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# Risk Management Practices: Organic No-Till Grain Production with Cover Crops

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*Ag Decision Maker*

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**O**rganic farming is a growing industry. In 2016, five million acres in the U.S. were certified as organic, with Iowa fifth in the nation with 103,136 acres. In 2018, organic farming was listed as a \$50 billion industry in the U.S. The Organic Trade Association stated that organic farmers were 35 percent more profitable than their conventional counterparts. Organic corn and soybeans can command a higher price and the latest United States Department of Agriculture (USDA) report shows the average price for a bushel of corn at \$9.75 and organic soybeans at \$19.41 per bushel. This compares to \$3.20 per bushel for non-organic corn and \$8.00 per bushel for non-organic soybeans.

The primary method of weed control in organic grain production is mechanical. Multiple tillage passes prior to planting, over-the-row harrowing and rotary hoeing and multiple between the row cultivations. While chemical costs are dramatically reduced, machinery and labor costs are increased. There are a few natural chemicals available for weed and pest control, but they are limited.

Tilling the soil numerous times also destroys soil health, adds to compaction, and impedes water infiltration. Crops grown organically by using no-till methods and cover crops have the advantage of improving soil health and water quality. Soil health is defined as the continued capacity of soil to function as a vital living ecosystem that sustains plants, animals, and humans.

Our soils contain thousands of bacteria, fungi, and insects, etc. Soil particles are held together by a glue-like substance called glomalin (photo upper right). It has been dyed green so that it shows up under a microscope. This “glue” gives our soil



*Photo credit: www.sciencedaily.com*

structure and helps to feed nutrients to the roots of plants. Every time the soil is disturbed with mechanical tillage, the glomalin is cut into smaller pieces and has to repair itself. This destroys soil structure and reduces the plant's ability to feed itself. Turning the soil over by plowing or cultivating also releases carbon into the air increasing greenhouse gases.

Using no-till in growing organic crops eliminates the mechanical disturbance of the soil, but now how do you control the weeds? Kathleen Delate, professor and extension organic specialist at Iowa State University, and John Teasdale from the Agriculture Research Service's Sustainable Agricultural Systems Laboratory at Beltsville, Maryland have been conducting research on raising organic crops using no-till and cover crops. The greatest successes have been with organic soybeans and wheat.

Delate's research shows yields of soybeans using the no-till/cover crop system are comparable to traditional organic soybeans. The added advantage is improved soil health and reduced tillage. Corn has not been as successful. Weeds have been a bigger issue when growing organic corn.

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Cover crops such as cereal rye have proven to increase organic matter, reduce soil erosion, suppress weeds and scavenge for nitrogen in the soil to retain and release later. Increasing the organic matter increases water infiltration and provides a better environment for beneficial bacteria, fungi, and glomalin.

No-till planting into the cover crop presents some challenges for organic farmers. Conventional farmers would typically use chemicals to terminate the crop. No-till roller/crimpers are being tested by several U.S. universities and are in use by some organic farmers. These worked the best on cover crops, such as cereal rye, that will die after having their stems crushed or cut. The objective is not to cut the stem completely in two, but to leave it intact so that it will leave a heavy mat on the soil that will suppress weed growth. The roller/crimper consists of a round steel cylinder with blades welded to it at an angle. This ideally would mount on the front of the tractor with the no-till planter mounted on the back of the tractor for a one-pass operation. The roller/crimper also could be mounted on the rear of the tractor, but this would result in a two-pass operation. The roller/crimper should be the same width as the planter and you must plant in the same direction as the roller/crimper to prevent plugging the planter. A good stand of the cover crop is needed in order to get a good mat on the soil and eliminate as much sunlight as possible from reaching the soil. This will help to eliminate weed seed germination, conserve moisture and keep soils cooler.

Proper timing of roller/crimping is important. The cereal rye must be mature enough to die after crimping. This is when the rye is past the pollen-shedding stage. Roller/crimping too early will result in regrowth of the rye and then using a high residue cultivator to salvage the crop may be in order.

Enterprise budgets listed on Iowa State University's Ag Decision Maker website, [www.extension.iastate.edu/agdm/crops/html/a1-18.html](http://www.extension.iastate.edu/agdm/crops/html/a1-18.html), list



Photo credit: no-tillfarmer.com



Photo credit: growjourney.com

machinery costs, including fixed and variable costs, for preparing and planting one acre of organic soybeans using conventional methods at \$52.20 per acre. This includes the machinery costs of \$4.40 per acre for fall planting rye and \$11.90 for planting soybeans. Adding a roller/crimper will increase machinery costs approximately \$2.80 per acre. Labor hours for planting and harvest are about 3.1 hours per acre at a cost of approximately \$40.30. Switching to a no-till with cover crops production system should reduce labor costs by \$20 per acre and machinery costs by \$28.70 per acre. Added seed costs for the cereal rye are about \$25 per acre. Taking into account machinery and

labor savings and including the additional seed costs results in \$23.70 per acre savings for the no-till/cover crops organic system over conventional organic production.

Any time you change to a new cropping system, you have a new management practice. Start small, do your research and seek out other farmers who have more experience. Building soil health along with organic crop production provides better water quality, increased organic matter, less soil erosion and reduced costs.

Further information on organic no-till grain production with cover crops can be viewed in the accompanying video, <https://vimeo.com/293007628>. Also see the complete series on Risk Management Practices, [www.extension.iastate.edu/agdm/wdothet.html](http://www.extension.iastate.edu/agdm/wdothet.html).



Further information on **organic no-till grain production with cover crops** can be viewed in the accompanying video, <https://vimeo.com/293007628>

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