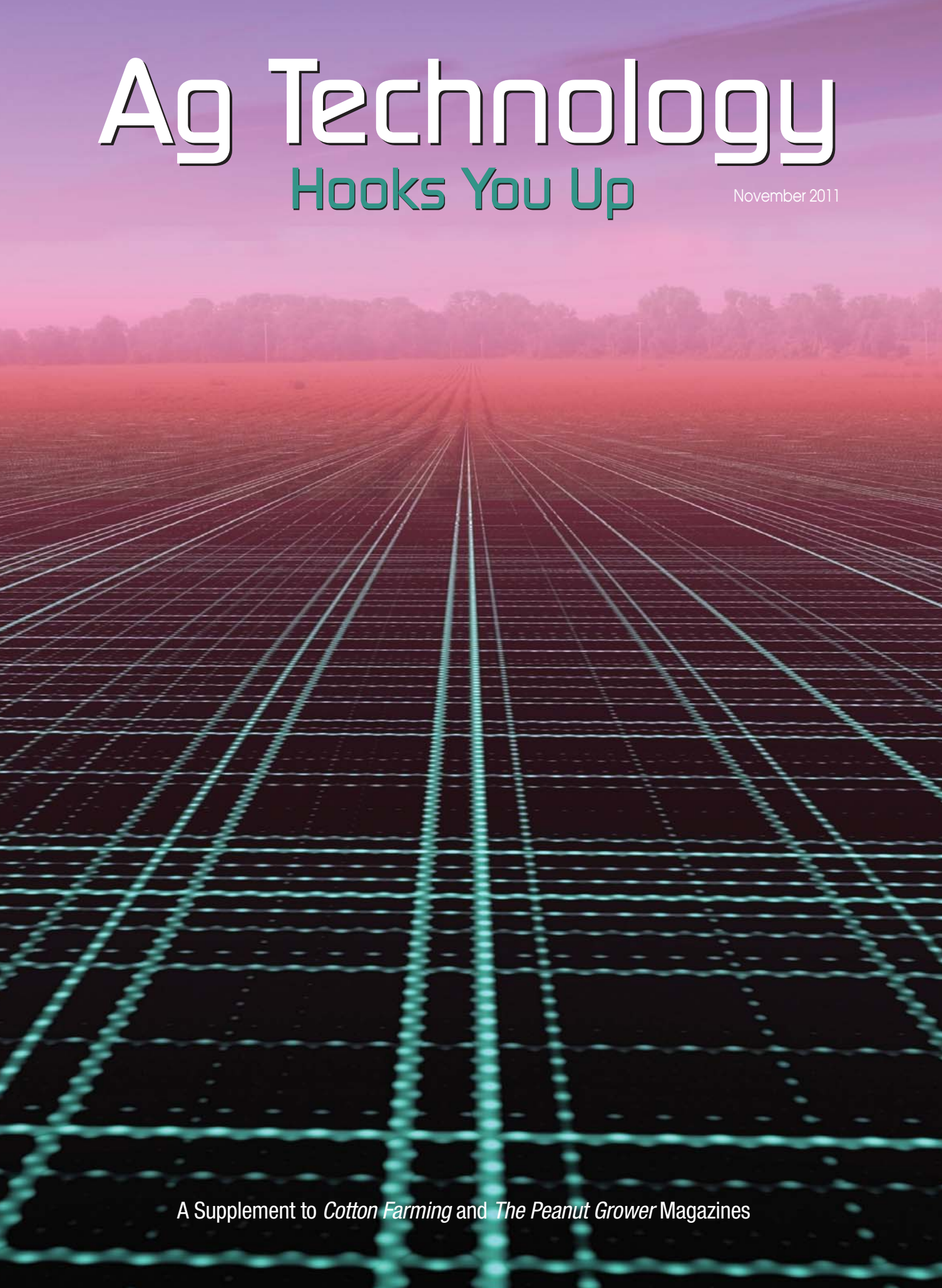
Ag Technology

Hooks You Up

November 2011



A Supplement to *Cotton Farming* and *The Peanut Grower* Magazines

Ag Technology

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Abstract technology photo
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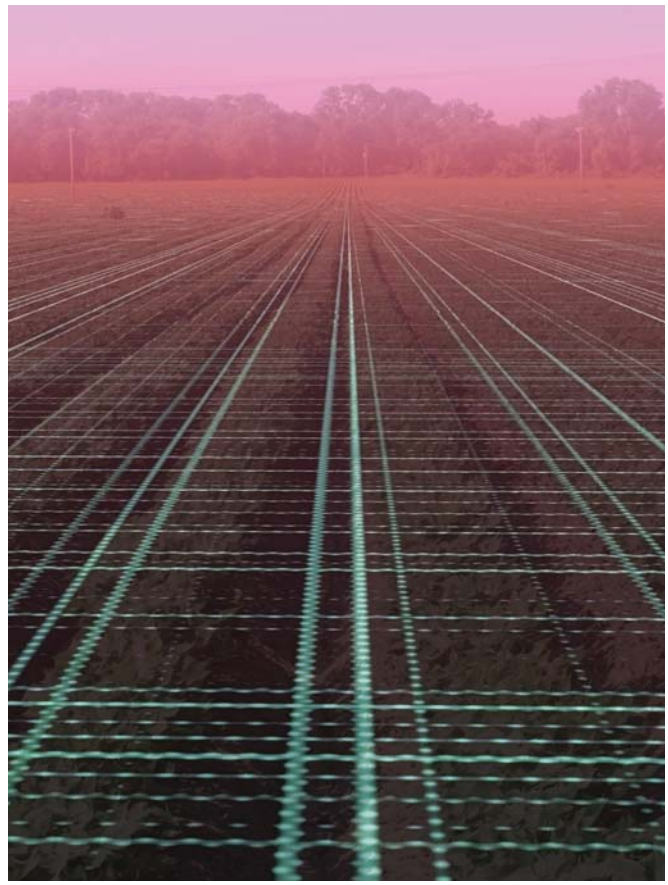


Cash In On Cool Tools

Today, ag technology hooks you up with increased profitability and convenience. It also simplifies farm management by providing useful information relative to an individual farm, and, in many cases, an individual field.

And, as an added bonus, it affords an opportunity for those who take advantage of it to realize an improved quality of life.

The agriculture industry has always depended on technology to propel it forward into the next era of producing more with less.

As this aspect of production agriculture continues to grow exponentially, keeping up with, or even being aware of, the different tools that are bombarding the marketplace can be daunting.

The goal of this special ag technology section is to provide a sampling of some of the latest technology options and how they can be incorporated into farming operations.

From smartphone apps to variable rate irrigation and individual row control on planters to online data storage, learning more about current ag technology helps producers, as well as others involved in production agriculture, get hooked up with the right combination that fits their needs.

User-Friendly Smarter Systems

Practical use of data in decision making excites the ag industry.

By Terry Griffin

Decision-making tools based on economic models and statistical techniques have existed in the academic arena for decades, waiting on the day when ample farm data would be available to make practical use of these models. Today is that day.

Analyses have existed for a decade that report simple yield average by soil type or varieties across farms; but that technology plateaued without much improvement. Today, sophisticated decision-making models that take into account variability, risk and the farmer's own risk-taking preference provide recommendations and even implement the decisions.

The weakest links in precision farming systems have typically been in the data management, analysis and decision making arena due to the lack of highly skilled people offering these services. Recent commercialization of smarter systems has reduced the need for these skilled individuals, replacing them with hardware, software and algorithms. Smarter systems include machinery communications with remote support (telematics/telemetry), automated data analyses and automated production farm management recommendations being made and decisions being implemented as on-the-go sensor-based applications. All these advancements provide users greater incentives to adopt and actually make use of technology.

Tool	Use
GPS	Automated guidance
Yield monitor data	On-farm experiments
Active NDVI sensors	On-the-go defoliant application
Electrical conductivity	Variable-rate seeding rates

Automation Means More Use

Precision technology became successful once the processes were automated. When GPS was used in automated guidance or when yield monitor data from an on-farm experiment was automatically analyzed, the technologies began to be used. We used to download soil data from SSURGO (and rubbersheet scans of the old books before that), but now most software has built-in tools to bring in the relevant soil polygons such that farmers and their advisors are using the data. Today, farmers collecting electrical conductivity data may not use soil series data other than for backgrounds of printed maps.

Envision a message from your planter: "If I were two rows wider/narrower, your profitability would be improved by X dollars per acre; I estimate that you would be willing to pay X dollars for this new machine."

Sensors provide time and motion data that are used to calculate field efficiency and fuel usage per acre. Telematics and/or telemetry provide producers with a report regarding how much fuel was used by location, enabling a site-specific map of gallons of fuel per minute. Equipment-based sensors provide data for diagnostics that are stored and/or wirelessly communicated with manufacturers.

Farmers can bring equipment into a service center, and the service provider already has a list of maintenance and repairs needed based on communication with the equipment. When time and motion data are added, farmers would know what the optimal size of implements are for a farm for a given set of field shapes and sizes. Time and motion data can be processed to determine the working rates (how many acres per hour can be covered) for individual machines (tractor/implement combinations and equipment operators as well).

Equipment Use

Field size and shape matters in how an operator can efficiently use equipment. The largest equipment size does not always equate to being the most efficient; it is possible that a smaller equipment size may actually be faster and have lower per-acre costs than larger versions in some fields.

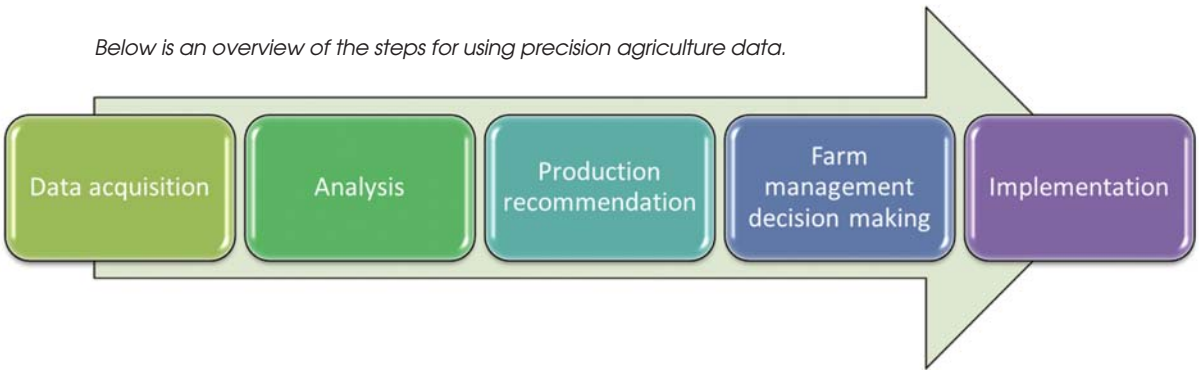
Given a farm's specific field sizes and shapes, the system

provides the farm decision maker (and the equipment manufacturer/sales) with information sufficient to choose optimal equipment sets and be able to estimate how much the individual farmer would be willing to pay for that equipment. Telematics allow remote file send such that a variable rate prescription can be wirelessly sent to the appropriate application equipment; the equipment operator does not have to load any instructions, just operate the machine.

technologies, such as automated guidance, have helped to reduce stress and improve the quality of life of family dynamics of the rural household.

One reason that automated guidance has been successful is that it requires less specialized skill than without the technology. Technologies such as yield monitors, grid soil sampling and variable-rate applications require greater management abilities to use the technology, and even more to make use of the data. Even

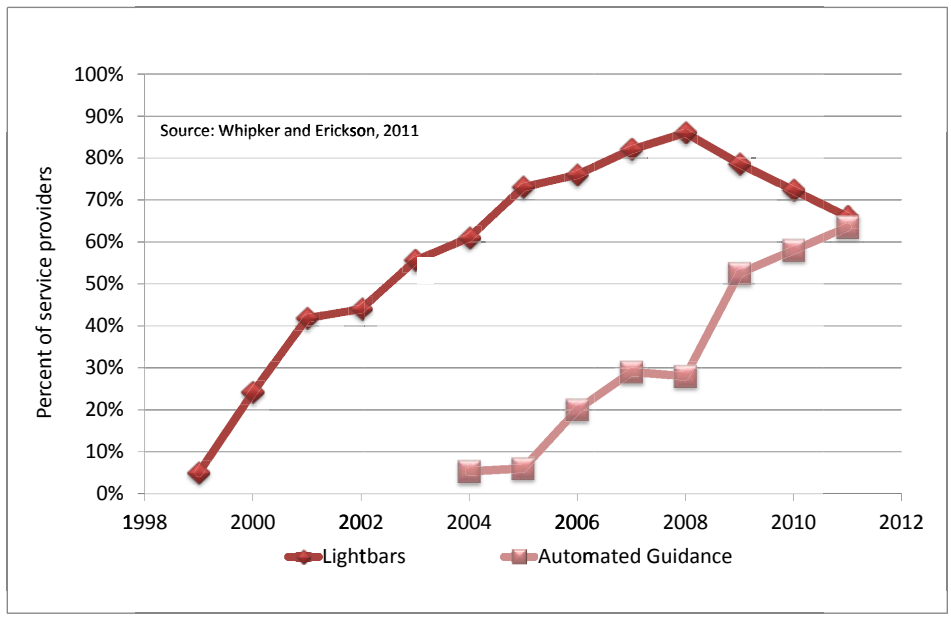
Below is an overview of the steps for using precision agriculture data.



'Grouped Data'

Community data (or pooled data) analysis is a tool farmers use to improve their management decisions and agronomic practices. This concept has been around for half a century, but is gaining traction among farmers, especially those in a "group" with data electronically stored. When information is gathered from multiple farms from across a region and properly analyzed, results are more valuable to the farmers who use it for decision-making purposes than if they were limited to using only their own farm data.

GPS lightbars readily caught on at farm and service provider levels as well as automated guidance. By the way, I no longer consider lightbars to be precision ag technology today as we once did 10 years ago. It was the higher levels of accuracy that incentivized farmers to adopt GPS guidance.



GPS-enabled navigation technologies were readily adopted by service providers.

Farmers are planting cotton on the flat over-ripped zones and not having to use beds. Controlled trafficking restricts compaction to a smaller portion of the field. Farmers are now able to rip cotton fields in the fall and plant seed at the appropriate area without having to bed. Deep placement of P and K fertilizers can be applied in a similar method and follow with planting the appropriate distance away several months later. Some cotton fields that have been in cotton for several decades have wound up with an additional row of cotton.

Improved Quality Of Life

Do spatial technologies make farmers… happier? The way farmers use some spatial technologies impacts the quality of life of the rural household. Specifically, GPS-enabled navigation

though the technology has been proven profitable for a wide range of farm scenarios, the leading reason for adoption, and in particular for farmers to remain using the technology, is that automated guidance has made their lives better.

There is a great deal of technology that goes into automated guidance. However, it is all embodied into the system so that the user does not have to possess specialized skills or abilities to make use of the technology. In the case of automated guidance, the user can have a lower level of skill or experience than before, yet still successfully operate the equipment. Therefore, the equipment operator is under less stress and realizes less fatigue. Less stress and fatigue equates into happier people who may be more pleasant to be around, increasing the happiness of the rural household, i.e. the farm family.

For a comparison example, take tractor cabs. Once farmers

experience cabs on farm equipment, especially those with air conditioning, radio and other amenities, they prefer not to go back to "cab less" even though there is no clear economic advantage of paying the cost of the technology. Put another way, if farmers were faced with the opportunity to take a sum of money in exchange of forever having their tractor cabs taken away, how much would that sum of money be?

Automated guidance is essentially the same, although there are clear economic, agronomic and engineering advantages to adopting the technology. Case study evidence from Australia reported additional quality time in the tractor cab between spouses – such at lunchtime – since the equipment operator could pay more attention to eating and communicating. Conversely, there is opposite evidence as well. In a preliminary study from Arkansas, a lady stated that with this technology, her husband and son worked many more hours in a day and into the night. She stayed awake at night in fear that they would become tired and get hurt from an accident.

In conclusion, today's user-friendly smarter systems are resulting in greater efficiency, easier decision making and even a less stressful, better quality of life for the farm family.

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Technology's 'Crystal Ball' Says We Are Not Likely To See The Following:

1) Although the technology has existed for some time, it is unlikely that autonomous farm equipment (unmanned/robotic) will be commercially available, at least at the size of modern field-scale equipment. Although automated guidance technology approaches autonomous operation, it is expected that there will always be a person present near the equipment who can take control and otherwise override the system.

2) Soil nutrient sampling at very dense resolutions, with the soil sample being sent to a lab for analysis.

3) Farmers sitting for long periods of time at a computer staring at precision ag data. Although the vision of a farmer sitting at a computer was once synonymous with precision agriculture, this model does not work in practice. Farmers are not farmers so that they can sit at computers and analyze data. The notion that data will confess and provide insight in a divine manner has not been observed.

Futuristic Technology

The line between current technology and futuristic technology has become grayed. In many cases, future technology is simply a matter of combining existing technologies into a usable system. Some technologies that exist in concept and are currently feasible, but do not exist in a commercialized system as of yet, include the following:

1) Envision a system where yield data from a combine is wirelessly uploaded to a computer system using cellular, Bluetooth or similar technology.

The uploaded yield monitor data is then corrected for flow delays and erroneous measurements before it is assembled with data from on-farm experiment treatments, soils, weather and other production and economic data.

That dataset is automatically analyzed using state-of-the-art techniques for spatial data and a report is generated, even emailed to the farmer, consultant, landowner or other associated people.

In addition to the report, a variable-rate prescription is generated and sent directly to the variable-rate applicator operated by the farmer or a third-party service provider.

Purchase orders may be predetermined based on the possible outcomes of the on-farm data analysis and automatically sent to input suppliers.

In this case, each of these steps exist in practice although they have not been assembled into a single operating system. Not yet anyway. Maybe tomorrow.

2) In order for soil nutrient analyses to be useful in a precision agriculture context, much higher sampling resolutions are needed.

Current sampling methods will be replaced with systems that increase resolution while reducing time requirements, thus requiring a fundamental shift in the way we sample, especially for soil nutrients.

We are only able to measure a few soil factors at high resolution (i.e., electrical conductivity, elevation). It is important to have sensors capable of accurately measuring soil nutrients and other factors at similar resolutions.

Sampling crop yields and electrical conductivity at a few hundred observations per acre and soils at one sample every two acres is not sufficient for data analysis.

The future of soil nutrient sampling will be in on-the-go sampling and most of the time with on-the-go application of variable rates of product based on the sensed data.

Until innovations have been made in resolution of soil nutrient testing, these spatially sparse variables will not be useful for farm management decision making.

Tech Tidbits

DRIVERLESS TRACTOR

Kinze Manufacturing,Inc. recently introduced the Kinze Autonomy Project, which is designed to reduce the need for skilled operators by taking the human element out of the tractor cab. With the autonomous grain cart solution, the combine operator sends a signal to the tractor instructing it to pull the cart up alongside of the combine, and the combine then empties out into the grain cart.

When the cart is full, the tractor and cart make their way across the field to a safety zone where a semi trailer is waiting. The semi operator then unloads the cart into the semi trailer.

Visit **www.kinze.com**.

LONG-LIVED LIGHTING

Magnalight by Larson Electronics recently announced the release of the EXP-EMG-12W-2L explosion proof emergency light with battery backup that provides 90 minutes of light operation in the event of power failure or any incident that results in the interruption of current to the light.

This Class 1 Division 1, Class 2 Division 1 and 2 approved emergency light contains two 6-watt LED lamps, a high temperature Nickel-Cadmium rechargeable battery and is designed to provide up to 10 years of reliable low maintenance operation. This emergency light offers an ideal solution for hazardous locations requiring a dependable source of failsafe illumination.

You can view Larson Electronics entire Magnalight line of explosion proof lighting at **Magnalight.com**.

SOCIAL MEDIA 'AGVOCATES'

As a leader in online technologies for more than a decade, Syngenta has developed the Growing Digital blog to help members of the agricultural community grow their business through social media and become agvocates for the industry as a whole.

Features of the Growing Digital blog include a series of instructional articles with tips on social media topics, ranging from setup and available platforms to the difference between business and personal use. It includes video instructions on creating an account and engaging in various social media platforms, such as Twitter and Facebook. Topics will be based on the user's level of social media experience so that the beginner, as well as the advanced social media user, finds useful information. New information will be added to the site each month.

For more about the blog, visit **www.GrowingDigitalBlog.com**.

Irrigation Technology

Wireless, variable-rate enhance pivot management and effectiveness.

By Carroll Smith

Back in the day, farmers had to spend a lot of time, fuel and labor riding from field to field to manually control their center pivots and make sure the systems were up and running correctly. They didn't have the ability to vary the amount of water that went out on different areas of the field, nor could they stop the system from watering, say, a turnrow or a low-lying wet area.

With today's irrigation technology, those same farmers now have options.

Farmers In Control

Rusty Davis, who operates Davis Farms with his brother Jerry in Decatur County, Ga., planted 700 acres of peanuts and 2,300 acres of cotton this year. About 90 percent of their acreage is irrigated with 23 center pivots. They had FieldNET wireless irrigation management installed on their FieldVISION pivot control panels on their new pivots, which, according to Lindsay, the manufacturer, allows them to "manage all of their pivots at their convenience from any computer or cell phone [This technology

Lindsay's Precision VRI is designed to save water and energy by allowing farmers to apply the right amount of water based on the unique characteristics of their fields, such as crop type, soil type, topography or obstacles in the field.

works on a smartphone, but if you don't have a smartphone, you can still use this technology from a laptop or tablet with an Internet connection]. It provides fast, easy access with pivot views, water usage and more."

Davis says he can just pull up to the field, click on his iPad and start up the pivot. Another example of the convenience he enjoys from this tool is when his electrical co-op has to cut off farmers' wells from 3 p.m. to 8 p.m. on certain days.

"The old way of dealing with this was to drive out to the well at 8 p.m. and wait for the co-op to release it," he says. After the light went off, you could start your well back up. Now I can be sitting at home eating supper, pull FieldNET up on my computer, start all my wells back up at about 8:30 p.m. and never even leave my house."

On their existing pivots, the Davis brothers went with FieldNET Pro with GPS. This is a wireless irrigation controller for existing pivots with mechanical panels. This technology allows pivots to be retrofitted for added intelligence, control and ease of use. They also have the FieldNet mobile app, which, among other things, will text the farmer when the pivot cuts on, cuts off or changes in any way.

"A farmer can set the text alerts to his preference – what he wants to be alerted about regarding his pivot irrigation system," Davis says.

'Scheduling' Benefits

By managing irrigation systems remotely, a farmer may be able to get a better handle on his total watering needs and perhaps do some prior scheduling, says Andy Murdock, Lindsay Regional Sales Manager in Cordele, Ga.

"A farmer can set up a water schedule and have the pivots come on automatically to prevent overwatering," he explains. "Also, if a farmer sees a big rain headed his way, he can pull up FieldNET, turn off all of the pivots that are on and let rainfall take care of that irrigation event, thus saving energy and water."

Variable-Rate Irrigation

In addition to remote irrigation system monitoring and scheduling, technology also exists such that farmers can tailor water to each individual field zone. Variable-rate irrigation (VRI) leads to water savings and getting the most out of crop inputs.

Calvin Perry, University of Georgia agricultural engineer, gives a couple of examples of when it may be of benefit for a farmer to consider VRI.

"If there is soil texture variability in the field that is changing the water-holding capacity, then a farmer may be overwatering in some areas and under watering in others," he says. "Or, if a situation exists where you are watering a lot of non-crop areas and you decide that you don't want to pay the pumping costs to put water out there or perhaps you are applying nitrogen (N) on sweet corn or cotton with the pivot, and you don't think it is smart to put out N on areas that aren't even cropped, then VRI may be a good fit here."

As for water savings, Perry says based on the 50 to 60 VRI systems with which he has worked in the past, he estimates water savings at 15 percent.

Why Waste Water, Period?

In addition to Lindsay's Precision VRI, precision rate technology for pivot and lateral irrigation systems, other products offered are Farmscan 7000S and 6800, developed as a joint venture between Advanced Ag Systems and Designfeats.

Rick Heard, with Advanced Ag Systems, is all about saving water. His mantra is "www." Not World Wide Web, but Why Waste Water, Period? In one instance, he estimated that by installing a 7000S on a particular pivot, the system will save 1.4 million gallons per lap.

Farmscan 7000S can tailor water applied by pivot based on soil variability and anomalies in the field.

The 7000S VRI also can be installed on a pivot to tailor water applied based on soil variability and anomalies in the field such as low-lying areas that stay wet and cause systems to bog down or non-crop areas that don't need to be watered. He said users create VRI maps on their office computers and transfer them to the Farmscan 7000S automatic section control across the field.

A 'Push Button' Option

If a farmer doesn't want to, or doesn't have the capability to generate the maps, he can opt for the simple, easy-to-use Advanced Irrigation Controller (AIC) 6800 with on/off controls, which is like setting an AB line on auto steer. The 6800 has GPS like other VRI products and can be upgraded to a more sophisticated VRI system if a farmer decides he wants to do that at some point.

Here's how it works. Suppose a farmer has a wet spot, which eventually turns into a mudhole as the pivot continues to water that area.

"The farmer can walk the pivot to the beginning of the mudhole and press a button that turns the sprinklers over the mudhole off, then walk it past the mudhole and press another button that turns the sprinklers back on," Heard says. "This will allow the mudhole to dry up without irrigation water being applied there. This process is stored in memory by longitude and latitude, so the pivot knows what to do each time it makes a lap. With most 6800s, the farmer will control a small target area. It also has end gun control."

In many cases, Heard says, as in the state of Georgia, these products have been approved as a conservation tool, and cost-sharing is available through the USDA-NRCS EQIP program.

When asked to look into his crystal ball regarding adoption rate of VRI by farmers, Perry shares his thoughts on the subject.

"If these droughts continue, some sort of government action takes place, if water becomes immediately allocated or more costly or more scarce, I think we will see a lot of these technologies, such as soil moisture sensors and VRI, immediately get more attention," he says.

Carroll Smith is the senior writer for Cotton Farming magazine. Contact Smith at (901) 767-4020 or csmith@onegrower.com.

Individual Row Control

Technology provides benefits, promotes innovative seeding methods.

By John Fulton

Planting remains one the most important, if not the most critical, operation on farms since it establishes all subsequent field operations along with impacting seed emergence and spacing. While planter technology has seen improvements over the last 10 years, technology to more precisely place seed continues to be developed by companies.

Current technology has really reduced skips and doubles, plus provides more uniform seed spacing over past seed-metering units. We also have available dynamically controlled down pressure systems for the row unit and row cleaners to help better maintain seed depth and bed preparation. Automatic section control has reduced overlap or double-planted areas, while guidance systems have provided the same benefit along with producing parallel crop rows.

These two technologies collectively provide substantial savings on seed and enhance harvesting since rows are not too close together and don't have double-planted areas that generate difficulties for harvester operators. A preliminary study being conducted by Auburn University and the University of Tennessee has indicated a 12 to 52 percent loss in corn yield and over twice the harvest loss in double-planted areas. Therefore, section control and guidance can provide benefits above and beyond just the seed savings.

Row By Row

There continues to be exciting new technologies to help improve planting and, most importantly, monitoring of seed metering. Recently, companies have provided the capability of displays to show seed singulation by row, allowing operators to watch how individual rows are performing relative to target rates. This capability is enabled by new seed tube technology with sensors that can accurately count seeds and identify if doubles are being dropped.

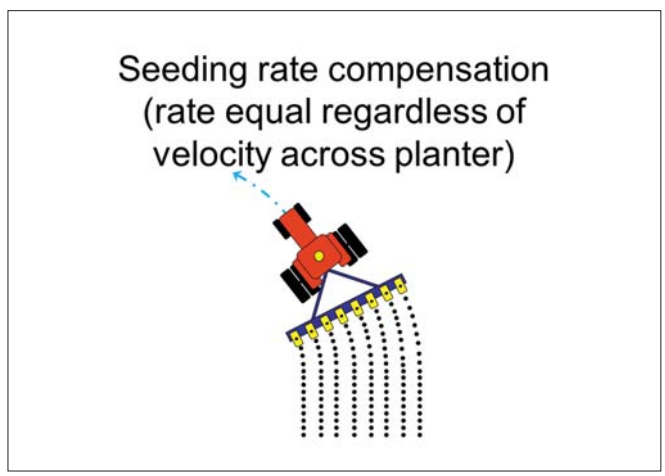
The combination of these technologies allows one to ensure seeds are evenly metered without skips and doubles. Similarly, it is easier to identify metering or other issues impacting seeding.

So what does the future hold? With display planting capabilities along with accurate seed tube sensors, the next step is to take this singulation feedback and control each row individually. The idea of individual control of each row unit opens up a wide range of planting capabilities and improves seed metering regardless of the operating conditions.

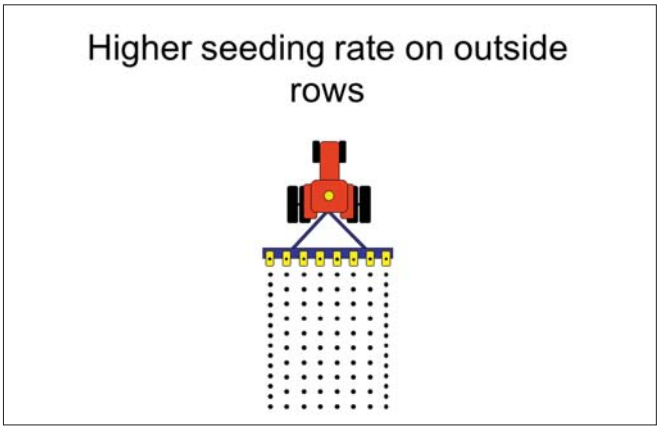
This is accomplished most likely by using a motor (e.g. electric or hydraulic) or some type of mechanically adjustable transmission at each row. Individual row control provides several benefits and also gives producers the ability to develop innovative seeding methods.

Seed Count Feedback

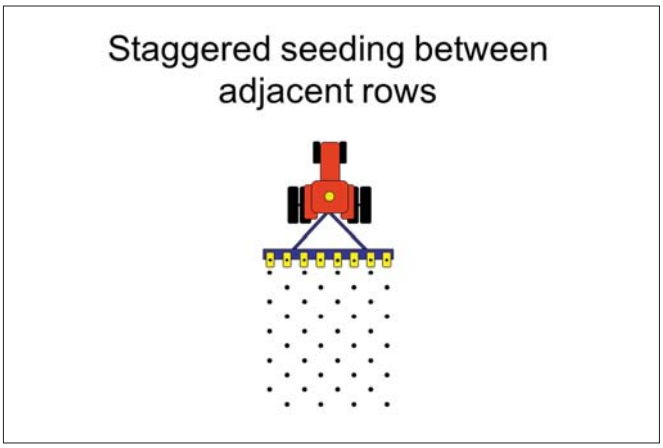
First, calibration is further advanced since each row can be adjusted independently. Therefore, the seed count feedback can be used to ensure the same seeding rate at each row. Calibration is easier and quicker since these seed tubes provide the level of



When traveling in a curved path, rate compensation ensures a uniform seeding rate across the planter.



Outside rows that are exposed to more sunlight may be seeded at a slightly higher rate to increase yield potential.



Staggering plants in adjacent rows may help reduce light interception competition between plants.

accuracy to verify seeding rate by row. To some extent, the planter and technology have the ability to auto-calibrate. The operator just enters the target rate, and the technology ensures that rate is met.

Second, it provides seeding rate compensation during curved travel. We all know that when traveling in a curved path, the inside rows place seeds closer together, while the outside rows are planting too far apart. This rate compensation ensures a uniform seeding rate (seeds/area) across the planter – an important feature on larger planters, especially 12 rows or more. This alone allows farmers to make uniform seeding, uniform!

Along a similar line and third on this list, farmers can control their seed spacing both within the row and also between adjacent rows. One might want to stagger plants in adjacent rows with the idea of reducing light interception competition between plants. Also, outside rows exposed to more sunlight might be seeded at a slightly higher rate to increase yield potential in these rows.

As-Applied Seeding Data

Next, variable-rate seeding along with automatic section control will be handled by the same drive mechanism for each row unit. This ability makes it easier to implement these two technologies since rate and on/off capabilities are at the individual rows.

Fourth, on-farm research can be enhanced with individual row control. Farmers can evaluate seeding rates and different metering strategies to determine what works best for their operation. For the future, as-applied seeding data showing each seed's location and seeding depth measured via a sensor on each row unit will provide another data layer for crop analysis. When coupled with stalk counters on harvesters (several have been developed and evaluated), a producer would have the as-planted and final population data to compare in a spatial context.

Tailor Seeding Techniques

Finally, this type of seed-metering control will permit producers to be innovative. There has been the idea of strip planting different crops within fields to maximize yields. It has worked for some. But I think there are unlimited ideas that could be attempted and evaluated related to planting. In theory, the target rate for each row could be different. Not sure what that might provide from a yield or management benefit, but the point is that we are able to do it today.

Seed companies have set a U.S. goal to double corn yields by 2030. While seed technology will greatly advance crops' yields to meet this goal, we still have to ensure seeds are planted in a way to maximize yield while reducing risk of loss.

Current and new planting technology will give producers the capability to push crop yields by tailoring their seeding techniques and ensure planters are operating at peak performance. The idea of crop management by individual corn plants might not be too far off, and precision agriculture technology is permitting us to get to that level of management.

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Turnrow Access

Crop consultants are taking it to the field.

By Carroll Smith

During the growing season, crop consultants run hard. More than ever, they are using technology such as smartphones, laptops, tablets and handheld computers plus special software to help them do their jobs more efficiently and stay in touch with their growers via phone calls, texts and emails.

"I like the iPads," says Arkansas consultant Chuck Farr. "I have all of my CDMS labels on my iPad, so I can look up any label at any time. I also keep a Verizon wireless wi-fi card in my truck so I can use my laptop to get on the Internet while out in the field. I don't know any consultants who don't have laptops and GPS in their trucks."

Arkansas crop consultant Chuck Farr loads all of his scouting reports onto his laptop while taking a lunch break at a local farm shop.

Another piece of technology that Farr uses more than anything else is a smartphone. If he needs to take a picture and send it to someone instantaneously, he can. He emails all of his scouting reports to his farmers using his phone, too.

FieldRecon And FieldRX

David Hydrick, another consultant in northeast Arkansas, is a big fan of FieldRecon computer software, which he uses to do all of his scouting. FieldRecon allows him to enter the names of all of his farmers and their fields into laptops. Then when the scout who is driving highlights the field he wants to go to – and because GPS is tied into FieldRecon – he can drive straight to it.

At the end of the day, all of the scouts copy everything they did to a jump drive and give it to Hydrick, who then imports it into his laptop. At that point, he can email each farmer's data right to him.

According to the FieldRecon Web site, "FieldRecon is based on the journaling concept. Activities that occur in the field are recorded as journal entries much like a daily log. Journal entries are recorded for various field activities, including planting, scouting, recommendations and pesticide applications. All entries can be displayed or filtered by date, activity and field."

Hydrick also uses an iPhone to send emails, keep up with his calendar and check the commodity markets while out in the field.

"The great thing is that most farmers have smartphones," he says. "When I email farmers my report, it's linked to their smartphone account, and they pick it up immediately, whether they are in Paris, Alaska or down at the coffee shop. They know I ran that day even if they didn't see me."

Hydrick also utilizes FieldRX software, which, according to the Web site "is an innovative and independent Web-based precision ag engine designed to create site-specific field prescriptions. Engineered by ag professionals for ag professionals, FieldRx is a new tool that allows agricultural dealers and crop consultants to create customizable site-specific recommendations based on grower preferences and spatial variability in the field. With the flexibility to accommodate multiple input sources and the automated upload of field information, this software has features to help you generate prescriptions with greater efficiency and reduced frustrations."

"We do all of our variable-rate fertility work with FieldRX," Hydrick says.

He also uses a Trimble Nomad handheld computer with built-in GPS to soil sample. This handheld is designed for rugged outdoor use, and the customer can pick the features that he or she needs. When it comes to crop consultants and ag technology, it appears that today's consultants are definitely hooked up.

"Whatever we would have in our offices in the wintertime is virtually in our hands during the summertime in our pickup trucks," Farr says. "Our office *is* our pickup truck during the growing season."

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Smart Phone Apps Search Tool

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Health & Fitness	Recall Watch	Designed for finding and sharing government health and safety recalls. Supports most government health and safety recall warnings including: FDA, CPSC, USDA/FSIS, MedWatch, Pet Health, and National Highway Traffic Safety Administration. Share important information via Facebook, Twitter, Text Message, or E-mail.	0.2 MB	recall, agricultural market	for all Android versions, supports App2SD	Stellar Computer Systems	http://www.stellarpc.com/

This simple-to-use smartphone apps search tool was developed by the University of Arkansas Division of Agriculture primarily for ag users.

Mobile phone usage is growing globally. At the end of 2010, 77 percent of the world's population subscribed to a mobile phone compared with 28.7 percent having Internet access, according to the International Telecommunication Union. App use has also expanded wildly. Earlier this year, Apple marked the 10 billionth download from its App Store.

An Extension engineer for the University of Arkansas Division of Agriculture has developed a search tool to find help users find just the right app among the thousands created across multiple smartphone operating systems.

"It is safe to assume that farmers, consultants and county agents will start relying more and more on smartphones by using either a number of smartphone applications, or mobile-friendly Web applications, in the near future," says Dharmendra Saraswat, assistant professor/Extension engineer for Biological and Agricultural Engineering.

Saraswat said the Smartphone Apps Search Tool "mainly caters to the agricultural users who have the option to search for free or paid apps using a list of keywords that dynamically varies as per user's choice across four major operating systems – Android, Blackberry, iPhone and Windows 7."

The tool is simple to use. There are three pull-down menus that narrow the search by operating system, by cost of app and by keyword or phrase.

Working with Saraswat on the search tool were Kandasamy Prasanna, Extension program associate for the University of Arkansas Division of Agriculture, and Benjamin Hancock, a University of Arkansas graduate student.

The new apps search tool can easily be accessed online at: **http://baegrisk.ddns.uark.edu/geospatial/smartPhoneSearch.aspx**.

Information for this article was provided by the University of Arkansas Division of Agriculture. Following is a sampling of agricultural apps for smartphones that was compiled using this new search tool as well as other sources.

Name	Description
AccuWeather	With GPS technology and new, interactive Google maps, the application makes it possible for you to get detailed and up-to-date weather forecasts and news wherever you are in the world. (Android, Blackberry, iPhone, Windows mobile)
DuPont TankMix	According to the iTunes Store, the DuPont TankMix Calculator App allows you to easily calculate the amount of product you will need to treat a specific field area, the amount of product you need to apply to a specific tank size, the amount of water you'll need to treat a specific field area or the amount of product you need to get the desired volume-to-volume ratio. (iPhone, iPod touch)
Farmer's Partner	This app, available for $4.99, enables a farmer to input dozens of variables to create a complete overview of the farm operation. Commodities pricing and breaking news are both built into the app, giving the producer both historic and up-to-date information to allow him to make the best decisions on marketing his grain. Farmer's Partner allows you to select the type of crop (corn, soybeans, milo or wheat), field type (dryland or irrigated), production cost inputs (including number of acres, insurance percent, APH yield, insurance yield and many more), sales history (track each sale by date, bushels sold, cash price, delivery period, buyer), profit and loss (factor in basis, offset and contract plus your historical sales information and cost inputs to help you make informed decisions about your grain marketing). (Android)
Genuity SeedSelector	This easy-to-load Blackberry app helps farmers find seed varieties with Genuity traits that are adapted to their soil type and maturity zone. It includes a complete listing of corn, soybeans and canola seed with the latest traits, such as Genuity Roundup Ready 2 Yield Soybeans and Genuity SmartStax Corn. The app allows a farmer to quickly sort seed varieties by soil type and maturity zone. The Genuity Seed Selector displays detailed information of each specific variety and allows farmers to easily contact seed companies by email or phone.(Blackberry)
Growing Degree Days	According to App Shopper, the Growing Degree Days app measures the maturity of your crop by viewing current and past growing degree days data for your farm's location. Growing Degree Days (GDD) are a measure of heat accumulation used in agriculture to predict the date that crops will reach maturity. Touch the map pin to display growing degree days for your current location. Move the map pin to see growing degree days for a different location. Growing degree days are listed by month and summarized for the year. The current year's growing degree days are compared to the previous year's growing degree days. GDD can now be viewed either in Map or Text mode. More detailed weather information added including: current conditions, animated radar, hourly forecast, extended forecast and severe weather. (Android, iPhone)

Name	Description
Hurricane Hub	The Hurricane Hub is a comprehensive guide to hurricane season, whether you live in an area impacted or if you're just interested in major storms. Keep up on latest reports, track the storms and ask people to check on your home or family and friends. Become part of the storm reporting process by going to Eye-reports and uploading photos or just by telling others what you see. (Android, iPhone)
iSpeak Spanish	According to the iTunes Store, the iSpeak Spanish app translates English to Spanish. Simply enter the text you want to translate, press the translate button and then press the "Speak It" button to hear your translation. (iPhone)
KIS Futures	According to the App Shopper, KIS Futures allows you to track prices on commodity futures and options. It also gives you a detailed snapshot (24 hours a day) of high, low, last and net change of multiple commodities markets and options, too. KIS covers all major commodities exchanges, automatically updates contracts and provides full technical studies on charts. It also has trustworthy quotes. A good Internet connection is needed for market data. 3G or Wi-fi will give optimum results. Quotes are normally delayed 10-15 minutes, depending on Exchanged delayed rules. (iPhone, iPod touch, iPad)
Lindsay FieldNET Mobile	Lindsay Corporation, maker of Zimmatic irrigation systems, introduced this pivot control app for smartphones. The new feature allows growers to fully control and monitor their irrigation pivots anywhere through the convenience of smartphones. FieldNET is an award-winning, Web-based irrigation management system. With the addition of FieldNET Mobile, growers can view the current status of all their pivots in one list, receive system alerts, arrange pivots by predefined groups, view water usage reports and receive a history of pivot run times. FieldNET Mobile is available as an upgrade in all areas serviced by FieldNET. (Android, Blackberry, iPhone)
Precision Earth	Precision Earth is an iOS-based app for collecting soil samples in the field on iPads and iPhones. The application enables users to create field boundaries, sample points and sampling grids in the field and to track collected samples and associate them with grower and farm information. Users also can import shape files and raster data and export collected field and soil sample data as shapefiles. The app is now available through iTunes for $249. (iPhone, iPad)
Project NOAH	NOAH stands for networked organisms and habitats. Think of Project Noah as a tool people can use to document and learn about their natural surroundings and as a technology platform research groups can use to harness the power of citizen scientists everywhere. Read on to find out how it all works. The Project Noah application has three modes: Spottings, Location-based Field Guide, Field Missions. (iPhone, iPod touch and iPad. Requires iOS 4.0 or later.)
SoilWeb	GPS-based, real-time access to USDA-NRCS soil survey data, formatted for the iPhone. This application retrieves graphical summaries of soil types associated with the iPhone's current geographic location, based on a user defined horizontal precision. Sketches of soil profiles are linked to their official soil series description (OSD) page. Soil series names are linked to their associated page with the CA Soil Resource Lab's online soil survey, SoilWeb. An up-to-date map of where data is available for queries can be found here http://casoilresource.lawr.ucdavis.edu/soil_web/national_status_map.php. (Android, iPhone, iPod touch and iPad. Requires iOS 3.1.2 or later)
The Weather Channel	The Weather Channel takes your weather experience to the next level with animating radar, hourly and extended forecasts, severe weather alerts and more. Features include interactive maps, widgets and track your weather via status bar. (Android, Blackberry, iPhone, Windows mobile)
U.S.C. Title 7: Agriculture	According to CNET, this app provides the complete text of Title 7 USC, Agriculture. Features include content current through 110th Congress 2nd Session, complete offline access, all tables Killer full-text search, header only search option, search highlighting, email sections, context-sensitive search, saved search history and bookmarks. Disclaimer: The information in this app is not intended to replace official versions, is subject to revision, and should not be considered legal advice. Tekk Innovations LLC presents this information without warranties, express or implied, regarding accuracy, timeliness or completeness. In addition, this disclaimer may change at anytime. When necessary, consult primary source material. (Android, iPhone, iPad, iPod touch)
WeatherBug	Check current conditions, view animated Doppler radar images and get the latest local weather information and severe weather alerts for your city and thousands of locations around the world. Get extended seven-day detailed forecasts, enhanced contour weather maps, live weather station camera images and much more. (Android, Blackberry, iPhone)
WhatsInvasive	This free app displays local lists of top invasive plants and/or animals (with images and short descriptions to remind you of what they look like) that have been identified by National Park Service or other invasive management authorities. You can browse these lists of species, and if you see one of them, then click the species name to send the GPS location to the experts. You can add a photo and text notes to your observation as well. (Android, iPhone coming soon) *Publisher's Note: These apps represent only a partial listing of all of the apps available for use in agriculture. Inclusion of an app does not imply endorsement, and exclusion of an app does not imply dissatisfaction.*

The Prime Meridian team from left to right: Charity Ogle, GIS Associate and Account Manager; Justin Ogle, Vice President and Head of GIS Operations; Steve Cubbage, Owner and President; Diane Ray, Customer Service and Business Operations Manager; and Brad Majors, Precision Hardware Consultant and Support Specialist.

Online Data Storage

New service allows farmers to securely store and share precision ag data.

As the use of precision ag technology becomes more widespread, so has the need for farmers to have an independent and secure home to store all of their precision ag data – both the original monitor and processed data. Today, precision agriculture data services company, Prime Meridian, gives producers a secure site, through **www.PrimeMeridianData.com**, to do just that.

"The ability to store data. The ability to share data. All designed with the farmers' and retailers' needs in mind. That is the focus of Prime Meridian," says company president, Steve Cubbage. "We are a facilitator, kind of a precision ag middleman who works with multiple parties to collect and analyze that data and put it back in a nice, neat package. This helps the farmer and the retailer decide what they want to do with the data. We also work with the retailer to enhance what he may already be offering from a precision standpoint."

Free, Online Account

Farmers can sign up for an online 1GB data storage account with Prime Meridian at no charge. For example, data from a yield monitor or a planter monitor or any GPS information that is vital to their operation can be uploaded to the site and stored.

"The main thing we want to emphasize to producers is that it is vital to store and archive your original data right off of your yield, planter or any other precision monitor's data card," says Cubbage. "That's data that can never be recreated, so treat it like an original land deed and put it in a safe deposit box. That's one of the main objectives behind Prime Meridian – to be a safe deposit box for precision ag data."

Also, any data collected by a retailer or an aerial applicator, for example, should be uploaded to the farmer's account so the farmer's entire precision team can work together. Once data has been collected, analyzed and uploaded, farmers can invite people they trust to securely access specific pieces of data without opening up the entire account to them. Two examples to illustrate this service's efficiency to a farming operation are as follows:

1. If a farmer has to submit fertility management data to the USDA to comply with a government program, instead of having to deliver all of the paperwork to a local office and maybe go back and forth a few times, he can invite the USDA official to access that data online from the Prime Meridian account.

2. If a farmer has yield data that he needs to share with his precision ag team, he can give them access to that data through his online Prime Meridian account without having to stop what he is doing and drive somewhere to drop off his yield data card.

Multi-Year Packages

One of the unique things Prime Meridian offers to farmers through their local premier retailers is multi-year Prime Packages.

"Retailers sell the packages to farmers, not just for one year, but for four years," Cubbage says. "The charge is X amount of dollars per acre per year, depending on which package the farmer chooses. It's important to build on the data from year to year.

"If a farmer misses a year of data collection, that creates a void," he explains. "You can never re-create data from a crop year. It has to be recorded. Our intention is to integrate what a farmer really needs to do to get the most out of his precision agriculture investment. The real question at the end of the day is, 'Are you farming for a year, or are you farming for a lifetime?'"

Prime Meridian contributed information for this article. For more details, visit ***www.PrimeMeridianData.com.***