

## Field Pea and Canola Intercropping Trial, 2021

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Intercropping is the production practice of growing two or more crops together at the same time. The concept of “peola”, intercropping peas and canola, has been around Canada for decades. This concept is also being researched in North Dakota, as peas and canola have significant acres in various parts of the state. Intercropping provides several potential benefits including a more competitive crop for weed management, fewer insect pests, better fertility and water utilization, reduced soil erosion, improved crop harvestability and an increase in crop production compared to monocropping. Despite these benefits come challenges such as aligning maturities of the different crops, weed control, mechanical limitations, economic costs to separate the different crop types from one another, and insurance or program restrictions. In an intercropping system each individual crop will yield less than if the crop were grown alone. The potential benefit will be that the total yield will be greater than if the crops were grown as monocrops. Land Equivalent Ratio (LER) is a measure of the yield advantage gained by growing an intercrop compared to growing the same crops as a monocrop and is calculated as the ratio of land under monocropping vs intercropping. Total LER is the sum of each individual crop and will be a number >1. For example, a LER of 1.15 means it would take 15 percent more land to equal the intercrop yield if each crop was grown alone.

A field pea and canola intercropping trial was initiated to determine the optimum seeding ratios of these two crops to attain maximum LER. The 100% monocrop seeding rate for peas was 325,000 pure live seed (PLS)/a (7.5 seeds/ft<sup>2</sup>) and 522,000 PLS/a (12 seeds/ft<sup>2</sup>) for canola. The ratios for field pea at 66, 50, and 33% were 5.0, 3.7, and 2.4 seed/ft<sup>2</sup>, respectively. The ratios for canola were 8, 6, and 4 seeds/ft<sup>2</sup> for 66, 50 and 33%, respectively. The trial was planted May 24 on conventionally tilled Svea-Barnes loam soil in 6-inch row spacing. The soil test for N-P-K was 55-10-260. Fertilizer added to the site included 100 lbs/a each of 11-52-0 and 0-0-60, and 76 lbs/a of 46-0-0. Granular inoculum was applied in furrow. A semi-leafless yellow pea and Clearfield canola variety were used. Trifluralin was applied PPI at 1 qt/a for weed control. The field design was a randomized complete block with four replications.

Intercropping spring stand, yield, LER and economic returns are presented in Table 1. Plant stands decreased with the corresponding reduction in seed ratios for each crop. Spring plant stands for monocrop pea and canola had a percent emergence of 92 and 68, respectively. Percent emergence at each ratio was similar to the monocrop ranging from 62 to 72 percent for canola and less for pea at 61 to 81 percent (data not shown). Pea and canola yields were the highest for the 100% monocrop. Average yield of the various seeding ratios for pea decreased by 69% compared to 100% monocrop while yield for the various ratios for canola decreased only 24% compared to the 100% monocrop canola. The individual LER's for the peas was much lower than the canola indicating that canola was the dominant crop in this study. No significant differences were seen between the total LER's indicating that no benefit was seen from combining these crops in an intercropping system. Previous pea-canola intercropping research in North Dakota and Canada has generally indicated LER's ranging from 1.05 to 1.25. Economic

returns increased slightly compared to monocrop values alone, but does not include cost of production and additional seed cleaning costs associated with intercrops, which would result in lower net revenue.

**Table 1. Pea – Canola intercropping spring stand, yield, LER and gross revenue.**

Pea/Canola	Spring Stand		Yield		Land Equivalent Ratio			Gross Economic Returns		
	Pea	Canola	Pea	Canola	Pea	Canola	Total	Pea	Canola	Gross Revenue
Seeding Ratio	plants/ft <sup>2</sup>		bu/a	lbs/a				----- \$/a -----		
100/0	6.9	-	43.6	-	1	-	1		659	659
0/100	-	8.2	-	1847	-	1	1	675	-	675
66/66	4.0	5.8	12.6	1392	0.29	0.75	1.04	195	470	665
33/66	1.8	5.6	6.3	1694	0.14	0.92	1.06	98	605	703
50/50	2.7	4.2	12.4	1459	0.28	0.79	1.07	192	521	713
66/33	3.7	2.6	14.2	1346	0.33	0.73	1.06	220	481	701
100/33	4.6	2.5	21.1	1065	0.49	0.56	1.07	327	380	707
LSD (0.05)	1.4	1.9	3.9	233	0.08	0.13	NS			
C.V. %	24.1	25.6	14.0	10.5	13.2	10.8	7.3			