

Evolving Our System

By Richard and Sharon Thompson

We started farming together in 1958 with the high inputs of purchased fertilizer, herbicides and insecticides that were required with the continuous corn program. In 1968 we changed back to a rotation of corn-soybean-corn-oat-hay (C-SB-C-O-H) using organic, alternative, and sustainable practices.

In the fall of 1983, half of the ridge-till soybean field was aerial seeded with rye and the other half with oats. Corn was planted the next spring into dead oat mulch and into living rye with a ridge-till planter. But the planter did not remove all the rye. The 1984 oat-cover corn yielded 86 bushels per acre. The rye-cover corn with compost + starters yielded 45 bu.; with manure + starters it yielded 52; and corn following rye and sidedressed with 50 lbs. nitrogen yielded 72 bushels.

In this comparison, all manures were spread on top of the ridges in the spring and then covered with soil by the planter. Rye ahead of corn, with manures on top of ridges in the spring is not sustainable. Spreading manure in the usual, wet spring when the neighbors are planting their corn is not sustainable for the people involved because of the huge workload and short time period. The average Boone County corn yield in 1984 was 121 bushels, which was 69 bu. better than the top-dressed compost corn yield of 45 (Fig. 8). This program was not working.

1993 was the flood year for central Iowa. Twin rows of rye drilled into soybean ridges the previous fall had seemed like a good idea. With all the rain, the rye grew waist high and had to be shredded. Then the problem was with all this stuff that had to be digested to make the nutrients available for the corn plant, plus the two-ton-dry-matter manure that was top-dressed on the ridges. The corn was short of nitrogen and was side-dressed late in the season. Our field #1 corn yield of 57 bushels was 27 less than the 84 bu. Boone County average. The yields were poor - too much rye, and we were still spreading manure in the spring. This program was not working either.

Six cover crop trials, treatments randomized with six replications, were completed on this farm from 1988 through 2004. Twin rows of fall rye were drilled into old soybean ridges. The average loss from these six trials was \$21.99 per acre, coming from reduced corn yields, rye seed cost, and the drilling expense. This was not a winner. Forget rye cover prior to corn in your rotation.

The cover crop question? If you are a continuous row crop farmer, there is a place for cover crops. But with our pasture rotation of corn-oats-6 yrs pasture, seven out of eight years completely covered 365 days a year, this is good enough. At this writing, the C-SB-C-O-H rotation is covered 2 years out of five. Is this adequate? Our experience broadcasting clovers at last cultivation is that it's risky establishing a good stand. With a poor stand of corn you may have enough sunlight for a cover crop, but with 30,000-plus corn plants per acre, there is no sunlight for the clover.

Our hillside 175-foot-long, 48-foot-wide and 12-foot-deep manure bunker was built in 1986, holding 3,755 cubic yards of manures and biosolids. There is no question this facility has increased our corn yields by taking better care of our nutrients. There are two gravel roads to the bunker with access 365 days of the year. You can clean pens in the rain.



Richard and Sharon Thompson (Boone)

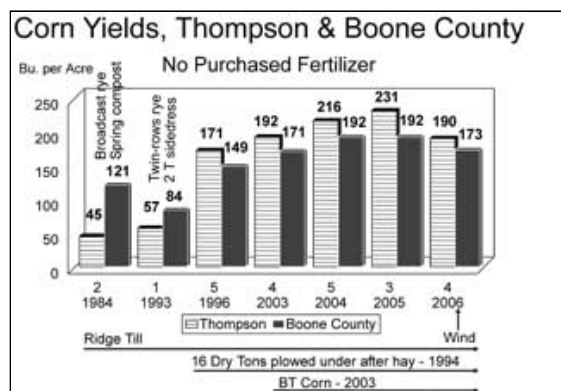


Figure 8. Historical corn yields on the Thompson farm.

Thanks to Doug Karlen and Keith Kohler at the National Soil Tilth Lab for sampling field #3 during the years 1994 through 1998. We had not used the moldboard plow for 25 years. The first year to fall plow under manure was 1993. They took 2-inch soil samples to the 8-inch depth. They determined soil weed seeds and phosphorus and potassium numbers at each 2-inch depth. They found stratification, meaning that after several years of not turning the soil, fertility was high in the top layers and lower deeper down. Soil phosphorus and potassium were in the Optimum to Very High range all the way down even before plowing, but plowing has evened out the nutrient levels. And ISU has since raised its categories for potassium (thanks partly to PFI research), so some of the K levels we saw would now fall into the Low range and perhaps limit yields. A Kverneland plow from Norway was purchased to get better coverage of manure, reducing the odor and sending the weed seeds to the bottom of the furrow. We feel fertility of any kind needs to be placed 8 inches deep in the soil, not on top of the soil.

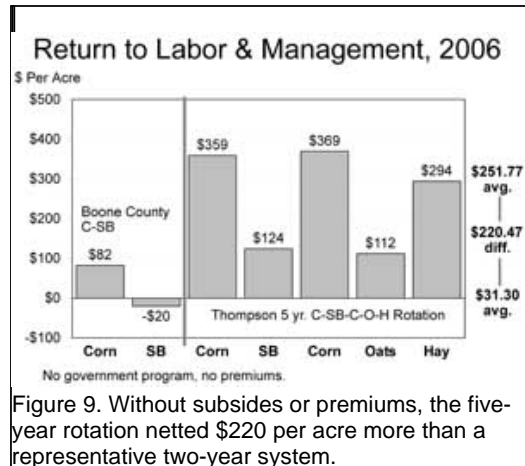


Figure 9. Without subsidies or premiums, the five-year rotation netted \$220 per acre more than a representative two-year system.

Boone County average corn yields increased from 121 bu. in 1984 to 173 in 2006, an increase of 52 bushels per acre, probably due to improved genetics. Our yields were 45 bu. in 1984, and they were up to 190 in 2006, an increase of 145 bushels per acre. This increase came about by no more rye cover and by fall-plowing manure under following hay. The 2006 corn was damaged by wind (Fig. 8). 2007 yields are standing straight and yielding 212 bushels per acre. Except for some research trials, no NPK fertilizers have been used for over forty years.

Our farm is a research farm and not certified organic. This freedom allows us to test many ideas. Why Bt corn? Our first test with Bt increased yields 15 to 19 bushels, and the corn stood better. Our cows showed no preference in grazing Bt and non-Bt cornstalks in the field or stacked cornstalks fed in the yard during the winter. In five comparisons, squirrels ate the Bt ear first.

Ridge-till has stood the test of time in weed management on this farm, even though very few are using the system today. Combining ridge tillage and the moldboard plow every five years makes a good pair. Our first Buffalo planter and cultivator were purchased in 1966. This is the only reduced tillage system that works without herbicides. Herbicides have been used on this farm on limited basis (spot spraying). Weeds have to be managed. You can't grow two crops at the same time.

If Dick had been stubborn about using only ridge-till, fertility on top the ridges, and broadcast rye, we would have moved off the farm long time ago. Maybe not together! When things are not working, change! Sort through information! Keep what fits your situation and throw out the rest! Sustainable Agriculture has to be people friendly.