

Field Pea and Canola Intercropping Trial, 2023

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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 continued from 2021 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/ft²) and 435,600 PLS/a (10 seeds/ft²) for canola. The ratios for field pea at 66, 50, and 33% were 5.0, 3.7, and 2.4 seed/ft², respectively. The ratios for canola were 7, 5, and 3 seeds/ft² for 66, 50 and 33%, respectively. The trial was planted May 31 on conventionally tilled Svea-Barnes loam soil in 6-inch row spacing. The soil test for N-P-K was 26-17-430. Canola was considered the primary crop and fertilized as such which included 80 lbs/a of 21-0-0-24 and 77 lbs/a of 46-0-0. 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.

Yield, LER and economic returns are presented in Table 1 which includes yield and LER from 2021. Pea and canola yields were the highest for the 100% monocrop in 2023. Average yield of the various seeding ratios for pea decreased by 52% compared to 100% monocrop while yield for the various ratios for canola decreased only 37% 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. The only significant difference between the total LER's was the Pea/Canola ratio of 100/33 was significantly higher than the ratio of 33/66. However, the 100/33 ratio still had a lower gross revenue than the monocrop canola. Prices for each crop was calculated at \$23.10/cwt for the canola and \$10/bu for the pea. The relationship between the prices of each crop may affect the gross economic returns on a yearly basis. In 2021 no significant differences were seen between the total LER's. Previous pea-canola intercropping research in North Dakota and Canada has generally indicated LER's ranging from 1.05 to 1.25. Economic

returns do not include cost of production and additional seed cleaning costs associated with intercropping, which would result in lower net revenue. Thorough planning is needed to determine costs and determine if intercropping is profitable for your farm.

Table 1. Pea – Canola intercropping yield, LER and gross revenue for 2021 and 2023.

Pea/Canola	2021		2021			2023		2023			Gross Economic Returns 2023		
	Yield		Land Equivalent Ratio			Yield		Land Equivalent Ratio			Pea	Canola	Gross Revenue
	Pea	Canola	Pea	Canola	Total	Pea	Canola	Pea	Canola	Total			
Seeding Ratio	bu/a	lbs/a				bu/a	lbs/a				-----\$/a-----		
100/0	43.6	-	1	-	1	51.8	-	1	-	1	518	-	518
0/100	-	1847	-	1	1	-	2806	-	1	1	-	648	648
66/66	12.6	1392	0.29	0.75	1.04	25.7	1721	0.50	0.62	1.11	257	397	654
33/66	6.3	1694	0.14	0.92	1.06	17.1	2015	0.33	0.72	1.05	171	465	636
50/50	12.4	1459	0.28	0.79	1.07	25.2	1789	0.49	0.64	1.13	252	413	665
66/33	14.2	1346	0.33	0.73	1.06	22.4	1854	0.43	0.67	1.09	224	428	652
100/33	21.1	1065	0.49	0.56	1.07	34.9	1425	0.67	0.51	1.18	349	329	678
LSD (0.05)	3.9	233	0.08	0.13	NS	6.1	262	0.12	0.08	0.09			
C.V. %	14.0	10.5	13.2	10.8	7.3	13.6	9.0	13.9	8.12	5.7			