimbatore	281.0 (16.8) ^b	55.7 (48.3) ^e	265.0 (16.3) ^e	50.1 (45.1) ^e
Mettupalayam	235.0 (15.3) ^f	60.1 (50.8) ^f	205.0 (14.4) ^f	55.9 (48.4) ^f
Kanyakumari	395.0 (19.9) ^a	89.2 (70.8) ^b	352.0 (18.8) ^b	78.9 (62.3) ^b
Rameshwaram	170.0 (13.0) ^g	50.0 (45.0) ^b	162.0 (12.7) ^g	41.9 (40.3) ^b
Cuddalore	466.0 (21.6) ^a	90.1 (71.7) ^a	370.0 (19.3) ^c	81.3 (64.4) ^c
Neyveli	362.0 (19.0) ^d	80.0 (63.5) ^c	294.0 (17.1) ^d	75.0 (60.0) ^c
Tambaram	257.0 (16.0) ^f	65.2 (53.9) ^e	242.0 (15.6) ^g	60.0 (50.8) ^e
Kayalpattanam	207.0 (14.4) ^h	50.1 (45.0) ^b	192.0 (13.9) ^h	41.5 (40.1) ^c
Perundurai	112.0 (10.6) ⁱ	49.3 (44.6) ^f	106.0 (10.3) ⁱ	39.0 (38.7) ^e
Marakkanam	378.0 (19.5) ^c	78.1 (62.0) ^d	344.0 (18.6) ^d	72.1 (58.1) ^d

In a column means followed by a common letter are not significantly different at the 5% level by DMRT.

Values in parentheses are transformed values.

fungal genus, *Glomus* spp was present in soils of all the ten places (Table 2). Further it was observed that *Gigaspora calospora* was present only in Coimbatore, Mettupalayam, Tambaram, Perundurai and *Acaulospora* sp. was present only in Kanyakumari, Rameshwaram, Cuddalore and Kayalpattanam.

Root length, shoot length and total dry weight were higher in *Casuarina* seedlings grow in soil of Kanyakumari followed by Cuddalore and it was lower in Tambaram soil. AM fungi spore and AM fungi infection percentage was more in *Casuarina* seedling grown in soil of cuddalore and it was less in perundurai. AM infection percentage was found to decrease after 60 days of planting. This may be due to on set of sporulation of AM fungi. Abott and Robson (1981) found that the infectivity of *Acaulospora laevis* from fresh root pieces declined rapidly with on set of sporulation.

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EFFECT OF LAND MANAGEMENT, IRRIGATION SCHEDULE AND ORGANIC AMENDMENTS ON PRODUCTIVITY OF IRRIGATED GROUNDNUT

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ABSTRACT

A field experiments was carried out during summer 1996 and 1997 at Vamban to study the productivity of irrigated Groundnut (*Arachis hypogaea* L.) as influenced by land management using organic amendments under varying irrigation regimes. Adopting land management of ridges and furrows and providing irrigation at 0.8 IW/CPE resulted in higher groundnut pod yield of 1588 kg/ha and benefit cost ratio of Rs. 2.75 under red lateritic soils of Vamban. Application of enriched FYM registered significant increase in plant height, number of pods per plant, pod yield WUE and benefit cost ratio over bio-digested slurry and pressmud in both the years.

KEY WORDS: Groundnut, Productivity, Land management, Irrigation regimes, Organic amendments.

Groundnut (*Arachis hypogaea* L.) is one of the important oilseed crops of Tamil Nadu. Land

management systems play a major role in increasing the infiltration, minimizing soil erosion