



Courtesy of Jason Johnson, NRCS

*SYSTEM WORKS: Levi Lyle of Keota uses this roller-crimper setup: Case IH 7230 with a Vittetoe roller-crimper front-mounted on a Zuidberg hitch and a Case IH 5400 soybean planter.*

## No-till, organic and roller-crimper — making it work

*Both conventional and organic farmers are using roller crimpers to terminate cover crops.*

Nick Ohde | Feb 22, 2018

No-till and organic found their stride at about the same time. While herbicides had enabled some farmers to no-till for a long time — some back as far as the late 1970s

or early 1980s — the introduction of glyphosate-tolerant soybeans in the mid-1990s made no-till farming more practical for a wider swath of farmers.

At the same time, the organic industry was beginning to boom. In Japan, a market for non-GMO edible soybeans raised without chemicals grew, and the organic row crop market took off. Two farming systems have been developing side by side since then.

### **Organic and no-till each have costs, benefits**

Many farmers then, as now, recognized that the loss of valuable topsoil was one of the most important challenges they faced with keeping their farm going for generations to come. Organic and no-till each provide costs and benefits, and different farmers took different paths. Some farmers, looking to eliminate the use of chemicals on their farm and going after higher premiums on organic crops, went the organic route.

Going organic meant not only cutting the chemicals, but also seeing a financial benefit of diversifying their crop rotations with deep-rooted perennial crops like clover, alfalfa or pasture. But as their neighbors put away their cultivators and plows, they had to keep turning over the soil through cultivation and the plowing under of sod.

No-tillers went the other route. As plant genetics, machinery and chemical programs developed, no-tillers were able to put the plow and cultivators in the grove for good and eliminate tillage on their farms. The downside is they now have to deal with complicated chemical programs and often rely more on input suppliers to be successful while continuing to sell their crops at bargain-basement prices. But knowing their soil would never be turned over was worth those trade-offs.

### **Cover crops help deliver results**

The rise of cover crops in the last five years has taken some of the lessons learned by the organic movement and bolstered the no-till system with biology — plants providing the weed-suppressing benefits that had primarily been done by machines or chemicals, while simultaneously adding organic matter back to the soil. Right now,

the most effective cover crops — like winter cereal rye in a corn-soy rotation or red clover in a corn-soy-oats rotation — still rely primarily on either plowing or chemical termination to get maximum benefits.

Thanks to some innovative farmers and researchers across the country, a day may come soon where farmers can have the best of both worlds. But harnessing the power of plants to optimize crop yields and soil health, while cutting inputs isn't easy, and the road to success has been paved with obstacles.

### **Weed control with organic no-till**

One of the biggest issues organic farmers face is weed management. Successful organic farmers address weed management through a variety of tactics including, among other things, crop rotations that include perennials, well-timed tillage and planting, cultivation and, if necessary, hand-pulling. No-till takes the first three of those tools out of their toolbox, leaving organic farmers with little alternative. Now cover crops add a tool back that's borrowed from the vegetable world: mulch as weed suppression.

On conventional farms, farmers across the state are seeing the weed suppression benefits of winter cereal rye planted in the fall after corn and terminated with herbicides in the spring around soybean planting time. But over the past few years, several Iowa farmers have been experimenting with how to use cover crops to suppress weeds without using a herbicide.

### **Roller-crimper gains attention**

The system all hinges on producing lots of biomass, and then laying the plant down in such a way that it dies and covers as much soil as possible — then in comes the roller-crimper. The goal is to roll weight over the plant at anthesis (flowering) when it is most susceptible to being killed mechanically because its energy is all being sent to reproduction.

Mowing doesn't work because it tosses the cover crop all over and leaves gaps for seed germination. Rolling at an earlier stage before anthesis doesn't work because the cover crop pops back up and keeps growing. To address this, the Rodale Institute

in Pennsylvania has designed a roller-crimper to be able to snap the stem of the cover crop without severing it. Farmers and manufacturers across the country are replicating the model and adapting it to their systems.

### **Farmers gain experience**

Billy Sammons and George Naylor are neighbors farming near Churdan in west-central Iowa. From 2015 to 2017, they conducted on-farm research with help from a USDA Sustainable Agriculture Research and Education grant to experiment with using a roller-crimper to develop no-till organic systems on their farms. You can find more information on their trials [online](#) .

In September 2015, they each broadcast winter cereal rye at 3 bushels per acre into standing corn with a Hagie highboy seeder. A timely rain led to good rye establishment and growth that fall. The following spring, they planted soybeans in 15-inch rows on May 20. After planting, they rolled the rye with a roller-crimper manufactured by a local metal fabricator based on Rodale designs.

“There were some issues with the rye standing back up, but an additional crimping solved that issue,” Sammons says. They ended up crimping twice, one in each direction, an effort to minimize regrowth. That year, Naylor’s farm was the control, and used tillage to terminate the rye. “Adequate weed suppression occurred for the entire growing season and soybean yields were similar on both farms, approximately 50 bushels per acre,” Sammons says.

### **Lessons learned using system**

For 2016-17, Naylor tried the roller-crimper system on his farm. In September, he had 2 bushels per acre of rye flown onto standing corn. The following spring, he planted soybeans in 15-inch rows with a Kinze no-till planter. For the first pass, he led with a 40-foot smooth land roller, going at a 10-degree angle to try to lay the rye down in a way that covered more of the ground.

After the first pass, they realized that the planter coulters weren’t cutting through the thick rye and decided to plant the rest of the field into standing rye.

The next day, Naylor used the same roller to roll the rest of the field. The system worked well, with limited weed pressure except for a little uneven germination of the soybeans, which he thinks is due to the seed trench not being closed and dry soil conditions. “I’m very interested in whether I can plant the beans a week or so before anthesis so that there’s better moisture for germination, and then roll the rye after the V1 soybean stage,” he says. “I’m sure this will not hurt the bean plants, but I wonder if the early competition might somehow result in lower yield.”

### **Getting good yields with roller crimper**

Levi Lyle of Keota in southeast Iowa drilled 2.5 bushels per acre of rye in October 2016 after corn harvest on 40 acres. The following spring, on June 5, he crimped and planted soybeans in 15-inch rows at 200,000 seeds per acre with one pass. His setup was a front-wheel assist Case IH 7230 with a Vittetoe roller-crimper front-mounted on a Zuidberg three-point front hitch and a Case IH 5400 soybean planter. His soybeans yielded 61 bushels per acre and no herbicides were necessary.



**TERMINATING:** The key to terminating a rye cover crop with a roller-crimper is waiting until anthesis, or pollen shed, which doesn’t typically occur until late May. If the rye isn’t to this stage, it’s not going to die.

“The front-wheel assist tractor was not essential but proved helpful to better control the front-mounted roller,” he says.

“The one pass roller-crimper and plant system worked excellent in 2017,” Lyle says. In a dry year, the mat of rye helped retain soil moisture in the early summer. The field he rolled actually yielded better than some conventionally managed soybeans he farms nearby with his dad — similar land with a similar corn suitability rating. “Dry conditions slowed the canopy closure allowing marestail to come through in places,” he says, “but the overall weed suppression of the rye mat fared better than the herbicide program on adjacent fields.”

### **Working with NRCS, ISU**

In 2018, Lyle plans to try planting soybeans 10 to 14 days before roller-crimping to give the rye a chance to put on more growth. “Because the rye cover crop must be terminated at anthesis, the greatest challenge is timing,” he says. He plans to work with the Natural Resources Conservation Service and Iowa State University to conduct a three-year study on the roller-crimper system on both no-till corn and soybeans.

Lyle’s neighbor and on-farm researcher with Practical Farmers of Iowa, Tim Sieren, tried roller-crimping for the first time in 2016-17. He broadcast 1.5 bushels per acre rye into cornstalks and incorporated the seed with a Bessler stalk chopper on Nov. 1, 2016. The following spring, he drilled soybeans on 7.5-inch rows with a John Deere 750 on May 30, and then used Lyle’s 15-foot roller crimper to crimp the rye that same day. He had limited success with that system.

Sieren says one issue is that he probably didn’t put out enough seed. “You need at least 2 bushels per acre to make a nice, thick mat of mulch,” he says, compared to the bushel and a half he used. Weather also complicated the situation; a hailstorm hit May 17, two weeks before planting, which thinned out the rye.

### **Timing of crimping important**

For Sieren, the plant-then-crimp method didn’t work as well. He says that when the drill went over the rye to plant the beans, it knocked some of the rye down, and so

when the crimper followed, it wasn't able to have the full effect. "When you run the drill through it first, it's half laid down and the crimper just rolls over and doesn't kink and crimp the stems as well as when it's standing," he says.

This year, Sieren plans to rent Lyle's one-pass setup. If that doesn't work, he'll crimp first, then follow with the drill in the same direction that he crimps. "The critical thing then is to run the drill the same direction as the rye was crimped, or you could end up with a big tangled up mess trying to drill 'against the grain,'" he says.

To read more about Sieren's on-farm research with Practical Farmers of Iowa and browse research reports about a variety of different subjects, check out [practicalfarmers.org/research-reports](https://practicalfarmers.org/research-reports) .

*Ohde writes for Practical Farmers of Iowa.*

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