Project Identification

1. **Project Title:** Achieving an Earlier Peola Harvest with both Polish and Early-Maturing Argentine Canola Varieties
2. **Project Number:** 20200434
3. **Producer Group Sponsoring the Project:** Saskatchewan Conservation Learning Centre
4. **Project Location(s):** Located on land near the Conservation Learning Centre (SW 20 46 26 W2, RM 461) owned by cooperating producer Curtis Tetarenko. Coordinates of corners:

   N52˚59.871' W105˚46.792'
   N52˚59.869' W105˚46.768'
   N52˚59.849' W105˚46.794'
   N52˚59.848' W105˚46.770'

5. **Project start and end dates (month & year):** May 2021 to February 2022
6. **Project contact person & contact details:**

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Objectives and Rationale

7. Project objectives:

This project was intended to determine and demonstrate if early-maturing canola varieties grown in combination with early-maturing pea varieties would allow for peola to be harvested earlier and more effectively than typical peola combinations. The objective of the project was to demonstrate peola as a suitable intercropping option for the Prince Albert region.

8. Project Rationale:

Mixed grain intercropping is becoming an increasingly popular cropping option for Saskatchewan producers. In the 2019 growing season, 17,850 acres of canola/pea, or peola, intercrop were insured through the Saskatchewan Crop Insurance Corporation (SCIC), which is greater than the 5,880 acres that were insured in 2018 (SCIC, 2019). This massive increase shows more producers are realizing the numerous benefits associated with intercropping. Peola can reduce producer input costs, all while increasing economic and ecological stability. Pulses stimulate microbial activity and have been shown to accelerate cycling of nutrients and increase production capacity in soil (Whetter, 2020). Peola in Manitoba has had reduced shattering rates and canola has acted like a buffer to peas during harvest, resulting in fewer splits and damage, despite the increased threshing speed of the combine. While yields of either crop may be lower when grown as an intercrop, the combined yield is often greater than when either crop is grown as a monocrop. Moreover, intercropping can reduce disease pressure of Mycospharrella. In one particular trial, the reasoning of reduced disease pressure was attributed to monocrop peas lodging during a fall rain and pods then picking up the disease and transferring it to their seeds. Whereas, the intercropped peas were supported by the canola and did not fall as frequently as the monocropped treatments. It was reported that the canola leaves also acted as a buffer and decreased the amount of rain hitting the ground and splashing back onto the peas (Dietz, 2020). Local producers have noted similar findings. Intercropped peas have more support and are more upright. Some producers have also hypothesized that peas may catch falling canola petals that may otherwise cause sclerotinia infections to spread (Whetter, 2020). Peola may help to reduce the prevalence of diseases in both peas and canola.

Peola intercrops can reduce input costs by lowering fertilizer, fungicide, and insecticide requirements, thus increasing economic returns for producers (Mahli, 2012). Intercropping has also been identified as a mitigation strategy for climate change and a best management practice (BMP) for Manitoba.

Recently in Saskatchewan, there has been an increased interest in growing intercrops. In 2018, the CLC carried out a self-funded Peola demonstration; and in 2019, the CLC was able to secure funding through ADOPT to conduct another Peola trial. Unfortunately, the 2019 peola intercropping demo underwent a difficult spring and harvest. There were canola establishment issues as a result of dry spring conditions and severe flea beetle pressure. Despite the seasons' setbacks, it was still possible to evaluate the success of the different pea varieties. Wet and cool harvest conditions resulted in peas maturing and shattering before the canola was ready for harvest. Severe deer browsing decimated the peas before they could be combined. Even with all of the trial's problems, the project invoked a lot of interest from local producers.

Both the 2018 and 2019 harvest years were difficult due to wet and cold conditions. Peola producers in the area expressed difficulty in getting their canola to ripen. Producers also had issues with peas maturing and shattering before the canola was ready to harvest. A local grower had suggested a way to overcome this issue may be with the use of an early maturing (85-90 DTM) Polish canola. In Edmonton, Polish canola is swathed a month earlier than Argentine canola. It also reaches maturity weeks earlier than the Argentine varieties in central Saskatchewan (Canola Council of Canada, 2017). The producer suggested that because Polish canola would mature faster than other varieties it would allow for the harvest of the peola in a timely manner. Moreover, flea beetle pressure is a serious concern for nearly all local canola producers. Research has shown that flea beetle resistance can be strengthened as the number of hairs on the leaves of young canola develop and increase. This resistance can surpass neonicotinoid seed treatment protection in some trials (Canada Council of Canada, 2020). Polish Canola is known to be very hairy. The hairs on the canola could explain why some Polish producers have not struggled with flea beetle pressure, while neighbouring Argentine varieties were significantly impacted. In the CLC's 2021 peola trial, Polish (Synergy), Early Argentine (43E03), and Regular Argentine (PV760) canola varieties were evaluated.

While the past few harvests have been wet and cold, springs have been very dry. These spring conditions have impacted the emergence and establishment of crops. Increasing the snowpack on fields is of utmost importance under these conditions. The straw residue from a monocropped pea field has poor snow-trapping capacity. The residue from peola may increase snow-trapping capability and reduce soil erosion. An earlier harvest gives producers the option of growing a winter cereal following their peola crop. With an earlier harvest of peola, winter wheat could be seeded during the optimal timeframe, from August 30th to September 15th. Growing winter cereals is an additional interest to area producers. In the past, they have not been able to successfully get their canola off in time to seed winter wheat.

In the north-central region, there are two polish canola seed suppliers: Trawin Seeds located in Melfort, and Robin Fenton in Tisdale. The presence of two suppliers indicates that there is interest and seed availability in our region. As for marketability, Polish canola can be sold as regular canola. Unfortunately, there is a risk of dockage due to the smaller seed size. However, Polish canola could be harvested during the 1st or 2nd week of August, allowing producers to take advantage of the August canola delivery premiums. Additionally, Polish canola is unique because it is a non-GMO variety, making it a viable option for organic producers and buyers. There is a great potential for the added value of Polish canola in organic or specific non-GMO markets. While this project was not managed under an organic system, it can still provide valuable information to organic producers.

References:

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Methodology and Results

9. Methodology:

To determine and demonstrate if early-maturing canola varieties grown in combination with early-maturing pea varieties would allow for peola to be harvested earlier and more effectively than typical peola combinations, thirteen treatments were evaluated in this trial. This project had a randomized complete block design and was replicated four times. A complete treatment list can be found in Table 1.

The trial was seeded on May 31st with the CLC’s Fabro Plot Seeder. All plots had ten-inch row spacing and soil temperature at seeding was 16.1°C. Seed depth was approximately 1 inch with peas and canola placed into the same row. In order to determine land equivalency ratios from yield and allow comparisons of competition between crops, all varieties were seeded at the same rate when intercropped and monocropped. Intercropped peas and monocropped peas were seeded at the recommended rate for monocrop peas, for a target plant stand of 85 plants/m^2. Intercropped canola and monocropped canola were seeded at a reduced, intercropped rate for a target plant stand of 65 plants/m^2, in order to ensure that the canola did not outcompete the peas.

An agronomic summary that includes seeding rates and inoculant, pesticide, and fertilizer application rates can be found in Table 2. All pea varieties received an application of AGTIV Pulse granular inoculant. The canola varieties PV760 and 43E03 already had seed treatment applied to them (from the suppliers). On May 22nd, the entire trial received a pre-emergent herbicide application of glyphosate. On June 14th, all treatments received a post-emergent application of Poast Ultra with Merge. The trial was scouted periodically for pests and disease but none was observed. No insecticides or fungicides were used in this trial. Due to intense weed pressure, all treatments were hand-weeded as needed throughout the growing season.

Composite soil samples were taken from the trial area in the spring of 2021 and sent to Agvise Laboratories for analysis. Fertilization rates were determined based on soil tests results. Only the monocropped treatments received fertilizer. Based on the 2021 crop planning guide, peas had a

target yield of 61.4 bu/ac. Fertilizer rates for the canola were determined based on a yield goal of 56 bu/ac at 100% seeding rates. As the canola was seeded at a reduced, intercropped rate, actual expected yields were around 46 bu/ac.

Table 1. Pea and canola varieties and seeding rates in the Peola trial.

Trt #	Treatment Description	Variety (s) seeded	Canola Seeding Rate (kg/ha)	Pea Seeding Rate (kg/ha)
1	Intercrop: Polish Canola and Early Pea 1	Synergy Canola and CDC Canary Peas	1.81	218.17
2	Intercrop: Polish Canola and Early Pea 2	Synergy Canola and CDC Meadow Peas	1.81	186.28
3	Intercrop: Polish Canola and Maple Pea	Synergy Canola and CDC Mosaic Maple Peas	1.81	176.64
4	Intercrop: Early Argentine Canola 1 and Early Pea 1	43E03 Canola and CDC Canary Peas	2.71	218.17
5	Intercrop: Early Argentine Canola 1 and Early Pea 2	43E03 Canola and CDC Meadow Peas	2.71	186.28
6	Intercrop: Early Argentine Canola 1 and Maple Pea	43E03 Canola and CDC Mosaic Maple Peas	2.71	176.64
7	*Intercrop: Early Argentine Canola 2 and Maple Pea	PV760 and CDC Mosaic Maple Peas	2.30	176.64
8	Monocrop: Polish Canola	Synergy Canola	1.81	
9	Monocrop: Early Argentine Canola 1	43E03 Canola	2.71	
10	*Monocrop: Early Argentine Canola 2	PV760 Canola	2.30	
11	Monocrop: Early Pea 1	CDC Canary Peas		218.17
12	Monocrop: Early Pea 2	CDC Meadow Peas		186.28
13	Monocrop: Maple Pea	CDC Mosaic Maple Peas		176.64

*N.B. Treatments 7 and 10 were initially supposed to include a regular Argentine canola variety, but an additional early Argentine canola variety was mistakenly chosen in its place.

Table 2. Agronomic summary.

Seeding date	May 31st
Seeding Method	Fabro plot seeder with double disc openers and 10-inch row spacing
Soil Temp at Seeding	16.1ºC
Stubble	Oat
Seed Depth	1 inch, both peas and canola were placed in the seed row
Fertilizer	Monocropped pea treatments: MAP (11-52-0) at 48 kg of P/ha Monocropped canola treatments: • Urea (46-0-0) at 187 kg of N/ha • MAP (11-52-0) at 56 kg of P/ha • Potash (0-0-60-0) at 54 kg of K/ha. Only monocropped treatments 9, 10, 11, 12, and 13 received fertilizer. All fertilizer was midrow banded.
Inoculant	AGTIV pulse granular inoculant at 4.5 kg/ha
Seed treatment	PV760 and 43E03 canola came pre-treated with a seed coating.
Pre-Emergent Herbicide	Roundup Transorb HC at 0.37 L/ac (200g of ae/ac) on May 22nd
Post-Emergent Herbicide	Poast Ultra at 0.3 L/ac and Merge at 0.5 L/100 L spray solution on June 14th
Emergence	Polish and early Argentine canola: June 7th Early peas and maple peas: June 9th
Plant Density Counts	2 x 1 m rows per plot on June 24th
Lodging	August 10th – rated on a scale of 1-9 September 13th – rated based on the Belgian lodging scale (area [1-10] x intensity [1-5] x 0.2)
Shatter Boxes	On August 12th, shatter boxes were put out for treatments 4 and 5 (plots 104, 105, 203, 209, 310, 312, 402, and 412).
Harvest Aid	August 9th, treatments 1, 2, 8, 11, 12: • Reglone at 1.11 L/ac to 125 L of water/ac. • N.B.: The aerial sprayer rate was mistakenly used instead of the ground sprayer rate. August 18th, treatments 3 and 13: • Reglone at 0.83 L/ac to 125 L of water/ac. August 30th, treatments 4, 5, 6, 7, 9, 10: • Reglone at 0.83 L/ac to 200 L of water/ac.
Harvest Date	Treatments 1, 2, 8, 11, and 12 were harvested on August 16th Treatments 3, 4, 5, 6, 7, 9, 10, and 13 were harvested on September 13th
Soil Type	Sandy loam
Soil Zone	Black

Shatter boxes were put out in treatments 4 (43E03 canola and CDC canary pea) and 5 (43E03 canola and CDC meadow pea) on August 12th. There was no apparent shattering in the other treatments.

Entire plots were combined using a Wintersteiger Quantum Plot Combine. Harvest started on August 16th, with treatments 1, 2, 8, 11, and 12 being harvested. Treatments 3, 4, 5, 6, 7, 9, 10, and 13 were harvested nearly a month later on September 13th.

Data collection included plant density counts, lodging, days to maturity, land equivalency ratio (LER) calculations, yield, rate of shattering, and economic analysis. On June 24th plant counts were taken by counting two-1-meter rows at the front and back of each plot. Lodging was rated on a scale of 1-9 and based on the Belgian lodging scale (area [1-10] x intensity [1-5] x 0.2). The land equivalency ratio (LER) is a concept that determines the relative land area required in monocropped operations to produce the same yield under an intercropped system. The formula for LER is as follows:

LER = [intercrop pea (kg/ha) / monocrop pea (kg/ha)] + [intercrop canola (kg/ha) / monocrop canola (kg/ha)]

Yield of each of the plots was weighed, cleaned, and then corrected to 10% moisture for the canola and 16% moisture for the peas. Scouting occurred throughout the growing season. The economic analysis was based on input costs and yield differences in each treatment.

Data analysis was completed by ANOVA using Statistix 10 software. Any non-parametric data was analyzed using the Kruskal-Wallis test. Post-hoc tests used were LSD for parametric data and Dunn's multiple comparisons test for non-parametric data.

10. Results

Weather

The 2021 growing season at the CLC was very hot and dry compared to past years (Table 3). The average temperature for the entire growing season was nearly 1˚C warmer than the long-term average. Total precipitation in the 2021 growing season was 97.1 mm lower than the long-term average. Precipitation was very low in May, resulting in the peola being seeded into a dry seedbed on May 31st. July was also exceptionally dry (9.6 mm) when compared to the long-term average of 84.6 mm, and hot with 10 days above 30°C. These unusually hot and dry conditions, combined with the slightly sandy soil composition at the trial site, resulted in accelerated maturity and evidence of heat and drought stress in the peas and canola. Precipitation was higher than average in August, which likely helped to reduce shattering losses in some treatments and resulted in some second growth in the peas. The first fall frost occurred on October 2 (-0.9˚C), well after all treatments had been harvested. The complete monthly weather summaries can be downloaded from src.sk.ca/download-weather-summaries.

Table 3. Weather conditions in the 2021 growing season at the Conservation Learning Centre from the onsite SRC weather station.

	May	June	July	August	September	October	Average/Total
				--- Mean Temperature (°C) ---			
2021	10.1	18.3	20.3	17.0	13.5	4.9	14.0
2012-2020	11.4	15.9	18.5	17.1	11.4	2.9	12.9
				--- Precipitation (mm) ---			
2021	29.8	84.0	9.6	57.0	9.5	13.9	202.3
2012-2020	40.4	79.6	84.6	42.9	31.2	20.7	299.4

Soil Samples

Soil samples were collected using a Dutch soil auger on May 17, 2021 and sent to Agvise Laboratories for analysis. Soil test results indicated nitrogen was low with 20 lb/ac in the top 30 cm (Table 4). Phosphorus was low at 7 ppm and potassium was also low at 90 ppm. Sulfur was very low with 10 lb/ac available in the top 30 cm.

Table 4. May 17, 2021 soil test results from Agvise Laboratories

Depth (cm)	N (lb/ac)	P (ppm)	K (ppm)	S (lb/ac)	Zn (ppm)	OM (%)	pH	Salts (mmho/cm)
0 to 15	13	7	90	6	1.05	2.4	6.1	0.11
15 to 30	7			4			6.7	0.12
0 to 30	20							

Maturity of the peas and polish canola was accelerated due to hot and dry growing conditions (Table 5). The polish canola matured over 3 weeks earlier than expected, around 64 DTM instead of 86-89 DTM. The early peas, CDC canary and CDC meadow, and the maple peas all reached maturity approximately a month earlier than anticipated, demonstrating extreme heat and drought stress. The early Argentine canola varieties, 43E03 and PV760, matured only a few days earlier than predicted. Anecdotal evidence from a local seed grower suggests that the DTM of polish canola may be very similar to Argentine canola if both are seeded at the same time (mid-May). However, if polish canola is seeded later, it tends to catch up to the Argentine canola. For this study, both the polish and Argentine canola varieties were seeded at the same time on May 31, and there was a substantial difference between the two types of canola. One potential explanation may be that the polish canola is more photosensitive than the Argentine varieties, but there does not appear to be any scientific evidence to support this hypothesis.

Table 5. Days to maturity of peas and canola when grown in intercrop during 2021 near Prince Albert, Sk. Conditions were exceptionally dry and hot.

Variety	Date of Maturity	Date of Emergence	Actual Days to Maturity	Expected Days to Maturity
Synergy (Polish) Canola	August 10th	June 7th	64	86-89*
43E03 Canola	August 30th	June 7th	84	90-93
PV760 Canola	August 30th	June 7th	84	90
CDC Canary Pea	August 10th	June 9th	62	95-97
CDC Meadow Pea	August 10th	June 9th	62	95-97
CDC Mosaic Maple Pea	August 17th	June 9th	69	100

*****Anecdotal evidence from a local seed grower suggests that the DTM of polish canola may be very similar to Argentine canola if both are seeded at the same time (mid-May). However, if polish canola is seeded later, it tends to catch up to the Argentine canola.

Establishment was very poor, with all treatments falling below target, likely due to very hot and dry spring growing conditions and intense weed competition (Table 6). Peas were seeded to a target seeding rate of 85 plants/m^2, and canola was seeded for a target plant density of 65 plants/m^2, resulting in a combined target density of 150 plants/m^2 for the intercropped treatments. Plant densities of individual crops were unfortunately not recorded for the intercrop treatments. Plant density in the intercropped treatments was highest in the PV760 (regular Argentine) and maple pea treatment at 108 plants/m^2, though it still fell short of the target plant density ($p<0.0001$). Plant density was lower in the synergy (polish) canola and CDC canary pea treatment, and in the 43E03 canola and CDC canary pea treatment, which could indicate that the CDC canary peas were less competitive when intercropped with canola than the CDC meadow peas and maple peas. In the monocropped treatments, plant density of the synergy (polish) canola was lower than the 43E03 and PV760 canola. Plant density in the monocrop pea treatments ranged between 68-74 plants/m^2.

In August, pea lodging was observably higher in monocropped treatments vs. intercropped treatments, which suggests that intercropping could reduce pea lodging (Table 6). Lodging was assessed again in September after some treatments had already been harvested. The synergy (polish) canola and maple pea treatment and the monocrop maple pea treatment had higher lodging than the monocrop 43E03 and PV760 canola ($p=0.0001$).

Yields were well below target and ranged between 0.85 – 11.45 bu/ac for canola and 1.69-5.54 bu/ac for peas (Table 7). Poor yields can likely be attributed to hot and dry growing conditions, early maturity of the crops due to heat and drought stress, and low emergence. The PV760 canola grown as a monocrop was the highest yielding treatment (11.45 bu/ac). This treatment yielded approximately 10 bu/ac more than synergy canola grown in an intercrop with canary peas or meadow peas ($p<0.0001$). Lower yields in the synergy (polish) canola were expected, as it typically yields lower than Argentine canola and plant stands were low. Due to variability amongst the data, there were no other significant differences in canola yields across treatments. Although yields were low for peas, there were some notable differences between treatments ($p=0.0445$).

Maple peas were consistently the lowest yielding variety when grown in intercrop and as a monocrop. Maple peas performed the worst, yielding 1.69 bu/ac, when grown in an intercrop with synergy canola. This suggests that the maple peas are not well suited to an intercrop with an early maturing canola variety such as polish or early Argentine canola. The highest yielding pea treatment was meadow peas at 5.54 bu/ac when grown as an intercrop with synergy canola. This intercropped pea yield was similar to the monocropped yield of 4.87 bu/ac ($p=0.0445$), indicating this variety of peas may experience a yield benefit when intercropped with synergy (polish) canola.

Table 6. Summary of means in the "Achieving an Earlier Peola Harvest with both Polish and Early-Maturing Argentine Canola Varieties" trial.

#	Description	Plant Density (plants/m^2)	Lodging		Yield (bu/ac)	
			Aug (1-9)	**Sep** (1-10)	Canola	Pea
1	Synergy Canola and CDC Canary Peas	87 C	4.00	-	0.85 B	3.68 ABC
2	Synergy Canola and CDC Meadow Peas	84 CD	4.25	-	1.16 B	5.54 A
3	Synergy Canola and CDC Mosaic Maple Peas	83 CD	3.00	4.05 A	3.05 AB	1.69 C
4	43E03 Canola and CDC Canary Peas	86 C	2.50	0.70 AB	4.37 AB	3.55 ABC
5	43E03 Canola and CDC Meadow Peas	90 BC	2.25	0.30 AB	5.06 AB	3.87 ABC
6	43E03 Canola and CDC Mosaic Maple Peas	106 AB	2.75	0.95 AB	4.46 AB	2.48 C
7	PV760 Canola and CDC Mosaic Maple Peas	108 A	2.25	1.45 AB	5.95 AB	2.68 BC
8	Synergy Canola	26 G	0.00	-	2.75 AB	-
9	43E03 Canola	61 EF	0.00	0.10 B	6.47 AB	-
10	PV760 Canola	48 F	0.00	0.10 B	11.45 A	-
11	CDC Canary Peas	74 CDE	4.50	-	-	4.82 AB
12	CDC Meadow Peas	74 CDE	5.75	-	-	4.87 AB
13	CDC Mosaic Maple Peas	68 DE	4.50	3.75 A	-	3.43 ABC
	p value	<0.0001	0.0020	0.0001	<0.0001	0.0445

†Values with the same letter are not statistically different (P>0.05)

‡Lodging was described by a 1-9 scale for August and using the Belgian scale for September.

Given the variability in yield for the intercropped treatments, it is difficult to discern meaningful differences in land equivalency ratio (LER) (Figure 1, p=0.5600). LER was highest when 43E03 canola was intercropped with either CDC meadow peas (LER=1.54) or CDC mosaic maple peas (LER=1.50), although these treatments do display a high degree of variability. This would indicate that 1.54 ha of meadow peas and 43E03 canola, or 1.50 ha of maple peas and 43E03 canola, would need to be monocropped in order to achieve the same yields as intercropping.

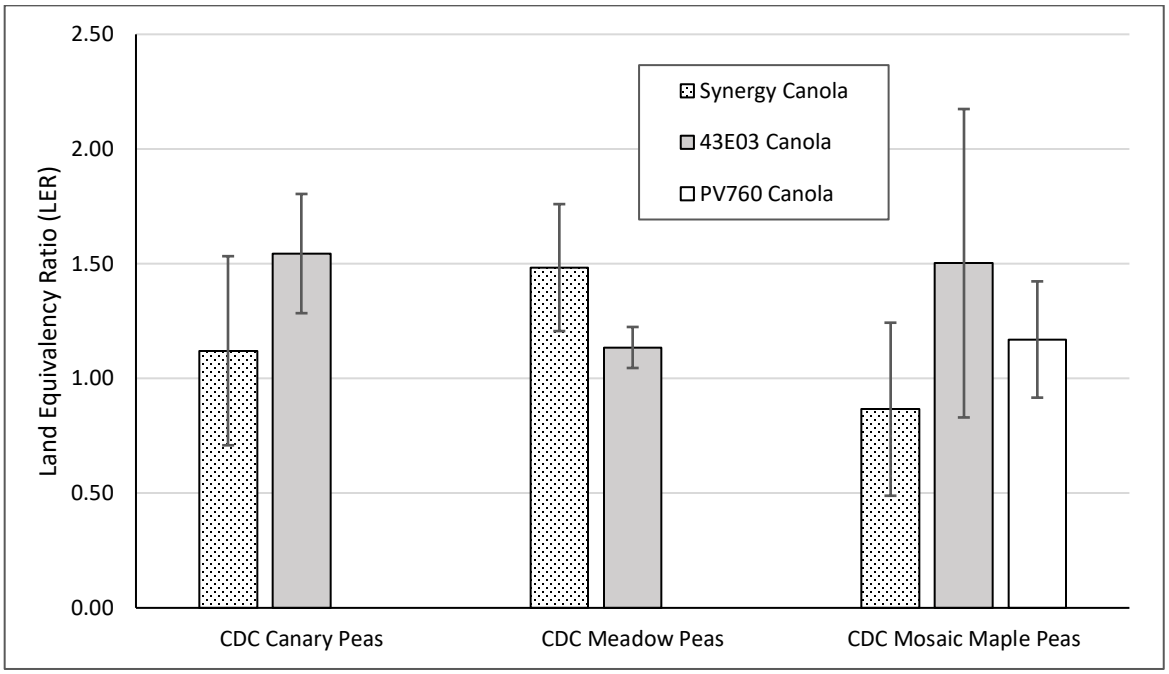

Figure 1. Land Equivalency Ratio (LER) of the intercrops in the "Achieving an Earlier Peola Harvest with both Polish and Early-Maturing Argentine Canola Varieties" trial (p=0.5600; error bars represent ± 1 standard deviation). LER refers to the area required to produce the same yields in a monocrop as a single unit area of intercropping.

Some shattering was observed in treatments where the 43E03 canola was grown with the early peas, CDC canary or CDC meadow (Table 7). There were no differences in shattering between the two treatments (p>0.05). Shattering was minimal, with canola losing between 6-8 seeds/m^2 and the peas losing 1-2 seeds/m^2. Shattering was likely reduced thanks to above average precipitation in August that kept the pods wet after they ripened.

Table 7. Mean shattering recorded from the peola intercrops of CDC Canary and Meadow peas with 43E03 canola. Shattering was not observed in any of the other treatments.

TRT #	Description	Shattered Seeds / m^2	
		Canola	Pea
4	43E03 Canola and CDC Canary Peas	8	2
5	43E03 Canola and CDC Meadow Peas	6	1
	p value	0.7681	0.7681

Net revenue was very low or negative in most treatments, due to extremely poor yields and high fertilizer prices (Table 8). Net revenue was negative in all monocropped treatments but positive in the intercropped treatments, which suggests that intercropping may help minimize financial losses under unfavourable growing conditions. Net revenue was highest in the PV760 canola and maple pea treatment at $104.89/ac and in the 43E03 canola and CDC meadow pea treatment at $103.53/ac. Net revenue was very low in all synergy (polish) canola treatments, likely due to very poor establishment and low yields. While it was not considered in this economic analysis, it is anticipated that there may be dockage when selling synergy (polish) canola due to its small seed size. On the other hand, earlier harvested crops, such as polish or Argentine canola intercropped with an early pea, may fetch a premium for an August delivery.

Table 8. Economic analysis for different canola and pea varieties grown as an intercrop in 2021 near Prince Albert, Sk. Expenses for this trial include the cost of seed and fertilizer only. Net revenue is provided as an estimate and is only meant to be used to help discern differences in revenue potential between treatments.

Description	Canola Yield (bu/ac)	Pea Yield (bu/ac)	Gross Revenue[1] ($/ac)	Expenses[2] ($/ac)	Net Revenue[3] ($/ac)
Synergy Canola and CDC Canary Peas	0.85	3.68	77.51	46.98	30.53
Synergy Canola and CDC Meadow Peas	1.16	5.54	114.27	46.98	67.29
Synergy Canola and CDC Mosaic Maple Peas	3.05	1.69	95.29	46.98	48.31
43E03 Canola and CDC Canary Peas	4.37	3.55	152.81	69.46	83.35
43E03 Canola and CDC Meadow Peas	5.06	3.87	172.99	69.46	103.53
43E03 Canola and CDC Mosaic Maple Peas	4.46	2.48	139.43	69.46	69.97
PV760 and Maple Peas	5.95	2.68	175.57	70.68	104.89
Synergy Canola	2.75	-	60.40	231.26	-170.85
43E03 Canola	6.47	-	142.35	253.74	-111.38
PV760 Canola	11.45	-	251.72	254.95	-3.23
CDC Canary Peas	-	4.82	77.11	121.84	-44.73
CDC Meadow Peas	-	4.87	78.00	121.84	-43.84
CDC Mosaic Maple Peas	-	3.43	57.27	121.84	-64.57

[1]Based on estimated market prices from https://www.statpub.com/index.php/prices/spotbids on January 31, 2021.

This estimate of gross revenue does not include dockage based on small seed size, bleaching, seed quality, etc., or premiums based on August canola/pea delivery. In the past, there have been premiums for maple peas, though this has not been as common in recent years.

[2]Expenses were calculated using prices from the spring of 2021 for pea seed, urea, MAP and potash. Pea seed cost was estimated from the 2021 Crop Planning Guide at $40.54/ac for all pea varieties. Canola seed costs were obtained from local seed distributors on February 3, 2022, putting synergy at $4/lb, 43E03 at $12/lb and PV760 at $14.70/lb. Fertilizer input prices were obtained from Lake Country Co-Op Agro, putting urea at $710/tonne, MAP at $1015/tonne, and potash at $585/tonne. Additional expenses to include that were not considered include pesticides, machinery wear and fuel, labour, property taxes, etc.

[3]Establishment and yield of all pea and canola varieties was very poor due to difficult growing conditions and accelerated maturity caused by heat and drought stress. As a result, net revenue is lower than what would be anticipated under more typical growing conditions.

11. Conclusions and Recommendations

It is difficult to discern meaningful conclusions from this trial due to unusually hot and dry conditions throughout the growing season, which resulted in very poor establishment and performance of all varieties of peas and canola in this trial. Heat and drought stress was evident. Lodging was observably higher in the peas grown in monocrop compared to the peas grown in intercrop, suggesting intercropping helps to reduce lodging in peas. Yields were extremely poor in all treatments, and ranged between 0.85-11.45 bu/ac for the canola and between 1.69-5.54 bu/ac for the peas. The PV760 canola was the highest yielding of the monocrop canola treatments. The CDC meadow peas yielded higher than all other pea intercrop and monocrop treatments when grown in an intercrop with synergy (polish) canola. This suggests that CDC meadow peas may experience a yield benefit from intercropping with synergy (polish) canola. Net revenue was low in all treatments, but consistently higher in intercropped treatments than in monocropped treatments. This could indicate that intercropping may reduce financial risk in a difficult growing season.

The typical peola intercrop combination used in this region is a regular Argentine canola with maple peas. Although this study did not perform well under the exceptionally hot and dry growing conditions, the demonstration has identified great potential in coupling earlier maturing peas to earlier maturing canola varieties. CDC Meadow Peas and Synergy Polish canola were one of the better performing pairings and were harvested approximately 1 month earlier on August 16, 2021, than the Meadow peas grown with the early Argentine canola on September 13, 2021. This earlier harvest could allow producers to follow the crop with either a cover crop or a winter cereal. Under 2021 growing conditions, peas grown with the early Argentine canola (43E03 and PV760) were the most profitable, but were harvested much later.

Repeating this trial under more typical, wetter, growing conditions would likely produce more meaningful results. It would also be of value to try other varieties of canola and peas that have a larger range of days to maturity. Different seeding dates of polish canola intercropped with peas would be another interesting factor to investigate. A demonstration highlighting weed control options in polish canola/pea intercrop would be valuable, as a major concern producers have about trying this combination is the reduced weed control options available.

Supporting Information

12. Acknowledgements

The Conservation Learning Centre graciously acknowledged the Ministry's support through signage directly in field with the project, verbally during the Field Day and on the Field Day agenda handed out to all visitors. The CLC would also like to thank a sales representative from Taurus Ag Marketing for donating the inoculant used in the trial, and Nutrien Ag Solutions for donated inputs.

Abstract

13. Abstract/Summary

This project aimed to demonstrate if early-maturing canola and pea varieties could allow for an earlier peola harvest. The trial was conducted near the Conservation Learning Centre, 18 km south of Prince Albert, SK. Unusually hot and dry conditions resulted in very poor emergence and performance of the peas and canola. 6 monocrop and 7 intercrop treatments were seeded, consisting of different combinations of polish (synergy) and early Argentine (43E03 and PV760) canola with early peas (CDC canary and CDC meadow) or CDC mosaic maple peas. Maturity was accelerated due to heat and drought, resulting in the peas reaching maturity nearly 1 month earlier than anticipated. Lodging was observably higher in the peas grown in monocrop compared to intercrop, suggesting that intercropping may help reduce lodging in peas. Yields were extremely low in all treatments, likely due to heat and drought stress, accelerated maturity and low plant densities. Yields ranged between 0.85-11.45 bu/ac for the canola and 1.69-5.54 bu/ac for the peas. PV760 canola was the highest yielding of the monocrop canola. Polish canola treatments were the lowest yielding of the monocrop canola and the intercropped treatments, which was expected as it typically yields lower than Argentine. Meadow peas yielded significantly higher than all other pea intercrop and monocrop treatments when grown with polish canola, suggesting they may experience a yield benefit from intercropping with polish canola. Net revenue in all treatments suffered from extremely poor yields and high fertilizer prices. Net revenue was consistently higher in the intercropped treatments than the monocropped treatments, indicating that intercropping may help lower financial risk in a difficult growing season. Peas grown with the early Argentine canola were the most profitable but were harvested 1 month later than peas grown with polish canola. This demonstration identified great potential in growing earlier peas with earlier maturing canola varieties for an earlier harvest, which could allow producers to follow the crop with either a cover crop or winter cereal. Repeating this trial under more typical, wetter, growing conditions would likely produce more meaningful results. This demonstration was featured at the virtual 2021 Annual Field Day. There have been 36 views. This demonstration will be featured in upcoming research updates and fact sheets.
