RESEARCH ABSTRACT

Principal Investigator(s): Virginia H. Dale
Oak Ridge National Laboratory
Environmental Sciences Division
MS 6038, P.O. Box 2008
Oak Ridge, TN 37831-6038
(615) 576--8043, FTS 626-8043

Study Title: Plant recovery on the debris avalanche

Key Words: terrestrial, plant, upland, shrubs, herbs, grasses, ecology, succession, seeds, dispersal, biomass, seeds, debris avalanche, long-term studies

Abstract: Seed dispersal and plant establishment have been monitored since 1980 on the debris avalanche created by the eruption of Mount St. Helens. The number of plants on the deposit increased over time to a high of almost 2 plants per square meter by 1983. The number of species per 250 meter square plot have increased to a mean of 10.3 in 1983 with 76 species being present over the entire deposit. Four years after the eruption only 30 percent of the species present before the eruption had reestablished themselves, and average plant cover was less than 1 percent. By 1989, plant cover had reached 18 percent.

The debris avalanche has been invaded primarily via wind-dispersed seed of early successional species that survived or have become established in adjacent disturbed areas. Most of the early successional species on the avalanche have plumed seeds that are adapted not only for long distance dispersal, but also for being trapped in wet areas or by spider webs. Fluctuations in the density of seeds dispersed to the deposit was related to variation in precipitation.

Neither seed abundance nor plant density correlated with absolute distance to a seed source or soil texture conditions. Colonization patterns are more influenced by the available biota and prevailing climate conditions than by substrate alterations resulting from the eruption.

This ten year study of plant recovery on the Mount St. Helens debris avalanche quantifies the resilience of native species in revegetating the largest landslide in recorded history. The research took advantage of the fact that some of the 97 permanent plots were invaded by exotic plant species introduced by federal agencies in attempts to enhance vegetation recovery. Comparing the revegetation patterns of plots with only native plants to plots with the exotic species demonstrated that non-native species actually slow down the rate of natural recovery. Only such a long-term study on a highly disturbed area can document the importance of native species in plant reestablishment. Knowledge of the species and their characteristics which were able to survive the volcanic eruption or to re-invade the area is essential for improved land reclamation programs and for better understanding of plant succession.

Type of Measurement(s): Permanent plots were established along two transects on the debris avalanche: one running north-south between Castle and Coldwater Lakes and the other running east-west. The area north of Castle Lake was first surveyed in July 1980. In August 1981, 31 250 meter square circular plots were placed at regular 50 m intervals on a transect between Castle and Coldwater Lakes; the center and 4 radii were marked and numbered; and any plants seen were marked with a stake. In June 1982 when the area was finally accessible by road, an additional 72 plots were established on a transect running east to west on the debris avalanche. The soil texture of each 250 meter square plot was assessed in August 1982. Sticky seed traps were placed in the center of each circular plot, and wind-dispersed propagules were measured in 1982 and 1983.

Frequency of Measurement(s): 1980, 1981, 1982, 1983, 1985, 1989, once annually all years. Seed traps were sampled six times in 1982.

Data Storage: Computer diskettes in LOTUS and ASCII

Long-term plans: Data available for collaborative efforts: Dale desires to continue monitoring the plots every five to ten years. Data is available for future collaborative efforts.