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Aerial data drives decisions

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Indiana farmers and brothers Dan and Brian Sutton are proving how imagery improves per-acre precision.

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Aerial data drives precision

LYNN BETTS

Brian Sutton estimates potential yield of zones derived from ADVI imagery and watches how each zone is mineralizing nitrogen during the season. Then he builds a prescription to apply 28% liquid nitrogen at variable rates with a Hagie highboy sprayer and Y-drops late in the season.

Season-long aerial images guide prescriptions for variable-rate planting, nitrogen and cover crops.

By Lynn Betts

Brian Sutton could make the case that he knows his Lowell, Ind., farm as well as any farmer in the country knows his own farm. Sutton has 20 years of yield history, every type of soil test, and seven years of season-long aerial photography at two-week intervals.

You might think all that information could complicate management decisions that he and his brother Dan make on their 1,400 acres of corn and soybeans. Instead, he says it simplifies decisions about using variable-rate technology to make the most of seed, fertilizer, cover crops and other crop inputs.

Plant racehorse by prescription

"A thermal aerial photo from the drought of 2012 showed me where my drought-prone soils are, and I made a planting prescription from that photo last year," Sutton says. "I used a multi-hybrid Precision Planting meter on my planter that pulls from two different boxes, planting a workhorse variety in the dry areas and racehorse corn in the areas not so susceptible to drought."

He thinks the system paid for itself in higher yields last year alone, with 15 more bushels per acre on the good soils with the racehorse hybrid. Using the workhorse corn on drought-prone areas was also his defense against drought.

"I'm going to do that every year going forward now, and may get a little more aggressive," Sutton says. He also increases seeding rates on the areas with highest potential as defined by his imagery.

Sutton now offers aerial imagery to farmers across the Midwest. He and his brother Dan founded AirScout, a company that's helping farmers make decisions based on a series of aerial images. Every two weeks, a pilot flies your fields. With each flight, you get a visual, thermal and Advanced Difference Vegetation Index (ADVI) photo.

"It's a check on your field's health," Sutton says. "It's like human health. You need an X-ray for some things, but a different kind of photo, a CT

scan or MRI to learn about other issues. One thing I've learned is you can't skimp on the flights. We don't offer just one or two flights over the season, because a single flight in the middle of the summer is out of context. I know from experience, you need the whole season to make informed decisions.

"When you have the entire season, you can scroll back in time to see what happened and when. That tells you what you can do differently the next season and possibly avoid some of the same mistakes."

Sutton says he knows this from experience on his own farm.

Prescription planting photo

Despite all the tools Sutton has to develop planting prescriptions, he uses only the best bare-soil ADVI image available to make a population prescription for planting.

"The soil has to be dry when the photo is taken, to reflect differences in organic matter rather than moisture," Sutton says. "It can be taken any time up until corn is 6 inches high, on either a tilled or no-till field. I check it against a thermal photo taken at the same time to be sure it is not skewed by moisture."

Once he gets a good "base" bare-soil ADVI photo, he can use it for years, Sutton says.

"It's essentially a relative organic matter photo that can be used as the basis for variable-rate prescription planting," he says. "Because of its ability to see differences in bare soil, the ADVI photo I use has taken NDVI [Normalized Difference Vegetation Index] imaging technology to the next level, where it enables extremely refined planting prescriptions.

"I have a drive on every row of my planter, and I know if I lay down a high-resolution zone, my controller can execute it. If I can use one photo to make an accurate map that shows relative soil potential for yield [relative organic matter] that I can use for years, that's about as simple as I can make prescription planting."

VR nitrogen for corn

"As I've compared lush areas of my fields with aerial photos from year to year, I've realized that maybe 10% of the field is always low and 10% is always high, but 80% of the field flip-flops from year to year due to rainfall," Sutton says.

He wants to put more nitrogen on the areas that have the most potential to produce the highest yields, but he doesn't know where those areas will be at the start of the season. "So I try to make sure the corn never has a bad day — with enough N to get it out of the ground, then enough for a good start, and then more to the areas with the highest potential as defined by the imagery later in the season," he explains.

His simplified plan is to apply 70 pounds of N upfront — 40 pounds preplant and 30 pounds starter with the planter, including N in a 2-by-2-inch offset and dribble starter in

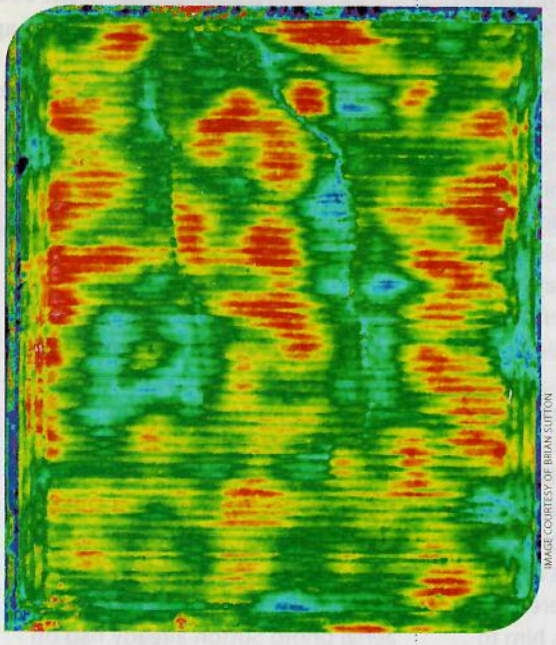

IMAGE COURTESY OF BRIAN SUTTON

Brian Sutton uses his best bare-soil Advanced Difference Vegetation Index image to make a population and variety prescription for planting. Red is heavier rates of grass seed and fewer brassicas. Blue is lower populations of grass seed and more brassicas.

Think *different*

When Brian Sutton started using aerial thermal images to manage his western Indiana farm seven years ago, he saw their value in early detection of diseases in corn and soybean fields. The flying farmer's use of thermal, visual and ADVI images has now evolved from a scouting tool to driving prescriptions for a number of variable-rate applications, and he's formed a company that allows other farmers to take advantage of what he's learned.

the furrow. That's followed with a blanket of 70 pounds of N at the V5 to V8 stage. Then Sutton watches the corn grow through June and July to see how the crop is shaping up. He looks at aerial ADVI photos in late June — which indicate biomass — to base decisions about more fertilizer on the healthiest plants.

"I already have 140 pounds of N on the whole field, so I know all the corn has enough N up to that point. I'm looking for the 'happy' areas of the field — the ones with higher yield potential at this time of year," Sutton says.

He believes farmer intuition at this point is better than any model, but since you can't see the whole field from the ground, you need a look from the air to identify not only areas with the highest yield potential, but also the incremental variation in the field for variable-rate N purposes.

"By the time I need to make a final decision about nitrogen, I have seen April, May and June pass by," Sutton says. "I know my current moisture level, and I know the 10-day forecast. Now I make an estimate on the potential yield of each zone derived from the ADVI imagery, and how each area is mineralizing nitrogen, and I build a prescription to apply 28% liquid nitrogen variable-rate with a Hagie [highboy sprayer] and Y-drops. That's much better than making a guess on nitrogen at the start of the season."

AirScout's service includes a "prescription" building tool at no cost.

Sutton partnered with Hagie in 2015 to build a special AirScout Edition machine capable of applying two different products at the same time, using two different prescriptions. This enables him to apply fungicides or foliar feed in the same pass as the last N fertilizer application.

Variable cover crops

Sutton started using cover crops seven years ago, and now uses them on every acre of corn and soybeans. Like others with a Hagie highboy, he's making full use of it by seeding cover crops into growing corn to give them an earlier start in the fall.

What Sutton is doing differently than most, though, is using the Hagie to vary both the rate and species of cover crops, to reach goals for different areas of the field. The prescription for seeding comes from an aerial photo Sutton already had on hand — essentially the same relative organic matter photo that he used earlier for variable-rate prescription corn planting. He's excited about the potential for variable rates and species of cover crops.

In late August, Sutton takes the wet tanks and hoses off his Hagie, and adds two dry boxes and a seeder he and his brother built specifically to seed cover crops using prescriptions from their AirScout imagery. They seed their own land and also custom-seed for neighbors.

"We want to control erosion and build organic matter in the low producing areas, like hillsides, so we've doubled the rate of grass seed or cereal rye for those areas," Sutton says. "But on the lower areas, we want to scavenge N and reduce compaction, so we'll use turnips and radish seed in a mix with clovers.

"It's a waste of seed to use the turnips and radishes on our poor soils that won't allow good penetration and have little nitrogen to scavenge; varying the species is something new that I think shows a lot of promise." CSD

Aerial imagery company

Brian Sutton and his brother Dan founded AirScout, a company that's helping farmers throughout the Midwest make decisions based in part on a series of aerial images. Based at Bult Field in Monee, Ill., near Sutton's farm in Indiana, he has planes in Colorado, Nebraska, Iowa, Illinois, Indiana, Ohio, Michigan, Wisconsin and Georgia. Farmers can buy AirScout's aerial image services through local agronomy businesses or cooperatives.

The cost is typically $7 to $9 an acre per year for a series of eight to 14 flights and includes the prescription and yield estimation tools.

For website demos, photos, and more information on both aerial images and ground application services at selected locations, visit *airscout.com*.

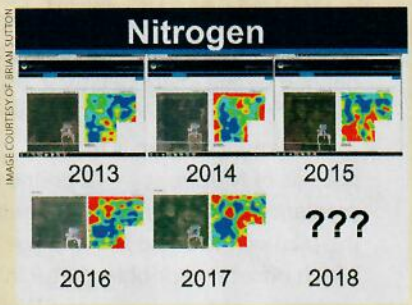

IMAGE COURTESY OF BRIAN SUTTON

A look back at five years of mapped-out nitrogen application on one of Brian Sutton's fields shows that both location and amount of late-season nitrogen varies each year with the weather. Note how the dark blue areas (highest N) move from year to year; in 2014 the highest N applied was in the southwest and west part of the field, but in 2015 the highest N was applied in the north half of the field. The images are taken late in the season, and N is variably applied; areas with the most potential for high yields get the most N late in the season.