2019 Annual Report for the Agriculture Demonstration of Practices and Technologies (ADOPT) Program

Project Title: Peaola vs. Mono-Crop Seeding Rates

Project Number: 20180462

Producer Group Sponsoring the Project: Western Applied Research Corporation

Project Location(s):

- Scott Saskatchewan, R.M. #380 Legal land description: NE 17-39-20 W3

Project start and end dates (month & year): May 2018 and completed January 2019

Project contact person & contact details:

Kayla Slind[1] (kayla.slind@warc.ca) and Jessica Enns[1] (jessica.enns@warc.ca)

[1]Western Applied Research Corporation, Scott, SK

Objectives and Rationale

Project objectives:

The objective of this trial was to evaluate how different seeding rates of pea and canola intercropped compare to their monocrops**.** This trial evaluated the new recommended seeding rates of canola and how they perform in intercropping compared to the canola monocrop. Lastly this project demonstrated the effect of one fungicide application versus no fungicide application on disease pressure in intercropping compared to monocrops.

Project Rationale:

While there are multiple research studies focused on intercropping peas and canola, or better known as “peaola”, there is little to no consistency regarding seeding rate recommendations. This is one of the many concerns that have been addressed by producers. The previous research indicated that intercropping provides greater yields than monocrops but varies substantially regarding specific seeding rates. Higher disease pressure is one of the negatives attributes involved with intercropping peas and canola. Therefore, showing producers disease pressure at the different seeding rates can assist them in deciding which combination of canola and pea seeding rates best suits their farm. Essentially this project will demonstrate to producers a more precise, clear picture of multiple seeding rates and how disease pressure and yield is affected, along with how the new recommended (lower) seeding rates of canola can affect disease pressure and yield.

Methodology and Results

Methodology:

The demonstration was arranged as a split-block design with four replicates and twelve treatments at Scott, SK 2019 (Table 1). The trial was split, for ease of spraying, into fungicide application versus non fungicide application, with seeded buffers of the canola monocrop (5 plants/ft^2) separating the different canola seeding rates for maturity timings. Spring herbicide glyphosate and Aim EC were applied to improve early season weed control. Prior to seeding, spring soil samples were collected at three depth increments (0-15 cm, 15-30 cm and 30-60 cm) in order to determine fertilizer rate recommendations (Table A1). The trial was sown on wheat stubble using a Fabro knife-opener drill with 10-inch row spacing. The canola was seed placed, while the peas with the inoculant were side banded. A plugged run did occur when side banding the peas as the plot seeder is gravity fed not aeration resulting in easier plugging than typical. The readily-available weed bank in the field was used and hand weeding occurred due to inconsistent crop emergence. Insecticide applications were at the discretion of the location manager and were not necessary in the 2019 growing season. Due to a cold wet fall delaying crop maturity the pea monocrop and the intercropping treatments were harvested on August 29th, while the canola monocrop was harvested on October 7th. Further details regarding treatment applications can be found in Appendix A1.

Table 1. Demonstration treatment list of canola and pea seeding rates with fungicide application (Y/N) on the trial "Peaola vs. Mono-Crop Seeding Rates" in Scott, SK in 2019

TRT	Fungicide Application (Y/N)	Field Pea Seeding Rate (plants/m^2)	Canola Seeding Rate (plants/ m^2)
1	Yes	80	0
2	Yes	0	54
3	Yes	80	54
4	Yes	80	32
5	Yes	40	54
6	Yes	40	32
7	No	80	0
8	No	0	54
9	No	80	54
10	No	80	32
11	No	40	54
12	No	40	32

Data Collection:

Plant densities were determined by counting numbers of emerged plants on 2 x 1 meter row lengths per plot approximately four weeks after crop emergence. Disease ratings occurred prior to fungicide application, one week after fungicide application and two weeks after fungicide application. Disease ratings were based on disease percent coverage of the plant with 0 = indicating no disease, 1= indicates <25% coverage, 2= indicates >25% - <50% coverage, 3= indicates <50% coverage, 4 = indicates <75% coverage, 5 = indicates plant death. There were 5 plants assessed per plot and the ratings were averaged to result in total disease rating per plot. The ratings were converted into a percentage by dividing the disease value by five and multiplied by 100. The field peas were assessed for both ascochyta blight and mycosphaerella blight, however, the dominant disease was mycosphaerella blight. The canola was assessed for sclerotinia stem rot. NDVI ratings were conducted using a handheld Greenseeker at the 2-3 leaf stage and 4-6 leaf stage in canola. Yields were determined from cleaned harvested grain samples and corrected to the required moisture content. Weather data was collected and recorded from an on-site station provided by FarmersEdge®. Long-term weather data was collected from Environment Canada.

Growing Conditions:

The 2019 growing season started out extremely dry in April with only 6.1 mm and continues into May with 12.7 mm of precipitation. June and July Scott received precipitation with 97.7 mm and 107.8 mm respectively. August was far below the long-term average with 18mm. Overall, when looking at the accumulated amount of precipitation in 2019 from April to September, there was 6.8 mm more than the long-term total. Throughout the growing season, April was only 0.4 °C warmer than the longer-term average at 4.2 °C. Overall, throughout the growing season the majority of the months were colder than the long-term average. May was 1.7 °C colder at 9.1 °C, July 1.2 °C below at 16.1 °C, and August 1.9 °C cooler at 14.4°C. June and September were within 0.1 °C of the longer-term average. Therefore, from April to September saw the average temperature (°C) drop from 12.4 °C to 11.7 °C.

Table 3. Mean monthly temperature, precipitation and growing degree day accumulated from April to September 2019 at Scott, SK

Year	April	May	June	July	August	Sept.	Average
---*Temperature (°C)* ---							
2019	4.2	9.1	14.9	16.1	14.4	11.3	11.7
Long-term^z	3.8	10.8	14.8	17.3	16.3	11.2	12.4
---*Precipitation (mm)*---							
2019	6.1	12.7	97.7	107.8	18	41.8	284.1
Long-term^z	24.4	38.9	69.7	69.4	48.7	26.5	277.6
---*Growing Degree Days*---							
2019	35.2	185.3	295.4	333.3	291.1	202.6	1342.9
Long-term^z	44	170.6	294.5	380.7	350.3	192.3	1432.4

^{z}Long-term average (1985 - 2014)

Analysis

The data was statistically analysed using the PROC MIXED in SAS 9.4. The residuals were tested for normality and equal variance to meet the assumptions of ANOVA. The means were separated using a Tukey's Honestly Significant Difference (HSD) test with level of significance at 0.05. Replications were treated as random effect factor whiles treatments were fixed effect factors.

Results & Discussion

Plant Density

The seeding rate of peas had a significant effect on crop emergence ($P<0.001$) while canola seeding rate did not ($P=0.1084$). These results indicate that the field pea seeding rates targeted of 80 and 40 plants/m^2 where achieved as densities varied between the 60 and 30 plants/m^2. The higher canola seeding rate on average resulted in a greater plant density than the lower seeding rate. Canola plant density varied greatly throughout the trial and this resulted in a non-significant effect between the two seeding rates (Figure 1). The variability in canola emergence is likely attributed to three factors: (1) the canola was seeded deeper than normal (1 inch) to ensure that the field peas were seeded at an acceptable depth, (2) the field was rolled following seeding to aid in harvesting the field peas, 3) the dry spring conditions restriction canola germination. These factors likely caused poor canola emergence throughout the trial.

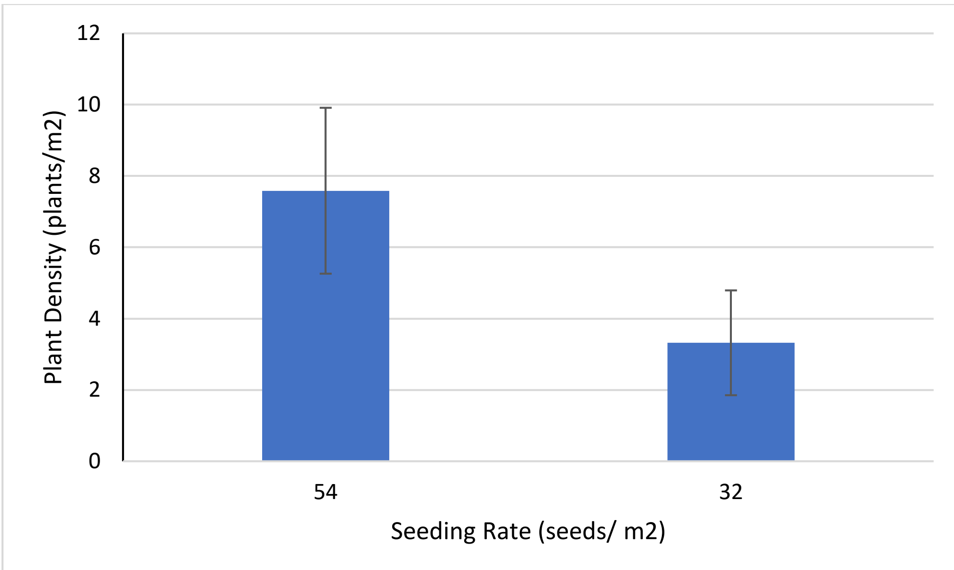

Figure 1. Comparison of canola plant density when seeded at 54 seeds/m^2 and 32seeds/m^2 at Scott, SK in 2019.

Disease Ratings

Canola disease ratings were conducted prior to the fungicide applications; however, disease pressure was low (< 20%) and did not result in any significant responses. Disease ratings conducted one week after application indicated that the unsprayed treatments had a slightly higher (19%) disease pressure compared to the sprayed treatments. Disease ratings two weeks after application indicated that the disease pressure increased by 47% in the unsprayed treatments compared to the sprayed treatments. The canola monocrop treatments had two of the three lowest canola disease ratings at both one and two weeks after the fungicide application. One week after the fungicide application the canola monocrop had the same disease pressure with or without a fungicide application (5%). Intercropped pea and canola treatments tended to have a higher disease pressure than the canola monocrops at both disease ratings (Figure 2).

The highest pea disease pressure recorded occurred two weeks after the fungicide application with a pea seeding rate of 80 plants/ m^2, canola seeding rate of 53 plants/ m^2 and without a fungicide application. This treatment had the same amount of disease as the treatment with a pea seeding rate of 80 plants/ m^2, canola seeding rate of 0 plants/ m^2 and no fungicide applied. Therefore, the presence of canola had little effect on the pea disease pressure (Figure 3).

The level of disease present was largely influenced by the field pea seeding rate ($P<0.001$) at all three disease ratings timings. The three disease ratings for peas with the seeding rate of 80 plants/m^2 consistently resulted in higher disease ratings when compared to 40 plants/ m^2. Pea disease was the highest in four out of the six treatments with the seeding rate of 80 seeds/m^2 prior to fungicide application (Figure 3). One week after the fungicide application the pea seeding rate of 80 plants/ m^2 resulted in the highest pea disease ratings in five out of the six treatments with the highest disease pressures. Lastly, two weeks after the fungicide application all six treatments with a pea seeding rate of 80 plants/ m^2 had the highest disease pressures compared to 40 plants/ m^2.

Seeding rate may affect disease severity in pea crops through its impact on canopy density. The lower, dense pea canopy is especially susceptible to disease development as humidity levels are higher in the lower canopy due to restricted air flow. This slows the rate of evaporation from the leaf surfaces and increases the amount of water vapour within the canopy. As a result, humidity levels and seeding rates are major influences on the rate of disease development (Roger et al. 1999). Additionally, higher seeding rates may also increase competition among plants and may reduce stem diameter in a dense canopy. A lesion on a thin stem may restrict water and nutrient transport more so than on a thick stem. Thin stems may be more subject to lodging which, in turn, allows for more rapid disease development (Wang 1998).

Intercropping canola with peas was believed to reduce the amount of disease development in peas, in particular with soil borne disease that spread during heavy rainfall. The lodged plants are more susceptible to disease whereas intercropping with canola allows the peas to remain upright and protected from disease development. Additionally, the canopy should dry out more easily between rain fall incidents. This added benefit associated with intercropping was not reported within this study, as the highest disease was reported with the high rates of canola and peas and peas seeded alone without a fungicide applied.

One management factor that may effectively manage disease is a fungicide application, however, seeding rate may influence fungicide efficacy. A dense canopy can reduce the penetration of foliar applied fungicides to the lower levels where disease severity is highest. Seeding rate did influence fungicide efficacy as the higher pea seeding rate had 17% more disease than the lower seeding rate. However, the fungicide application in general did slightly reduce the overall disease pressure, regardless of seeding rate, compared to the unsprayed intercrop and mono-cropped peas. Overall, when considering disease management in an intercropping system, a fungicide should be utilized regardless of canola seeding rate to ensure a healthy plant stand.

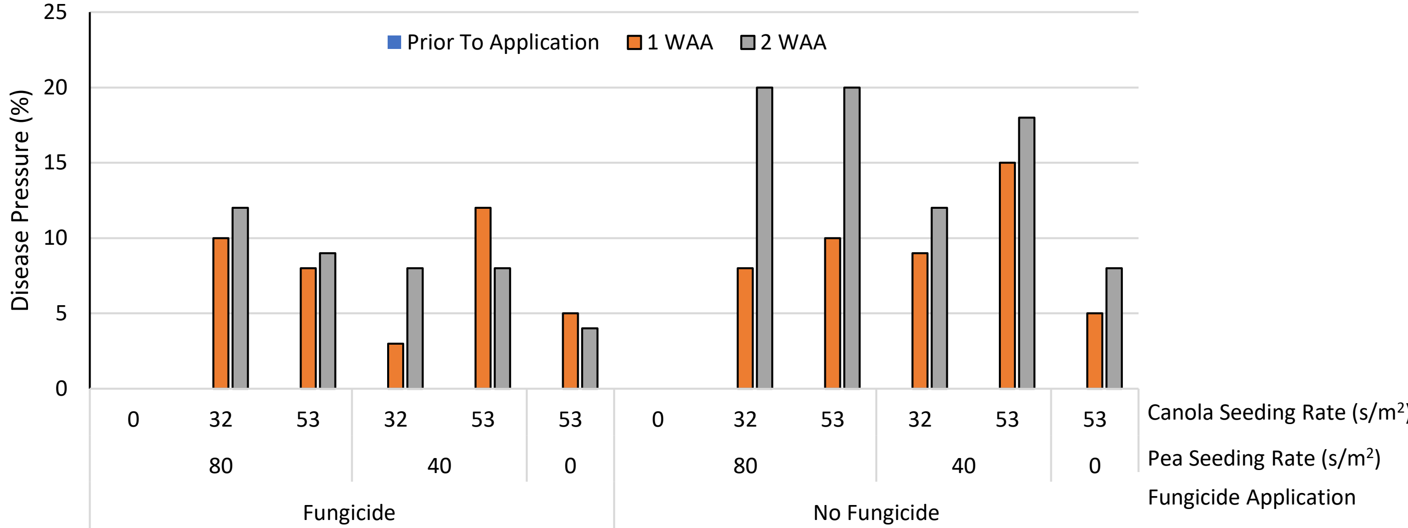

Figure 2. Disease rating pressure (%) on canola seeded as a mono-crop and intercropped with canola at a high canola seeding rate (53 seeds/m^2) and low canola seeding rate (32 seeds/m^2) with and without fungicide application in Scott, SK in 2019

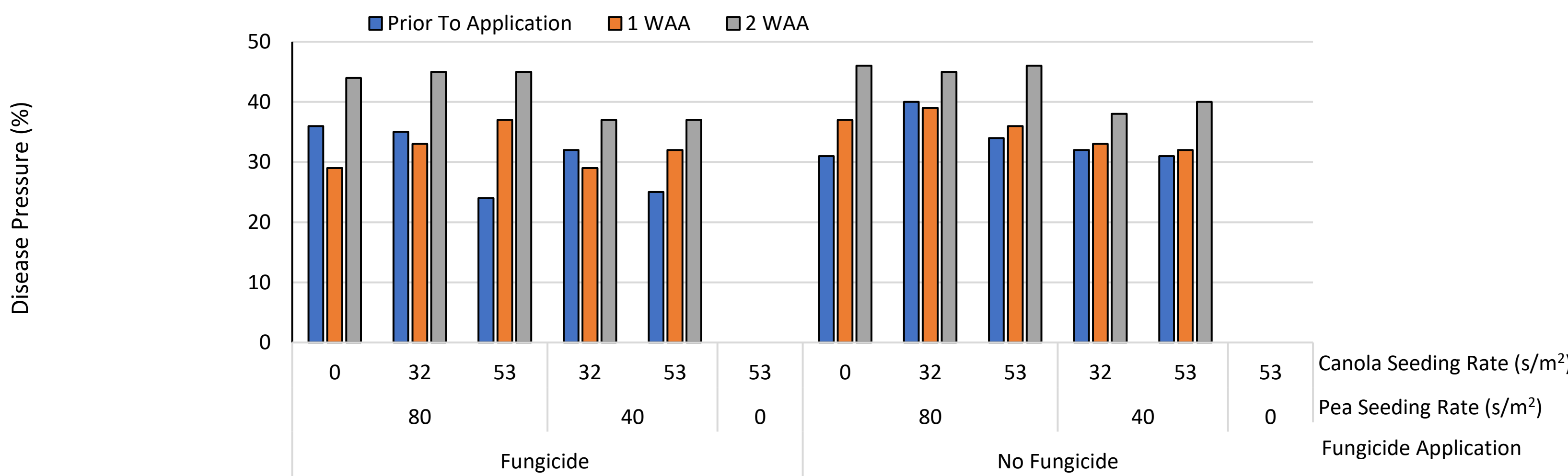

Figure 3. Disease rating pressure (%) on field peas seeded as a mono-crop and intercropped with canola at a high pea seeding rate (80 seeds/m^2) and low pea seeding rate (40 seeds/m^2) with and without fungicide application in Scott, SK in 2019.

NDVI

NDVI ratings were conducted using a handheld Greenseeker at the two to three leaf stage and four to six leaf stage in canola. At both stages, the seeding rates had a significant effect on NDVI (P<0.0001). The highest NDVI recorded at the two to three leaf stage occurred four out of the six treatments with a pea seeding rate of 80 plants/m^2. Similarly, when NDVI was conducted at the four to six leaf stage, the six highest NDVI ratings had a pea seeding rate of 80 plants/m2. At both leaf stages the canola monocrop treatments had the lowest NDVI, which correlates to the thinner plant stand seen from the drought. When NDVI was conducted at both leaf stages there was no consistency between the canola seeding rate of 32 or 53 plants/m^2 and the fungicide application was applied later in the growing season so therefore had no effect on NDVI.

In general, the highest NDVI was recorded with a pea seeding rate of 80 plants/m^2 at the 2-3 and 4-6 leaf stage. At both leaf stages the canola monocrop treatments had the lowest NDVI, which correlates to the thinner plant density from the drought and poor emergence. The fungicide application was applied later in the growing season so therefore had no effect on NDVI.

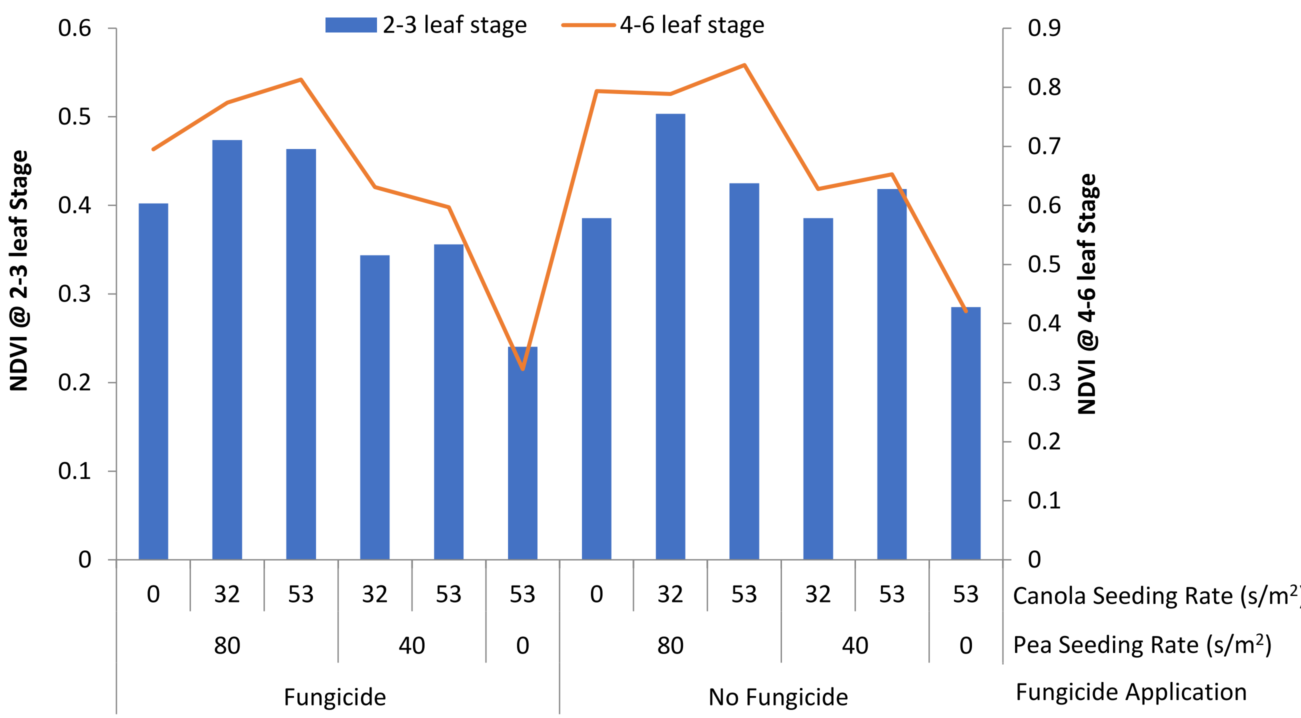

Figure 4. Comparison NDVI ratings at the early stage (2-3 leaf) and the late stage (4-6 leaf) regarding pea and canola seeding rates (plants/m^2) in Scott, SK in 2019.

Yield

The two highest yields of 83 bu/ac (5571.6 kg/ha) and 82.3 bu/ac (5525.7 kg/ha) occurred at the high pea seeding rate (80 seeds/m^2) intercropped with canola at 53 plants/m^2 and 32 plants/m^2 with a fungicide application, respectively. Peas seeded as a monocrop had a similar yield of 80.1 bu/ac (5374.4 kg/ha) the with a fungicide application. A substantial drop in yield occurred at 74.9 bu/ac (5025.9 kg/ha) with the field pea monocrop without a fungicide application. Fungicide application averaged over field pea seeding rates resulted in a 6 bu/ac yield gain compared to the unsprayed peas. The lowest pea yields occurred with the seeding rate of 40 seeds/m^2 with an average yield reduction of 41% compared to the higher seeding rate. Fungicide applications has a lesser effect on the lower pea seeding rates, however, a 5 bu/ac gain occurred when a fungicide was applied compared to when no fungicides were applied.

The two highest canola yields occurred when canola was seeded as a monocrop at the highest seeding rate of 53 seeds/m^2. The highest yield of 31.5 bu/ac (2117.4 kg/ha) occurred when no fungicide was applied and a slightly lower yield of 27.1 bu/ac (1821.8 kg/ha) when a fungicide was applied. The effect of fungicide on canola was inconsistent and did not influence canola yield. The low seeding rate of 32 seeds/m^2 resulted in the lowest yields, regardless of the intercrop combination (Figure 5).

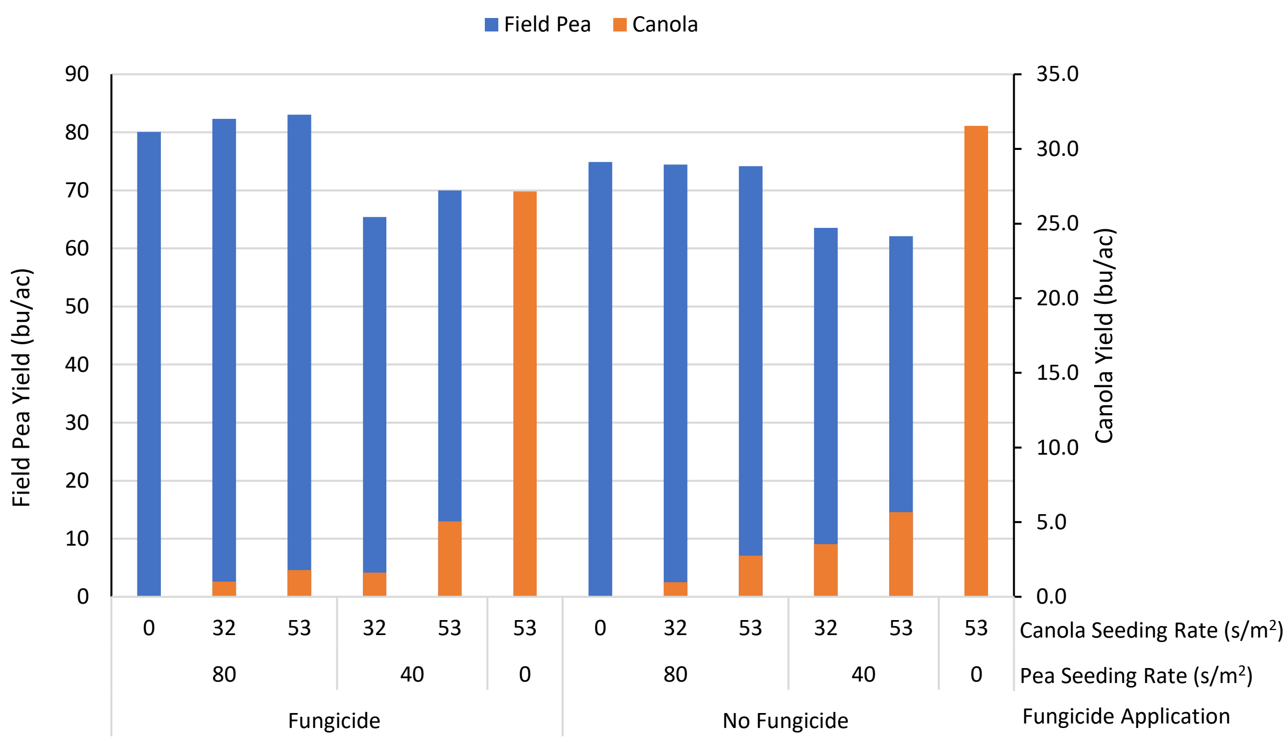

Figure 5. Comparing the yield (bu/ac) of field pea and canola seeding rates seeded as an intercrop and monocrop at two different seeding rates of field pea at 80 vs. 40 seeds/m^2 and canola at 53 vs. 32 plants/m^2 with and without a fungicide application in Scott, SK in 2019.

The results coincide with several studies (Gan et al. 2002; Johnston et al. 2002; Grenkow et al. 2014) in which a lower pea seeding rate typically results in a reduced yield. Gan et al. (2002) reported that optimum dryland pea plant density is 65-70 plants/m^2 when grown in southwestern Saskatchewan on wheat stubble. Johnston et al. (2002) found that field pea yield was optimized at 80 plants/m^2 (108 seeds/m^2) and yields dropped significantly at populations below 50 plants m/^{2}. Grenkow et al. (2014) found that seeding rate was the most dominant factor influencing field pea yields and that plant densities below the current recommendation of 75- 85 plants/m^2 resulted in yield reductions up to 7 bu/ ac. Based on these results, whether field peas are grown as an intercrop or monocrop, the pea seeding rate should remain close to the recommended rate of 75 to 85 plants/m^2 or slightly below. Dropping the seeding rate to 40 plants/m^2 will reduce the pea yield and result in large field gaps if the canola does not establish.

The canola yield when seeded as a monocrop was the highest with and without fungicide. Canola seeded as an intercrop was unsuccessful at both the high and low seeding rates. The low canola seeding rate resulted in a plant density too low for the crop to effectively become established and compete with the field peas as crop densities ranged between 1.5 to 4 plants/m^2. This very low density resulted in very low yield. The canola yield ranged between 1 and 3.5 bu/ ac when intercropped with field peas. The high (54 seed/m^2) canola seeding rate resulted in a variable establishment with densities ranging between 5 and 9 plants/m^2. Establishment was better for the higher seeding rate compared to the lower seeding rate; however, canola yield was still low with a range of 1.8 to 5.7 bu/ac. Overall, the cost of the seed and time required to seed this intercrop would likely outweigh the return on profits.

As canola emergence was very low and variable throughout this study it is difficult to accurately assess the correct seeding rate required for a canola and pea intercrop. What can be learned is that when an intercrop is used, the reliance on canola to reduce disease pressure is not sufficient and a fungicide should be utilized to protect yields. Additionally, that the lowest seeding rate of field peas and canola were not successful in both the monocrop or intercrop. When considering intercropping a higher rate of one crop should be utilized in case emergence of the secondary crop is poor.

Table 4. Comparison of each treatment regarding emergence, disease ratings, NDVI and yields on the trial "Peaola vs. Mono-Crop Seeding Rates" in Scott, SK in 2019

	Pea Emergence	Canola emergence	Pea Disease Ratings			Canola Disease Ratings			NDVI		Pea Yield		Canola Yield	
TRT	plants/m2	plants/m2	Prior	1 WAA	2 WAA	Prior	1 WAA	2 WAA	2-3 leaf	4-6 leaf	kg/ha	bu/ac	kg/ha	bu/ac
1	69.6	NA	36	29	44	0	0	0	0.4022	0.6951	5374.4	80.1	0.0	0.0
2	NA	8.3	35	33	45	0	10	12	0.2405	0.3228	0.0	0.0	1821.8	27.1
3	64.7	4.6	24	37	45	0	8	9	0.4636	0.8131	5571.6	83.0	120.3	1.8
4	66.1	4.9	32	29	37	0	3	8	0.4737	0.7741	5525.7	82.3	68.1	1.0
5	38.4	7.6	25	32	37	0	12	8	0.3562	0.597	4697.7	70.0	338.8	5.0
6	33.9	2.9	0	0	0	0	5	4	0.3437	0.6311	4390.8	65.4	109.2	1.6
7	66.7	NA	31	37	46	0	0	0	0.3857	0.7937	5025.9	74.9	0.0	0.0
8	NA	10.8	40	39	45	0	8	20	0.2851	0.4206	0.0	0.0	2117.4	31.5
9	65.9	5.1	34	36	46	0	10	20	0.425	0.8377	4979.0	74.2	184.3	2.7
10	57.6	1.4	32	33	38	0	9	12	0.5033	0.7885	4996.1	74.4	65.4	1.0
11	33.4	8.8	31	32	40	0	15	18	0.4185	0.6526	4169.1	62.1	380.4	5.7
12	46.5	3.9	0	0	0	0	5	8	0.3858	0.6278	4266.1	63.6	237.0	3.5

Conclusions and Recommendations

The results indicate that the field pea seeding rates targeted of 80 and 40 plants/m^2 where achieved as crop densities varied between the 60 and 30 plants/m^2. The higher canola seeding rate on average resulted in a greater plant density than the lower seeding rate. Canola plant density varied greatly throughout the trial and in general had poor emergence due to seeding and environmental constraints. The application of a fungicide reduced disease pressure in peas and resulted in a 6 bu/ac yield gain compared to the unsprayed peas. The lowest pea yields occurred with the seeding rate of 40 seeds/m^2 with an average yield reduction of 41% compared to the higher seeding rate. Fungicide application has a lesser effect on the lower pea seeding rates, however, a 5 bu/ac gain occurred when a fungicide was applied compared to when no fungicides were applied. The disease levels in canola were relatively low (<20%) prior to application but 2 WAA there was a 47% increase in disease pressure in the unsprayed treatments compared to the sprayed. Alternatively, disease pressure within the field peas were strongly related to seeding rates. Throughout the three disease rating timings for field peas the seeding rate of 80 plants/m^2 consistently resulted in higher disease pressure compared to 40 plants/m^2. Seeding rate may affect disease severity in pea crops through its impact on canopy density. The lower, dense pea canopy is especially susceptible to disease development as humidity levels are higher in the lower canopy due to restricted air flow. Intercropping canola with peas was speculated to reduce the amount of disease development in peas, as the canola improves canopy air flow and reduces lodging. These two factors should reduce disease development, however, the monocrop and intercropped peas had similar disease levels. Although intercropping did not influence disease pressure in peas, it may have improved pea yields. The two highest yields of 83 bu/ac and 82.3 bu/ac occurred at the high pea seeding rate (80 seeds/m^2) intercropped with canola at 53 plants/m^2 and 32 plants/m^2 with a fungicide application. The third highest yield was achieved as a pea monocrop with a yield of 80 bu/ac. The two highest canola yields occurred when canola was seeded as a monocrop at the highest seeding rate of 53 seeds/m^2 with and without a fungicide application. The low seeding rate of 32 seeds/m^2 resulted in the lowest yields, regardless of the intercrop combination. In general, canola seeded as an intercrop was unsuccessful at both the high and low seeding rates. The low canola seeding rate resulted in a plant density too low for the crop to effectively become established and compete with the field peas as crop densities ranged between 1.5 to 4 plants/m^2. This very low density resulted in yields between 1 and 3.5 bu/ ac. The high (54 seed/m^2) canola seeding rate resulted in a variable establishment with densities ranging between 5 and 9 plants/m^2. Establishment was better for the higher seeding rate compared to the lower seeding rate; however, canola yields were still low with a range of 1.8 to 5.7 bu/ac. The cost of the seed and time required to seed this intercrop may outweigh the return on profits. However, for producers interested in an intercrop, a seeding rate of 80 plants/m^2 for peas, 5 plants/m^2 for canola with a fungicide application is a great starting point.

Supporting Information

Acknowledgements

Financial support was provided by the Agricultural Demonstration of Practices and Technologies (ADOPT) initiative under the Canada-Saskatchewan Canadian Agricultural Partnership (CAP) bi-lateral agreement. The Saskatchewan Ministry of Agriculture will be acknowledged in any written or oral presentations which may arise regarding this study. We would like to acknowledge Herb Schell and our summer staff, Keanna Svendsen-Striga, Jocelyn Leidl and Haile Wangler, for their technical assistance with project development and implementation for the 2019 growing season. This report will be distributed through WARC's website and included in WARC's and Agri-ARM annual reports.

Appendices

Appendix A

Table A1. Agronomic and treatment application information during the growing season at Scott, 2019

	Product	Rate	Date
Fertilizer:			
All treatments	0-15-0-10		May 13th
Canola monocrop	80 lb/ac		
Pea monocrop	0 lb/ac		
Peaola intercrop	40 lb/ac		
Variety:		80 seeds/ m2	May 18th
Canola	45P70	221 lb/ ac	
Pea	Arbarth		
Fungicide	Priaxor *(based on protocol)*	180 ml/ ac	July 3rd
Desiccation			
Canola monocrop	Reglone ION	0.83L/ac	September 18th
Pea monocrop	Reglone ION	0.83L/ac	September 23rd
Peaola intercrop	Reglone ION	0.83L/ac	September 23rd

Abstract

Abstract/Summary

The objective of this trial was to evaluate how different seeding rates of pea and canola intercropped compare to their monocrops along with the effects of a fungicide application. The demonstration was arranged as a split-block design with four replicates and twelve treatments at Scott, SK 2019. The treatments consisted of intercropped field peas at a seeding rate of 80 and 40 plants/m^2 and canola seeded at 53 and 32 plants/m^2 and a monocrop of peas (80 plants/m^2) and canola (53 plants/m^2) with and without a fungicide application. The application of a fungicide reduced disease pressure in peas and resulted in a 6 bu/ac yield gain compared to the unsprayed peas. The lowest pea yields occurred with the seeding rate of 40 seeds/m^2 with an average yield reduction of 41% compared to the higher seeding rate. Fungicide applications has a lesser effect on the lower pea seeding rates, however, when fungicide was applied a 5 bu/ac yield gain occurred compared to the unsprayed. The disease levels in canola were relatively low (<20%) prior to application but 2 WAA there was a 47% increase in disease pressure in the unsprayed treatments compared to the sprayed. The presence of canola within the intercrop had little bearing on the overall disease pressure on the peas. Disease pressure within the field peas were strongly related to seeding rates ($P < 0.0001$). Field peas seeded at 80 plants/m^2 consistently resulted in higher disease pressure (12%) compared to 40 plants/m^2. The two highest yields of 83 bu/ac and 82.3 bu/ac occurred at the high pea seeding rate (80 seeds/m^2) intercropped with canola at 53 plants/m^2 and 32 plants/m^2 with a fungicide application. The third highest yield was achieved as a pea monocrop with a yield of 80 bu/ac. Canola seeded as an intercrop at a lower and higher seeding rate had very low yields between 1 and 5.7 bu/ac. The cost of the seed and time required to seed this intercrop may outweigh the return on profits. However, for producers interested in an intercrop, a seeding rate of 80 plants/m^2 for peas, 5 plants/m^2 for canola with a fungicide application is a great starting point.

Extension Activities:

This project was presented at the Scott Field Day that reached producers and industry personnel throughout the surrounding Wilkie, Landis, and Unity areas. Signs stating the objective of this demonstration with acknowledgement of the ADOPT program and the Saskatchewan Ministry of Agriculture were posted in front of the plots. A fact sheet will be generated and distributed on the WARC website as well as all Agri-ARM and WARC events to ensure the information will be transferred to producers.

References

Wang, T. F. 1998. Evaluation of mycosphaerella blight resistance in pea. M.Sc. Thesis, University of Saskatchewan, Saskatoon, SK. 129 pp.

Roger, C., Tivoli, B. and Huber, L. 1999a. Effects of interrupted wet periods and different temperatures on the development of ascochyta blight caused by Mycosphaerella pinodes on pea (*Pisum sativum*) seedlings. Plant Pathol. 48:10–18