

Reciprocal differences in low temperature germination and seedling vigor in several inbred lines of sweet corn (*Zea mays*)

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Objectives

There have been several reports where differential phenotypic expression was observed in maize (*Zea mays*) for various kernel and germination traits. We have identified phenotypically divergent inbred lines for cold germination and other agronomic characteristics. The objective of this study was to identify differentially expressed traits related to cold germination and seedling vigor

Materials and Methods

Ten times self pollinated sweet corn (sh2) inbred lines were screened and reciprocal F1 hybrids were made. Two set of these reciprocal F1 (KSH25/KSH3, KSH3/KSH25 and KSH4/KSH29, KSH29/KSH4) hybrids were tested for cold germination and seedling vigor response.

Results and Discussion

Seven inbred lines were screened for cold germination and characterized seed properties (table 1). KSH23 and KSH25 showed high germination (>90%) at low temperature. KSH6, KSH29 showed low germination (<50%). Reciprocal F1 hybrids were made between divergent inbred lines and hybrids that showed differential phenotypes to the cold germination and seedling growth (Figure 1, 2).

Comparison of reciprocal F1 hybrids provides an excellent system to study genes associated with parent-of-origin effects in diploid tissue that influences various traits of agronomic interest. The differential expressions can be attributed to epigenetic phenomena such as genomic imprinting and xenia, dosage effects and cytoplasmic effects.

The results provide leads to improving our understanding of the genes involved in stress response during seed germination and seedling vigor

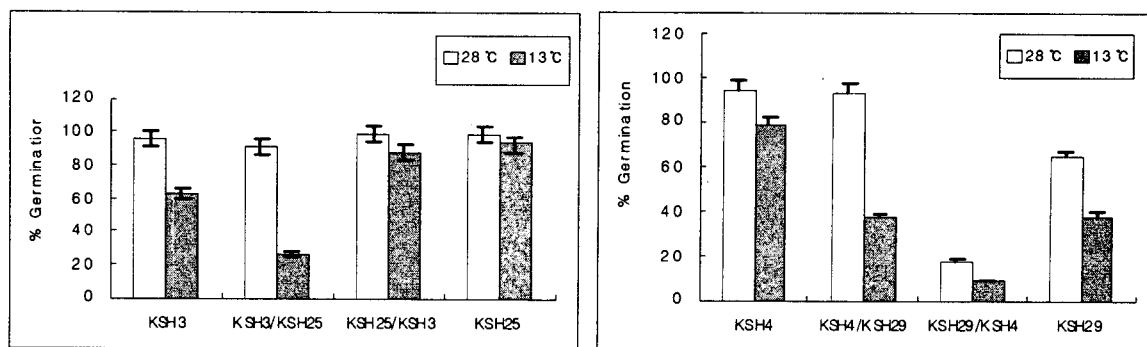


Figure 1. Low temperature response of self pollinated inbred lines and their reciprocal F1 hybrids. The differential response of the F1 hybrids indicates maternal effect.

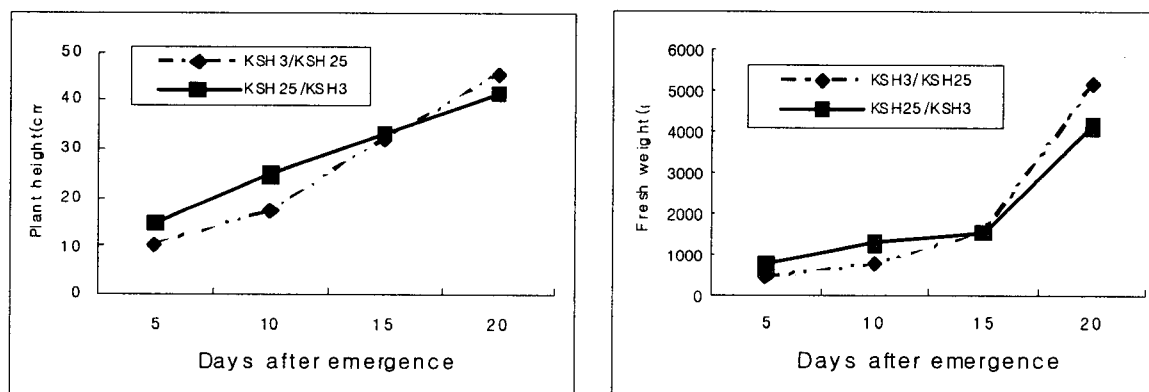


Fig 2. The reciprocal differences of seedling vigor in plant height and fresh weight.

Table1. Seed characteristics of 7 parental inbred lines of sweet (sh2) corn
Lines Pericarp 100 Starch Germination Kernel

Lines	Pericarp thick. (μm)	100 kernel wt.(g)	Starch content (%)	Germination		Kernel			L/D ratio
				28°C	13°C	length (mm)	diameter r(mm)	thickness (mm)	
KSH1	35.2	12.3	14.6	96.0	83.3	11.0	7.8	1.5	1.41
KSH3	25.3	12.3	14.8	96.7	63.3	8.3	8.4	3.0	0.99
KSH4	56.9	11.3	15.7	99.0	78.0	10.0	6.9	2.5	1.45
KSH6	38.8	11.4	14.9	70.7	49.3	8.9	8.3	2.4	1.07
KSH23	29.1	10.5	15.1	98.7	91.3	9.9	7.4	2.4	1.34
KSH25	32.1	10.3	16.1	98.7	93.3	8.9	7.4	2.2	1.26
KSH29	41.4	6.7	13.7	64.0	44.7	8.7	8.0	2.0	1.23