

Columns

AGRI-COACH CORNER

The four Rs of nitrogen use

To get the most of nitrogen fertilizer you need the right source, the right placement, at the right rate at the right time

BY ELSTON SOLBERG

Just like reading, 'riting and 'rithmetic were the basics when we went to school, every now and then we have to remind ourselves about the basics of nitrogen application. Maximizing nitrogen use efficiency requires using the right rate in the right placement with the right source and at the right time for each specific situation. Nothing new here but we have learned and relearned since, and we have new technologies at our disposal, so maybe these basics need a twist.

The discussion started out as a question that came over the Agri-Trend network from an agri-coach in Manitoba who had a client dealing with a lot of fall moisture,

heavy clay soils with high organic matter (OM) and high pH. He was using 0.75-inch Stealth openers on 7.2-inch spacing —about 10 per cent seed bed utilization (SBU) — and wanted to put all his fertilizer needs down directly with the seed next spring (including N as urea). His crops are barley, wheat, oats, flax and canola. His N requirements range from about 90 to 140 pounds per acre. What are his options?

ONE VERSUS TWO OR MORE PASSES

ESN and Agrotain would provide some increased flexibility for seed-placed fertilizer but Agrotain will NOT give nearly enough protection for these rates with these narrow openers unless he seeds

into a moist seedbed and orders rain within one hour to three days of seeding. But then, he wouldn't need to use Agrotain.

ESN is a better option but even this doesn't solve all problems at high application rates. Doug Penney, senior agri-coach with Agri-Trend says, "I see a lot of situations where I think we are trying to do too much with one placement and one blend. I get nervous about conclusions about what is safe based on just a few site years of data. Elston and I were involved in a large study (over 120 site years of data) that looked at rates, sources and SBU. A very important characteristic of the data was that there were very large differences in the amount of fertilizer required to cause injury among sites and years." In other

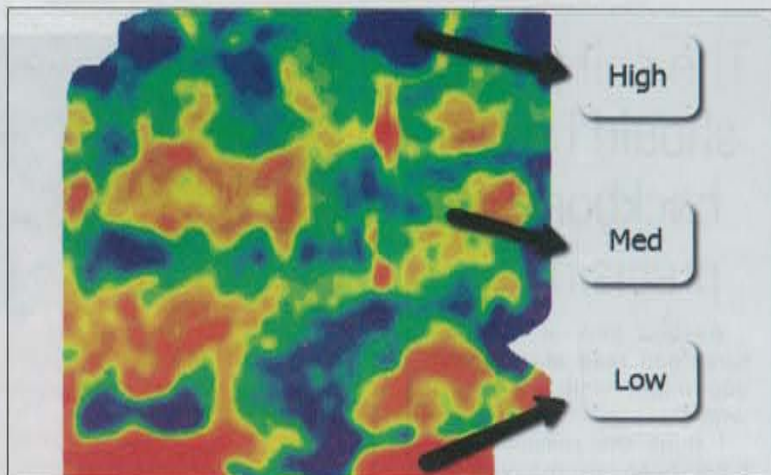


Figure 1. Veris soil EC and RTK elevation index map to segregate denitrification potential zones (map courtesy of Agri-Trend Geo Solutions Inc.).

words, what is safe most of the time is not safe all the time.

What this producer needs to reduce his risk is more SBU, better placement, two passes or all three to consistently achieve the high yields possible in his area.

From here, the conversation went on to the economics of using urea, Agrotain or ESN to when would it make the most sense to use these products.

THE FOUR Rs

Both Doug and I were fortunate to work with Dr. Marvin Nyborg "in the good 'ol days," when he first started to look at differences between fall- and spring-applied N, N sources and denitrification. He was even working with several nitrification inhibitors. Just so you know that times have changed, at least one "eminent" soil scientist was very adamant that denitrification was not an issue in the Prairie Region of Western Canada.

Not only were there regional differences as to the frequency and amount of denitrification losses (much more in central Alberta than southern Alberta) but it depended on where you located the plots in the field. Losses of fall-applied N were minimal on upper divergent slopes but frequently quite large on lower slopes.

Here's the twist on the four Rs. It seems apparent there are areas of the field more suited to the ESN or Agrotain products and where the economics of using them would pay much greater over the course of the season. I think there is very good potential for "variable product technology."

There are many situations where 10 per cent to 30 per cent of a field would benefit from ESN in most years. While we cannot predict when we will have excessively wet conditions like those that we experienced this year, we can identify parts of fields that are prone to being excessively wet. Warren Bills, president of our sister company, Agri-Trend Geo Solutions, says, "We have the technology to predict and map where in the field significant denitrification losses are most likely to occur. We can identify those with topography maps from elevation data, Veris (EC readings) and particularly in this year, imagery."

Why not do this and develop a VRT plan based on different nitrogen products of different types? We could simply put ESN and/or Agrotain on the high-risk N loss areas and a blend of these products on the moderate risk zones and urea alone where the risk of N loss is minimal (Fig. 1). N loss risk varies greatly across Western Canada. No matter, this approach can deal with most loss mechanisms, leaching, denitrification and volatilization. Sound crazy? Maybe, but that's what they said about the Wright brothers.

I know product tanks, etc. may currently limit us but given the ingenuity of the farmers out there, I have no doubt someone will come up with a solution. In fact, Warren Bills told me that he worked with a farmer this year who pulled six compartment tanks with his air drill. His front cart (three tanks) was entirely used for urea. This idea isn't that far out there in this kind of a setup. Marvin Nyborg would be impressed, I'm pretty sure.

Elston Solberg is a senior agri-coach and president of Agri-Trend Agronomy.



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