

# Agronomy Guide Sheet - Soil Health Series



## A Strategy to Improve Soil Health in a Midwest Corn-Soybean Cropping System

Farmers adapting management to improve soil health find that by integrating several cropping practices into a system, where each practice complements the rest, results in benefits from the whole system that exceed the sum of the parts.

Managing for Soil Health is recognized as a regenerative approach for farmers to achieve higher resilience to the effects of extreme weather conditions and attain higher yield capacity on any soil.

The following is an approach for a Corn-Soybean (C-SB) Farmer interested in a no-till cropping system that is low in risk, and will jump start nearly any soil type toward higher production capacity and function:

**Step 1:** Harvest corn as early as practical. Scout and treat problem weeds like marestail and dandelion if present. **No-Till (NT) a Cereal Rye Cover Crop (CC) into corn stalks - It's easy to establish and easy to kill.** 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 aerial, incorporated with a vertical tillage tool or drilled with a high rate of success. It can be mixed with other species such as daikon radish or rapeseed depending on the seeding date and resource concerns. This is your first No-till operation.

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

Soybeans respond well to the cereal rye environment, even when planted into tall cereal rye. Soybeans are not adversely affected by immobilized Nitrogen (N) which can be associated with a more mature high Carbon: Nitrogen cereal grain like rye. In fact it responds favorably to a rye CC which has great benefits for weed control, keeping soils cooler in summer and late season water conservation. During most Midwest summers an extra ½" to 1" of water in August can have a major benefit to soybean yield.

Soybeans in Cereal Rye during Extreme Drought



Cereal Rye Drilled Into Corn Stalks



Soybeans Planted Into 4-5' Cereal Rye



### Step 3: Plant a low Carbon: Nitrogen (C:N) CC mix after SB.

Cover crops prior to corn should trap or produce N in the fall and early spring, but release N at the optimum time in the spring/summer. Corn into a mix such as: Oat/Daikon Radish that winter kills, or annual ryegrass/Crimson Clover mix will capture or produce organic N and release the N at time of greatest need. This becomes your third No-Till operation.

Cereal grain cover crops ahead of corn may have a high N immobilization if allowed to mature. This can limit plant available nitrogen for the corn crop. Remember that C:N ratio is closely related to CC maturity. If cereal grain cover crops 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 N application at planting or in starter fertilizer.

### Step 4: NT corn into the low C:N mix the following spring.

This makes the NT corn the 4<sup>th</sup> NT operation that has jump started the soil with many of the soil health qualities from a more mature system. By planting a cover crop mix with a low C:N ratio, N is released more timely and the corn crop also benefits from the timed release of the organic N.

By now, 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.

### Result... great production potential!

**Soil health-** “The capacity of a soil to function as a vital, living ecosystem that sustains plants, animals, and humans”

NRCS Soil Health- <http://www.nrcs.usda.gov/wps/portal/nrcs/main/national/soils/health/>

IN- NRCS Soil Health- [http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/in/soils/health/?cid=nrcs144p2\\_031079](http://www.nrcs.usda.gov/wps/portal/nrcs/detailfull/in/soils/health/?cid=nrcs144p2_031079)

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Oats and Daikon Radish Drilled after Soybean



Austrian Winter Pea Nitrogen Nodules



Corn Planted Into a Low C:N Cover Crop Mix

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