
Germination and Emergence of Diverse Dry Bean Varieties Under Cold and Dry Conditions

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Abstract

Dry bean (*Phaseolus vulgaris* L.) originated in the tropics and is a warm season crop. In temperate climates such as Saskatchewan, producers face many challenges in growing the crop. Sowing often occurs under suboptimal conditions for crop growth. Planting in early spring (early May) in cold soils results in poor stands while waiting for warmer temperatures in June reduces the length of the growing season. In some years, like 2002, the seedbed conditions at sowing time are cold and dry, which adversely affect stand establishment.

Two experiments were conducted in the phytotron at the University of Saskatchewan to address the stand establishment problem in dry bean. The first experiment tested 12 bean varieties/lines for germination ability in petri plates placed in incubation chambers using 20 different temperature regimes. The bean varieties included nine from bean breeding programs across western Canada and one variety from the bean breeding program at Michigan State University and these were compared with two bean lines (G9345, G8823), known to have some cold tolerance, obtained from CIAT (International Centre for Tropical Agriculture) in Cali, Colombia. All genotypes were then tested for emergence in the soil in growth chambers at five temperatures and three soil moisture regimes.

From the petri plates, the break-point temperature for bean germination where genotypes varied was 16/16 C (day/night). Temperatures above this were optimal for germination for all bean varieties used in the experiment. The two CIAT lines G9345 and G8823 had superior germination (about 35%) at a lower temperature regime of 14/10 C. Among prairie adapted varieties, AC Polaris had the best germination (25%) under the same temperature regime.

Under simulated field conditions, emergence and plant development were slowed down by drought stress or cooler temperatures. Under cool temperatures the two CIAT lines had faster emergence than the bean varieties bred in western Canada. CDC Nighthawk and AC Polaris were most promising among prairie adapted varieties.