

# Cover Crops for Corn and Soybeans

James J. Hoorman, Assistant Professor, Ohio State University Extension Educator  
 Alan P. Sundermeier, Associate Professor, Ohio State University Extension Educator  
 Rafiq Islam, Senior Research Scientist, OARDC/Ohio State University

Cover crops can greatly improve soil conditions to increase soil productivity. Both corn and soybeans respond to cover crops in a long-term no-till system because the cover crops improve the soil ecology.

**Tip 1:** Add 40-60# N in a corn starter to stimulate early corn growth, when soil microbial communities are recovering due to cold spring soil temperatures. Microbial populations increase exponentially with moisture and warmer soils in late spring and early summer, thus more recycled nutrients are available for crop production. Long-term N studies have shown that almost 20-50% of N for corn comes from the decomposition of native soil organic matter (SOM) as temperatures increase further with adequate moisture.

**Tip 2:** Plan to add 100-150#N in fertilizer, manure, or grow a legume cover crop to decompose the additional 0.1 to 0.15 increase in SOM from cover crop roots. Soil microbes feed first, SOM residue ties up N second, and corn roots feed third on available N; so in a no-till system, adjust N rates to compensate for these differences in N utilization.

**Tip 3:** In the fall, plant legume cover crops before corn to add 50-150# of organic N or brassicas (radish) to aerate the soil before corn production. Minimize using high carbon to nitrogen ratio (C:N) cover crops (e. g. only grass cover crops) that will need additional N to decompose. Soil microbes and the decomposing soil organic matter will tie up most of the available N first, so the growing corn crop will utilize any remaining available N last.

**Tip 4:** Legumes maximize their N production (85-90%) at blooming. Terminate legume cover crops before they set seed and tie up N. Most legume N will become available to the next crop in 2-5 weeks, once they start to decompose.

**Tip 5:** Most corn diseases and especially soybean diseases like *Phytophthora*, *Fusarium*, *Phythium*, and *Rhizoctonia* thrive under wet soils. Use cover crops with living roots to dry out the soil profile to reduce disease pressure.

**Tip 6:** Cereal rye before soybeans has been shown to reduce *Phytophthora* and *Rhizoctonia* by promoting a predator that consumes these organisms. Cereal rye also dries out the soil due to evapotranspiration, changing the soil environmental conditions to help control these diseases.



*Commolores aut et pligenis rem illenihil idusantia disquunt autem ea nimus mint, oditatur mi, optatur? Quia accullecum haribusapid quasitatem et rem vel mint lam inventendus ut dolupta eos ducias alitas autae.*

**Tip 7:** To increase predators for destructive insects, plant summer cover crops that flower and provide nectar to developing predators (buckwheat, sunflower, hairy vetch, red clover, or sweet clover).

**Tip 8:** Flowering plants with small open flowers promote nectar for predators in early spring (dandelion, henbit), mid-summer (buckwheat, sunflower, flowering legumes and clovers) and late fall (Wild carrot or Queen Ann's Lace, Goldenrod). Minimize use of insecticides and fungicides.

**Tip 9:** Predators also need long-term no-till and large chunks of residue as shelter to survive the winter. Plant cover crops along end rows, grass waterways, road ditches, creeks, and buffer areas to increase predator populations.

**Tip 10:** Daikon radish controls slugs due to ingestion of biochemicals which are toxic to slugs. Cover crops may be an alternative food source for soft body insects and protect the main crop from damage.

**Tip 11:** Cereal rye and annual ryegrass decrease soybean cyst nematodes by 80-90% if planted early in the fall when soil temperatures are above 50°F.

**Tip 12:** Ground beetles (*Carabidae*) and lightning bugs (*Coleoptera*) are natural predators of soft body insects like aphids, slugs, cutworm, and army worm. Ground beetles eat their weight in weed seed and insects every day.



THE OHIO STATE UNIVERSITY

COLLEGE OF FOOD, AGRICULTURAL,  
AND ENVIRONMENTAL SCIENCES

URL/UNIT/PROGRAM/COUNTY NAME 1

URL/UNIT/PROGRAM/COUNTY NAME 2

**Tip 13:** The best weed fighters are Sorghum Sudan grass, radish, cowpea, buckwheat, and cereal rye; which out compete weeds for space, water, sunlight and nutrients and/or have natural herbicides (glucosinates) that bio-fumigate the soil. Avoid tillage which preserves and replants weed seeds.

**Tip 14:** Cereal rye control weeds through allelopathic (toxins) compounds; competition for space, light, moisture and nutrients; and reduces diseases through evapotranspiration, drying soil. Cereal rye (grasses with fibrous roots) before soybeans maximize phosphorous recycling.

**Tip 15:** In cereal rye, the allelopathic effects come from partially anaerobic decomposition of cover crop leaves and stalks and wet soil conditions. To minimize corn planting problems, selectively cut or harvest above ground biomass to reduce toxins and add manure or N fertilizer to reduce the C:N ratio to decompose the residues. If you cannot harvest it, kill it early, and wait three weeks to plant corn.

**Tip 16:** Planting earlier maturing corn and soybeans will allow for maximum cover crop growth. Ohio research shows that corn and soybean yields are related to timing of precipitation more than crop maturity.

**Tip 17:** Early seeded broadcast cover crop failures may be associated with herbicide carryover when using triazines and ALS herbicides, especially during dry weather. Carefully plan herbicide applications in corn and soybeans to account for possible herbicide carryover.

**Tip 18:** After a late corn harvest, there are very few options for planting cover crops going to soybeans. Cereal rye (1 bushel/A) may be planted as late as November 1<sup>st</sup>, but may not germinate until spring. Kale and rape may be drilled in mid-late October. Broadcasting cover crop seed in late fall is usually not successful. A grass cover crop (cereal rye, or oats) are the best cover crops before soybeans.

**Tip 19:** After late soybeans going to corn, a legume or brassica is generally the best option. However, most of these cover crops need to be seeded by October 1<sup>st</sup>.

**Tip 20:** Broadcast seeding or flying on seed before harvest is the best option. Increase seeding rates by 10-20% and at least 1 inch of rain is necessary for good germination and growth. Small seeded cover crops like radish, crimson clover and oats (Buckeye mix) have been successful.

**Tip 21:** Some farmers plant oats, cereal rye, or annual ryegrass before corn. Oats freezes out but kill the other covers early. Annual ryegrass may be more difficult to manage and cereal rye has some allelopathic properties which needs to be managed. See *Growing, Establishing and Managing Cover Crops fact sheet SAG-XX-15* for more information.

**Summary:** Diverse cover crops and continuous long-term no-till associated with grain crops create a resilient environment for all species to grow and thrive. The improved soil environment efficiently utilizes soil nutrients, protects the soil, and increases crop production.

For more information, visit the Midwest Cover Crops Council (MCCC) website. Refer to the Cover Crop Selector Program at the MCCC website for more information on planting and managing cover crops.

## References

- Altieri, M. A., Nicholls, C. I., & Fritz, M. A. (2005). In *Manage insects on your farm: a guide to ecological strategies*. Beltsville: Sustainable Agriculture Network.
- Clark, A. (2007) *Managing Cover Crops Profitably*, 3<sup>rd</sup> Ed., Handbook Series Book 9, Sustainable Agriculture Research & Education, United States Department of Agriculture.
- Hoorman, JJ and Islam, KR. (2010) Understanding Soil Microbes and Nutrient Recycling, Ohio State University Fact Sheet, SAG-16-10.
- Hoorman, JJ, Islam KR, Sundermeier, AP, and Reeder, RC. (2009) Using Cover Crops to Convert to No-till, Ohio State University Fact Sheet, SAG-11-09.
- Hoorman, JJ, Islam KR, and Sundermeier, AP. (2009) Sustainable Crop Rotations Using Cover Crops, Ohio State University Fact Sheet, SAG-09-09.
- Hoorman, JJ, Reeder, RC, and Sa, JCM. (2011) Biology of Soil Compaction (Revised and Updated), *Journal of No-till*, Volume 9, No. 2. pg 583-587.
- Midwest Cover Crops Field Guide, 2<sup>nd</sup> Edition. (2014). ID-433. [www.mccc.msu.edu](http://www.mccc.msu.edu)

The College of Food, Agricultural, and Environmental Sciences and its academic and research departments including, Ohio Agricultural Research and Development Center (OARDC), Agricultural Technical Institute (ATI) and Ohio State University Extension embraces human diversity and is committed to ensuring that all research and related educational programs are available to clientele on a nondiscriminatory basis without regard to age, ancestry, color, disability, gender identity or expression, genetic information, HIV/AIDS status, military status, national origin, race, religion, sex, sexual orientation, or veteran status. This statement is in accordance with United States Civil Rights Laws and the USDA.

Bruce McPherson, Ph.D., Vice President for Agricultural Administration & Dean

For Deaf and Hard of Hearing, please contact the College of Food, Agricultural, and Environmental Sciences using your preferred communication (e-mail, relay services, or video relay services). Phone 1-800-750-0750 between 8 a.m. and 5 p.m. EST Monday through Friday. Inform the operator to dial 614-292-6891.