

RESEARCH ABSTRACT

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**Study Title:** Recovery of mycorrhizal associations on Mount St. Helens.

**Key Words:** terrestrial upland plant trees vegetation  
fungi mycorrhizae animal vertebrate elk gopher  
nutrient succession pyroclastic flow blowdown zone ashfall zone  
long-term studies

**Abstract:** This work has studied the recovery of mycorrhizal associations on Mount St. Helens since the eruption in 1980. Mycorrhizal associations are symbioses between plants and fungi localized on the roots of plants. The fungi provide much of the nutrients utilized by the plants and the plants provide carbohydrates to the fungi. The associations on Mount St. Helens range from those plants that form facultative mycorrhizal associations, many herbaceous species including *Lupinus lepidus*, L., *latifolius*, and *Epilobium angustifolium*, to the coniferous trees that are obligately dependent on mycorrhizae.

Our work has concentrated on the vectors that move propagules of the mycorrhizal fungi and the ability of those vectors to place inoculum wherein the symbiosis can establish. We have separated the reestablishment dynamics in three zones, the sterile pyroclastic flow with no surviving propagules, the blast zone wherein most of the vegetation was destroyed, and the ashfall zone wherein most of the organisms survived but had to deal with the overlying ash. The recovery rates formed a gradient. Virtually all of the mycorrhizal types that were present before the eruption recovered quickly in the ashfall zones. Pocket gophers and ants facilitated this recovery by returning mycorrhizal fungi to the surface where contact with plant propagules could be made. In the blast zone, gophers and other rodents also survived and initiated mycorrhizal reformation within two to four years. Gophers and other rodents have initiated new mycorrhizal activity on the pumice plain following their arrival at the particular plant patch. They appear to key on patches of plants rather than individuals for their inoculum dispersal. Wind did not appear to be important for long range dispersal of soil-borne mycorrhizal fungi but may move propagules within a patch. Wind did appear to be important for the long-distance dispersal of the early ectomycorrhizal fungi such as *Thelephora* sp. Together these data indicate that the mycorrhizal fungi are critical to the recovery of the vegetation on Mount St. Helens and that a variety of animals served as vectors for the dispersal of these important fungi.

**Type of Measurement(s):** Presence or absence of mycorrhizal fungal propagules; spore density (#/kg soil); infection presence; species composition (when possible).

**Frequency of Measurement(s):** Twice annually in 1982-1986; once annually in 1988 and 1990.

**Data Storage:** Original data sheets at San Diego State University.

**Long-term plans, Data available for collaborative efforts:** Plans are to continue monitoring approximately every three to five years within the sample areas into the next century. Collaborative efforts will be considered on a case specific basis.