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Study finds soybean yields resilient following late rye termination

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For South Dakota Soil Health Coalition

PIERRE, SD – A cover crop of quick growing cereal rye can keep the soil in place over winter’s brown and blowing days. Its long roots soak up excess spring rains, and its straw helps block weeds.

The more biomass, or plant growth, the more beneficial a cover crop is, but it will eventually impact the following cash crop by using up nutrients and water. For that reason, farmers need to plan a well-timed termination of a rye cover crop, especially in dry years.

A three-year study (bit.ly/RyeStudy) looked at rye termination dates ahead of soybean planting in five Midwestern states, including South Dakota. It found no significant effects on soybean yields, even with later termination dates when the cover crop put on more biomass.

The earlier rye is planted in the fall, the more biomass it puts on. In the spring, the crop really starts to shoot up in May. Biomass can double in the first two weeks of that month, said Chris Proctor, Associate Extension Educator of Agronomy and Horticulture with the University of Nebraska-Lincoln. Proctor led the university’s grant for the rye termination study.

“Once you hit that growth window, that rye really takes off in the spring,” he said. “If you miss that termination window, it can move along pretty fast with rye.”

Soybeans are pretty forgiving, he said, allowing farmers more flexibility in timing cover crop termination.

“That’s a little easier system to start with,” Proctor said.

Soybeans sprout through the cover crop residue, but corn is wimpier. It doesn’t like to compete with other crops. Plus, unlike beans, corn needs nitrogen earlier in the season to boost its growth. Rye will take some of that nutrient away until its residue starts to break down, usually in June and July.

The study, which took place in South Dakota at the U.S. Department of Agriculture’s Agricultural Research Service site in Brookings, involved drilling 80 pounds of cereal rye into corn stubble in the fall

and terminating at different dates in the spring. In one case, rye was terminated with glyphosate about two weeks ahead of soybean planting. In another, termination took place the same day as planting.

Dates had no significant impact on soybean yields in Brookings, and only in 2019 was biomass growth notably different between early and late termination. In that year, soybeans were planted later than usual, in mid-June. Rye left to grow until then was in the heading stage, whereas in other years termination occurred at tillering, even in the late-terminated rye.

The Brookings researchers have had success with several different termination dates, said Shannon Osborne, a research agronomist who helped author the study, which was funded by soybean checkoff dollars through the North Central Soybean Research Program and the Wisconsin Soybean Marketing Board. Success depended on managing the rye for the specific conditions of the growing season and the following crop, she said.

Generally, if the spring is dry and you're planting corn, terminate early, she said.

"You have to watch it," Osborne said. "You can't just plant it and forget it. Maybe it has to be terminated if you're not getting those spring rains that you would normally get."

Precipitation was about average in Brookings during the first year of the study, 2019. The following two years were dry until April.

A rye cover crop in the Midwest isn't usually planted until late in the growing season, so it doesn't have much chance to put on significant biomass. Across the study, the rye biomass averaged 203 pounds per acre when terminated before planting and 626 pounds when terminated at planting.

Biomass is not likely to make a big impact on the following cash crop until there's much more growth.

"When you get above a half a ton or more, you really start to notice it," said Proctor, the Nebraska researcher.

Even low biomass amounts can bring big benefits, though, he said.

It manages soil erosion, helps the soil capture rainwater and keeps nitrogen from leaching into the groundwater. Weed suppression is another big benefit. With cover crops crowding them out, Proctor has seen fewer winter annuals like marestail in the fall and less giant ragweed and pigweed species in the spring.

Some farmers Proctor has worked with will delay planting until the rye puts on enough biomass to really edge out weeds. In doing so, they've been able to skip one pass of herbicide during the growing season, he said.

"That's at the extreme end, but they've been pretty successful with it," Proctor said.

The termination date study also measured insect pest levels. In Brookings, researchers didn't find anything of concern. In Nebraska, they documented quite a bit of beneficial activity from creepy crawlies, said Justin McMechan, an entomology professor at the University of Nebraska-Lincoln who was part of the study. In particular, they saw more spiders, which like to feed on soybean-damaging black cutworms.

In Brookings, the research station has a long-term study interseeding rye into corn. Each year brings various conditions and interesting challenges. This season saw rain in late October and early November to help establish the cover crop. Osborne was still seeing green rye in the plots as Thanksgiving neared because temperatures stayed warm until late in the fall.

“I’m really going to be curious what survived in the spring,” she said.

To learn more about soil health land management practices and the work conducted by the South Dakota Soil Health Coalition with the help of partners like the U.S. Department of Agriculture Natural Resources Conservation Service, visit www.sdoilhealthcoalition.org or contact the Coalition at sdsoilhealth@gmail.com or 605-280-4190.



Submitted photo courtesy of Dr. Louis Hesler, USDA-ARS

A rye plot at the USDA North Central Agricultural Research Laboratory in Brookings, S.D., starts to fade six days after termination spray in 2019. The rye was tall and had started heading, a common environment for when soybeans were planted. Adjacent plots with a tan rye cover crop were terminated earlier.

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Submitted photo courtesy of Dr. Louis Hesler, USDA-ARS

Soybeans emerge among a terminated rye cover crop in this 2019 photo from the USDA North Central Agricultural Research Laboratory in Brookings, S.D.

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