

Consider ways to reduce tillage this fall to save money and soil

BY Van Larson

Many Minnesota farmers are reluctant to do less tillage. But new tools can help you cut tillage intensity without sacrificing yields. Reducing tillage can be good for both your soil's health and your bottom line.

Growers are well aware of the conservation advantages of reduced tillage: less wind and water erosion, improved soil structure, higher organic matter, less compaction risk, better water infiltration ... the list goes on.

Yet, with our cool, wet springs and short growing season, farmers worry that a blanket of crop residue will slow soil warming in the spring, delay planting, interfere with emergence and growth — and ultimately, cut yields.

However, there are many ways to lower tillage intensity and expense, even in our northern climate.

Strip tillage is one example. This system leaves two-thirds of the soil surface undisturbed and protected by crop residue. Seeds are placed in a 10-inch-wide cleared strip. Tillage is usually combined with fertilizer banding, which eliminates a fertilizer pass and boosts nutrient use efficiency.

A University of Minnesota study from 2010 to 2012 compared yields, costs and residue cover under fall strip tillage, two-pass vertical tillage, and fall chisel plow or disk rip plus spring field cultivation. Corn and soybean yields were not significantly different for any of the tillage systems, the study found. (Corn and soybeans were grown in a two-year rotation.) However, strip tillage left more residue cover and was significantly cheaper than conventional tillage, saving \$13/acre in corn and \$6/acre in soybeans, says Jodi DeJong-Hughes, University of Minnesota Extension tillage expert.

An earlier study in 2004 and 2005 at 13 sites in southern and west central Minnesota compared corn yields following soybeans under no-till, strip till, one-pass spring field cultivation, and chisel plow plus spring field cultivation. This study found that tillage treatments had a greater impact on corn yields in 2004, a cooler-than-normal year, than in 2005, a warmer-than-normal year. Averaged over two years, corn yields were similar for strip tillage and chisel plow plus cultivation, DeJong-Hughes says. These results confirmed long-term, small-plot tillage trials at Waseca, which have found very little difference among treatments that included some tillage, she adds.

Soybeans show little response to tillage

Shallow vertical tillage is another way to manage residue with less soil disturbance than conventional tillage methods. These tools, which cut up residue and loosen the top two or three inches of soil, can work very well for soybeans following corn. The cost for one-pass vertical tillage averages \$10 to \$12/acre, DeJong-Hughes estimates — about half the cost of conventional chisel plow plus spring cultivation.

In well-drained fields, you may be able to eliminate tillage altogether for soybeans, saving more than \$20/acre over conventional tillage expense.

“Soybeans grow really well in high residue,” says Seth Naeve, U-M Extension soybean agronomist. “You can do light tillage or no tillage, and either way, soybeans respond well.”

In a cold, wet spring, soybeans planted into high residue take longer to emerge and may look tough for a few weeks, compared to the neighbor’s conventionally-tilled beans, Naeve acknowledges. However, when it comes to yield, soybeans can compensate for uneven emergence or a slower start. “In Minnesota, we have a wide window for soybean planting,” Naeve says. “We can maximize yields through mid-May.” And in a dry year, he adds, no-till soybeans typically outperform conventionally-tilled beans.

A study in southern Minnesota, from 2006 to 2008, compared soybean yields in no-till, strip-till and chisel-plow, following strip-tilled corn. Tillage had no significant effects on soybean yields in any year, showing soybeans’ versatility in various tillage systems, DeJong-Hughes says.

Consider small changes

If you’re not ready to make big changes in your tillage system this fall, consider some small changes. For example, skip an operation, such as chopping corn stalks on ground going into soybeans, saving yourself about \$12/acre.

Do selective tillage, such as running an in-line ripper only in compacted areas like headlands.

Substitute less aggressive chisel points on your chisel plow, or till at a shallower depth. Straight points and sweeps, for example, do less soil mixing and bury less residue than twisted shovels, DeJong-Hughes says.

For more on tillage options and crop residue management, check out the U-M Extension tillage website at: <http://www.extension.umn.edu/agriculture/tillage/>. Tillage machinery ownership and operating costs are available at <http://www.extension.umn.edu/agriculture/business/farm-financial-management/>.

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Key points

- Reducing tillage can cut production costs and save soil.
- Strip till corn yields are equal to conventionally tilled corn yields.
- Soybeans yield well with little or no tillage.

[Optional charts and captions. They are listed in order of importance. The first two charts should be used together, as they are the same study.]

Tillage Effects on Soybean Yields*			
Tillage Treatment	Residue (% after planting)	Yield (bu/acre)	Cost (\$/ac)
Strip Till	64	50.8	\$14.60
Salford 2 Passes	49	51.3	\$19.72
Salford 2 Passes (prev. tillage chisel plow)	50	49.5	\$19.72
Chisel Plow + FC (prev. tillage disk rip)	50	49.6	\$20.48

LSD (0.10)**		NS***	
*Three-year average, 2010 – 2012 at Clarkfield, Minn., soybeans after corn **Least significant difference ***Not significant			

Tillage Effects on Corn Yields*			
Tillage Treatment	Residue (% after planting)	Yield (bu/acre)	Cost (\$/ac)
Strip Till	43	153.8	\$14.60
Salford 2 Passes	26	156.0	\$19.72
Chisel Plow + FC (prev. tillage Salford)	29	151.5	\$20.48
Disk Rip + FC (prev. tillage chisel plow)	32	153.3	\$28.15
LSD (0.10)**		NS***	
*Three-year average, 2010 – 2012 at Clarkfield, Minn., corn after soybeans **Least significant difference ***Not significant			

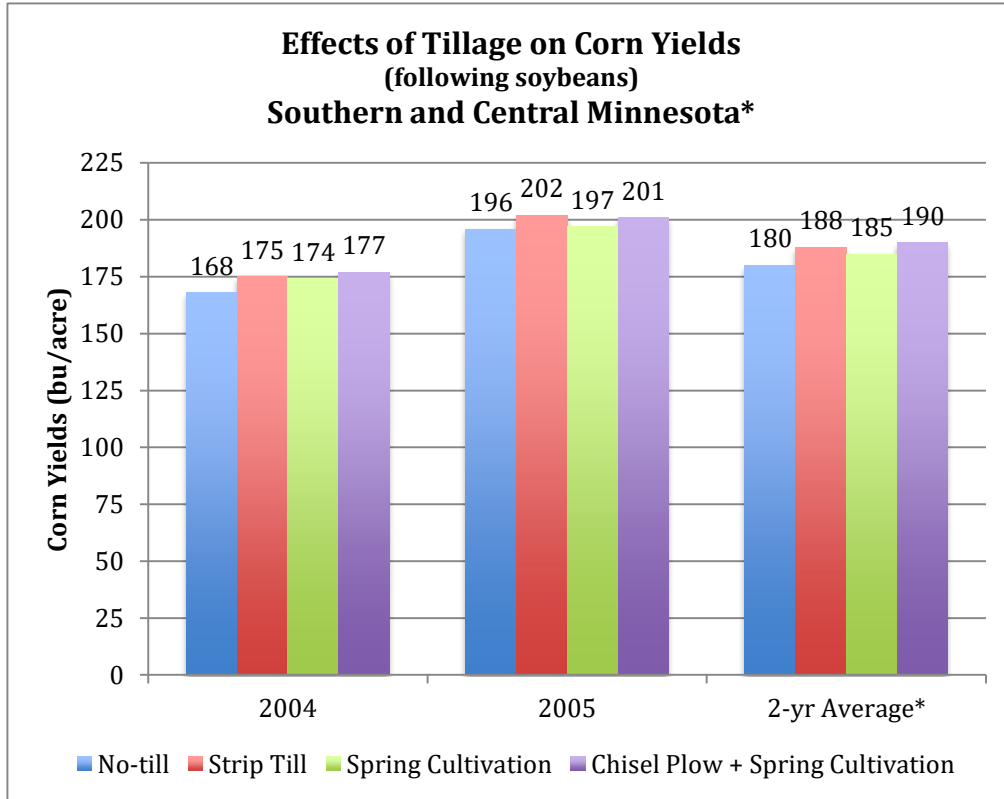
Source: Jodi DeJong-Hughes, University of Minnesota

A three-year study of residue coverage and soybean and corn yields at Clarkfield, Minn., from 2010 to 2012 found no significant yield differences among tillage systems. Costs per acre were calculated using new equipment prices, depreciation, wear and tear, tractor, labor, and fuel usage at \$3.50/gal.

Tillage Effects on Soybean Yields*				
Tillage Treatment	2006	2007	2008	Residue
	Yield (bu/acre)			%
Chisel Plow	50.3	47.2	43.9	53
No Till	47.8	46.8	41.6	73
Strip Till	50.7	48.4	44.6	62
LSD (0.05)**	NS***	NS	NS	4.4
*Southern Minnesota **Least significant difference ***Not significant				

Source: Nowatzki et al, via Jodi DeJong-Hughes, University of Minnesota

Tillage system had no effect on soybean yields in a study from 2006 to 2008 in southern Minnesota.



*Stearns, Grant, Wabasha, Sibley, Cottonwood, Blue Earth, Redwood, Fillmore, Lac qui Parle, Rice, Meeker, Pope counties

Source: Jodi DeJong-Hughes, University of Minnesota

High-residue tillage systems like strip-till can produce yields similar to conventional tillage systems, while maintaining adequate residue cover and reducing soil erosion risk and tillage expense.