Does Mulch Improve Plant Survival and Growth in Restoration Sites?

Successfully restoring wildland conditions in urban areas is often a difficult process. Determining management practices to improve long-term plant survival and growth and developing effective methods for long-term weed control are both critical. This is especially true for restoration projects, where weeding, watering, and other after care is often minimal.

A research project at the University of Washington's Center for Urban Horticulture is investigating whether mulching an unmanaged restoration site prior to plant installation is more beneficial to plant growth and survivorship than applying herbicide to the site. The research hypothesis is that plants grown in the mulched plots will show higher rates of survival and growth than the plants grown in areas sprayed by an herbicide.

Study Procedure

In spring 2000, six 10 foot by 10 foot test plots were created in the Union Bay Natural Area (UBNA). All six plots were mowed to remove aboveground vegetation. The plots were then randomly assigned to a treatment; three were sprayed with an herbicide, and three were covered with approximately eight inches of wood chip mulch. The plots were then planted with three northwest natives: snowberry (*Symphoricarpos albus* (L.) Blake), red-flowering currant (*Ribes sanguineum* Pursh) and oceanspray (*Holodiscus discolor* Pursh (Maxim.). Since this experiment was designed to simulate a typical restoration project, no after-care is provided.

Analysis

Each spring, the plants are analyzed to determine their survival and growth rates; this monitoring will continue for five years. The first analysis occurred in April 2001, when plants were counted and survival percentages for each species and treatment were determined. The height of each plant, from the root crown to the tip of the stem, was then measured. The relative success of the test plants and weedy invaders was also noted. Finally, the data were analyzed using single factor analysis of variance (ANOVA).

Results and Discussion

Survival - One year after installation, plants in mulched plots had a greater rate of survival than herbicide-treated plots (Figs. 1-2). For snowberry ($n = 330$) and oceanspray ($n = 30$), differences between treatments were significant ($p < 0.004$). For red-flowering currant, mulched plants were bigger than those in herbicide-treated plots, but not significantly so ($n = 15$; $p > 0.4$). The higher survival in mulched plots may indicate better establishment and a higher chance of survivorship in subsequent years.

Growth - Mulched sites also had larger (taller and bushier) plants than herbicide-treated sites (Figs. 1

Figure 1: Typical mulched (left) and herbicide-treated (right) plots one year after installation; note the rows of mulched snowberry on the left, obscured by weeds on the right

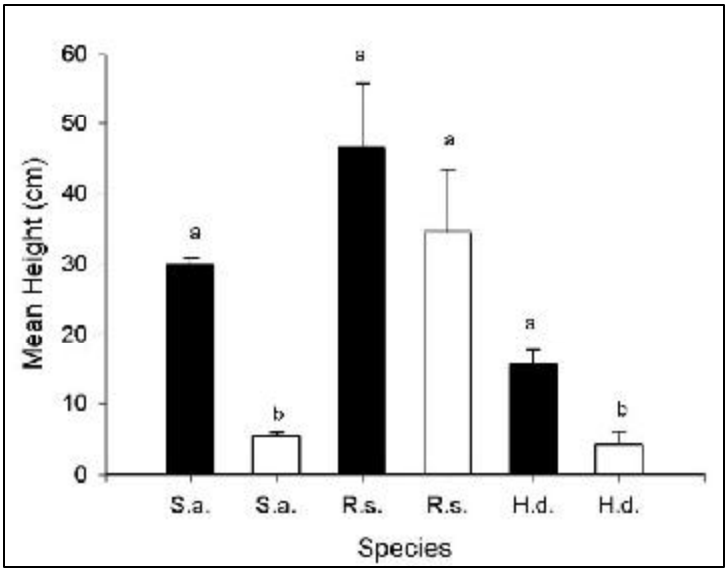

Figure 2: Percent survival (± SE), spring 2001. Within each species, bars with the same superscript letter were not significantly different ($p > 0.05$). Dark bars represent mulched plots, and white bars represent herbicide-treated plots; S.a. = *Symphoricarpos albus*; R.s. = *Ribes sanguineum;* H.d. = *Holodiscus discolor.*

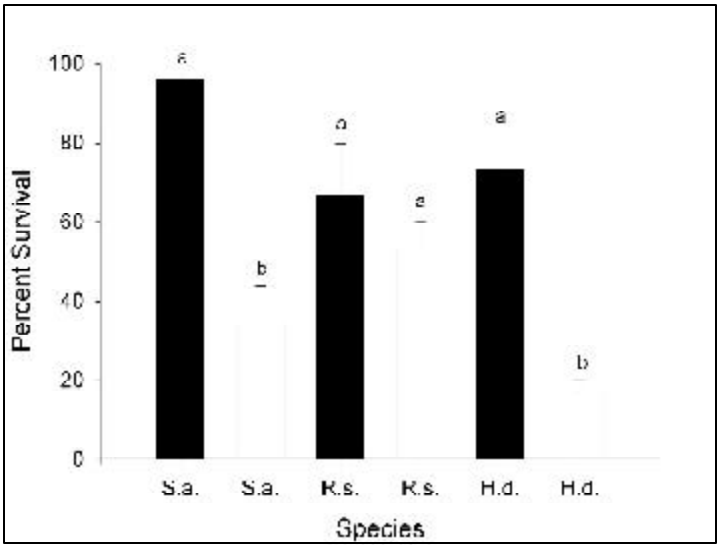

Figure 3: Mean plant heights (± SE), spring 2001. Within each species, bars with the same superscript letter were not significantly different ($p > 0.05$). Dark bars represent mulched plots, and white bars represent herbicide-treated plots; S.a. = *Symphoricarpos albus*; R.s. = *Ribes sanguineum;* H.d. = *Holodiscus discolor.*

and 3); in the spring, these plants also had more leaves, perhaps simply due to breaking bud earlier than unmulched plants. As with survivorship, between-treatment differences in plant height were significant ($p < 0.0001$) for snowberry and oceanspray, but not for red-flowering currant ($p > 0.1$).

The results so far are providing substantial evidence that mulch can be beneficial to plants. Plants in mulched plots are larger, more vigorous, faster-developing, and have higher rates of survival than plants in herbicide-treated plots. The mulched plots also have fewer weeds, helping to reduce competition for resources. The soil under the mulch likely stays warmer longer into the winter and also warms faster in the spring, helping to extend the plants' growing seasons. The soil in the mulched plots also retains more water, which is crucial for plant establishment, especially in sites receiving no supplemental water.

The research results suggest that all restoration sites, but especially those receiving no supplemental water, should be mulched. A thick layer of organic mulch will help retain the soil moisture crucial for plant survival while also reducing growth of weeds that compete for needed resources. The mulch will also help to reduce soil erosion, provide organic matter to the plants and soil organisms, and moderate soil temperatures. These benefits, combined with other good management practices, can improve the success and survival of restoration sites while reducing the need for costly after care.

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