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A NEW GENERATION OF CONSERVATION TILLAGE

The field of conservation technology continues to expand, with innovations opening up new possibilities for producers

It has been over 20 years since the pioneers of conservation tillage (CT) traded in their discs and plows for no-till drills and air seeders. Today, more and more producers are turning to CT practices in order to save on input costs such as fuel and out of a general desire to be better stewards of the land.

However, many farmers — both those who have been incorporating it for years and those who are just now getting those first pangs of curiosity — have the same common questions about conservation tillage: Where is it headed? What is out there that will help me get more efficiency and yield? And how can I start a CT system — or expand my existing operation — without breaking the bank?

Conservation tillage has been "fine-tuned" in recent years, says Lawrence Papworth, an engineer with the AgTech Centre in Lethbridge, Alberta, with older technology improved upon and some older practices refined. "Because we have a mandate to support all aspects of agricultural sustainability, AgTech has had the opportunity to gain first-hand knowledge of the latest in CT technology and equipment for many years," says Papworth.

"We've seen a move away from air seeders to more precision-oriented air drills, which has partially driven the rise in popularity of double-shoot or 'low draft' openers, which in turn has presented the added benefit of increased fuel efficiency. We've seen a resurgence in the popularity — and improvements in the quality — of disc openers and soil levelling devices. We're also seeing promising advances in the field of residue managers, while tractors with variable speed transmission (VST) are opening up new possibilities for efficiency."

Another trend Papworth has observed is farmers "test driving" conservation tillage to see if it meets their needs. They are also using the many resources on the Internet and asking their equipment dealers to help determine the direction of their conservation tillage practices.

"Farmers are being cautious about conservation tillage, but that's a good thing," he says. "CT is not for everybody; it can be a serious investment that can have a long-term impact on the farm and how things are done. It's not suited to every crop or every kind of soil/environment condition.

"That said, much of the new technology — and the fine tuning of some old technology — has positioned CT practices in a more viable position for more kinds of operations than ever before."✦

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New technology, and ol

The development of conservation tillage (CT) technology has largely been a case of "the cart leading the horse," says AgTech engineer Lawrence Papworth. In other words, one technology drives the need for complementary technology. As one technology makes seeding faster, for example, something else must come in to make fertilizer application similarly efficient.

"Double-shooting fertilizer, the re-emergence of disc openers, the new developments in residue managers and soil levelling devices are all trends in conservation tillage that are connected to the same theme: making CT practices more efficient and more economical," says Papworth.

Double-shooting fertilizer makes gains

There's no need to look further than changing trends in fertilizer placement to find an example of how new farm technology drives further innovations. "A general movement away from air seeders and towards air drills necessitated the development of new ways to apply fertilizer," says Papworth. "With air seeders, seed could be planted and a high level of nitrogen could be applied at the same time because of the wide seed spread of the openers.

"However, because air drills are so much more precise, some nitrogen can be applied along with the seed but usually not as much as the crop requires. The solution, then, has been to place fertilizer in a separate band from the seed. Double-shoot openers have enabled this."

Double-shoot openers place a band of fertilizer two to three inches below and to the side of the seed in a single pass. The advantage of this side banding method, says Papworth, is that high rates of fertilizer can be applied while minimizing damage to seedlings.

Low draft double-shoot openers are the latest wave of double-shoot openers, says Papworth. "They place the seed and fertilizer at the same depth. This results in less power required to pull the air drill."

A number of manufacturers make low draft double-shoot openers. The AgTech Centre recently tested many of the low draft openers on the market. "Performance of the openers was very good, although mixing of seed and fertilizer occurred with some of the openers tested," says Papworth. "Small amounts of seed and fertilizer mixing at the same depth were not a concern."

Mid-row banding is another method that places fertilizer to the side of the seed. The difference between mid-row banding and double-shooting is that fertilizer is placed between every second seed row using a separate knife, disc or coulter.

"The major advantage of mid-row banding is that it works well in all types of soil," says Papworth. "However, both methods work on the same basic principle: maximize nitrogen, minimize seedling damage."

Disc openers back in style

Disc openers are an example of an older technology that has been refined to the point where it is considered by many to be a newly viable — and with some crops even superior — tool for conservation tillage, says Papworth.

"Disc openers are definitely coming back," he says. "Many years ago a lot of the zero-till drills had disc openers, but there were a lot of problems with durability. Today, most manufacturers have addressed that problem, and durability is not the issue it was 10 to 15 years ago."

These old-school openers are particularly appropriate for small seeds, such as canola and mustard, that require planting at a shallow and accurate depth. "Disc openers are definitely the easiest openers to use if you are planting smaller seeds and want to minimize disturbance," says Papworth. "And, when combined with narrow row spacing, they can be a major factor

Tips for 'test driving' conservation tillage

Erring on the side of caution the best way to find out if CT is a fit

Although conservation tillage (CT) is generally touted as a way to increase the efficiency of a farm, it does not have this effect in every case. "There have been farmers that have jumped right into it and have had a bad experience as a result," says Lawrence Papworth, an engineer with the AgTech Centre in Lethbridge, Alberta.

The thing every producer should do before investing in expensive equipment and committing to a full CT regime is to take conservation tillage for a 'test drive' to see if it meets the needs of the operation, he says.

Here are a few ways to find out if conservation tillage is for you without breaking the bank:

Use a custom operator. One of the most popular ways to "test drive" conservation tillage is to hire someone to direct seed one or two quarters. "I've talked to quite a few farmers who bought direct seeding systems after hiring someone who does custom direct seeding," says Papworth.

Do the easy crops first. Seeding crops that do not require extremely specific seed depths, such as wheat and barley, can help avoid a lot of headaches. "Plant crops that are relatively easy to direct seed such as cereals, peas and winter wheat into canola stubble," says Papworth.

Look into rental and leasing options. Find out which farm machinery dealerships in your area have rental and leasing

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d technology made new, highlight the latest developments in CT equipment

in higher-than-average yields." (See Sidebar, "Narrow row spacing gets results under direct seeding.")

What tends to turn producers off of disc openers is the high cost, says Papworth. They have more metal and bearings that naturally increase the price tag. And because of the weight required to hold the discs in the ground, they also have a tendency to use a lot of power at deeper seeding depths. But this is generally not a problem if people are seeding shallow into soil with high moisture content.

Residue managers get question marks

Residue management is a crucial component of any conservation tillage program as plant residues serve to enrich the soil, conserve moisture and minimize weed germination. It's a practice traditionally done at harvest time with chaff spreaders and straw choppers. If the residue is still not spread widely enough, producers often make one pass with a heavy harrow — a practice that tends to disturb the soil.

The new residue management tools are used prior to or at the time of the seeding operation, says Papworth. They represent a more conservation-friendly option than tillage to accomplish this, but the question is just how much efficiency these residue managers offer over more traditional methods.

"From what we've observed in our research, it seems that residue managers only offer an advantage where there are exceptionally high yields and exceptionally high amounts of chaff, such as on some irrigation farms," says Papworth. "At this point, between the yield and cost factors, I can't see the purchase of residue managers being very widespread."

That doesn't mean there may not be a place for them on the farm in the future. "Like most technology, residue management technology is ever-evolving," says Papworth. "There's a prototype model for hoe openers, for example, that shows some potential.

"It basically consists of a wheel that runs to the side of the opener. The wheel pins the residue beside the opener rather than pushing it up the shank and plugging up the opener," he says. "We used it with a Flexi-Coil shank in our test and it worked well. I think it'll catch on when it's made commercially available."

Soil levelling devices rethought

Soil levellers — often referred to as "furrow closers" — are another example of CT technology that has enjoyed newfound popularity. This is again due in part to technological fine-tuning, says Papworth.

"The earliest soil levellers involved a set of rotary or tine harrows that, while workable, tended to get plugged up easily," says Papworth. "Today, the most common soil levellers forego harrows with a set of discs attached to the shank. These discs throw the soil back on the furrow or deflect soil to the furrow."

The primary benefit of this is that it allows the drill to operate at high speeds with a wider opener, creating a significant time advantage. "Some producers also like wider openers because of the increased seedbed utilization and the minimization of seed damage from nitrogen," he says.

A variation of the basic soil levelling concept involves a single fluted disc that attaches to the shank and runs behind the opener. "We found that the one model we tested — one manufactured by K-Hart — did a good job of covering the seed for wide openers."

Another variation is the mid-row leveller available from Haukaas. "These are basically an additional set of packers which fit ahead of and between the packers," says Papworth. "Unfortunately, AgTech has not yet had the opportunity to test these levellers."

agreements, says Papworth. "It could save a bundle compared to buying the equipment only to find that it's not suitable for your operation."

When in doubt, use narrow row spacing. Narrow row spacing results in the greatest yields under direct seeding regardless of the type of opener used. "However, openers with smaller seedbed utilization, such as the disc varieties, seem to result in particularly good yields under direct tillage," says Papworth.

Have a good weed control program. "Conservation tillage sometimes comes with a whole new regime of weeds to deal with," says Papworth. "That is why a good herbicide program can be extremely valuable."

Look at lower cost options. By using a little creativity, older equipment on the farm can be adapted for direct seeding applications. "Older hoe drills, because of their weight, can make good implements for seeding into tall stubble. A do-it-yourself air drill can be built by mounting a set of Techno-till packers — otherwise known as burr packers — on an old air seeder," says Papworth.

"Lower-cost solutions often lack the benefits of the new equipment designed specifically for conservation tillage needs, but they are a way to see if CT works for you before making a large investment."

The future of CT

So what does the future of conservation tillage technology hold? Papworth believes the process of refinement and response will continue to drive the practice forward and make it more attractive to producers.

Variable Speed Transmission. "Conservation tillage technology is constantly being fine-tuned to make it even more efficient," he says. "A good example of this is tractors with variable speed transmission (VST). Tractors with VST perform at optimum engine performance — and as a result optimum fuel efficiency — regardless of seed depth or soil conditions. They're ideal for farm operations with a variety of conditions, power requirements and seeding depths."

Like most CT technology, the major drawback of VST is cost. "However, with the price of fuel rising like it is, it's becoming easier to justify the cost of such a purchase," says Papworth.

Cross Slot openers. Another technology worth keeping an eye on is Cross Slot openers. These low-disturbance single-disc openers place seed and fertilizer in horizontally separated bands or "slots."

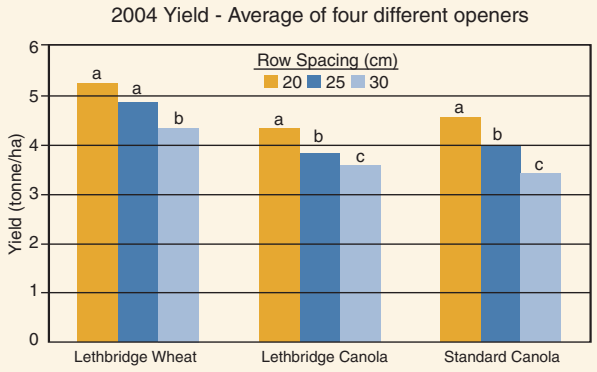
"Cross Slot openers replace residue over the slot and trap moisture in the slot. This helps assist germination even in very dry soils," says Papworth.

Cross Slot openers have actually been around for a number of years, says Papworth, but are poised to make a comeback as producers realize their positive effects on soil viability. "The problem is that they're hard to find in Canada," he says. "However, it's a technology to stay aware of as it becomes more available here."✦

More information available

Narrow row spacing gets results under direct seeding

This AgTech study conducted in 2004 shows that narrow row spacing under direct seeding resulted in consistently higher yields.



AgTech studies have consistently shown that where it comes to row spacing under direct seeding, the narrower the better. "We've found that the narrower row spacings are the best for yield, and it's a trend that has proven itself among a wide variety ofopeners," says AgTech Engineer Lawrence Papworth. "The most dramatic yield increases have been seen with the use of disc openers, which have a smaller seedbed utilization."

More information on conservation tillage, such as the report on the left, is available from the following sources

AgTech. Phone AgTech at (403) 329-1212. In Alberta, long-distance callers can reach the AgTech Centre toll-free by dialing the Alberta Government RITE line at 310-0000.

Ropin' The Web. www.ropintheweb.com.

AAFRD. To find an agronomist in your area, call AAFRD toll-free at 1-866-882-7677.

Reduced Tillage Linkages. www.reducedtillage.ca.

Dealers and industry contacts. Equipment dealers are often good resources for information on conservation tillage equipment.

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