Will a cereal rye cover crop suppress your weeds?

The ability of cover crops to suppress weeds is well documented, with the majority of research using cereal rye as the cover crop. While many people attribute the weed suppression of rye to the release of allelopathic chemicals, most research has shown the primary factor affecting weed growth is the physical barrier of rye on the soil surface (Teasdale et al. 1991, Teasdale and Mohler 1993, Teasdale and Mohler 2000). In order for cover crops to contribute to weed management, they must be managed in a way that maximizes accumulation of biomass. Iowa’s relatively short growing season, compared to other areas where cover crops are more commonly used, has a major impact on the contribution of cover crops to weed management.

To evaluate weed suppression from a cereal rye cover crop, rye was planted in mid-September and mid-October of 2012 and 2013 at rates ranging from 0.5 to 4 bushel per acre. Common lambsquarters and waterhemp were seeded following planting of rye. The rye was terminated the first week of May with glyphosate, and weed emergence was measured throughout the growing season. Seeding rate did not affect rye biomass at the time of termination in either year; however, planting date had a large effect on biomass levels. Rye biomass from the October planting date was less than 500 lb/A regardless of seeding rate, whereas all rates on the September planting date produced about 3200 lb/A of rye biomass (Table 1).

High levels of rye associated with the September seeding dates resulted in a 15% reduction in lambsquarters emergence, but more than doubled waterhemp densities (Table 1). In contrast, low levels of rye in the October seeding dates increased emergence of both species, although the effect on waterhemp was much less than seen with high levels of rye residue. The failure of rye to suppress weeds is not surprising based on the quantity of rye biomass produced. Other researchers have reported that at least 9000 lb/A of biomass is needed to consistently reduce weed establishment (Smith et al. 2011). Increasing seeding rates to excessive amounts (4 bu/A) failed to increase biomass at termination. This is likely due to tillering of rye compensating for differences in plant stands.

The difference between the species is likely due to their respective emergence patterns. Lambsquarters is an early-emerging weed, so its peak emergence period occurred before or shortly after termination of the rye. Waterhemp is a late-emerging weed, so much of the rye biomass had degraded by the time of peak waterhemp emergence. The rye residue that remained at this time apparently created a more favorable environment for germination and establishment of waterhemp.

The presence of rye residue resulted in delayed emergence of waterhemp in both years, whereas lambsquarters emergence was extended only in 2014. The high levels of rye associated with September planting dates delayed emergence of waterhemp by two to three weeks, whereas with lambsquarters the time until 50% emergence was delayed by four weeks in 2014. The shift in waterhemp
emergence is illustrated in Figure 1. Delayed emergence of weeds reduces their competitiveness, but also prolongs the time period in which control efforts need to be implemented.

While it is well documented that rye cover crops can suppress weeds, we believe Iowa’s relatively short growing season will likely minimize the contribution of cover crops to weed management. Allowing a rye cover crop to accumulate sufficient biomass to consistently suppress weeds would require planting dates for corn and soybean to be delayed until mid- to late-May. Although cover crops may not reduce weed populations when managed in a manner that allows maximum corn and soybean yield potential, there are many other benefits associated with their inclusion in corn and soybean production.

References


Prepared by:

Meaghan Anderson
mjbryan@iastate.edu

Bob Hartzler
hartzler@iastate.edu

December 31, 2014