

Developing field pea varietal blends for higher yields and pest suppression

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| SPG Contributions | Project Status | Duration/Timeline of Project (Year to Year) | Co-funders | Total Project Cost |
|-------------------|----------------|--|---|--------------------|
| \$101,060.85 | Completed | April 2017 – June 2020 | Saskatchewan Ministry of Agriculture – Agriculture Development Fund (ADF) | \$255,534.85 |

Project Description

To develop varietal blends of leafed and semi-leafless field pea for release by the Crop Development Centre (CDC).

The primary production and secondary processing of field pea makes a significant contribution to Saskatchewan's economy annually. Field pea has two distinct leaf morphologies: a leafed-type (LV) with leaflets extending from the stipule; and a semi-leafless (SL) type, with tendrils extending from their stipules. Semi-leafless types exhibit better lodging resistance than leafed types, which improves harvestability and crop yields under certain environmental conditions. For this reason, semi-leafless varieties have displaced leafed varieties; however, leafed varieties are still favoured for forage production. Previous research has indicated that when lodging is prevented, leafed varieties can outyield semi-leafless varieties. Thus, the blending of leafed with semi-leaf varieties may overcome lodging issues, resulting in higher yields. To test this hypothesis, near isogenic leafed lines of 4 high-yielding semi-leafless varieties (CDC Amarillo, CDC Dakota, CDC Centennial, and CDC Striker) were bred. Two field studies were conducted from 2017-19; the first, comparing the performance of near-isogenic blends of 75:25 SL:LV to non-isogenic blends (same SL:LV proportions) as well as to SL and LV monocultures. The second study investigated the blending ratio of LV to SL required to optimize light interception and yield, as well as to reduce lodging and disease severity. A third study used digital imaging to measure field pea height and assess lodging, and compared these measurements to ground measurements.

Outcome

In study one, CDC Amarillo, CDC Dakota, and CDC Striker blends yielded similarly to the LV and SL monocultures; whereas, the CDC Centennial blends yielded 9% lower than the SL monoculture. LV monocultures had lower lodging height indexes (higher lodging) than the LV:SL blends and their SL monoculture counterparts. Blends of CDC Centennial, CDC Amarillo, and CDC Striker had similar lodging height indexes as SL monocultures; however, the lodging height index of CDC Dakota blends was 9% lower than the SL monoculture, indicating slightly higher lodging with the blend. Blends of near-isogenic pairs performed similarly to non-isogenic pairs in terms of lodging height index, disease severity, biomass production, and crop yield. In study two, SL:LV ratios up to 67/33 of provided a 1.4%- 7.4% yield increase compared to SL (100/0) monocultures; however, this was variety dependent. The lodging height index of LV:SL blends was similar to the SL monoculture provided the LV proportion was less than 33%. The nDSM, a canopy height measurement derived from digital images, correlated highly with manual measurements of crop height ($r > 0.80$). Lodging estimates from digital imagery were able to distinguish treatment differences with more precision than manual ground measurements. The peak nDSM and maximum nDSM provided fair predictions of final yield ($r = 0.51$). The benefits of blending semi-leafless and leafed varieties was small, and the proportion of leafed material in the blend should not exceed 33%. In conclusion, the yields of semi-leafless and leafed blends were similar to semi-leafless parent indicating that large yield gains should probably not be expected by blending semi-leafless and leafed pea varieties.

Research Objective

OBJECTIVE 1

To develop varietal blends of leafed and semi-leafless field pea for release by the Crop Development Centre (CDC).