

Effect of seeding rate on flea beetle damage and agronomic performance of sized seeds of open-pollinated and hybrid Argentine canola in 2004-2006

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The objective of this study was to investigate the effect of seeding rate on flea beetle damage and agronomic performance of open-pollinated (op) and hybrid Argentine canola. Certified seed lots of three herbicide-tolerant varieties were sieved through graded screens to obtain seeds of uniform diameter and weight. The sized seeds were planted in summer fallow at four rates ranging from 2.0-5.0 lb/acre. Flea beetle damage was below the economic threshold in all tests. Plant populations from sized seeds of the three varieties were remarkably similar over 3 test years. Plant densities increased as seeding rates increased. Sized seeds of a new hybrid variety had the highest shoot weights, highest biomass and highest seed yield. Over 3 years, a seeding rate of 5.0 lb/acre (5.6 kg/ha, 25 seeds/m-row) and plant density of 70-75 plants/m² provided the highest yield in the op and older hybrid variety. A seeding rate of 4.0 lb/acre (4.5 kg/ha, 20 seeds/m-row) and plant density of 55-60 plants/m² provided the highest yield in the new hybrid variety.

As described in the Canola Growers Manual, seed size, seed weight and seeding rate may affect the establishment, growth and yield of Argentine canola. The Manual recommends that canola should be seeded at 5-8 lb/acre (5.6-9.0 kg/ha) and provide target plant populations of 40-200 plants/m². Re-seeding is recommended when plant populations are less than 32-43 plants/m² with conventional varieties and less than 11-22 plants/m² with herbicide-tolerant hybrid varieties. In this study, we investigated the effect of seeding rate on flea beetle damage and the performance of open-pollinated (op) and hybrid canola grown from uniform-sized seeds.

Field tests were conducted at AAFC-Saskatoon in 2004-2006. To standardize the comparisons, certified seed lots of an op variety, older hybrid variety and new hybrid variety were sieved through graded screens to obtain seeds of similar size (1.8-2.0 mm diameter) and 1000-seed weight (4.0-4.2 g). Sized seeds of each variety were treated with a commercial seed dressing and seeded in summer fallow at four rates equivalent to 2, 3, 4 and 5.0 lb/acre (2.2, 3.4, 4.5 and 5.6 kg/ha). The row-spacing was 7 inches (17.8 cm). Flea beetle damage to the cotyledons was assessed 20 days after seeding. Agronomic assessments focused on stand establishment, final plant densities, shoot growth, biomass accumulation and seed yield. Shoot biomass was calculated from the number of seedlings/m-row and shoot weight.

Flea beetle damage

Flea beetle damage to the cotyledons was below the economic threshold (25%) in all tests. Seeding rate had no effect on flea beetle damage in 2004 and 2005 when damage averaged less than 5%. Damage was higher in 2006 and declined as the seeding rate increased.

Stand establishment and plant densities

Stand establishment in summer fallow was excellent, averaging 87-93% in 2004, 85-92% in 2005 and 83-89% in 2006. In each year of testing, plants/m² increased as seeding rates increased. Plant populations from sized seeds of the three varieties were remarkably similar over 3 years. With seeding rates of 2, 3, 4, and 5 lb/acre, plant densities in 2004-2006 averaged 29, 44, 57 and 73 plants/m², respectively, in the op variety; 28, 43, 55, and 70 plants/m² in the older hybrid variety and 28, 43, 57 and 73 plants/m² in the new hybrid variety. Minimum plant densities for re-seeding an op cultivar were reached or exceeded with a seeding rate of 3 lb/acre (3.4 kg/ha, 15 seeds/m-row). Minimum plant densities for re-seeding a hybrid cultivar were exceeded with a seeding rate of 2 lb/acre (2.2 kg/ha, 10 seeds/m-row).

Shoot growth

Shoot weights after 14, 20, 28 and 34 days differed among the three varieties in each year of testing. On each sampling date, sized seeds of the op variety had the lowest shoot weight whereas sized seeds of the new hybrid variety had the highest shoot weight. Superior shoot growth in the new hybrid variety was likely due to heterosis because seed weights were standardized. In most instances, seeding rate had no effect on the shoot weight of each variety after 14-34 days.

Biomass accumulation

Shoot biomass after 14, 20, 28 and 34 days differed among the three varieties in each year of testing. On each sampling date, sized seeds of the op variety had the lowest biomass whereas sized seeds of the new hybrid variety had the highest biomass. Shoot biomass in each variety increased as the seeding rate increased. Depending on the year, the shoot biomass of the new hybrid variety seeded at 3.5-3.7 lb/acre (3.9-4.1 kg/ha) was equal to that of the op variety seeded at 5 lb/acre (5.6 kg/ha).

Seed yield

Yields from sized seeds of the three varieties differed in each year of testing. The op variety had the lowest yield whereas the new hybrid variety had the highest yield. Over 3 years, yields in the op, older hybrid and new hybrid variety averaged 53.0, 57.5 and 62.4 bu/acre, respectively. Seeding rate had little effect on the yield of each variety in 2004. In 2005 and 2006, yields of each variety increased as seeding rates increased. Over 3 years, a seeding rate of 5.0 lb/acre (5.6 kg/ha, 25 seeds/m-row) and plant density of 70-75 plants/m² provided the highest yield in the op and older hybrid variety. In contrast, a seeding rate of 4.0 lb/acre (4.5 kg/ha, 20 seeds/m-row) and plant density of 55-60 plants/m² provided the highest yield in the new hybrid variety. Sized seeds of the new hybrid variety were the most vigorous and provided a higher yield than the other two varieties at a lower seeding rate. A lower seeding rate would reduce production costs and seed treatment use.

For information on related studies, go to:

Elliott.CARP2004-14.1. **Effect of neonicotinoid seed treatments on flea beetle damage and performance of Polish canola (*Brassica rapa*) in 2003-2005**

Elliott.CARP2004-14.2. Effect of neonicotinoid seed treatments on flea beetle damage and performance of Argentine canola (*Brassica napus*) in 2003-2006

Elliott.CARP2004-14.3. Effect of seeding date and seeding rate on flea beetle damage and agronomic performance of open-pollinated and hybrid Argentine canola under different tillage practices in 2001-2006

Elliott.CARP2004-14.5. Effect of seed quality on the performance of hybrid Argentine canola in early- and late-seeded plots with conventional and minimum tillage

Elliott.CARP2004-14.6. Effect of production practices and seed quality on the performance of open-pollinated Argentine canola in conventional, minimum and zero tillage