

Vegetation and Nitrogen Dynamics for Organically Managed Highbush Blueberry (*Vaccinium corymbosum* L. Cultivar 'Duke') in the Annapolis Valley, Nova Scotia, Canada.

Burkhard, N.E.¹, Lynch, D.H.,¹ & Percival, D.C.²

Keywords: highbush blueberry, organic production, mulch, weed control, nitrogen dynamics

Abstract

*While consumer demand for blueberries and organic produce is increasing, few studies have focused on organic production of highbush blueberry (*Vaccinium corymbosum* L.). Weed control is a major challenge for organic growers, and nitrogen (N) fertility can be unpredictable when using organic amendments. This study was initiated to assess the use of a variety of mulches and fertility treatments for organically managed highbush blueberry (HBB) and their impact on weed growth and N acquisition, HBB growth, leaf tissue N, berry yield and quality, and soil acidity, moisture, temperature, and mineral N dynamics. The experimental design was a randomized split-plot consisting of five blocks, six fertility and mulch treatments [no amendment, ammonium sulphate fertilizer (AS), Nutri®-wave pelletized poultry manure (NW), pine-needle mulch (PN), manure-sawdust compost (MC), and seafood waste compost (SC)] as the main plots, and two levels of weed management (+/- hand-weeding) as the split plots in an established field of 'Duke' HBB in the Annapolis Valley, Nova Scotia, Canada. Results from the two-year study indicate that PN was the most effective mulch at suppressing weeds, decreasing weed biomass by 64 % in the application and residual year. SC did not provide any weed control benefit in either year due to weed germination in the compost. MC provided some weed control benefit in the first trial, but experienced prolific weed germination in the second. Weeds were a significant competitor for soil mineral N and caused reductions in HBB growth, leaf tissue N content and berry yields. Mulch treatments, on the other hand, increased plant canopy volume, leaf tissue N, P, and K, soil moisture and reduced soil temperature extremes. Berry total phenolic content and titratable acidity were not affected by fertility or mulch treatments, although SC caused a slight increase in soluble solids content over MC. Response parameters were comparable for NW and AS, which were often similar to the control and suggest that application rates or timing were not effective. Elevated soil mineral N levels were maintained for the longest period under SC, while PN did not increase mineral N above control levels. There was no evidence of net N immobilization despite high C/N ratios of the PN (72:1) and MC (48:1). Spring mineral N flux, as measured by Plant Root Simulator (PRS™)-probes, was consistent in both trials (SC > MC > PN) and reflected mulch C/N ratios and extracted soil mineral N results. A weak linear correlation was found between PRS-N and leaf tissue N, and no significant relationship was found with berry yield, suggesting that PRS™-probes would not be a suitable soil N management tool for HBB growers. Research results support the use of pine-needle mulch for weed control in organic HBB production systems. Long-term research would be recommended to assess the influence of mulches on HBB performance, soil acidity, nutrient dynamics, and mycorrhizal associations over time.*

¹ Nova Scotia Agricultural College, Department of Plant & Animal Sciences, P.O. Box 550, Truro, NS, B2N 5E3, Canada.

² Nova Scotia Agricultural College, Department of Environmental Science, Truro, P.O. Box 550, NS, B2N 5E3 Canada.