Increasing pea acres through intercropping

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Research Objectives

Evaluate organic pea intercrop mixtures to further understand their impact on:

- Weed suppression
- Grain yield
- Plant growth and grain quality
- Profitability

Research Project Summary

In 2019 and 2020 three separate pea intercrop experiments (yellow pea-barley, yellow pea-oat and yellow pea-mustard) were completed in Carman Manitoba, Canada. Peas were planted in both sole and mixed stands. Each year, peas were sown at the appropriate rate to achieve a target plant density of 120 plants/m^2, with three different target plant densities of each companion crop (barley: 45 plants/m^2, 75 plants/m^2 and 150 plants/m^2; oats: 48 plants/m^2, 80 plants/m^2 and 160 plants/m^2; mustard: 44 plants/m^2, 88 plants/m^2 and 132 plants/m^2). Each experiment was a randomized complete block design replicated four times. The targeted plot length was 10 metres and the targeted plot width was 1.83 metres, with two-metre alleyways. Intercrops followed a high nitrogen-need crop to ensure low indigenous soil nitrogen. In 2019 the experiment was seeded on May 10 (Carman S1-2019). In 2020, the same experiment was repeated, twice, with staggered seeding dates (Carman S1-2020=May 7, 2020, Carman S2=May 21, 2020).

Results and Conclusions

Below is a sample of draft results obtained from the pea-barley trial. Additional results have been compiled and will be presented in the final thesis.

When compared to the pea monocrop, the pea + high rate barley intercrop significantly reduced average pea biomass by 25%, indicating competition within the pea-barley mixture. However, there were no significant differences in total crop biomass (pea+barley) among all four treatments, indicating that a similar level of net primary productivity was met throughout all four treatments. The pea + low rate barley, pea + medium rate barley, and pea + high rate barley intercrop mixtures significantly reduced weed biomass by 21, 35, and 44%, respectively. When compared to the pea monocrop, the pea + high rate barley intercrop significantly reduced pea grain yield by 16%, indicating competition within the pea + high rate barley mixture. Therefore,

by incorporating a 50% seeding rate of barley into a pea sole crop, a farmer may reduce their pea grain yields by 16%, while potentially reducing weed biomass by 44%.

In 2019, below-average spring soil moisture levels on-top of above-average temperatures resulted in poor field pea establishment, but excellent barley establishment. In 2020, the conditions were reversed, resulting in excellent pea establishment, but poor barley establishment. The variation in intercrop establishment across 2019 and 2020 benefited the research because we were able to observe how different pea-barley intercrop mixtures function across different growing conditions. It is evident that where the environment produced poor field pea-growing conditions the differences in both pea and barley grain yields between intercrop treatments were significantly greater when compared to when the environment produced optimal pea-growing conditions. The results indicate that organic pea-barley intercropping may allow farmers to be more adaptable to variable growing conditions and weed populations