RELATIVE FITNESS OF SHATTERCANE, SORGHUM, AND THEIR HYBRIDS. Lilyrani Sahoo, Jared J. Schmidt, John L. Lindquist, Don J. Lee and J. F. Pedersen, Graduate Research Assistant, Graduate Research Assistant, Associate professor, Professor, Department of Agronomy and Horiculture, University of Nebraska, Lincoln NE 68583, Adjunct Professor, USDA-ARS, University of Nebraska, Lincoln NE 68583.

Grain sorghum (*Sorghum bicolor ssp. bicolor*) can interbreed with its closest weedy relative, shattercane (*Sorghum bicolor L. Moench ssp. drummondii*).This hybridization can contribute to changes in fitness and the potential invasiveness of shattercane. Traits contributing to shattercane fitness include seed dormancy and germinability, vegetative growth and competitive ability, and fecundity. Understanding the fitness of shattercane x sorghum hybrids is particularly important because if alleles from the crop can become introgressed into the weed population, then a transgene and its associated trait introduced in a crop also may become introgressed into the weed population. The object of this research was to assess the fitness of shattercane x sorghum hybrids relative to their parents.

Four genetic lines were evaluated in this research. The commercial inbred sorghum line RTx430 was used as the male parent (SO) and an inbred shattercane line with A3 male sterility was used as the female parent (SHA3). Their progeny were the F1 hybrid (F1). The inbred wild-type shattercane (SH) used to produce the A3 male sterile shattercane was included as the fertile shattercane parent. Several fitness characteristics were measured including: germination, early emergence and seedling survival, phenological development, plant height, tiller number and height, leaf area, above ground biomass and seed production. Shattercane seeds in a natural state are potentially dormant. Our first experiment was conducted to compare the dormancy and germinability of the four lines at various temperatures in germination chambers. Temperature treatments included four constant temperatures (20, 25, 30, and 35 C) and three variable temperatures: standard germination test for sorghum (varying from 20-30 C over the course of a day, used as control), cold germination (prechill at 10 C for 5 d followed by standard germination), and accelerated aging germination (accelerated aging at 43 C for 3 d at high humidity followed by standard germination). A second experiment was conducted at Lincoln and Mead, Nebraska to compare fitness characteristics of the four lines in two field environments. Fifty seeds of each line were sown in a uniform spacing by hand to a depth of 2 cm in a single 3 m long row. Four adjacent rows, one for each line, were spaced 0.76 m apart to make up a complete block. There were four replicate blocks at each location. Emergence and mortality were measured every other day or as required for the first twenty days. Five plants were randomly selected and permanently marked within the first week of emergence and plant height, growth stage, tiller height and number of tillers was measured on a weekly basis throughout the growing season. Total plant biomass and leaf area were measured by clipping five plants per experimental unit at the soil surface at panicle emergence. Panicles of five plants were bagged after pollination and tied to a stake to ensure no loss of seed and panicles were harvested when seeds were fully mature. Seeds of each panicle were threshed by hand and seed number and 100 seed weight and were determined. Results were analyzed using ANOVA and nonlinear regression analysis. Where possible, results from the shattercane lines were pooled.

The germination chamber experiments showed that shattercane and the F1 hybrids were partially dormant 20 C and some sorghum seeds died. Both sorghum and the F1 hybrids were more sensitive to the high temperatures of the accelerated aging treatment than shattercane. However, the accelerated aging treatment increased the rate of shattercane and the F1 hybrid germination (to 1.9 d) more than sorghum (2.4 d) indicating that the germination patterns of F1 hybrids were more like shattercane, but the sensitivity to environmental conditions were more like sorghum. In the field experiments, the F1 hybrids were taller and produced more total aboveground biomass compared to either parent, but the

F1 leaf area index (LAI) was intermediate between sorghum and shattercane. The greater height and LAI of the F1 hybrids compared to the shattercane imply that the hybrid may be more competitive than shattercane. The weight of 100 seeds was greatest for sorghum, intermediate for the F1 hybrid and smallest for shattercane. Seed production per panicle was similar for the F1 hybrid and shattercane and smaller for sorghum. These combined results indicate that the fitness of F1 hybrids would be relatively greater than its wild shattercane parent. Therefore, traits introduced into a crop are likely to be successfully introgressed into the shattercane population unless they have a specific deleterious effect on the fitness of the shattercane plant.

2008 North Central Weed Science Society Proc. 63:101.