The future path for conservation tillage in corn

Some variables in tillage systems are changing, adding pros and cons to the discussion over the right level of tillage

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Researcher Tony Vyn advises to look beyond just the planter—where it puts the seed and how deep and how uniform—and focus on the opportunity for the plant to compete once it's emerged in terms of soil resources.

Tony Vyn says he's more comfortable talking about future trends in tillage with his dad than his grandson. Speculation is something we want from economists, but we don't often get from agronomists, Vyn told the audience at the FarmSmart conference recently, and the future of conservation tillage is definitely speculation.

Vyn has been performing no-till corn research since 1978, sharing his Crop Science career between the University of Guelph and Purdue University in Indiana. Even with his many years of experience he's not confident in his predictions, but generally he foresees continued no-till for soybeans and wheat and some sort of tillage for corn.

As with most good debates in farming, the future of conservation tillage "depends", says Vyn, on factors such as soil type, erosion risk, crop rotation, changes in technology, farm size and associated crop management.

According to Vyn you can be a pessimist or an optimist. There are reasons for pessimism – a reduction in no-till for corn - and Vyn cited challenges that included the cool, wet springs that mean more challenges to planting dates, higher soil compaction, more corn-on-corn and higher corn yields that result in more residues. Residue distribution and nutrient stratification are issues as well, as are herbicide-resistant weeds that may lure some to return to the 'steel solution'.

But there's optimism too, says Vyn. There are now more stress-tolerant hybrids that can handle early soil saturation and cooler temperatures. Seed treatments are better now, and planter and tillage equipment modification has meant increased residue flow capability.

There are also the soil protection advantages that encourage the environmentally friendly perception that favours no-till in the 'green' production of corn, encouraging government support and subsidies that will provide income not from the grain but from the practice of no-till cultivation.

Surface residue – both the quantity and the source - is a big part of the problem with no-till corn on level, clay soils even when they are systematically drained. With no residue removal, and for corn following 200-bushel corn, Illinois researchers reported 27-bushel yield reductions. Even with nearly complete corn residue removal in no-till, researchers are still seeing two to three bushel yield reductions.

Tony Vyn

THIS HAS made him look to strip tillage, which has been widely adopted. "It truly is the system of choice for corn after corn," says Vyn. "You have to think about the corn plant and what it's responding to." No-till yield reductions when corn follows corn is not because of soil temperature differences; it's not because the plants are shorter or take two days longer to silk. It's primarily because there is so much more variability in the plants which causes intense competition within the row—what Vyn calls the 'tall plant, short plant' syndrome. No-till corn does grow slower in response to cooler soil temperatures, but if no-till plants were shorter but all uniform, yields would be the same as those with conventional tillage.

So how do we make the soil environment as consistent as possible in the row? Consistent means not just temperature and moisture, but also for consistency of root penetration and nutrient availability. Plant-to-plant competition adds another stress on top of no-till stress.

That's why Vyn advises, don't only focus on the planter – where it puts the seed and how deep and how uniform – but focus on the opportunity for the plant to compete once it's emerged in terms of soil resources. Keep that in mind when comparing tillage systems.

There's no guarantee that strip tillage will result in higher yield for corn following soybean but it will allow more planting days.

The precision of planting is critical for strip tillage with four to five bushels higher yield when planting accurately in the center of the strip till berm, than visually planting and trying to stay on center or planting to one side.

BERM HEIGHT is also a consideration on sloping lands where the berm can become a channel if it's too low. If you have a good residue cover situation to begin with you can safely go into fall strip tillage with slopes up to 5 percent but not beyond that, Vyn advises. The worst erosion occurs when the berm was too low to begin with, collapsed into a depression over winter, and then if we get heavy spring rainfall it creates a vulnerable situation where spring tillage that may work better.

So Vyn's predictions for the future of conservation tillage include the continued growth of pure no-till among enterprising farmers, with the expansion of rotational no-till, which includes strip till.

Strip tillage is going to be the fastest growing system in the Corn Belt, but it needs a successful spring option if fall strip tillage was not completed – there have been too many wet fall situations where the harvest is delayed to make this system totally reliable in northern growing areas. He also sees chisel plowing as a less than satisfactory tillage solution in the future, while more modified no-till systems, including vertical tillage, will expand.

Whatever the future, Vyn predicts that adoption of tillage practices will—unfortunately -be driven more by testimonials and marketing than by research. Although he is pleased by the tillage research professionals like Greg Stewart and others have been able to do in Ontario since he left, tillage research scientists are few and far between across the Corn Belt and tillage research investments at public universities are equally scarce.