Corn & Soybean News

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Field Yield Checking? Look for 'Out-of-Cycle' Soil Testing Needs

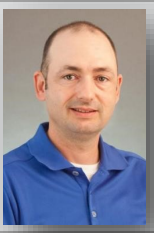
The time for yield checking corn and soybean is near. This is an important activity for growers, consultants, and company agronomists. Visits like this are another chance to look at each field and assess the crop nutrition program. When the yield check identifies a field that is underperforming relative to expectations, other stressors (water, weeds, diseases and insects) are evaluated and ruled out, and a nutrition problem remains suspect, a soil test may be called for. Late season plant tissue analysis is not recommended because the resulting nutrient concentration values are difficult to interpret (except for the corn stalk nitrate test). Further, when the yield check finds a field with outstanding final yield potential – and with commensurately high levels of potential nutrient removal – a soil test may be called for in order to monitor that field's available nutrient levels so that the field's yield potential is sustained. A routine UK soil test will generate information on soil acidity (pH) and bioavailable (Mehlich III extractable) phosphate (P), potash (K), magnesium (Mg), calcium (Ca) and zinc (Zn). Assessments of bioavailable boron (B) and manganese (Mn) can be done upon request.

There have been a significant number of complaints that soil test levels in some of the best fields are not holding up, and that even with aggressive nutrient application rates. Kentucky has been blessed with several years of generally good to excellent weather conditions – leading to excellent crop yields and greater nutrient removal. But many producers soil sample fields according to a set cycle – every second, third, even fourth (not recommended), year. Growers apply annual fertilizer doses for each subsequent crop according to that first-year soil test result. When we talk about precision agriculture and soil sample density, we think about how many acres per sample but temporal density, years per sample, is probably more important – particularly for 'special' fields. If highly productive fields are 'coming in low' on the producer's usual soil sampling schedule, that indicates that the soil testing program also needs to be more aggressive – and these fields need to be soil sampled/tested 'out-of-cycle'. Soil sampling more often is a cheap investment with high return potential.

Soil sampling will occur 2 (fall) to 6 (spring) months after a yield check visit to the field, giving a person ample time to forget those 'special' fields identified earlier as candidates for 'out-of-cycle' soil testing. AGR-16 (http://www2.ca.uky.edu/agcomm/pubs/agr/agr16/agr16.pdf) describes soil sampling. AGR-1 (http://www2.ca.uky.edu/agcomm/pubs/agr/agr1/agr1.pdf) gives UK lime and fertilizer rate recommendations as a function of soil test laboratory values. This year let's not forget the 'special' fields we found while doing our yield checks. I've been in some fields with problems and some with outstanding yield potential. Let's not forget to get those 'special' field situations soil sampled.

Dr. John Grove
Professor of Agronomy/
Soils Research and Extension
(270) 365-7541 - Ext. 21301
jgrove@uky.edu

Dr. Edwin Ritchey
Extension Soils Specialist
(270) 365-7541 - Ext. 21331
edwin.ritchey@uky.edu



Dr. Joshua McGrath
Extension Specialist - Agricultural Soil Management
(859) 257-8887
josh.mcgrath@uky.edu
@NPK_Professor

Cereal rye cultivar selection for improved cover crop performance

Cereal rye cover crops (Figure 1) can bring many benefits to Kentucky's corn and soybean producers. Different cereal rye cultivars may vary in their adaptation to winter conditions. FSome, considered cool-season cultivars, were developed in more northern states and perform better in colder conditions. Warm-season cultivars, developed in southern states, perform better in milder climates. Kentucky's climate is "transitional" between northern and southern conditions so deciding between a cool- or warm-season cultivar can be challenging for producers. Moreover, the optimal cultivar may depend on planting date and specific weather conditions so evaluating these cultivars across multiple situations provides useful information on their adaptation to Kentucky.

We are currently completing a two-year research project, funded by the Kentucky Small Grain Growers Association, to assess the performance of warm- and cool-season cereal rye cultivars and triticale when planted at two dates. This project examines a range of cover crop characteristics and benefits, including rooting depth, ground cover, weed suppression, soil nitrate levels, and soybean nitrogen utilization. We are also examining two factors reported in this article -- aboveground biomass production and impacts on subsequent soybean yield. In brief, we planted six types of cover crops at two dates and sampled their biomass prior to termination with glyphosate the following spring. The cover crops included two cool-season cereal rye cultivars, 'Aroostook' and 'Wheeler,' and two warm-season cultivars, 'Florida 401' and 'Wrens Abruzzi'. We also included a 'variety not stated' cereal rye, triticale ('NE 426GT'), and a no cover control. Soybeans were planted into residues on 30" rows at a population of 150,000 seeds per acre. See Table 1 for experimental dates.

Figure 1. A cereal rye cover crop prior to termination in April, Lexington, KY. Note that cereal rye is a small grain, and different from annual ryegrass. For more information about these two species, see "Annual ryegrass or cereal rye cover crops – what's best for you?" Volume 1 issue 2 (October 2019) Corn and Soybean newsletter: https://www.kygrains.info/corn-and-soybean-news

Operation	2018-19	2019-20
Earlier cover crop planting date	9/14/18	9/30/19
Later cover crop planting date	10/24/18	10/21/19
Cover crop termination	4/24/19	4/11/20
Soybean planting	5/15/19	5/26/20

Table 1. Key dates for this experiment, which is being conducted in Lexington.

In both years of the study, when cover crops were planted earlier, the cool-season cultivars and triticale produced more aboveground biomass than the warm-season cultivars (Figure 2). Results for the later planted cover crops were different in the two years. In the first year (2018-19), aboveground biomass was similar across all cultivars when planted later; average biomass was approximately 400 lbs/acre. In the second year (2019-20), the warm-season cultivars performed better the cool-season cultivars and triticale when planted later.

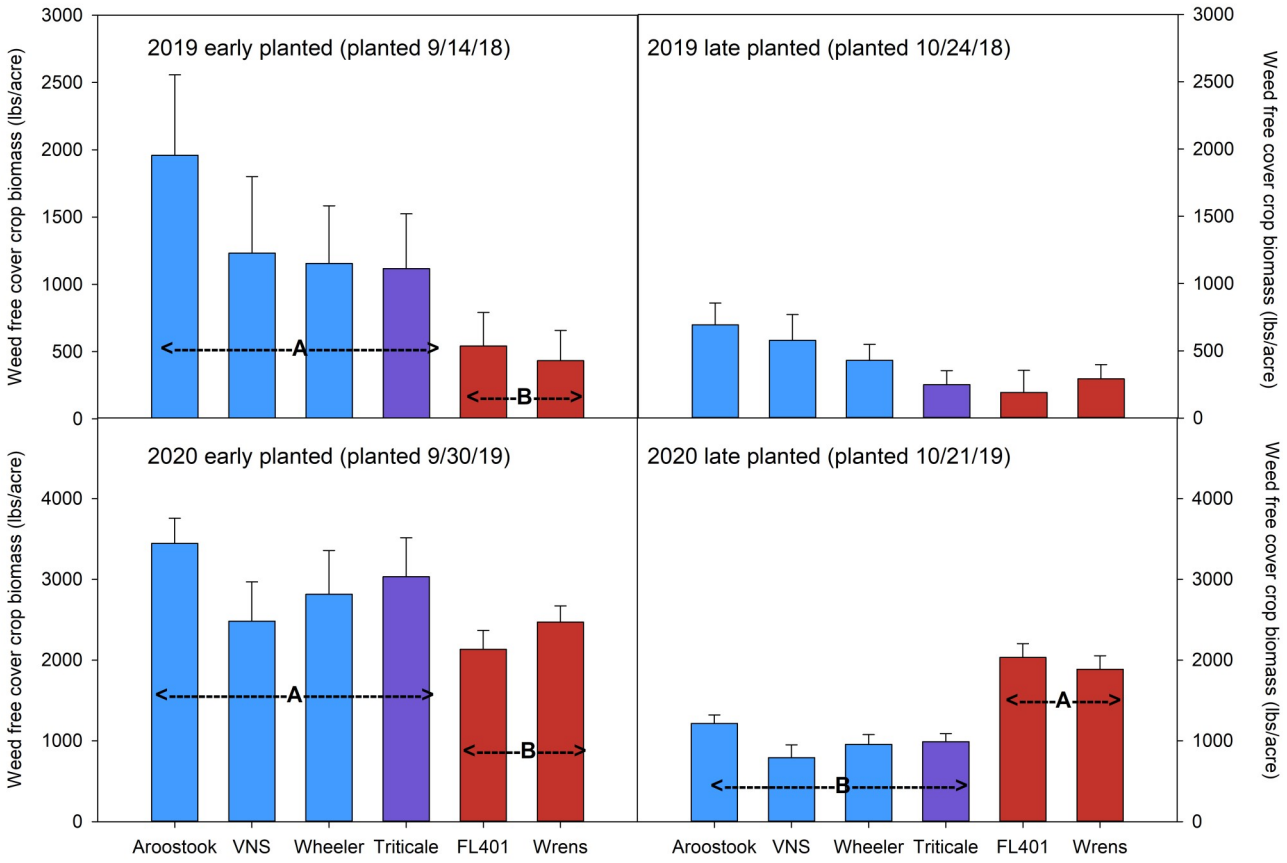


Figure 2. Weed-free cover crop biomass, by cultivar, for early and late planting date in 2019 and 2020. Cool-season cultivars are in blue bars, triticale is purple, and the warm-season cultivars are in red bars. Bars connected by the same letter are not statistically different, so triticale biomass was similar to the cool-season cereal rye cultivars (in blue) for each planting date in each year. There were no differences between cultivars for the late planting date in 2019.

Why did we observe these differences between years, particularly for the late-planted cover crops? Weather conditions likely played a role. Warm and wet conditions in the fall of 2018 were ideal for cover crop growth and the warm-season cultivars had jointed by early 2019. We then had a deep and extended "polar vortex" in January 2019 when minimum temperatures approached 0°F. Aboveground foliage on the warm-season cultivars that had already jointed was killed (Figure 3); the cool-season cultivars did not exhibit this damage, nor did triticale. None of the late-planted cover crops showed damage from these harsh winter weather conditions either, likely because they did not accumulate much aboveground biomass and the warm-season cultivars had not yet jointed. The spring of 2019 was sub-optimal for cover crop growth, remaining cool until termination. Winter conditions in the second year were much milder than the winter of 2018-19. We did not have extended "polar vortex" conditions. In fact, conditions were pretty ideal for cover crop growth in this winter and spring – relatively warm and wet.

Are certain cultivars better suited to an early or late planting date? In 2019, Aroostook and the triticale, and to some degree the Wheeler cereal rye, all had higher biomass when planted earlier than when planted later. In both years, biomass of the warm-season cereal ryes was similar

Figure 3. Polar vortex damage to FL401 cereal rye in February 2019. Most of the aboveground foliage died, though plants were still alive.

whether they were planted early or late. Biomass was low in 2018-19, likely because of the colder winter. In 2019-20, however, both warm-season cultivars performed reasonably well—biomass when planted early was similar to one of the cool-season cultivars and they actually produced more biomass than the cool-season cultivars when planted later. Predicting the winter weather conditions, however, remains elusive so it is difficult to know whether the warm-season cultivars will be a good option if your goal is to maximize aboveground biomass.

We did not observe any differences in soybean density among cover crop treatments in either year. In 2019, soybean yield was lower following some cover crop cultivars but variability in yield was not explained by the amount of cover crop biomass, and yield following the no cover crop control was in the middle of all treatments. This suggests that something other than just the cover crop biomass was affecting yield.

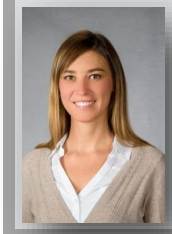
How do these findings help you select a cereal rye cultivar? Our results to date can assist with selection based on aboveground biomass production, but results on ground cover, rooting depth, and soil nitrate scavenging, as well as detailed weed suppression results, are still forthcoming. If you want to maximize aboveground biomass, Aroostook is an excellent choice. It consistently produced the most biomass when planted early, and its biomass production was close to the top when planted late. If you choose Aroostook, make sure you are prepared to deal with residue by adjusting your planter properly. If you are concerned with having too much cover crop biomass and residue at planting, the warm-season cultivars may be a good solution for you. Even in the second year, with better growing conditions, they only produced about 2000 lbs/acre of biomass by termination – almost half that produced by the Aroostook. However, in winters like we had in 2018-19, the aboveground biomass may die back.

Stay tuned for additional information about rooting depth, root biomass, weed suppression, ground cover, and changes in soil nitrate provided by these cultivars! These services may be maximized by a cultivar that does not produce the most aboveground biomass. In addition, other cultivars may be optimal for alternative uses of cover crops, including grazing or baling. Thus, in addition to considering planting date, considering the desired cover crop benefits is key to selecting the optimal species or cultivar. And for more information, please see the following articles:

As a cover crop, how does wheat compare to cereal rye? Volume 23 Issue 1 (February 2019) Wheat Science Newsletter: https://wheatscience.ca.uky.edu/newsletters

Annual ryegrass or cereal rye cover crops – what's best for you? Volume 1 issue 2 (October 2019) Corn and Soybean newsletter: https://www.kygrains.info/corn-and-soybean-news

Dr. Erin Haramoto
Associate Professor
Plant and Soil Sciences Department
Weed Science Program
(859) 218-0745
erin.haramoto@uky.edu



Dr. Hanna Poffenbarger
Assistant Professor
Plant and Soil Sciences Department
(859) 257-5925
hanna.poffenbarger@uky.edu
@hpoffenb

Useful Resources

KyGRAINS.info

Crops Marketing and Management Update

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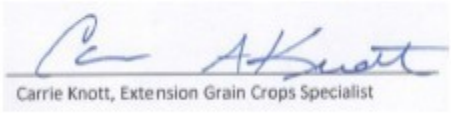
Chad Lee, Extension Grain Crops Specialist



Carrie Knott, Extension Grain Crops Specialist