INTRODUCTION

One of the most pressing challenges that vegetable growers are faced with is high input costs, namely fertilizers; this is because vegetable crops tend to have high nutrient demands translating into higher fertilizer requirements[1]. Research is needed to help growers better manage fertilizer costs – and one way to do this is to better manage soil nutrient cycling.

Cover crops (CC) have the potential to immobilize nutrients, especially nitrogen (N), that would otherwise be lost during post- or pre-harvest periods, leading to improved N management[2]. Incorporating CCs in vegetable rotation may benefit subsequent crops yields and/or crop nutrient use efficiencies[3-4]. However, information on how CCs influence N management for vegetable production on the prairies is scarce. The Saskatchewan vegetable industry would benefit from research and development focused on better N management, and one potential strategy to improve N management could be cover cropping.

RESEARCH OBJECTIVES

1) What are the optimum ranges of N application rate for sweet corn, carrot and broccoli based on yield, N harvest indices (NHI), and N use efficiencies (NUE)?
2) How does CC cover cropping affect subsequent crop yield, NHI and NUE?
3) What are the relationships between NUE and N application rates in these vegetable crops?

EXPERIMENTAL DESCRIPTION AND METHODOLOGY

We established a field trial for sweet corn (Zea mays L. var. rugosa), carrot (Daucus carota subsp. sativus), and broccoli (Brassica oleracea var. italica) in 2017 and repeated in 2018 on a Sutherland clay soil (Dark Brown Chernozem) in Saskatoon for a fully phased sweet corn-carrot-carrot sequence.

As the main effect, each crop type received five N fertilizer treatments (ranging from 0 to 300 kg N ha<sup>-1</sup>) arranged in a split-block RCBD with three replicates. In 2018, beet (Beta vulgaris L.) was substituted for carrot due to germination issues. After harvest, sub-plots were established with us without a shoulder-season rye CC, and the effect followed into the subsequent growing season.

RESULTS AND DISCUSSION

Compared with zero N control, N fertilizer rate did not affect vegetable crop yields in either year, demonstrating the N-rich nature of the soil at this site. Depending on the crop, moderate to high application rates of N significantly reduced NUE; N rates above zero N control reduced NUE for sweet corn, rates above 75 kg N ha<sup>-1</sup> reduced NUE for broccoli, and all rates above 55 kg N ha<sup>-1</sup> reduced NUE for the root crop in 2018.

Subsequent to the CC in 2018, we found no N fertilizer by CC interaction for crop yields or NUE. The NHI CC had no effect on crop yield or NUE for sweet corn or carrot, but significantly reduced broccoli yield and NUE. Regression analysis showed a decreasing trend in NUE with increasing N rates for all three vegetables, regardless of the CC.

REFERENCES


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