ABSTRACT
This thesis consists of three sections that provide detailed local knowledge of nutrient management in wild blueberry production. The first section investigates the main and interactive effects of long term fertilizer (NPK) enrichments on soil mineral nitrogen, organic nitrogen and carbon, microbial biomass nitrogen and carbon, net mineralization and net nitrification in wild blueberry soils. The second section studied the optimization of wild blueberry growth, development, foliar nutrients and harvestable yields by using response surface methodology. The third section covers the nutrient estimation technologies using field spectroscopy. The remote sensing data was analysed with a combination partial least squares regression and variable selection algorithms (Chemometric analysis).

The results indicate elevated nitrification activity under nitrogen enrichments, mainly performed by heterotrophs, report unusually high levels of dissolved organic carbon (> 150 C ha\(^{-1}\)), a fungal dominated soil system and plant uptake of organic nitrogen during active growth season. Nitrification and high dissolved organic carbon levels needs to be acknowledged, in connection with possible nitrogen saturation and potential environmental hazards. The results imply towards a need for nitrification inhibition measures.

The results suggest fertilizer dose of nitrogen (35 kg ha\(^{-1}\)), phosphorus (40 kg ha\(^{-1}\)) and potassium (30 kg ha\(^{-1}\)) for the optimum growth, development and harvestable yields of wild blueberry. Under these fertilizer rates, the corresponding predicted harvestable yield is 4126 kg ha\(^{-1}\) that is as much as 13% higher than would be produced by commonly used fertilizer rate in the industry. This study presented new leaf nutrient ranges for sprout and crop years for wild blueberry fields in Central Nova Scotia. This study also recommend fertilizer rate of 28, 45 and 30 kg ha\(^{-1}\) of nitrogen, phosphorous and potassium respectively that keep leaf nutrients content within in suggested leaf nutrient ranges. Hyperspectral remote sensing technologies were used for estimating macro and micro nutrients. This study provides critical information on wavelengths important for nutrient estimation in reflectance spectra (400-2500 nm). The results and inferences from this thesis may be employed to improve crop production, increase economic returns, health of soil and sustainability of wild blueberry production in Nova Scotia.