

RESEARCH ABSTRACT

**Principal Investigator(s):** Paul Heilman and Shiou Kuo  
Western Washington Research and Extension Center  
Washington State University  
Puyallup, WA 98371  
(206) 840-4500

**Study Title:** Survival and growth of native plant species planted in the Mount St. Helens blast area.

**Key Words:** terrestrial plant riparian trees herbs  
grasses legumes conifers Douglas fir cottonwood revegetation  
hardwoods fertilizer erosion control ashfall zone archives

**Abstract:** The principal objective of this research was to determine the potential of establishing vegetative cover in areas with deep deposits of volcanic materials from the eruptions of Mount St. Helens in 1980 in order to provide for erosion control. Three sites northeast and northwest of the mountain that received approximately 25 cm or more of volcanic materials were studied: two with largely pumice materials and one with predominately fine ash.

Greenhouse experiments were conducted to determine the influence of N forms, and N and P rates on seedling establishment and growth of grasses and forbs. Many of these species and varieties emerged rather well in the pumice material, but their emergence was severely restricted in the ash.

The field seeding trial contained 28 species and/or varieties of grasses and legumes seeded at three sites. Reasonably good establishment and growth was obtained with several species on the two pumice sites but not at the plots on fine ash. Nine types of seeded grasses performed satisfactorily. Legumes generally performed very poorly in the seeding trials. The survival of planted Douglas fir varied considerably among sites. Net annual growth and foliar N were significantly improved by fertilizers applied as a supplement to individual trees. The established grasses and legumes did not have any significant effect on growth performance of the trees. The performance of cottonwood on the mudflow of the North Fork of the Toutle River has been disappointingly poor, despite the significant improvement of foliar N levels and net growth of the trees by fertilizer treatments.

Type of Measurement(s): Laboratory studies: analyses of volcanic soils collected from research sites included particle size, porosity, bulk density, thickness of soil layers, pH, CEC, organic C, exchangeable Ca, Mg, Na,  $\text{NH}_4^+$ -N, available phosphate; and a fertilizer leaching study.

Greenhouse studies: seedling emergence, dry matter yield for herbs on 3 different soil types; dry matter yield, number and fresh weight of nodules on legume roots to determine effects of N source and N and P rates on herbs in 3 soil types.

Field studies: number of transplanted individuals survived; flowering and seed maturation, % germination and emergence for sowed seeds; kg/ha fertilizer, seeding rates (1,000 seeds/kg, kg/ha), density (plants/m<sup>2</sup>), % cover, dry weight of seeded grasses (g/m<sup>2</sup>); uptake of N and P (g/m<sup>2</sup>) for seeded herbs; height (cm), annual growth (cm), % survival, color of Douglas fir seedlings; fertilizer applications to Douglas fir; height, growth rate, and nutrient concentration in foliage for cottonwoods.

**Frequency of Measurement(s):** Soil analyses were performed in 1981 and 1983.

Greenhouse experiments performed once in 1982.

Field experiments were performed 1981-1983. Herbs were planted in transplanting trials in 1982; survival evaluated each growing season. Herb and grass seed sown and fertilized in field trials in fall 1981 and spring 1982; emergence evaluated twice in fall 1981; other observations made two years after seeding. Additional herb and grass seeding trial conducted in 1983. Douglas fir seedlings planted and fertilized May 1982; annual growth measured yearly and other observations made two years after planting. Cottonwood stem cuttings planted April 1981; fertilized April 1982; height measured yearly and other observations made in 1982.

**Data Storage:** Data is on file in SAS software at Washington State University Computing Center.

**Long-term plans:** Data available for collaborative efforts: Data is available for collaborative efforts. Monitoring of plots will continue, though it will become less frequent.