Impact of Nursery Fertilization on Seedlings Competitiveness Against Natural Vegetation on Mixedwood Sites

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Poster Abstract

Mixedwood sites that make up a large part of the boreal forests in Canada are characterized by intensive competition to planted seedlings from natural weedy vegetation after harvest. Weed competition is mainly controlled by herbicide application due to operational simplicity, treatment effectiveness, and economical considerations. However, high dependence on chemical herbicides may be detrimental to the environment, hence alternative control approaches are being sought. Here we propose an alternative method based on enhancing the growth performance of containerized black spruce *(Picea mariana* (Mill) BSP) seedlings to outcompete weeds through nutrient loading at the nursery. This practice builds up plant nutrient reserves without altering seedling size. Loading is economical, effective and environmentally friendly, since: (1) the cost of extra fertilizer is relatively small; (2) the fertilizer is applied only to seedlings in the nursery; (3) no chemicals (herbicides or fertilizers) are applied in the field; (4) only planted seedlings are favored, thus conserving species diversity of natural flora and fauna of the site.

We tested the effectiveness of this method by comparing the growth and nutrient dynamics of nutrient-loaded and conventionally fertilized seedlings in the field. Although similar in height and biomass at planting as conventional stock, nutrient-loaded seedlings contained 39, 69, and 22% more tissue N, P, and K content, respectively. After two field growing seasons, nutrient loaded seedlings attained 15-27% more height, 16-39% more biomass, resulting in 15-27% reduction in weed biomass. Above ground biomasses of seedling and weed were negatively correlated indicating that increase in crop biomass was at the cost of weed biomass, and vice-versa. We attribute the improved competitiveness of loaded-seedlings to contrasting nutrient utilization traits induced by nursery fertilization. Nutrient-loaded seedlings translocated more nutrients to actively growing parts from the reserves built up during green-house preconditioning phase than did conventionally fertilized seedlings. These preliminary results demonstrate that loading is a cost-effective and environmentally friendly option for vegetation management on weed prone sites.