



## Mackenzie Applied Research Association

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### Seeding and fertilizer rate effects on canola and barley in northern Peace region

**Introduction:** Seeding and fertilizer rates can effect crop establishment. Optimizing these factors has also demonstrated enhanced crop yield and competitiveness to weeds.

For barley, a plant population of 22 plants/ft<sup>2</sup> is considered optimum for weed management and yield. However, surveys done in central Alberta found that barley stands often had well below 15 plants/ft<sup>2</sup>. This suggests that the competitiveness of barley grown in Alberta could be increased by raising the seeding rate. Canola population within a range of 7 to 17 plants/ft<sup>2</sup> normally competes very well with weeds and have very little effect on the final yield. However, differences in days to maturity may be negatively affected. The effect of seeding rates on maturity is more pronounced where the weather conditions are predominantly cool, such as the northern Peace region.

The nitrogen fertilizer and seeding rate may also influence grain protein content in barley, which in turns affect its malt quality. The optimum level of protein for malting barley is between 9.5 and 11.5 per cent. For the 8.5 to 13 % protein level, the grain is accepted for malting but it is subject to downgrading. The concentration of protein in the grain depends on the amount of nitrogen in the plant and how many grains the nitrogen is distributed to.

**Objectives:** To evaluate the effects of seeding and fertility rates on malt barley and canola seed quality and yield.

**Materials and Methods:** The trials were set up as field scale factorial with 3 replicates. Weed control was excellent and lodging, insect or diseases were not present.

For barley, factor A was 120, 147 and 180 lbs/ac of NPKS (36-0-7-3). Factor B was 20, 25 and 29

lbs/ac of NP (11-52). Factor C was 80, 90 and 110 lbs/ac of seeding rates. Plots measured 25 feet wide by a half a mile long. Direct seeding was done on May 17, 2006, with a Flexicoil air drill equipped with shank spacing of 9" and 3" paired rows openers. Plant count was done on June 6, 2006 (8 samples/ plot). At this time the crop was at 2 to 3 leaf stage.

The Roundup Ready canola trial had 140, 170 and 200 lbs/ac rates of NPKS (36-0-7-3) as factor A. Factor B was 14, 17 and 22 lbs/ac rates of NP (11-52). Factor C was 4, 5.5 and 8 lbs/ac of seeding rates. Plots measured 25 feet wide and about one mile long. The canola seed was treated with Helix© and seeded on May 9, 2006. Direct seeding was done with a Flexicoil air drill with nine inch row spacing. Plant count was done on June 6 was (8 samples/ plot).

**Results and Discussion:** There was no interaction between fertilizer and seeding rates for barley or canola plant populations. Barley plant population average was 11.7 plants/ ft<sup>2</sup> at 80.0 lbs/ac, 13.4/plants/ ft<sup>2</sup> at 90 lbs/ac, and 14.6 plants/ft<sup>2</sup> at 110 lbs/ac (Table 1). These barley populations were much below the optimum and similar to the ones reported from central Alberta. Canola plant population average was 8.2 plants/ft<sup>2</sup> at 4 lbs/ac, 8.5 plants/ft<sup>2</sup> at 5.5 lbs/ac, and 9.3 plants/ft<sup>2</sup> at 8 lbs/ac (Table 2). Canola populations were near the lower end of the optimum range. Fertilizer rates had no influence on plant populations.

Even though the higher seeding rates showed higher plant populations, the yields were not improved at higher rates (Table 1 & 2). For example, the average barley yield was 75.3 bu/ac for 80 lb/ac, 75.5 bu/ac for 90 lb/ac, and 75.3 bu/ac for 110 lb/ac seed rate. Similarly, the average canola yield was 40.8 bu/ac for 4.0 lb/ac, 40.8 bu/ac for 5.5 lb/ac, and 41.1 bu/ac for

8.0 lb/ac seed rate. The competitive advantage and resulting higher yields may not have been realized due, in part, to the generous rainfall received in the 2006 growing season.

The protein content in barley seed tended to decline with increase in seed rate when nitrogen fertilizer rate was not changed (Table 1). For example at 147 lb/ac nitrogen rate, the average protein content was 12.5% at 80 lb/ac and 12.2% at 110 lb/ac seed rate. As expected the protein content increased with nitrogen rate. At 90 lb/ac seed rate, the protein content was 12.2% with 120 lb/ac and 13.0% with 180 lb/ac of 36-0-7-3 (NPKS) fertilizer rate.

**Conclusions:** Higher seeding rates increased plant populations but had no effect on the yield

of barley and canola. Fertilizer rates had no effect on the plant population or yield of both crops. The protein content in barley seed increased with higher nitrogen rate and lower seed rate.

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**Table 1. Barley establishment, yield and protein content with different seed and fertilizer rates.**

Treat #	Seed lb/ac	11-52 (NP), lb/ac	36-0-7-3 (NPKS), lb/ac	Plants # ft <sup>2</sup>	Yield bu/ac	Protein %
1	80	25	147	11.3	77	12.3
2	80	25	147	11.0	75	12.8
3	80	25	147	11.9	74	12.5
4	90	20	120	12.8	70	12.1
5	90	20	180	13.4	79	12.7
6	90	20	180	13.3	81	13.0
7	90	29	120	14.0	76	12.5
8	90	29	120	13.6	74	12.0
9	90	29	120	13.8	73	12.2
10	110	25	147	14.3	77	12.4
11	110	25	147	14.1	76	12.1
12	110	25	147	14.0	73	12.0

**Table 2. Canola establishment and yield with different seed and fertilizer rates.**

Treat #	Seed lb/ac	11-52 (NP), lb/ac	36-0-7-3 (NPKS), lb/ac	Plants # ft <sup>2</sup>	Yield bu/ac
1	4.0	17	170	8.5	40.5
2	4.0	17	170	7.9	41.0
3	4.0	17	170	8.1	40.9
4	5.5	22	140	8.4	40.4
5	5.5	22	140	8.1	40.7
6	5.5	22	140	9.2	39.4
7	5.5	14	200	7.9	40.8
8	5.5	14	200	8.4	41.2
9	5.5	14	200	8.5	42.3
10	8.0	17	170	9.0	41.4
11	8.0	17	170	9.3	40.8
12	8.0	17	170	9.9	41.1