BATTLE RIVER IMPLEMENTS LTD.

AGRONOMY UPDATE

Tapping into Atmospheric Nitrogen

It's no secret that over the past several months the price of nitrogen fertilizer has been skyrocketing, as supply chain issues and natural gas costs have combined to make fertilizer expensive and possibly scarce at seeding time. While some of those concerns seem to have eased over the past few weeks, it is a stark reminder of how much crop production on the Prairies is tied to the price and supply of nitrogen. To make the future even more uncertain, the Federal government's commitment to fighting greenhouse gas emissions by targeting a goal of reducing nitrogen fertilizer use to 70% of 2020 levels, speaks to possible self-imposed shortages in upcoming years.

With all these factors in play, there has been renewed focus on finding ways to tap into all that nitrogen that makes 78% of our atmosphere. Finding ways to have non-legume crops fix their own N is not a new concept. It has been a goal in agriculture ever since we figured out how peas were doing it back in the 1880's. But how we have gone about chasing that goal has certainly changed in the last few decades. In this age of biotechnology, research has centered around 3 main areas. The first is an effort to genetically engineer a rhizobium-root relationship in cereals and canola just as we see in peas and lentils. The second focus of research involves transgenic technology; where N fixing bacteria genes are introduced directly into the host plant, eliminating the need for inoculants. While this may ultimately be the most efficient way to access atmospheric N, it is a complex and difficult task which still seems to be far away, and will likely face fierce opposition from environmental and/or organic farming groups once it is developed.

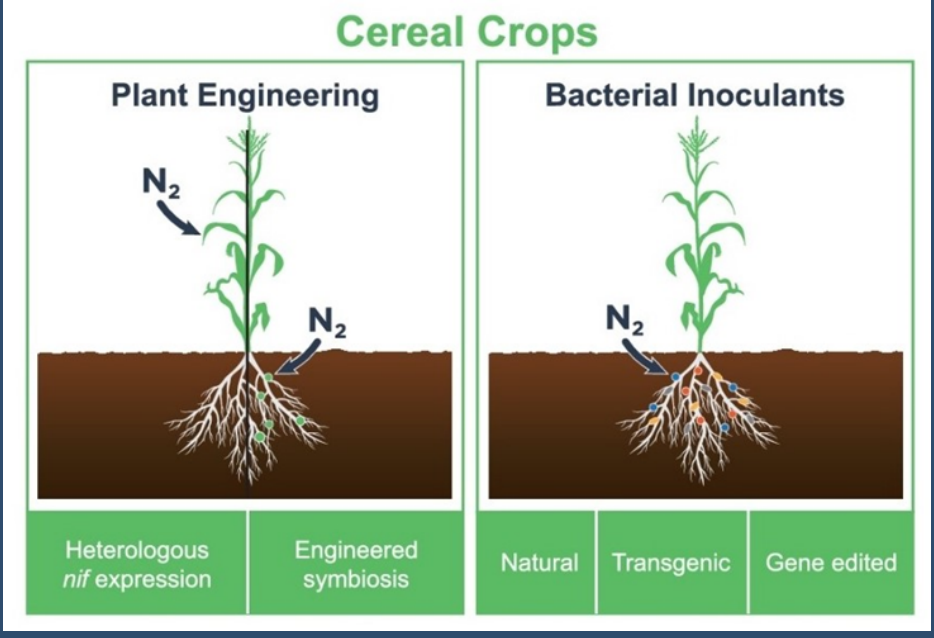

Image from ScienceDirect Vol 62 April 2020

In the meantime, the area of research that has yielded the best results so far focuses on improving bacteria that already exists within some crops such as sugarcane, or can be found in the root biosphere of some crops, so that they can better fix atmospheric nitrogen. At this point there are at least four different products commercially available in Canada that I am aware of and likely more coming. All are naturally occurring nitrogen-fixing bacteria that colonize the leaves and roots of any type of crop, making atmospheric N available to the plant. As I understand it, this is technically a symbiotic relationship like rhizobia has with peas. Unlike that relationship however, the plant expends no energy helping these bacteria colonies grow and survive. The bacteria simply use the carbon that the plants produce as a by-product of respiration anyway.

At this point it is hard to understand exactly how much nitrogen is being supplied to the crop – certainly not enough to replace a significant amount of product out of your fertility plan. But it is supplying a steady source of nitrogen throughout the growing season with no risk of leaching or volatilization, and is equally available to the crop throughout the field, regardless of soil organic matter or slope position. Used as a supplement, these products appear to give small boosts in both yield and quality of most crops on a reasonably consistent basis.

In recent years, we have been conducting trials at the Battle River Training Field aimed at reducing banded N rates; putting on about 80% of what would be required for a 75 bushel wheat crop or a 55 bushel canola crop at seeding time. We have then been using our Crop Intelligence App to model water driven yield potential of the crop, and top dressing N in-season when conditions and crop potential seems to warrant it. Our goal is to determine whether we can get a consistent response to top dressing by using Crop Intelligence to model available soil water and to see if there is any difference in response between applying the N as 28-0-0 through our John Deere sprayer as opposed to applying 46-0-0 through a Salford fertilizer spreader. I am very curious to see where these biologicals can fit into a top dressing program and how much N they can potentially replace. Hopefully we get the in-season rainfall we are going to need to make these trials doable!

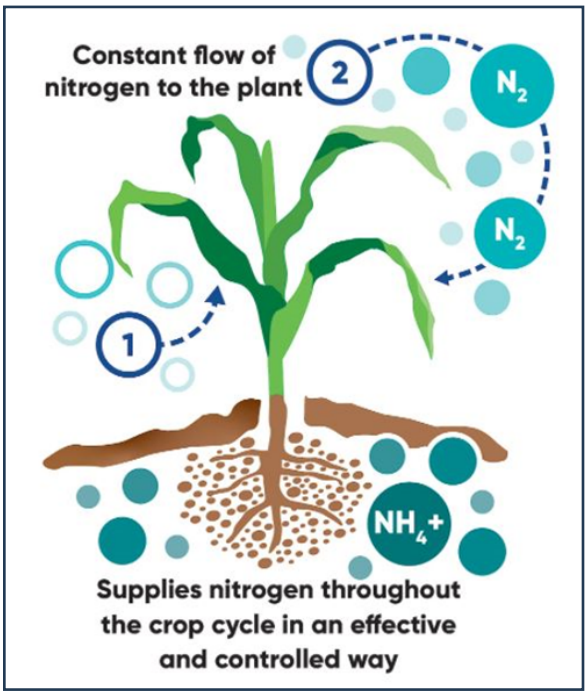

Image from Corteva Agroscience