

# Effect of germination, seed weight and vigour index on the agronomic performance of Argentine canola in early and late May plantings

*B. Elliott, Saskatoon Research Centre, Agriculture and Agri-Food Canada  
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## Key findings

- 1. Seed lots with germination above 95% had the highest seedling establishment in all tests.*
- 2. Germination of seed lots in the standard germination test (SGT) and pre-chill test (PCT2) provided a reliable indication of seedling establishment in early and late May plantings of all tests. The SGT provided the best indication of establishment in warm soil (10-20°C). PCT 2 provided the best indication of establishment in cool soil (5-10°C).*
- 3. Seed lots with high seed weights produced larger seedlings than seed lots with low seed weights in all tests.*
- 4. Seed lots with a high vigour index in the SGT or PCT 2 had higher total plant weight than seed lots with a low vigour index in all tests. Yields improved as the vigour index increased in 3/6 tests.*

## Experimental methods

Seed lots of open-pollinated and hybrid Argentine canola were evaluated yearly in six seed labs using the standard germination test (SGT) and pre-chill test (PCT 2). In the SGT, seeds were placed on a blue blotter in a plastic box and watered. Seeds were incubated at alternating 25/15°C daily temperatures and corresponding 8L/16D photoperiod for 7 days. In PCT 2, seeds were placed in a plastic box containing a mixture of sand and Bell's premium potting soil and watered. Seeds were placed in the dark at 5°C for 7 days and alternating 25/15°C daily temperatures for 5 days. The vigour index was calculated by multiplying the 1000-seed weight times the final % germination/100 in the SGT or PCT 2. Seed lots were planted at identical rates (200 seeds per 6.1m row) in early May and late May at three locations in 1998, 1999 and 2000. Agronomic assessments focussed on seedling establishment, shoot fresh weight, total plant weight and yield. Total plant weight was calculated from the number of seedlings/m-row and shoot fresh weight.

## Details

- 1. Seed lots with germination above 95% had the highest seedling establishment in all tests.*

Seed lots that had less than 90% germination at 7 days in the SGT had the poorest establishment in early and late May plantings of all tests (see Table 1). Seedling establishment improved as germination and seed grade increased. Seed lots with germination above 95% had the highest establishment in early and late May plantings. Establishment was lower when seed lots were planted in early May than in late May.

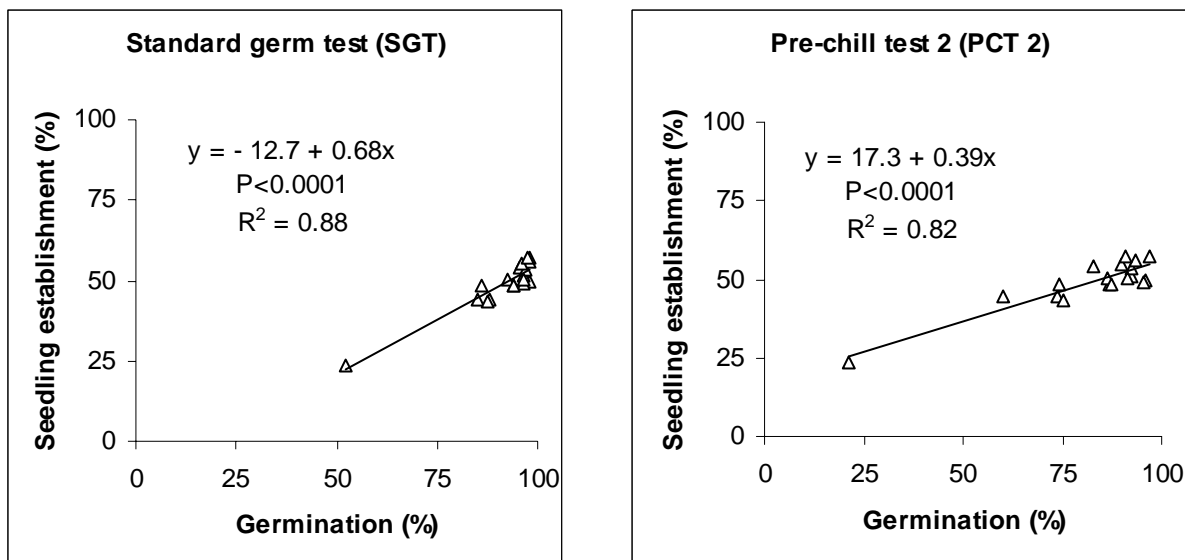
**Table 1. Effect of germination and seed grade on establishment of Argentine canola in early and late May plantings in 1998-2000.**

Germination (%)	Seed grade	Seed lots (n)	Seeded early May <sup>a</sup>			Seeded late May <sup>a</sup>		
			1998	1999	2000	1998	1999	2000
<80	Substandard	2-3	24%	26%	39%	32%	41%	53%
80-90	Cert. No.2	4-6	45%	38%	40%	54%	49%	51%
90-95	Cert. No.1	3-5	49%	48%	49%	56%	52%	59%
95-100	Cert. No.1	6-10	53%	56%	54%	65%	58%	62%

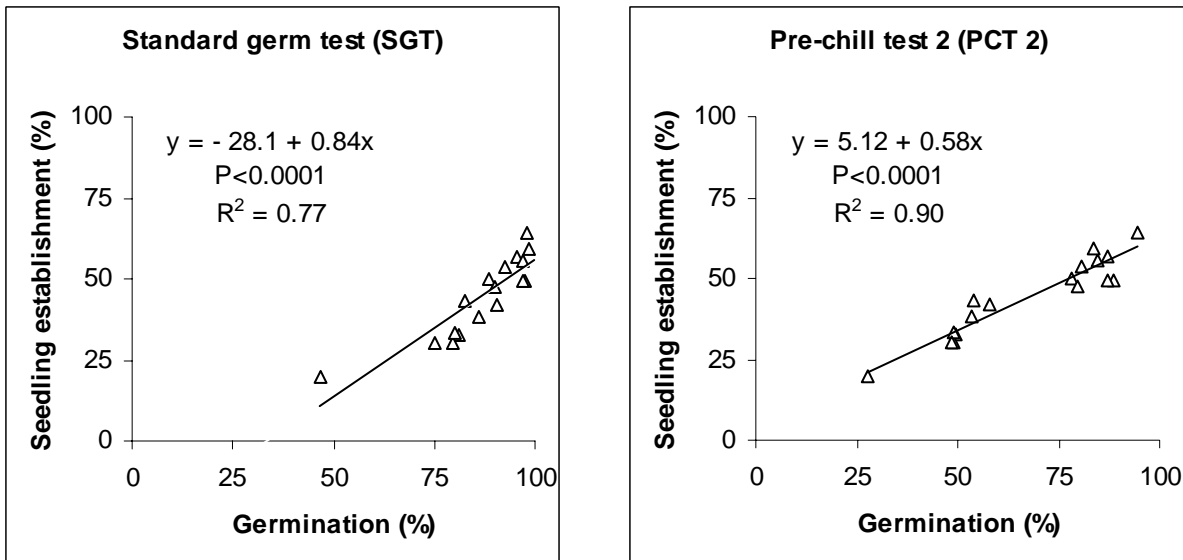
<sup>a</sup> % establishment assessed 21-28 days after seeding.

**2. Germination of seed lots in the standard germination test (SGT) and pre-chill test (PCT 2) provided a reliable indication of seedling establishment in early and late May plantings of all tests. The SGT provided the best indication of establishment in warm soil (10-20°C). PCT 2 provided the best indication of establishment in cool soil (5-10°C).**

In early and late May plantings of all tests, seedling establishment 21-28 days after seeding was positively correlated with germination of the seed lots in the SGT and PCT 2. Seedling establishment increased as % germination increased (see Figs.1 and 2). Regression analysis indicated that germination in the SGT ( $R^2=0.88$ ) provided a better indication of seedling establishment in warm soil than germination in PCT 2 ( $R^2=0.82$ ). In contrast, germination in PCT 2 ( $R^2=0.90$ ) provided a better indication of seedling establishment in cool soil than the SGT ( $R^2=0.77$ ). Seed lots with germination above 95% in the SGT and above 90% in PCT 2 had the highest establishment in warm and cool soil.



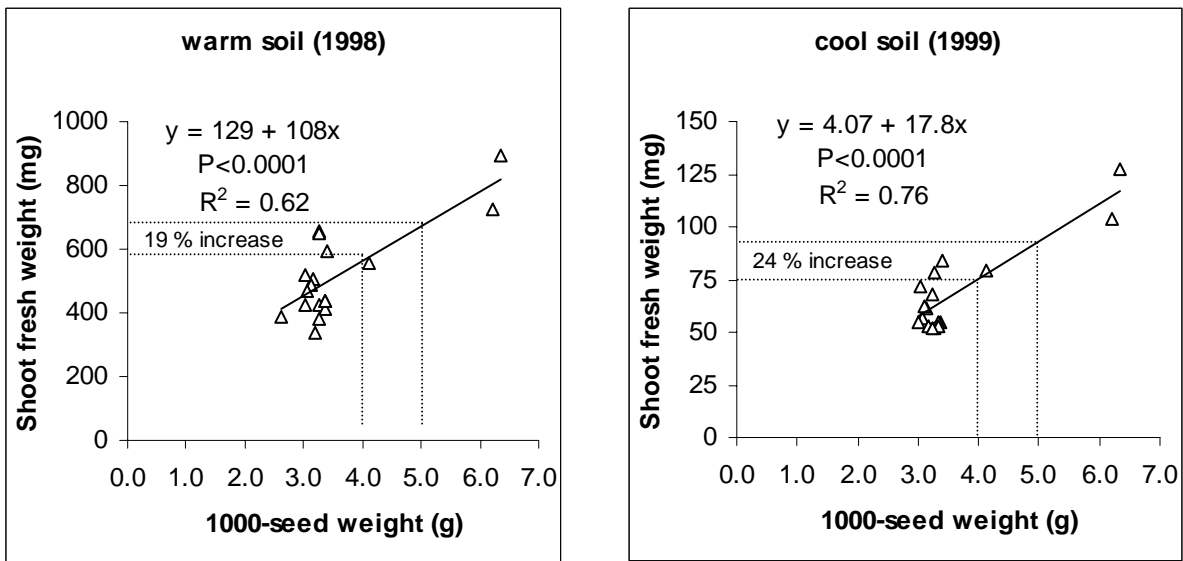
**Fig. 1. Relationship between germination (SGT & PCT 2) and establishment in early May plantings in 1998 (warm soil).**



**Fig. 2. Relationship between germination (SGT & PCT 2) and establishment in early May plantings in 1999 (cool soil).**

**3. Seed lots with high seed weights produced larger seedlings than seed lots with low seed weights in all tests.**

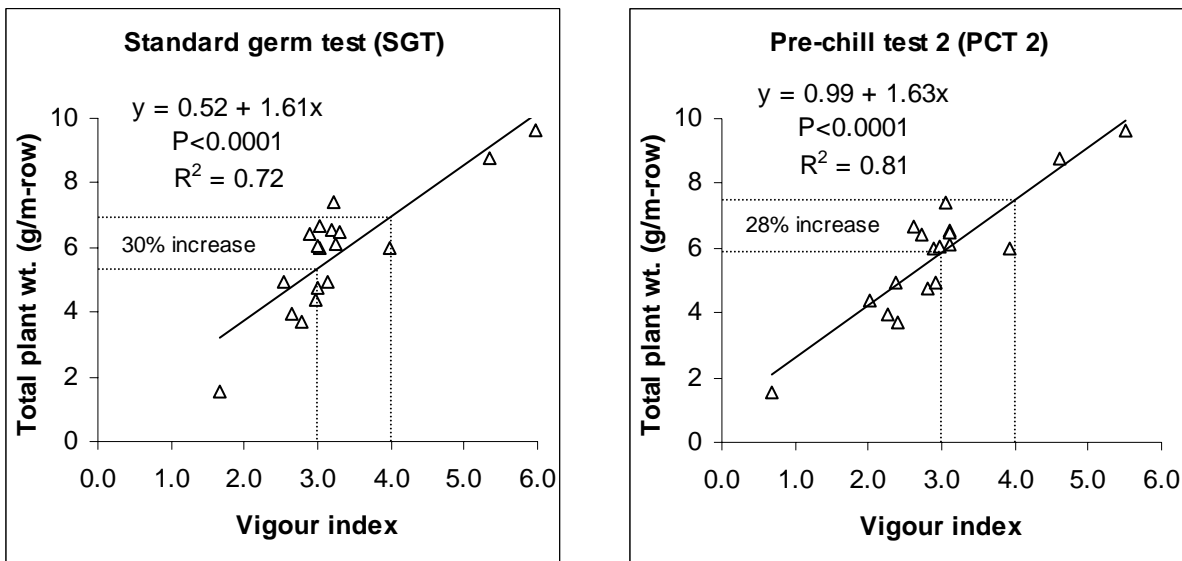
In early and late May plantings of all tests, shoot fresh weights 21 days after seeding were positively correlated with the 1000-seed weight of seed lots. Shoot fresh weights in warm and cool soils increased as the 1000-seed weight increased (see Fig.3). A 1.0g increase in 1000-seed weight improved shoot fresh weight by 19% in warm soil and by 24% in cool soil.



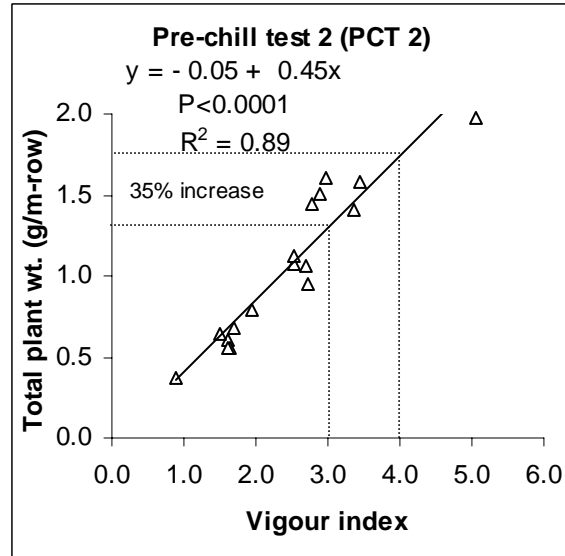
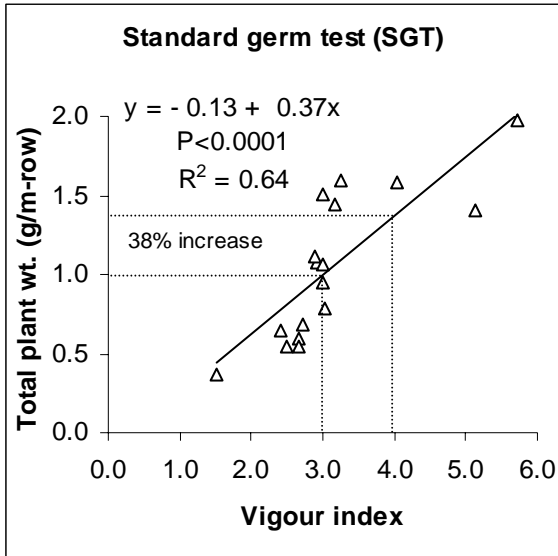
**Fig. 3. Relationship between 1000-seed weight and shoot fresh weight in early May plantings in 1998 (warm soil) and 1999 (cool soil).**

**4. Seed lots with a high vigour index in the SGT or PCT 2 had higher total plant weights than seed lots with a low vigour index in all tests. Yields improved as the vigour index increased in 3/6 tests.**

In early and late May plantings of all tests, total plant weights 21 days after seeding were positively correlated with the vigour index of seed lots in the SGT and PCT 2. Total plant weights increased as the vigour index increased (see Figs. 4 and 5). Regression analysis indicated that a 1.0 unit increase in the vigour index improved total plant weight by 28-30% in warm soil. Vigour indices in either the SGT ( $R^2=0.72$ ) or PCT 2 ( $R^2=0.82$ ) provided an excellent indication of plant growth potential in warm soil. A 1.0 unit increase in the vigour index improved total plant weight by 35-38% in cool soil. Vigour indices in PCT 2 ( $R^2=0.89$ ) provided a better indication of total plant weight in cool soil than vigour indices in the SGT ( $R^2=0.64$ ). Seed lots with a vigour index above 3.0 in the SGT or PCT had the highest total plant weight in early and late May plantings in all tests. Yields in 3/6 tests were positively correlated with the vigour index of seed lots in the SGT and PCT 2. A 1.0 unit increase in the vigour index improved yield by 5-13%.



**Fig. 4. Relationship between vigour index (SGT, PCT 2) and total plant weight in early May plantings in 1998 (warm soil).**



*Fig. 5. Relationship between vigour index (SGT, PCT 2) and total plant weight in early May plantings in 1999 (cool soil).*

For a copy of the complete report, contact Nicole Guay at [guay@canola-council.org](mailto:guay@canola-council.org) or at 204-982-2100.