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"Alberta has approximately 26 million acres of annually seeded crop land. Every field is unique and requires its own prescription map to use VRT effectively."

HARNESSING THE POWER OF VRT

New knowledge aims to put more of the variable rate opportunity in farmers' hands

There's no doubt it's an attractive concept. New variable rate technology (VRT) approaches have the potential to optimize nitrogen fertilizer application, seed application and even herbicide application. That means more efficiency, along with the promise of cost savings and environmental benefits.

But in practice, VRT is an area where progress with the technology has been far ahead of farmers' ability to put it to good use.

The equipment, for most part, is there to perform a range of variable rate applications. But often the solid depth of field-specific information needed to make prescription maps for it is lacking. At the same time, there's a knowledge gap where many producers are in the early stages of learning about VRT and haven't seen a whole lot of data to give them a clear idea of the best approaches and the economics potential those approaches represent.

Now new efforts on several fronts in Alberta are aiming to help fill those gaps. What they all share is an on-the-ground focus.

"The high tech side of VRT approaches is one thing," says project engineer Mike Bevans of the Alberta Agriculture and Rural Development (ARD) AgTech Centre in Lethbridge. "But the other part is a thorough understanding of the land where you plan to use it. That means getting down to the soil level and understanding all the factors involved, including responses under different environmental conditions. The more information you can get, the better your opportunity for success."

The precision approach

More farmers are becoming familiar with the basics of VRT, which is a particular way of applying the core technology of precision farming to manage variability in fields. In practice, this is essentially a process of applying different rates of inputs to different areas of a field, with a goal to optimize those applications for benefits such as lower costs, better yields, environmental advantages and overall higher returns.

In practical terms, VRT is typically accomplished by developing a prescription map for a particular field, transferring the map information to a controller in the cab of the vehicle, and driving the field. The controller changes the application

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rate based on the prescription map, and records how much was applied where. Some more advanced VRT approaches can also be done on-the-fly, using sensors that measure what is needed by the crop and adjust the rate accordingly in real time.

Prescription maps often break fields into five to 10 management zones, based on soil tests, topography, aerial photos, previous yields and other factors, depending on the technology and information available. To help evaluate the effectiveness of VRT approaches and collect data for use in future years, yields are typically measured in each zone and a check strip, using combine yield monitoring and GPS systems.

Managing variability in fields

Indications are that precision farming and VRT are growing steadily in adoption for use in seeding and fertilizer application. There is also potential to use VRT for spraying though there are hurdles to overcome for this option to become more viable. For all three options, many see VRT approaches gradually becoming more common.

"There's anecdotal evidence that VRT is working in the right situations," says Bevans. "However, it is a difficult area to evaluate because there's simply not a lot of information out there on the methodologies involved. Most producers who are doing this are working directly with companies and it seems that everyone is approaching it a little differently."

For example, some producers will base their approach solely off yield maps, while some will go off satellite imagery and some will go off soil sampling. "It may be that there's lots of different ways to get good results. But we haven't seen a lot of data to show the best approaches for different situations."

Records anchor success

More information and data is expected to gradually emerge, including through ongoing field studies by ARD and partners. In the meantime, Bevans advises a cautious, hands-on, eyes-open approach for farmers who are testing the waters.

Like in so many areas of farming today, one of the most critical things is to have good records – the more years and more detail they cover, the better, he says. "When you try a VRT approach, it's important to have the ability to compare what was done and the results from the period before the practice change to the period after the practice change. Records are the only way to do that. Otherwise, when you see a result such as higher yield, you don't know if it was due to VRT or some other factor. Good records also help you have a better prescription map that is likely to be more effective."

The producer needs to keep meticulous records of yields, inputs and a number of related key factors, to really be able to make a good decision, he says. "It's the only way to answer the question, 'Is VRT worth it for my field?' Don't simply take someone else's word for it. Keep the knowledge and the management decisions in your hands." ✦

KICK-STARTING NEW VRT PROGRESS

Several fresh resources and efforts are coming on stream that will support producer decision-making on VRT.

Advanced VRT manual. Developed by the Agricultural Research and Extension Council of Alberta (ARECA), this new manual builds on the more basic version released earlier and is titled Advanced Precision Farming and Variable Rate Technology: A Resource Guide. "We've put a lot more depth into many areas of the manual, in particular the GPS and GIS mapping components," says Ty Faechner, Executive Director of ARECA. It's available free of charge at www.areca.ab.ca for reading or download.

Economic data. ARECA has also supported field trials over 2009 and 2010 to better understand the economics of VRT. The latest results were analyzed in early 2011 and have yielded mixed findings, says agricultural economist Dennis Dey, a consultant on the project. "There is no clear cut evidence to make the case that a farm business will be better off implementing VRT compared to their current practice of applying a constant, single rate application of fertilizer," says Dey. "However, the data and the economic analysis do provide a better understanding of the constraints to be overcome and the opportunities that variable rate applications of fertilizer might provide in the future."

Right now, the indications are that whether VRT pays or not depends largely on the specifics of the field, the knowledge that producers have available on that field and how well they use that knowledge to their advantage. "For variable rate fertilizer applications, the key is having good knowledge of the fertilizer response pattern for each zone within a field," says Dey.

New large scale Alberta project. ARD has its own major project, recently underway on a broad basis in Alberta, to further help address the economic question as well as support strategies on best methodologies. Mike Bevans of the ARD AgTech Centre plays a key role in the multi-level, multi-institutional project, which is headed by ARD agronomy research scientist Ross McKenzie.

"The big focus of this study is to look at what is happening on the ground under a wide variety of field conditions, with the idea of using this information to design methodologies for using VRT for fertilizer application," says Bevans. "Research and knowledge to develop variable rate fertilizer prescription maps is lacking for the Canadian prairies. This project will help remove that barrier."

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