

**Final Report to  
The Agricultural Research Foundation  
and the  
Nursery Regulatory Committee**

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**Project Title:** Determining Invasive Habits of *Buddleja* Cultivars in the PNW

**Project Number:** 05-09

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**Abstract**

The objective of this project was to develop a model for distinguishing between invasive and non-invasive cultivars of ornamental species. *Buddleja davidii*, also known as butterfly bush, will be used as the subject in developing this model.

The first goal of this project was to document why *Buddleja* invades specific natural areas.

A second goal was to collect escaped seedlings from natural sites and nurseries, which will be used in a future experiment that utilizes genetic markers for determining which cultivars are more/less invasive.

**Progress:**

**Goal 1:**

Soil samples were collected to determine chemical properties of soils in which plants invade. Three sub-samples (each 1 pint) of soil were collected from each site and analyzed for macro-nutrient concentration, and soil pH. Physical characteristics of the soil were also assessed by classifying the soil by its history of disturbance, flood history, hydrology and soil texture class (sand, silt, or clay).

Local vegetation was documented. Local plant material was identified and described as juvenile or mature, its size, density, and vigor (competitiveness). A subjective

assessment was made as to whether or not *Buddleja* are growing with native vegetation, or displacing it.

Butterfly bush was found growing in a wide variety of sites, from flood plains to mountain slopes. Areas of densest invasion were on burn sites in reforestation areas, and sites that receive frequent disturbance such as flood plains. Density of seedling occurrence was approximately 4 times higher in riparian areas (0.23 plants/m<sup>2</sup>) than other natural sites, industrial sites, or roadsides. Density of seedlings at all sites tended to decrease with increased groundcover (living plants or dead plant debris).

Few escaped seedlings were found at production or retail nurseries. Production nurseries frequently cut plants back to encourage branching and more dense plant form. In the process, flowers are removed and not allowed to produce seed. Escaped seedlings were found at production nurseries that allowed plants in production or nearby landscape plantings to retain flowers over the winter.

Retail nurseries typically sell their stock before the end of the growing season. Plants not sold are cut back prior to over-wintering. Research from the United Kingdom reported that seed from butterfly bush are not released from the plant until the following spring. Because flower heads are almost always removed for one or more reasons throughout the growing season in both production and retail nurseries, the occurrence of escaped seedlings from these sites was low. It is not likely that production and retail sites are a source of escaped butterfly bush plants, although they might be a source of escaped seedlings once they are installed in home landscapes.

## **Objective 2:**

Seedlings were collected from each invaded site. These seedlings are being grown at NWREC for future analysis with genetic markers.

Genetic markers are being developed at the University of Minnesota, in cooperation with our efforts. Development of these markers is being funded by the Horticulture Research Institute from a grant co-written by myself and Stan Hokanson at U. Minn. We have extracted DNA from 15 cultivars of butterfly bush and have run initial ISSR amplifications on a subset of five of them with 4 primer sets. While we amplified bands, we are not satisfied with the initial results and are now beginning a series of optimization experiments, i.e. thermocycler parameters, PCR reagents, DNA amounts. This is typical for any initial attempt with a new plant species.

As soon as molecular markers are developed for distinguishing butterfly bush genotypes, we can begin studying how they spread through Oregon and attempt to determine the source of the invading plants.