

## Diversity of ectomycorrhizal fungi: from a root tip to trees

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Ectomycorrhizal symbiosis is important and complex in the forest ecosystem. In this study, the diversity of ectomycorrhizal fungi (EMF) in a sub-alpine cold temperate forest dominated by *Abies kawakamii* and *Tsuga chinensis* var. *formosana* was investigated by morphology and DNA sequencing identification. Six morphotypes of mycorrhizae were described from the roots of two conifer species and 19 EMF species were detected by Sanger sequencing of rDNA ITS. Results show that four and six EMF species were detected from two morphotypes of ectomycorrhizae, one to two EMF species were detected from the other four morphotypes. *Laccaria* sp. were found in two *A. kawakamii* ectomycorrhizal morphotypes. *Russula peckii* formed more than two morphotypes of mycorrhizae with both tree species. These indicated that a single mycorrhizal root tip of plant may associate with multiple EMF species and a fungus existed in different ectomycorrhizal morphotypes with the same host. In total, 80,552 reads were obtained by next-generation sequencing and of 73,374 reads were identified as 8 families 35 EMF species. Russulaceae, Sebacinaceae were dominant in both tree species. *A. kawakamii* and *T. chinensis* were associated with 18 and 29 EMF species, respectively. Different abundances of 12 EMF species exist between two host trees. It indicated that EMF associated with multiple hosts with host preference. Both plants sharing EMF and EMF associated with hosts benefit the stability of EMF community.