Effect of seed quality on the performance of Argentine varieties in the 2002 regional test

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Part 5 of CARP Project # 2003-02-01-19. Conducted at AAFC Saskatoon in 2002.

Key findings

1. *Seed lots of Argentine varieties in the 2002 regional test differed in their 1000-seed weight, germination in the modified germination test (MGT) and tolerance to high temperature in the controlled deterioration test (CDT).*

2. *Germination of seed lots in the CDT provided a better indication of seedling establishment in very dry soil than germination in the MGT. Seed lots with germination above 90% in the CDT had the best establishment in very dry soil.*

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

4. *Seed lots with a high vigour index in the MGT or CDT had higher total plant weights and better plant growth that seed lots with a low vigour index.*

Experimental methods

Seed quality tests were conducted on seed lots of 32 Argentine varieties from the 2002 regional test. Seed lots were evaluated in the modified germination test (MGT) and controlled deterioration test (CDT). In the MGT, seeds were placed on a blue blotter in a plastic box and watered. Seeds were incubated at 20°C and 8L/16D photoperiod for 7 days. In the CDT, seeds (20% moisture content) were incubated in foil pouches at 10°C for 24 hours and 45°C for 24 hours. Seeds were then evaluated in the MGT for 7 days. The vigour index was calculated by multiplying the 1000-seed weight times the final % germination/100 in the MGT or CDT. Seed lots were planted at 200 seeds per 6.1 m/row in mid May at Saskatoon. Moisture conditions were very poor at seeding. 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 of Argentine varieties in the 2002 regional test differed in their 1000-seed weight, germination in the modified germination test (MGT) and tolerance to high temperature in the controlled deterioration test (CDT).***

   Thousand-seed weights of open-pollinated, synthetic and hybrid Argentine varieties ranged from 2.9g to 4.7g (see Table 1). Germination of the seed lots in the MGT ranged from 67% to 99%. Tolerance of seed lots to high temperature in the CDT also differed, ranging from 8% to 99%. Seed lots with germination above 90% were the most tolerant to high temperature.

Table 1. Range in 1000-seed weight and germination in seed lots of Argentine varieties in the 2002 regional test.

			Germination (%)	
Breeding type	Seed lots (n)	1000-seed weight (g)	MGT	CDT
open-pollinated	18	2.9-4.7	76-99	55-99
synthetic	5	3.0-4.2	67-99	55-98
hybrid	9	3.1-4.6	86-99	8-99

2. Germination of seed lots in the MGT and CDT provided a better indication of seedling establishment in very dry soil than germination in the MGT. Seed lots with germination above 90% in the CDT had the best establishment in very dry soil.

Seedling establishment 20 days after seeding was positively correlated with germination of the seed lots in the CDT. Seedling establishment increased as % germination increased (see Fig. 1). Regression analysis indicated that germination in the CDT (R^2=0.31) provided a better indication of seedling establishment in very dry soil than germination in the MGT (R^2=0.09). Seed lots with germination above 90% in the CDT had the highest establishment in dry soil.

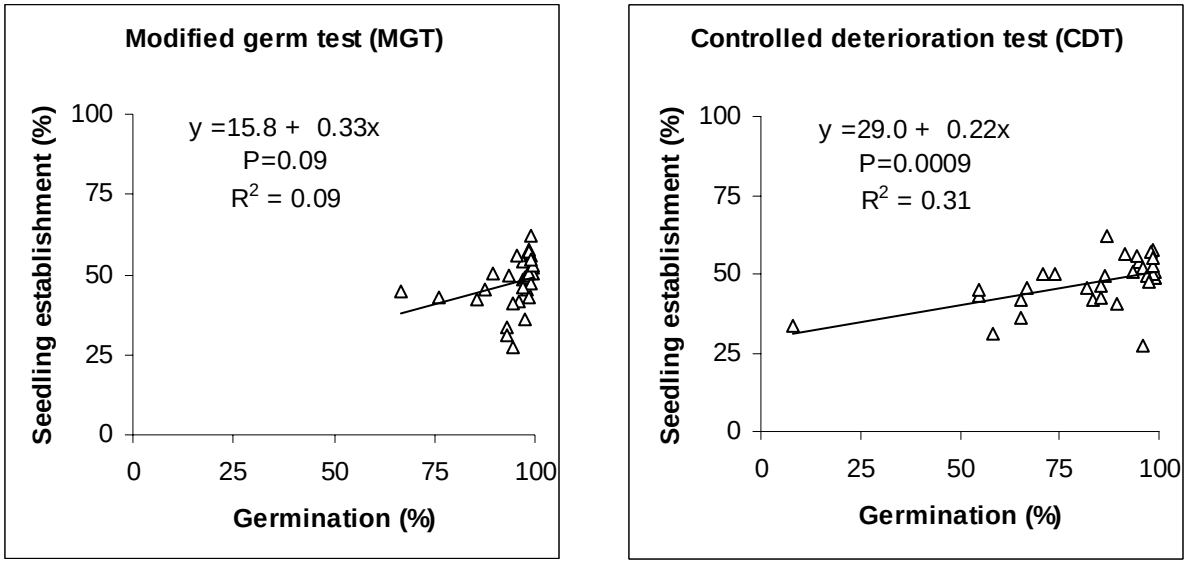

Fig. 1. Relationship between germination (MGT, CDT) and establishment of Argentine varieties in the 2002 regional test.

3. Seed lots with high seed weights produced larger seedlings than seed lots with low seed weights.

Shoot fresh weights 20 days after seeding were positively correlated with the 1000-seed weight of the seed lots. Under very dry conditions, shoot fresh weights increased as the 1000-seed weight increased (see Fig. 2). A 1.0g increase in 1000-seed weight improved shoot weights by 34%.

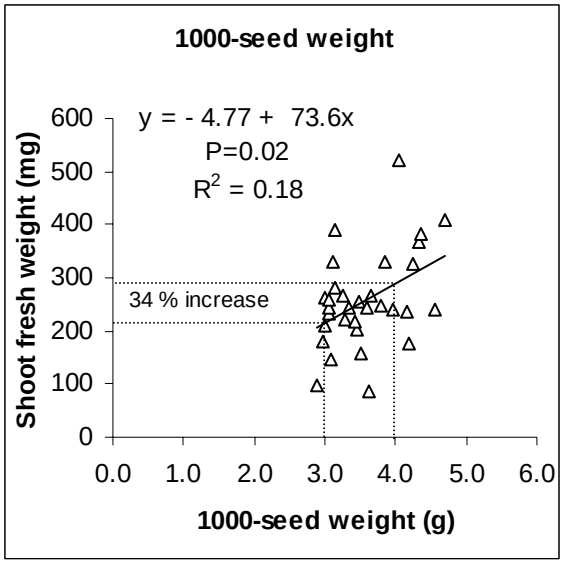

Fig. 2. Relationship between 1000-seed weight and shoot fresh weight of Argentine varieties in the 2002 regional test.

4. Seed lots with a high vigour index in the MGT or CDT had higher total plant weights and better plant growth that seed lots with a low vigour index.

Total plant weights 20 days after seeding were positively correlated with the vigour index of seed lots in the MGT and CDT. Total plant weights increased as the vigour index increased (see Fig. 3). A 1.0 unit increase in the vigour index of seed lots in the MGT and CDT, increased total plant weight by 45% and 27%, respectively. Seed lots with a vigour index above 3.5 in the MGT or CDT had the highest plant weights. Yields were not correlated with 1000-seed weight, germination or vigour index.

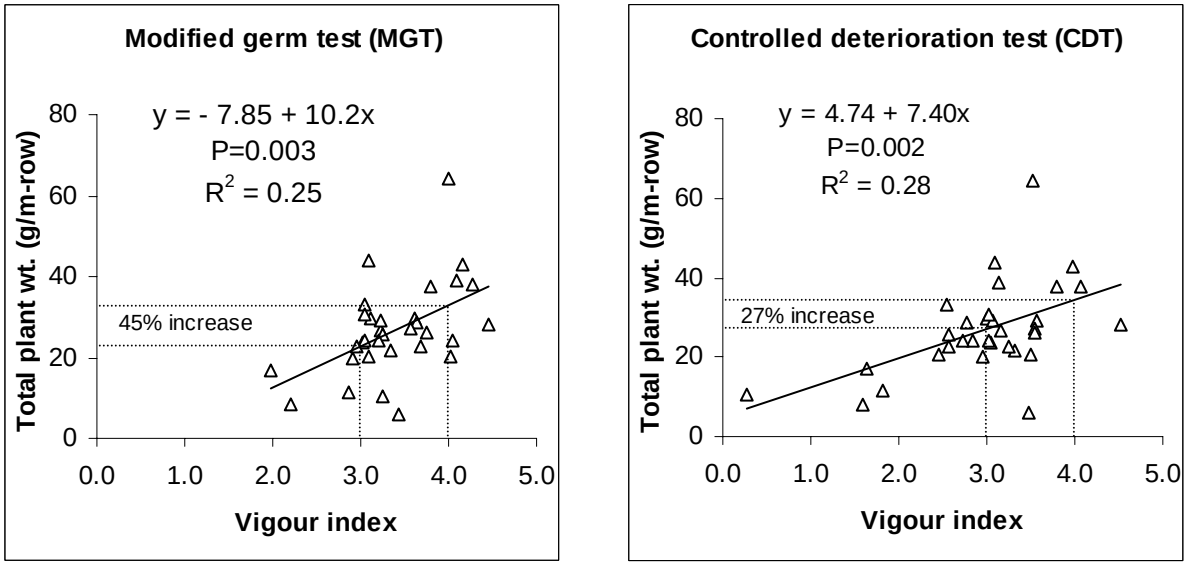

Fig. 3. Relationship between vigour index (MGT, CDT) and total plant weight of Argentine varieties in the 2002 regional test.

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