WHAT IS IT WITH CORN ON CORN?

CORN FOLLOWING CORN TOOK SOME LUMPS IN 2010 AND 2011. HERE'S HOW TO SNAP IT BACK INTO SHAPE.

BY GIL GULLICKSON, CROPS TECHNOLOGY EDITOR · ILLUSTRATION BY JOHN COULTER

Continuous corn and corn-on-corn used to be a snap to grow. But that hasn't been the case in 2010 and 2011 in some regions like central Illinois.

"There were pockets that have had really bad luck the past two years," says Emerson Nafziger, University of Illinois (U of I) Extension agronomist. In some cases, reports of 100-bushel-per-acre yield differences for corn following corn vs. corn following soybeans under similar practices surfaced.

"Our corn-on-corn yields used to be tremendous," says Clarke Kelso, Macomb, Illinois. "In 2008, our average corn yield was 240 bushels (per acre), and most of that was corn-on-corn. We have been disappointed the last two years, though. Frequently, corn-on-corn yields have been 20 to 40 bushels per acre below those of corn following soybeans."

Dan Shaw

Darren Shaw

Still, excellent demand has caused many farmers to stick with corn following corn in 2012.

"We used to be in the low 20s (millions of acres)," says Ty Vaughn, U.S. corn product management lead for Monsanto. "Now, we are pushing 28 million acres of corn after corn."

In agronomic jargon, corn-on-corn means corn in its second year following a crop like soybeans. Continuous corn means corn in at least its third year. Typically, second-year corn yields take a 10% yield hit compared to corn planted after soybeans. That dip, though, has been eased by the advent of insect-resistant traits protecting corn from European corn borer and corn rootworm.

"I have had farmers tell me, 'We don't have any more problems with corn-on-corn. We have corn borer whipped. We have rootworm whipped.' From an agronomic standpoint, our expectations got off a little bit," says Nafziger.

What Happened?

Problems in 2010 started in the fall of 2009, where sopping soils during a hectic harvest nixed fall tillage in many areas of the Corn Belt. Spring tillage and subsequent planting in 2010 occurred in still-wet soils and sticky residue that hampered emergence.

"In 2010, lower yields were caused by a compromised root system damaged by saturated soil conditions," says Nafziger. This was further compounded by limited July and August rainfall.

Last year was more straightforward, as a great autumn in 2010 paved the way for fall tillage. It set up a smooth planting season with excellent emergence. Then it turned dry.

"Most evidence points to lack of water during the critical grain-filling period as a major cause of lower corn-on-corn yields in 2011," says Nafziger. "In both years, heavier and wetter soils tended to be affected the most. These are some of the better-producing soils in a normal year. In 2010 and 2011, some clay knobs did better than good soils."

High input costs also accompanied plunging yields for corn following corn.

"Everything is more costly if you grow more corn," says Gary Schnitkey, U of I Extension farm management specialist. "We see lots of additional tillage on corn-on-corn to break up cornstalks. This adds to costs and reduces the advantages of corn-on-corn."

In 2012, corn won the acreage battle with soybeans, spiking to 96 million bushels planted – the largest since 1937. Still, economics have changed over summer.

"Last winter, the market said to grow more corn," says Schnitkey. Now, spiking prices give soybeans the edge.

It's likely, though, that corn following corn acres will stay strong. In Illinois, for example, farmers planted 9 million soybean acres in 2010 and 2011. As long as corn acreage hovers around 12 million acres, Nafziger notes 20% to 25% of Illinois corn will need to follow corn.

So how do you successfully grow it? Dan and Darren Shaw, a father-son team from Edgar, Nebraska, notes growing corn after corn requires a systems approach consisting of several components. Here are five steps the Shaws and others follow.

1 Clear And Spread Corn Residue

The Shaws first clear residue with a light fall grazing by their cows following harvest. This has an added bonus.

"That helps get rid of kernels and ears so we aren't battling volunteer corn the ➤

Photography: Gil Gullickson

Soybean Rotation Still Shines

Jon Halbur plants both corn-on-corn and corn following soybeans. Although both are doing well, the Coon Rapids, Iowa, farmer's plans likely will stick with corn rotated with soybeans in future years.

"No-till corn-on-corn works well, but I still like a rotation," says Halbur. "I think there is a bright future for soybeans. The break in rotation breaks pest cycles. The rotation helps weed control, as I can use different modes of action to keep weeds off balance. There also has not been as much disease in corn on soybeans ground compared to corn-on-corn."

Illinois Farm Business Management Association (IFBMA) records show from 2001 to 2010, corn profits were $28 per acre higher than those of soybeans. However, returns were variable. In 2002, 2005, and 2010, soybean profits were higher, says Gary Shnitkey, University of Illinois Extension farm management specialist. In 2009, for example, corn yields fared well, but high drying bills nipped corn profits.

Jon Halbur

"We also had the highest fertilizer costs on record," says Schnitkey. "That's why soybeans were more profitable than corn that year."

Should soybean prices continue to rise, 2012 may be a year in which soybean profits eclipse those of corn. As of late June, the current corn-to-soybean price ratios of .44 was higher than IFBMA average ratios for 1976-1988 (.38), 1989-2000 (.41), and 2001-2010 (.40). (A .40 price ratio is $5 per bushel for corn, $12.50 for soybeans. The higher the ratio, the better for soybeans.)

Price, though, is only part of the equation. One reason corn was more profitable than soybeans during much of the 2000s was due to yields.

"Over the long run, yields have been the predominant factor causing corn profits to increase," says Schnitkey. "Until we see something happen on the relative yield side, there will be more incentives to grow more corn." •

next year," says Dan Shaw.

They also set their corn rows wider than normal. "Thirty-six-inch rows gives us more room to spread out corn residue," he says.

2 Hit 'Em Where They Ain't

That's what early 1900s baseball player Wee Willie Keeler replied when asked about his batting success. This also applies to corn following corn – avoid stalks and residue as much as you can. Mike Schardt, a Carleton, Nebraska, no-tiller, plants and fertilizes no-till corn between old corn rows

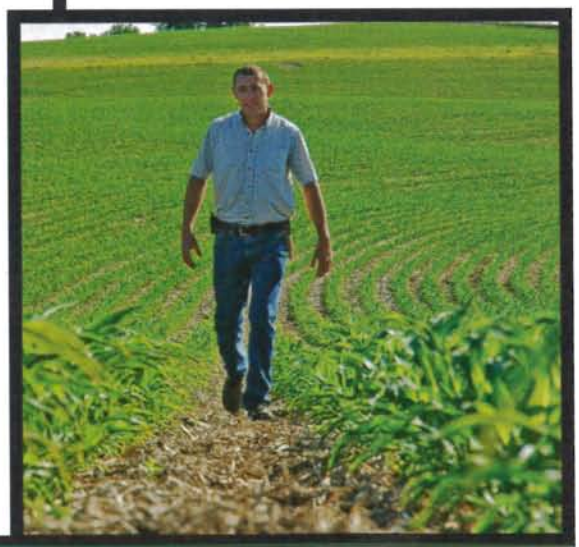
"The whole idea is to plant on one side and fertilize on the other," he says. "The planter does a more even job of planting, as opposed to running at an angle to the old stalk. We experience even planting depth. We don't have the residue raising the planter out of the ground."

He first slices in-row no-till corn residue with a planter-mounted single-disk fertilizer opener. "That slices the trash and gives the trash whippers the ability to move the residue," he says. "After the opener slices the residue, the only thing that stops the trash whippers from clearing the residue is if a cob wedges behind the disk. Otherwise, it is incredible what they go through."

Strip-till also works well for corn after corn, says Bruce Battles, Syngenta crop specialist.

"It gives you the best of both worlds," he says. "It creates a zone that is black that warms up and is dry for farmers to plant into. Meanwhile, it retains corn residue pushed to the side that can be used to build soil organic matter. It also can shift some of a farmer's spring workload into fall."

Above: Planting through residue is a challenge, particularly when you're no-tilling corn into corn like Mike Schardt, Carleton, Nebraska.
Above, right: Schardt shows corn residue from 2009, 2010, and 2011 in a 2012 cornfield. He plants and fertilizes between old corn rows to dodge residue and stalks.
Bottom: Jon Halbur prefers planting corn on soybean ground. One benefit includes breaking pest cycles.



3 Carefully Select Corn Hybrids

"Yield potential beats everything," says Darren Shaw. "We aim to plant the best."

On-farm test plots aid the Shaws in finding top yielders. "Proving it on your own farm is important," he says. "What works for us doesn't necessarily work for our neighbors."

On the heels of yield potential is disease tolerance, since the rampant residue of corn following corn is a haven for disease inoculum. "We look for hybrids that are heavy on resistance to gray leaf spot, common rust, anthracnose, and Goss's wilt," says Schardt.

He also uses fungicides to battle those first three fungal diseases. Goss's wilt, which has migrated in recent years from Colorado and Nebraska eastward into the Corn

Belt, is another animal. It's a bacterial disease that fungicides won't touch.

"In a few severely infected fields, Goss's wilt has reduced yields 50%," says Carl Bradley, U of I Extension plant pathologist.

Varietal tolerance can slice its impact, although symptoms still may occur. Breaking up residue following harvest can reduce inoculum. Shifting the following year to a nonhost crop is a way to dodge it.

Emergence is another key factor, given corn needs to often break through a residue mat. "We do everything to get the hybrid out of the ground," says Darren Shaw. "You can also have crusting problems, so emergence and early-season vigor is important."

4 Step Up Fertility

"In general, it takes 40 to 50 pounds (per acre) more nitrogen (N) to grow corn-on-corn than corn after soybeans," says Battles.

There are a number of ways to make up this difference. "One trend I see is more sidedressing of 28% or 32% N," he says. "N can also be topdressed on it, but you need a rain to incorporate it."

The Shaws soil-sample and normally aim for 220- to 250-bushel-per-acre yields on irrigated corn after corn. They fertilize in several phases consisting of preplant anhydrous ammonia, 10-34-0 starter fertilizer in-furrow at planting, and sidedressed 28-0-0-5 at cultivation. If wet soils prevent the preplant anhydrous ammonia application, they add another sidedressing trip.

"Weather is always an issue with sidedressing," says Dan Shaw. If wet weather nixes sidedressing in corn after corn fields, they use a high-boy sprayer to drop the 28-0-0-5 in between corn rows.

5 Watch For Rootworm Trait Failure

In 2011, cases of corn rootworm that resisted the Cry3Bb1 protein surfaced in some Midwestern areas. This is the Bt rootworm-resistant trait found in Monsanto's YieldGard VT Triple and Genuity VT Triple Pro corn products. In most cases, it was found in continuous cornfields where farmers had repeatedly used the trait.

For fields planted to these types of hybrids that are experiencing greater-than-expected corn rootworm damage this year, Monsanto officials give these following recommendations:

- Rotate to soybeans or another crop. "This can break the rootworm cycle and enable growers to start fresh the following year," says Luke Samuel, product development manager at Monsanto.
- Switch to pyramided products that feature double modes of action for above- and below-ground insect protection.
- Apply a soil or foliar insecticide on fields planted with a single-action-mode rootworm technology if pyramided products are not available.
- Plant the correct refuge and follow an insect resistance management plan.

What's Up For 2012?

Relatively dry conditions in many areas enabled farmers to plant corn on time this spring.

"We have seen yield decreases (in corn-on-corn) during a wet spring and when it stays wet," says Vaughn.

Conversely, this summer's drought is an ominous side for water-gulping corn-on-corn and continuous corn.

"Corn after corn problems result from stress, most commonly water stress," says Nafziger. "Hybrids are getting better, but it still takes water. A 200-bushel corn crop needs 22 inches of water. When it is short of that, corn yields less. There is no way around that." •

Nix Volunteers

Each spring, farmers meticulously adjust their corn planter to plant optimum populations. If they grow corn-on-corn under tillage, they may be planting another crop – volunteer corn.

"The problem is that if it were just volunteer corn and not herbicide-tolerant volunteer corn, we could do something about it," says Kevin Bradley, University of Missouri Extension weed scientist. "What has happened is that as we've adopted Roundup Ready corn and now both Roundup Ready and Liberty Link stacks, we are trying to control Roundup Ready corn in Roundup Ready corn. That just doesn't work, and we don't have any (herbicide) options."

Battling volunteer corn in corn requires forward thinking. "The best strategy is to prevent it from ever getting into the soil," says Bruce Battles, Syngenta crop specialist.

Adjusting your combine properly to prevent harvest losses is a good first step. Losing just 1 bushel per acre at harvest can sow 80,000 seeds per acre.

"The good news is 90% of those seeds won't germinate," says Reid Smeda, University of Missouri weed scientist. Still, that leaves 10% (or 8,000 seeds per acre) of volunteer corn. University of Minnesota trials from 2007 and 2008 showed in years when volunteer corn affected corn yield, volunteer corn populations of 8,000 plants per acre sliced yields 8%.

Besides combine adjustment, steps to boost standibility can help, notes Battles. Fungicides that curb disease aid ear retention so less corn falls on the ground. "It has a double benefit of boosting yields in the fall and also of decreasing the amount of corn left in the field," says Battles. No-till is also a way to minimize volunteer corn the next year. "Tillage mimics actual planting," says Smeda.

Now is a good time to think about volunteer corn control in corn-on-corn and continuous corn in 2013. "Think before the fact," says Battles. •