

## Studies on plant establishment and mycorrhizal symbiosis in disturbed terrestrial locations

Keisuke OBASE

Kangwon National University

Volcanic eruptions are one of the extreme disturbances that suddenly and extensively change existing forest ecosystems to the devastated areas. Mycorrhizal symbiosis that consists of plants and mycorrhizal fungi is significant for vegetation recovery on disturbed terrestrial locations. We investigated the status of mycorrhizal fungal colonization in pioneer plants and the effect of mycorrhizal associations on a host plant in areas devastated by the 2000 eruption of Mt. Usu, Japan. The study site is located near the Nishiyama craters on Mount Usu. In the study site, a fern *Equisetum arvense* and perennial herbaceous plants such as *Polygonum sachalinense*, *Petasites japonicus* var. *giganteus* and *Artemisia montana* distributed widely and increased plant cover immediately just after the volcanic eruption. On the other hand, woody plants *Populus maximowiczii*, *Salix sachalinensis* and *Salix hultenii* var. *angustifolia* dominantly established and grow in height with high survivorship. We surveyed the frequencies and root colonization ratio of mycorrhizal fungi in those major plants and revealed that all of them associated with ectomycorrhizal (ECM) and/or arbuscular mycorrhizal (AM) fungi. Although the mycorrhizal frequencies and root colonization ratios in *E. arvense* and *P. sachalinense* were low, frequencies of mycorrhizal associations of other plants were relatively high. Our study revealed that forming mycorrhizal associations could occur even just after volcanic eruption in the early stage of vegetation recovery. Dominant Salicaceae associated commonly with ECM fungi and exhibited more variable associations with AM fungi. We found 6 to 10 ECM morphotypes in each ECM host and on average 1-2 in each seedling. We observed *Inocybe lacera*, *Laccaria amethystina*, *Thelephora terrestris* and *Tomentella ellisii* commonly in the roots of the dominant Salicaceae plants. Common fungi accounted for more than 60% of ECM colonization in each woody plant. These ECM fungi are well known colonizers of plants in disturbed or primary habitats (e.g. Danielson and Visser 1990; Nara et al. 2003). As same as previous reports (Nara 2007), generalists that can form ECM with various woody plants dominated in the study site. Inoculation experiment of dominant ECM fungi revealed that seedling height and biomass were increased by ECM colonization and effects of inoculation on seedling growth varied among ECM fungal partner. It seemed that *To. ellisii*, *H. mesophaeum* and *L. amethystina* that promote root growth are advantageous for plant establishment in disturbed area because they might support host plants

to endure against low water content and nutrient in soils and soil erosion. This study has revealed that mycorrhizal associations could play important roles on vegetation recovery just after volcanic eruption.

## Reference

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