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Phylogenetic distribution and evolution of mycorrhizas in land plants

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Abstract A survey of 659 papers mostly published since 1987 was conducted to compile a checklist of mycorrhizal occurrence among 3,617 species (263 families) of land plants. A plant phylogeny was then used to map the mycorrhizal information to examine evolutionary patterns. Several findings from this survey enhance our understanding of the roles of mycorrhizas in the origin and subsequent diversification of land plants. First, 80 and 92% of surveyed land plant species and families are mycorrhizal. Second, arbuscular mycorrhiza (AM) is the predominant and ancestral type of mycorrhiza in land plants. Its occurrence in a vast majority of land plants and early-diverging lineages of liverworts suggests that the origin of AM probably coincided with the origin of land plants. Third, ectomycorrhiza (ECM) and its derived types independently evolved from AM many times through parallel evolution. Coevolution between plant and fungal partners in ECM and its derived types has probably contributed to diversification of both plant hosts and fungal symbionts. Fourth, mycoheterotrophy and loss of the mycorrhizal condition also evolved many times independently in land plants through parallel evolution.

Keywords Mycorrhizas · Land plants · Fungi · Parallel evolution

Introduction

Mycorrhizas, dual organs of absorption formed when symbiotic fungi inhabit healthy tissues of most terrestrial plants (Trappe 1996), have widespread occurrence among land plants and are increasingly believed to have played an important role in the successful colonization of the land by

plants (Pirozynski and Malloch 1975; Malloch et al. 1980; Harley and Harley 1987; Trappe 1987; Selosse and Le Tacon 1998; Read et al. 2000; Brundrett 2002). Since Nägeli first described them in 1842 (see Koide and Mosse 2004), only a few major surveys have been conducted on their phylogenetic distribution in various groups of land plants either by retrieving information from literature or through direct observation (Trappe 1987; Harley and Harley 1987; Newman and Reddell 1987). Trappe (1987) gathered information on the presence and absence of mycorrhizas in 6,507 species of angiosperms investigated in previous studies and mapped the phylogenetic distribution of mycorrhizas using the classification system by Cronquist (1981). He found that 82% of the species were mycorrhizal. From the occurrence of various types of mycorrhizas in different subclasses and orders of angiosperms, he further inferred that the ancestral type was glomeromycetous (the original word “zygomycetous” is not used because fungi forming this type of mycorrhiza are now placed in the new phylum Glomeromycota, see Schussler et al. 2001) mycorrhiza, and ascomycetous and basidiomycetous mycorrhizas belong to the derived types, and that evolution of mycorrhizas in plants had progressed from obligate to facultative mycorrhizas and ultimately to nonmycorrhizas. In the same year, Harley and Harley (1987) published a checklist of the mycorrhizal status of 144 families of vascular plants in the British flora, documenting various types of mycorrhizas in an entire flora for the first time. More recently, Gemma et al. (1992) and Zhao (2000) investigated the mycorrhizal status of 89 and 256 species of pteridophytes in Hawaii and Yunnan, China, respectively. They found that the percentages of mycorrhizal species in pteridophytes (74 and 33%, respectively) were lower than in angiosperms as reported by Trappe (1987). Whether bryophytes have mycorrhizas or not is still a debatable issue, but many liverworts and hornworts have fungal associations (Read et al. 2000). In two surveys of British liverworts, Pocock and Duckett (1985) and Duckett et al. (1991) reported that among the 206 and 284 examined species, respectively, 16% contained fungal endophytes in their rhizoids or thalli.

Mycorrhizal research has advanced at an astonishing pace over the last two decades due to a recent surge of interest in

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the subject by botanists, mycologists, and ecologists. A large number of new reports on mycorrhizal occurrence in land plants, especially in pteridophytes and liverworts, have been published since the surveys by Trappe (1987) and Harley and Harley (1987). During the same period, our understanding of the land plant phylogeny was greatly improved through major efforts by molecular systematists. An explicit phylogenetic classification system of angiosperms is now available (Stevens 2004), and a nonflowering land plant phylogeny will be published soon (Qiu et al. unpublished data). Hence, reviewing mycorrhizal occurrence in land plants and mapping this information onto the newly available plant phylogeny will update our knowledge on mycorrhizal abundance in plants, facilitate examination of the origin and evolutionary pattern of mycorrhizal symbiosis in land plants, and enhance our understanding of this important biological interaction and its impact on evolution of both plants and fungi. Areas that require further study, especially the taxa that occupy critical positions in the land plant phylogeny and for which mycorrhizal information is still lacking, can also be identified through these efforts.

Materials and methods

In this review, we compiled information on mycorrhizal occurrence in land plants mostly from the papers published since 1987, as those published before were reviewed by Trappe (1987) and Harley and Harley (1987). First, a library consisting of 4,193 mycorrhiza-related references was established. After browsing the abstracts, 961 references that provided information on mycorrhizal occurrence in plant species from all the continents and all major habitats were selected. Due to time limitation and unavailability of some literature, 659 of these 961 references are reviewed here. Data on mycorrhizal status of each plant species were extracted from these references, based on whether the species was mycorrhizal or not, and if so, what type. An updated mycorrhizal classification system proposed by Smith and Read (1997) was used here. Seven types of mycorrhizas were all recognized (see the footnote b in Table 1), along with nonmycorrhiza and mycoheterotrophy. A species is considered to be obligately mycorrhizal if it is always found to form mycorrhiza, while a species is considered to be facultatively mycorrhizal if it is reported to form mycorrhizas in one habitat but not in another. If a plant species can form different kinds of mycorrhizas simultaneously or in different habitats, it is recorded as forming all relevant mycorrhizal types. All the data are presented in Table 1, which groups all the examined plant species into families that are further arranged according to the land plant phylogeny used in this study (Stevens 2004; Qiu et al. unpublished). The family definition for vascular plants generally follows Mabblerley (1987), but for a small number of newly recognized families, the nomenclature of Stevens (2004) is used. For liverworts, the system by Grolle (1983) for family definition is followed. The data from Harley and Harley (1987), containing 1,101 species, were added to this table, but those of Trappe (1987) were not as they were not published.

The information in Table 1 was then mapped onto a land plant phylogeny drawn according to a multigene analysis of nonflowering land plants (Qiu et al. unpublished) and the angiosperm classification system proposed by Stevens (2004). Family was used as the unit of reconstruction (i.e., terminal node) in this phylogeny. For each family, the percentages of obligate, facultative, and nonmycorrhizal species, and the percentage of each type of mycorrhizas among all mycorrhizal species were calculated and plotted onto the land plant phylogeny.

One major improvement of this review over those by Trappe (1987) and Harley and Harley (1987) is the use of a rigorously reconstructed land plant phylogeny to map the mycorrhizal information down to the family level for a worldwide coverage. Trappe (1987) covered only angiosperms, whereas Harley and Harley (1987) surveyed only the British vascular flora. Cronquist's (1981) classification system of angiosperms used by Trappe (1987) has been significantly revised by molecular systematists (Soltis et al. 2000; Stevens 2004). Another major improvement is that information on mycorrhizal occurrence, more precisely fungal association in bryophytes, is included for the first time. Hence, this review should allow a thorough examination of origin and evolution of mycorrhizal symbiosis in land plants.

Results and discussion

A total of 3,617 species from 263 families of land plants were covered in this survey of mycorrhizal status (Tables 1 and 2). For land plants as a whole, 80% of the recorded species and 92% of the families are mycorrhizal. When broken into four traditionally delimited groups (angiosperms, gymnosperms, pteridophytes, and bryophytes), these percentages vary from group to group. In angiosperms, the most species-rich clade of land plants and the dominant group in most terrestrial plant communities, 85 and 94% of species and families are mycorrhizal. These numbers are similar to those reported by Trappe (1987), whose study included more than twice as many species as this one. All of the 84 species of gymnosperms surveyed here are mycorrhizal, and almost all of them are obligately mycorrhizal. These two aspects of mycorrhizal status in gymnosperms highlight the essential role that mycorrhizas play in the life of these plants, which generally grow in nutrient-poor environments. For pteridophytes, 52 and 93% of the species and families are mycorrhizal. Finally, 46 and 71% of the bryophyte species and families have fungal associations.

When this body of information is projected in a plant phylogenetic perspective (Fig. 1), the origin and evolutionary patterns of mycorrhizas in land plants become quite clear. Below, we discuss these various aspects of mycorrhizal evolution in plants.

Origin of mycorrhizal symbiosis in land plants

The continuous phylogenetic distribution of mycorrhizas throughout land plants, with the sole major exception of

Table 1 An updated checklist of mycorrhizal occurrence among land plants

Examined species ^a	Mycorrhizal status ^{b,c}	References
BRYOPHYTES		
Haplomitriaceae		
<i>Haplomitrium gibbsiae</i>	AM-like	107
<i>Haplomitrium ovalifolium</i>	AM-like	107
Blasiaceae		
<i>Blasia pusilla</i>	None	182, 328
Lunulariaceae		
<i>Lunularia cruciata</i>	Fungal association (G)	182
Marchantiaceae		
<i>Marchantia foliacea</i>	AM-like	505
<i>Marchantia polymorpha</i>	Fungal association (G)	182
Aytoniaceae		
<i>Asterella wilmsii</i>	AM-like	345
Conocephalaceae		
<i>Conocephalum conicum</i>	AM-like Fungal association (G)	346 182
Ricciaceae		
<i>Riccia fluitans</i>	None	182
Metzgeriaceae		
<i>Apometzgeria pubescens</i>	None	466
<i>Metzgeria conjugata</i>	None	466
<i>Metzgeria fruticulosa</i>	None	466
<i>Metzgeria furcata</i>	None	466
<i>Metzgeria leptoneura</i>	None	466
<i>Metzgeria temperata</i>	None	466
Aneuraceae		
<i>Aneura pinguis</i>	ORM-like (B)	347
<i>Cryptothallus mirabilis</i>	Fungal association ORM-like (B) Mycoheterotrophy (via ECM)	466 347 77, 483
<i>Riccardia latifrons</i>	None	466
<i>Riccardia multifida</i>	None	466
<i>Riccardia palmate</i>	None	466
Pelliaceae		
<i>Pellia endiviifolia</i>	AM-like	598
<i>Pellia epiphylla</i>	Fungal association (G)	182
<i>Pellia fabbrioniana</i>	AM-like	483
Codoniaceae		
<i>Fossombronina pusilla</i>	Fungal association (G)	182
<i>Fossombronina wondraczekii</i>	Fungal association	328
Radulaceae		
<i>Radula aquilegia</i>	None	466
<i>Radula complanata</i>	None	466
<i>Radula lindbergiana</i>	None	466

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
Porellaceae		
<i>Porella arboris-vitae</i>	None	466
<i>Porella cordaeana</i>	None	466
<i>Porella obtusata</i>	None	466
<i>Porella pinnata</i>	None	466
<i>Porella platyphylla</i>	None	466
Jubulaceae		
<i>Frullania dilatata</i>	None	466
<i>Frullania fragilifolia</i>	None	466
<i>Frullania microphylla</i>	None	466
<i>Frullania tamarisci</i>	None	466
<i>Frullania teneriffae</i>	None	466
<i>Jubula hutchinsiae</i>	None	466
Lejeuneaceae		
<i>Aphanolejeunea microscopica</i>	None	466
<i>Cololejeunea calcarea</i>	None	466
<i>Cololejeunea minutissima</i>	None	466
<i>Cohura calyptrifolia</i>	None	466
<i>Drepanolejeunea hamatifolia</i>	None	466
<i>Harpalejeunea ovata</i>	None	466
<i>Lejeunea cavifolia</i>	None	466
<i>Lejeunea lamacerina</i>	None	466
<i>Lejeunea patens</i>	None	466
<i>Lejeunea ulicina</i>	None	466
<i>Marchesinia mackaii</i>	None	466
Pseudolepicoleaceae		
<i>Blepharostoma trichophyllum</i>	None Fungal association	466 328
Herbertaceae		
<i>Herbertus borealis</i>	None	466
Plagiochilaceae		
<i>Pedinophyllum interruptum</i>	None	466
<i>Plagiochila asplenioides</i>	None	466
<i>Plagiochila porelloides</i>	None	466
<i>Plagiochila punctata</i>	Fungal association	466
<i>Plagiochila spinulosa</i>	None	466
Arnelliaceae		
<i>Southbya nigrella</i>	Fungal association (B)	182
Geocalycaceae		
<i>Chiloscyphus pallescens</i>	None	466
<i>Chiloscyphus polyanthus</i>	None	466
<i>Geocalyx graveolens</i>	Fungal association	466
<i>Harpanthus flotovianus</i>	None	466
<i>Harpanthus scutatus</i>	Fungal association	466
<i>Leptoscyphus cuneifolius</i>	None	466
<i>Lophocolea bidentata</i>	None	466
<i>Lophocolea cuspidate</i>	None	466
<i>Lophocolea heterophylla</i>	None Fungal association	182, 466 328
<i>Saccogyna viticulosa</i>	Fungal association	466

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
Lepidoziaceae		
<i>Bazzania flaccida</i>	None	328
<i>Bazzania tricrenata</i>	None	466
<i>Bazzania trilobata</i>	None	328, 466
<i>Kurzia pauciflora</i>	Fungal association	466
	Fungal association	182, 328
	(A)	
<i>Kurzia sylvatica</i>	Fungal association	466
<i>Kurzia trichoclados</i>	Fungal association	466
<i>Lepidozia reptans</i>	Fungal association	466
	Fungal association	182, 328
	(A)	
<i>Telaranea murphyae</i>	Fungal association	466
<i>Telaranea nematodes</i>	Fungal association	466
Scapaniaceae		
<i>Diplophyllum albicans</i>	None	182, 466
	Fungal association	328
<i>Diplophyllum obtusifolium</i>	Fungal association	328
<i>Douinia ovata</i>	None	466
<i>Scapania calcicola</i>	None	466
<i>Scapania cuspiduligera</i>	None	466
<i>Scapania gracilis</i>	None	466
<i>Scapania scandica</i>	None	466
<i>Scapania umbrosa</i>	None	466
Cephaloziellaceae		
<i>Cephaloziella baumgartneri</i>	None	466
<i>Cephaloziella divaricata</i>	Fungal association	466
	Fungal association	182, 328
	(A)	
<i>Cephaloziella exiliflora</i>	Fungal association	118
	(A)	
<i>Cephaloziella hampeana</i>	Fungal association	466
<i>Cephaloziella massalongi</i>	None	466
<i>Cephaloziella rubella</i>	Fungal association	466
Cephaloziaceae		
<i>Cephalozia bicuspidate</i>	Fungal association	466
	Fungal association	182, 328
	(A)	
<i>Cephalozia catenulate</i>	None	466
	Fungal association	328
<i>Cephalozia connivens</i>	Fungal association	466
	Fungal association	182
	(A)	
<i>Cephalozia leucantha</i>	Fungal association	466
<i>Cephalozia loitlesbergeri</i>	Fungal association	466
	Fungal association	182
	(A)	
<i>Cephalozia lumulifolia</i>	Fungal association	328, 466
<i>Cephalozia macrostachya</i>	Fungal association	466
<i>Cephalozia pleniceps</i>	Fungal association	466
<i>Cladopodiella fluitans</i>	None	466

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Cladopodiella francisci</i>	Fungal association	466
<i>Nowellia curvifolia</i>	Fungal association	182, 328, 466
	(A)	
<i>Odontoschisma denudatum</i>	None	466
	Fungal association	182
	(A)	
<i>Odontoschisma elongatum</i>	None	466
<i>Odontoschisma sphagni</i>	Fungal association	466
	Fungal association	182
	(A)	
Calypogeiaceae		
<i>Calypogeia arguta</i>	Fungal association	466
<i>Calypogeia azurea</i>	Fungal association	328
	(A, B)	
<i>Calypogeia fissa</i>	Fungal association	466
	Fungal association	182
	(A)	
<i>Calypogeia integristipula</i>	Fungal association	328
<i>Calypogeia muellerana</i>	Fungal association	466
	Fungal association	182
	(A)	
	Fungal association	328
	(A, B)	
<i>Calypogeia neesiana</i>	Fungal association	328, 466
<i>Calypogeia sphagnicola</i>	Fungal association	466
<i>Calypogeia trichomanis</i>	Fungal association	466
Jungermanniaceae		
<i>Anastrophyllum minutum</i>	Fungal association	328
<i>Barbilophozia barbata</i>	Fungal association	328
	(A, B)	
<i>Barbilophozia hatcheri</i>	None	466
<i>Jamesoniella autumnalis</i>	Fungal association	466
<i>Jamesoniella undulifolia</i>	None	466
<i>Jungermannia atrovirens</i>	None	466
<i>Jungermannia borealis</i>	None	466
<i>Jungermannia exsertifolia</i>	None	466
<i>Jungermannia gracillima</i>	None	182, 466
<i>Jungermannia obovata</i>	None	466
<i>Jungermannia pumila</i>	None	466
<i>Leiocolea turbinata</i>	None	466
<i>Lophozia incisa</i>	Fungal association	328
	(B)	
<i>Lophozia sudetica</i>	Fungal association	328
	(B)	
<i>Lophozia ventricosa</i>	Fungal association	182
	(B)	
<i>Mylia anomala</i>	Fungal association	328, 466
<i>Mylia taylorii</i>	Fungal association	328
<i>Nardia breidlerii</i>	Fungal association	466
<i>Nardia scalaris</i>	Fungal association	182, 328
	(B)	
<i>Sphenolobus helleranus</i>	None	466

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Sphenolobus minutus</i>	None	466
Gymnomitriaceae		
<i>Gymnomitrium concinnatum</i>	None	466
<i>Gymnomitrium crenulatum</i>	None	466
<i>Gymnomitrium obtusum</i>	None	466
<i>Marsupella adusta</i>	None	466
<i>Marsupella alpina</i>	None	466
<i>Marsupella emarginata</i>	None	466
	Fungal association	328
<i>Marsupella stableri</i>	None	466
Anthocerotaceae		
<i>Anthoceros punctatus</i>	AM-like	525
<i>Phaeoceros laevis</i>	AM-like	344
PTERIDOPHYTES		
Lycopodiaceae		
<i>Diphasiastrum alpinum</i>	AM + NM	260, 261
<i>Diphasiastrum complanatum</i>	NM	654
<i>Diphasiastrum issleri</i>	AM	260, 261
<i>Huperzia australiana</i>	AM	342
<i>Huperzia phyllantha</i>	AM	226
<i>Huperzia selago</i>	AM + NM	260, 261
<i>Huperzia serrata</i> f. <i>longipetiolata</i>	NM	654
<i>Lycopodiastrum casuarinoides</i>	NM	654
<i>Lycopodiella inundata</i>	AM	212
	AM + NM	260, 261
<i>Lycopodium alpinum</i>	NM	594
<i>Lycopodium annotinum</i>	AM	260, 261
<i>Lycopodium cernuum</i>	AM	181, 226
<i>Lycopodium clavatum</i>	AM	521, 594
	AM + NM	260, 261
<i>Lycopodium japonicum</i>	AM	654
<i>Lycopodium selago</i>	NM	594
<i>Palhinhaea cernua</i>	NM	654
<i>Phlegmariurus henryi</i>	NM	654
Isoetaceae		
<i>Isoetes echinospora</i>	NM	260, 261
<i>Isoetes histrix</i>	NM	260, 261
<i>Isoetes lacustris</i>	NM	260, 261
Selaginellaceae		
<i>Selaginella arbuscula</i>	AM	226
<i>Selaginella biformis</i>	AM	654
<i>Selaginella chrysocaulos</i>	NM	654
<i>Selaginella davidii</i>	AM	653, 654
<i>Selaginella delicatula</i>	AM	654
<i>Selaginella frondosa</i>	AM	654
<i>Selaginella helferi</i>	NM	654
<i>Selaginella involvens</i>	AM	654
<i>Selaginella kraussiana</i>	AM + NM	260, 261
<i>Selaginella mairei</i>	AM	343

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Selaginella moellendorffii</i>	AM	653
<i>Selaginella monospora</i>	NM	654
<i>Selaginella picta</i>	AM	654
<i>Selaginella pulvinata</i>	AM	343, 654
<i>Selaginella remotifolia</i>	AM	654
<i>Selaginella sanguinolenta</i>	AM	654
<i>Selaginella selaginoides</i>	AM	260, 261
Equisetaceae		
<i>Equisetum arvense</i>	NM	307, 594, 260, 261
	AM	599
<i>Equisetum debile</i>	NM	654
<i>Equisetum diffusum</i>	AM	343
	NM	654
<i>Equisetum fluviatile</i>	NM	260, 261
<i>Equisetum hyemale</i>	AM	653, 260, 261
<i>Equisetum palustre</i>	NM	260, 261
<i>Equisetum pratense</i>	NM	260, 261
<i>Equisetum ramosissimum</i>	NM	368, 260, 261
	AM	653
<i>Equisetum sylvaticum</i>	AM + NM	260, 261
<i>Equisetum telmateia</i>	AM	260, 261
<i>Equisetum × trachydon</i>	AM	260, 261
<i>Equisetum variegatum</i>	NM	594
	AM	260, 261
Marattiaceae		
<i>Angiopteris caudatifformis</i>	AM	654, 655
<i>Angiopteris evecta</i>	AM	226
<i>Angiopteris hokouensis</i>	AM	654
<i>Angiopteris wangii</i>	AM	654
<i>Angiopteris yunnanensis</i>	AM	654
<i>Archangiopteris bipinnata</i>	AM	654
<i>Archangiopteris henryi</i>	AM	654
<i>Archangiopteris hokouensis</i>	AM	654
<i>Archangiopteris subrotundata</i>	AM	654
<i>Calathea</i> sp.	AM	510
<i>Christensenia assamica</i>	AM	654
<i>Ctenanthe</i> sp.	AM	510
<i>Ischnosiphon gracilis</i>	AM	510
<i>Marattia douglasii</i>	NM	226
<i>Monotagma plurispicatum</i>	AM	510
<i>Saranthe compositae</i>	NM	510
<i>Stromanthe porteana</i>	AM	510
Psilotaceae		
<i>Psilotum complanatum</i>	NM	226
<i>Psilotum nudum</i>	AM	226
<i>Psilotum</i> sp.	AM	483
Ophioglossaceae		
<i>Botrychium lanuginosum</i>	AM	653
<i>Botrychium lunaria</i>	AM	194, 260, 261
<i>Botrychium ternatum</i>	AM	653
<i>Botrychium virginianum</i>	AM	329

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Ophioglossum concinnum</i>	AM	226
<i>Ophioglossum lusitanicum</i>	AM	260, 261
<i>Ophioglossum pendulum</i>	AM	226
<i>Ophioglossum petiolatum</i>	AM	654
	NM	226
<i>Ophioglossum reticulatum</i>	AM	522, 654
<i>Ophioglossum themale</i>	AM	654
<i>Ophioglossum vulgatum</i>	AM	653, 260, 261
Osmundaceae		
<i>Osmunda cinnamomea</i>	AM	140
<i>Osmunda japonica</i>	AM	653, 654
<i>Osmunda regalis</i>	AM + NM	260, 261
Hymenophyllaceae		
<i>Crepidomanes latealatum</i>	NM	654
<i>Hymenophyllum</i>	M (endo)	260, 261
<i>tunbrigense</i>		
<i>Hymenophyllum wilsonii</i>	M (endo)	260, 261
<i>Mecodium badium</i>	NM	654
<i>Mecodium blumeanum</i>	NM	654
<i>Mecodium recurvum</i>	AM	226
<i>Sphaerocionium</i>	AM	226
<i>lanceolatum</i>		
<i>Trichomanes auriculatum</i>	NM	654
<i>Trichomanes speciosum</i>	NM	260, 261
<i>Vandenboschia cyrtotheca</i>	NM	226
<i>Vandenboschia davalliodes</i>	NM	226
Gleicheniaceae		
<i>Dicranopteris dichotoma</i>	AM	653
<i>Dicranopteris gigantea</i>	NM	654
<i>Dicranopteris linearis</i>	AM	226
<i>Dicranopteris pedata</i>	NM	654
<i>Dicranopteris splendida</i>	NM	654
<i>Diplopterygium glaucoides</i>	NM	654
<i>Diplopterygium glaucum</i>	NM	654
<i>Diplopterygium pinnatum</i>	AM	226
<i>Sticherus laevigatus</i>	NM	654
<i>Sticherus owhyhensis</i>	AM	226
Schizaeaceae		
<i>Anemia phyllitidis</i>	AM	31
<i>Lygodium conforme</i>	AM	654
<i>Lygodium japonicum</i>	AM	653
	NM	654
<i>Schizaea robusta</i>	AM	226
Marsileaceae		
<i>Pilularia globulifera</i>	AM + NM	260, 261
Azollaceae		
<i>Azolla filiculoides</i>	NM	226, 260, 261
Plagiogyriaceae		
<i>Plagiogyria distinctissima</i>	AM	654
Cyatheaceae		
<i>Alsophila constularis</i>	NM	654
<i>Alsophila spinulosa</i>	AM	654
<i>Cyathea cooperi</i>	AM	226

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Gymnosphaera gigantea</i>	NM	654
<i>Gymnosphaera podophylla</i>	NM	654
<i>Sphaeropteris brunoniana</i>	NM	654
Dicksoniaceae		
<i>Cibotium barometze</i>	NM	654
<i>Cibotium chamissoi</i>	AM	226
<i>Cibotium glaucum</i>	AM	226
<i>Cibotium st.-johnii</i>	AM	226
Pteridaceae		
<i>Doryopteris decipiens</i>	AM	226
<i>Doryopteris decora</i>	AM	226
<i>Histiopteris incisa</i>	AM	654
<i>Pellaea mairei</i>	AM	654
<i>Pellaea ternifolia</i>	AM	226
<i>Pteridium aquilinum</i>	AM	653
<i>Pteridium revolutum</i>	NM	654
<i>Pteris aspericaulis</i>	AM	653
<i>Pteris aspericaulis</i> var.	NM	654
<i>tricolor</i>		
<i>Pteris cretica</i>	AM	226
<i>Pteris cretica</i> var. <i>laeta</i>	NM	654
<i>Pteris cretica</i> var. <i>nervosa</i>	NM	654
<i>Pteris dissitifolia</i>	NM	654
<i>Pteris ensiformis</i>	NM	654
<i>Pteris esquirolii</i>	NM	654
<i>Pteris excelsa</i>	AM	226
	NM	654
<i>Pteris irregularis</i>	AM	226
<i>Pteris linearis</i>	NM	654
<i>Pteris semipinnata</i>	NM	654
<i>Pteris setulosocostulata</i>	AM	654
<i>Pteris venusta</i>	AM	655
<i>Pteris vittata</i>	AM	226, 653
	NM	654
<i>Pteris wangiana</i>	NM	654
Vittariaceae		
<i>Antrophyrum henryi</i>	NM	654
<i>Vittaria elongata</i>	AM	226
<i>Vittaria flexuosa</i>	NM	654
Adiantaceae		
<i>Adiantum bonatianum</i>	AM	654
<i>Adiantum capillus-veneris</i>	AM + NM	260, 261
<i>Adiantum edgeworthii</i>	AM	654
<i>Adiantum flabellulatum</i>	AM	654
<i>Adiantum malesianum</i>	NM	654
<i>Adiantum philipense</i>	AM	343
	NM	654
<i>Aleuritopteris</i>	AM	654
<i>albomarginatata</i>		
<i>Aleuritopteris argentea</i>	AM	654
<i>Aleuritopteris duclouxii</i>	NM	654
<i>Aleuritopteris</i>	NM	654
<i>pseudofarinosa</i>		

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Anogramma leptophylla</i>	NM	260, 261
<i>Cheilosoria hancockii</i>	AM	654
<i>Coniogramme intermedia</i>	AM	654
<i>Coniogramme rosthorni</i>	NM	654
<i>Coniogramme simillima</i>	AM	654
<i>Cryptogramma crista</i>	AM + NM	260, 261
<i>Gymnopteris bipinnata</i>	NM	654
<i>var. auriculata</i>		
<i>Gymnopteris vestita</i>	AM	654
<i>Leptolepidium subvillosum</i>	NM	654
<i>Onychium angustifrons</i>	NM	654
<i>Onychium contigium</i>	AM	654
<i>Onychium japonicum</i>	NM	654
<i>var. lucidum</i>		
<i>Onychium lucidum</i>	AM	654
<i>Sinopteris grevilleoides</i>	NM	654
Dennstaedtiaceae		
<i>Dennstaedtia melanostipes</i>	AM	654
<i>Dennstaedtia scabra</i>	AM	654
<i>Hypolepis punctata</i>	NM	654
<i>Lindsaea cultrata</i>	AM	653
<i>Lindsaea ensifolia</i>	NM	654
<i>Lindsaea javanensis</i>	NM	654
<i>Lindsaea odorata</i>	NM	654
<i>Lindsaea orbiculata</i>	AM	654
<i>Microlepis hookeriana</i>	AM	654
<i>Microlepis marginata</i>	AM	654
<i>Microlepis marginata</i>	AM	654
<i>var. calvescens</i>		
<i>Microlepis pilosissima</i>	AM	654
<i>Microlepis platyphylla</i>	NM	654
<i>Microlepis rhomboidea</i>	NM	654
<i>Microlepis strigosa</i>	AM	226
<i>Monachosorum henryi</i>	AM	654
<i>Pteridium aquilinum</i>	AM + NM	260, 261
<i>Pteridium decompositum</i>	AM	226
<i>Schizoloma heterophyllum</i>	NM	653
<i>Stenoloma chusanum</i>	AM	653, 654
Aspleniaceae		
<i>Acrophorus stipellatus</i>	NM	654
<i>Acystopteris tenuisecta</i>	AM	654
<i>Allantodia alata</i>	NM	654
<i>Allantodia chinensis</i>	AM	653
<i>Allantodia dilatata</i>	AM	654
<i>Allantodia doederleinii</i>	NM	654
<i>Allantodia laxifrons</i>	AM	654
<i>Allantodia megaphylla</i>	NM	654
<i>Allantodia spectabilis</i>	AM	654
<i>Allantodia stenochlamys</i>	NM	654
<i>Asplenium adiantum-nigrum</i>	AM	226
<i>var. nigrum</i>	AM + NM	260, 261
<i>Asplenium billotii</i>	NM	260, 261
<i>Asplenium cheilosorum</i>	AM	654

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Asplenium excisum</i>	NM	654
<i>Asplenium finlaysonianum</i>	NM	654
<i>Asplenium florentinum</i>	AM	226
<i>Asplenium fuscipes</i>	NM	654
<i>Asplenium griffithianum</i>	NM	654
<i>Asplenium horridum</i>	NM	226
<i>Asplenium lushanense</i>	AM	654
<i>Asplenium macraei</i>	AM	226
<i>Asplenium marinum</i>	NM	260, 261
<i>Asplenium nidus</i>	NM	226
<i>Asplenium normale</i>	AM	226
	NM	654
<i>Asplenium onopteris</i>	NM	472
<i>Asplenium pekinense</i>	NM	654
<i>Asplenium praemosum</i>	NM	654
<i>Asplenium prolongatum</i>	NM	654
<i>Asplenium ruta-muraria</i>	AM + NM	260, 261
<i>Asplenium septentrionale</i>	NM	260, 261
<i>Asplenium sphenotomum</i>	AM	226
<i>Asplenium tenuicaule</i>	NM	654
<i>Asplenium trichomanes</i>	AM + NM	260, 261
<i>Asplenium unilaterale</i>	AM	226
	NM	654
<i>Asplenium varians</i>	NM	654
<i>Asplenium viride</i>	AM + NM	260, 261
<i>Asplenium wrightioides</i>	NM	654
<i>Asplenium yunnanense</i>	NM	654
<i>Athyriopsis longipes</i>	AM	654
<i>Athyriopsis ptersennii</i>	AM	654
<i>Athyrium anisopterum</i>	NM	654
<i>Athyrium biserrulatum</i>	AM	654
<i>Athyrium delicatulum</i>	NM	654
<i>Athyrium dissitifolium</i>	AM	654
<i>Athyrium distentifolium</i>	AM + NM	260, 261
<i>Athyrium esculentum</i>	AM	226
<i>Athyrium filix-femina</i>	AM + NM	260, 261
<i>Athyrium japonica</i>	AM	226
<i>Athyrium mackinnonii</i>	NM	654
<i>Athyrium macraei</i>	AM	226
<i>Athyrium mengtzeense</i>	AM	654
<i>Athyrium microphyllum</i>	AM	226
<i>Athyrium niponicum</i>	NM	654
<i>Athyrium sandwichianum</i>	AM	226
<i>Athyrium stigillosum</i>	AM	654
<i>Athyrium wardii</i>	AM	653
<i>Bolbitis heteroclita</i>	NM	654
<i>Bolbitis hokouensis</i>	NM	654
<i>Callipteris esculenta</i>	AM	653
	NM	654
<i>Ceterach officinarum</i>	NM	260, 261
<i>Ctenitis mariformis</i>	AM	653
<i>Ctenitis membranifolia</i>	NM	654
<i>Ctenitopsis devexa</i>	NM	654

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Ctenitopsis glabra</i>	NM	654
<i>Ctenitopsis sagenioides</i>	NM	654
<i>Ctenitopsis setulaosa</i>	NM	654
<i>Ctenitopsis subsageriacea</i>	NM	654
<i>Cystopteris fragilis</i>	AM + NM	260, 261
<i>Cystopteris montana</i>	NM	260, 261
<i>Cystopteris pellucida</i>	AM	653
<i>Diacalpe christensenae</i>	NM	654
<i>Diplazium donianum</i>	AM	653
	NM	654
<i>Diplazium lanceum</i>	AM	653
<i>Diplazium splendens</i>	AM	654
<i>Dryoathyrium boryanum</i>	NM	654
<i>Dryoathyrium edentulum</i>	AM	654
<i>Egenolfia sinensis</i>	AM	654
<i>Egenolfia tokinensis</i>	AM	654
<i>Gymnocarpium dryopteris</i>	AM + NM	260, 261
<i>Hypodematium crenatum</i>	AM	654
<i>Lomariopsis spectabilis</i>	NM	654
<i>Lunathyrium dolosum</i>	NM	654
<i>Monomelanium pullingeri</i>	AM	654
<i>var. daweishanicolum</i>		
<i>Neottopteris antrophyoides</i>	NM	654
<i>Neottopteris simonsiana</i>	NM	654
<i>Phyllitis scolopendrium</i>	AM	260, 261
<i>Pleocnemia winitei</i>	NM	654
<i>Pseudocystopteris atkinsonii</i>	NM	654
<i>Quercifilix zeylanica</i>	NM	654
<i>Tectaria coadunata</i>	NM	654
<i>Tectaria decurrens</i>	NM	654
<i>Tectaria dubia</i>	NM	654
<i>Tectaria hainanensis</i>	NM	654
<i>Tectaria hokouensis</i>	NM	654
<i>Tectaria simonii</i>	NM	654
<i>Tectaria variolosa</i>	NM	654
<i>Tectaria yunnanensis</i>	NM	654
<i>Woodsia alpina</i>	NM	260, 261
<i>Woodsia ilvensis</i>	NM	260, 261
Thelypteridaceae		
<i>Ampelopteris prolifera</i>	NM	654
<i>Dictyocline wilfordii</i>	AM	653
<i>Cyclogramma auriculata</i>	AM	654
<i>Cyclosorus acuminatus</i>	NM	654
<i>Cyclosorus dentatus</i>	NM	654
<i>Cyclosorus hokouensis</i>	AM	654
<i>Cyclosorus mollicesculus</i>	NM	654
<i>Cyclosorus parasiticus</i>	NM	654
<i>Cyclosorus subnigrescens</i>	NM	654
<i>Cyclosorus truncatus</i>	NM	654
<i>Dictyocline griffithii</i>	AM	654
<i>Glaphyopteridopsis erubescens</i>	AM	654

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Macrothelypteris toressiana</i>	AM	654
<i>Metathelypteris flaccida</i>	NM	654
<i>Oreopteris limbosperma</i>	AM	260, 261
<i>Parathelypteris beddomei</i>	NM	654
<i>Parathelypteris hirsutipes</i>	AM	654
<i>Parathelypteris nipponica</i>	NM	653
<i>Phegopteris connectilis</i>	AM + NM	260, 261
<i>Pronephrum gymnopteridifrons</i>	NM	654
<i>Pronephrum nudotum</i>	NM	654
<i>Pronephrum simplex</i>	NM	654
<i>Pseudocyclosorus esquirolii</i>	AM	654
<i>Pseudocyclosorus subochthodes</i>	NM	654
<i>Pseudophegopteris pyrhorachis</i>	NM	654
<i>Pseudophegopteris yunkweiensis</i>	NM	654
<i>Thelypteris cyatheoides</i>	NM	226
<i>Thelypteris globulifera</i>	AM	226
<i>Thelypteris hudsoniana</i>	AM	226
<i>Thelypteris interrupta</i>	NM	226
<i>Thelypteris parasitica</i>	AM	226
<i>Thelypteris sandwicensis</i>	NM	226
<i>Thelypteris thelypteroides</i>	AM + NM	260, 261
Blechnaceae		
<i>Blechnum occidentale</i>	AM	226
<i>Blechnum orientale</i>	AM	654
<i>Blechnum penna-marina</i>	NM	342
<i>Blechnum spicant</i>	AM + NM	260, 261
<i>Brainea insignis</i>	NM	654
<i>Doodia kunthiana</i>	AM	226
<i>Sadleria cyatheoides</i>	AM	226
<i>Sadleria squarrosa</i>	AM	226
<i>Woodwardia japonica</i>	AM	654
<i>Woodwardia orientalis</i>	AM	653
<i>Woodwardia unigemmata</i>	NM	654
Dryopteridaceae		
<i>Acrorumohra diffraeta</i>	AM	654
<i>Arachniodes festina</i>	AM	653
<i>Arachniodes globisora</i>	AM	654
<i>Arachniodes rhomboidea</i>	AM	653
<i>Arachniodes simplicior</i>	AM	653
<i>Arachniodes sporadosora</i>	NM	654
<i>Cyrtomium caryotideum</i> f. <i>caryotideum</i>	AM	654
<i>Cyrtomium fortunei</i>	NM	654
<i>Dryopteris basisora</i>	NM	654
<i>Dryopteris caroli-hopei</i>	NM	654
<i>Dryopteris carthusiana</i>	AM	598
	AM + NM	260, 261
<i>Dryopteris chrysocoma</i>	NM	654

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Dryopteris cochleata</i>	NM	654
<i>Dryopteris cristata</i>	AM	260, 261
<i>Dryopteris dilatata</i>	AM	260, 261
<i>Dryopteris filix-mas</i>	AM + ECM + NM	260, 261
<i>Dryopteris fructuosa</i>	AM	654
<i>Dryopteris fuscipes</i>	AM	653
<i>Dryopteris fusco-atra</i>	AM	226
<i>Dryopteris glabra</i>	AM	226
<i>Dryopteris lepidopoda</i>	NM	654
<i>Dryopteris marginata</i>	AM	654
<i>Dryopteris odontoloma</i>	NM	654
<i>Dryopteris sparsa</i>	AM	654
<i>Dryopteris stenolepis</i>	NM	654
<i>Dryopteris sublacera</i>	AM	654
<i>Dryopteris thelypteris</i>	AM	140
<i>Dryopteris unidentata</i>	AM	226
<i>Dryopteris wallichiana</i>	AM	226
<i>Nothoperanema hendersonii</i>	NM	654
<i>Polystichum aculeatum</i>	AM + NM	260, 261
<i>Polystichum alteruatum</i>	NM	654
<i>Polystichum chingae</i>	NM	654
<i>Polystichum dielsii</i>	NM	654
<i>Polystichum eximium</i>	NM	654
<i>Polystichum jizhushanense</i>	AM	654
<i>Polystichum lonchitis</i>	AM	260, 261
<i>Polystichum pycnopterum</i>	NM	654
<i>Polystichum tsus-simense</i>	AM	654
<i>Polystichum vestitum</i>	NM	342
<i>Tectaria gaudichaudii</i>	AM	226
Nephrolepidaceae		
<i>Arthropteris palisotii</i>	NM	654
<i>Nephrolepis biserrata</i>	AM	35
<i>Nephrolepis faleata</i>	NM	654
Polypodiaceae		
<i>Arthromeris mairei</i>	NM	654
<i>Cheilanthes lanosa</i>	AM	449
<i>Colysis diversifolia</i>	NM	654
<i>Colysis hemitoma</i>	NM	653
<i>Colysis hokouensis</i>	NM	654
<i>Colysis pentaphylla</i>	NM	654
<i>Drynaria propinqua</i>	NM	654
<i>Lepidogrammitis rostrama</i>	NM	654
<i>Lepisorus contortus</i>	NM	654
<i>Lepisorus macrosphaerus</i>	NM	654
<i>Lepisorus scolopendrium</i>	NM	654
<i>Microsorium carinatum</i>	NM	654
<i>Microsorium henryi</i>	NM	654
<i>Microsorium membranaceum</i>	NM	654
<i>Microsorium punctatum</i>	NM	654
<i>Microsorium spectrum</i>	NM	226
<i>Neocheiropteris</i>		

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>palmatopedata</i>	NM	654
<i>Neolepisorus ovatus</i>	NM	654
<i>Neolepisorus sinensis</i>	NM	654
<i>Onoclea sensibilis</i>	AM	140
<i>Phlebodium aureum</i>	NM	226
<i>Phymatopsis crenatopinnata</i>	NM	654
<i>Phymatopsis nigrovenia</i>	NM	654
<i>Phymatopsis trisecta</i>	NM	654
<i>Phymatosorus scolopendria</i>	NM	226
<i>Pleopeltis thunbergiana</i>	NM	226
<i>Polypodiodes amoenum</i>	NM	654
<i>Polypodium pellucidum</i>	NM	226
<i>Polypodium vulgare</i>	AM + NM	260, 261
<i>Pyrrosia adnaseens</i>	NM	654
<i>Pyrrosia gralla</i>	NM	654
<i>Pyrrosia lingua</i>	NM	654
<i>Pyrrosia mollis</i>	NM	654
<i>Pyrrosia subfurfuracea</i>	NM	654
<i>Pyrrosia tonkinensis</i>	NM	654
<i>Tricholepidium maculosum</i>	NM	654
Grammitidaceae		
<i>Adenophorus abietinus</i>	AM	226
<i>Adenophorus pinnatifidus</i>	NM	226
<i>Adenophorus tamariscinus</i>	AM	226
<i>Grammitis baldwinii</i>	NM	226
<i>Grammitis poeppigeana</i>	NM	342
<i>Grammitis tenella</i>	AM	226
<i>Loxogramme ensiformis</i>	NM	654
<i>Xiphopteris saffordii</i>	NM	226
Davalliaceae		
<i>Araiostegia perdurans</i>	NM	654
<i>Nephrolepis cordifolia</i>	AM	226
<i>Nephrolepis exaltata</i>	AM	226
<i>Nephrolepis multiflora</i>	AM	226
GYMNOSPERMS		
Cycadaceae		
<i>Cycas circinalis</i>	AM	423
<i>Cycas revoluta</i>	AM	423
Zamiaceae		
<i>Ceratozamia mexicana</i>	AM	616
<i>Dioon edule</i>	AM	203, 616
<i>Lepidozamia hopei</i>	AM	484
<i>Macrozamia reidleyi</i>	AM	93
<i>Zamia pumila</i>	AM	203
Ginkgoaceae		
<i>Ginkgo biloba</i>	AM	206
Pinaceae		
<i>Abies alba</i>	ECM	189
<i>Abies grandis</i>	ECM	375
<i>Abies lasiocarpa</i>	ECM	314
<i>Abies spp.</i>	ECM	260, 261
<i>Cedrus atlantica</i>	ECM	431

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Larix decidua</i>	ECM	260, 261
<i>Larix kaempferi</i>	ECM	644, 260, 261
<i>Larix occidentalis</i>	ECM	156
<i>Picea abies</i>	ECM	8
	ECM + EEM	260, 261
<i>Picea engelmannii</i>	ECM	314
<i>Picea glauca</i>	ECM	285, 338, 414, 470
<i>Picea glehnii</i>	ECM	308
<i>Picea mariana</i>	ECM	91
<i>Picea rubens</i>	ECM	232
<i>Picea sitchensis</i>	ECM	13, 205, 260, 261
<i>Pinus banksiana</i>	ECM	91
<i>Pinus cembra</i>	ECM	498
<i>Pinus contorta</i>	ECM	98, 156, 403
<i>Pinus densiflora</i>	ECM	228, 309, 634, 635
<i>Pinus echinata</i>	ECM	444
<i>Pinus edulis</i>	ECM	223, 265, 470
<i>Pinus elliotii</i>	ECM	470, 564
<i>Pinus halepensis</i>	ECM	411, 590
<i>Pinus jeffreyi</i>	ECM	617
<i>Pinus lambertiana</i>	ECM	617
<i>Pinus massoniana</i>	ECM	323, 564
<i>Pinus montezumae</i>	ECM	509
<i>Pinus muricata</i>	ECM	218, 280
	ECM + AM	281
<i>Pinus nigra</i>	ECM	260, 261
<i>Pinus patula</i>	ECM	487
<i>Pinus pinaster</i>	ECM	458, 260, 261
<i>Pinus pinea</i>	ECM	368, 451
<i>Pinus ponderosa</i>	AM	550
	ECM	156, 188, 375, 506, 618
<i>Pinus radiata</i>	ECM	184
<i>Pinus resinosa</i>	ECM	363, 470
<i>Pinus rigida</i>	ECM	152
<i>Pinus sylvestris</i>	ECM	239, 320, 420
	ECM + EEM + NM	260, 261
<i>Pinus tabulaeformis</i>	ECM	634, 635
<i>Pinus taeda</i>	ECM	139, 160, 190
<i>Pinus thunbergii</i>	ECM	364
<i>Pseudotsuga menziesii</i>	ECM	70, 156, 236, 259, 280, 375
	AM	550
	AM + ECM	116
	ECM + EEM	260, 261
<i>Tsuga heterophylla</i>	ECM	9, 313
	AM + ECM	116

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
Ephedraceae		
<i>Ephedra trifurca</i>	AM	137
Welwitschiaceae		
<i>Welwitschia mirabilis</i>	AM	296
Gnetaceae		
<i>Gnetum africanum</i>	ECM	445
<i>Gnetum buchholzianum</i>	ECM	445
<i>Gnetum sp.</i>	AM + ECM	445
Araucariaceae		
<i>Agathis robusta</i>	AM	388
<i>Araucaria angustifolia</i>	AM	31, 89, 650
<i>Araucaria cunninghamii</i>	AM	388
<i>Wollemia nobilis</i>	AM + EEM	388
<i>Wollemia sp.</i>	ECM	656
Podocarpaceae		
<i>Dacrycarpus dacrydioides</i>	AM	504
<i>Dacrydium cupressinum</i>	AM	504
<i>Parasitaxus ustus</i>	Mycoheterotrophy via AM?	659
<i>Podocarpus falcatus</i>	AM	637, 638
<i>Prumnopitys ferruginea</i>	AM	504
<i>Prumnopitys taxifolia</i>	AM	504
Taxodiaceae		
<i>Metasequoia glyptostroboides</i>	AM	559
<i>Sequoia sempervirens</i>	AM	6
<i>Sequoiadendrom giganteum</i>	AM	6
Cupressaceae		
<i>Austrocedrus chilensis</i>	AM	207
<i>Chamaecyparis thyoides</i>	AM	106
<i>Juniperus communis</i>	AM + ECM	260, 261
<i>Juniperus communis ssp. nana</i>	AM + ECM	260, 261
<i>Juniperus monosperma</i>	AM	470
<i>Juniperus oxycedrus</i> L. ssp. <i>macrocarpa</i>	AM	368
<i>Juniperus procera</i>	AM	637, 638
<i>Libocedrus decurrens</i>	AM	6, 25
<i>Tetraclinis articulata</i>	AM	169, 412
<i>Thuja occidentalis</i>	AM	81, 385
<i>Thuja plicata</i>	AM	100
Taxaceae		
<i>Taxus baccata</i>	AM	637, 638, 260, 261
<i>Taxus × media</i>	AM	515
ANGIOSPERMS		
Nymphaeaceae		
<i>Nuphar × intermedia</i>	NM	260, 261
<i>Nuphar lutea</i>	NM	62, 260, 261
<i>Nuphar pumila</i>	NM	260, 261
<i>Nymphaea alba</i>	NM	260, 261

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Nymphaea</i> sp.	AM	656
Acoraceae		
<i>Acorus calamus</i>	AM	531
	NM	260, 261
Tofieldiaceae		
<i>Tofieldia pusilla</i>	AM	260, 261
Araceae		
<i>Aglaonema modestum</i>	AM	655
<i>Alocasia longiloba</i>	AM	655
<i>Alocasia macrorrhiza</i>	AM	422
<i>Amorphophallus bannaensis</i>	AM	422
<i>Anthurium affine</i>	AM	510
<i>Anthurium pentaphyllum</i>	AM	510
<i>Anthurium pitteri</i>	AM	474
<i>Arum italicum</i>	AM	260, 261
<i>Arum maculatum</i>	AM	260, 261
<i>Arum neglectum</i>	AM	260, 261
<i>Caladium bicolor</i>	AM	510
<i>Calla palustris</i>	NM	260, 261
<i>Colocasia esculenta</i>	AM	531
<i>Dieffenbachia amoena</i>	AM	510
<i>Philodendron ornatum</i>	NM	510
<i>Philodendron undulatum</i>	NM	510
<i>Pistia stratiotes</i>	NM	510
<i>Rhaphidophora decursiva</i>	AM	422
Hydrocharitaceae		
<i>Egeria densa</i>	NM	510
<i>Elodea canadensis</i>	NM	62, 260, 261
<i>Hydrilla verticillata</i>	NM	260, 261
<i>Vallisneria americana</i>	AM	631, 632
Butomaceae		
<i>Butomus umbellatus</i>	NM	260, 261
Alismataceae		
<i>Alisma lanceolatum</i>	AM + NM	260, 261
<i>Alisma plantago-aquatica</i>	AM	58
	NM	62, 260, 261
<i>Alisma subcordatum</i>	Weak AM	626
<i>Alisma triviale</i>	AM	140
<i>Baldellia ranunculoides</i>	AM	368
<i>Echinodorus grandiflorus</i>	NM	510
<i>Sagittaria latifolia</i>	AM	626
Limnocharitaceae		
<i>Hydrocleys nymphoides</i>		
Juncaginaceae		
<i>Triglochin maritima</i>	AM + NM	260, 261
<i>Triglochin palustris</i>	NM	260, 261
Potamogetonaceae		
<i>Potamogeton crispus</i>	NM	62, 260, 261
<i>Potamogeton gramineus</i>	NM	62
<i>Potamogeton lucens</i>	NM	62
<i>Potamogeton natans</i>	AM	58
	NM	62, 260, 261

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Potamogeton perfoliatus</i>	NM	62
<i>Potamogeton polygonifolius</i>	NM	260, 261
<i>Potamogeton praelongus</i>	NM	62
Petrosaviaceae		
<i>Petrosavia sakurarii</i>	Mycoheterotrophy	657, 658
<i>Petrosavia stellaris</i>	Mycoheterotrophy	657, 658
Nartheciaceae		
<i>Narthecium ossifragum</i>	AM + NM	260, 261
Burmanniaceae		
<i>Burmanna tenella</i>	Mycoheterotrophy (via AM)	290
<i>Thismia</i> sp.	Mycoheterotrophy	656
Dioscoreaceae		
<i>Tacca chantrieri</i>	NM	655
<i>Tamus communis</i>	AM	260, 261
Triuridaceae		
<i>Sciaphila polygyna</i>	Mycoheterotrophy	291
<i>Sciaphila tosaensis</i>	Mycoheterotrophy (via AM)	642
Pandanaaceae		
<i>Freycinetia arborea</i>	AM	326
<i>Pandanus furcatus</i>	NM	655
<i>Pandanus tectorius</i>	NM	326
Cyclanthaceae		
<i>Asplundia gardneri</i>	NM	510
Corsiaceae		
<i>Arachnitis uniflora</i>	Mycoheterotrophy (via AM)	79
Alstroemeriaceae		
<i>Alstroemeria aurea</i>	AM	207
Colchicaceae		
<i>Colchicum autumnale</i>	AM	260, 261
Melanthiaceae		
<i>Paris quadrifolia</i>	AM + NM	260, 261
<i>Trillium flexipes</i>	AM	165
<i>Veratrum viride</i>	AM	140
Smilacaceae		
<i>Smilax aspera</i>	AM	63, 368
<i>Smilax corbularia</i>	AM	422
<i>Smilax hypoglauca</i>	AM	422
<i>Smilax indica</i>	AM	422
Liliaceae		
<i>Gagea lutea</i>	AM + NM	260, 261
<i>Lilium martagon</i>	AM	260, 261
<i>Muscari comosum</i>	AM	260, 261
<i>Muscari neglectum</i>	AM	260, 261
<i>Smilacina racemosa</i>	AM	165
Orchidaceae		
<i>Aceras anthropophorum</i>	ORM	260, 261
<i>Anacamptis pyramidalis</i>	ORM	260, 261
<i>Anoectochilus burmannicus</i>	ORM	422
<i>Anoectochilus roxburghii</i>	ORM	422

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Anoectochilus tortus</i>	AM	655
<i>Apostasia odorata</i>	AM	422
<i>Arundina graminifolia</i>	ORM	326
<i>Caladenia formosa</i>	ORM	286
<i>Calypso bulbosa</i>	ORM	153
<i>Cephalanthera austinae</i>	Mycoheterotrophy (via ECM)	569
<i>Cephalanthera damasonium</i>	ORM + ECM	78
<i>Cephalanthera longifolia</i>	ORM	260, 261
<i>Cephalanthera rubra</i>	ORM + ECM	78
	ORM	368, 260, 261
<i>Chloraea virescens</i>	ORM	207
<i>Coeloglossum viride</i>	ORM	260, 261
<i>Corallorhiza maculata</i>	Mycoheterotrophy (via ECM)	569, 570, 571
<i>Corallorhiza mertensiana</i>	Mycoheterotrophy	570
<i>Corallorhiza trifida</i>	Mycoheterotrophy	392, 260, 261
<i>Corybas dienemus</i>	ORM	342
<i>Cypripedium calceolus</i>	ORM	540
	ORM + NM	260, 261
<i>Cypripedium californicum</i>	ORM	540
<i>Cypripedium candidum</i>	ORM	540
<i>Cypripedium fasciculatum</i>	ORM	540
<i>Cypripedium guttatum</i>	ORM	540
<i>Cypripedium montanum</i>	ORM	540
<i>Cypripedium parviflorum</i>	ORM	540
<i>Dactylorhiza fuchsia</i>	ORM	260, 261
<i>Dactylorhiza incarnata</i>	ORM	173, 260, 261
<i>Dactylorhiza maculata</i>	ORM	260, 261
<i>Dactylorhiza maculata ssp. ericetorum</i>	ORM	260, 261
<i>Dactylorhiza majalis</i>	ORM	78, 334, 480, 260, 261
<i>Dactylorhiza praetermissa</i>	ORM	260, 261
<i>Dactylorhiza praetermissa var. jumialis</i>	ORM	173
<i>Dactylorhiza purpurella</i>	ORM	260, 261
<i>Epipactis atrorubens</i>	ORM + ECM	78
	ORM	304, 260, 261
<i>Epipactis distans</i>	ORM + ECM	78
<i>Epipactis helleborine</i>	ORM + ECM	78
	ORM	260, 261
<i>Epipactis microphylla</i>	ORM + ECM	530
<i>Epipactis palustris</i>	ORM	78, 481
	ORM + NM	260, 261
<i>Epipactis purpurata</i>	ORM	260, 261
<i>Epipogium aphyllum</i>	ORM	260, 261
<i>Goodyera repens</i>	ORM	260, 261
<i>Gymnadenia conopsea</i>	ORM	260, 261
<i>Gymnadenia odoratissima</i>	ORM	260, 261
<i>Haemaria discolor var. dawsoniana</i>	ORM	122

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Hammarbya paludosa</i>	ORM	260, 261
<i>Herminium monorchis</i>	ORM	260, 261
<i>Hexalectris spicata</i>	Mycoheterotrophy (via ECM)	572
<i>Himantoglossum hircinum</i>	ORM	260, 261
<i>Ionopsis utricularioides</i>	ORM	448
<i>Liparis loeselii</i>	ORM	260, 261
<i>Listera cordata</i>	ORM	260, 261
<i>Listera ovata</i>	ORM	260, 261
<i>Malaxis latifolia</i>	ORM	422
<i>Microtis parviflora</i>	ORM	459
<i>Neotinea maculata</i>	ORM	260, 261
<i>Neottia nidus-avis</i>	ORM + ECM	78
	ORM	260, 261
<i>Newiedia veratrifolia</i>	ORM	333
<i>Ophrys apifera</i>	ORM	260, 261
<i>Ophrys fuciflora</i>	ORM	260, 261
<i>Ophrys insectifera</i>	ORM	260, 261
<i>Ophrys lutea</i>	ORM	56
<i>Ophrys sphegodes</i>	ORM	260, 261
<i>Orchis mascula</i>	ORM	260, 261
<i>Orchis militaris</i>	ORM	260, 261
<i>Orchis morio</i>	ORM	75, 173, 260, 261
<i>Orchis palustris</i>	ORM	195
<i>Orchis purpurea</i>	ORM	260, 261
<i>Orchis simia</i>	ORM	260, 261
<i>Orchis ustulata</i>	ORM	260, 261
<i>Phaius mishmensis</i>	AM	655
<i>Platanthera bifolia</i>	ORM	260, 261
<i>Platanthera chlorantha</i>	ORM	78, 260, 261
<i>Platanthera leucophaea</i>	ORM	652
<i>Pseudorchis albida</i>	ORM	260, 261
<i>Pterostylis acuminata</i>	ORM	460
<i>Serapias vomeracea ssp. vomeracea</i>	ORM	195
<i>Spathoglottis plicata</i>	ORM	326, 534, 565
<i>Spiranthes aestivalis</i>	ORM	260, 261
<i>Spiranthes sinensis var. amoena</i>	ORM	376
<i>Spiranthes spiralis</i>	ORM	368, 260, 261
<i>Stanhopea tigrina</i>	ORM	196
<i>Tolumnia variegata</i>	ORM	448
Asteliaceae		
<i>Astelia menziesiana</i>	AM	326
Hypoxidaceae		
<i>Curculigo capitulata</i>	AM	422
Iridaceae		
<i>Crocus vernus</i>	AM	260, 261
<i>Gladiolus segetum</i>	AM	260, 261
<i>Iris foetidissima</i>	AM	260, 261
<i>Iris germanica</i>	AM	260, 261

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Iris pseudacorus</i>	AM AM + NM	368 260, 261
<i>Sisyrinchium atlanticum</i>	AM	643
<i>Sisyrinchium sp.</i>	NM	207
<i>Sparaxis tricolor</i>	AM	514
Hemerocallidaceae		
<i>Dianella sandwicensis</i>	AM	326
Asphodelaceae		
<i>Asphodelus fistulosus</i>	AM	114, 115
<i>Bulbine alata</i>	AM	438
<i>Haworthia tortuosa</i>	AM	417
Alliaceae		
<i>Allium ampeloprasum</i>	AM	260, 261
<i>Allium canadense</i>	AM	140
<i>Allium cepa</i>	AM	7, 349, 260, 261
<i>Allium oleraceum</i>	AM + NM	260, 261
<i>Allium porrum</i>	AM	272, 260, 261
<i>Allium sativum</i>	AM	260, 261
<i>Allium schoenoprasum</i>	AM	3, 260, 261
<i>Allium scorodoprasum</i>	AM	260, 261
<i>Allium sphaerocephalon</i>	AM	472, 260, 261
<i>Allium subhirsutum</i>	AM	472
<i>Allium triquetrum</i>	AM	260, 261
<i>Allium ursinum</i>	AM	260, 261
Amaryllidaceae		
<i>Galanthus nivalis</i>	AM	260, 261
<i>Leucojum aestivum</i>	AM	260, 261
<i>Leucojum vernum</i>	AM + NM	260, 261
<i>Narcissus poeticus</i>	AM	260, 261
<i>Narcissus pseudonarcissus</i>	AM	260, 261
Themidaceae		
<i>Brodiaea laxa</i>	AM	513
Hyacinthaceae		
<i>Hyacinthoides non-scripta</i>	AM	398, 399, 260, 261
<i>Ornithogalum nutans</i>	AM	260, 261
<i>Ornithogalum pyrenaicum</i>	AM	260, 261
<i>Ornithogalum umbellatum</i>	AM	260, 261
<i>Scilla autumnalis</i>	AM	260, 261
Agavaceae		
<i>Agave americana</i>	AM	343
<i>Agave datylio</i>	Weak AM	112
<i>Agave deserti</i>	AM	151
<i>Agave marmorata</i>	AM	103
<i>Agave salmiana</i>	Weak AM	103
<i>Agave univittata</i>	AM	417
<i>Yucca elata</i>	AM	137
<i>Yucca periculosa</i>	Weak AM	103
<i>Yucca valida</i>	AM	417
Asparagaceae		
<i>Asparagus acutifolius</i>	AM	368, 472

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Asparagus officinalis</i>	AM	192, 383, 260, 261
Ruscaceae		
<i>Convallaria majalis</i>	AM + NM	260, 261
<i>Maianthemum bifolium</i>	AM + NM	260, 261
<i>Polygonatum multiflorum</i>	AM + NM	260, 261
<i>Polygonatum odoratum</i>	AM + NM	260, 261
<i>Polygonatum verticillatum</i>	AM + NM	260, 261
<i>Ruscus aculeatus</i>	AM	368, 260, 261
Arecaceae		
<i>Astrocaryum mexicanum</i>	AM	436
<i>Bactris gasipaes</i>	AM	135
<i>Caryota monostachya</i>	AM	655
<i>Cocos nucifera</i>	AM	326, 580
<i>Euterpe edulis</i>	AM	651
<i>Euterpe oleracea</i>	AM	130
<i>Serenoa repens</i>	AM	201
<i>Syagrus romanzoffiana</i>	Weak AM	651
<i>Wallichia mooreana</i>	NM	655
Sparganiaceae		
<i>Sparganium angustifolium</i>	NM	62
<i>Sparganium chlorocarpum</i>	AM	58
<i>Sparganium emersum</i>	NM	62
<i>Sparganium erectum</i>	NM	62
<i>Sparganium eurycarpum</i>	AM	260, 261
<i>Sparganium eurycarpum</i>	Weak AM	626
Typhaceae		
<i>Typha angustifolia</i>	NM	62, 368
	Weak AM	557
	AM	566, 260, 261
<i>Typha latifolia</i>	NM	62
	Weak AM	557
	AM	140, 185, 599
<i>Typha × glauca</i>	Weak AM	557
Bromeliaceae		
<i>Aechmea stelligera</i>	NM	510
<i>Ananas comosus</i>	AM	44, 246
<i>Hechtia aff. podantha</i>	Weak AM	103
<i>Vriesea limae</i>	AM	510
Juncaceae		
<i>Juncus acutiflorus</i>	AM + NM	260, 261
<i>Juncus alpinus</i>	AM + NM	260, 261
<i>Juncus articulatus</i>	AM	260, 261
<i>Juncus biglumis</i>	NM	260, 261
<i>Juncus bufonius</i>	AM + NM	260, 261
<i>Juncus bulbosus</i>	NM	62, 260, 261
<i>Juncus dudleyi</i>	AM	599
<i>Juncus effuses</i>	NM	62
	AM	140
	AM + NM	260, 261
<i>Juncus filiformis</i>	Weak AM	194
	NM	260, 261
<i>Juncus gerardi</i>	AM + NM	260, 261

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Juncus inflexus</i>	AM	260, 261
<i>Juncus maritimus</i>	NM	368, 260, 261
<i>Juncus nodosus</i>	AM	599
<i>Juncus planifolius</i>	AM	326
<i>Juncus roemerianus</i>	AM	278
<i>Juncus scheuchzerioides</i>	AM	342
	NM	560
<i>Juncus squarrosus</i>	AM + NM	260, 261
<i>Juncus torreyi</i>	AM	599
<i>Juncus trifidus</i>	AM	260, 261
<i>Luzula campestris</i>	AM + NM	260, 261
<i>Luzula crinita</i> var. <i>crinita</i>	NM	342
<i>Luzula hawaiiensis</i>	AM	326
<i>Luzula luzuloides</i>	NM	260, 261
<i>Luzula pallescens</i>	NM	260, 261
<i>Luzula pilosa</i>	AM + NM	260, 261
<i>Luzula spicata</i>	AM	260, 261
<i>Luzula sylvatica</i>	NM	260, 261
Cyperaceae		
<i>Bequerelia cymosa</i>	AM	426
<i>Bulboschoneus maritimus</i>	AM	426
<i>Bulbostylis barbata</i>	Facultative AM	426
<i>Bulbostylis capillaris</i>	NM	326
	AM	149
	Facultative AM	426
<i>Bulbostylis cf. conifera</i>	AM	358
<i>Bulbostylis densa</i>	AM	426
<i>Bulbostylis paradoxa</i>	AM	358
<i>Bulbostylis puberula</i>	NM	426
<i>Carex acnescens</i>	NM	426
<i>Carex acuta</i>	NM	62, 260, 261
<i>Carex acutiformis</i>	NM	260, 261
<i>Carex albonigra</i>	NM	426
<i>Carex amphibola</i>	NM	402
<i>Carex annectens</i>	AM	402
<i>Carex aphylla</i>	NM	207
<i>Carex aquatilis</i>	NM	426
<i>Carex arenaria</i>	AM + NM	260, 261
<i>Carex atherodes</i>	NM	402
	Facultative AM	426
<i>Carex baccans</i>	AM	426
<i>Carex bicknellii</i>	AM	402
<i>Carex bigelowii</i>	NM	501, 594, 426
<i>Carex blanda</i>	AM	402
<i>Carex boelckeiana</i>	NM	207
<i>Carex brevior</i>	AM	402
<i>Carex brizoides</i>	NM	426
<i>Carex brunnescens</i>	AM	194
<i>Carex buxbaumii</i>	AM	402
	NM	260, 261
<i>Carex caryophyllea</i>	NM	456, 260, 261
<i>Carex cephalophora</i>	AM	402

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Carex chordorrhiza</i>	NM	260, 261
<i>Carex crawei</i>	AM	402
<i>Carex cristatella</i>	AM	58, 402
<i>Carex curta</i>	NM	260, 261
<i>Carex davalliana</i>	AM	260, 261
<i>Carex digitata</i>	NM	260, 261
<i>Carex dioica</i>	NM	260, 261
<i>Carex distans</i>	NM	260, 261
<i>Carex disticha</i>	AM + NM	260, 261
<i>Carex divulsa</i>	AM	260, 261
<i>Carex ebenea</i>	NM	426
<i>Carex echinata</i>	NM	260, 261
<i>Carex elongata</i>	NM	260, 261
<i>Carex ericetorum</i>	NM	456, 260, 261
<i>Carex fillifolia</i>	NM	426
<i>Carex flacca</i>	NM	426
	AM + NM	260, 261
<i>Carex flava</i>	AM	140
	NM	426
	AM + NM	260, 261
<i>Carex fuscula</i>	AM	426
<i>Carex gayana</i>	NM	426
<i>Carex grannularis</i>	AM	402, 599
<i>Carex gravida</i>	AM	402
<i>Carex hallerana</i>	NM	472
<i>Carex hirta</i>	AM	456
	NM	260, 261
<i>Carex hostiana</i>	NM	260, 261
<i>Carex humilis</i>	NM	260, 261
<i>Carex hystericina</i>	NM	426
<i>Carex interior</i>	NM	402
<i>Carex lachenalii</i>	NM	426, 260, 261
<i>Carex lanuginosa</i>	NM	599
<i>Carex lasiocarpa</i>	AM	58
	Weak AM	626
	Facultative AM	426
	NM	426, 260, 261
<i>Carex lepidocarpa</i>	NM	260, 261
<i>Carex limosa</i>	NM	260, 261
<i>Carex lindleyana</i>	AM	426
<i>Carex lurida</i>	AM	58, 140
<i>Carex madoviana</i>	NM	426
<i>Carex maritime</i>	NM	426
<i>Carex membranacea</i>	NM	426
<i>Carex mertensii</i>	NM	584
<i>Carex meyenii</i>	AM	326
<i>Carex microchaeta</i>	NM	594
<i>Carex misandra</i>	NM	426
<i>Carex montana</i>	NM	260, 261
<i>Carex muricata</i>	NM	426
	AM + NM	260, 261
<i>Carex myosurus</i>	AM	426

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Carex nardina</i>	NM	426
<i>Carex nigra</i>	AM	140, 194
	AM + NM	260, 261
<i>Carex otrubae</i>	NM	260, 261
<i>Carex oxyandra</i>	NM	587
<i>Carex pallescens</i>	AM	194
	NM	260, 261
<i>Carex panacea</i>	AM	194
<i>Carex panicea</i>	AM + NM	260, 261
<i>Carex paniculata</i>	NM	260, 261
<i>Carex pellita</i>	NM	402
<i>Carex pendula</i>	NM	368, 260, 261
<i>Carex pensylvanica</i>	AM	402
<i>Carex pilulifera</i>	NM	260, 261
<i>Carex podocarpa</i>	NM	594
<i>Carex pulicaris</i>	NM	260, 261
<i>Carex remota</i>	AM + NM	260, 261
<i>Carex riparia</i>	NM	260, 261
<i>Carex rosea</i>	AM	402
<i>Carex rostrata</i>	NM	260, 261
<i>Carex scoparia</i>	AM	402
	NM	140
<i>Carex serotina</i>	NM	260, 261
<i>Carex speciosa</i>	AM	426
<i>Carex sprengelii</i>	NM	402
<i>Carex stenophylla</i> ssp. <i>eleocharis</i>	NM	426
<i>Carex sterilis</i>	NM	426
<i>Carex stipata</i>	AM	140, 402
<i>Carex stricta</i>	NM	140, 402
	AM	626
	Facultative AM	426
<i>Carex</i> aff. <i>subantarctica</i>	NM	426
<i>Carex subspathecea</i>	NM	426
<i>Carex sylvatica</i>	NM	426, 260, 261
<i>Carex tenera</i>	NM	402
<i>Carex tetanica</i>	AM	402
<i>Carex tribuloides</i>	AM	58, 140
<i>Carex trichocarpa</i>	AM	599
<i>Carex trifida</i>	NM	342
<i>Carex ursine</i>	NM	426
<i>Carex urticulata</i>	NM	426
<i>Carex vaginata</i>	NM	503, 260, 261
<i>Carex vesicaria</i>	AM	626
	AM + NM	260, 261
<i>Carex vulpina</i>	NM	260, 261
<i>Carex vulpinoidea</i>	AM	58, 140, 402
<i>Carex wahuensis</i>	AM	326
	NM	426
<i>Caustis dioica</i>	NM	426
<i>Caustis flexuosa</i>	AM	67
<i>Cladium amaicense</i>	AM	426
<i>Cladium jamaicense</i>	AM	297

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Cladium mariscus</i>	NM	368
	AM + NM	260, 261
<i>Cyathochaeta avenacea</i>	NM	426
<i>Cyperus arenarius</i>	AM	426
<i>Cyperus articulatus</i>	Weak AM	143
	Facultative AM	426
<i>Cyperus brevifolius</i>	AM	426
<i>Cyperus bulbosus</i>	NM	426
<i>Cyperus castaneus</i>	NM	426
<i>Cyperus clarkei</i>	AM	426
<i>Cyperus compressus</i>	Facultative AM	426
<i>Cyperus cyperinus</i>	AM	426
<i>Cyperus decompositus</i>	NM	426
<i>Cyperus difformis</i>	Facultative AM	426
<i>Cyperus distans</i>	Facultative AM	426
<i>Cyperus dubius</i>	AM	426
<i>Cyperus esculentus</i>	NM	426
<i>Cyperus exaltatus</i>	NM	426
<i>Cyperus flavescens</i>	AM	599
<i>Cyperus halpan</i>	Facultative AM	426
	NM	426
<i>Cyperus iria</i>	AM	424, 426
<i>Cyperus javanicus</i>	NM	426
<i>Cyperus kyllinga</i>	Facultative AM	355, 426
<i>Cyperus laevigatus</i>	AM	426
<i>Cyperus ligularis</i>	AM	426
	Facultative AM	426
<i>Cyperus luzulae</i>	NM	426
<i>Cyperus microiria</i>	NM	643
<i>Cyperus niveus</i>	AM	343
<i>Cyperus nutans</i>	AM	426
<i>Cyperus odoratus</i>	AM	426
<i>Cyperus paniceus</i>	AM	426
<i>Cyperus pilosus</i>	AM	426
<i>Cyperus platyphyllus</i>	AM	426
<i>Cyperus pohlii</i>	NM	426
<i>Cyperus pygmaeus</i>	AM	426
<i>Cyperus rotundus</i>	NM	326
	AM	343, 424, 425
	Facultative AM	426
<i>Cyperus squarrosus</i>	AM	426
<i>Cyperus stoloniferous</i>	AM	426
<i>Cyperus strigosus</i>	AM	599
	NM	426
<i>Cyperus surinamensis</i>	Facultative AM	426
<i>Cyperus tenuispica</i>	NM	426
<i>Cyperus triceps</i>	AM	426
<i>Eleocharis acutangula</i>	AM	426
<i>Eleocharis dulcis</i>	AM	426
<i>Eleocharis erythropoda</i>	NM	599
<i>Eleocharis geniculata</i>	AM	426
	NM	426
<i>Eleocharis multicaulis</i>	NM	260, 261

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Eleocharis ovata</i>	AM	140
<i>Eleocharis aff. pachycarpa</i>	NM	426
<i>Eleocharis palustris</i>	NM	62
	AM + NM	260, 261
<i>Eleocharis quinqueflora</i>	NM	260, 261
<i>Eleocharis scheuchzeri</i>	NM	426
<i>Eleocharis tenuis</i>	NM	426
<i>Eleocharis triste</i>	NM	426
<i>Eleocharis uniglumis</i>	NM	260, 261
<i>Eleocharis vaginatum</i>	NM	426
<i>Eriophorum angustifolium</i>	AM + NM	260, 261
<i>Eriophorum latifolium</i>	NM	260, 261
<i>Eriophorum vaginatum</i>	AM + NM	260, 261
<i>Fimbristylis consanguinea</i>	AM	426
<i>Fimbristylis cymosa</i>	NM	326, 355
<i>Fimbristylis eragrostis</i>	AM	426
<i>Fimbristylis falcata</i>	Facultative AM	426
<i>Fimbristylis miliacea</i>	Facultative AM	426
<i>Fimbristylis ovata</i>	Facultative AM	426
<i>Fimbristylis schoenoides</i>	NM	426
<i>Fimbristylis trachycarya</i>	NM	426
<i>Fimbristylis triflora</i>	NM	426
<i>Fimbristylis complanata</i>	NM	149
<i>Fuirena ciliaris</i>	NM	426
<i>Gahnia gahiniformis</i>	NM	426
<i>Gahnia vitiensis</i>	AM	326
<i>Gahnia vitiensis</i>	AM	326
<i>ssp. kauaiensis</i>		
<i>Hypolytrum bullatum</i>	AM	426
<i>Hypolytrum pulchrum</i>	AM	149, 358
<i>Isolepis antarctica</i>	NM	426
<i>Isolepis aucklandica</i>	NM	342
<i>Isolepis nodosa</i>	AM	426
<i>Kobresia bellardii</i>	AM	426
<i>Kobresia myosuroides</i>	Facultative AM	426
	ECM	656
<i>Kobresia simpliciuscula</i>	NM	426, 260, 261
<i>Kyllinga brevifolia</i>	NM	422, 426
<i>Kyllinga bulbosa</i>	NM	426
<i>Kyllinga nemoralis</i>	NM	426
<i>Lagenocarpus guianensis</i>	AM	358
<i>Lagenocarpus sphacelata</i>	NM	426
<i>Lepidosperma gracile</i>	AM	397
<i>Machaerina augustifolia</i>	NM	326
<i>Machaerina mariscoides</i>	AM	326
<i>Mariscus dubius</i>	NM	426
<i>Mariscus mariscoides</i>	AM	426
<i>ssp. meyenii</i>		
<i>Mariscus meyenianus</i>	AM	326
<i>Mariscus paniceus</i>	NM	426
<i>Mariscus squarrosus</i>	NM	426
<i>Mesomelaena pseudostygia</i>	NM	426
<i>Oreobolus furcatus</i>	AM	326

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Pleurostachys cephalotes</i>	Facultative AM	426
<i>Pycreus flavidus</i>	AM	426
<i>Pycreus polystachyos</i>	Facultative AM	426
	AM	326
<i>Pycreus pumilus</i>	AM	426
<i>Pycreus puncticulatus</i>	NM	426
<i>Rhynchospora barbata</i>	AM	149, 358
<i>Rhynchospora brasiliensis</i>	AM	358
<i>Rhynchospora cephalotes</i>	Facultative AM	426
<i>Rhynchospora ciliata</i>	NM	426
<i>Rhynchospora cormbosa</i>	AM	426
<i>Rhynchospora longisetis</i>	NM	426
<i>Rhynchospora pubera</i>	AM	426
<i>Rikliella squarrosa</i>	AM	426
<i>Schoenoplectus grossus</i>	NM	426
<i>Schoenoplectus juncooides</i>	NM	426
<i>Schoenoplectus</i>	NM	426
<i>senegalensis</i>		
<i>Schoenoplectus supinus</i>	AM	426
<i>Schoenus ferrugineus</i>	AM + NM	260, 261
<i>Schoenus nigricans</i>	AM + NM	260, 261
<i>Scirpus acutus</i>	AM	58, 626
<i>Scirpus atrovirens</i>	AM	58, 140, 599, 626
<i>Scirpus cespitosus</i>	NM	426
<i>Scirpus cyperinus</i>	AM	58, 140
<i>Scirpus fluviatilis</i>	AM	426
<i>Scirpus holoschoenus</i>	NM	368
<i>Scirpus maritimus</i>	AM	626
	NM	260, 261
<i>Scirpus pendulus</i>	AM	599
<i>Scirpus aff. perpusillus</i>	NM	426
<i>Scirpus pungens</i>	AM	599
<i>Scirpus robustus</i>	AM	426
<i>Scirpus sylvaticus</i>	NM	260, 261
<i>Scirpus tabernaemontani</i>	AM	599
<i>Scirpus validus</i>	AM	58
<i>Scleria latifolia</i>	Facultative AM	426
<i>Scleria lithosperma</i>	AM	426
<i>Scleria melaleuca</i>	Facultative AM	426
<i>Tetraria capillaris</i>	AM	397
<i>Trichophorum alpinum</i>	NM	260, 261
<i>Trichophorum cespitosum</i>	AM + NM	260, 261
<i>Uncinia richleriana</i>	NM	207
<i>Uncinia uncinata</i>	NM	326
Restionaceae		
<i>Alexgeorgea nitens</i>	AM	397
<i>Lyginia barbata</i>	AM	397
Poaceae		
<i>Aeluropus littoralis</i>	AM	620
<i>var. sinensis</i>		
<i>Agropyron desertorum</i>	AM	183
<i>Agropyron repens</i>	AM	307

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Agropyron smithii</i>	AM	354
<i>Agropyron trachycaulum</i>	AM	132
<i>Agropyron tsukushiense</i>	AM	643
var. <i>pransiens</i>		
<i>Agropyron tsukushiense</i>	AM	294
var. <i>transiens</i>		
<i>Agrostis alba</i>	AM	140
<i>Agrostis canina</i>	AM + NM	260, 261
<i>Agrostis capillaris</i>	AM	242
	AM + NM	260, 261
<i>Agrostis gigantea</i>	AM	260, 261
<i>Agrostis magellanica</i>	AM	560
	NM	342
<i>Agrostis palustris</i>	AM	126
<i>Agrostis scabra</i>	AM	95, 587
<i>Agrostis stolonifera</i>	AM	456, 467
	AM + NM	260, 261
<i>Agrostis stolonifera</i>	NM	307
ssp. <i>stolonifera</i>		
<i>Aira caryophylla</i>	NM	207
	AM + NM	260, 261
<i>Aira praecox</i>	AM + NM	260, 261
<i>Alopecurus aequalis</i>	NM	260, 261
<i>Alopecurus geniculatus</i>	AM	260, 261
<i>Alopecurus myosuroides</i>	AM	260, 261
<i>Alopecurus pratensis</i>	AM	260, 261
<i>Ammocalamagrostis baltica</i>	AM + NM	260, 261
<i>Ammophila arenaria</i>	AM	331, 368
	AM + NM	260, 261
<i>Ammophila breviligulata</i>	AM	224, 225, 324, 352
		472
<i>Ampelodesmos mauritanicus</i>	AM	415
<i>Andropogon capillipes</i>	AM	29
<i>Andropogon gerardii</i>	Facultative AM	168, 263, 276, 524
	AM	88
<i>Andropogon gerardii</i>	AM	326, 415
var. <i>paucipilus</i>		
<i>Andropogon virginicus</i>	AM	194
<i>Anthoxanthum odoratum</i>	AM	260, 261
	AM + NM	260, 261
<i>Apera spica-venti</i>	AM	260, 261
<i>Aristida adscensionis</i>	AM	479
<i>Aristida contorta</i>	Weak AM	438
<i>Aristida holathera</i>	NM	438
<i>Aristida longiseta</i>	AM	604
<i>Aristida mutabilis</i>	AM	567
<i>Aristida aff. romeriana</i>	AM	143
<i>Aristida stricta</i>	NM	30, 415
<i>Arrhenatherum elatius</i>	AM + NM	260, 261
<i>Avena barbata</i>	AM	472

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Avena fatua</i>	AM	260, 261
<i>Avena sativa</i>	AM	15
	AM + NM	260, 261
<i>Avena strigosa</i>	AM	260, 261
<i>Avenula pratensis</i>	AM	260, 261
<i>Avenula pubescens</i>	AM	260, 261
<i>Axonopus pruinosis</i>	AM	358
<i>Beckmannia syzigachne</i>	AM	294
<i>Bothriochloa pertusa</i>	AM	343
<i>Bouteloua eripoda</i>	AM	137
<i>Boutelous repens</i>	AM	143
<i>Brachiaria decumbens</i>	AM	150, 358
<i>Brachiaria humidicola</i>	AM	150, 358
<i>Brachypodium pinnatum</i>	AM + NM	260, 261
<i>Brachypodium ramosum</i>	AM	472
<i>Brachypodium sylvaticum</i>	AM	260, 261
<i>Briza maxima</i>	AM	472, 260, 261
<i>Briza media</i>	AM + NM	260, 261
<i>Briza minor</i>	AM	643, 260, 261
<i>Bromus erectus</i>	AM	260, 261
<i>Bromus hordeaceus</i>	AM	493
	AM + NM	260, 261
<i>Bromus inermis</i>	AM	260, 261
<i>Bromus madritensis</i>	AM	646
ssp. <i>rubens</i>		
<i>Bromus sterilis</i>	NM	260, 261
<i>Bromus tectorum</i>	Facultative AM	237
<i>Calamagrostis canescens</i>	AM	260, 261
<i>Calamagrostis epigejos</i>	AM	307
	AM + NM	260, 261
<i>Calamagrostis stricta</i>	AM	260, 261
<i>Calamagrostis villosa</i>	AM	54, 366, 615
<i>Calamovilfa longifolia</i>	AM	88
<i>Catapodium rigidum</i>	AM	472
<i>Cenchrus ciliaris</i>	AM	20
<i>Cenchrus setigerus</i>	AM	567
<i>Chusquea culeou</i>	AM	207
<i>Cinna arundinacea</i>	AM	140
<i>Corynephorus canescens</i>	AM	81
	AM + NM	260, 261
<i>Cymbopogon jwarancusa</i>	AM	567
<i>Cymbopogon winterianus</i>	AM	327
<i>Cynodon dactylon</i>	AM	294, 260, 261
<i>Cynosurus cristatus</i>	AM	260, 261
<i>Dactylis glomerata</i>	AM	497
	AM + NM	260, 261
<i>Danthonia decumbens</i>	AM	194, 260, 261
<i>Dendrocalamus asper</i>	AM	608
<i>Dendrocalamus strictus</i>	AM	482
<i>Deschampsia antarctica</i>	Facultative AM	166
	NM	560
<i>Deschampsia caespitosa</i>	NM	342

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Deschampsia cespitosa</i>	AM	194, 293, 260, 261
<i>Deschampsia chapmanii</i>	AM	342
<i>Deschampsia flexuosa</i>	AM	194, 270, 366, 615, 260, 261
<i>Desmazeria rigida</i>	AM	260, 261
<i>Dichanthelium cynodon</i>	AM	326
<i>Dichanthelium lanuginosum</i>	AM	95
<i>Digitaria adscendens</i>	AM	294
<i>Digitaria chinensis</i>	AM	422
<i>Digitaria ciliaris</i>	Weak AM	129
	AM	643
<i>Digitaria eriantha</i>	AM	23
<i>Digitaria sanguinalis</i>	AM	260, 261
<i>Digitaria violascens</i>	AM	422
<i>Distichlis spicata</i>	AM	278
<i>Distichlis stricta</i>	AM	302
<i>Echinochloa crus-galli</i>	AM	140
	AM + NM	260, 261
<i>Echinolaena inflexa</i>	AM	358
<i>Eleusine coracana</i>	AM	576
<i>Eleusine indica</i>	AM	422
<i>Elymus canadensis</i>	AM	263, 274
<i>Elymus caninus</i>	AM	260, 261
<i>Elymus farctus</i>	AM + NM	260, 261
<i>Elymus pycnanthus</i>	AM + NM	260, 261
<i>Elymus repens</i>	AM	260, 261
<i>Enneapogon avenaceus</i>	AM	438
<i>Eragrostis dielsii</i>	Facultative AM	438
<i>Eragrostis ferruginea</i>	AM	643
<i>Eriachne aristidea</i>	Weak AM	438
<i>Festuca altissima</i>	NM	260, 261
<i>Festuca argentina</i>	AM	207
<i>Festuca arundinacea</i>	AM	275, 260, 261
<i>Festuca baffinensis</i>	AM	158
<i>Festuca brachyphylla</i>	AM	158
<i>Festuca brigantina</i>	AM	235
<i>Festuca contracta</i>	NM	342
<i>Festuca erecta</i>	AM	560
<i>Festuca gigantea</i>	NM	260, 261
<i>Festuca hyperborea</i>	NM	158
<i>Festuca idahoensis</i>	AM	109, 371
<i>Festuca juncifolia</i>	AM	260, 261
<i>Festuca lemanii</i>	AM	260, 261
<i>Festuca ovina</i>	AM	194, 456
	AM + NM	260, 261
<i>Festuca pallescens</i>	AM	207
<i>Festuca pratensis</i>	AM	194
	AM + NM	260, 261
<i>Festuca pumila</i>	AM	80
<i>Festuca rubra</i>	AM + ECM + NM	260, 261

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Festuca vivipara</i>	AM	260, 261
<i>Glyceria fluitans</i>	NM	260, 261
<i>Glyceria maxima</i>	NM	260, 261
<i>Glyceria plicata</i>	AM + NM	260, 261
<i>Heteropogon contortus</i>	AM	326, 343
<i>Hierochloe odorata</i>	AM	599, 260, 261
<i>Holcus lanatus</i>	AM	395, 586
	AM + NM	260, 261
<i>Holcus mollis</i>	AM	194, 260, 261
<i>Homolepsis aturensis</i>	AM	142
<i>Hordeum brachyantherum</i>	AM	293
<i>Hordeum comosum</i>	AM	207
<i>Hordeum distichon</i>	AM	260, 261
<i>Hordeum jubatum</i>	AM	302, 626
<i>Hordeum murinum</i>	AM	260, 261
<i>Hordeum vulgare</i>	AM	119
	AM + NM	260, 261
<i>Imperata cylindrica</i>	AM	422
<i>Ischaemum byronis</i>	AM	326
<i>Koeleria glauca</i>	NM	260, 261
<i>Koeleria macrantha</i>	AM	260, 261
<i>Koeleria pyramidata</i>	NM	274
<i>Koeleria vurilochensis</i>	NM	207
<i>Lagurus ovatus</i>	AM	260, 261
<i>Lasiurus sindicus</i>	AM	567
<i>Leersia hexandra</i>	AM	404
<i>Leersia oryzoides</i>	AM	58, 140
	NM	260, 261
<i>Leymus arenarius</i>	AM	240, 241
	NM	260, 261
<i>Lolium perenne</i>	AM	23, 140, 171, 307
<i>Lolium perenne</i>	AM	260, 261
<i>ssp. multiflorum</i>		
<i>Lolium perenne</i>	AM	260, 261
<i>ssp. perenne</i>		
<i>Lolium temulentum</i>	AM + NM	260, 261
<i>Lygeum spartum</i>	AM	170
<i>Melica nutans</i>	AM + NM	260, 261
<i>Melica uniflora</i>	NM	260, 261
<i>Microstegium ciliatum</i>	AM	422
<i>Milium effusum</i>	AM + NM	260, 261
<i>Molinia caerulea</i>	AM	586, 260, 261
<i>Mulenbergia porteri</i>	AM	137
<i>Nardus stricta</i>	AM	194, 269, 260, 261
<i>Nassella leucotricha</i>	AM	604
<i>Neyraudia reynaudiana</i>	AM	343
<i>Oryza sativa</i>	AM	536
<i>Oryzopsis hymenoides</i>	AM	11
<i>Palicourea rigida</i>	AM	358
<i>Panicum amarum</i>	AM	43

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Panicum clandestinum</i>	AM	58
<i>Panicum hemitomon</i>	AM	404
<i>Panicum laxum</i>	AM	149
<i>Panicum maximum</i>	AM	20
<i>Panicum micranthum</i>	AM	358
<i>Panicum nephelophilum</i>	AM	326
<i>Panicum purpurascens</i>	AM	143
<i>Panicum virgatum</i>	AM	83, 134
	Weak AM	626
<i>Panicum virginatum</i>	AM	193
<i>Paractaenium novae-hollandiae</i>	NM	438
<i>Parapholis incurva</i>	AM	260, 261
<i>Paspalidium flavidum</i>	AM	343
<i>Paspalum cf. carinatum</i>	AM	358
<i>Paspalum conjugatum</i>	AM	142
<i>Paspalum dilatatum</i>	AM	243
<i>Paspalum notatum</i>	AM	193, 295, 562
<i>Paspalum thunbergii</i>	AM	643
<i>Pennisetum alopecuroides</i>	AM	643
<i>Pennisetum glaucum</i>	AM	51, 567
<i>Pennisetum padicillatum</i>	AM	544
<i>Pennisetum parviflorum</i>	AM	545
<i>Pennisetum setaceum</i>	AM	326
<i>Phalaris arundinacea</i>	AM	58, 140
	NM	62
	AM + NM	260, 261
<i>Phleum alpinum</i>	AM	194, 260, 261
<i>Phleum arenarium</i>	NM	260, 261
<i>Phleum phleoides</i>	AM + NM	260, 261
<i>Phleum pratense</i>	AM	132, 194, 260, 261
<i>Phragmites australis</i>	NM	62
	AM	140, 368
	AM + NM	260, 261
<i>Phragmites communis</i>	AM	620
<i>Piptatherum miliaceum</i>	AM	497
<i>Poa alpina</i>	AM + NM	260, 261
<i>Poa angustifolia</i>	AM	307
<i>Poa annua</i>	AM	560, 643
	NM	342
	AM + NM	260, 261
<i>Poa arctica</i>	NM	594
<i>Poa compressa</i>	NM	307
	AM + NM	260, 261
<i>Poa cookie</i>	NM	560
	AM	342
<i>Poa flexuosa</i>	AM + NM	260, 261
<i>Poa foliosa</i>	NM	342
<i>Poa kerguelensis</i>	AM	560
<i>Poa lanuginosa</i>	AM	207
<i>Poa literosa</i>	NM	342

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Poa nemoralis</i>	AM + NM	260, 261
<i>Poa palustris</i>	AM + NM	260, 261
<i>Poa pratensis</i>	AM	194, 467, 626
	AM + NM	260, 261
<i>Poa trivialis</i>	AM + NM	260, 261
<i>Polypogon monspeliensis</i>	AM	260, 261
<i>Puccinellia distans</i>	AM + NM	260, 261
<i>Puccinellia macquariensis</i>	AM	342
<i>Puccinellia maritima</i>	AM + NM	260, 261
<i>Puccinellia nuttalliana</i>	AM	301
<i>Raddiella esembeckii</i>	AM	358
<i>Rhynchelytrum repens</i>	AM	355
<i>Saccharum officinarum</i>	AM	326, 489
<i>Saccharum spontaneum</i>	Weak AM	439
<i>Schizachyrium scoparium</i>	Facultative AM	29
	AM	117, 140
<i>Schizachyrium stoloniferum</i>	AM	415
<i>Secale cereale</i>	AM	512
	AM + NM	260, 261
<i>Sesleria albicans</i>	AM + NM	260, 261
<i>Setaria glauca</i>	AM	643
<i>Setaria pumila</i>	AM	260, 261
<i>Setaria verticillata</i>	AM	260, 261
<i>Setaria viridis</i>	AM	643
	AM + NM	260, 261
<i>Sorghastrum nutans</i>	AM	264
<i>Sorghum bicolor</i>	AM	171
<i>Sorghum halpense</i>	AM	193
<i>Sorghum sudanense</i>	AM	311
<i>Spartina alterniflora</i>	NM	278
	Weak AM	391
<i>Spartina anglica</i>	NM	260, 261
<i>Spartina cynosuroides</i>	AM	278, 391
<i>Spartina gracilis</i>	AM	302
<i>Spartina patens</i>	AM	97, 278, 324
<i>Spartina pectinata</i>	AM	626
<i>Spartina × townsendii</i>	NM	260, 261
<i>Sphenopholis obtusa</i>	AM	625
<i>Sporobolus heterolepis</i>	AM	168
<i>Sporobolus virginicus</i>	AM	144, 326
<i>Sporobolus wrightii</i>	AM	491
<i>Stipa tenacissima</i>	AM	497
<i>Themeda triandra</i>	AM	23
<i>Thysanolaena maxima</i>	AM	422
<i>Trachypogon gouinii</i>	AM	144
<i>Trachypogon plumosus</i>	AM	149, 353, 358
<i>Triodia basedowii</i>	Weak AM	438
<i>Tripogon filiformis</i>	AM	343
<i>Triraphis mollis</i>	Weak AM	438
<i>Trisetum flavescens</i>	AM	207, 260, 261
<i>Triticum aestivum</i>	AM	15
<i>Triticum durum</i>	AM	10
<i>Uniola paniculata</i>	AM	563

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Vulpia ciliata</i> ssp. <i>ambigua</i>	AM	110
<i>Zea mays</i>	AM	123
<i>Zoysia japonica</i>	AM	326
Commelinaceae		
<i>Amischotolype hispida</i>	AM	655
<i>Commelina communis</i>	AM	294
	NM	643
<i>Commelina</i> aff. <i>erecta</i>	AM	143
Musaceae		
<i>Musa acuminata</i>	AM	163
Heliconiaceae		
<i>Heliconia psittacorum</i>	AM	510
Cannaceae		
<i>Canna coccinea</i>	NM	510
Zingiberaceae		
<i>Alpinia conchigera</i>	AM	655
<i>Amomum villosum</i>	AM	422
<i>Costus speciosus</i>	AM	422
<i>Paramomum petaloideum</i>	AM	655
<i>Renalmia guianensis</i>	AM	510
Costaceae		
<i>Costus scaber</i>	AM	510
<i>Costus spiralis</i> var. <i>spiralis</i>	AM	510
Myristicaceae		
<i>Horsfieldia pandurifolia</i>	AM	655
<i>Horsfieldia tetratepala</i>	AM	422
<i>Myristica yunnanensis</i>	AM	655
<i>Pycnanthus angolensis</i>	AM	445
<i>Staudtia kamerunensis</i>	AM	445
Magnoliaceae		
<i>Liriodendron tulipifera</i>	AM	362, 470
<i>Magnolia henryi</i>	AM	422, 655
<i>Talauma ovata</i>	NM	548
Annonaceae		
<i>Annona cherimola</i>	AM	42
<i>Enantia chlorantha</i>	AM	445
<i>Goniothalamus griffithii</i>	AM	422, 655
<i>Hexalobus crispiflorus</i>	AM	445
<i>Mitrephora calcarea</i>	AM	655
<i>Pseuduvaria indochinensis</i>	NM	655
Lauraceae		
<i>Beilschmiedia pendula</i>	AM	356, 357
<i>Cryptocarya angulata</i>	AM	222
<i>Cryptocarya mackinnoniana</i>	AM	222
<i>Cryptocarya yunnanensis</i>	AM	422
<i>Laurus nobilis</i>	AM	368, 603
<i>Lindera benzoin</i>	AM	140
<i>Litsea dileniiifolia</i>	AM	655
<i>Litsea liyuyingi</i>	AM	655
<i>Nectandra rigida</i>	AM	31
<i>Ocotea indecora</i>	AM	651
<i>Ocotea puberula</i>	AM	651

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Persea americana</i>	AM	41, 250, 326, 609
<i>Phoebe lanceolata</i>	AM	422
Aristolochiaceae		
<i>Asarum europaeum</i>	AM + NM	260, 261
Piperaceae		
<i>Peperomia hesperomannii</i>	AM	326
<i>Peperomia membranacea</i>	AM	326
<i>Piper longum</i>	AM	422, 655
<i>Piper nigrum</i>	AM	578
<i>Piper sarmentosum</i>	AM	422
<i>Piper</i> sp.	NM	422
Papaveraceae		
<i>Chelidonium majus</i>	NM	260, 261
<i>Macleaya cordata</i>	AM	343
<i>Papaver rhoeas</i>	AM + NM	260, 261
<i>Papaver somniferum</i>	NM	260, 261
Menispermaceae		
<i>Cocculus trilobus</i>	AM	326
Berberidaceae		
<i>Berberis buxifolia</i>	AM	207
<i>Berberis darwinii</i>	NM	207
<i>Berberis vulgaris</i>	AM	260, 261
<i>Mahonia aquifolium</i>	AM	260, 261
<i>Podophyllum peltatum</i>	AM	410, 621
Ranunculaceae		
<i>Aconitum delphinifolium</i>	AM	594
<i>Aconitum napellus</i>	AM + NM	260, 261
<i>Actea spicata</i>	AM + NM	260, 261
<i>Anemone nemorosa</i>	AM + NM	260, 261
<i>Anemone ranunculoides</i>	AM	260, 261
<i>Anemone vulgaris</i>	AM	260, 261
<i>Batrachium circinatum</i>	NM	62
<i>Batrachium peltatum</i>	NM	62
<i>Caltha palustris</i>	NM	62
	AM + NM	260, 261
<i>Clematis stans</i>	AM	636
<i>Clematis vitalba</i>	AM	368
	AM + ECM	260, 261
<i>Consolida ambigua</i>	AM	260, 261
<i>Corydalis lutea</i>	NM	260, 261
<i>Corydalis solida</i>	NM	260, 261
<i>Fumaria officinalis</i>	AM + NM	260, 261
<i>Helleborus foetidus</i>	AM	260, 261
<i>Myosurus minimus</i>	AM	260, 261
<i>Pulsatilla patens</i>	AM	408
<i>Pulsatilla pratensis</i>	AM	408
<i>Pulsatilla vulgaris</i>	AM + NM	260, 261
<i>Ranunculus acris</i>	AM	194, 456, 586, 260, 261
<i>Ranunculus acris</i> ssp. <i>pumilus</i>	AM	503
<i>Ranunculus adoneus</i>	AM	416, 519

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Ranunculus auricomus</i>	AM	586
	AM + NM	260, 261
<i>Ranunculus biternatus</i>	AM	560
<i>Ranunculus bulbosus</i>	AM	456, 260, 261
<i>Ranunculus crassipes</i>	AM	342
<i>Ranunculus ficaria</i>	AM + NM	260, 261
<i>Ranunculus flammula</i>	AM	62
	AM + NM	260, 261
<i>Ranunculus fluitans</i>	NM	260, 261
<i>Ranunculus lingua</i>	AM + NM	260, 261
<i>Ranunculus nemorosus</i>	AM	586
<i>Ranunculus paludosus</i>	AM	260, 261
<i>Ranunculus repens</i>	AM + NM	260, 261
<i>Ranunculus reptans</i> × <i>flammula</i>	AM	260, 261
<i>Ranunculus sardous</i>	AM	260, 261
<i>Ranunculus sceleratus</i>	AM + NM	260, 261
<i>Thalictrum minus</i>	AM	260, 261
<i>Trollius europaeus</i>	AM	194, 503, 260, 261
Proteaceae		
<i>Banksia aricifolia</i>	Weak AM	454
<i>Conospermum longifolium</i>	AM	67
<i>Conospermum taxifolium</i>	AM	67
<i>Lomatia hirsute</i>	NM	207
<i>Grevillea robusta</i>	NM	326
<i>Telopea speciosissima</i>	AM	67
Buxaceae		
<i>Buxus sempervirens</i>	AM	260, 261
Gunneraceae		
<i>Gunnera petaloidea</i>	AM	326
Dilleniaceae		
<i>Hibbertia serpyllifolia</i>	AM	67
Droseraceae		
<i>Drosera anglica</i>	NM	326, 260, 261
<i>Drosera intermedia</i>	AM	212
	NM	260, 261
<i>Drosera rotundifolia</i>	AM	140
	AM + NM	260, 261
Frankeniaceae		
<i>Frankenia laevis</i>	NM	260, 261
<i>Frankenia plicata</i>	Weak AM	438
Tamaricaceae		
<i>Tamarix chinensis</i>	AM	620
<i>Tamarix gallica</i>	AM	368
Plumbaginaceae		
<i>Armeria maritima</i>	AM	277
	AM + NM	260, 261
<i>Armeria maritima</i> <i>ssp. halleri</i>	AM	456
<i>Limonium vulgare</i>	AM + NM	260, 261
Polygonaceae		
<i>Bistorta vivipara</i>	AM	194

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Coccoloba uvifera</i>	ECM	326
<i>Coccoloba warmingii</i>	AM	31
<i>Fagopyrum esculentum</i>	NM	260, 261
<i>Fallopia convolvulus</i>	NM	260, 261
<i>Oxyria digyna</i>	NM	260, 261
<i>Polygonum amphibium</i>	Facultative AM	62, 626
	NM	260, 261
<i>Polygonum aviculare</i>	NM	307
	AM + NM	260, 261
<i>Polygonum bistorta</i>	NM	594
	AM	260, 261
<i>Polygonum capitatum</i>	ECM + weak AM	326
<i>Polygonum cespitosum</i>	AM	140
<i>Polygonum cuspidatum</i>	AM	636
	NM	643
<i>Polygonum hydropiper</i>	NM	260, 261
<i>Polygonum lapathifolium</i>	NM	260, 261
<i>Polygonum lapathifolium</i> <i>ssp. pallidum</i>	NM	307
<i>Polygonum longisetum</i>	NM	643
<i>Polygonum maritimum</i>	NM	260, 261
<i>Polygonum mite</i>	NM	260, 261
<i>Polygonum pesicaria</i>	Weak AM	626
	AM + NM	260, 261
<i>Polygonum statice</i>	AM	343
<i>Polygonum viviparum</i>	ECM	594
	AM + ECM	260, 261
<i>Polygonum weyrichii</i>	ECM	587
<i>Polygonum weyrichii</i> <i>var. alpinum</i>	NM	636
<i>Rumex acetosa</i>	AM	194, 294, 456
	AM + NM	260, 261
<i>Rumex acetosella</i>	NM	207, 456
<i>Rumex acetosella</i> agg.	NM	260, 261
<i>Rumex alpinus</i>	AM + NM	260, 261
<i>Rumex altissimus</i>	AM	140
<i>Rumex conglomeratus</i>	NM	260, 261
<i>Rumex crispus</i>	NM	307
	AM + NM	260, 261
<i>Rumex hastatus</i>	AM	343
<i>Rumex hydrolapathum</i>	NM	62
<i>Rumex japonicus</i>	NM	643
<i>Rumex longifolius</i>	Weak AM	194
<i>Rumex obtusifolius</i>	AM + NM	260, 261
<i>Rumex palustris</i>	NM	260, 261
<i>Rumex scutatus</i>	NM	260, 261
<i>Ruprechtia laxiflora</i>	NM	651
Caryophyllaceae		
<i>Agrostemma githago</i>	NM	260, 261
<i>Arenaria serpyllifolia</i>	NM	260, 261
<i>Cerastium alpinum</i>	NM	260, 261
<i>Cerastium arcticum</i>	NM	260, 261

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Cerastium arvense</i>	AM	456
	NM	260, 261
<i>Cerastium cerastoides</i>	NM	260, 261
<i>Cerastium fontanum</i>	AM	194
	NM	456
<i>Cerastium fontanum</i> <i>ssp. fontanum</i>	AM	342
<i>Cerastium fontanum</i> <i>ssp. glabrescens</i>	AM + NM	260, 261
<i>Cerastium glomeratum</i>	NM	560
<i>Cerastium holosteoides</i> <i>var. hallaisanense</i>	NM	643
<i>Cerastium semidecandrum</i>	NM	260, 261
<i>Colobanthus apetalus</i> <i>var. alpinus</i>	AM	342
<i>Colobanthus kerguelensis</i>	NM	560
<i>Colobanthus muscoides</i>	NM	342
<i>Dianthus carthusianorum</i>	AM	456
	NM	260, 261
<i>Dianthus caryophyllus</i>	NM	554
<i>Dianthus deltoides</i>	NM	260, 261
<i>Dianthus gratianopolitanus</i>	NM	260, 261
<i>Gypsophila fastigiata</i>	NM	456
<i>Honkenya peploides</i>	NM	260, 261
<i>Lychnis flos-cuculi</i>	AM + NM	260, 261
<i>Lychnis viscaria</i>	NM	260, 261
<i>Minuartia hybrida</i>	AM	260, 261
<i>Minuartia verna</i>	NM	260, 261
<i>Moehringia trinervia</i>	NM	260, 261
<i>Myosoton aquaticum</i>	NM	260, 261
<i>Polycarpaea corymbosa</i>	AM	336
<i>Sagina apetalata</i>	NM	260, 261
<i>Sagina procumbens</i>	NM	260, 261
<i>Sagina subulata</i>	NM	260, 261
<i>Saponaria officinalis</i>	NM	260, 261
<i>Scleranthus annuus</i>	NM	260, 261
<i>Silene acaulis</i>	AM	594
	AM + ECM + NM	260, 261
<i>Silene alba</i>	NM	260, 261
<i>Silene colorata</i> <i>ssp. canescens</i>	AM	368
<i>Silene dioica</i>	Weak AM	194
	NM	260, 261
<i>Silene maritima</i>	NM	260, 261
<i>Silene nutans</i>	NM	260, 261
<i>Silene otites</i>	AM	260, 261
<i>Silene vulgaris</i>	NM	456, 260, 261
<i>Schiedea spergulina</i>	AM	326
<i>Spergula arvensis</i>	AM + NM	260, 261
<i>Spergularia marina</i>	AM or NM	260, 261
<i>Spergularia media</i>	AM + NM	260, 261
<i>Stellaria alsine</i>	NM	260, 261
<i>Stellaria graminea</i>	NM	260, 261

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Stellaria holostea</i>	AM + NM	260, 261
<i>Stellaria media</i>	AM	294
	AM + NM	260, 261
<i>Stellaria media ssp. media</i>	AM	342
<i>Stellaria nemorum</i>	AM + NM	260, 261
<i>Stellaria pallida</i>	AM + NM	260, 261
<i>Stellaria palustris</i>	NM	260, 261
<i>Stellaria parviflora</i>	NM	342
Amaranthaceae		
<i>Achyranthes aspera</i>	NM	422
	AM	343
<i>Achyranthes fauriei</i>	NM	643
<i>Achyranthes splendens</i>	NM	326
<i>Amaranthus caudatus</i>	AM	33
<i>Amaranthus lividus</i>	AM	294
<i>Amaranthus retroflexus</i>	NM	260, 261
<i>Amaranthus spinosus</i>	NM	422
	AM	343
<i>Amaranthus tricolor</i>	AM	33
<i>Amaranthus viridis</i>	AM	343
<i>Atriplex barclayana</i>	Weak AM	112
<i>Atriplex canescens</i>	AM	57
<i>Atriplex glabriuscula</i>	NM	260, 261
<i>Atriplex halimus</i>	NM	368
<i>Atriplex hortensis</i>	NM	260, 261
<i>Atriplex julacea</i>	AM	543
<i>Atriplex limbata</i>	NM	438
<i>Atriplex littoralis</i>	AM	260, 261
<i>Atriplex patula</i>	AM	260, 261
<i>Atriplex prostrata</i>	NM	260, 261
<i>Atriplex semibaccata</i>	NM	326
<i>Beta vulgaris</i>	AM	260, 261
<i>Celosia cristata</i>	AM	33
<i>Chenopodium album</i>	NM	307
	AM + NM	260, 261
<i>Chenopodium</i> <i>ambrosioides</i>	AM	343
<i>Chenopodium bonus-</i> <i>henricus</i>	NM	260, 261
<i>Chenopodium glaucum</i>	NM	260, 261
<i>Chenopodium murale</i>	NM	326
<i>Chenopodium rubrum</i>	NM	260, 261
<i>Enchylaena tomentosa</i>	NM	438
<i>Gomphrena globosa</i>	AM	33
<i>Halimione portulacoides</i>	AM + NM	260, 261
<i>Nototrichium sandwicense</i>	NM	326
<i>Ptilotus latifolius</i>	NM	438
<i>Ptilotus obovatus</i> <i>var. obo-</i> <i>vatus</i>	NM	438
<i>Ptilotus sessilifolius</i>	NM	438
<i>Salicornia europaea</i>	AM	277
	AM + NM	260, 261

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Salsola kali</i>	NM	19, 300, 260, 261
	AM + NM	438
<i>Sclerolaena diacantha</i>	AM	438
<i>Sclerolaena holtiana</i>	NM	438
<i>Suaeda glauca</i>	AM	620
<i>Suaeda maritima</i>	AM	533
	AM + NM	260, 261
<i>Suaeda vera</i>	AM + NM	260, 261
Aizoaceae		
<i>Cheredospsis purpurea</i>	NM	417
<i>Delosperma herbium</i>	Falcutative AM	417
<i>Sesuvium portulacastrum</i>	NM	326
	AM	143
<i>Tetragonia tetragonioides</i>	AM	326
Phytolaccaceae		
<i>Stegnosperma halimifolia</i>	AM	112
Nyctaginaceae		
<i>Abronia maritima</i>	Falcutative AM	543
<i>Abronia umbellata</i>	AM	543
<i>Boerhavia repens</i>	NM	326
<i>Bougainvillea spectabilis</i>	NM	326, 651
<i>Mirabilis jalapa</i>	NM	326
<i>Neea sp.</i>	ECM	656
<i>Pisonia sp.</i>	ECM	656
<i>Pisonia umbellifera</i>	NM	326
Cactaceae		
<i>Chamacereus sylvestris</i>	NM	417
<i>Cochemia poselgeri</i>	AM	112
<i>Coryphanta radians</i>	Weak AM	103
<i>Escontria chiotilla</i>	Weak AM	103
<i>Ferocactus acanthodes</i>	AM	151
<i>Ferocactus flavovirens</i>	Weak AM	103
<i>Ferocactus latispinus</i>	Weak AM	103
<i>Ferocactus peninsulae</i>	AM	112
<i>Lemaireocereus thurberi</i>	Weak AM	112
<i>Lophocereus schottii</i>	AM	112
<i>Machaerocereus gummosus</i>	Weak AM	112
<i>Mammillaria carnea</i>	Weak AM	103
<i>Mammillaria dioica</i>	Weak AM	112
<i>Mamillaria elongata</i>	NM	417
<i>Myrtillocactus geometrizans</i>	Weak AM	103
<i>Neobuxbaumia tetetzo</i>	Weak AM	103
<i>Nopalea karwinskiana</i>	AM	20
<i>Opuntia cholla</i>	AM	112
<i>Opuntia excelsa</i>	AM	20
<i>Opuntia ficus-indica</i>	AM	151
<i>Opuntia lindsayi</i>	AM	112
<i>Opuntia pilifera</i>	AM	103
<i>Opuntia puberula</i>	AM	20
<i>Opuntia streptacantha</i>	AM	103
<i>Opuntia stricta var. dillenii</i>	AM	143

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Opuntia tuna</i>	NM	417
<i>Pachycereus pectin-aboriginum</i>	AM	494
<i>Pachycereus pringlei</i>	Weak AM	112
<i>Selenicereus macdonaldiae</i>	AM	417
<i>Stenocereus queretaroensis</i>	AM	463, 464
<i>Stenocereus stellatus</i>	Weak AM	103
Portulacaceae		
<i>Lyallia kerguelensis</i>	NM	560
<i>Montia fontana</i>	NM	342
<i>ssp. fontana</i>		
<i>Montia perfoliata</i>	NM	207
<i>Montia sibirica</i>	AM	260, 261
<i>Portulaca intraterranea</i>	NM	438
<i>Portulaca lutea</i>	NM	326
<i>Portulaca oleracea</i>	AM + NM	260, 261
<i>Portulaca sclerocarpa</i>	NM	326
Olacaceae		
<i>Coula edulis</i>	AM	445
<i>Ongokea gore</i>	AM	445
<i>Strombosis grandifolia</i>	AM	445
Loranthaceae		
<i>Viscum album</i>	NM	260, 261
Santalaceae		
<i>Santalum ellipticum</i>	NM	326
<i>Santalum paniculatum</i>	AM	326
<i>Thesium alpinum</i>	NM	456
<i>Thesium humifusum</i>	NM	260, 261
Loasaceae		
<i>Caiophora sylvestris</i>	NM	207
<i>Loasa berghii</i>	NM	207
Cornaceae		
<i>Cornus sanguinea</i>	AM + NM	260, 261
Balsaminaceae		
<i>Impatiens capensis</i>	AM	140
<i>Impatiens glandulifera</i>	AM + NM	260, 261
<i>Impatiens noli-tangere</i>	AM + NM	260, 261
<i>Impatiens parviflora</i>	AM + NM	260, 261
<i>Impatiens walleriana</i>	AM	322
Tetrameristaceae		
<i>Tetramerista glabra</i>	AM	568
Polemoniaceae		
<i>Polemonium caeruleum</i>	AM	260, 261
Fouquieriaceae		
<i>Fouquieria digueti</i>	AM	112
Theaceae		
<i>Pyrenaria cheliensis</i>	AM	422
Ebenaceae		
<i>Diospyros nigrocartex</i>	AM	422, 655
Theophrastaceae		
<i>Jacquinia pungens</i>	AM	20
Primulaceae		
<i>Anagallis arvensis</i>	AM	472, 260, 261

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Anagallis tenella</i>	AM	260, 261
<i>Asterolinum stellatum</i>	AM	472
<i>Cyclamen hederifolium</i>	AM	260, 261
<i>Glaux maritima</i>	AM	260, 261
<i>Hottonia palustris</i>	AM + NM	260, 261
<i>Lysimachia japonica</i>	AM	643
<i>Lysimachia nemorum</i>	AM + NM	260, 261
<i>Lysimachia nummularia</i>	AM + NM	260, 261
<i>Lysimachia terrestris</i>	AM	140
	AM + NM	260, 261
<i>Lysimachia thyrsoiflora</i>	NM	62
	AM + NM	260, 261
<i>Lysimachia vulgaris</i>	AM	368
	AM + NM	260, 261
<i>Primula elatior</i>	AM	260, 261
<i>Primula farinosa</i>	AM	260, 261
<i>Primula veris</i>	AM + NM	260, 261
<i>Primula vulgaris</i>	AM	260, 261
<i>Samolus valerandi</i>	AM	368, 260, 261
<i>Trientalis europaea</i>	AM	501
	AM + NM	260, 261
Myrsinaceae		
<i>Ardisia crenata</i>	AM	87
<i>Ardisia tenera</i>	AM	422, 655
<i>Measa indica</i>	AM	422
<i>Myrsine alyxifolia</i>	AM	326
<i>Rapanea ferruginea</i>	AM	31
Styracaceae		
<i>Strichinus brasiliensis</i>	AM	651
Diapensiaceae		
<i>Diapensia lapponica</i>	ERM	260, 261
Lecythidaceae		
<i>Barringtonia macrostachya</i>	AM	655
<i>Barringtonia racemosa</i>	AM	655
<i>Cariniana estrellensis</i>	AM	651
Sapotaceae		
<i>Aningeria adolfi-friedericii</i>	AM	637, 638
<i>Aningeria robusta</i>	AM	445
<i>Argania spinosa</i>	AM	434
<i>Austranella congolensis</i>	AM	445
<i>Baillonella toxisperma</i>	AM	445
<i>Gambeya africana</i>	AM	445
<i>Omphalocarpum procerum</i>	AM	445
<i>Palaquium gutta</i>	AM	568
Actinidiaceae		
<i>Actinidia deliciosa</i>	AM	523
Clethraceae		
<i>Clethra barbinervis</i>	AM	335
Ericaceae		
<i>Andromeda polifolia</i>	ERM	260, 261
<i>Arbutus menziesii</i>	ABM	374
	ECM	375

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Arbutus unedo</i>	ABM	200, 238, 421, 368, 472, 260, 261
<i>Arctostaphylos alpinus</i>	ABM	594
	ERM	260, 261
<i>Arctostaphylos uva-ursi</i>	ABM	259, 507
	M(endo) + ERM +	260, 261
	ABM + ECM +	
	EEM	
<i>Calluna vulgaris</i>	ERM	72, 238, 299, 260, 261
<i>Cassiope tetragona</i>	ERM	594
<i>Cavendishia capitulata</i>	ERM	474
<i>Cavendishia melastomoides</i>	ERM	474
<i>Daboecia cantabrica</i>	ERM	260, 261
<i>Disterigma humboldtii</i>	ERM	474
<i>Empetrum nigrum</i>	ERM	594, 260, 261
<i>Erica arborea</i>	ERM	368
<i>Erica cinerea</i>	ERM	99, 260, 261
<i>Erica erigena</i>	ERM	260, 261
<i>Erica mackaiana</i>	ERM	260, 261
<i>Erica multiflora</i>	ERM	472
<i>Erica tetralix</i>	ERM	260, 261
<i>Erica vagans</i>	ERM	260, 261
<i>Gaultheria erecta</i>	ERM	474
<i>Gaultheria procumbens</i>	ERM	238
<i>Gaultheria shallon</i>	ERM	22, 639
<i>Gonocalyx costaricense</i>	ERM	474
<i>Kalmia latifolia</i>	ERM	238
<i>Ledum palustre</i>	ERM	260, 261
<i>Ledum palustre</i>	ERM	594
<i>ssp. decumbens</i>		
<i>Ledum palustre</i>	ERM	594
<i>ssp. groenlandicum</i>		
<i>Leucopogon parviflorus</i>	ERM	401
<i>Loiseleuria procumbens</i>	ERM	238
<i>Loiseleuria procumbens</i>	ERM	594, 260, 261
<i>Oxydendrum arboreum</i>	ERM	238
<i>Pernettya mucronata</i>	ERM	207
<i>Phyllodoce caerulea</i>	ERM	260, 261
<i>Pieris floribunda</i>	ERM	238, 555
<i>Rhododendron</i>	ERM	154
<i>brachycarpum</i>		
<i>Rhododendron</i>	ERM	238
<i>calendulaceum</i>		
<i>Rhododendron</i>	ERM	238
<i>carolinianum</i>		
<i>Rhododendron catawbiense</i>	ERM	238
<i>Rhododendron maximum</i>	ERM	238
<i>Rhododendron</i>	ERM	238
<i>mucronulatum</i>		
<i>Rhododendron obtusum</i>	ERM	601

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Rhododendron ponticum</i>	ERM	260, 261
<i>Sphycospermum buxifolium</i>	ERM	474
<i>Sphycospermum cordifolium</i>	ERM	474
<i>Vaccinium angustifolium</i>	ERM	157
<i>Vaccinium calycinum</i>	ERM + AM	325, 326
<i>Vaccinium corymbosum</i>	ERM	238, 645
<i>Vaccinium dentatum</i>	ERM + AM	325, 326
<i>Vaccinium macrocarpon</i>	ERM	99, 238, 260, 261
<i>Vaccinium myrtillus</i>	ERM	72, 260, 261
<i>Vaccinium oxycoccos</i>	ERM	260, 261
<i>Vaccinium reticulatum</i>	ERM + weak AM	326
	ERM + AM	325
<i>Vaccinium uliginosum</i>	ERM	594, 260, 261
<i>Vaccinium vitis-idaea</i>	ERM	594, 260, 261
<i>Woollsia pungens</i>	ERM	401
Ericaceae "Pyrolaceae"		
<i>Moneses uniflora</i>	EEM + M(endo)	260, 261
<i>Orthilia secunda</i>	EEM + M(endo)	260, 261
<i>Pyrola media</i>	M(endo)	260, 261
<i>Pyrola minor</i>	EEM + M(endo)	260, 261
<i>Pyrola rotundifolia</i>	EEM + M(endo)	260, 261
Ericaceae (Monotropeoideae)		
<i>Monotropa hypopitys</i>	MTM	260, 261
<i>Monotropa uniflora</i>	MTM	647
<i>Monotropastrum humile</i>	MTM	384
<i>Sarcodes sanguinea</i>	ERM + MTM	332
Ericaceae (Epacridoideae)		
<i>Astroloma conostephioides</i>	ERM	393
<i>Astroloma humifusum</i>	ERM	393
<i>Astroloma pinifolium</i>	ERM	393, 394
<i>Brachyloma daphnoides</i>	AM	67
	ERM	393
<i>Epacris impressa</i>	ERM	393, 394
<i>Epacris impressa</i>	ERM	393
<i>var. grandiflora</i>		
<i>Epacris microphylla</i>	AM	67
	ERM	128
<i>Leucopogon ericoides</i>	ERM	393
<i>Leucopogon juniperinus</i>	AM	67
<i>Leucopogon parviflorus</i>	ERM	393, 556
<i>Lysinema ciliatum</i>	ERM	36
<i>Styphelia adscendens</i>	ERM	393
<i>Styphelia tameiameia</i>	ERM + AM	325, 326
<i>Woollsia pungens</i>	ERM	127, 312
Icacinaeae		
<i>Pittosporopsis kerrii</i>	AM	422
Boraginaceae		
<i>Arnebia hispidisima</i>	AM	567
<i>Borago officinalis</i>	NM	260, 261
<i>Borreria sonora</i>	AM	112
<i>Cerastium arvense</i>	NM	207
<i>Cordia alliodora</i>	AM	20

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Cordia curassavica</i>	Weak AM	103
<i>Cordia ecalyculata</i>	AM	651
<i>Cordia trichotoma</i>	AM	651
<i>Cynoglossum creticum</i>	AM	207
<i>Cynoglossum lanceolatum</i>	AM	343
<i>Echium vulgare</i>	AM	260, 261
<i>Heliotropium anomalum</i>	AM	326
<i>Heliotropium curassavicum</i>	AM	326
<i>Heliotropium sp.</i>	AM	567
<i>Lithospermum arvense</i>	NM	260, 261
<i>Lithospermum officinale</i>	NM	260, 261
<i>Lithospermum</i>	AM	260, 261
<i>purpureocaeruleum</i>		
<i>Myosotis alpestris</i>	AM + NM	260, 261
<i>Myosotis arvensis</i>	NM	260, 261
<i>Myosotis decumbens</i>	Facultative AM	194
<i>Myosotis discolor</i>	AM	260, 261
<i>Myosotis laxa</i>	AM	260, 261
<i>ssp. caespitosa</i>		
<i>Myosotis palustris</i>	Facultative AM	62
<i>Myosotis ramosissima</i>	AM + NM	260, 261
<i>Myosotis scorpioides</i>	AM + NM	260, 261
<i>Myosotis sylvatica</i>	AM + NM	260, 261
<i>Omphalalappula concava</i>	NM	438
<i>Plagiobothrys figuratus</i>	AM	293
<i>Pulmonaria officinalis</i>	AM + NM	260, 261
<i>Silene andicola</i>	NM	207
<i>Stellaria graminea</i>	AM	194
<i>Stellaria media</i>	AM	207
<i>Symphytum officinale</i>	AM	260, 261
<i>Symphytum tuberosum</i>	AM + NM	260, 261
<i>Tournefortia argentea</i>	AM	326
<i>Trichodesma zeylanicum</i>	AM	438
Rubiaceae		
<i>Asperula cynanchica</i>	AM	260, 261
<i>Borreria articularis</i>	AM	336
<i>Borreria pusilla</i>	AM	336
<i>Canthium parvifolium</i>	AM	422
<i>Cephalanthus occidentalis</i>	AM	140
<i>Chesalia curviflora</i>	AM	422, 655
<i>Coffea arabica</i>	AM	602
<i>cv. guatemala</i>		
<i>Coprosma ernodeoides</i>	AM	326
<i>Coprosma kauensis</i>	AM	326
<i>Coprosma perpusilla</i>	NM	342
<i>ssp. subantarctica</i>		
<i>Declieuxia fruticosa</i>	AM	149
<i>Duperrea pavettaefolia</i>	AM	655
<i>Galium album</i>	AM	194, 260, 261
<i>Galium antarcticum</i>	AM	560
<i>Galium aparine</i>	NM	207
	AM + NM	260, 261
<i>Galium boreale</i>	AM	260, 261

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Galium cruciata</i>	AM	260, 261
<i>Galium mollugo</i>	AM	456
	AM + NM	260, 261
<i>Galium odoratum</i>	AM + NM	260, 261
<i>Galium palustre</i>	AM + NM	260, 261
<i>Galium saxatile</i>	AM + NM	260, 261
<i>Galium sp.</i>	AM	140
<i>Galium uliginosum</i>	NM	260, 261
<i>Galium verum</i>	AM	260, 261
<i>Geophila herbacea</i>	AM	422, 655
<i>Hedyotis costata</i>	AM	422
<i>Hedyotis elatior</i>	AM	326
<i>Hedyotis foggiana</i>	AM	326
<i>Hedyotis terminalis</i>	AM	326
<i>Lasianthus hookeri</i>	AM	422
<i>Lasianthus sikkimensis</i>	AM	655
<i>Lasianthus verticillatus</i>	AM	655
<i>Metadina trichotoma</i>	AM	655
<i>Mitragina ciliata</i>	AM	445
<i>Morinda lucida</i>	AM	422
<i>Mycetia hirta</i>	AM	655
<i>Nauclea diederrichii</i>	AM	445
<i>Neonauclea tsaiana</i>	AM	655
<i>Nertera granadensis</i>	AM	326
<i>Oldenlandia aspera</i>	AM	336
<i>Ophiorrhiza austro-yunnanensis</i>	AM	422
<i>Paederia scandens</i>	AM	643
<i>Pausynistalia johimbe</i>	AM	445
<i>Prismatomeria tetrandra</i>	AM	422
<i>Psychotria calocarpa</i>	AM	655
<i>Psychotria henryi</i>	AM	422
<i>Psychotria siamica</i>	NM	655
<i>Psychotria sp.</i>	AM	326
<i>Randia ruglosa</i>	AM	315
<i>Relbunium hypocarpium</i>	AM	207
<i>Relbunium richardianum</i>	AM	207
<i>Rubia peregrina</i>	AM	368
	AM + ECM	472
	ECM	260, 261
<i>Sherardia arvensis</i>	AM	472
<i>Vangueria infausta</i>	AM	84, 85
<i>Vangueria infausta ssp. infausta</i>	AM	221
Gentianaceae		
<i>Blackstonia perfoliata</i>	AM	368, 472
	AM + NM	260, 261
<i>Centaurium erythraea</i>	AM	472, 260, 261
<i>Gentiana algida</i>	NM	594
<i>Gentiana nivalis</i>	AM + NM	260, 261
<i>Gentiana pneumonanthe</i>	AM + NM	260, 261

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Gentiana verna</i>	AM	561, 260, 261
<i>Gentianella amarella</i>	AM	260, 261
<i>Gentianella campestris</i>	AM	194, 260, 261
<i>Gentianella germanica</i>	AM	456, 260, 261
<i>Voyria aurantiaca</i>	Mycoheterotrophy (via AM)	79
<i>Voyria caerulea</i>	Mycoheterotrophy (via AM)	79
<i>Voyria corymbosa</i>	Mycoheterotrophy (via AM)	79
<i>Voyria obconica</i>	Mycoheterotrophy (via AM)	292
<i>Voyria rosea</i>	Mycoheterotrophy (via AM)	79
<i>Voyria tenuiflora</i>	Mycoheterotrophy (via AM)	79
<i>Voyriella parviflora</i>	Mycoheterotrophy (via AM)	79
Loganiaceae		
<i>Anthocleista schweinfurthii</i>	AM	445
<i>Buddleia asiatica</i>	AM	326
Apocynaceae		
<i>Adenium obesum</i>	AM	623
<i>Adenium somalense</i>	AM	623
<i>Allamanda cathartica var. schottii</i>	AM	623
<i>Allamanda violacea</i>	AM	623
<i>Alstonia boonei</i>	AM	445
<i>Alyxia oliviaeformis</i>	AM	326
<i>Amsonia tabernaemontana</i>	AM	623
<i>Apocynum cannabinum</i>	AM	623
<i>Apocynum medium</i>	AM	623
<i>Aspidosperma parvifolium</i>	NM	548
<i>Aspidosperma polyneuron</i>	NM	651
<i>Catharanthus roseus</i>	AM	623
<i>Dyera costulata</i>	NM	568
<i>Landolphia heudelottii</i>	NM	47
<i>Mandevilla sanderei</i>	AM	623
<i>Nerium oleander</i>	AM	623
<i>Pachypodium lamerei</i>	AM	623
<i>Picralima nitida</i>	AM	445
<i>Plumeria obtuse</i>	AM	623
<i>Plumeria rubra</i>	AM	623
<i>Rauwolfia serpentina</i>	AM	623
<i>Rauwolfia verticillata</i>	AM	623
<i>Saba senegalensis</i>	NM	47
<i>Stemmadenia donnell-smithii</i>	AM	244
<i>Strophanthus capensis</i>	AM	623
<i>Tabernaemontana australis</i>	AM	651
<i>Thevetia peruviana</i>	AM	623

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Trachelospermum jasminoides</i>	AM	623
<i>Vinca major</i>	AM	260, 261
<i>Vinca minor</i>	AM	623, 260, 261
Apocynaceae		
(Asclepiadoideae)		
<i>Asclepias incarnata</i>	AM	58, 140
<i>Calotropis gigantea</i>	AM	343
<i>Cynanchum nummularifolium</i>	AM	207
<i>Periploca graeca</i>	NM	368
<i>Stapelia glabricaulis</i>	AM	417
Oleaceae		
<i>Fraxinus excelsior</i>	AM	465, 622
	AM + ECM	260, 261
<i>Fraxinus ornus</i>	AM	368
<i>Fraxinus oxycarpa</i>	AM	368
<i>Fraxinus pennsylvanica</i>	AM	28
<i>Jasminum laurifolium</i>	AM	655
<i>Jasminum wangii</i>	AM	422
<i>Ligustrum vulgare</i>	AM	368, 260, 261
<i>Olea europaea</i>	AM	17, 101
<i>Olea europaea ssp. cuspidate</i>	AM	637, 638
<i>Olea europaea ssp. sylvestris</i>	AM	108, 368
<i>Olea europaea var. oleaster</i>	AM	472
<i>Phillyrea angustifolia</i>	AM	368, 472
<i>Phillyrea latifolia</i>	AM	368
Gesneriaceae		
<i>Corallodiscus flabellatus</i>	AM	343
<i>Cytrandra longifolia</i>	AM	326
Pedaliaceae		
<i>Sesamum indicum</i>	AM	612
Plantaginaceae		
<i>Callitriche hamulata</i>	AM	260, 261
<i>Littorella uniflora</i>	AM	62, 432, 260, 261
<i>Plantago coronopus</i>	AM	260, 261
<i>Plantago drummondii</i>	AM	438
<i>Plantago lanceolata</i>	AM	194, 307, 446, 456, 260, 261
<i>Plantago major</i>	AM	49, 368, 260, 261
<i>Plantago major ssp. intermedia</i>	AM	260, 261
<i>Plantago maritima</i>	AM	260, 261
<i>Plantago media</i>	AM	48, 194, 260, 261
<i>Plantago princeps</i>	AM	326
Bignoniaceae		
<i>Incarvillea arguta</i>	AM	343
<i>Jacaranda mimosaeifolia</i>	AM	548, 651

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Jacaranda puberula</i>	AM	651
<i>Oroxylum indicum</i>	AM	655
<i>Stenolobium stans</i>	AM	548
<i>Tabebuia chrysotricha</i>	AM	651
<i>Tabebuia roseo-alba</i>	AM	651
<i>Tecoma stans</i>	Weak AM	103
	AM	112
<i>Zeyheria tuberculosa</i>	NM	651
Verbenaceae		
<i>Aegiphila sellowiana</i>	AM	651
<i>Citharexylum myrianthum</i>	AM	651
<i>Clerodendron japonicum</i>	AM	422
<i>Lantana camara</i>	AM	326
<i>Lippia graveolens</i>	Weak AM	103
<i>Lippia nodiflora</i>	AM	143
<i>Tectona grandis</i>	AM	476
<i>Teucrium flavum</i>	AM	368
<i>Verbena hastata</i>	AM	140
<i>Verbena officinalis</i>	AM	260, 261
<i>Vitex agnus-castus</i>	AM	368
<i>Vitex montevidensis</i>	AM	651
<i>Vitex negundo</i>	AM	343
<i>Vitex rotundifolia</i>	AM	326
<i>Vitex vestita</i>	AM	655
Lamiaceae		
<i>Ajuga genevensis</i>	AM	260, 261
<i>Ajuga pyramidalis</i>	AM	194
<i>Ajuga reptans</i>	AM	260, 261
<i>Ballota nigra</i>	NM	260, 261
<i>Betonica officinalis</i>	AM	212
<i>Clinopodium gracile</i>	AM	643
<i>Clinopodium vulgare</i>	AM + NM	260, 261
<i>Colebrookea oppositifolia</i>	AM	655
<i>Coleus parviflorus</i>	AM	469
<i>Coleus × hybridus</i>	AM	322
<i>Collinsonia canadensis</i>	AM	140
<i>Elsholtzia blanda</i>	AM	422
<i>Elsholtzia cypriani</i>	AM	343
<i>Galeopsis segetum</i>	NM	260, 261
<i>Galeopsis tetrahit</i>	NM	260, 261
<i>Glechoma hederacea</i>	AM + NM	260, 261
<i>Gomphostemma microdon</i>	AM	655
<i>Hyptis lantiflora</i>	AM	112
<i>Lamiastrum galeobdolon</i>	AM + NM	260, 261
<i>Lamium album</i>	AM	260, 261
<i>Lamium amplexicaule</i>	AM	294, 260, 261
<i>Lamium purpureum</i>	AM	260, 261
<i>Lavandula augustifolia</i>	AM	348
<i>Lavandula officinalis</i>	AM	104
<i>Lavandula pedunculata</i>	AM	339
<i>Lavandula spica</i>	AM	39
<i>Leucas aspera</i>	AM	336
<i>Lycopus europaeus</i>	AM + NM	260, 261

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Melittis melissophyllum</i>	AM + NM	260, 261
<i>Mentha aquatica</i>	AM	368
	AM + NM	260, 261
<i>Mentha arvensis</i>	AM	248
	AM + NM	260, 261
<i>Mentha arvensis</i> <i>ssp. haplocalyx</i>	AM	1
<i>Mentha cardiaca</i>	AM	1
<i>Mentha citrata</i>	AM	1
<i>Mentha piperita</i>	AM	1
	AM + NM	260, 261
<i>Mentha pulegium</i>	AM	260, 261
<i>Mentha spicata</i>	AM	1
<i>Mentha viridis</i>	AM	1
<i>Nepeta cataria</i>	AM	260, 261
<i>Ocimum basilicum</i>	AM	105, 171, 343
<i>Origanum vulgare</i>	AM	260, 261
<i>Paraphlomis javanica</i>	AM	655
<i>Prunella vulgaris</i>	AM	194, 586
	AM + NM	260, 261
<i>Pycnanthemum tenuifolium</i>	AM	140, 599
<i>Pycnanthemum</i> <i>virginianum</i>	AM	140
<i>Rosmarinus officinalis</i>	AM	472
<i>Salvia azurea</i>	AM	633
<i>Salvia officinalis</i>	AM	105
<i>Salvia pratensis</i>	AM	260, 261
<i>Salvia splendens</i>	AM	322
<i>Salvia verbenaca</i>	AM	260, 261
<i>Scutellaria galericulata</i>	AM + NM	260, 261
<i>Stachys</i> × <i>ambigua</i>	AM	260, 261
<i>Stachys maritima</i>	AM	368
<i>Stachys officinalis</i>	AM	260, 261
<i>Stachys palustris</i>	AM	260, 261
<i>Stachys recta</i>	NM	368
<i>var. psammophila</i>		
<i>Stachys sylvatica</i>	AM + NM	260, 261
<i>Stenogyne purpurea</i>	AM	326
<i>Teucrium chamaedrys</i>	AM	260, 261
<i>Teucrium fruticans</i>	AM	348, 472
<i>Teucrium scordium</i>	AM	260, 261
<i>Teucrium scordonia</i>	AM	260, 261
<i>Thymus mastichina</i>	AM	339
<i>Thymus polytrichus</i>	AM	630
<i>ssp. britannicus</i>		
<i>Thymus pulegioides</i>	AM	456
<i>Thymus serpyllum</i>	AM	456, 260, 261
<i>Thymus vulgaris</i>	AM	105, 583
<i>Thymus zygis</i>	AM	339
Acanthaceae		
<i>Barleria cristata</i>	AM	343
<i>Carlowrightia californica</i>	AM	112

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Justicia procumbens</i> var. <i>leucantha</i>	AM	643
<i>Phlogacanthus curviflorus</i>	AM	655
<i>Pseudoranthemum</i> <i>palatiferum</i>	AM	422, 655
<i>Ruellia peninsularis</i>	AM	112
Scrophulariaceae		
<i>Antirrhinum majus</i>	AM	74
<i>Bartsia alpina</i>	AM + NM	260, 261
<i>Buddleja davidii</i>	NM	260, 261
<i>Calceolaria crenatiflora</i>	AM	207
<i>Calceolaria polyrrhiza</i>	AM	207
<i>Castilleja arvensis</i>	NM	326
<i>Chaenorhinum minus</i>	NM	260, 261
<i>Cymbalaria muralis</i>	AM	260, 261
<i>Digitalis purpurea</i>	AM + NM	260, 261
<i>Eremophila longifolia</i>	Weak AM	438
<i>Eremophila macdonnellii</i>	Weak AM	438
<i>Euphrasia minima</i>	NM	260, 261
<i>Euphrasia officinalis</i> s. l.	NM	260, 261
<i>Euphrasia stricta</i>	NM	456
<i>Kickxia spuria</i>	AM	260, 261
<i>Lamourouxia rhinanthifolia</i>	NM	103
<i>Linaria repens</i>	AM + NM	260, 261
<i>Linaria supina</i>	AM + NM	260, 261
<i>Linaria vulgaris</i>	AM + NM	260, 261
<i>Melampyrum arvense</i>	NM	260, 261
<i>Melampyrum cristatum</i>	NM	260, 261
<i>Melampyrum pretense</i>	NM	194
	AM + NM	260, 261
<i>Melampyrum sylvaticum</i>	NM	194, 260, 261
<i>Mimulus guttatus</i>	NM	62
	AM	95
<i>Mimulus ringens</i>	AM	140
<i>Odontites lutea</i>	AM	368
<i>Odontites verna</i>	NM	260, 261
<i>Pedicularis capitata</i>	NM	594
<i>Pedicularis kanei</i>	NM	594
<i>Pedicularis langsdoerffii</i>	NM	594
<i>Pedicularis palustris</i>	NM	260, 261
<i>Pedicularis sylvatica</i>	NM	260, 261
<i>Pedicularis verticillata</i>	NM	594
<i>Penstemon cardwellii</i>	Facultative AM	585
<i>Penstemon frutescens</i>	Facultative AM	587
<i>Plantago asiatica</i>	AM	643
<i>Rhinanthus angustifolius</i>	AM	456
	NM	260, 261
<i>Rhinanthus minor</i>	Weak AM	194
<i>Scrophularia auriculata</i>	AM	260, 261
<i>Scrophularia nodosa</i>	AM + NM	260, 261
<i>Scrophularia umbrosa</i>	NM	260, 261
<i>Scrophularia vernalis</i>	NM	260, 261

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Verbascum lychnitis</i>	AM	260, 261
<i>Verbascum nigrum</i>	AM	260, 261
<i>Verbascum thapsus</i>	AM	207, 260, 261
<i>Veronica agrestis</i>	AM + NM	260, 261
<i>Veronica alpina</i>	AM	260, 261
<i>Veronica</i> <i>anagallis-aquatica</i>	Facultative AM	62
<i>Veronica arvensis</i>	AM	260, 261
<i>Veronica beccabunga</i>	AM	643, 260, 261
<i>Veronica chamaedrys</i>	NM	62, 260, 261
	AM + NM	194, 456
<i>Veronica filiformis</i>	AM	260, 261
<i>Veronica fruticans</i>	AM	260, 261
<i>Veronica officinalis</i>	AM	194
	AM + NM	260, 261
<i>Veronica peregrina</i>	AM	260, 261
<i>Veronica persica</i>	AM	260, 261
<i>Veronica serpyllifolia</i>	AM	643, 260, 261
<i>Veronica spicata</i>	AM	194, 260, 261
<i>Veronica spicata</i>	AM	260, 261
Lentibulariaceae		
<i>Pinguicula alpina</i>	NM	260, 261
<i>Pinguicula vulgaris</i>	NM	260, 261
Convolvulaceae		
<i>Calystegia sepium</i>	AM	260, 261
<i>Calystegia soldanella</i>	NM	368
<i>Convolvulus arvensis</i>	AM	260, 261
<i>Convolvulus elegantissimus</i>	AM	472
<i>Convolvulus eyreanus</i>	AM	438
<i>Ipomoea arborescens</i>	Weak AM	103
<i>Ipomoea batatas</i>	AM	455
<i>Ipomoea imperati</i>	AM	326
<i>Ipomoea pes-caprae</i>	AM	64, 65, 144, 326, 336
<i>Ipomoea stolonifera</i>	Weak AM	143
<i>Jacquemontia ovalifolia</i>	AM	326
<i>Jacquemontia reclinata</i>	AM	202
Solanaceae		
<i>Atropa belladonna</i>	AM	260, 261
<i>Capsicum annuum</i>	AM	50
<i>Cestrum intermedium</i>	AM	651
<i>Datura metal</i>	AM	216
<i>Datura stramonium</i>	AM	343
<i>Lycium barbarum</i>	AM	260, 261
<i>Lycium fremontii</i>	AM	112
<i>Lycium sandwicense</i>	AM	326
<i>Lycopersicon esculentum</i>	AM	407
<i>Nicotiana velutina</i>	AM	438
<i>Petunia × hybrida</i>	AM	322
<i>Solanum argenteum</i>	AM	651
<i>Solanum dulcamara</i>	NM	62
	AM	260, 261
<i>Solanum elipticum</i>	AM	438
<i>Solanum khasianum</i>	AM	343

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Solanum hindsianum</i>	AM	112
<i>Solanum nigrum</i>	AM + NM	260, 261
<i>Solanum surattense</i>	AM	567
<i>Solanum torvum</i>	NM	422
<i>Solanum tuberosum</i>	AM	386
Aquifoliaceae		
<i>Ilex aquifolium</i>	AM + ECM	260, 261
<i>Ilex paraguariensis</i>	AM	31
<i>Ilex verticallata</i>	AM	140
Araliaceae		
<i>Didymopanax</i> <i>angustissimum</i>	AM	31
<i>Hedera helix</i>	AM	368, 472, 260, 261
<i>Macropanax dispermus</i>	AM	655
<i>Panax ginseng</i>	AM	178
<i>Panax quinquefolius</i>	AM	390
<i>Pseudopanax laetevirens</i>	AM	207
<i>Stilbocarpa polaris</i>	NM	342
<i>Trevesia palmata</i>	NM	422
<i>Trevesia palmata</i> <i>var. costata</i>	NM	655
Pittosporaceae		
<i>Pittosporum gayanum</i>	AM	326
Apiaceae		
<i>Actinotis helianthi</i>	AM	67
<i>Aegopodium podagraria</i>	AM + NM	260, 261
<i>Aethusa cynapium</i>	AM	260, 261
<i>Angelica archangelica</i>	AM	260, 261
<i>Angelica sylvestris</i>	AM	260, 261
<i>Anthriscus sylvestris</i>	NM	260, 261
<i>Apium graveolens</i>	AM	490, 260, 261
<i>Apium nodiflorum</i>	NM	260, 261
<i>Astrantia major</i>	AM + NM	260, 261
<i>Azorella macquariensis</i>	AM	342
<i>Berula erecta</i>	Facultative AM	62
	NM	260, 261
<i>Bupleurum baldense</i>	AM	472
<i>Bupleurum falcatum</i>	AM	260, 261
<i>Carum carvi</i>	AM	194, 260, 261
<i>Chaerophyllum temulentum</i>	AM + NM	260, 261
<i>Conium maculatum</i>	AM	260, 261
<i>Conopodium majus</i>	AM	260, 261
<i>Coriandrum sativum</i>	AM	220
<i>Daucus carota</i>	AM	171
	AM + NM	260, 261
<i>Echinophora spinosa</i>	AM	368
<i>Eryngium campestre</i>	AM	260, 261
<i>Eryngium maritimum</i>	AM	368
	AM + NM	260, 261
<i>Eryngium paniculatum</i>	AM	207
<i>Foeniculum vulgare</i>	AM	305
<i>Heracleum sphondylium</i>	AM + NM	260, 261

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Hydrocotyle bonariensis</i>	AM	143
<i>Hydrocotyle novae-zeelandiae</i>	AM	342
<i>Hydrocotyle vulgaris</i>	AM	368
	AM + NM	260, 261
<i>Myrrhis odorata</i>	AM	260, 261
<i>Oenanthe aquatica</i>	NM	260, 261
<i>Oenanthe crocata</i>	NM	260, 261
<i>Osmorhiza chilensis</i>	AM	207
<i>Pastinaca sativa</i>	AM	307, 260, 261
<i>Petroselinum crispum</i>	AM	171
	NM	260, 261
<i>Peucedanum ostruthium</i>	AM	260, 261
<i>Peucedanum palustre</i>	AM	260, 261
<i>Pimpinella major</i>	AM + NM	260, 261
<i>Pimpinella saxifraga</i>	AM	194, 456
	AM + NM	260, 261
<i>Platysace linearifolia</i>	ECM	67
<i>Sanicula europaea</i>	AM	260, 261
<i>Scandix pecten-veneris</i>	AM	260, 261
<i>Seseli libanotis</i>	AM	260, 261
<i>Seseli tortuosum</i>	AM	368
<i>Silaum silaus</i>	AM	260, 261
<i>Sium latifolium</i>	NM	260, 261
<i>Trachymene glaucifolia</i>	AM	438
Campanulaceae		
<i>Brighamia insignis</i>	AM	326
<i>Campanula glomerata</i>	AM	260, 261
<i>Campanula lasiocarpa</i>	AM	587
<i>Campanula patula</i>	AM	260, 261
<i>Campanula persicifolia</i>	AM	194
	AM + NM	260, 261
<i>Campanula punctata</i>	AM	636
<i>ssp. hondoensis</i>		
<i>Campanula rapunculoides</i>	AM	260, 261
<i>Campanula rotundifolia</i>	AM	194, 437, 456, 260, 261
<i>Campanula trachelium</i>	NM	260, 261
<i>Clermontia fauriei</i>	AM	326
<i>Cyanea leptostegia</i>	AM	326
<i>Downingia elegans</i>	AM	293
<i>Jasione montana</i>	AM + NM	260, 261
<i>Lobelia cardinalis</i>	AM	140
<i>Lobelia dortmanna</i>	AM	62, 432, 260, 261
<i>Lobelia sp.</i>	AM + ECM	656
<i>Lobelia yuccoides</i>	AM	326
<i>Phyteuma orbiculare</i>	AM	260, 261
<i>Phyteuma spicatum</i>	AM + NM	260, 261
<i>Pratia nummularia</i>	AM	422
<i>Trematolobelia kauaiensis</i>	AM	326
Menyanthaceae		
<i>Menyanthes trifoliata</i>	NM	260, 261

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Nymphoides peltata</i>	NM	260, 261
Goodeniaceae		
<i>Calogyne sp.</i>	AM + ECM	656
<i>Dampiera stricta</i>	AM + ECM	67
<i>Goodenia cycloptera</i>	AM	438
<i>Goodenia lunata</i>	AM	438
<i>Goodenia sp.</i>	AM + ECM	656
<i>Scaevola chamissoniana</i>	AM	326
<i>Scaevola gaudichaudii</i>	AM	326
<i>Scaevola parvibarbata</i>	AM	438
<i>Scaevola procera</i>	AM	326
<i>Scaevola sericea</i>	AM	326
Asteraceae		
<i>Achillea millefolium</i>	AM	194
	AM + NM	260, 261
<i>Achillea ptarmica</i>	AM	194
	NM	260, 261
<i>Ageratina espinosarum</i>	Weak AM	103
<i>Ageratum conyzoides</i>	AM	336, 422
<i>Ambrosia artemisifolia</i>	AM	143
<i>Anaphalis margaritacea</i>	Facultative AM	585
	AM	260, 261
<i>Angianthus sp.</i>	AM + ECM	656
<i>Antennaria dioica</i>	AM	194, 260, 261
<i>Anthemis arvensis</i>	AM	260, 261
<i>Anthemis tinctoria</i>	AM	260, 261
<i>Arctium lappa</i>	AM + NM	260, 261
<i>Arctium minus s. l.</i>	AM	260, 261
<i>Arnica angustifolia</i>	AM	443
<i>Arnica montana</i>	AM	194, 269
<i>Artemisia absinthium</i>	NM	260, 261
<i>Artemisia californica</i>	AM	646
<i>Artemisia campestris</i>	AM	260, 261
<i>Artemisia codonocephala</i>	AM	343
<i>Artemisia dracunculus</i>	AM	105
<i>Artemisia ludoviciana</i>	AM	633
<i>Artemisia maritima</i>	AM + NM	260, 261
<i>Artemisia princeps</i>	AM	643
<i>Artemisia tridentata</i>	AM	183
<i>Artemisia tridentata</i>	AM	552
<i>ssp. wyomingensis</i>		
<i>Artemisia vulgaris</i>	AM	307, 260, 261
<i>Aster novi belgii</i>	AM	260, 261
<i>Aster sericeus</i>	AM	633
<i>Aster subulatus</i>	AM	326
<i>Aster tripolium</i>	AM	113, 518, 260, 261
<i>Baccharis racemosa</i>	AM	207
<i>Balduina angustifolia</i>	AM	30
<i>Bebbia juncea</i>	AM	112
<i>Bellis perennis</i>	AM + NM	260, 261
<i>Berkheya coddii</i>	AM	597

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Bidens asymmetrica</i> × <i>sandwicensis</i>	AM	227
<i>Bidens bipinnata</i>	AM	422
<i>Bidens cosmoides</i>	AM	326
<i>Bidens frondosa</i>	AM	140, 368
<i>Bidens pilosa</i>	AM	143, 343, 422
<i>Bidens sandwicensis</i>	AM	227, 326
<i>Bidens tripartita</i>	AM	140
	AM + NM	260, 261
<i>Blainvillea acmella</i>	AM	343
<i>Calendula officinalis</i>	AM	260, 261
<i>Callistephus chinensis</i>	AM	428
<i>Carduus acanthoides</i>	AM	307, 260, 261
<i>Carlina vulgaris</i>	AM	456, 260, 261
<i>Carthamus tinctorius</i>	AM	94
<i>Centaurea cyanus</i>	AM	260, 261
<i>Centaurea jacea</i>	AM	194, 260, 261
<i>Centaurea maculosa</i>	AM	109, 371
<i>Centaurea nigra</i>	AM	260, 261
<i>Centaurea pratensis</i>	AM	260, 261
<i>Centaurea scabiosa</i>	AM	260, 261
<i>Centaurea subciliata</i>	AM	368
<i>Chrysanthemum morifolium</i>	AM	551
<i>Chrysanthemum segetum</i>	AM	260, 261
<i>Cicerbita alpina</i>	AM + NM	260, 261
<i>Cichorium intybus</i>	AM	260, 261
<i>Cirsium acaule</i>	AM	260, 261
<i>Cirsium arvense</i>	AM	307, 260, 261
<i>Cirsium helenioides</i>	AM	260, 261
<i>Cirsium oleraceum</i>	AM	260, 261
<i>Cirsium palustre</i>	AM + NM	260, 261
<i>Cirsium purpuratum</i>	AM	636
<i>Cirsium setosum</i>	AM	620
<i>Cirsium vulgare</i>	AM	626
	AM + NM	260, 261
<i>Conyza blinii</i>	AM	343
<i>Conyza canadensis</i>	AM	326, 343
<i>Cotula plumose</i>	NM	342, 560
<i>Crassocephalum crepidioides</i>	AM	422
<i>Crepis biennis</i>	AM	260, 261
<i>Crepis capillaris</i>	AM	260, 261
<i>Crepis paludosa</i>	AM + NM	260, 261
<i>Crepis praemorsa</i>	AM	194
<i>Crepis setosa</i>	AM	207
<i>Cynara cardunculus</i>	AM	369
<i>Dittrichia viscosa</i>	AM	497
<i>Dubautia ciliolata</i>	AM	326
<i>Dubautia knudseni</i>	AM	326
<i>Dubautia plantaginea</i>	AM	326
<i>Dubautia scabra</i>	AM	326
<i>Eclipta alba</i>	AM	577

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Emilia sonchifolia</i>	AM	326, 336
<i>Erechtites hieracifolia</i>	AM	326
<i>Ericameria diffusa</i>	AM	112
<i>Erigeron acer</i>	NM	260, 261
<i>Erigeron annuus</i>	AM	643
<i>Erigeron bonariensis</i>	AM	643
<i>Erigeron borealis</i>	AM	260, 261
<i>Erigeron canadensis</i>	AM	294
	AM + NM	260, 261
<i>Eriophyllum lanatum</i>	AM	293
<i>Eupatorium cannabinum</i>	AM	260, 261
<i>Eupatorium coelesticum</i>	AM	422
<i>Eupatorium maculatum</i>	AM	140
<i>Eupatorium odoratum</i>	AM	422
<i>Eupatorium perfoliatum</i>	AM	140
<i>Eupatorium serotinum</i>	AM	599
<i>Filaginella uliginosa</i>	AM	194
<i>Florestina tripteris</i>	AM	143
<i>Flourensia cernua</i>	AM	137
<i>Galinsoga ciliata</i>	AM	260, 261
<i>Galinsoga parviflora</i>	AM	260, 261
<i>Galinsoga supinum</i>	AM	260, 261
<i>Galinsoga sylvaticum</i>	AM	260, 261
<i>Galinsoga uliginosum</i>	AM	260, 261
<i>Gnaphalium norvegicum</i>	AM	502, 503, 260, 261
<i>Gnephosis eriocarpa</i>	Weak AM	438
<i>Gutierrezia sarothrae</i>	AM	492, 493
<i>Gymnosperma glutinosum</i>	Weak AM	103
<i>Haplopappus venetus</i>	AM	543
<i>Helianthus annuus</i>	AM	121, 260, 261
<i>Helianthus niveus</i>	AM	543
<i>Helichrysum italicum</i>	AM	368
<i>Helichrysum sp.</i>	AM + ECM	656
<i>Helichrysum stoechas</i>	AM	368
<i>Helipterum sp.</i>	AM + ECM	656
<i>Hieracium albiflorum</i>	Facultative AM	585
<i>Hieracium alpinum</i>	AM	260, 261
<i>Hieracium bifidum</i>	AM	260, 261
<i>Hieracium lachenalii</i>	AM	260, 261
<i>Hieracium lactucella</i>	AM	194
<i>Hieracium laevigatum</i>	AM + NM	260, 261
<i>Hieracium murorum</i>	AM + NM	260, 261
<i>Hieracium pilosella</i>	AM	270, 456, 260, 261
<i>Hieracium sagittatum</i>	AM	260, 261
<i>Hieracium subaundum</i>	AM	260, 261
<i>Hieracium umbellatum</i>	AM	194, 260, 261
<i>Hieracium vulgatum</i>	AM + NM	260, 261
<i>Homogyne alpina</i>	AM + ECM	260, 261
<i>Hypochoeris radicata</i>	Facultative AM	584, 585, 260, 261
<i>Hypochoeris achyrophorus</i>	AM	472

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Inula conyza</i>	AM	260, 261
<i>Inula salicina</i>	AM	260, 261
<i>Ixeris denticulate</i>	AM	129
<i>Jaumea carnosa</i>	AM	90
<i>Lactuca hirsuta</i>	AM	140
<i>Lactuca sativa</i>	AM	40, 171, 500
<i>Laggera pterodonta</i>	AM	343
<i>Lapsana communis</i>	AM	260, 261
<i>Launaea sarmentosa</i>	AM	336
<i>Leontodon autumnalis</i>	AM	194, 260, 261
<i>Leontodon hispidus</i>	AM	260, 261
<i>Leontodon hispidus</i> <i>ssp. danubialis</i>	AM	456
<i>Leontodon hispidus</i> <i>ssp. hispidus</i>	AM	456
<i>Leucanthemum vulgare</i>	AM	194, 260, 261
<i>Leuceria achillaeifolia</i>	NM	207
<i>Liatris tenuifolia</i> <i>var. laevigata</i>	Weak AM	30
<i>Lipochaeta connata</i>	AM	326
<i>Matricaria maritima</i> <i>ssp. inodora</i>	AM	307
<i>Matricaria matricarioides</i>	AM	260, 261
<i>Matricaria recutita</i>	AM + NM	260, 261
<i>Microseris laciniata</i>	AM	293
<i>Mutisia decurrens</i>	AM	207
<i>Mutisia spinosa</i>	AM	207
<i>Mycelis muralis</i>	AM + ECM + NM	260, 261
<i>Omalothea norvegica</i>	AM	194
<i>Onopordum acanthium</i>	AM + NM	260, 261
<i>Otanthus maritimus</i>	AM	368
<i>Othonna gregorii</i>	AM + NM	438
<i>Palafoxia lindenii</i>	AM	144
<i>Parthenium argentatum</i>	AM	461
<i>Parthenium hysterophorus</i>	AM	343
<i>Pectis saturejoides</i>	AM	143
<i>Petasites albus</i>	AM + NM	260, 261
<i>Petasites frigidus</i>	NM	594
<i>Petasites hybridus</i>	AM + NM	260, 261
<i>Phagnalon rupestre</i>	AM	472
<i>Picris echioides</i>	AM	260, 261
<i>Picris hieracioides</i>	AM	260, 261
<i>Piptocarpha axillaris</i>	AM	651
<i>Pityopsis graminifolia</i>	Weak AM	30
<i>Pleurophyllum hookeri</i>	AM	342
<i>Podolepis sp.</i>	AM + ECM	656
<i>Polycalymma stuartii</i>	AM	438
<i>Porophyllum numularium</i>	AM	143
<i>Pulicaria angustifolia</i>	AM	567
<i>Pulicaria dysenterica</i>	AM	260, 261
<i>Remya kauaiensis</i>	AM	326
<i>Rhodanthe floribunda</i>	AM	438
<i>Rhodanthe moschata</i>	AM	438

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Sagittaria latifolia</i>	AM	58, 626
<i>Sanvitalia procumbens</i>	AM	260, 261
<i>Saussurea alpina</i>	AM	260, 261
<i>Scorzonera humilis</i>	AM	194
<i>Senecio articulatus</i>	AM	417
<i>Senecio bicolor</i>	AM	368, 260, 261
<i>Senecio bracteolatus</i>	AM	207
<i>Senecio erucifolius</i>	AM	260, 261
<i>Senecio jacobaea</i>	AM + NM	260, 261
<i>Senecio pendulus</i>	AM	417
<i>Senecio praecox</i>	AM	208
	NM	103
<i>Senecio squalidus</i>	AM	260, 261
<i>Senecio sylvaticus</i>	AM + NM	260, 261
<i>Senecio viscosus</i>	AM	307, 260, 261
<i>Senecio vulgaris</i>	AM	625
	AM + NM	260, 261
<i>Serratula tinctoria</i>	AM	212, 260, 261
<i>Siegesbeckia orientalis</i>	AM	343
<i>Solidago altissima</i>	AM	643
<i>Solidago canadensis</i>	AM	298, 626
<i>Solidago chilensis</i>	AM	207
<i>Solidago gigantea</i>	AM	140
<i>Solidago graminifolia</i>	AM	140
<i>Solidago litoralis</i>	AM	368
<i>Solidago sp.</i>	AM	58
<i>Solidago virgaurea</i>	AM	194, 260, 261
<i>Sonchus arvensis</i>	AM	302
	AM + NM	260, 261
<i>Sonchus asper</i>	AM + NM	260, 261
<i>Sonchus oleraceus</i>	AM	343, 643, 260, 261
<i>Spilanthes callimorpha</i>	AM	422
<i>Synedrella nudiflora</i>	AM	422
<i>Tagetes erecta</i>	AM	2, 102, 350
<i>Tagetes patula</i>	AM	322, 350, 554
<i>Tagetes tenuifolia</i>	AM	350
<i>Tanacetum parthenium</i>	NM	260, 261
<i>Tanacetum vulgare</i>	AM + NM	260, 261
<i>Taraxacum japonicum</i>	AM	643
<i>Taraxacum officinale</i>	AM	307
<i>Tithonia diversifolia</i>	AM	422, 539
<i>Tragopogon pratensis</i>	AM	260, 261
<i>Tridax procumbens</i>	AM	336
<i>Tripleurospermum</i> <i>inodorum</i>	AM	260, 261
<i>Tripleurospermum</i> <i>maritimum</i>	AM	260, 261
<i>Tussilago farfara</i>	AM	307
	AM + NM	260, 261
<i>Verbesina encelioides</i>	AM	326
<i>Vernonia noveboracensis</i>	AM	140
<i>Viguiera eriophora</i>	AM	103

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Waitzia sp.</i>	AM + ECM	656
<i>Wedelia trilobata</i>	AM	326
<i>Wilkesia gymnoxiphium</i>	AM	326
<i>Xanthium sibiricum</i>	AM	343
<i>Xanthocephalum microcephala</i>	AM	137
<i>Zinnia acerosa</i>	AM	137
<i>Zinnia elegans</i>	AM	2, 343
Adoxaceae		
<i>Adoxa moschatellina</i>	NM	260, 261
Caprifoliaceae		
<i>Carlemania tetragona</i>	AM	655
<i>Linnaea borealis</i>	AM	260, 261
<i>Lonicera caprifolium</i>	AM	260, 261
<i>Lonicera implexa</i>	AM	368
<i>Lonicera periclymenum</i>	AM	260, 261
<i>Lonicera xylosteum</i>	AM + NM	260, 261
<i>Sambucus nigra</i>	AM + NM	260, 261
<i>Sambucus racemosa</i>	AM + ECM+NM	260, 261
<i>Symphoricarpos rivularis</i>	AM + NM	260, 261
<i>Viburnum lantana</i>	AM	260, 261
<i>Viburnum lentago</i>	AM	140
<i>Viburnum opulus</i>	AM	260, 261
<i>Viburnum tinus</i>	AM	368
Dipsacaceae		
<i>Dipsacus fullonum</i>	AM + NM	260, 261
<i>Knautia arvensis</i>	AM	194, 260, 261
<i>Pycnocomon rutifolium</i>	AM	368
<i>Scabiosa columbaria</i>	AM	260, 261
<i>Scabiosa ochroleuca</i>	AM	456
<i>Succisa pratensis</i>	AM	194, 260, 261
Valerianaceae		
<i>Centranthus ruber</i>	NM	260, 261
<i>Valeriana dioica</i>	NM	260, 261
<i>Valeriana laxiflorac</i>	AM	207
<i>Valeriana officinalis</i>	AM + NM	260, 261
Hamamelidaceae		
<i>Liquidambar styraciflua</i>	AM	139
Crassulaceae		
<i>Aeonium decorum</i>	AM	417
<i>Crassula aquatica</i>	NM	260, 261
<i>Crassula moschata</i>	NM	342, 560
<i>Crassula phyturus</i>	AM	417
<i>Crassula rupestris</i>	AM	417
<i>Echeveria sedoides</i>	NM	417
<i>Kalanchoe daigremontana</i>	AM	417
<i>Sedum acre</i>	AM + NM	260, 261
<i>Sedum adolfii</i>	AM	417
<i>Sedum album</i>	NM	260, 261
<i>Sedum dasyphyllum</i>	NM	260, 261
<i>Sedum forsteranum</i>	NM	260, 261
<i>Sedum reflexum</i>	NM	260, 261
<i>Sedum rosea</i>	AM + NM	260, 261

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Sedum telephium</i>	NM	260, 261
<i>Sempervivum tectorum</i>	M(endo) + NM	260, 261
Haloragaceae		
<i>Myriophyllum alterniflorum</i>	NM	260, 261
<i>Proserpinaca palustris</i>	AM	140
Grossulariaceae		
<i>Ribes alpinum</i>	AM + ECM + NM	260, 261
<i>Ribes magellanicum</i>	AM	207
<i>Ribes nigrum</i>	AM	260, 261
<i>Ribes rubrum</i>	AM	260, 261
<i>Ribes uva-crispa</i>	AM	260, 261
Saxifragaceae		
<i>Chrysosplenium alternifolium</i>	AM + NM	260, 261
<i>Chrysosplenium oppositifolium</i>	NM	260, 261
<i>Saxifraga aizoides</i>	AM + NM	260, 261
<i>Saxifraga granulata</i>	AM	194
	AM + NM	260, 261
<i>Saxifraga hieracifolia</i>	NM	594
<i>Saxifraga hirculus</i>	NM	594
<i>Saxifraga oppositifolia</i>	AM + NM	260, 261
<i>Saxifraga stellaris</i>	NM	260, 261
Vitaceae		
<i>Cayratia japonica</i>	AM	643
<i>Leea compactiflora</i>	AM	655
<i>Leea indica</i>	AM	655
<i>Leea marcophylla</i>	AM	655
<i>Vitis vinifera</i>	AM	306, 517
Geraniaceae		
<i>Erodium cicutarium</i>	AM + NM	260, 261
<i>Erodium crinitum</i>	AM	438
<i>Geranium carolinianum</i>	AM	643
<i>Geranium dissectum</i>	AM	260, 261
<i>Geranium lucidum</i>	AM + NM	260, 261
<i>Geranium molle</i>	AM + NM	260, 261
<i>Geranium nodosum</i>	AM	260, 261
<i>Geranium pratense</i>	AM	260, 261
<i>Geranium robertianum</i>	AM	262, 472
	AM + NM	260, 261
<i>Geranium sanguineum</i>	NM	260, 261
<i>Geranium sessiliflorum</i>	AM	207
<i>Geranium sylvaticum</i>	AM	194, 260, 261
<i>Pelargonium hortorum</i>	AM	435
Combretaceae		
<i>Terminalia catappa</i>	AM	326
<i>Terminalia superba</i>	AM	445
Onagraceae		
<i>Camissonia californica</i>	AM	543
<i>Chamerion angustifolium</i>	AM + NM	260, 261
<i>Circaea alpina</i>	AM	260, 261
<i>Circaea lutetiana</i>	AM	260, 261

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Epilobium alsinifolium</i>	AM + NM	260, 261
<i>Epilobium anagallidifolium</i>	AM	260, 261
<i>Epilobium angustifolium</i>	Facultative AM	585
<i>Epilobium brunnescens</i> <i>ssp. brunnescens</i>	NM	342
<i>Epilobium ciliatum</i>	AM	260, 261
<i>Epilobium coloratum</i>	AM	140
<i>Epilobium hirsutum</i>	Facultative AM	62
	AM	260, 261
<i>Epilobium lanceolatum</i>	AM	260, 261
<i>Epilobium montanum</i>	AM + NM	260, 261
<i>Epilobium obscurum</i>	AM	260, 261
<i>Epilobium palustre</i>	AM	260, 261
<i>Epilobium parviflorum</i>	AM	260, 261
<i>Epilobium pendunculare</i>	AM	342
<i>Epilobium roseum</i>	AM	260, 261
<i>Epilobium tetragonum</i>	AM	260, 261
<i>Ludwigia palustris</i>	AM	140
<i>Ludwigia prostrata</i>	AM	422
<i>Oenothera biennis</i>	AM	260, 261
<i>Oenothera erythrosepala</i>	AM	260, 261
Lythraceae		
<i>Cuphea carthagenensis</i>	AM	326
<i>Lafoensia pacari</i>	AM	651
<i>Lythrum alatum</i>	AM	599
<i>Lythrum hyssopifolia</i>	NM	260, 261
<i>Lythrum maritimum</i>	AM	326
<i>Lythrum salicaria</i>	AM	140, 462, 558, 629
	AM + NM	260, 261
Myrtaceae		
<i>Acca sellowiana</i>	AM	31
<i>Acmena resa</i>	AM	222
<i>Angophora hispida</i>	ECM	67
<i>Baeckea ramosissima</i>	ECM	67
<i>Campomanesia</i> <i>xanthocarpa</i>	AM	651
<i>Eucalyptus bosistoana</i>	AM	5
<i>Eucalyptus camaldulensis</i>	AM + ECM	179
<i>Eucalyptus citriodora</i>	AM	343
	AM + ECM	179
<i>Eucalyptus cloeziana</i>	AM + ECM	179
<i>Eucalyptus delegatensis</i>	AM	5
<i>Eucalyptus dives</i>	AM	5
<i>Eucalyptus dumosa</i>	Weak AM	5
<i>Eucalyptus dunnii</i>	AM + ECM	442
<i>Eucalyptus globoidea</i>	ECM	133
<i>Eucalyptus globulus</i>	AM	5
	ECM	359
<i>Eucalyptus globulus</i> <i>ssp. bicostata</i>	ECM	12
<i>Eucalyptus gomphocephala</i>	AM	5

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Eucalyptus grandis</i>	AM + ECM	179
	ECM	96
<i>Eucalyptus haemostoma</i>	ECM	67
<i>Eucalyptus largiflorens</i>	AM	5
<i>Eucalyptus macarthurii</i>	AM	5
<i>Eucalyptus marginata</i>	ECM	365
<i>Eucalyptus microcorys</i>	ECM	120
<i>Eucalyptus racemosa</i>	ECM	67
<i>Eucalyptus regnans</i>	ECM	341
<i>Eucalyptus sieberi</i>	ECM	133
<i>Eucalyptus stricta</i>	ECM	67
<i>Eucalyptus torelliana</i>	ECM	120
<i>Eucalyptus urophylla</i>	AM	5
	AM + ECM	179
<i>Eucalyptus viminalis</i>	AM	5
	AM + ECM	66
<i>Eucalyptus viridis</i>	AM	5
<i>Eugenia uniflora</i>	AM	651
<i>Gomidesia spectabilis</i>	AM	31
<i>Kunzea capitata</i>	ECM	67
<i>Leptospermum flavescens</i>	ECM	67
<i>Leptospermum lanigerum</i>	ECM	67
<i>Luma apiculata</i>	AM	207
<i>Melaleuca quinquenervia</i>	AM + ECM	316
<i>Metrosideros polymorpha</i>	AM	326
<i>Myrtus communis</i>	AM	368, 382, 472
<i>Plinia rivularis</i>	Weak AM	651
<i>Psidium cattleianum</i>	AM	326
<i>Psidium guajava</i>	AM	31, 198, 337
<i>Rhodomyrtus tomentosa</i>	AM	326
<i>Syzygium firmum</i>	AM	215
<i>Syzygium guineense</i>	AM	637, 638
<i>Syzygium jambolanum</i>	AM	548
<i>Syzygium latilimbium</i>	AM	422
<i>Syzygium makul</i>	AM	215
<i>Syzygium operculatum</i>	AM	215
<i>Syzygium rubicundum</i>	AM	215
<i>Tristaniopsis whiteana</i>	NM	568
Melastomataceae		
<i>Clidemia hirta</i>	AM	326
<i>Graffenrieda emarginata</i>	AM + ECM	266
<i>Leandra dasytricha</i>	AM	31
<i>Melastoma affine</i>	NM	422
<i>Melastoma melabathricum</i>	AM	568
Krameriaceae		
<i>Krameria paucifolia</i>	AM	112
Zygophyllaceae		
<i>Balanites aegyptiaca</i>	AM	47
<i>Fagonia cretica</i>	AM	567
<i>Larrea tridentata</i>	AM	112, 137
<i>Morkillia mexicana</i>	Weak AM	103
<i>Tribulus cistoides</i>	NM	326
<i>Tribulus terrester</i>	AM	343

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Viscainoa geniculata</i>	AM	112
<i>Zygophyllum dumosum</i>	AM	268
<i>Zygophyllum howittii</i>	NM	438
Parnassiaceae		
<i>Parnassia palustris</i>	AM + NM	260, 261
Celastraceae		
<i>Euonymus europaeus</i>	AM	260, 261
<i>Maytenus boaria</i>	AM	207
<i>Maytenus chubutensis</i>	AM	207
<i>Maytenus magellanica</i>	AM	207
<i>Maytenus phyllantoides</i>	AM	112
Humiriaceae		
<i>Sacoglottis gabonensis</i>	AM	445
Pandaceae		
<i>Panda oleosa</i>	AM	445
Rhizophoraceae		
<i>Combretocapus rotundatus</i>	NM	568
<i>Poga oleosa</i>	AM	445
Linaceae		
<i>Linum bienne</i>	AM	472
<i>Linum catharticum</i>	AM	456
	AM + NM	260, 261
<i>Linum perenne</i>	NM	260, 261
<i>ssp. anglicum</i>		
<i>Linum strictum</i>	AM	472
<i>Linum trigynum</i>	AM	472
<i>Linum usitatissimum</i>	AM	171, 180
	AM + NM	260, 261
Erythroxylaceae		
<i>Erythroxylon compactum</i>	NM	103
Euphorbiaceae		
<i>Acalypha acmophylla</i>	AM	343
<i>Actinostemon concolor</i>	AM	651
<i>Adelia virgata</i>	AM	112
<i>Alchornea cordifolia</i>	AM	445
<i>Alchornea tiliaefolia</i>	AM	422, 655
<i>Aleurites moluccana</i>	AM	326
<i>Amperea xiphioclada</i>	ECM	67
<i>Baccaurea ramiflora</i>	AM	422, 655
<i>Breynia fruticosa</i>	AM	422
<i>Celaenodendron mexicanum</i>	AM	20
<i>Chamaesyce atrococca</i>	AM	326
<i>Chamaesyce celastroides</i>	AM	326
<i>Chamaesyce degeneri</i>	AM	326
<i>Chamaesyce hypericifolia</i>	AM	326
<i>Cleidion bracteosum</i>	AM	422
<i>Cleidion brevipetiolatum</i>	AM	655
<i>Cleistanthus sumatranus</i>	AM	422
	NM	655
<i>Croton ciliato-glanduliferus</i>	Weak AM	103
<i>Croton floribundus</i>	AM	651

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Croton kongensis</i>	AM	422
<i>Croton machrostachyus</i>	AM	637, 638
<i>Croton punctatus</i>	AM	143
<i>Croton urucurana</i>	AM	651
<i>Ditaxis lanceolata</i>	AM	112
<i>Drypetes gossweileri</i>	AM	445
<i>Drypetes hoaensis</i>	NM	655
<i>Epiprinus silhetianus</i>	NM	655
<i>Euphorbia amygdaloides</i>	AM	260, 261
<i>Euphorbia cyparissias</i>	AM	260, 261
<i>Euphorbia dulcis</i>	AM	260, 261
<i>Euphorbia esula</i>	AM	260, 261
<i>Euphorbia gatbergensis</i>	AM	417
<i>Euphorbia helioscopia</i>	AM + NM	260, 261
<i>Euphorbia heterophylla</i>	AM	343
<i>Euphorbia hirta</i>	AM	216, 343
	Facultative AM	422
<i>Euphorbia lathyris</i>	AM	260, 261
<i>Euphorbia paralias</i>	AM	260, 261
<i>Euphorbia parliramulosa</i>	AM	417
<i>Euphorbia peplis</i>	AM	368
<i>Euphorbia peplus</i>	AM	472
	AM + NM	260, 261
<i>Euphorbia royleana</i>	AM	343
<i>Euphorbia tannensis</i>	AM	438
<i>Euphorbia thymifolia</i>	AM	343
<i>Glochidion assamicum</i>	NM	655
<i>Hevea brasiliensis</i>	AM	288, 526, 527
<i>Hieronyma alchorneoides</i>	AM	31
<i>Jatropha cinerea</i>	AM	112
<i>Jatropha cuneata</i>	AM	112
<i>Macaranga denticulata</i>	AM	422, 648
<i>Macaranga indica</i>	AM	655
<i>Macaranga peltata</i>	AM	315
<i>Manihot esculanta</i>	AM	252
<i>Mercurialis annua</i>	AM	260, 261
<i>Mercurialis perennis</i>	AM + NM	260, 261
<i>Pedilanthus cymbiferus</i>	NM	103
	AM	112
<i>Pedilanthus macrocarpus</i>	AM	112
<i>Phyllanthus asteranthus</i>	AM	422
<i>Phyllanthus lacunarius</i>	AM	438
<i>Phyllanthus niruri</i>	AM	577
<i>Phyllanthus urinaria</i>	AM	343
<i>Ricinodendron heudelotii</i>	AM	445
<i>Ricinus communis</i>	AM	318
<i>Sauropus androgynus</i>	AM	253
<i>Sebastiania commersoniana</i>	AM	651
<i>Uapaca acuminata</i>	AM + ECM	445
<i>Uapaca guineense</i>	ECM	52, 445
<i>Uapaca heudelotti</i>	AM	52

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Uapaca staudtii</i>	ECM+AM	413
	ECM	445
<i>Uapaca vanhouttei</i>	ECM	445
Violaceae		
<i>Viola arvensis</i>	AM + NM	260, 261
<i>Viola calaminaria</i>	AM	588
<i>Viola canina</i>	AM	269
	AM + NM	260, 261
<i>Viola hirta</i>	AM	260, 261
<i>Viola kitaibeliana</i>	AM + NM	260, 261
<i>Viola lutea</i>	AM	260, 261
<i>Viola maculata</i>	AM	207
<i>Viola odorata</i>	AM	260, 261
<i>Viola palustris</i>	AM + NM	260, 261
<i>Viola reichenbachiana</i>	AM + NM	260, 261
<i>Viola riviniana</i>	AM	260, 261
<i>Viola rupestris</i>	AM	260, 261
<i>Viola tricolor</i>	AM	194, 456
	AM + NM	260, 261
<i>Viola wailenalenae</i>	AM	326
<i>Viola</i> × <i>wittrockiana</i>	AM	322
Salicaceae		
<i>Casearia sylvestris</i>	AM	31, 651
<i>Populus alba</i>	ECM+AM	368
	ECM+NM	260, 261
<i>Populus balsamifera</i>	ECM	470
<i>Populus balsamifera</i> <i>ssp. trichocarpa</i>	ECM	271
<i>Populus</i> × <i>canadensis</i>	AM + ECM	260, 261
<i>Populus canescens</i>	ECM	260, 261
<i>Populus deltoides</i>	AM	140
<i>Populus euroamericana</i>	AM + ECM	317
<i>Populus nigra</i>	AM + ECM	260, 261
<i>Populus nigra</i> 'Italica'	AM + ECM	260, 261
<i>Populus serotina</i>	AM + ECM	260, 261
<i>Populus tremula</i>	AM + ECM	260, 261
<i>Populus tremula</i> × <i>tremuloides</i>	ECM	59
<i>Populus tremuloides</i>	ECM	145, 338
	ECM+AM	430
<i>Populus trichocarpa</i>	ECM	59, 260, 261
<i>Salix alba</i>	ECM	260, 261
<i>Salix alba vitellina</i>	ECM	260, 261
<i>Salix arbuscula</i>	ECM	260, 261
<i>Salix arctica</i>	ECM	594
<i>Salix aurita</i>	ECM+NM	260, 261
<i>Salix babylonica</i>	AM + ECM	316, 260, 261
<i>Salix caprea</i>	AM + ECM	260, 261
<i>Salix cinerea</i>	AM + ECM	260, 261
<i>Salix daphnoides</i>	ECM	260, 261
<i>Salix fragilis</i>	ECM	260, 261
<i>Salix gracilistyla</i>	AM	511
<i>Salix herbacea</i>	ECM+EEM	260, 261

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Salix lapponum</i>	ECM	260, 261
<i>Salix myrsinites</i>	ECM	260, 261
<i>Salix nigra</i>	AM	140
<i>Salix nigricans</i>	ECM+NM	260, 261
<i>Salix phylicifolia</i>	ECM	260, 261
<i>Salix polaris</i>	ECM	594
<i>Salix purpurea</i>	AM + ECM	260, 261
<i>Salix reinii</i>	ECM	587
<i>Salix repens</i>	AM	605
	AM + ECM	260, 261
<i>Salix reticulata</i>	ECM	594, 260, 261
<i>Salix triandra</i>	ECM	260, 261
<i>Salix viminalis</i>	AM	60
	AM + ECM	260, 261
<i>Xylosma ciliatifolium</i>	AM	651
<i>Xylosma pseudosalzmannii</i>	AM	651
Turneraceae		
<i>Turnera ulmifolia</i>	AM	143
Clusiaceae		
<i>Calophyllum sclerophyllum</i>	AM	568
<i>Calophyllum soulattri</i>	AM	568
<i>Clusia minor</i>	AM	474
<i>Clusia rotundata</i>	AM	474
<i>Cratoxylum arborescens</i>	AM	568
<i>Garcinia cowa</i>	NM	655
<i>Garcinia kola</i>	AM	445
<i>Garcinia lucida</i>	AM	445
<i>Garcinia xanthochymus</i>	Facultative AM	422
Hypericaceae		
<i>Hypericum calycinum</i>	NM	260, 261
<i>Hypericum hirsutum</i>	NM	260, 261
<i>Hypericum humifusum</i>	NM	260, 261
<i>Hypericum maculatum</i>	AM	194, 260, 261
<i>Hypericum montanum</i>	NM	260, 261
<i>Hypericum perforatum</i>	AM	409, 260, 261
<i>Hypericum pulchrum</i>	AM	260, 261
<i>Hypericum tetrapterum</i>	AM + NM	260, 261
Elatinaceae		
<i>Elatine hexandra</i>	AM	62
Ochnaceae		
<i>Lophira alata</i>	AM	445
Chrysobalanaceae		
<i>Licania platypus</i>	AM	321
Oxalidaceae		
<i>Oxalis acetosella</i>	AM	598
	AM + NM	260, 261
<i>Oxalis corniculata</i>	AM	294, 643, 260, 261
<i>Oxalis corymbosa</i>	AM	643
<i>Oxalis exilis</i>	AM	260, 261
<i>Oxalis europaea</i>	AM	260, 261
<i>Oxalis stricta</i>	AM	260, 261
<i>Oxalis valdiviensis</i>	AM	207

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
Cunoniaceae		
<i>Ceratopetalum apetalum</i>	AM	387
	ECM	389
Elaeocarpaceae		
<i>Aristotelia chilensis</i>	AM	207
<i>Elaeocarpus austro-yunnanensis</i>	AM	422
<i>Sloanea guianensis</i>	AM	31
Polygalaceae		
<i>Polygala nicaeensis</i>	AM	368
<i>Polygala amarella</i>	AM + NM	260, 261
<i>Polygala calcarea</i>	AM	260, 261
<i>Polygala serpyllifolia</i>	AM	260, 261
<i>Polygala vulgaris</i>	AM	194
	AM + ECM	260, 261
<i>Salomonina sp.</i>	Mycoheterotrophy via AM	658
Fabaceae		
<i>Acacia albida</i>	AM	174
<i>Acacia ampliceps</i>	AM	477
<i>Acacia arabica</i>	AM	317
<i>Acacia auriculiformis</i>	AM	52, 229
<i>Acacia bonariensis</i>	AM + ECM	211
<i>Acacia caven</i>	AM	211
<i>Acacia cochliacantha</i>	Weak AM	103
<i>Acacia constricta</i>	Weak AM	103
<i>Acacia eriopoda</i>	AM	477
<i>Acacia farnesiana</i>	AM	343, 600
	Weak AM	103
<i>Acacia holosericea</i>	ECM	186
<i>Acacia koa</i>	AM	326, 406
<i>Acacia leptocarpa</i>	AM	52
<i>Acacia linifolia</i>	AM	68
	ECM+AM	67
<i>Acacia mangium</i>	ECM	186, 187
	AM	52, 257, 520
<i>Acacia nilotica</i>	AM	473, 538
<i>Acacia obtusifolia</i>	ECM+AM	67
<i>Acacia pennatula</i>	AM	18
<i>Acacia polyphylla</i>	AM	651
<i>Acacia suaveolens</i>	ECM+AM	67
<i>Acacia tortilis</i>	AM	567
<i>Acacia ulicifolia</i>	ECM+AM	67
<i>Adenanthera pavonina</i>	AM	52
<i>Aeschynomene indica</i>	AM	546
<i>Azelia africana</i>	NM	47
	ECM	45, 52
<i>Azelia bipidensis</i>	ECM+AM	413, 445
<i>Azelia pachyloba</i>	AM + ECM	445
<i>Azelia quanzensis</i>	ECM	418
<i>Albizia corniculata</i>	AM	655
<i>Albizia falcataria</i>	AM	14
<i>Albizia ferruginea</i>	AM	52, 256

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Albizia gummifera</i>	AM	637, 638
<i>Albizia hassleri</i>	AM	651
<i>Albizia kalkora</i>	AM	343
<i>Albizia lebbeck</i>	AM	52, 216, 477, 538, 548
<i>Albizia schimperiana</i>	AM	637, 638
<i>Alysicarpus regosus</i>	AM	336
<i>Alysicarpus vaginalis</i>	AM	343
<i>Amorpha crenulata</i>	AM	202
<i>Amphimas ferrugineus</i>	AM	445
<i>Amphimas pterocarpoides</i>	AM	52, 445
<i>Anadenanthera colubrina</i>	AM	452, 651
<i>Anadenanthera falcata</i>	AM	548
<i>Anadenanthera macrocarpa</i>	AM	651
<i>Anadenanthera peregrina</i>	AM	528, 593
<i>Anthonotha fragrans</i>	ECM	52
	ECM+AM	413, 445
<i>Anthonotha macrophylla</i>	ECM	52, 413, 445
<i>Anthyllis cytisoides</i>	AM	170, 234, 583
<i>Anthyllis tetraphylla</i>	AM	472
<i>Anthyllis vulneraria</i>	AM	456
	AM + NM	260, 261
<i>Aphanocalyx cynometroides</i>	ECM	413
<i>Arachis hypogaea</i>	AM	111
<i>Astragalus alpinus</i>	NM	594
<i>Astragalus applegatei</i>	AM	55
<i>Astragalus glycyphyllos</i>	NM	260, 261
<i>Atylosia scarabaeoides</i>	AM	343
<i>Baphia nitida</i>	AM	52
<i>Bauhinia forficata</i>	AM	211, 651
<i>Berlinia bracteosa</i>	ECM	445
<i>Berlinia confusa</i>	ECM	52, 445
<i>Bossiaea obcordata</i>	AM	67
<i>Brachystegia cynometroides</i>	ECM	445
<i>Brachystegia eurycoma</i>	ECM	445
<i>Brachystegia leonensis</i>	ECM	52
<i>Brachystegia zenkeri</i>	ECM	445
<i>Bussea occidentalis</i>	AM	52
<i>Caesalpinia eriostachys</i>	AM	20
<i>Caesalpinia ferrea</i>	AM	548
<i>Caesalpinia gilliesii</i>	AM	211
<i>Caesalpinia pannosa</i>	AM	112
<i>Caesalpinia peltophoroides</i>	AM	548
<i>Cajanus cajan</i>	AM	172, 624
<i>Calliandra eriophylla</i>	Weak AM	103
<i>Calliandra parvifolia</i>	Weak AM + ECM	211
<i>Calliandra selloi</i>	AM	211
<i>Calliandra tweedii</i>	AM + ECM	211
<i>Calopogonium caeruleum</i>	AM	289
<i>Calopogonium mucunoides</i>	AM	439

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Canavalia rosea</i>	AM	144, 336
<i>Cassia grandis</i>	AM	548
<i>Cassia siamea</i>	AM	52, 230, 251
<i>Cassia spectabilis</i>	AM	258
<i>Castanospermum australe</i>	AM	4
<i>Cathormion polyanthum</i>	AM	211
<i>Centrolobium tomentosum</i>	AM	372, 651
<i>Ceratonia siliqua</i>	AM	147
<i>Cercidium praecox</i>	AM	112
<i>Chamaecrista chamaecristoides</i>	AM	143
<i>Cicer arietinum</i>	AM	124, 125
<i>Colophospermum mopane</i>	AM	477
<i>Copaifera langsdorffii</i>	AM	548, 651
<i>Cordyla pinnata</i>	AM	47
<i>Coronilla emerus ssp. emeroides</i>	AM	368
<i>Coronilla scorpioides</i>	AM	472
<i>Coronilla varia</i>	AM	159
	NM	260, 261
<i>Crotalaria burhia</i>	AM	567
<i>Crotalaria incana</i>	AM	143
<i>Crotalaria medicaginea</i>	AM	343, 567
<i>Cullen discolor</i>	AM	438
<i>Cullen pallida</i>	AM	438
<i>Cylicodiscus gabunensis</i>	AM	445
<i>Cynometra alexandri</i>	AM	591
<i>Cynometra leonensis</i>	AM	52
<i>Cynometra sanagaensis</i>	AM	445
<i>Cytisus scoparius</i>	AM	260, 261
<i>Dalbergia obtusifolia</i>	AM	655
<i>Dalbergia sissoo</i>	AM	317, 473
<i>Daniella ogea</i>	AM	445
<i>Daviesia corymbosa</i>	AM	67
<i>Desmanthus illinoensis</i>	AM	541
<i>Desmodium heterophyllum</i>	AM	355
<i>Desmodium microphyllum</i>	AM	343
<i>Desmodium oxyphyllum</i>	AM	643
<i>Desmodium paniculatum</i>	AM	541
<i>Detarium macrocarpum</i>	AM	445
<i>Dialium guineense</i>	AM	47, 52
<i>Dicorynia guianensis</i>	AM	71, 161
<i>Didelotia africana</i>	ECM + Weak AM	413
	ECM	445
<i>Didelotia letouzeyi</i>	ECM	413, 445
<i>Dillwynia parvifolia var. tricopoda</i>	ECM+AM	67
<i>Dillwynia retorta</i>	ECM	67
	AM	589
<i>Diphysa robinoides</i>	AM	143
<i>Dipteryx panamensis</i>	AM	321

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Distemonanthus benthamianus</i>	AM	445
<i>Dorycnium hirsutum</i>	NM	368
<i>Enterolobium contortisiliquum</i>	AM	211, 651
<i>Enterolobium cyclocarpum</i>	AM	143, 256
<i>Eperua falcata</i>	AM	161
<i>Erythrina berteroana</i>	AM	142
<i>Erythrina crista-galli</i>	AM	211
<i>Erythrina poeppigiana</i>	AM	148
<i>Erythrophleum ivorense</i>	AM	52, 445
<i>Eysenhardtia polystachya</i>	Weak AM	103
<i>Faidherbia albida</i>	AM	46
<i>Genista hirsute</i>	AM	339
<i>Genista tinctoria</i>	AM	260, 261
<i>Geoffroea decorticans</i>	AM	211
<i>Gilbertiodendron brachystegioides</i>	ECM	445
<i>Gilbertiodendron dewevrei</i>	ECM+AM	591
	ECM	445
<i>Gilbertiodendron preussi</i>	ECM	52
<i>Gleditsia amorphoides</i>	Weak AM + ECM	211
<i>Gliricidia sepium</i>	AM	52, 199, 258
<i>Glyceria maxima</i>	NM	62
<i>Glycine max</i>	AM	37
<i>Gompholobium grandiflorum</i>	AM	67
<i>Gossweilerodendron balsamiferum</i>	AM	445
<i>Guibourtia tessmannii</i>	AM	445
<i>Havardia albicans</i>	AM	18
<i>Hedysarum confertum</i>	AM	496
<i>Hedysarum coronarium</i>	AM	351
<i>Hedysarum spinosissimum</i>	AM	496
<i>Hippocrepis comosa</i>	AM	260, 261
<i>Hippocrepis unisiliquosa</i>	AM	472
<i>Holocalyx balansae</i>	Weak AM	651
<i>Hymenaea courbaril</i>	NM	548
<i>Indigofera brevidens</i>	Weak AM	438
<i>Indigofera cordifolia</i>	AM	567
<i>Indigofera linifolia</i>	AM	567
<i>Inga leiocalycina</i>	AM	627
<i>Inga marginata</i>	AM	31
<i>Inga sessilis</i>	AM	651
<i>Inga striata</i>	AM	651
<i>Inga uruguayensis</i>	AM	211
<i>Intsia palembanica</i>	AM + ECM	14
<i>Julbernardia seretii</i>	ECM+AM	591
	ECM	445
<i>Koompassia malacensis</i>	NM	568
<i>Kummerowia striata</i>	AM	213
<i>Lablab purpureus</i>	AM	640
<i>Laburnum anagyroides</i>	AM	260, 261

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Lathyrus montanus</i>	AM	260, 261
<i>Lathyrus japonicus</i>	AM	260, 261
<i>Lathyrus niger</i>	AM + NM	260, 261
<i>Lathyrus odoratus</i>	AM	260, 261
<i>Lathyrus pratensis</i>	AM	194
	AM + NM	260, 261
<i>Lens culinaris</i>	AM	319
<i>Leucaena leucocephala</i>	AM	18, 52, 254, 326
<i>Lonchocarpus campestris</i>	AM	651
<i>Lonchocarpus muehlbergianus</i>	Weak AM	651
<i>Lonchocarpus nitidus</i>	AM + ECM	211
<i>Lotus corniculatus</i>	AM	140, 159, 194, 307, 456
	AM + NM	260, 261
<i>Lotus glaber</i>	AM	508
<i>Lotus tenuis</i>	AM	396
<i>Lotus uliginosus</i>	AM	260, 261
<i>Lupinus arcticus</i>	NM	594
<i>Lysiloma candida</i>	AM	112
<i>Machaerium minutiflorum</i>	AM	651
<i>Machaerium stipitatum</i>	Weak AM	651
<i>Macrotyloma uniflorum</i>	AM	453
<i>Medicago littoralis</i>	AM	368
<i>Medicago lupulina</i>	AM	260, 261
<i>Medicago marina</i>	AM	368
<i>Medicago polymorpha</i>	AM	294, 260, 261
<i>Medicago sativa</i>	AM	38, 159, 351, 260, 261
<i>Melilotus alba</i>	AM	260, 261
<i>Melilotus officinalis</i>	AM	159, 260, 261
<i>Microberlinia bisulcata</i>	ECM	413
<i>Mimosa adenantheroides</i>	Weak AM	103
<i>Mimosa bimucronata</i>	AM	452
<i>Mimosa biuncifera</i>	Weak AM	103
	AM	82
<i>Mimosa calcicola</i>	Weak AM	103
<i>Mimosa lacerata</i>	Weak AM	103
<i>Mimosa luisana</i>	AM	103
<i>Mimosa polyantha</i>	Weak AM	103
<i>Mimosa pudic</i>	AM	326
<i>Mimosa purpusii</i>	Weak AM	103
<i>Mimosa scabrella</i>	AM	31, 651
<i>Mimosa texana</i>	Weak AM	103
<i>Monopetalanthus le-testui</i>	ECM	445
<i>Monopetalanthus microphyllus</i>	ECM	445
<i>Mora excelsa</i>	AM	592
<i>Olneya tesota</i>	AM	112
<i>Onobrychis viciifolia</i>	AM	260, 261
<i>Onobrychis sativa</i>	AM	260, 261
<i>Ononis repens</i>	AM	260, 261

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Ononis spinosa</i>	AM	260, 261
<i>Ormosia arborea</i>	NM	548
	AM	651
<i>Oxystigma buchholzii</i>	AM	445
<i>Oxystigma mannii</i>	AM	445
<i>Oxytropis scammaniana</i>	AM	594
<i>Pachyelasma tessmannii</i>	AM	445
<i>Paraberlinia bifoliolata</i>	ECM	445
<i>Parapiptadenia rigida</i>	AM	211, 452, 651
<i>Parkia bicolor</i>	AM	52
<i>Parkia biglobosa</i>	AM	47, 247
<i>Parkia speciosa</i>	AM	14
<i>Parkinsonia aculeata</i>	AM	211
<i>Peltophorum dubium</i>	AM	211
	NM	548, 651
<i>Pentaclethra macrophyll</i>	AM	52, 445
<i>Phaseolus lunatus</i>	AM	20
<i>Phaseolus mungo</i>	AM	478
<i>Phaseolus radiatus</i>	AM	478
<i>Phaseolus vulgaris</i>	AM	37
<i>Piptadeniastrum africanum</i>	AM	52, 445
<i>Plagiosiphon longitubus</i>	AM	445
<i>Plagiosiphon multijugus</i>	AM	445
<i>Platycyamus regnellii</i>	AM	548
<i>Poecilanthus parviflora</i>	AM	211, 651
<i>Prioria copaifera</i>	AM	592
<i>Prosopis articulata</i>	AM	112
<i>Prosopis cineraria</i>	AM	379
<i>Prosopis glandulose</i>	AM	137
<i>Prosopis juliflora</i>	AM	76, 175, 567
<i>Prosopis laevigata</i>	AM	495
<i>Psoralea bituminosa</i>	AM	472
<i>Pterocarpus angolensis</i>	AM	419
<i>Pterocarpus mildbraedii</i>	AM	445
<i>Pterocarpus soyauxii</i>	AM	445
<i>Pterogyne nitens</i>	Weak AM	651
<i>Pueraria phaseoloides</i>	AM	150
<i>Pultenaea elliptica</i>	ECM + AM	67
<i>Retama sphaerocarpa</i>	AM	16, 17, 497
<i>Robinia pseudoacacia</i>	ECM	330
	AM + ECM	582, 260, 261
	ECM + EEM	86
<i>Samanea saman</i>	AM	52
<i>Schizolobium parahyba</i>	AM	548
<i>Schrankia quadrivalvis</i>	AM	143
<i>Scorodophloeus zenkeri</i>	AM	445
<i>Scorpiurus muricatus</i>	AM	472
<i>Senna corymbosa</i>	AM	211
<i>Senna macranthera</i>	AM	548, 651
<i>Senna multijuga</i>	AM	548
<i>Senna siamea</i>	AM	441
<i>Senna spectabilis</i>	AM	548
<i>Sesbania aegyptiaca</i>	AM	231

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Sesbania grandiflora</i>	AM	231
<i>Sesbania punicea</i>	AM	211
<i>Sesbania tomentosa</i>	AM	326, 227
<i>Sophora chrysophylla</i>	AM	326, 406
<i>Spartium junceum</i>	AM	368
<i>Strophostyles helvola</i>	AM	596
<i>Strophostyles umbellata</i>	AM	532
<i>Stryphnodendron microstachyum</i>	AM	36
<i>Stylosanthes guvanensis</i>	AM	545
<i>Stylosanthes scarbaeoides</i>	AM	545
<i>Swainsona phacoides</i>	AM	438
<i>Tamarindus indica</i>	AM	47, 247, 343
<i>Tephrosia purpurea</i>	AM	216, 343
<i>Tephrosia sphaerospora</i>	AM	438
<i>Tetramerlinia bifoliolata</i>	ECM + Weak AM	413
	ECM	445
<i>Tetramerlinia moreliana</i>	ECM	413
<i>Tipuana tipu</i>	AM	548
<i>Toubaouate brevipaniculata</i>	ECM	445
<i>Trifolium arvense</i>	AM	307
<i>Trifolium aureum</i>	AM	194
<i>Trifolium dubium</i>	AM	643, 260, 261
<i>Trifolium fragiferum</i>	NM	260, 261
<i>Trifolium glomeratum</i>	AM	260, 261
<i>Trifolium hybridum</i>	AM	307
	AM + NM	260, 261
<i>Trifolium medium</i>	AM	260, 261
<i>Trifolium pratense</i>	AM	140, 159, 194, 204, 456
	AM + NM	260, 261
<i>Trifolium repens</i>	AM	140, 194, 283, 643, 260, 261
<i>Trifolium spadiceum</i>	AM	194
<i>Trifolium subterraneum</i>	AM	171
	AM + NM	260, 261
<i>Trigonella foenumgraecum</i>	AM	220
<i>Ulex europaeus</i>	AM	368, 260, 261
<i>Ulex gallii</i>	NM	260, 261
<i>Ulex parviflorus</i>	AM	497
<i>Vicia angustifolia</i>	AM	643
<i>var. segetalis</i>		
<i>Vicia cracca</i>	AM	194, 294, 260, 261
<i>Vicia faba</i>	AM	191
<i>Vicia nigricans</i>	AM	207
<i>Vicia hirsute</i>	AM	643, 260, 261
<i>Vicia sativa</i>	AM	260, 261
<i>Vicia sepium</i>	AM	194, 260, 261
<i>Vicia sylvatica</i>	AM + ECM	260, 261
<i>Vicia tetrasperma</i>	AM	307, 260, 261

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Vicia villosa</i>	AM	140
<i>Vigna aconitifolius</i>	AM	343
<i>Vigna luteola</i>	AM	273
<i>Vigna marina</i>	AM	326, 547
<i>Vigna mungo</i>	AM	319
<i>Vigna parkeri</i>	AM	440
<i>Vigna radiate</i>	AM	377
<i>Vigna unguiculata</i>	AM	37, 287
<i>Xylia xylocarpa</i>	AM	315
<i>Zornia sp.</i>	Weak AM	103
Rosaceae		
<i>Acaena magellanica</i>	AM	342
<i>Acaena minor</i>	NM	560
	AM	342
<i>Acaena novae-zelandiae</i>	AM	260, 261
<i>Acaena ovalifolia</i>	AM	207
<i>Acaena pinnatifida</i>	AM	207
<i>Adenostoma fasciculatum</i>	AM + ECM	21
<i>Agrimonia eupatoria</i>	AM	260, 261
<i>Alchemilla alpina</i>	AM	80, 194, 260, 261
<i>Alchemilla glabra</i>	AM	260, 261
<i>Alchemilla glaucescens</i>	AM	194
<i>Alchemilla glomerulans</i>	AM	503
<i>Alchemilla vulagris</i> agg.	AM + NM	260, 261
<i>Alchemilla xanthochlora</i>	AM	260, 261
<i>Aphanes arvensis</i>	AM	260, 261
<i>Cotoneaster integerrimus</i>	AM	260, 261
<i>Crataegus laevigata</i>	AM + ECM	260, 261
<i>Crataegus monogyna</i>	ECM	368
	AM + ECM	260, 261
<i>Dryas octopetala</i>	ECM	80, 594
	AM + ECM	260, 261
<i>Duchesnea chrysantha</i>	AM	643
<i>Filipendula ulmaria</i>	AM + NM	260, 261
<i>Fragaria chiloensis</i>	AM	207
<i>Fragaria vesca</i>	AM + NM	260, 261
<i>Fragaria xananassa</i>	AM	537
<i>Geum rivale</i>	AM	194
	AM + NM	260, 261
<i>Geum urbanum</i>	AM	260, 261
<i>Geum virginianum</i>	AM	140
<i>Hagenia abyssinica</i>	AM	637, 638
<i>Malus communis</i>	AM	260, 261
<i>Malus domestica</i>	AM	368
<i>Malus micromalus</i>	AM	26
<i>Malus pumila</i>	AM	233
<i>var. domestica</i>		
<i>Malus sylvestris</i>	AM + ECM	260, 261
<i>Osteomeles anthyllidifolia</i>	AM	326
<i>Ovidia andina</i>	AM	207
<i>Potentilla anglica</i>	AM	260, 261

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Potentilla anserine</i>	AM	307, 626, 260, 261
<i>Potentilla argentea</i>	AM	260, 261
<i>Potentilla cinerea</i>	AM	456
<i>Potentilla crantzii</i>	AM	194, 260, 261
<i>Potentilla erecta</i>	AM	194, 586
	AM + NM	260, 261
<i>Potentilla fruticosa</i>	AM	260, 261
<i>Potentilla hookeriana</i>	AM	443
<i>Potentilla palustris</i>	AM + NM	260, 261
<i>Potentilla pulchella</i>	AM	443
<i>Potentilla reptans</i>	AM	260, 261
<i>Potentilla sterilis</i>	AM	260, 261
<i>Potentilla tabernaemontani</i>	AM	260, 261
<i>Prunus africana</i>	AM	637, 638
<i>Prunus avium</i>	AM	465
	AM + ECM	260, 261
<i>Prunus cerasifera</i>	AM	73
<i>Prunus cerasus</i>	ECM	260, 261
<i>Prunus domestica</i>	AM + NM	260, 261
<i>Prunus maritima</i>	AM	324
<i>Prunus padus</i>	AM + ECM	260, 261
<i>Prunus sellowii</i>	Weak AM	651
<i>Prunus spinosa</i>	AM + NM	260, 261
<i>Pyrus communis</i>	AM	219
<i>Pyrus pyraister</i>	AM + ECM	260, 261
<i>Rosa arvensis</i>	AM	260, 261
<i>Rosa canina</i>	AM	81, 260, 261
<i>Rosa hybrida</i>	AM	160
<i>Rosa rubiginosa</i>	AM	207
<i>Rosa rugosa</i>	AM	324
<i>Rosa sempervirens</i>	AM	368
<i>Rubus caesius</i>	AM	260, 261
<i>Rubus chamaemorus</i>	NM	260, 261
<i>Rubus fruticosus s. l.</i>	AM	260, 261
<i>Rubus idaeus</i>	AM	573, 574
	AM + NM	260, 261
<i>Rubus nessensis</i>	AM + ECM	260, 261
<i>Rubus rufus</i>	AM	422
<i>Rubus saxatilis</i>	AM	260, 261
<i>Rubus ulmifolius</i>	AM	368
<i>Sanguisorba minor</i>	AM	260, 261
<i>Sanguisorba officinalis</i>	AM	260, 261
<i>Sibbaldia procumbens</i>	AM	594
	NM	260, 261
<i>Sorbus aria</i>	AM + ECM	260, 261
<i>Sorbus aucuparia</i>	AM + ECM + NM	260, 261
<i>Sorbus torminalis</i>	ECM	260, 261
<i>Spiraea latifolia</i>	AM	140
<i>Spiraea tomentosa</i>	AM	140
Rhamnaceae		
<i>Colletia hystrix</i>	AM	207
<i>Colubrina glabra</i>	AM	112

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Colubrina glandulosa</i>	AM	651
<i>Colubrina oppositifolia</i>	AM	227
<i>Condalia globosa</i>	AM	112
<i>Discaria articulata</i>	AM	207
<i>Discaria chacaye</i>	AM	207
<i>Frangula alnus</i>	AM + ECM + NM	260, 261
<i>Hovenia dulcis</i>	AM	548
<i>Phyllica ericoides</i>	AM	24
<i>Rhamnus catharticus</i>	AM + NM	260, 261
<i>Rhamnus lycioides</i>	AM	17, 108
<i>Ventilago calyculata</i>	AM	655
<i>Zizyphus mauritiana</i>	AM	47, 343, 378, 381, 655
<i>Zizyphus nummularia</i>	AM	567
<i>Zizyphus obtusifolia</i>	AM	112
<i>Zizyphus xylopyrus</i>	AM	380
Elaeagnaceae		
<i>Elaeagnus commutata</i>	AM	613
<i>Hippophae rhamnoides</i>	AM	405, 260, 261
<i>Hippophae tibetana</i>	AM	581
<i>Shepherdia canadensis</i>	AM	581
Ulmaceae		
<i>Celtis wightii</i>	AM	422
<i>Gironniera subaequalis</i>	NM	422
<i>Trema micrantha</i>	AM	548, 651
<i>Trema orientalis</i>	AM	445
<i>Ulmus glabra</i>	AM	260, 261
<i>Ulmus procera</i>	AM + ECM	260, 261
Cannabaceae		
<i>Humulus lupulus</i>	AM + NM	260, 261
Moraceae		
<i>Artocarpus altilis</i>	AM	136
<i>Brosimum alicastrum</i>	AM	18
<i>Brosimum lactescens</i>	AM	31
<i>Broussonetia papyrifera</i>	AM	343
<i>Ficus cyrtophylla</i>	NM	655
<i>Ficus guaranitica</i>	AM	651
<i>Ficus hirta</i>	AM	422
<i>Ficus hispida</i>	AM	655
<i>Ficus langkokensis</i>	AM	655
<i>Milicia excelsa</i>	AM	445
<i>Milicia regia</i>	AM	279
<i>Morus alba</i>	AM	475, 535
<i>Musanga cecropioides</i>	AM	445
<i>Sorocea bonplandii</i>	Weak AM	651
Urticaceae		
<i>Boehmeria zollingeriana</i>	AM	422
<i>Cecropia glaziovii</i>	AM	651
<i>Cecropia pachystachya</i>	AM	651
<i>Elatostema parvum</i>	AM	422
<i>Parietaria judaica</i>	AM + NM	260, 261
<i>Pipturus albidus</i>	AM	326

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Touchardia latifolia</i>	NM	326
<i>Urera glabra</i>	AM	326
<i>Urtica dioica</i>	NM	611
	AM + NM	260, 261
<i>Urtica urens</i>	NM	260, 261
Cucurbitaceae		
<i>Bryonia dioica</i>	AM	260, 261
<i>Citrullus lanatus</i>	AM	310, 438
<i>Ctenolepis cerasiformis</i>	AM	567
<i>Cucumis callosus</i>	AM	567
<i>Cucumis sativus</i>	AM	499
<i>Cucurbita foetidissima</i>	AM	396
<i>Cucurbita pepo</i>	AM	340
<i>Mukia maderaspatana</i>	AM	216
Begoniaceae		
<i>Begonia angustinei</i>	AM	422
<i>Begonia cathayana</i>	AM	422
<i>Hillebrandia sandwicensis</i>	AM	326
Tetramelaceae		
<i>Tetrameles nudiflora</i>	AM	422
Fagaceae		
<i>Castanea sativa</i>	ECM	260, 261
<i>Castanopsis borneensis</i>	ECM	267
<i>Castanopsis indica</i>	NM	422
	AM	655
<i>Fagus sylvatica</i>	ECM	529, 260, 261
<i>Lithocarpus densiflora</i>	ECM	375
<i>Lithocarpus leucostachyus</i>	NM	422
<i>Nothofagus dombeyi</i>	ECM	207
<i>Quercus alba</i>	ECM	444, 470
<i>Quercus cerris</i>	ECM	260, 261
<i>Quercus ilex</i>	ECM	368, 472, 260, 261
<i>Quercus petraea</i>	ECM	53, 260, 261
<i>Quercus pubescens</i>	ECM	138
<i>Quercus robur</i>	ECM	53, 368, 260, 261
<i>Quercus rubra</i>	ECM	214
Myricaceae		
<i>Comptonia peregrina</i>	Facultative AM	284
<i>Myrica cerifera</i>	AM	468
<i>Myrica faya</i>	AM	326
<i>Myrica gale</i>	Facultative AM	146
	AM + NM	260, 261
<i>Myrica pensylvanica</i>	NM	324
	Facultative AM	284
Juglandaceae		
<i>Engelhardtia roxburghiana</i>	ECM	267
<i>Juglans nigra</i>	AM	465
<i>Juglans regia</i>	AM	177
	AM + ECM + NM	260, 261
Betulaceae		

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Alnus acuminata</i>	ECM	61
<i>Alnus cordata</i>	AM	361
<i>Alnus glutinosa</i>	AM	210
	ECM + AM	368
	ECM	471
	AM + ECM + EEM + NM	260, 261
<i>Alnus incana</i>	AM	34
	AM + ECM	260, 261
<i>Alnus sinuate</i>	ECM	271
<i>Alnus tenuifolia</i>	ECM	641
<i>Betula alleghaniensis</i>	ECM	162, 516
<i>Betula lenta</i>	ECM	619
<i>Betula nana</i>	ECM	594, 260, 261
<i>Betula papyrifera</i>	ECM	303
<i>Betula pendula</i>	ECM	92, 155
	ECM+EEM	260, 261
<i>Betula pubescens</i>	ECM	370
	ECM+EEM	260, 261
<i>Betula verrucosa</i>	ECM	217
<i>Carpinus betulus</i>	ECM	529, 260, 261
<i>Corylus avellana</i>	ECM	367, 529, 260, 261
Casuarinaceae		
<i>Allocasuarina littoralis</i>	ECM	579
<i>Casuarina cunninghamiana</i>	Weak AM	485
	AM	316
	Weak ECM	579
<i>Casuarina equisetifolia</i>	AM	447, 326, 542, 606
<i>Casuarina equisetifolia ssp. equisetifolia</i>	ECM	579
Tropaeolaceae		
<i>Tropaeolum majus</i>	AM	360, 610
Moringaceae		
<i>Moringa concanensis</i>	AM	450
Caricaceae		
<i>Carica papaya</i>	AM	360, 595
Bataceae		
<i>Batis maritime</i>	NM	326
Resedaceae		
<i>Reseda lutea</i>	AM + NM	260, 261
<i>Reseda luteola</i>	AM + NM	260, 261
Capparidaceae		
<i>Atamisquea emarginata</i>	AM	112
<i>Capparis sandwichiana</i>	NM	326
Brassicaceae		
<i>Alliaria petiolata</i>	NM	260, 261
<i>Alyssum montanum</i>	NM	456
<i>Arabidopsis thaliana</i>	Weak AM + NM	260, 261
<i>Arabis alpina</i>	NM	260, 261
<i>Arabis hirsuta</i>	NM	472, 260, 261

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Armoracia rusticana</i>	AM + NM	260, 261
<i>Barbarea vulgaris</i>	NM	260, 261
<i>Biscutella laevigata</i>	NM	456
	AM	446, 260, 261
<i>Blennodia pterosperma</i>	NM	438
<i>Brassica napus</i>	AM + NM	260, 261
<i>Brassica nigra</i>	NM	83, 260, 261
<i>Brassica oleracea</i>	AM + NM	260, 261
<i>Brassica rapa</i>	NM	260, 261
<i>Cakile maritima</i>	NM	368
	AM + NM	260, 261
<i>Capsella bursa-pastoris</i>	Facultative AM	167
	AM	164
	AM + NM	260, 261
<i>Cardamine amara</i>	NM	260, 261
<i>Cardamine bulbifera</i>	AM + NM	260, 261
<i>Cardamine concatenata</i>	NM	165
<i>Cardamine corymbosa</i>	NM	342
<i>Cardamine flexuosa</i>	AM + NM	260, 261
<i>Cardamine hirsuta</i>	AM + NM	260, 261
<i>Cardamine impatiens</i>	NM	260, 261
<i>Cardamine pratensis</i>	NM	260, 261
<i>Cardamine trifolia</i>	NM	260, 261
<i>Cardaminopsis arenosa</i>	AM	456
<i>Cochlearia anglica</i>	AM + NM	260, 261
<i>Cochlearia danica</i>	AM	260, 261
<i>Cochlearia officinalis</i>	AM + NM	260, 261
<i>Diplotaxis eruroides</i>	AM + NM	260, 261
<i>Diplotaxis muralis</i>	AM + NM	260, 261
<i>Erophila verna</i>	NM	260, 261
<i>Erysimum cheiranthoides</i>	NM	260, 261
<i>Hesperis matronalis</i>	Facultative AM	167
<i>Iberis amara</i>	AM	260, 261
<i>Isatis tinctoria</i>	NM	260, 261
<i>Lepidium bidentatum</i>	AM	326
<i>Lepidium phlebopetalum</i>	NM	438
<i>Lepidium ruderale</i>	NM	260, 261
<i>Lepidium serra</i>	NM	326
<i>Matthiola incana</i>	Facultative AM	167
<i>Nasturtium officinale</i>	NM	260, 261
<i>Pringlea antiscorbutica</i>	NM	560
<i>Raphanus raphanistrum</i>	NM	260, 261
<i>Raphanus sativus</i>	AM + NM	260, 261
<i>Rorippa amphibia</i>	NM	62
<i>Rorippa islandica</i>	AM	140
<i>Rorippa palustris</i>	NM	260, 261
<i>Sinapis alba</i>	NM	260, 261
<i>Sisymbrium loeselii</i>	NM	260, 261

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Sisymbrium officinale</i>	AM + NM	260, 261
<i>Sisymbrium orientale</i>	NM	260, 261
<i>Thlaspi arvense</i>	NM	260, 261
<i>Thlaspi caerulescens</i>	AM	488
<i>Thlaspi montanum</i>	AM	488
<i>Thlaspi praecox</i>	AM	488, 614
Thymelaeaceae		
<i>Daphne laureola</i>	AM	260, 261
<i>Daphne gnidium</i>	AM	368
<i>Daphne mezereum</i>	AM + NM	260, 261
<i>Gonystylus bancanus</i>	AM	568
<i>Pimelea linifolia</i>	AM	67
<i>Wikstroemia furcata</i>	AM	326
Bixaceae		
<i>Cochlospermum vitifolium</i>	AM	20
Cistaceae		
<i>Cistus creticus</i>	ECM	368
<i>Cistus ladanifer</i>	ECM	339
<i>Cistus incanus</i>	ECM	368
<i>Cistus monspeliensis</i>	ECM	368
	ECM + AM	472
<i>Fumana thymifolia</i>	AM	472
<i>Helianthemum almeriense</i>	EEM + ECM	249
<i>Helianthemum apenninum</i>	AM + ECM + EEM	260, 261
<i>Helianthemum canum</i>	AM + ECM + EEM	260, 261
<i>Helianthemum guttatum</i>	ECM + EEM	209
<i>Helianthemum nummularium</i>	ECM	80
	AM + ECM + EEM	260, 261
<i>Helianthemum ovatum</i>	ECM	330
<i>Tuberaria guttata</i>	ECM	260, 261
Dipterocarpaceae		
<i>Hopea mengarawan</i>	NM	568
<i>Shorea balangeran</i>	AM	568
<i>Shorea leprosula</i>	ECM	14
<i>Shorea teysmanniana</i>	AM	568
<i>Shorea uliginosa</i>	AM	568
Malvaceae		
<i>Abelmoschus esculentus</i>	AM	69
<i>Abutilon californicum</i>	AM	112
<i>Abutilon indicum</i>	AM	343
<i>Abutilon otocarpum</i>	AM	438
<i>Abutilon theophrasti</i>	AM	553
<i>Althaea officinalis</i>	AM	260, 261
<i>Bastardiopsis densiflora</i>	AM	651
<i>Gossypium hirsutum</i>	AM	7, 649
<i>Gossypium tomentosum</i>	AM	326
<i>Kokia kauaiensis</i>	AM	326
<i>Malva sylvestris</i>	AM	260, 261

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Thespesia populnea</i>	AM	326
<i>Sida ammophila</i>	NM + Weak AM	438
<i>Sida cordifolia</i>	AM	567
<i>Sida fallax</i>	AM	326
<i>Sida szechuensis</i>	AM	343
Malvaceae (Bombacoideae)		
<i>Adansonia digitata</i>	AM	47
<i>Bombax malabaricum</i>	AM	343
<i>Ceiba pentandra</i>	AM	18
<i>Ceiba speciosa</i>	AM	548
<i>Chorisia speciosa</i>	AM	651
<i>Ochroma pyramidale</i>	AM	321
<i>Pseudobombax grandiflorum</i>	AM	651
Malvaceae (Tilioideae)		
<i>Corchorus tridens</i>	AM	567
<i>Grewia biloba</i>	AM	343
<i>Heliocarpus americanus</i>	AM	651
<i>Heliocarpus appendiculatus</i>	AM	244, 245
<i>Heliocarpus pallidus</i>	AM	20
<i>Luehea candicans</i>	AM	651
<i>Luehea divaricata</i>	AM	651
<i>Luehea grandiflora</i>	AM	548
<i>Luehea seemanii</i>	AM	321
<i>Tilia cordata</i>	ECM	529
	AM + ECM + NM	260, 261
<i>Tilia platyphyllos</i>	ECM	549, 260, 261
<i>Tilia × vulgaris</i>	ECM	260, 261
Malvaceae (Sterculioideae)		
<i>Eriobroma oblonga</i>	AM	445
<i>Guazuma ulmifolia</i>	AM	18, 32, 651
<i>Pterigota macrocarpa</i>	AM	445
<i>Pterospermum menglunense</i>	AM	422
<i>Pterospermum yunnanensis</i>	AM	655
<i>Theobroma cacao</i>	AM	131, 321
<i>Waltheria indica</i>	AM	143, 326
Rutaceae		
<i>Acronychia pedunculata</i>	AM	655
<i>Agathosma ovata</i>	AM	24
<i>Boronia thujona</i>	AM	67
<i>Citrus aurantifolia</i>	AM	400
<i>Citrus aurantium</i>	AM	429
<i>Citrus jambhiri</i>	AM	176
<i>Eriostemon australasius</i>	AM	67
<i>Fagara heitzii</i>	AM	445
<i>Flindersia brayleana</i>	AM	222
<i>Melicope barbigera</i>	AM	326
<i>Paramignya retispina</i>	AM	655
<i>Zanthoxylum rhetsa</i>	AM	315
Meliaceae		
<i>Azadirachta excelsa</i>	AM	282

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Azadirachta indica</i>	AM	255, 427, 477
<i>Cabralea canjerana</i>	AM	31
<i>Cedrella fissilis</i>	AM	548, 593, 651
<i>Chisocheton siamensis</i>	Facultative AM	422
<i>Ekebergia capensis</i>	AM	637, 638
<i>Entandrophragma angolense</i>	AM	445
<i>Entandrophragma candollei</i>	AM	445
<i>Entandrophragma cylindricum</i>	AM	445
<i>Entandrophragma utile</i>	AM	445
<i>Guarea cedrata</i>	AM	445
<i>Guarea kunthiana</i>	Weak AM	651
<i>Khaya ivorensis</i>	AM	445
<i>Lansium domesticum</i>	AM	422
<i>Lovoa trichilioides</i>	AM	445
<i>Melia azedarach</i>	AM	422
<i>Melia toosanden</i>	NM	422
<i>Swietenia macrophylla</i>	AM	433
<i>Trichilia casaretti</i>	Weak AM	651
<i>Trichilia clausenii</i>	Weak AM	651
<i>Trichilia elegans</i>	Weak AM	651
Simaroubaceae		
<i>Castella peninsularis</i>	AM	112
<i>Irvingia gabonensis</i>	AM	445
Anacardiaceae		
<i>Anacardium excelsum</i>	AM	321
<i>Anacardium occidentale</i>	AM	27, 47
<i>Antrocaryon klaineianum</i>	AM	445
<i>Astronium graveolens</i>	AM	651
<i>Camposperma auriculatum</i>	AM	568
<i>Cyrtocarpa edulis</i>	AM	112
<i>Mangifera sp.</i>	AM	486
<i>Pistacia atlantica</i>	AM	197
<i>Pistacia lentiscus</i>	AM	368, 472
<i>Pistacia palestina</i>	AM	197
<i>Pistacia terebinthus</i>	AM	104
<i>Pistacia vera</i>	AM	197
<i>Schinus patagonicus</i>	AM	207
<i>Schinus terebinthifolius</i>	AM	548, 651
<i>Sclerocarya birrea</i>	AM	47
<i>Trychoscypha acuminata</i>	AM	445
Burseraceae		
<i>Bursera fagaroides</i>	NM	103
	AM	112
<i>Bursera hindsiana</i>	Weak AM	112
<i>Bursera microphylla</i>	Weak AM	112
<i>Canarium schweinfurthii</i>	AM	445
Sapindaceae		
<i>Acer campestre</i>	AM + ECM + NM	260, 261

Table 1 (continued)

Examined species ^a	Mycorrhizal status ^{b,c}	References
<i>Acer platanoides</i>	AM	607
	AM + ECM + NM	260, 261
<i>Acer pseudoplatanus</i>	AM	465, 622
	AM + ECM + NM	260, 261
<i>Acer rubrum</i>	AM	140
<i>Acer saccharum</i>	AM	141, 162, 470
<i>Aesculus hippocastanum</i>	AM	260, 261
<i>Allophylus schweinfurthii</i>	AM	445
<i>Aphania senegalensis</i>	AM	47
<i>Blighia welwitschii</i>	AM	445
<i>Cardiospermum corindum</i>	AM	112
<i>Deinbollia pycnophylla</i>	AM	445
<i>Dodonaea viscosa</i>	AM	326, 343, 479
<i>Eriocoelem macrocarpum</i>	AM	445
<i>Harpullia cupanioides</i>	AM	655
<i>Lepisanthes senegalensis</i>	Facultative AM	422
<i>Litchi chinensis</i>	AM	326
<i>Matayba guianensis</i>	AM	31
<i>Pometia tomentosa</i>	AM	422
	NM	655
<i>Sapindus saponaria</i>	AM	548
Some unplaced taxa		
Bruniaceae		
<i>Staavia radiata</i>	AM	24
Escalloniaceae		
<i>Escallonia rubra</i>	AM	207

^aThe families in column 1 are divided into four groups: bryophytes, pteridophytes, gymnosperms and angiosperms. For each group, the order of families is consistent with the phylogeny used in Fig. 1

^bThe mycorrhizal types shown in column 2 are consistent to the current widely used system of Smith and Read (1997): *AM* arbuscular mycorrhiza, *ECM* ectomycorrhiza, *EEM* ectendomycorrhiza, *ORM* orchid mycorrhiza, *ERM* ericoid mycorrhiza, *MTM* monotropoid mycorrhiza, *ABM* arbutoid mycorrhiza, as well as *NM* nonmycorrhiza, and mycoheterotrophy

^cFor the bryophytes, fungal associations were used instead of mycorrhiza; *A*, *B*, and *G* indicate ascomycetous, basidiomycetous, and glomeromycetous fungal associations, respectively

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mosses (Fig. 1; but see Boullard 1988 for mycorrhizoids in *Takakia*), tends to suggest that these plant–fungus interactions began when land plants originated. At present, there is no doubt that bryophytes preceded vascular plants during early evolution of land plants (Kenrick and Crane 1997).

Table 1 (continued)

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Furthermore, liverworts are clearly favored as the earliest divergent lineage of extant land plants according to emerging molecular evidence (Qiu et al. 1998; Dombrowska and Qiu 2004; Groth-Malonek et al. 2005; Qiu et al. unpublished), despite some lingering controversy on relationships among three bryophyte lineages: liverworts, mosses, and hornworts (see Qiu and Lee 2000; Renzaglia et al. 2000). Hence, the widespread occurrence of fungal association in liverworts deserves some attention here.

Mycorrhizas, or more precisely mycorrhizoids and mycothalli, are found in many of the liverworts that have been investigated (Pocock and Duckett 1985; Boullard 1988; Duckett et al. 1991). Several aspects of these symbioses revealed by recent studies may help clarify their evolutionary relationship to mycorrhizas in vascular plants. First, in cases where detailed ultrastructural analysis has been done, structures similar to those in the endomycorrhizas of vascular plants, i.e. arbuscules, have been observed in some liverworts (Read et al. 2000; Carafa et al. 2003; Russell and Bulman 2005). Second, cross-inoculation experiments have convincingly demonstrated that the same fungi can infect both liverworts and angiosperms and produce similar structures for either glomeromycetous or ascomycetous mycorrhizas (Read et al. 2000). Third, although isotopic tracing of nutrient, water, and carbon exchange has not been done for most liverwort–fungus symbioses, the carbon flow from *Betula* through the ectomycorrhizal fungus *Tulasnella* to the mycoheterotrophic liverwort *Cryptothallus* has been confirmed by a ^{14}C feeding experiment (Bidartondo et al. 2003). Finally, the evolutionary pattern of plant–fungus symbiosis observed in angiosperms by Trappe (1987) and in vascular plants (this study), i.e., glomeromycetous mycorrhizas being the common type and occurring in early-diverging plant lineages and ascomycetous and basidiomycetous mycorrhizas being the rare type and found in late-evolving plant lineages, is also seen in liverworts (Fig. 1). These four lines of evidence indicate that even though the plant structures involved in symbiosis are probably structurally and functionally analogous between liverworts and vascular plants, the nature of the biological interaction is almost certain to be evolutionarily homologous. Besides further investigations of the functional aspects of mycorrhizas in liverworts and other bryophytes as suggested by Read et al. (2000), one line of evidence that will provide conclusive support for evolutionary homology between the mycorrhizal symbioses in bryophytes and vascular plants could come from studies of plant genes that are involved in the processes, some of

Table 2 Mycorrhizal investigation of four major groups of land plants at both family and species levels

Group	Total number of families/species surveyed	No. (%) of mycorrhizal families (obligate and facultative)	No. (%) of obligately mycorrhizal species	No. (%) of facultatively mycorrhizal species	No. (%) of nonmycorrhizal families	No. (%) of nonmycorrhizal species
Bryophytes	28/143	20 (71%)	60 (42%)	6 (4%)	8 (29%)	77 (54%)
Pteriophytes	28/426	26 (93%)	185 (43%)	39 (9%)	2 (7%)	202 (47%)
Gymnosperms	12/84	12 (100%)	83 (99%)	1 (1%)	0 (0%)	0 (0%)
Angiosperms	195/2,964	184 (94%)	2,141 (72%)	396 (13%)	11 (6%)	427 (14%)
Sum	263/3,617	242 (92%)	2,469 (68%)	442 (12%)	21 (8%)	706 (20%)

which have been identified in recent studies (Stracke et al. 2002; Liu et al. 2003; Ane et al. 2004; Demchenko et al. 2004; Levy et al. 2004). If the same genes are found to control development of mycorrhizas in all groups regardless of their expression in the gametophytes of bryophytes or the sporophytes of vascular plants, and if the gene phylogenies are congruent to the plant phylogeny, the final doubt about homology of the two types of symbioses will be dispelled.

If the mycorrhizal symbiosis in liverworts, other bryophytes, such as the moss *Takakia* (see Boullard 1988), and hornworts proves to be homologous to that in vascular plants, it becomes obvious that mycorrhiza was indeed an important means of water and nutrient uptake adopted by the earliest land plants (Pirozynski and Malloch 1975). Fossil evidence is in agreement with such a scenario. Both glomeromycetous fungi (Redecker et al. 2000) and liverworts (Wellman et al. 2003) evolved by the Ordovician, when plants colonized the land (Kenrick and Crane 1997). Fossil mycorrhizas formed between nonseptate fungi and the protracheophyte *Aglaophyton major* have been uncovered from the Rhynie chert, confirming that this type of plant–fungus interaction existed at least 400 million years ago (Remy et al. 1994; Kerp et al. 2004; Taylor et al. 2005). It is possible that evolution of mycorrhiza might even have predated the origin of land plants, if fungal association in the extinct charophyte *Palaenitella* (Taylor et al. 1992) is mycorrhizal. We conclude that although more work is needed to solidify the relationship between mycorrhizal symbioses in bryophytes and vascular plants, including morphological, physiological, and molecular characterization of the plant–fungus interactions in both bryophytes and early vascular plants (see Read et al. 2000), all available evidence seems to point to an origin of mycorrhizas at the beginning of land plant evolution.

Arbuscular mycorrhiza is the ancestral type of mycorrhiza

When the different types of mycorrhizas are mapped onto the land plant phylogeny, it becomes clear that arbuscular mycorrhiza (AM), the endomycorrhiza formed by glomeromycetous fungi and plants, is the ancestral type, as it occurs in a vast majority of plants and in all early-diverging lineages of major clades of land plants (Fig. 1). Even in

bryophytes where the plant structures involved in symbiosis are rhizoids and thalli of the gametophyte, glomeromycetous fungi-mediated symbiosis results in formation of AM-like structures and is found in most early-diverging lineages of liverworts and in hornworts (Ligrone and Lopes 1989; Read et al. 2000; Russell and Bulman 2005). These two aspects of AM symbiosis suggest that the genetic mechanism underlying interaction between the plants and glomeromycetous fungi might have been established in the common ancestor of all land plants. Future molecular studies should be able to test this hypothesis to determine if the same genes are involved in plants–glomeromycetous fungi symbioses throughout land plants.

Trappe (1987) reported that AM is the ancestral type of mycorrhiza in angiosperms. Our survey, which broadens the scope to include all land plants, extends this conclusion to all land plants. This result is not likely to change even if relationships among three bryophyte lineages and vascular plants are altered (see Qiu and Lee 2000) because all of their early-diverging lineages possess AM when they are mycorrhizal. Furthermore, fossil evidence clearly indicates that AM is the most ancient type of mycorrhiza. The Devonian protracheophyte *Aglaophyton major* provides the best fossil record for existence of AM-like symbiosis as early as 400 million years ago; the arbuscules are visible in the protosteles of this early Devonian plant (Remy et al. 1994; Taylor et al. 2005). Fossil roots of younger age from the Triassic show that this type of symbiosis has been present continuously in early land plant evolution (Stubblefield et al. 1987). On the other hand, the oldest ectomycorrhizal fossils have so far been found only in the middle Eocene (50 million years ago) (LePage et al. 1997). The fossil record of glomeromycetous fungi, found in the Ordovician (Redecker et al. 2000), also clearly predates that of ascomycetous fungi unearthed from the Lower Devonian (Taylor et al. 1999). Given all these lines of evidence, it seems safe to conclude that AM represents the ancestral type of mycorrhiza in land plants.

Many independent conversions of arbuscular mycorrhiza to other types of mycorrhizas

If the ancestral state of AM in land plants is accepted, and further, if it can be agreed upon that the glomeromycetous fungi–plant interaction is underpinned by a genetic mech-

anism that has been stably inherited since its establishment in the common ancestor of all land plants, the phylogenetic distribution of AM and other types of mycorrhiza shown in Fig. 1 leads to the conclusion that there have been many independent conversions of AM to these other types of mycorrhizas. Brundrett (2002) previously proposed these evolutionary changes. In this review, we find overwhelming evidence in support of this hypothesis. Many plant lineages, ranging from pteridophytes through gymnosperms to angiosperms, contain some species that can form both AM and other types of mycorrhizas, e.g., Dryopteridaceae, Pinaceae, Gnetaceae, Araucariaceae, Cupressaceae, Orchidaceae, Cyperaceae, Poaceae, Ranunculaceae, Polygonaceae, Caryophyllaceae, Ericaceae, Rubiaceae, Oleaceae, Aquifoliaceae, Campanulaceae, Goodeniaceae, Asteraceae, Caprifoliaceae, Grossulariaceae, Myrtaceae, Melastomataceae, Euphorbiaceae, Salicaceae, Polygalaceae, Fabaceae, Rosaceae, Rhamnaceae, Juglandaceae, Betulaceae, Casuarinaceae, Cistaceae, Malvaceae, and Sapindaceae (Table 1; Fig. 1). These species might be in a transitional state from AM to other types of mycorrhizas. These other types of mycorrhizas have probably evolved as a consequence of emergence of new lineages in fungi on one side (e.g., certain groups of Ascomycetes and Basidiomycetes) and in plants on the other side (e.g., Pinaceae, Orchidaceae, Ericaceae, Fagales, and Malvales), and the associations formed by these new lineages that were able to colonize habitats that were previously not very successfully occupied by AM plants (Malloch et al. 1980). Because these other types of mycorrhizas have been classified using both morphological and plant partner criteria (Smith and Read 1997), we follow this classification in our discussion below.

Ectomycorrhiza

Ectomycorrhiza (ECM) is a partnership between mostly basidiomycetous fungi and various groups of land plants. It primarily occurs in Pinaceae, Araucariaceae, Cupressaceae, Gnetaceae, Polygonaceae, Nyctaginaceae, Myrtaceae, Salicaceae, Fabaceae, Fagales, and Malvales. In addition, many other families of vascular plants contain a small percentage of species that form this type of mycorrhiza. Most leafy liverworts also have ascomycetous and basidiomycetous fungal associations (Table 1; Fig. 1). Although ECM is much rarer than AM in land plants, among all types of mycorrhizas formed by ascomycetous and basidiomycetous fungi, it is the most common one. When viewed in a plant phylogenetic perspective, the distribution of ECM clearly suggests many independent origins of this type of mycorrhiza because its occurrence is sporadic throughout land plants and it is mostly found in derived lineages in major plant clades. Previously, Bruns and Shefferson (2004) estimated at least 12 independent origins of ECM within angiosperms by mapping ectomycorrhizal information provided in Smith and Read (1997) onto an angiosperm phylogeny (Soltis et al. 2000). Fitter and Moyersoen (1996) conducted a similar survey and reached a similar

conclusion. Our study revealed many more events of evolution of this type of mycorrhiza in land plants (Fig. 1).

Examination of the evolutionary histories of both plants and fungi may provide some ideas to understand how this type of mycorrhiza evolved repeatedly. The plants that form ECM typically grow in nutrient-poor environments, e.g., temperate and timberline forests of both Southern and Northern Hemispheres (Malloch et al. 1980), the spruce–hemlock–redwood forest of the coastal fog belt in the Pacific Northwestern USA, the wet eucalyptus forest in Australia, and the wet dipterocarp forest of Australasia (J. Trappe, personal communication). Phylogenetically, these plants represent derived lineages of some major land plant clades that once lived in a less nutrient-deficient environment, e.g., Pinaceae and Cupressaceae, as opposed to other conifers such as Cephalotaxaceae, Taxaceae, and Taxodiaceae, and Fagales and some Malvales vs other rosids. Meanwhile, the fungal species that participate in ECM symbiosis evolved repeatedly from saprotrophic homobasidiomycetes and also reverted to free-living condition many times independently (Hibbett et al. 2000), and they also represent derived lineages of fungi as a whole (Lutzoni et al. 2004). Thus, evolution of ECM could be viewed as an adaptation by those major plant clades to the change of environment when the climate on earth became more seasonal and arid (Hickey and Doyle 1977; Malloch et al. 1980), which immobilized nutrients, or simply as an adaptation to the environments that were limited in nutrient availability. From these considerations, it may be argued that the plasticity exhibited by ECM evolution reflects the opportunistic nature of a collective response by both plant and fungal partners to environmental challenges. This seems to be a short-term evolutionary strategy in comparison to AM, which clearly represents a major evolutionary innovation to solve a permanent water-and-nutrients deficiency problem faced by plants when they first made the virtually irreversible invasion onto the land in the Ordovician.

Fig. 1 A phylogenetic tree of 263 land plant families mapped with mycorrhizal information. **a** Non-angiosperms (including bryophytes, pteridophytes, and gymnosperms), **b** angiosperms except core eudicots, **c** core eudicots except rosids, and **d** rosids. For each family, the number in the column *Total* shows the total number of examined species; the *M%* column shows the percentage of obligately mycorrhizal species. The *FM%* column shows the percentage of facultatively mycorrhizal species, and the *NM%* column shows the percentage of nonmycorrhizal species. *Thicker terminal branches* were used to indicate 21 nonmycorrhizal families. For each of the 242 mycorrhizal families, the percentages of different types of mycorrhizae among all mycorrhizal species are shown in the *M type* column. The mycorrhizal types are consistent to the current widely used system of Smith and Read (1997): *AM* arbuscular mycorrhiza, *ECM* ectomycorrhiza, *EEM* ectendomycorrhiza, *ORM* orchid mycorrhiza, *ERM* ericoid mycorrhiza, *MTM* monotropoid mycorrhiza, *ABM* arbutoid mycorrhiza, as well as mycoheterotrophy. For the bryophytes, fungal associations were used instead of mycorrhiza: *A*, *B*, and *G* indicate ascomycetous, basidiomycetous, and glomeromycetous fungal associations, respectively. ^①Families in which ectomycorrhizal species have been reported. ^②Families in which mycoheterotrophic species have been reported

Fig. 1 (continued)

b

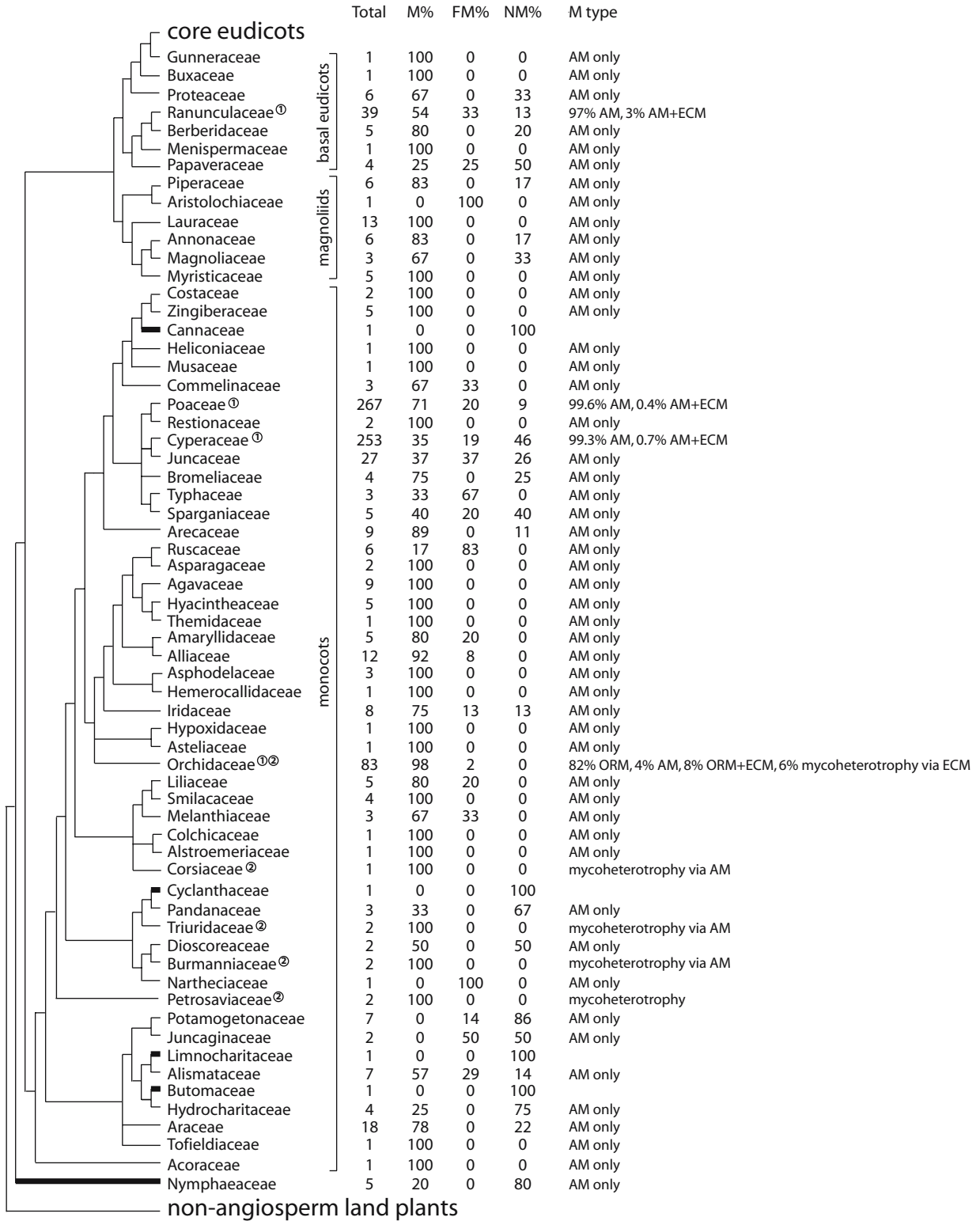
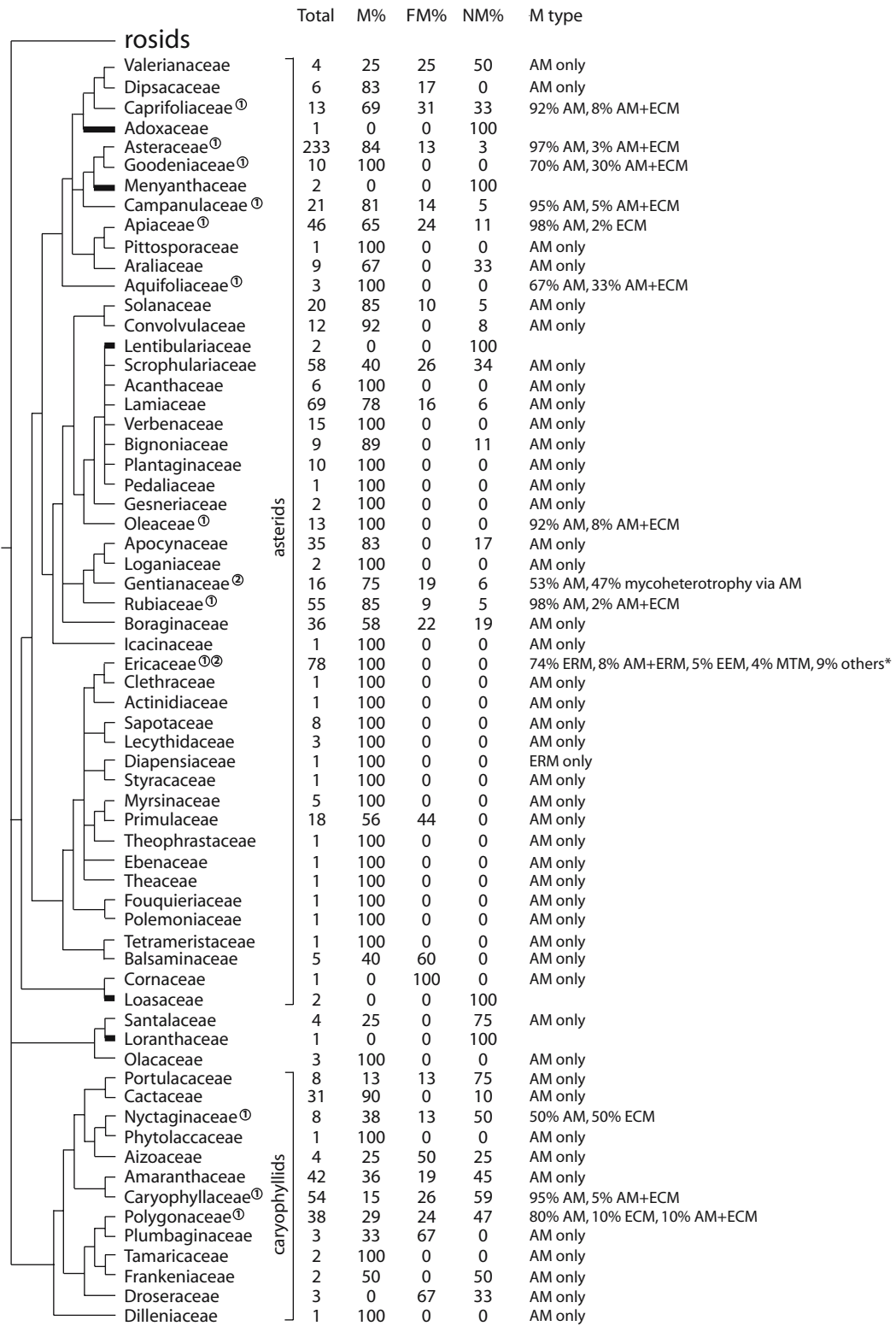


Fig. 1 (continued)

C



* Ericaceae: MTM is mycoheterotrophic. 9% others include 1.3% AM, 1.3% endoM, 1.3% ABM, 1.3% ABM+ECM, 1.3% ABM+ERM, 1.3% Mono M+ERM, 1.3% ERM+ABM+ECM+EEM

Fig. 1 (continued)

d

	Total	M%	FM%	NM%	M type
Sapindaceae ^⓪	19	74	26	0	84% AM, 16% AM+ECM
Burseraceae	4	75	25	0	AM only
Anacardiaceae	16	100	0	0	AM only
Simaroubaceae	2	100	0	0	AM only
Meliaceae	21	90	5	5	AM only
Rutaceae	12	100	0	0	AM only
Malvaceae ^⓪	42	95	5	0	93% AM, 5% ECM, 2% AM+ECM
Dipterocarpaceae ^⓪	5	80	0	20	75% AM, 25% ECM
Cistaceae ^⓪	12	100	0	0	8% AM, 42% ECM, 8% AM+ECM, 17% ECM+EEM, 25% AM+ECM+EEM
Bixaceae	1	100	0	0	AM only
Thymelaeaceae	6	83	17	0	AM only
Brassicaceae	55	15	33	53	AM only
Capparidaceae	2	50	0	50	AM only
Resedaceae	2	0	100	0	AM only
Bataceae	1	0	0	100	
Caricaceae	1	100	0	0	AM only
Moringaceae	1	100	0	0	AM only
Tropaeolaceae	1	100	0	0	AM only
Casuarinaceae ^⓪	4	100	0	0	25% AM, 50% ECM, 25% AM+ECM
Betulaceae ^⓪	15	93	7	0	7% AM, 67% ECM, 7% AM+ECM, 13% ECM+EEM, 7% AM+ECM+EEM
Juglandaceae ^⓪	3	67	33	0	33% AM, 33% ECM, 33% AM+ECM
Myricaceae	5	40	60	0	AM only
Fagaceae ^⓪	14	86	7	7	8% AM, 92% ECM
Tetramelaceae	1	100	0	0	AM only
Begoniaceae	3	100	0	0	AM only
Cucurbitaceae	8	100	0	0	AM only
Urticaceae	10	60	20	20	AM only
Moraceae	14	93	0	7	AM only
Cannabaceae	1	0	100	0	AM only
Ulmaceae ^⓪	6	83	0	17	80% AM, 20% AM+ECM
Elaeagnaceae	4	100	0	0	AM only
Rhamnaceae ^⓪	17	88	12	0	94% AM, 6% AM+ECM
Rosaceae ^⓪	80	84	15	1	84% AM, 3% ECM, 13% AM+ECM
Fabaceae ^⓪	315	94	3	3	86% AM, 7% ECM, 7% AM+ECM, 0.3% AM+ECM+EEM
Polygalaceae ^{⓪②}	6	87	13	0	67% AM, 17% AM+ECM, 17% mycoheterotrophy via AM
Elaeocarpaceae	3	100	0	0	AM only
Cunoniaceae ^⓪	1	100	0	0	AM+ECM
Oxalidaceae	7	86	14	0	AM only
Chrysobalanaceae	1	100	0	0	AM only
Ochnaceae	1	100	0	0	AM only
Elatinaceae	1	100	0	0	AM only
Hypericaceae	8	38	13	50	AM only
Clusiaceae	9	78	11	11	AM only
Turneraceae	1	100	0	0	AM only
Salicaceae ^⓪	41	93	7	0	15% AM, 49% ECM, 34% AM+ECM, 2% ECM+EEM
Violaceae	15	60	40	0	AM only
Euphorbiaceae ^⓪	69	87	9	4	92% AM, 5% ECM, 3% AM+ECM
Erythroxylaceae	1	0	0	100	
Linaceae	6	50	33	17	AM only
Rhizophoraceae	2	50	0	50	AM only
Pandaceae	1	100	0	0	AM only
Humiriaceae	1	100	0	0	AM only
Celastraceae	5	100	0	0	AM only
Parnassiaceae	1	0	100	0	AM only
Zygophyllaceae	9	78	0	22	AM only
Krameriaceae	1	100	0	0	AM only
Melastomataceae ^⓪	5	80	0	20	75% AM, 25% AM+ECM
Myrtaceae ^⓪	52	98	0	2	53% AM, 29% ECM, 17% AM+ECM
Lythraceae	6	67	17	17	AM only
Onagraceae	23	74	22	4	AM only
Combretaceae	2	100	0	0	AM only
Geraniaceae	13	62	31	8	AM only
Vitaceae	5	100	0	0	AM only
Saxifragaceae	9	11	44	44	AM only
Grossulariaceae ^⓪	5	80	20	0	80% AM, 20% AM+ECM
Haloragaceae	2	50	0	50	AM only
Crassulaceae	16	31	19	50	88% AM, 12% endo-M (also AM?)
Hamamelidaceae	1	100	0	0	AM only

rosids

The very different evolutionary pattern of ECM from that of AM might suggest a different underlying genetic mechanism. Also, the structure is quite different between the two types of mycorrhizas. In ECM, the fungal hyphae do not penetrate the cell wall, and instead form a Hartig net (an intercellular meshwork in the root epidermis and cortex) and a sheath around the root derived from this net. On the other hand, the fungal hyphae in AM penetrate the cell wall and often form arbuscules. At present, little is known about the molecular genetic basis of ECM development. All plant genes involved in mycorrhizal symbiosis identified so far control AM development (Stracke et al. 2002; Liu et al. 2003; Ane et al. 2004; Demchenko et al. 2004; Levy et al. 2004). One of these genes has a homolog in the moss *Physcomitrella patens* and several other early land plants (Wang and Qiu, unpublished data). Hence, it can be inferred that there might be a general genetic program in plants that mediates plant–fungus interaction, a small portion of which might even be involved in plant–fungal pathogen interaction as well (Harrison 1999). This program was most likely established at the beginning of land plant evolution, if not earlier, and mostly targets glomeromycetous fungi. It has been inherited in land plants since its inception and is responsible for the prevalence of AM seen today. When ECM evolved in a particular plant lineage, the homobasidiomycetous fungi might have adopted much of this general genetic program, but also modified some aspects of it to suit a slightly different plant–fungus partnership. One intriguing question is how different plant lineages, particularly those as diverse as ferns, gymnosperms, and angiosperms, adapted the general genetic program for ECM development, as the structures of mycorrhizas are apparently very similar between these diverse lineages. Perhaps different genes are involved in each case, thus, the host specificity developed with different fungal symbionts in each case of ECM (as opposed to AM). Indeed, difference in gene expression was observed to be related to host specificity (Le Quere et al. 2004). Future work will likely reveal more details to help us understand how many independent conversions of ECM from AM had occurred.

The ericaceous mycorrhizas and their close relationship to ectomycorrhiza

There are six types of mycorrhizas in Ericaceae. With the exception of AM, five of them are partnerships between ascomycetous or basidiomycetous fungi and plants: ECM, ectendomycorrhiza (EEM), arbutoid mycorrhiza (ABM), monotropoid mycorrhiza (MTM), and ericoid mycorrhiza (ERM). Among these five types, ECM occurs in many plant lineages outside of Ericaceae (see above), and EEM is found in Pinaceae, Araucariaceae, Ericaceae, Salicaceae, Fabaceae, Betulaceae, and Cistaceae (Fig. 1). ABM, MTM, and ERM can be deemed to be genuinely ericaceous mycorrhizas, as they occur almost exclusively in this family. The only exception is ERM, which has also been found in Diapensiaceae, a close relative of Ericaceae. The

ericaceous mycorrhizas share many characteristics with ECM, but exhibit a high degree of intracellular penetration (Smith and Read 1997). Brundrett (2002) suggested that ABM, MTM, and ERM were derived from ECM. Our mapping of ECM and these other types of mycorrhizas onto the land plant phylogeny and examination of their distribution within Ericaceae supports this interpretation. Further, we add that EEM probably represents a transitional stage between ECM and the three types of ericaceous mycorrhizas, ABM, MTM, and ERM, as ECM and EEM are found only in the basal lineages of Ericaceae, Monotropeoideae, and Arbutoideae (Kron et al. 2002).

Previous studies have identified the fungal symbionts of the ericaceous mycorrhizas. One interesting phenomenon is that the fungal strains isolated from these three types of mycorrhizas can also form ECM with other plant species (reviewed by Smith and Read 1997). This observation strongly suggests a close relationship between ECM and the ericaceous mycorrhizas. An interesting question that arises is why the same fungi cannot penetrate into root cells of ectomycorrhizal hosts yet are able to do so with ericaceous plants. One answer could be that host plants play an important role in controlling development of different types of mycorrhizas.

Orchid mycorrhiza

Orchid mycorrhiza (ORM) is generally thought to be restricted to the Orchidaceae, which involve mostly basidiomycetous fungi (Leake 1994). Occurrence of this type of mycorrhiza in other plants such as the subterranean nonphotosynthetic liverwort *Cryptothallus mirabilis* (Ligrone et al. 1993; Bidartondo et al. 2003) and the monocot *Thismia* sp. (Brundrett 2002 see <http://www.ffp.csiro.au/research/mycorrhiza/>) probably represents functional and structural convergence, as the fungal partners are of different types than those of the true ORM in Orchidaceae (Leake 1994). In this perspective, ORM, like the ericaceous mycorrhizas discussed above, can be considered to occur exclusively in one plant family, Orchidaceae, and probably represents a highly specialized type of ectomycorrhiza. One fact supporting this idea is that some species of lower Epidendroideae, an early-diverging lineage within Orchidaceae (Cameron et al. 1999), still have ECM (Bidartondo et al. 2004; Selsosse et al. 2004).

Did evolution of ectomycorrhiza and its derived types of mycorrhizas spur diversification of plant lineages that harbor these symbiotic systems?

If AM was instrumental in the origin and subsequent diversification of land plants in a newly exploited niche, did evolution of ECM and its derived types of mycorrhizas, which involve Ascomycetes and Basidiomycetes, contribute to diversification of plant lineages that forged these new partnerships? Our review provides a rather positive

answer to this question. In plant families where ECM and its derivatives are the main types of mycorrhizas or account for a significant percentage (>20%), e.g., Pinaceae, Orchidaceae, Nyctaginaceae, Polygonaceae, Ericaceae, Aquifoliaceae, Salicaceae, Fagaceae, Betulaceae, Cistaceae, Dipterocarpaceae, Myrtaceae, and Melastomataceae (Mabberley 1987), the species number is often high to very high in comparison to their close relatives that have AM (Fig. 1). In the case of woody plants, the members of these families are often dominant species in their communities (Malloch et al. 1980). Although there are many factors that may affect speciation rate, we believe that the correlation between high occurrence rate of ECM and its derived types of mycorrhizas and the species richness of plant clades that harbor these symbiotic systems are not coincidental. This observation becomes particularly striking when compared to mycoheterotrophy, another type of plant–fungus symbiosis, which will be discussed below. Because ascomycetous and basidiomycetous mycorrhizal fungi have a much higher host specificity than glomeromycetous fungi (Horton and Bruns 1998; Newton and Haigh 1998; Bidartondo and Bruns 2002), diversification of the plant hosts had likely in turn driven the speciation rate of the fungal symbionts. This coevolutionary arms race probably explains the large number of Basidiomycetes that are ectomycorrhizal today (Molina et al. 1992). In comparison, AM has obviously contributed very little to the diversification of glomeromycetous fungi, and the relatively low host specificity of these fungi may be to blame.

Mycoheterotrophy

Mycoheterotrophy represents a shift of balanced mutualistic symbiosis between plants and fungi toward an exploitative use of mycorrhizal fungi by plants that are no longer fully photosynthetic (Leake 1994). It is clearly a derived condition in mycorrhizal evolution. In our survey, we found that mycoheterotrophy had evolved many times independently in land plants, in the following families: Aneuraceae, Podocarpaceae, Petrosaviaceae, Burmanniaceae, Triuridiaceae, Corsiaceae, Orchidaceae, Ericaceae (Monotropoideae), Gentianaceae, and Polygalaceae (Fig. 1). The mycoheterotrophy in the moss genus *Buxbaumia* needs more thorough investigation (Leake 1994). In addition, gametophytes of *Lycopodium*, *Psilotum*, and *Botrychium* are also mycoheterotrophic (reviewed by Brundrett 2002). However, it has been suggested that mycoheterotrophy in these latter cases and most species of Orchidaceae may be different from that in other plant groups mentioned above (Bidartondo 2005) because these plants only engage in mycoheterotrophy for a part of their life cycles during establishment, and they are photosynthetic for the rest of their life cycles and enter mutualistic symbiosis with mycorrhizal fungi.

The independent evolution of mycoheterotrophy in many unrelated lineages of land plants is further underscored by the fact that it evolved repeatedly from AM and ECM and ECM-derived types of mycorrhizas (Fig. 1).

Hence, evolution of mycoheterotrophy reinforces the evolutionary parallelism commonly seen in mycorrhizal evolution, which has dominated evolution of ECM as discussed above and loss of mycorrhiza to be discussed below. Although one may think that an exploitative relationship such as mycoheterotrophy can be evolutionarily unstable, which seems to be supported by the general paucity of species in most clades of mycoheterotrophic plants (Leake 1994), this unique type of interaction among more than two species of very different modes of nutrition uptake (autotrophy and heterotrophy) might have played a special role to facilitate some major transitions during land plant evolution. In the case of lycophytes and ferns, mycoheterotrophy probably helped to ease the transition from a gametophyte generation-dominant life cycle in bryophytes to a sporophyte generation-dominant life cycle in vascular plants. For most Orchidaceae, mycoheterotrophy has perhaps alleviated the problem of extremely small size of the seeds, which can be advantageous for dispersal but at the same time, limits nutrition packaging for the next generation, and thus has probably contributed significantly to the success of the family. These two examples once again highlight the important roles played by fungi not only in the origin, but also in many subsequent radiations of land plant evolution.

Many independent losses of mycorrhiza in land plants

Many families of land plants have not been found to form mycorrhizas with fungi in their natural habitats. In liverworts, no fungal association has been observed in Blasiaceae, Ricciaceae, Metzgeriaceae, Radulaceae, Porcellaceae, Jubuliaceae, Lejeuneaceae, or Herbertaceae. In pteridophytes, species in Isoetaceae and Azollaceae are nonmycorrhizal. Similarly in angiosperms, species in Nymphaeaceae, Butomaceae, Limncharitaceae, Cyclanthaceae, Cannaceae, Loranthaceae, Loasaceae, Lentibulariaceae, Menyanthaceae, Adoxaceae, Erythroxyllaceae, and Bataceae are nonmycorrhizal. In addition, nonmycorrhizal species occur together with mycorrhizal species in many families, and approximately half of the ten or more species examined in the following families are nonmycorrhizal: Geocalycaceae, Jungermanniaceae, Lycopodiaceae, Hymenophyllaceae, Gleicheniaceae, Pteridaceae, Adiantaceae, Aspleniaceae, Thelypteridaceae, Dryopteridaceae, Polypodiaceae, Cyperaceae, Polygonaceae, Amaranthaceae, Caryophyllaceae, Crassulaceae, and Brassicaceae (Table 1, Fig. 1). The fact that these families are deeply embedded among mycorrhizal families and are not closely related to each other provides convincing evidence that these plants lost their ability to form mycorrhiza independently.

There are two interesting features for phylogenetic distribution of nonmycorrhizal plants. One is that leafy liverworts and pteridophytes in general tend to have a high concentration of nonmycorrhizal species. Of course, mosses, as an entire clade, lack mycorrhiza as well (Read et al. 2000) except *Takakia* (Boullard 1988). Gymnosperms, on the other hand, are all mycorrhizal and almost

all obligately mycorrhizal. Angiosperms generally are also mycorrhizal, and have only a few groups that have a high percentage of nonmycorrhizal species, alismatids (including Araceae according to Stevens' (2004) new classification system, see Fig. 1b), Cyperaceae, caryophyllids, and Brassicaceae. This feature may be related to the fact that early land plants had not fully adapted to the symbiotic system with the fungi. Indeed, these plants generally have the *Paris*-type AM, which lacks well-developed systems of intercellular hyphae and do not always form arbuscules (Read et al. 2000). It will be interesting to see if future studies can demonstrate that a simpler genetic system is behind this rather unstable symbiotic relationship in basal land plants. The other feature is that almost all nonmycorrhizal plants are derived from ancestors that engaged in AM symbiosis. In the several families where ECM and ECM-derived mycorrhizas dominate or account for a large percentage, e.g., Pinaceae, Orchidaceae, Ericaceae, Myrtaceae, Salicaceae, Fagales, and Cistaceae, very few species are nonmycorrhizal. This feature is perhaps related to the highly specialized nature of the ECM symbiosis.

As to the mechanisms responsible for mycorrhizal loss, Trappe (1987) noticed several characters that tend to be shared by nonmycorrhizal species, and his observations still hold true here. First, many nonmycorrhizal vascular plants grow in aquatic or wetland habitat. In these environments, both nutrients and water supplies are not as limited as in the typical terrestrial environment. Hence, the plants can develop independence from the fungal symbionts and reduce the carbon cost that would normally be provided to the fungal partners in exchange for nutrients and water. The loss of mycorrhiza in alismatids and other aquatic plants likely occurred through this mechanism. Second, species that grow in nutrient-rich environments tend to be nonmycorrhizal. The ruderals in caryophyllids, Brassicaceae, and Crassulaceae, and the spring ephemerals in Ranunculaceae, Papaveraceae, and Saxifragaceae belong to this category. Third, the plants that have a long, fine, and highly branched root system with well-developed root hairs also have a high tendency to become nonmycorrhizal. Cyperaceae and the ruderals perhaps developed independence from fungal symbionts through this route. It has been suggested that root hairs and mycorrhizal fungi were two alternative mechanisms for plant nutrient uptake (Baylis 1970; Koide 1991). If a plant can absorb sufficient nutrients through its own root hairs, any genetic changes preventing the formation of mycorrhiza with fungi would be favorably selected. Besides these three observations made by Trappe (1987), we also noticed that many liverworts that lack fungal association are leaf and bark epiphytes, e.g., Radulaceae, Jubulaceae, Porellaceae, and Lejeuneaceae. A possible explanation could be that fungal development is thwarted by defense mechanisms of the plant on which these epiphytes live.

Areas of further study

This study and those by Trappe (1987) and Harley and Harley (1987) represent the three most extensive surveys of mycorrhizal occurrence in land plants, but the total number of species included in the three studies is only slightly over 10,000 (assuming that there is little overlap among the three surveys), which is about 3% of all listed land plant species that live on our planet. As can be seen from Table 1 and Fig. 1, for most plant families we have knowledge of the mycorrhizal status for only one or a few species. Hence, the first area that deserves more attention in the future is the investigation of mycorrhizal status of more species. From this study and those by Trappe (1987) and Harley and Harley (1987), as well as several reviews published earlier on this topic (Pirozynski and Malloch 1975; Malloch et al. 1980; Selosse and Le Tacon 1998; Read et al. 2000; Brundrett 2002), it is clear that mycorrhizas were instrumental in the origin and subsequent diversification of land plants and are continuing to play a vital role in maintaining floristic diversity and ecosystem function on earth. Thus, mycorrhizal symbiosis should be viewed as an integral part of any floristic, ecological, or evolutionary studies in the future.

Besides the general increase of mycorrhizal research, a few specific areas should be pursued. First, more basal land plants should be investigated, as they occupy an especially important position in our understanding of the origin of mycorrhizal symbiosis in land plants. Despite several studies on basal land plants (Pocock and Duckett 1985; Duckett et al. 1991; Read et al. 2000), our knowledge on phylogenetically critically positioned taxa such as Treubiaceae, many simple thalloid liverworts, mosses, and some hornworts, remains fragmentary. In this regard, mosses deserve special attention, as they represent the only major clade of land plants that is nonmycorrhizal (Read et al. 2000), a situation which by itself is very puzzling. Several basal moss lineages such as Andreaeaceae, Tetrarhiaceae, Polytrichaceae, Buxbaumiaceae, and Diphysciaceae all grow on nutrient-poor, sandy soil or rocks. It will be interesting to know how they manage to grow on these poor substrates if they are truly nonmycorrhizal. *Takakia*, a sister group to all other mosses, is reported to be mycorrhizal (Boullard 1988) and grows on thin soil and rocks (Gao 2000). Second, several early-diverging lineages of angiosperms, Amborella, Austrobaileyales, Chloranthaceae, and magnoliids should be investigated; the information on their mycorrhizal status is currently lacking. Even when Trappe's (1987) survey is included, our knowledge of these plants is still quite poor. A focused study on these plants will fill an important gap in our understanding of mycorrhizal evolution in early angiosperms. Finally, as we learn more from studies of model organisms such as legumes (Stracke et al. 2002; Liu et al. 2003; Ane et al. 2004; Demchenko et al. 2004; Levy et al. 2004), characterization of molecular aspects of mycorrhizas in nonmodel organisms will significantly expand the dimension and depth of our knowledge of this important symbiotic system. In summary, the mycorrhizal research

conducted over the last several decades has brought this long neglected field into mainstream biology, and future research will undoubtedly further enhance our understanding of this important biological interaction and its impact on the evolution of both plants and fungi, as well as the establishment and functioning of the terrestrial ecosystem.

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