Yellow Pea Response to Preceding Crop, Residue Management, and P Fertilizer Placement (Establishment Year)

Project duration: 2020 – 2023
Objectives: Determine the effect of preceding crop, residue management and P fertility strategy, and their interactions, on pea establishment, weed community, disease incidence, yield and seed quality
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Background (provided by Kristen MacMillan)
In Manitoba, 38% of pea acres are grown on wheat stubble and 20% on canola stubble [Manitoba Agricultural Services Corporation (MASC) 2010-2015]. The yield impact of preceding crop on pea yield is not currently known despite some obvious agronomic concerns. Crop rotation data from MASC (2010-2015) points to some of these risks by showing that the relative yield of pea grown on wheat stubble is 103% compared to 96% for peas grown on canola stubble. Canola is a non-mycorrhizal crop and a host to Sclerotinia white mould. Peas are also susceptible to white mould and are a mycorrhizal crop, therefore, may be negatively affected by reduced AMF populations and increased sclerotinia risk following canola stubble. Starter P is commonly recommended in fields with low soil test levels. We aim to investigate if there is an interaction between field pea response to P fertilizer and preceding stubble type arising from the mycorrhizal and non-mycorrhizal crops. Little research has been conducted on P fertilizer strategy in field pea and strategies vary widely among farmers. In an informal Twitter poll in August 2019, the majority of farmers apply P fertilizer as starter in the seed row (44%) followed by side band or mid placement (26%), seed row plus side band or mid row (14%) and none (16%). According to the 2015 fertilizer use survey, only 45% of western Canadian farmers are applying P, primarily in the seed row (44%) and at an average rate of 19 lbs P205/ac. Yield response to 25 kg ha-1 of starter P has been documented, but no work is currently available on P fertilizer placement. Overall, there are fewer agronomic risks associated with seeding peas into wheat stubble. Peas are also tolerant to early seeding into cool soil and present an opportunity for reduced or rotational no-till systems in regions of Manitoba where tillage is common practice.

Results
In 2020, spring wheat and canola crops were established to provide the residue treatments for the 2021 pea test. Target spring wheat and canola seeding rates are shown in Table 1. Treatments for 2021 are provided in Table 2.

Table 1: Targets

	Seeding Rate seeds/ft2	Live Plant Stand plants/ft2	Seed Survival %
Wheat	32	27	85
Canola	10	6	60

Table 2: Treatment Structure

Treatment No	Preceding crop	Residue Management	P Fertility Strategy
1	Wheat	Tilled	None
2	Wheat	Tilled	Seed row
3	Wheat	Tilled	Side band
4	Wheat	Direct Seed	None
5	Wheat	Direct Seed	Seed row
6	Wheat	Direct Seed	Side band
7	Canola	Tilled	None
8	Canola	Tilled	Seed row
9	Canola	Tilled	Side band
10	Canola	Direct Seed	None
11	Canola	Direct Seed	Seed row
12	Canola	Direct Seed	Side band

Materials and methods

Experimental Design: Rectangular Lattice
Treatments: 12
Varieties: Wheat – AAC Brandon; Canola – L233P
Seeding: May 19
Harvest: Sep 22

Agronomic information
Previous year's crop: Barley Silage
Soil Type: Erickson Loam Clay
Landscape: Rolling with trees to the east
Seedbed preparation: Heavy harrowed

Data collected	Date collected
Plant Density:	Jun 16 (4 weeks after seeding)
Disease risk at wheat flag leaf:	Jun 24
Disease risk at canola anthesis:	Jul 8-15 (20-50% bloom)
Height:	Aug 15
Lodging:	Aug 15
Yield:	Oct 27
Moisture:	Oct 27

Table 3: 2020 Fertility Information

	Available	Wheat Added	Canola Added	Type
N	58 lb/ac	131 lb/ac	96 lb/ac	46-0-0
P	71 ppm	15 lb/ac	10 lb/ac	11-56-0-0
K	513 ppm	-	-	-

Table 4: Pesticide Application

Crop stage	Date	Product	Rate
Pre-emerge	May 19	Heat	28.0 g/ac
		Round-up	0.64 L/ac
In-crop	Jul 9	Proline (canola)	140 ml/ac
		Prosaro (wheat)	325 ml/ac
	Jun 22	Prestige XC-A	0.17 L/ac
Desiccation	Aug 25	RoundUp	0.64 L/ac
		Heat	20.0 g/ac
		Merge	0.3 L/ac