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CROPWATCH

Figure 1. Early-planted rye on the left and late-planted rye on the right at in a research study at the Eastern Nebraska Research and Extension Center near Mead.

Cover Crop Productivity In Corn And Soybean Systems

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Research in UNL's cover crop project is now in its fourth and final year. Our early planting of cover crops will be carried out within the next week by broadcasting into corn and soybean. The late planting will be done by drilling after harvest. Next spring, cover crops will be killed two weeks before planting corn or soybean.

In the first two years of this study, cereal rye was our most productive cover crop, followed by the mixes. Legumes produced very little biomass and the radishes winter-killed. Last fall, to improve legume establishment, we doubled the seeding rate for our legume mix to 50 lb/ac of winter pea and 20 lb/ac of hairy vetch. Radish was replaced by forage collards, a more winter-hardy brassica, planted at 10 lb/ac.

We also doubled the legume seeding rate in our two mixes, but kept the rye seeding rate at 60 lb/ac when planted alone, 30 lb/ac in the rye+3 mix (rye, vetch, pea, collards) and 20 lb/ac in the rye+5 mix (rye, vetch, pea, collards, black oats and balansa clover). Trials were discontinued at Brule in western Nebraska because the short fall growing season and lack of precipitation restricts cover crop productivity.

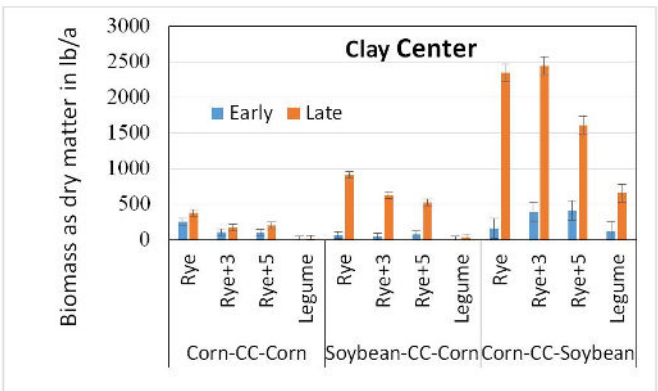

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Figure 2. Biomass production of cover crops at Clay Center in the spring of 2017. Corn-CC-Corn (cover crops planted in corn, followed by corn), Soybean-CC-corn (cover crops planted in soybean, followed by corn), Corn-CC-soybean (cover crops planted into corn, followed by soybean).

2017 Results

Biomass in spring 2017 was intermediate between the low productivity observed in 2015 and the high productivity of 2016. As in the past, at all sites rye made up at least 95% of the biomass in the rye+3 and rye+5 mixes. Legume establishment failed at Concord (northeast Nebraska) and Mead (eastern Nebraska), but showed some

promise at Clay Center (south central Nebraska). Collards did not survive the winter, neither planted alone nor in the rye+3 and rye+5 mixes.

At Clay Center, cover crops planted into corn followed by corn the next spring (corn-CC-corn) and those planted into soybean followed by corn (soybean-CC-corn) were sampled April 13. Cover crops planted into corn and followed by soybean (corn-CC-soybean) were terminated two weeks later (April 27) because of the later planting date of soybean.

The early plantings (August 30) produced less than 500 lb/ac of dry matter in each cropping sequence (*Figure 2*). There may not have been enough precipitation in the fall to support emergence and growth of broadcast cover crops. Clay Center is the only irrigated site, but irrigation ended before cover crop planting. Additional irrigation may be necessary at drier sites to improve emergence of broadcast cover crops. It is also possible that the August 30 planting date was too early, as corn and soybean were still mostly green, and little sunlight reached the broadcast seeds. Late-planted cover crops (drilled October 21) have the advantage of improved seed-to-soil contact, resulting in higher emergence and productivity. Late rye terminated on April 13 had 1,000 lb/ac of dry matter. Two weeks later, in the cover crops before soybean, late rye and the rye+3 mix had 2,400 lb/ac of dry matter. Late legume at that time had 700 lb/ac of dry matter, the highest legume biomass observed in our study.

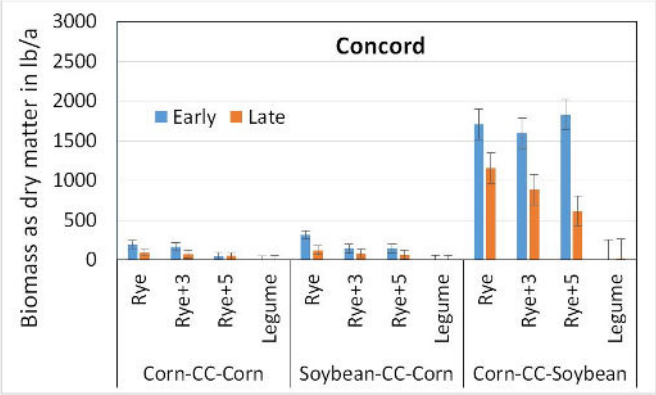

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Figure 3. Biomass production of cover crops at Concord in the spring of 2017. Corn-CC-Corn (cover crops planted in corn, followed by corn), Soybean-CC-corn (cover crops planted in soybean, followed by corn), Corn-CC-soybean (cover crops planted into corn, followed by soybean).

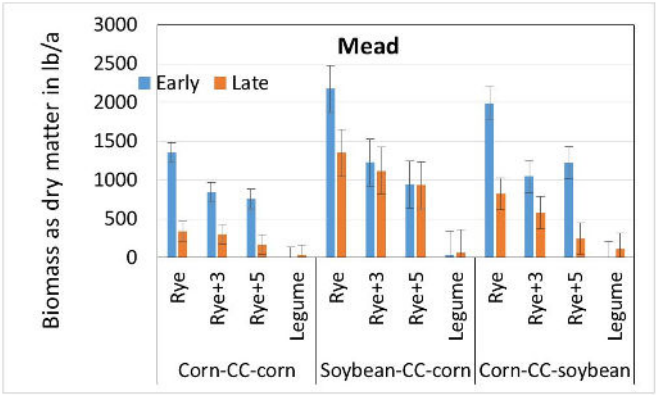

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Figure 4. Biomass production of cover crops at Mead in the spring of 2017. Corn-CC-Corn (cover crops planted in corn, followed by corn), Soybean-CC-corn (cover crops planted in soybean, followed by corn), Corn-CC-soybean (cover crops planted into corn, followed by soybean).

At Concord, cover crops planted before corn were sampled April 20 and had less than 300 lb/ac of biomass in both the early and late plantings, probably due to the dry winter and early spring (*Figure 3*). Rain started falling in late April, with 1.6 inches alone on April 30, benefiting the cover crops still growing in the corn-CC-soybean sequence. When they were terminated on May 9, they had about 2,000 lb/ac of dry matter in the early and about 1,000 lb/ac in the late planting.

At Mead, early rye was the most productive cover crop and always had higher biomass than late rye (*Figure 1*, *Figure 4*). As at the other sites, cover crops in the corn-CC-corn sequence had less growth than the other sequences, probably because establishment is difficult in the high residue under continuous corn.

For winter cover cropping in corn and soybean systems in Nebraska, rye is the most productive cover crop, followed by the rye+3 mix and the rye+5 mix. Brassicas tested so far were not winter-hardy. Hairy vetch and winter pea survive the winter, but are too slow growing to accumulate significant amounts of biomass. Mixes of these species are dominated by rye and can be thought of as rye planted at a lower seeding rate. Thus, the seeding rate of rye can be lowered from 60 lb/ac to 30 lb/ac, especially when planting early, which should still allow for considerable biomass production but cuts seed costs in half. In northeast and eastern Nebraska planting rye before corn and soybean harvest has a considerable advantage over planting after harvest. On the other hand, in south-central Nebraska where soils can be very dry in the fall, planting after harvest with a drill led to better establishment and productivity of cover crops. For growers wishing to maximize cover crop biomass in the spring, delaying termination two weeks from mid-April to early May can double cover crop biomass.

We will continue to make our findings on cover crop productivity, impacts on corn and soybean yields, changes in soil nitrate, organic matter, soil physical properties and soil health indicators available on CropWatch and through Nebraska Extension programs.

Acknowledgement

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