Early-season Stress Can Have Small Effect on Soybean Seed Protein and Oil Content

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The value of a soybean crop is largely dependent on the protein and oil content of the seed. However, seed protein and oil content can vary widely, with protein ranging between 34.1 to 56.8% and oil ranging between 8.3 to 27.9% (Wilcox and Shibles, 2001). Soybean genotype has a major impact on seed protein and oil content, but environmental factors and agronomic management practices can also cause significant variation in soybean seed composition (Rotundo et al., 2016).

The majority of previous research efforts have focused on the effects of environmental stresses such as elevated temperature and drought on soybean protein and oil content during the reproductive growth stages of soybean. Logically, these studies have focused on the effects of stress during the reproductive growth stages because that is when soybean seeds develop and protein and oil content is determined. However, very little information exists about the effect of early-season stress on soybean seed composition. Therefore, the objective of this study was to examine the effects of early-season stress on soybean seed protein and oil content.

Study Locations and Analysis

Field studies were established at two locations in Kentucky during 2013 and 2014. One site was located at the Spindletop Research Farm in Lexington, KY (38.12’ N, 84.49’ W). The soil type at this location was a Loradale Silt Loam (fine, mixed, active, mesic Typic Argiudoll). The other site was located on a private farm near Hodgenville, KY (37.56’ N, 85.82’ W), which contained predominately Elk Silt Loam soil (fine-silty, mixed, active, mesic Ultic Hapludalf). The preceding crop was corn (Zea mays L.) at both locations in both years. Planting occurred in mid-May in 2013 and late May to early June in 2014. All plots were seeded in 15-inch rows at a seeding rate 175,000 seeds/acre. The glyphosate- [N-(phosphomethyl)glycine] resistant soybean cultivar AG 4130 (Monsanto Co., St. Louis, MO) was planted in 2013 and, due to seed availability issues, a similar cultivar, AG 4135, was planted in 2014. Plots were maintained weed-free for the entire growing season.