North Central Region Canola Research Grant
Progress Report
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Title
Effect of Tillage System and Nitrogen Source and Fertility on Canola Performance in Central North Dakota.

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Abstract
The effect of tillage system and nitrogen (N) and fertility on canola establishment, yield and quality, disease incidence and severity, and weed management trial was conducted at Carrington in 2006. The trial has helped generate interest in reducing input costs of canola production in North Dakota.

Objective
To determine the effect of tillage system and N and fertility on canola establishment, yield and quality, disease incidence and severity, and weed management.

Progress
Methods: The trial was conducted at Carrington in 2006. The experimental design for the trial was a split-split-plot design block with three replicates.

Hybrid canola seed was planted on May 3 at 500,000 seeds / acre. The trial was harvested August 3.

Results: The 2006 growing season was warm and very dry with above average temperatures for the entire growing season and below normal precipitation for all months except August. The remainder of the growing season was very dry with above normal temperatures. Canola stands were reduced due to dry soil at planting and excessive planting depth. Canola yields ranged from 459 to 1040 lbs / acre (Table 3). Total above ground biomass ranged for 3,255 to 5,295 lbs / acre (Table 3).

When we look at the impact of tillage system across all fertilities we see that 1000 KWT increases as the amount of tillage decreases from No Till (N) to minimum tillage (M) to conventional tillage (T) (Table 1). However, we also see in this study that yield and stand decrease as tillage decreases (Table 1).

When we look at the N fertility across all tillage systems as one would expect all parameters increase with increasing levels of N (Table 2). However, we see that the manure (M) treatment is statistically equal to the 80 lbs treatment for all parameters and significantly higher for 1000 KWT, Oil content, and significantly lower for plant height (Table 2).

When we look at the interaction of tillage and fertility we see that the 0 fertility treatment is significantly lower for all parameters except 1000 KWT and Oil content which it is actually higher (Table 3).

Impact

This research project has helped identify an alternative fertilizer source along with tillage systems that can be used to reduce the input costs of canola in North Dakota.

Conclusions

By utilizing 40 lbs of N as manure as a fertilizer source we are able to show that canola can achieve the same yields as applying 80 lbs of N as synthetic fertilizer thereby proving that manure is an economically viable way to decrease input costs. Also, there is no statistical difference in canola yield across tillage systems so reducing tillage also an economically viable way to decrease input costs.

Table 1. Tillage

	Biomass Weight lbs	1000 KWT gm	Oil %	Yield lbs	Straw Weight lbs	Stand plants/acre	Plant Height in
M	4,676	2.4	43.5	833	3,882	403,015	40
N	4,540	2.5	44.1	674	3,866	276,053	40
T	4,880	2.3	43.4	804	4,076	316,714	40
Average	4,699	2.4	43.7	770	3,942	331,927	40
C.V.	14	4.3	3.6	29	13	30	1
LSD 0.05	543	0.1	1.3	196	458	85,088	1

Table 2. Fertility

	Biomass Weight lbs	1000 KWT gm	Oil %	Yield lbs	Straw Weight lbs	Stand plants/acre	Plant Height in
0	3,394	2.5	45.9	480	2,966	301,316	37
40	4,895	2.4	41.9	726	4,169	369,546	42
80	5,002	2.3	42.1	927	4,075	324,182	43
M	5,504	2.4	44.8	947	4,557	332,665	38
Average	4,699	2.4	43.7	770	3,942	331,927	40
C.V.	14	4.3	3.6	29	13	30	1
LSD 0.05	627	0.1	1.5	226	529	98,251	1

Table 3. Tillage by Fertility

		Biomass Weight lbs	1000 KWT gm	Oil %	Yield lbs	Straw Weight lbs	Stand plants/acre	Plant Height in
M	0	3,255	2.6	46.4	516	2,739	359,588	36
M	40	4,902	2.4	42.0	829	4,073	440,357	41
M	80	5,295	2.3	40.0	1,034	4,261	413,803	43
M	M	5,253	2.3	45.7	953	4,300	398,313	38
N	0	3,325	2.6	46.4	459	2,866	256,690	37
N	40	4,844	2.4	41.6	595	4,250	299,841	42
N	80	4,393	2.5	43.0	708	3,685	242,307	43
N	M	5,599	2.5	45.5	935	4,664	305,373	38
T	0	3,601	2.3	44.9	466	3,135	287,670	38
T	40	4,939	2.4	42.1	755	4,185	368,439	42
T	80	5,318	2.3	43.4	1,040	4,278	316,437	44
T	M	5,661	2.4	43.2	953	4,708	294,309	38
Average		4,699	2.4	43.7	770	3,929	331,927	40
C.V.		14	4.3	3.6	29	13	30	1
LSD 0.05		1,087	0.2	2.7	391	916	170,175	2