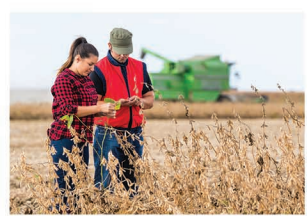


CONSERVATION CROPPING SYSTEM FOR CORN-BEAN NO-TILL

What's Your Strategy?



A **Conservation Cropping System** is a suite of practices that work synergistically to replenish soil life, restore organic matter to your farm's soils, and in return reduce risks. Over time these improvements increase nutrient efficiency and farm profitability, reduce sediment and nutrient losses, and make farms more resilient to extreme weather conditions. The practices are tailored specifically to your farm, with considerations such as the equipment you own, the crops you raise, and your soils, slope and proximity to water.



What Is the Purpose of Conservation Cropping System?

The purpose of this Conservation Cropping System (CCS) recipe is to provide starting steps for a corn-soybean farmer, who is already using continuous no-till, to begin a CCS that is low in risk and will jump start nearly any soil type toward higher production capacity and function. If farmers implement these strategies on just a portion of their farms, they can learn by doing, and over time develop a CCS that works for their farm on all the acres.

Cover crops are not simply another growing-season choice, like which seed treatment to use, but instead cover crops are important tools for accomplishing long-term goals such as ensuring farm productivity and profitability for the next generation.

Best Type of Conservation Cropping System?

The best CCS is the suite of practices that work well with your farm to improve soil health while improving profitability. Every CCS includes practices to:

- 1) Reduce soil disturbance to the maximum extent possible
- 2) Keep a living root in the system for as long as possible
- 3) Diversify crop rotations
- 4) Keep the soil covered with living or dead (mulch) vegetation at all times

For every CCS, a good starting point is to have a fertilization plan that maximizes nutrient use efficiency through the 4Rs. The 4R concept incorporates the Right fertilizer source at the Right rate, at the Right time and in the Right place:

<http://www.nutrientstewardship.com/4rs/>

Step-by-Step Process for CCS Corn-Bean Rotation with Continuous No-Till:

Step 1) Harvest corn as early as practical. Treat problem weeds like marehail and dandelion if present. No-till a cereal rye cover crop into corn stalks—it's easy to establish and easy to kill. (NOTE: This is the first no-till operation.)

Cereal Rye is one of the most versatile cover crops because it is very cold tolerant, one of the most tolerant species to residual corn herbicides, and can be seeded aerially and/or incorporated with a vertical tillage tool or drilled with success. Cereal Rye can also be mixed with other species such as daikon radish or rapeseed, depending on the seeding date and resource concerns.

Step 2) No-till a relatively early group soybean into the cereal rye and try to plant these soybeans early in the planting season. (NOTE: Early group soybeans are more determinant, and benefit from early planting and this gives one a wider window to seed a cover crop mix next fall. This becomes the second no-till operation.)

This picture demonstrates a simulated 1" rain event. The two silver pans hold the same soil type. The soil on the left is tilled annually, while the soil on the right has



been managed with continuous no-till and cover crops for 7 years. The pans below the soil collect the water. More rainfall infiltrated through the cover-cropped soil, while more rainfall ran off the surface of the tilled soil.

Soybeans respond well to a cereal rye environment, even when planted into tall cereal rye. Soybeans are not adversely affected by immobilized nitrogen that can be associated with a cereal grain like rye due to a high Carbon:Nitrogen (C:N) ratio. In fact, soybeans respond favorably to cereal rye which has great benefits for weed control (NOTE: May not need a post applied herbicide), keeps the soil cooler in the summer, and the cereal rye mulch reduces evaporation increasing water availability in the later summer. (NOTE: During most Midwest summers an extra 1" to 2" of water in August can have a major benefit to soybean yield.)

Step 3) Plant a low C:N cover crop mix after the soybeans. Cover crops prior to corn should trap or produce nitrogen in the fall and early spring, but release nitrogen at the optimum time in the spring/summer. (NOTE: Planting the corn into a mix, such as oat/daikon radish or annual rye-grass/crimson clover, will capture or produce organic nitrogen and release it at time of greatest need. This becomes the third no-till operation.)

Cereal grain cover crops ahead of corn may have a high nitrogen immobilization if allowed to mature. This can limit plant available nitrogen for the corn crop, especially in a young corn plant. Remember that C:N ratio is closely related to cover crop maturity. If cereal grain cover crops (triticale produces less biomass than cereal rye if early termination is not possible) are the only available option due to other resource concerns (such as erosion control), plan to terminate them in the vegetative stage and consider adding species with lower C:N like Austrian winter pea or crimson clover. Also consider timing a portion (20-50 lbs/ac) of nitrogen application at planting or in starter fertilizer.

Key Considerations: What are your neighbors' cropping systems like, extra equipment you're likely to need, notes on timing, etc.

Step 4) No-till corn into the low C:N mix the following spring. (NOTE: This becomes the final no-till operation.) By planting a cover crop mix with a low C:N ratio, nitrogen is released in a more timely manner and the corn crop benefits from this process as well.

Observations

By the fourth no-till operation, soil biological populations and processes are well on their way. Soil aggregates are stabilizing and pores are opening. Water infiltration and holding capacity are on the rise. Nutrients are cycling and accessible from alternate pathways.

Continual Learning:

Seek out "farmer mentors" – look for farmers in the area who are implementing soil health management practices.

Consult with Soil Health Specialists and find field days at the Illinois Sustainable Ag Partnership: www.ILsustainableAg.org

Stop in your local USDA Natural Resources Conservation Service and county Soil & Water Conservation District office for technical and financial assistance with the conservation practices discussed in this fact sheet:

<https://www.nrcs.usda.gov/wps/portal/nrcs/main/il/contact/local/>

Sign up for updates with the Soil Health Partnership & find other farmers, field days, and professionals:

www.soilhealthpartnership.org



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