



By Larry Reichenberger



COVER CROP CRAZE

*No-till and cover crops
are teaming up to boost soil quality*

Cover cropping isn't new, but it clearly is an idea whose time has finally arrived. From little more than a novelty of sustainable agriculture, cover crops have vaulted into the production agriculture mainstream.

"The price of fuel and fertilizer finally got high enough that farmers began appreciating the benefits that cover cropping offers," explains Dwayne Beck, no-till innovator and director of the Pierre, S. D.-based

Dakota Lakes Research Farm.

Cover crops benefit both the soil and the subsequent crop. They help prevent soil erosion, increase organic matter, fix atmospheric nitrogen, recycle nutrients, provide grazing, reduce compaction, suppress weeds and pests, utilize excess soil moisture, and improve water infiltration.

"They're not magic, but if cover crops are planted at the right time and in the right rotation, they help solve many of the problems that confront

no-till crop production," adds Beck.

Farmers and researchers across the country echo that analysis. In Ohio, cow peas are replacing 120 pounds of expensive nitrogen; in Iowa, turnips are keeping 80% of the nutrients from manure from leaking into the groundwater; in Illinois, deep-rooted oil seed radishes are breaking stubborn compaction layers; and in South Dakota, cover-crop-cocktail blends are speeding improvements in soil quality.

Building the soil. Dan Forgey says his main goal in adopting cover cropping on the Cronin Farm, near Gettysburg, S. D., has been to improve soil health. "We've been no-tilling for 16 years and have raised the organic matter level of our soils by 1%—going from 2.5% to 3.5% and 4%. That's a positive development, but it's a slow process. Cover cropping can double this rate of increase," he says.

Higher organic matter levels can be expected to translate into more nitrogen mineralization in the soil. Also, the resulting increased activity of soil microorganisms has been shown to increase phosphorus availability.

"We haven't measured the nutrient impact of cover cropping, but we know it's positive because we're growing higher yields and buying less fertilizer," adds Forgey.

Forgey uses a blend, or "cocktail" of cover crop species to reap multiple benefits. "We mix the seed from three to six different species and plant it with an air seeder shortly after wheat harvest. We like the mix to include 20% to 25% legumes to produce nitrogen, cereals with fibrous root systems that improve soil structure and feed soil microorganisms, and brassica crops, like turnips and radishes, to cycle nutrients and break compaction layers." ♦

►**Left page:** Researchers in Ohio believe the deep-rooting pattern of buckwheat make it a potential cover crop. ►**Left page inset:** Various types of clover still fit in the cover-crop picture.

►**Left:** Up to six different species make up a typical cover crop "cocktail" for Dan Forgey. Forgey credits no-till and cover cropping for the major improvements he's seeing in the health and quality of soil on the Cronin farm in South Dakota.





► **Below:** Many no-tillers use a mixture of cover crops including cereals, legumes, and brassicas to capture multiple benefits in a single season.

► **Below:** Cameron Peirce used the three-month period between continuous wheat crops for sunn hemp to fix nitrogen and improve the soil.

► **Below:** Amaranth was one of 32 species initially evaluated as potential cover crops by researchers at Ohio State University.



In Forgey's program, cover crops are grazed in the fall and winter to reap more immediate financial gains. "We try to plant about 700 acres per year, so cover crops fit in the rotation every five or six years," he says.

Beck explains that the proper cover crop blend depends on the ultimate goal. "You need to balance the diet of the soil microbes—just like feeding livestock. If you want to maintain surface residue, cut back on high-protein broadleaf crops in the mix to slow microbial activity. If you want residue to convert quickly to organic matter, increase the broadleaves. To enhance nitrogen, include brassica crops (turnips or rape) in the mixture. These quickly take carryover nitrogen out of the soil, which spurs legumes in the mixture to maximize nitrogen fixation. Then, the nitrogen cycles back into the soil over the following crop years."

Growing interest. There's also a clamor over cover crops on the other side of the Corn Belt, according to Ohio State University soil scientist Rafiq Islam. "There's tremendous interest as farmers have begun to understand all the benefits of including cover crops in their rotations," he says.

In five years of research with 32

▶**Left:** Casey Cronin shows an oilseed radish and turnip dug from a thick cover-crop canopy on his family's farm near Gettysburg, S. D.

different cover crops, Islam has documented those benefits. "We're finding that cow peas or Austrian winter peas, planted after wheat harvest in early July, can provide 120 to 150 pounds of nitrogen per acre—often all that's needed by a corn crop," he says.

Islam says the nutrient cycling capability of cover crops also have a big environmental impact. "We've seen a cover of oilseed radish accumulate up to 200 pounds of phosphorus and 600 pounds of nitrogen per acre. With its low carbon/nitrogen ratio, this plant material breaks down rapidly. This means farmers who apply manure can keep nutrients in the root zone, rather than getting leached out."

Islam, who works at Ohio State's South Centers at Piketon, Ohio, says his effort is now focused on five cover crops—annual and cereal rye; winter peas; cow peas; and oilseed radish. "There's still interest in traditional winter cover crops, like crown vetch, planted behind corn or soybeans," he explains, "but the focus is on the summer types planted after wheat. They have more time to grow, and are terminated for free by freezing temperatures rather than needing a herbicide application."

Producing nitrogen and improving soil quality are the focus of Hutchinson, Kan., farmer Cameron Peirce's cover-crop program. "Last summer,

we grew sunn hemp for about 60 days between wheat harvest and no-till wheat planting in the fall. The crop grew 4 feet tall before we killed it in early September with an application of Roundup and 2,4-D," he says.

Sunn hemp is a tropical legume that originated in India, and is grown widely in Brazil. The seed cost, Peirce says, ran about \$25 per acre.

"We're estimating it will add about 50 pounds of nitrogen per acre. That won't be available for the new wheat crop, but we're counting on it for the double-crop sunflowers we will plant next summer," says Peirce.

Some perspective. Growers are often reluctant to plant cover crops for fear of using up soil moisture, Forgey says. "That was a concern, because we receive an average annual rainfall of only 18.5 inches. However, the improved soil health is well worth it.

"Herbicide carryover is a concern, and seed can be expensive and sometimes hard to find. We're producing some of our own seed, and there's often an opportunity to trade with other cover-crop growers," adds Forgey. ■

▶**Below left:** Broadleaf cover crops take up nitrogen and phosphorus from the soil and cycle them back into the root zone. ▶**Below:** Rafiq Islam says the best opportunity for cover cropping exists when planting after wheat in the summer and fall before rotating to corn or soybeans.



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