Comparison of Germination and Freeze Damage for Lines of the Cultivar Bailey Expressing Differences in Fatty Acid Composition


Availability of peanut (Arachis hypogaea L.) cultivars expressing the high oleate trait is increasing in the U.S.A. Concern has been expressed about the impact of this trait on germination under low soil temperatures and impact on freeze damage following digging and vine inversion. Greenhouse experiments were conducted to compare germination and response to freezing temperature following harvest of two lines of the normal-oleate cultivar Bailey and the backcross-derived high-oleate line N12009oCLT). Seeds of both lines were planted in pots using a loamy sand soil, watered to initiate germination, and allowed to remain in the greenhouse under warm conditions for 2 d. After 2 d pots either remained in the greenhouse at 12 h at 95°F days and 12 h at 75°F nights or were placed in a growth chamber for 2 d at 12 h at 70°F days and 12 h at 40°F day and nights. Pots were then maintained in the greenhouse until completion of the experiment. The treatment regime was designed to simulate a cold front with a short duration several days after planting. Germination was affected by peanut line (p = 0.0020) and temperature (p = 0.0088) but not the interaction of these treatment factors (p = 0.4155). Results were inconclusive relative to the impact of oleate trait on germination. The rate of germination was delayed for both peanut lines following exposure to 2 d of cold temperature.

In the experiment comparing possible differences in freeze damage for the peanut lines, peanut seed was planted in mid-October or early November in the greenhouse with plants harvested in late February. Peanut pods remained on the plant after harvest (digging). Following 1 or 2 d of drying in the greenhouse, plants and pods were placed outside of the greenhouse at an approximate temperature of 25° F for one night. A group of plants including pods was also placed outside the greenhouse immediately after harvest with no time for drying. Following exposure to freezing temperature, plants and pods were placed in the greenhouse for additional drying. A control group remained in the greenhouse without exposure to freezing temperature. More visible symptoms of damage from freezing were observed as the moisture content of pods increased. There was no interaction of peanut line with harvest time and planting date for visible symptoms of freeze damage (p = 0.3885 to 0.9696). Additionally, the main effect of peanut line was not significant for freeze damage. While results from these experiments should be considered preliminary, these data suggest that peanut with the high oleate trait most likely will respond in a manner similar to the normal oleate trait of the same variety under extremes in temperature. This research was funded by the Everett
W. Byrd Endowment at North Carolina State University through a proposal designed to support undergraduate student research in the Dept. of Crop Science.