

## **Canola Seeding Rate and Hybrid Influence on Spring Canola Performance in Northeast North Dakota, 2013-14.**

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Spring canola has become a viable economic alternative for many producers in North Dakota. Previous research conducted on seeding rates in North Dakota focused on open pollinated and hybrid non-herbicide tolerant lines. Advances in canola breeding have lead producers to favor seeding herbicide tolerant Roundup Ready (RR) and Liberty Link (LL) hybrids. Rising seed prices have resulted in producer consideration of lower seeding rates to reduce costs. This field study examined the effects of seeding rates on yield and agronomic traits of a RR and LL hybrid. The study was conducted at Langdon in a randomized complete block design in a split plot arrangement with hybrids as main plots and seeding rates as subplots. Plots consisted of seven rows with a six inch spacing. Seeding rates were 3, 6, 9, 12 and 15 pure live seed (pls)/ft<sup>2</sup>. The seeding rates, in lbs/a, for the different years and hybrid seed lots are given in Table 1. The trial was planted on May 24 and 21 in 2013 and 2014, respectively. Trials were planted later than normal both years due to wet and/or cold soil conditions. Precipitation and temperatures were nearly ideal to produce very high yields in both growing seasons. The trial was conducted using best management practices for canola including fertility, fungicide and harvest management. Each hybrid was sprayed with its corresponding herbicide trait for weed control. Two hybrids cultivars were used; Liberty Link InVigor L130 and Roundup Ready HyClass 955.

Various environment x hybrid and seeding rate interactions occurred for days to first flower, days to end flower, flower duration, plant height, harvest plant stand, and net return but the differences (data not shown) generally would not be of any practical significance to canola production. For this reason, seeding rate and hybrid cultivar comparisons are averaged over hybrids and seeding rates, respectively. The two canola hybrids were similar to each other in yield and all other traits observed except for oil percent where HyClass 955 had a significantly higher oil level than InVigor L130.

Plant emergence in 2013 and 2014 was excellent for both hybrids averaging over 90 percent for the seeding rates. This was somewhat atypical as emergence rates usually range from 60-80 percent. Days to flower, end flower, and maturity were all significantly delayed at the 3 pls/ft<sup>2</sup> seeding rate compared to other seeding rates. This was probably a result of increased branching from the lower plant density.

The higher the seeding rate the faster percent ground cover was attained. Plant height was greater at the lower seeding rates while lodging increased slightly with increasing seeding rates although the differences were not significant. No lodging was observed in the 2014 trial. Seeding rate had no effect on percent oil which supports previous research.

Yield generally increased with higher seeding rates. The 3 pls/ft<sup>2</sup> seeding rate yielded significantly less than the 6, 9, 12, or 15 pls/ft<sup>2</sup> seeding rate. There was no significant difference in yield between the 6 and 9, 9 and 15, and 12 and 15 pls/ft<sup>2</sup> seeding rates. The data would suggest that seeding between 9 and 12 pls/ft<sup>2</sup> would result in optimum yields. If seed bed conditions resulted in an emergence of 60 percent, plant stands of between 5 and 7 plants/ft<sup>2</sup> would still be attained. This population should still maintain a yield higher than the 3 pls/ft<sup>2</sup> seeding rate where significant losses were observed. Seeding rates could be reduced with ideal seedbed conditions of adequate moisture and warm soil temperatures. Net return was calculated by multiplying yield times a market price of \$ 0.17/lb minus seed cost. Seed cost for the two years was \$10.72/lb for both hybrids. There was no significant differences in net return at P≤0.10 level. The significant F value for net return was P≤0.21. Numerically, the optimum seeding rate for net return was between 9 and 12 pls/ft<sup>2</sup>. The 3 seeds/ft<sup>2</sup> seeding rate was \$22/a less than the 6 pls/ft<sup>2</sup> seeding rate, although this was not significant.

**Table 1. Seeding rates in pls/ft<sup>2</sup> vs lbs/a for InVigor L130 and HyClass 955 in 2013-2014.**

| Seeding Rate          | 2013 - L130              | 2014 - L130 | 2013 - 955 | 2014 - 955 |
|-----------------------|--------------------------|-------------|------------|------------|
|                       | Seedlot size in seeds/lb |             |            |            |
|                       | 108,000                  | 89,000      | 114,000    | 107,000    |
| Seeds/ft <sup>2</sup> | -----lbs/a-----          |             |            |            |
| 3                     | 1.2                      | 1.5         | 1.2        | 1.3        |
| 6                     | 2.4                      | 3.0         | 2.3        | 2.5        |
| 9                     | 3.5                      | 4.5         | 3.5        | 3.8        |
| 12                    | 4.7                      | 6.0         | 4.7        | 5.0        |
| 15                    | 5.9                      | 7.5         | 5.8        | 6.3        |

**Table 2. Seeding rate effect on canola yield and other agronomic traits averaged over cultivars, Langdon 2013-2014.**

| Seeding Rate | Yield | Emergence           |       | Harvest              |      | 1st                  | End  | Flower | Maturity | Cover          | HT   | Lodging | Oil  | Net Return |
|--------------|-------|---------------------|-------|----------------------|------|----------------------|------|--------|----------|----------------|------|---------|------|------------|
|              |       | PLS/ft <sup>2</sup> | lbs/a | plts/ft <sup>2</sup> | %    | plts/ft <sup>2</sup> | %    | Flower |          |                |      |         |      |            |
|              |       |                     |       |                      |      | DAP <sup>1</sup>     | DAP  | Days   | DAP      | % <sup>2</sup> | in   | 0-9     | %    | \$         |
| 3            | 3334  | 2.6                 | 84    | 2.9                  | 95   | 43.6                 | 61.7 | 18.1   | 91.6     | 29.4           | 48.6 | 0.4     | 46.0 | 553        |
| 6            | 3543  | 5.7                 | 94    | 5.8                  | 96   | 42.1                 | 60.1 | 18.0   | 90.3     | 61.6           | 47.5 | 0.4     | 46.3 | 575        |
| 9            | 3689  | 8.7                 | 96    | 8.5                  | 94   | 41.6                 | 59.6 | 18.1   | 89.9     | 77.5           | 47.3 | 0.8     | 46.4 | 586        |
| 12           | 3898  | 12.0                | 100   | 10.7                 | 89   | 42.0                 | 60.0 | 18.0   | 89.6     | 83.3           | 45.6 | 0.9     | 46.1 | 608        |
| 15           | 3812  | 14.6                | 98    | 13.4                 | 89   | 41.1                 | 59.4 | 18.3   | 89.5     | 88.3           | 45.3 | 1.0     | 46.0 | 579        |
| LSD 10%      | 181   | 0.9                 | NS    | 0.9                  | NS   | 0.4                  | 0.5  | NS     | 0.6      | 3.0            | 1.1  | NS      | NS   | NS         |
| C.V. %       | 8.4   | 17.4                | 18.3  | 17.6                 | 17.7 | 1.5                  | 1.4  | 4.6    | 1.1      | 7.5            | 4.0  | 93.8    | 1.7  | 9.0        |

**Table 3. Comparison of two canola cultivars averaged over seeding rates, Langdon 2013-2014.**

| Variety      | YIELD | ES  | ES%  | HS  | HS%  | 1STF <sup>1</sup> | END  | FD   | DM   | Cover <sup>2</sup> | HT   | LGD | OIL  | Net    |
|--------------|-------|-----|------|-----|------|-------------------|------|------|------|--------------------|------|-----|------|--------|
|              |       |     |      |     |      |                   |      |      |      |                    |      |     |      | Return |
| HyClass 955  | 3657  | 8.6 | 91.9 | 8.1 | 90.6 | 41.2              | 59.4 | 18.2 | 89.6 | 68.6               | 44.1 | 1.0 | 48.1 | 583    |
| InVigor L130 | 3653  | 8.8 | 96.6 | 8.4 | 94.0 | 43.0              | 61.0 | 18.0 | 90.8 | 67.5               | 49.6 | 0.4 | 44.2 | 578    |
| LSD 10%      | NS    | NS  | NS   | NS  | NS   | NS                | NS   | NS   | NS   | NS                 | NS   | NS  | *    | NS     |

<sup>1</sup>DAP=Days after planting.

<sup>2</sup>Visual rating of percent area of plot covered by plant growth. Rated at 5-6 leaf stage.

\* Significant at P≤ 0.10.