Priming Sweet Corn Seed to Improve Emergence Under Cool Conditions

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Corn inbreds planted when soil is 10C and lower are often injured by cold water imbibitional stress (Cohn and Obendorf, 1978). Bodsworth and Bewley (1981) found that polyethylene glycol (PEG) 6000 promoted seed germination of two field corn cultivars when germinated at 10C. The objective of the current study was to evaluate PEG 8000 for improving emergence of two *sh2* sweet corn hybrids.

Six seeds of sweet corn *sh2* hybrids ('Crisp 'N Sweet' and 'How Sweet It Is'; Crookham Seed Co.) were placed in 9-cm-diameter petri dishes containing 15 ml of PEG 8000 absorbed into two sheets of Whatman #1 filter paper. Seeds were in excellent contact with a thin layer of PEG on the surface of saturated filter paper. Concentrations used were 100, 200, and 300 g PEG/liter distilled water (-0.16, -0.56, -1.14 mPa, respectively) (Michel, 1983). Seeds were primed at 15C for either 4, 3, 2, or 1 days, such that priming was completed for all seeds on the same day. Control seeds received no treatment.

Excess PEG was rinsed off with distilled water. Control and treated seeds were planted immediately after completion of the 4-day priming treatment. Six seeds of each cultivar were placed on the surface of unsterilized potting mixture of 1 vermiculite : 1 sand : 1 peatite : 1 silt loam soil (by volume) in 0.8-liter round pots and covered to a depth of 2.5 cm. There were two pots per treatment for each cultivar. Pots were covered with plastic wrap to prevent moisture loss and placed in a growth chamber at 10C for 12

days to create imbibitional stress. Thereafter, the chamber was held at 15C to test emergence, which was scored daily. Cumulative emergence data were analyzed after an arcsin transformation. Actual data are used in the figures, but significance is based on transformed data.

Priming significantly improved seedling emergence rate; final emergence was similar to that of unprimed seed (Fig. 1). Reduced emergence from control seeds was likely due to cold water imbibitional damage (Cohn and Obendorf, 1978), as no evidence of seedling disease was found.

Hybrids responded differently to priming duration and PEG concentration (Fig. 2). Optimal emergence of 'How Sweet It Is' resulted from 1 day of priming with 100 g PEG/liter. In contrast, optimal emergence of 'Crisp 'N Sweet' resulted from either 2 or 3 days of PEG treatment (100 or 200 g-liter⁻¹, respectively). These data showed that priming enhanced sweet corn (*sh2*) seedling emergence under cool conditions and agrees with results found by Bodsworth and Bewley (1981) with field corn. Optimum priming duration and osmotic potential for *sh2* cultivars used in our study varied from 1 to 2 days and -0.16 mPa to -0.56 mPa (100 to 200 g PEG/liter), respectively, while the optimal condition for field corn was 6 days at 1.0 mPa (Bodsworth and Bewley, 1981). Emergence response to presowing hydration was also cultivar-dependent with high sugar sweet corn (Bennett and Waters, 1987). These comparisons with sweet corn show that optimal priming duration and PEG concentration will also likely vary with cultivar.

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Fig. 1. Seedling emergence at 15C from primed and unprimed sweet corn seed following 12 days of imbibition at 10C. Responses averaged over

from primed seed was significantly different than emergence from unprimed seed on each day but 16 and 21 ($P = 0.01$, arcsin transformation).

Fig. 2. Interaction of PEG concentration, priming duration, and cultivar on seedling emergence of 'How Sweet It Is' (top) and 'Crisp 'N Sweet' (bottom) sweet corn.

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