Using Seed Technologies to Improve Establishment in Switchgrass

Poor initial stand establishment is a major impediment to successful production of switchgrass for biomass production. In the Northeast, target planting sites often have cool and poorly drained soils, making spring plantings difficult. Early planting into cool and moist soil makes seedlings susceptible to damping-off and root rot. Late planting provides additional time required for field preparation, but may not allow enough time for seedling establishment prior to the first killing frost and the end of the growing season. The objective of this project was to determine if seed technologies and seeding rates affect the length of the switchgrass establishment season in New York.

Seed lots of lowland cultivar Kanlow and upland cultivar Blackwell switchgrass were chosen based upon their germination and purity. Four treatments were studied: 1) Control or no treatment; 2) Gaucho XT at 3.4 fl. oz./cwt. +Thiram 42S; 3) Primed seed (proprietary treatment provided by Seed Dynamics Incorporated, Salinas, CA); 4) Seed primed and treated with Gaucho XT+Thiram 42S. Three seeding rates were studied (388, 775, 1162 seeds/m^2). Entries consisted of all possible combinations of cultivars, treatments, and seeding rates, totaling twenty-four entries. Three replicated plot trials were established next to each other in Ithaca, NY, on June 15, July 25, and August 30, 2012. In 2012, severe drought prevented earlier planting in July and August. Seedling establishment was assessed in 2012 by counting seedling density several weeks after establishment. Winter survival was assessed in 2013 using a frequency grid to calculate stand percentage, and yields for the June and July plantings were taken in November 2013.

Increasing seeding rates increased seedling density several weeks after planting in all trials, but seed technologies only showed an effect on seedling density in the July and August plantings. Following the winter, stand percentages for the June and July plantings in Kanlow were 50% and 1% and in Blackwell were 49% and 12%, respectively. Stand percentage in Blackwell seeded in July increased with seed technologies and seeding rate. The August planting did not survive the winter. For the June trial, the treated seed plots yielded more than the untreated seed plots (2.6 vs 2.2 tons per acre). Also, Kanlow yielded more than Blackwell (3.0 vs 1.9 tons per acre). For the July trial, the Blackwell plots were damaged but survived the winter while the Kanlow plots were a complete loss.

Priming and treating seeds may increase the rate of seedling establishment. However, the onset of winter and particularly the effect of the first killing frost on delicate switchgrass seedlings inherently limit this approach in extending the planting window. Planting in late July and in August resulted in good initial plant stands, but poor to nonexistent stands after the first winter.

R. Crawford, J. Hansen, A. Taylor, G. Bergstrom, P. Salon, J. Crawford, and D. Viands