

Organic No-Till Soybean Production

Making it Work in Ontario

Growing cover crop-based organic no-till soybeans requires a different system approach than for standard organic production. Three years of extensive research trials in Ontario have guided the development of four key best practices for growing no-till organic soybeans following a cereal rye cover crop. This tip sheet is designed to provide practical advice for Ontario growers.



1. Seed cereal rye early and thick

- Drill rye by September 20 at 110-170 lb/ac for a strong, competitive stand

2. Have a plan B ready

- If rye is too thin, till under before jointing
- If spring conditions are dry but the rye stand is strong, cut for feed or harvest as grain

3. Use equipment that can plant into high residue

- Seed into standing rye before crimping with a well-maintained no-till drill or plant into rolled rye mulch with a planter modified for high residue conditions

4. Bump up soybean seeding rate

- Plant soybeans at 250,000-300,000 seeds/acre to close canopy and maximize yield

Organic no-till soybean timeline

Preparation for growing organic no-till soybeans begins well in advance of crop planting. Here is the typical seasonal timeline.



Timeline adapted from Dr. Matthew Ryan and Jeff Liebert, Cornell University. Sustainable Cropping Systems Lab. Organic No-Till Planted Soybean Production. 2021.

Four best practices for organic no-till soybean production in Ontario

1. Seed cereal rye early and thick

In April



You want this.

Seeded September 20 at 170 lb/ac



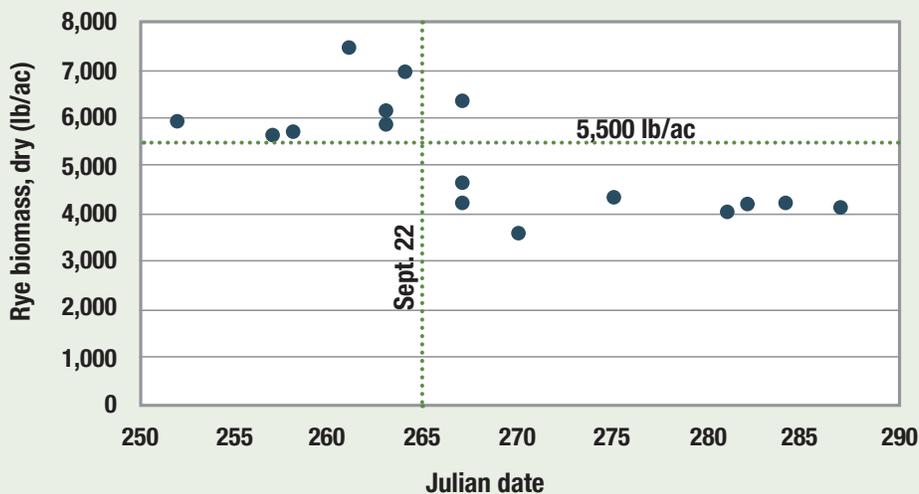
Not this.

Seeded October 2 at 170 lb/ac

Seed by mid-September

to target 6,000 lb/ac biomass

Rye Biomass vs. Seeding Date



2. Have a plan B ready

Too thin?

If the cereal rye cover crop is not uniform and dense, it will not compete effectively with winter annual weeds or provide a thick enough mulch to suppress later-emerging weeds.



Terminate rye prior to jointing with tillage.
Proceed with tillage-based soybean production.

Too dry?

If the rye is thick enough but conditions turn dry in May, and the forecast lacks precipitation, the cover crop will deplete soil moisture and significantly lower soybean yield potential.



Harvest rye for feed,
followed by tillage-based
soybean production.



Harvest rye for grain,
followed by cover
crop seeding.

3. Use equipment that can plant into high residue

Equipment not set up for high residue will not perform well.



Uncut residue

Soybean seedling

This no-till drill was unable to cut through a thick, rolled rye mulch. Drills are best suited to seeding into standing rye before crimping.

Strong stands can be achieved with the right seeding equipment.



This crop was planted into rolled rye using a no-till planter that cut the mulch, seeded to depth and closed the slot.

Keys to success

- Sharp disc openers cut through rye
- Sufficient down-pressure gets seed to depth
- Effective closing wheels close the seed slot

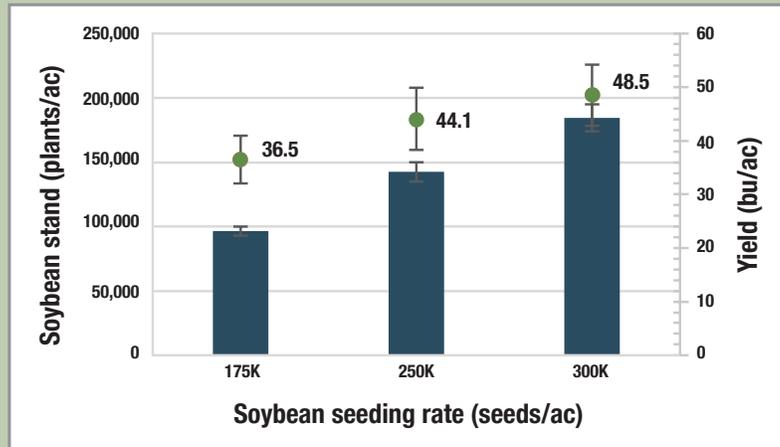


Dawn Gaugetine closing wheels performed well in organic no-till.

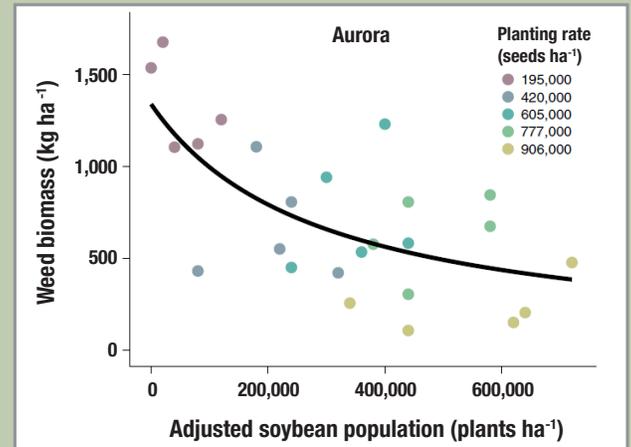
4. Bump up soybean seeding rate

A thick soybean stand helps to close the canopy more quickly and compensate for delayed early season growth. It also results in a stand that is more competitive with any weed escapes from the rye mulch.

Results averaged from two Ontario organic no-till seeding rate trials in 2021 showed a yield benefit to a seeding rate of **300,000 seeds/acre**.



Research at Cornell University found the highest partial return at 260,000-295,000 seeds/acre and lower weed biomass with higher seeding rates.¹



¹Liebert and Ryan. 2017. High Planting Rates Improve Weed Suppression, Yield, and Profitability in Organically-Managed, No-till-Planted Soybean. Weed Technology. DOI: 10.1017/wet.2017.35

Organic no-till performance in Ontario, 2019-2021 trials

From three years of trials, we know that organic no-till soybeans must be integrated as part of a system. Adjustments in crop rotation and agronomic practices are key. We learned that experience helps growers achieve higher yields with organic no-till.

9 Replicated strip trials

- On-farm and research station sites
- Compared organic no-till vs. tillage-based organic or no-till with herbicides
- Yields averaged 32 bu/ac and were 40% lower for cover crop-based organic no-till soybeans than soybeans grown with tillage or herbicides for weed control



10 Observational sites

- Full or partial fields planted no-till on certified organic farms
- Monitored throughout each season
- No-till soybeans at all 10 sites over three seasons averaged 39 bu/ac



“Good base fertility and planting the rye thick are key. Don’t go in with the assumption that it’s going to work the same way every year – be ready to alter your plans if needed.”

Project cooperator, Morris Van De Walle, St. Marys, Ontario

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