Understanding your soil's yield potential

by Laura Rance, Farmers' Independent Weekly

Just about any farmer in this province can look across his or her land base and point to where the best and worst yields are typically harvested. Curtis Cavers and Mitchell Timmerman, land and nutrient management specialists with MAFRI's Soils and Crops section, can look up those same co-ordinates on agricultural capability maps and tell that farmer why.

Extension agronomists are just starting to connect the science that has gone into developing the land classification system with farmers' intuitive knowledge of their land's capability.

Connecting the "what" of yield with the scientific "why" are key to improving the "how" of improving nutrient management efficiency in this province.

And it is truly a win-win-win situation: it puts more money into farmers' pockets, protects land and water resources from nutrient overloading, and spares the province the high cost of enforcing regulatory compliance.

If incoming nutrient management regulations — about as welcome in farming circles as a nuclear missile — are the stick, the carrot in this whole equation is the reality that farmers can have the best of both worlds — better economic returns and be in society's good books.

"If you bring the agronomy and economics back into it, I think you have a much better sales pitch and you are going to arrive very close if not exactly at the same place. Everybody wants the same thing, but we're coming at it from very different perspectives," says Cavers.

More than a soil test

From a land and nutrient management perspective, managing crop fertility goes much deeper than knowing how many nutrients are in the soil.

"Before you get to how you apply the nutrients the thing you need to get to is — what do you think the yield potential is in that area?" says Cavers, who worked with several department colleagues last year hosting workshops in farm fields across the province.

It goes much deeper than the soil test. In fact, using that as the farmer's only guide to nutrient management can result in some miscues.

"It is easy to misinterpret what a soil test is telling you, or over-interpret what it is telling you," Cavers said.

"Residual nutrients are just that, how much is left over. A critical thinker has to ask why is there as much left over as there is."

Yield potential is determined by available nutrients, but also by the soil's texture, salinity, moisture-holding capacity, how well it is drained and its slope. And don't forget to factor in past management practices, such as the rotation, whether it has been tilled

extensively, left prone to erosion, zero-tilled, cropped intensively, or grazed.

"Then we can start to look at some realistic management solutions, either to reduce risk, reduce cost, increase yields, avoid nutrient losses and not run into this pseudo-regulatory problem," Cavers says. With that as a starting point, farmers can then assess their options.

"You can start to talk about the poorer areas of the field, is there anything we can do to kind of improve the productivity or if nothing else lower the cost?"

Timmerman says it's important for farmers to realistically assess their yield-limiting factors. They aren't always related to available nutrients, which means they can't simply be fixed by adding more.

"The limitation supercedes anything that can be done to address it, and therefore it comes down to efficiency. Is it worth putting the same inputs into that part of the field as the rest? And can that reasonably be done based on the layout of the field?" he says.

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The three R's of farm energy consumption

by Laura Rance, Farmers' Independent Weekly

"Reduce, re-use, recycle." It works in farming too.

Research and extension agronomists say there are ways farmers can reduce their energy consumption, re-use their input investments, and recycle the nutrients on their farms. Researchers Cynthia Grant with Agriculture and Agri-Food Canada in Brandon and Martin Entz at the University of Manitoba say farmers can come at the nitrogen question from four different angles.

They can produce crops with low nitrogen requirements, produce their own nitrogen, use alternate nitrogen sources, and optimize their application efficiency.

For example, flax is a crop that uses relatively low amounts of nitrogen relative to high-yielding crops such as corn or barley and high-protein crops such as canola.

Here are some other energy saving options:

• Zero-tillage: Moving from a conventional tillage to a no-tillage system can reduce energy use on the farm by 15 per cent without reducing crop output. There is a corresponding decrease in tractor hours and labour.

Many farmers in the heavier soils say zero tillage won't work for them. It's true the technology evolved as a way for farmers to conserve moisture. It is also true that the problem facing many farmers these days is soggy soils.

But it was farmers who adapted the original machinery to make the system work on their farms in the first place. They've done it before; they can do it again.

• Perennial forages: Adding perennial legumes to the rotation can cut energy use by as much as 35 per cent in addition to producing significant amounts of nitrogen for following crops. According to Manitoba Agriculture, Food and Rural Initiatives, alfalfa can provide nitrogen benefits for up to seven years after removal.

Grain farmers have traditionally shied away from this practice because they don't know how to market forage and don't want to reduce their annual productivity. Perhaps a more realistic approach would be to look upon the forage part of their cycle as channelling productivity into high-value energy crop instead of a commodity that sells for below the cost of production.

• Grazing forage instead of removing hay and hauling it to the livestock reduces fuel costs but also reduces fertilizer requirements when the land is converted back to annual grain production.

• Growing grain legumes once very four years reduces nitrogen fertilizer requirements by 25 per cent, which equates with an approximate 12 per cent reduction in overall energy use over a four-year-rotation.

• Legume cover crops can reduce nitrogen fertilizer needs by as much as 50 per cent in the following crop. Adding a legume cover crop every other year will result in an approximate eight to 10 per cent reduction in rotational energy use, Entz says.

• Relay cropping involves seeding legume crop directly into an established first crop. One example is sowing alfalfa or red clover into winter wheat or fall rye in the spring. The cereal crop is harvested and the green manure crop left to grow until the first killing frost. These systems can produce up to 120 kilograms of nitrogen per hectare, of which about 60 per cent becomes available within the next two years.

• Intercropping: Growing a pulse crop in the same field as an oilseed such as canola or mustard increases output and decreases the amount of input dollars spent.

• Double cropping is when a legume is sown post-harvest and allowed to grow through the autumn season. In soils that are excessively wet, they will also consume moisture.

• Organic farmers, who rely on forages and green manure crops for nutrient production, have been shown to use half as much fossil energy as conventionally managed farms. As well, organic rotations that incorporate forages have been found to be the most profitable, even when production is lower.

Looking for ideas? Check out this website

Finding independent ideas for on-farm application isn't always easy for farmers looking to venture outside of conventional production practices.

And if they do find research, it's often been carried out in some far away place where conditions could be very different from what local farmers face.

Here's one local source worth checking out:
http://umanitoba.ca/outreach/naturalagriculture/

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Less jargon

This process puts a different spin on the hyperbole surrounding precision farming and variable rate fertilizer applications when the technology first hit the market a decade or so ago.

At the time, the sales pitch was maximizing output by applying more fertilizer to low-yielding areas.

"The technology was so sexy, so intriguing, it shot ahead of everything else," Cavers said. "But we never got to talk about why the fields are variable."

The agricultural capability land classification system, which has been around since the 1970s, hasn't been tailored as a tool for helping farmers until recently, as environmental farm planning rises up the ranks of farm management policy.

Recently, extension workers have moved to replace the scientific jargon of agricultural capability into farmer-friendly language and visual aids containing photos that provide comparative samples of different landscapes and agricultural capability factors.

So it is much more than a bunch of maps. It is a way of quantitatively measuring the different characteristics of soil that contribute to yield. Characteristics such as texture, slope and salinity will determine how capable the land is of using the nutrients farmers offer it.

That could entail a host of management strategies ranging from varying fertilizer rates to changing the crop rotation or tillage practices to maximize the soil's capabilities.

"You are not going to change the soil's properties by adding nutrients," Cavers says. "You have to play the hand you're dealt."