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## ***Gymnopodium floribundum* Trees (*Polygonaceae*) Harbour a Diverse Ectomycorrhizal Fungal Community in the Tropical Deciduous Forest of Southeastern Mexico**

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### Short Commentary

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#### ABSTRACT

Recent field work developed in a monodominant forest of *Gymnopodium floribundum* (*Polygonaceae*) in the tropical deciduous forest established in southeastern Mexico (Chiapas State), led us to discover a number of above ground fruit bodies of putative ectomycorrhizal species of *basidiomycetes* families *Boletaceae*, *Amanitaceae*, *Russulaceae*, *Cortinariaceae* and *Cantharellaceae*, and also to know the edibility of *basidiomes* of *Tremelloscypha gelatinosa* and *Lactarius chiapanensis* both hunted during the rainy season by local people for consumption. The presence of such fungal groups under *Gymnopodium* trees suggested the possibility that *G. floribundum* is an ectomycorrhizal-forming tree. In the tropical forests of Mexico above- and below ground ectomycorrhizal fungal component has not been investigated and for tropical members of the *Polygonaceae*, the ectomycorrhizal associates of *Coccoloba* but not of *Gymnopodium* have been recorded. We develop research in order to document the ectomycorrhizal fungal community of *G. floribundum* in the tropical deciduous forest of southeastern Mexico

With the benefits provided by the molecular techniques in the study of ectomycorrhizal fungi (EcMF), our knowledge about the different lineages of species integrating the fungal communities in forest ecosystems has increased greatly. Beyond of records of above ground fruit bodies the EcMF communities are being more accurately revised, based on below ground distinctive root tips morphotypes. Numerous papers document the species diversity and community composition of EcMF in temperate forests, but also information on tropical habitats of the world is increasing [1-5]. Research in natural habitats that consider sporocaps/ectomycorrhizae to recognize specific native ectomycorrhizal plant/fungi symbionts or EcMF community composition supported by molecular information has been recently developed in Mexico [6-14]. In the last few years as part of our monitoring program to study the macrofungi inhabiting different forest ecosystems from Mexico, we have focused our research on recognizing ectomycorrhizal fungal species associated to putative ectomycorrhizal trees, especially on tree species or on forest ecosystems devoid of information about the specific mycobionts. Examining the above ground fruit bodies and the below ground ectomycorrhizae counterparts, morphologically documented and supported by molecular tools, we have recorded the association between *Fagus grandifolia* var. *mexicana* trees with *Lactarius badiopallescens*, *L. cinereus* and *L. fumosibrunneus*, *Carpinus caroliniana* with *L. indigo*, *Quercus xalapensis* with *L. strigosipes*, *Quercus* sp. with *L. strigosipes*; *Turbinellus floccosus* with *Abies religiosa* and *L. cuspidoaurantiacus* and *L. herrerae* associated with *Alnus acuminata* [8,11-13].

Field work developed in a forest dominated by *Gymnopodium floribundum* (*Polygonaceae*) in the tropical deciduous forest established in southeastern Mexico (Chiapas State) (**Figure 1a and 1b**), led us to discover that the fruit bodies of the *heterobasidiomycete* *Tremelloscypha gelatinosa* (**Figure 1c**) locally named “nangañaña” are harvested during the rainy season by local people for consumption, whereas *Lactarius chiapanensis* known as “moni” (**Figure 1d**), is harvested for sale in popular markets of the region [8,15]. *Tremelloscypha gelatinosa* is a member of the *Sebacinales* group A and it is phylogenetically related to ectomycorrhizal species [16,17]. The presence of *Lactarius chiapanensis* and *Tremelloscypha gelatinosa* under *Gymnopodium* trees, suggested then, the possibility that *G. floribundum* is an ectomycorrhizal-forming tree. Surprising indeed, during subsequent explorations in such tropical forest we found the occurrence of a number of fruit bodies of putative EcMF belonging

to basidiomycete families Boletaceae, Amanitaceae, Russulaceae, Cortinariaceae and Cantharellaceae (Figure 1e and 1f) (Bandala and Montoya 2014). While lineages of these groups are recognized as important elements of the ectomycorrhizal fungal community in different tropical forest worldwide, in the tropical forests of Mexico above- and below ground EcMF component has not been investigated and for tropical members of the Polygonaceae, to our knowledge, the ectomycorrhizal associates of *Coccoloba* but not of *Gymnopodium* have been recorded [18-29].



**Figure 1.** a. *Gymnopodium* forest panorama in the tropical deciduous forest under study. b. *Gymnopodium floribundum*. c. *Tremelloscypha gelatinosa*. d. *Lactarius chiapanensis*. e. *Boletus* sp. f. *Inocybe* sp.

*Gymnopodium floribundum* is monodominant over a number of hectares in the tropical deciduous forest under study (Figure 1a) and the presence of the component of EcMF now observed above ground is expected to be potentially richer in species at root tip level, in congruence with the assumption that in tropical habitats, the aggregations or dominance of ectomycorrhizal trees are favored by the interaction of associated EcMF and that monodominant forests may harbor a more diverse ectomycorrhizal community than mixed forest [30-32]. As this forest is continuously being fragmented, the ectomycorrhizal edible mushrooms could be an incentive for local communities to protect it. Local communities should learn about the value of the ecological role of the ectomycorrhizae for enhancing seedlings establishment and tree growth, and appreciate the relation of the presence of these later with the availability of fruit bodies production as an alternative to obtain a non-timber forest product, source of protein-rich food and of economic incomes.

We have in developing a long-term project to investigate the ectomycorrhizal fungal community of *Gymnopodium floribundum* in the tropical deciduous forest of southeastern Mexico with the following main goals: taxonomic studies to describe the ectomycorrhizal species (sporomes/ectomycorrhizas), recognize specific interactions analyzing root tips, document the species richness and the structure of the ECM fungal community.

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