

Regenerating Soil Health for Resilience



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**Agriculture
and Markets**



No-till planting soybean into rolled cereal rye





Traditional tillage-based organic production

Cover crop no-till

- Compared with traditional organic corn-soybean-wheat
- 27% less diesel fuel
 - 31% less labor
 - 13% less energy use
 - 6% less GHG emissions¹

No-till planting soybean into rolled-crimped cereal rye can **improve soil health, increase water infiltration, and protect soil from erosion**, compared to planting into tilled soil without a cover crop²

1) Mirsky, SB, MR Ryan, et al. 2012. Conservation tillage issues: Cover crop-based organic rotational no-till grain production in the Mid-Atlantic region. *Renewable Agriculture and Food Systems* 27:31-40.

2) Crowley, KA, HM van Es, MI Gómez, and MR Ryan. 2018. Tradeoffs in cereal rye management strategies prior to organically managed soybean. *Agronomy Journal* 110:1-13.

Benefits of cover crop-based no-till





FARMER FEATURE: MARTENS FARM

Klaas Martens farms with his family on over 1,600 acres of certified organic land in Penn Yan, New York. They have been farming organically since 1992 and are actively involved in the organic farming community. Situated on the western shore of Seneca Lake, their farm has Honeoye and Cayuga silt loam soils. In 2013, Klaas and his son, Peter, worked with Jeff Liebert to conduct an organic no-till planted soybean trial that compared the effects of three different cover crop species (cereal rye, triticale, and winter barley) and two cover crop termination dates on cover crop biomass, weed suppression, and soybean yield. Two varieties of each cover crop species were included in the experiment: 'Aroostook' and a variety-not-stated (VNS) cereal rye, 'TriCal 818' and 'TriCal 815' triticale, and 'McGregor' and 'Verdan' barley. All cover crops were seeded on September 16, 2013, at a density-based seeding rate of 2 bu/acre and then rolled the following spring on May 30, 2014 (early termination date) and June 5, 2014 (late termination date).

Before rolling, high cover crop biomass was recorded in all treatments, with over 8,000 lb/acre of cereal rye, 7,000 lb/acre of triticale, and 5,000 lb/acre of barley on May 30. In the week between the first and second termination dates, cover crop biomass increased between 500 and 1,000 lb/acre across the three cover crops.

Klaas, Peter, and Jeff no-till planted the soybeans ('Viking 2265', 2.2 relative maturity) on June 5 at a rate of 300,000 seeds/acre using an Esch No-Till 5507 drill. As the downward pressure was dispersed across 15 row

units, some adjustments were needed to ensure good seed-to-soil contact through the thick cover crop mulch. Klaas and Peter added a spacer on the hitch to alter the angle of the drill, they removed the spacers from the hydraulic cylinders (one on each side), and they loaded 2,500 lb of additional weight to the drill to enhance the down pressure.

A negligible amount of cover crop stood back up (i.e., bounced back) after rolling, even at the earlier date. Weed biomass, measured on September 15, 2014, was lower in plots where cover crop biomass was higher. The winter barley produced the lowest amount of cover crop biomass and had the highest weed biomass out of all treatments. Quackgrass (*Elymus repens*) and common ragweed (*Ambrosia artemisiifolia*) were the two most common weed species across all treatments, though common ragweed populations were lower in plots that were rolled at the later date.

Despite differences in cover crop biomass and weed suppression, soybean yields did not differ and averaged 40 bu/acre across all treatments. Klaas was satisfied enough with the results of this trial to purchase his own roller-crimper and continue experimenting with rolled cover crop organic no-till planted soybean production. Increasing the number of acres under organic no-till planted soybean management each year since the trial, Klaas has recommended this approach to other farmers at conferences and grower meetings as a way to prevent erosion and improve soil health, while still maintaining profitable yields.

"I think the rolled no-till soybeans are a good example of a practice that has not been adopted as widely or as quickly as it should have been because it was being pushed mainly as a practice as opposed to it being introduced as a part of a farming system."

- Klaas Martens



Figure 18. Klaas Martens and Jeff Liebert survey some of the cover crop test strips at Klaas's farm in 2014 (top). A cereal rye cover crop being rolled for the variety trials (bottom left). Barley, triticale, and cereal rye were planted as part of this trial (bottom right).

ORGANIC NO-TILL PLANTED SOYBEAN PRODUCTION

A guide for organic farmers in New York State



Production guide available online

<https://bit.ly/ontsguide>



New tools for non-chemical weed management



Interrow mower for terminating weeds between rows



Weed zapper for terminating weeds above rows



Aerial image of field experiment in Aurora, NY

Hairy vetch + Cereal rye

Cereal rye

Hairy vetch

Winter canola

Tilled (Control)

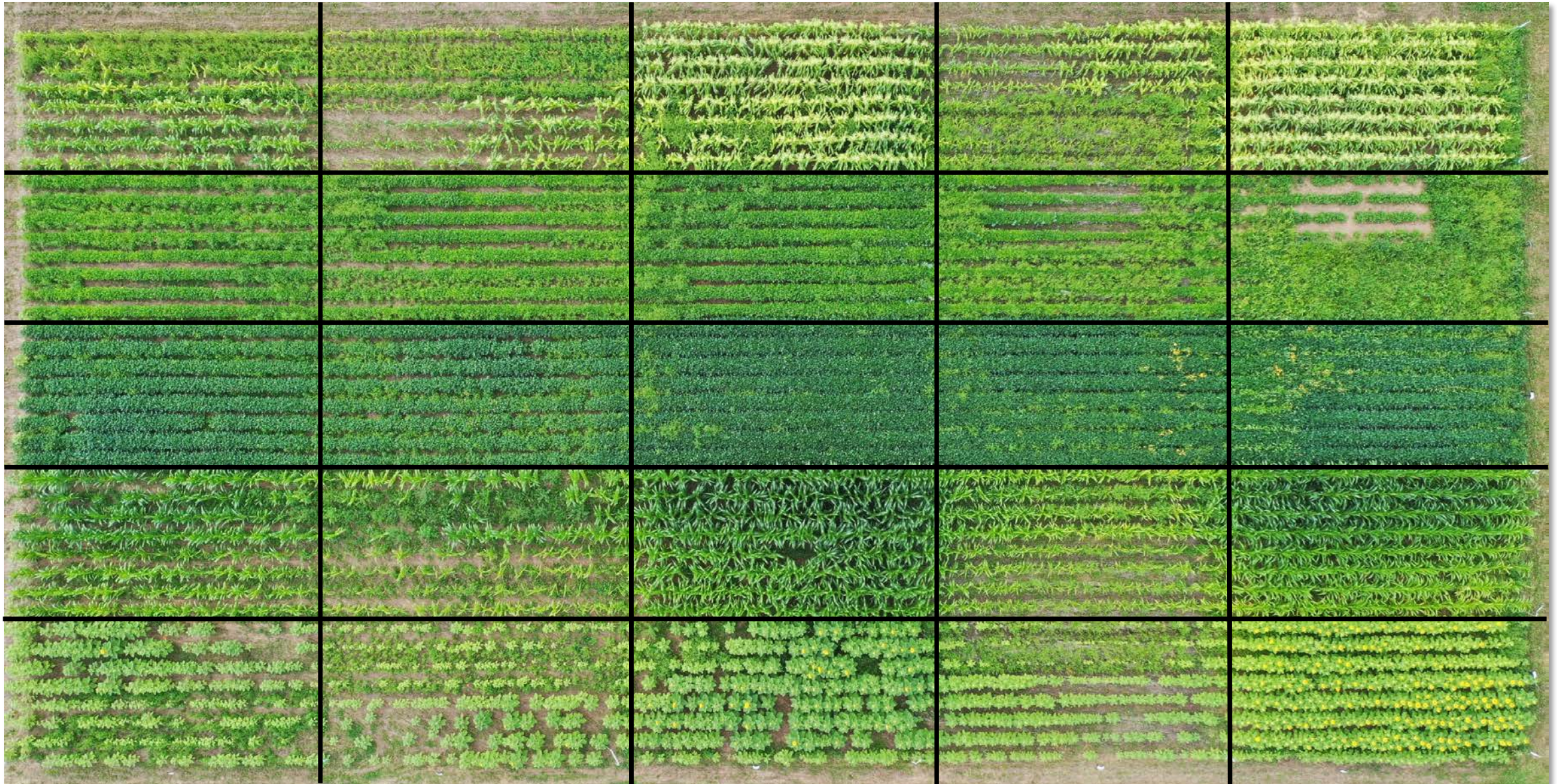
Sweet corn

Dry bean

Soybean

Corn

Sunflower



Watch video online: <https://hvfarmhub.org/searching-for-successful-no-till-crop-sequences/>

Uri Menalled



Broomcorn
Cereal Rye mulch
Sorghum vulgare

Variety: Aroostook
Seeding rate: 187 lbs/ac (\$75/ac)
Seeding date: 9/7/2022

No-till drilling winter wheat into summer cover crops



Chris Pelzer

Winter-killed cover crops for no-till spring wheat



Kristen Loria

Summary

- Increasing resilience to climate change by improving soil health
- Developing management guidelines for cover crop no-till
- Consistent success with soybean, promising preliminary results with corn, sunflower, and wheat

