No-Tilling Organic Soybeans with Spring-Interseeded Cereal Rye

More and more growers are experimenting with no-tilling organic soybeans. New research shows interseeding cereal rye in spring can improve weed suppression, but timing, row spacing and good stand establishment play a critical role.

By Julia Gerlach, Managing Editor

IN THE FACE of marketplace pressures and mounting instances of herbicide-resistant weeds, a growing cadre of growers are turning to no-till organic soybeans.

While many no-tillers are familiar with using cereal rye as a cover crop during the off-season before soybeans, a practice that is gaining interest in this no-till organic system is to use cereal rye between the soybean rows during the growing season. Like nutrients and water, that we thought planting date would have an effect on,” says Nicole Tautges, an agroecologist with MFAI. She discussed mid-season results of their studies in an August 5 webinar hosted by the Institute. Silva, associate professor and organic and sustainable cropping systems specialist at UW-Madison has also conducted similar trials at the university’s Arlington Research Station.

**Trial Setup.** The MFAI study looked at three planting dates: May 26, June 1 and June 15. Originally, researchers planned for the earliest date to be May 15 but wet weather prevented fieldwork at that time. The soybeans and the rye were planted on the same day.

The research trial was not designed for a completely no-till system, but could be adapted for strict no-till. In this case, researchers were focused on reduced tillage. Prior to planting, researchers used the stale-seedbed method to prepare the ground: Weeds just below the soil surface were allowed to germinate and then were killed via cultivation with minimal soil disturbance prior to planting the cash crop.

Soil tests done prior to planting showed adequate levels of phosphorus (P) and potassium (K), so no fertilizer was applied.

According to Tautges, “intercropping studies have found that growing a non-nitrogen-fixing crop, along with a legume, actually increases the amount of nitrogen (N) fixed by the legume. So by having a grass crop, the soybean will respond to the increased competition for N in the soil by pumping up and increasing its N fixation.”

**Evaluating Weed Competition.** Attempting to beat back weeds in a no-till organic system, researchers at Michael Fields Agricultural Institute are experimenting with narrow-row soybeans planted in 7½-inch rows with a “living mulch” of winter rye. The plots were planted on (from left to right) May 25, June 1 and June 15, with the June 1 date showing the most promise for achieving a good soybean stand and suppressing weeds. Photos were taken on August 3, 2020.

This approach is currently of experimental interest because the rye could help suppress weeds and it gives growers an alternative to trying to get rye established in the fall, which can be challenging in areas with a shorter growing season.

During the 2020 growing season, researchers at the Michael Fields Agricultural Institute, of East Troy, Wis., with direction from Erin Silva at the University of Wisconsin-Madison, did replicated field trials of this system to see if planting date and/or row width would impact results.

“There’s a lot of competition for resources, along with planting date, row spacing was also an experimental treatment. Soybeans were drilled in either 7½-inch narrow rows or 30-inch wide rows. All cereal rye was drilled on 7½-inch rows between the soybean rows. No cultivation or herbicides were used for weed control at any point.

The narrow-row soybeans were seeded at a rate of 225,000 seeds (80 pounds) per acre, whereas the wide-row soybeans were planted at a rate of 210,000 seeds (75 pounds) per acre. The rye was seeded at 115 pounds per acre.
Untreated and certified organic Aroostook rye — a winter rye that performs well in northern states such as Wisconsin — was used because when planted in the spring it won’t vernalize and flower. Instead, it stays vegetative and dies back in the summer, Tautges says. In addition, researchers chose rye because its allelopathic properties have been shown to suppress weeds in some cases.

Results are being compared to a control of inter-row cultivated 30-inch soybeans with no cereal rye, which is how most organic soybeans are grown.

**Narrow Rows Best.** Amongst all the treatments, Tautges says the 7½-inch soybeans with interseeded rye that was planted on June 1 have shown the most promising results.

“In mid-July, the soybean stand was really healthy and uniform,” she says. “Where there were gaps in the soybean canopy, you could see the winter rye poking through but there weren’t too many weeds. So the two crops — the cash crop soybean and the winter rye living mulch — were doing a really good job working together to suppress weed pressure.”

Three weeks later in early August, the stand continued to look very healthy. The soybeans canopied, and while there were a few broadleaf weeds, pressure was very low.

“The rye was still there under the canopy but it was starting to die back. So this treatment really worked the way we wanted it to,” Tautges says. “The rye grew enough early on to suppress weeds, but the soybeans were able to get up and canopy, which kept weed pressure to a minimum.”

The early-planted 7½-inch soybeans were a disappointment, she says, due to wet weather in the month of May.

“But the first planting date, we were trying to get in early and we prepared our seedbed when soils were too wet. We didn’t get great uniform seedbed preparation and therefore we didn’t get uniform seed placement and soybean germination,” says Tautges. “So we had a lot of weeds and the rye wasn’t saving us there.”

By early August, she says, the soybean stands were fuller, but still very weedy and there was no canopy closure.

The June 15 planting of 7½-inch soybeans was also not as successful as the June 1 date. “In mid-July, the June 15 soybean stand was a bit spottier and the soybeans were looking a bit yellow, which suggested to me that the rye was causing some competition with the soybeans,” she says.

In early August, the hot weather had negatively affected the June 15 planting. “The soybeans were behind and the hot temperatures led to less vigorous rye growth and development and it wasn’t able to compete as well against our warm season grassy weeds,” Tautges says.

With all three planting dates, the 30-inch soybeans overall were not as successful as the narrow rows. “We got decent soybeans stands, but had a lot of warm season grassy weeds growing between the rows,” she explains. “The rye wasn’t doing a good job out-competing the weeds in the wide row scenarios.”

**Weed Growth.** Tautges captured weed germination and count data twice — at 2 and 4 weeks after planting — and combined the counts for each treatment. She grouped the weeds into three categories — broadleaf weeds, grassy weeds and Canada thistle, which tends to be a big enough problem in organic fields to warrant its own category.

In narrow-row soybean with interseeded rye, there was less overall weed pressure compared to the 30-inch rows, with the exception of the May 25 date, where they didn’t achieve a good soybean stand. The June 1 date performed best overall in suppressing weeds.

With the growing season still underway, the final results of the trials are not yet known. Besides soybean yields, weed biomass measurements will be taken to evaluate outcomes.

But early takeaways suggest that it is possible to achieve good weed suppression by planting soybean on narrow rows with a living mulch of interseeded rye. While the 7½-inch soybean interseeded with rye treatment effectively suppressed weeds and developed a good canopy, the trial demonstrated that it is essential to achieve a uniform, thick stand of soybeans at establishment. Where there gaps in the stand early on, weeds proliferated and dominated the stand, even with rye present.

While the partial-season results of the narrow-row June 1 planting are encouraging, it’s important to note that more testing is required to make recommendations for soybean growers. If the system proves successful, it could greatly reduce soil disturbance and the time growers spend cultivating in organic soybean systems. But UW-Madison’s Silva recommends a cautious approach when implementing this technique on farms, as trials conducted by her team have been variable.

“In some years, we have excellent weed control. But in others, fields have been weedier than ideal — for example, we have foxtail pressure in our fields this year,” Silva says. “Research partners — including MFAI and farmer cooperators — are still learning how to reduce risk and under what conditions the practice can be optimized. I would certainly recommend starting on smaller acreage and learning through experience how to optimize under specific farm conditions.”

---

**Pick Up Your Copy of the First-Ever History Book on No-Till Farming!**

From Maverick to Mainstream: A History of No-Till Farming

From Maverick to Mainstream: A History of No-Till Farming is a truly unique account of the historical developments, people and technology of no-till. It serves as a lasting reminder of how innovations — and their most determined champions — can make a difference in changing the way we farm and feed the world.

**Visit NoTillFarmer.com/NoTillHistory or call (800) 277-1570**

---

**JUST $47.95!**

---

---