Regenerating Soil Health for Resilience

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New York Soil Health Summit – December 13, 2022
No-till planting soybean into rolled cereal rye
Traditional tillage-based organic production

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

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 crop.

Benefits of cover crop-based no-till
**Organic No-Till Planted Soybean Production**

A guide for organic farmers in New York State

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**Farmer Feature: Martens Farm**

Klas Martens farms with his family an over 4,500 acres of certified organic land in eastern New York. They have been farming organically since 1959 and are deeply involved in the organic farming community. He used the eastern shore of Seneca Lake, their farm has horticulture and organic dairy acres and 27.2 acres of organic ground. Klas and his son, Peter, worked with Jeff Zobrist to conduct an organic no-till planted soybean trial that evaluated the effects of three different cover crop species (canola, radish, and winter barley) and two cover crop seeding rates on soybean yield, weed suppression, and weed suppression. Two varieties of each cover crop species were included in the experiment: "Blackhawk" and a variety not-till (SNV) - winter radish, "Triticale" and "Pueblo" winter barley, and "Helldorado" and "Phenix" barley. All cover crops were seeded on May 4, 2016, at a density-based seeding rate of 9.25 acres/increased, and then rated the following spring on May 30, 2016, for weed control and June 1, 2016, for land preparation and yield.

Before rolling, high cover crop biomass was recorded in all treatments, with over 1.500 lbs/tarlet at so near 1,670.99 acres of canola, and 1,680.98 acres of barley on May 30. In the week between the first and second measurement dates, winter barley biomass increased between 300 and 7,000.96 acres across the three cover crops. Klas, Peter, and Jeff Zobrist planted the soybeans ("J984" and "J989") on June 1, 2016, at a rate of 100,000 seeds per acre using a John Deere 7706 cultivator. The downed biomass was dispersed across 35 rows, and some adjustments were needed to ensure good seed-to-soil contact through the holes cover crop mulch. Klas and Peter used a spade to dig the holes to the angle of the drill, they removed the spacers from the fieldwork cylinders on each drill, and then used 1.500 lbs to an additional weight to the drill to ensure the down pressure.

A weighable amount of cover crop killed back up to 4 tons of biomass; after rolling, earth of the earlier plots, and the last plot was still lower in rows where cover crop biomass was higher. The higher biomass produced the lowest amount of cover crop biomass and kill the highest weed biomass out of all treatments. Quinoa (sheep sorghum), and common ragweed (several species) 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 plants did not differ and averaged 30-40 inches across all treatments. Klas was satisfied enough with the results of the trial to purchase his own cultivator and continue experimenting with roller-crimped cover crops for no-till vegetable production. Increasing the number of acres under organic no-till planted soybean management each year since the trial, Klas has recommended this approach to other farmers of our community, and I am working on a new partnership to improve our farming system health, while still maintaining profitability yields.

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**Production guide available online**

New tools for non-chemical weed management

Interrow mower for terminating weeds between rows
Weed zapper for terminating weeds above rows

Watch video online: https://www.youtube.com/watch?v=Syd7v6Rvh3Y
### Aerial image of field experiment in Aurora, NY

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<tr>
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<th>Hairy vetch + Cereal rye</th>
<th>Cereal rye</th>
<th>Hairy vetch</th>
<th>Winter canola</th>
<th>Tilled (Control)</th>
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Watch video online: [https://hvfarmhub.org/searching-for-successful-no-till-crop-sequences/](https://hvfarmhub.org/searching-for-successful-no-till-crop-sequences/)
No-till drilling winter wheat into summer cover crops
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