

STUDY ON ARBUSCULAR MYCORRHIZAL ASSOCIATIONS IN ORNAMENTAL PLANTS - A SURVEY

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A preliminary survey has been made to determine the arbuscular mycorrhizal status of 73 ornamental plants belonging to 35 families. The mycorrhizal infection was found in 28 species showing wide range of colonisation i.e., 10-90%. The highest percentage (90%) of colonisation were recorded in *Clerodendrum inerme* of the family Verbenaceae followed by *Acalypha wilkesiana*, *Bougainvillea spectabilis*, *Duranta repens*, *Maranta arundinacea*, and *Malvaviscus arboreus* where roots were observed with 70% AM colonisation. Plants belonging to the family Verbenaceae were shown to have better mycorrhization as compared to others, where as plants belonging to the family Apocynaceae, Asclepiadaceae, Begoniaceae, Boraginaceae, Caesalpiaceae, Malpighiaceae, Melastomataceae, Mimosaceae, Moraceae, Myrtaceae, Pittosporaceae, Selaginaceae, Solanaceae, Urticaceae were found to be nonmycorrhizal. The findings regarding the varied pattern of AM colonisation in the ornamental plants suggests the host preference phenomenon of these fungi.

Keywords : Arbuscular mycorrhiza; Ornamental plants.

Introduction

The arbuscular mycorrhizal (AM) fungi are distributed in the tropical and subtropical soils. Ecologically, the habitat variation doesn't seem to affect incidence and distribution of AM fungi to a considerable extent as they have been isolated from rhizosphere soil of forest^{1,2}, agricultural fields³, sand dunes⁴, aquatic system, saline soils⁵ and acid soils⁶. There are at least 300,000 representative hosts in the world flora and about 120 species of AM mycorrhizal fungi^{7,8}. According to Gerdeman⁹ it was easier to list most families that did not form AM than to list those that did. The symbiosis was so well balanced that although many of the host cells are invaded by the fungal endophyte there is no visible tissue damage and in certain conditions it enhanced the growth and vigour of the host plants. With these consideration, a preliminary screening was conducted for the host association of AM fungi in natural condition.

Materials and Methods

A large number(73) of ornamental plants of different families (Table 1) were collected from the nursery of Regional Plant Resource Centre, Bhubneswar, Orissa for determination of mycorrhizal status in term of colonisation (%). Root samples of the different plant roots were treated with the 10% KOH at 90° C/1

hr for clearing¹⁰, afterwards stained with 0.05% trypan blue for 30 min. Slides of the root bits (1 cm) were prepared in lactophenol mount and observed for the presence of mycelium, vesicles and arbuscles. The root colonisation (%) was determined according to slide method of Schenck⁸.

Results and Discussion

Among 73 ornamental plants studied, 28 species have shown incidence of AM infection (Table-1) and colonisation percentage ranged from 10 to 90%. *Clerodendrum inerme* of the family Verbenaceae showed highest colonisation (90%) followed by *Acalypha wilkesiana* (70%), *Duranta repens* (70%), *Maranta arundinacea* (70%), *Malvaviscus arboreus* (70%). Plants which had 40-60% root colonisation were *Barleria lupulina*, *Clusia rosea*, *Coleus blumei*, *Clerodendrum thomsonae*, *Gmelina hystrix*, *Jasminum pubscens*, *Hibiscus rosa sinensis*, *Ixora chinensis*, *Lawsonia inermis*, *Malpighia glabra*, *Murraya paniculata*, *Quisqualis indica*, *Russelia rotundifolia*, *Thunbergia erecta*, *Vitex agnuscastus*. Poor colonization (10%) was noted in *Beloperone guttata*, *Caladium hortulanum*, *Calathea princeps*, *Curculigo recurvata* and *Polyscias guilfoylei*.

Prevalence of AM fungi in the soil of ornamental plants in the nursery

Table 1. Vesicular arbuscular mycorrhizal colonization in ornamental plants.

Name of Plants	Family	AM Colonisation % ± SEM
<i>Acalypha wilkesianas</i> ¹	Euphorbiaceae	70 ± 4.619
<i>Aglaonema commutatum</i> ²	Araceae	20 ± 2.889
<i>Allamanda cathartica</i>	Apocynaceae	0
<i>Barleria lupulina</i> ³	Acanthaceae	50 ± 2.309
<i>Begonia sp.</i>	Begoniaceae	0
<i>Beloperone guttata</i> ⁴	Acanthaceae	10 ± 1.55
<i>Bougainvillea spectabilis</i> ⁵	Nyctaginaceae	70 ± 2.906
<i>Brownea ariza</i>	Caesalpiniaceae	0
<i>Brunfelsia undulata</i>	Solanaceae	0
<i>Caladium hortulanum</i> ⁶	Araceae	10 ± 1.732
<i>Calathea ornata</i>	Araceae	0
<i>Calathea princeps</i> ⁷	Araceae	10 ± 1.555
<i>Calliandra hematocephala</i>	Mimosaceae	0
<i>Callistemon lanceolatus</i>	Myrtaceae	0
<i>Canna generalis</i> ⁸	Cannaceae	20 ± 2.309
<i>Carmona retusa</i>	Boraginaceae	0
<i>Cerbera fruticosa</i>	Apocynaceae	0
<i>Clerodendrum inerme</i> ⁹	Verbenaceae	90 ± 0.5774
<i>Clerodendrum thomsonae</i> ¹⁰	Verbenaceae	60 ± 4.041
<i>Clusia rosea</i> ¹¹	Clusiaceae	50 ± 2.309
<i>Codiaeum variegatum</i>	Euphorbiaceae	0
<i>Coleus blumei</i> ¹²	Lamiaceae	40 ± 4.619
<i>Cordyline terminalis</i>	Liliaceae	0
<i>Cordyline terminalis "rainbow"</i>	Liliaceae	0
<i>Costus malortieanus</i>	Costaceae	0
<i>Curculigo recurvata</i> ¹³	Hypoxidaceae	10 ± 0.5774
<i>Diaphenbachia amoena</i>	Araceae	0
<i>Dracaena goldseffiana</i>	Liliaceae	0
<i>Dracaena sanderiana</i>	Liliaceae	0
<i>Dracaena terniflora</i>	Liliaceae	0
<i>Duranta repens</i> ¹⁴	Verbenaceae	70 ± 4.619
<i>Elaeocarpus granitus</i>	Eleaocarpaceae	0
<i>Eranthemum bicolor</i>	Acanthaceae	0
<i>Ficus benjamina</i>	Moraceae	0
<i>Gardenia jasminoides</i>	Rubiaceae	0

<i>Gmelina hystrix</i> ¹⁵	Verbenaceae	50 ± 2.309
<i>Graptophyllum pictum</i>	Acanthaceae	0
<i>Heliconia psittacorum</i>	Moraceae	0
<i>Hibiscus rosa sinensis</i> ¹⁶	Malvaceae	40 ± 2.309
<i>Holmskioidea sanguinea</i>	Verbenaceae	0
<i>Homalomena wallisii</i>	Araceae	0
<i>Ixora chinensis</i> ¹⁷	Rubiaceae	50 ± 5.196
<i>Jacobinia carnea</i>	Acanthaceae	0
<i>Jasminum pubescens</i> ¹⁸	Oleaceae	60 ± 4.041
<i>Jasminum sambac</i>	Oleaceae	0
<i>Lawsonia inermis</i> ¹⁹	Lythraceae	40 ± 1.155
<i>Legerstroemia indica</i>	Lythraceae	0
<i>Malpighia coccigera</i>	Malpighiaceae	0
<i>Malpighia glabra</i> ²⁰	Malpighiaceae	40 ± 2.887
<i>Malvaviscus arboreus</i> ²¹	Malvaceae	70 ± 4.619
<i>Maranta arundinacea</i> ²²	Marantaceae	70 ± 4.217
<i>Maranta leuconeura</i>	Marantaceae	0
<i>Melastoma malabathrium</i>	Melastomataceae	0
<i>Murraya paniculata</i> ²³	Rutaceae	60 ± 2.887
<i>Mussaenda erythrophylla</i>	Rubiaceae	0
<i>Mussaenda frondosa</i>	Rubiaceae	0
<i>Ophiopogon japonicus</i>	Liliaceae	0
<i>Pilea cadierrl</i>	Urticaceae	0
<i>Pilea serpyllacea</i>	Urticaceae	0
<i>Pittosporum tobira</i>	Pittosporaceae	0
<i>Pleomele reflexa</i>	Liliaceae	0
<i>Polyscias guilfoylei</i> ²⁴	Araliaceae	10 ± 1.732
<i>Pseudoranthemum atropurpureum</i>	Acanthaceae	0
<i>Quisqualis indica</i> ²⁵	Combretaceae	60 ± 1.732
<i>Rhoea spathacea</i>	Liliaceae	0
<i>Russellia rotundifolia</i> ²⁶	Scrophulariaceae	40 ± 2.309
<i>Sansevieria trifasciata</i>	Liliaceae	0
<i>Selaginella indica</i>	Selaginaceae	0
<i>Syngonium podophyllum</i>	Araceae	0
<i>Tabernamontana divaricata</i>	Apocynaceae	0
<i>Thunbergia erecta</i> ²⁷	Acanthaceae	50 ± 5.196
<i>Vallisneria spiralis</i>	Asclepiadaceae	0
<i>Vitex agnuscastus</i> ²⁸	Verbenaceae	60 ± 1.732

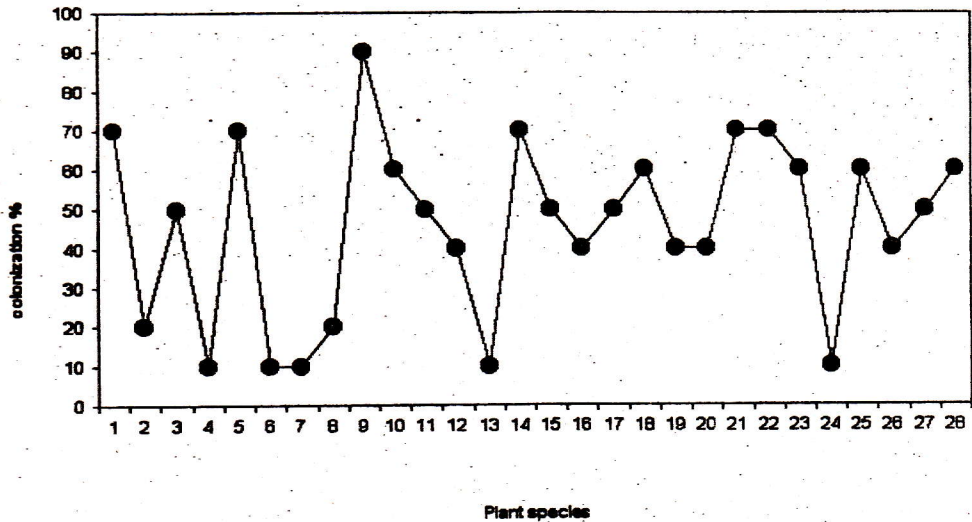


Fig 1. AM colonization pattern among 28 different ornamental plants (Species index 1-28 is given in table 1)

was evident from the results of this survey. The occurrence of mycorrhizal association in these plant groups not only suggests its ubiquitous behaviour, but indicated nonspecific, nutritional requirement too. Among all plants tested *Clerodendrum inerme* belonging to Verbenaceae have shown the highest colonisation (Fig.1). There was recent evidence that plant species with in a single family can vary in their susceptibility as much as plant species in very distinct families. Even varieties and cultivars of the same species were reported to colonise in different intensities. A very high level of acceptability and/or nonsusceptibility of the host plants was noted in the present study. It might be the fact that occurrence of indigenous and symbiotically competent AM fungi associated with ornamental plants preferred suitable

hosts.

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