Agro 100
cultivating innovation

Meet the phosphorus challenge with **Nitro-C**

Nitro-C™/MC 6-2-0

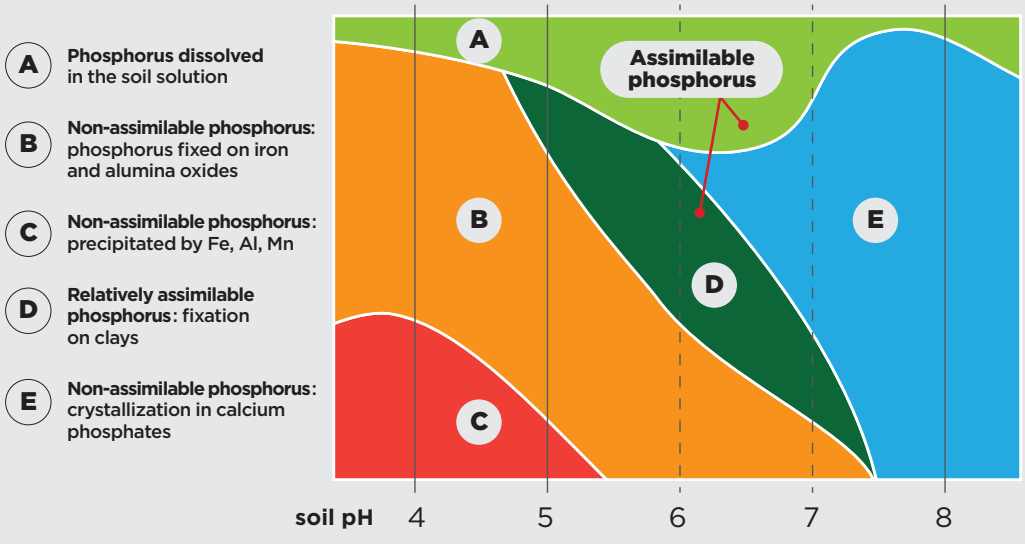
The phosphorus challenge

Phosphorus is essential for plant growth. This nutrient is required for energy storage. It is also a component of the cellular membranes of DNA and RNA. Yet, most of the phosphorus is fixed in the soil and only a small portion (approximately 10–20%) is available to plants. Agro-100 is offering a technology, Nitro-C, that increases plant available phosphorus in the soil solution.

Liquid starters

Adding liquid starters temporarily increases the concentration of phosphorus in the soil solution and helps meet the growing plants requirements in phosphorus. However, certain conditions can influence the adsorption and fixation of phosphorus that is added with liquid starters. The agronomic objective that is established is to maximize the phosphorus concentration in the soil solution by using agronomic practices that reduce phosphorus fixation. Here are some important points to consider.

- Maximize soil aeration in order to increase the activity of soil micro-organisms and the mineralization of organic phosphorus.
- Adjust soil pH to a value between 6 and 7. Soil pH has a direct effect on phosphorus availability. A pH between 3 and 5 will increase phosphorus fixation with iron (Fe) while a pH between 5 and 7 will increase fixation with aluminum (Al). When the pH is above 7, phosphorus will bind with calcium oxide, thus becoming insoluble.
- Soils with a high clay content have a higher contact surface than loamy or sandy soils. Therefore, they will fix a higher quantity of phosphorus on the Al and Fe ions present on these surfaces. Soils high in Al and Fe will naturally fix more phosphorus.



Phosphorus in the soil

Source

Image adapted from UNIFA, *Effets sur la fertilité chimique, biodisponibilité du phosphore.*

Agro 100
cultivating innovation

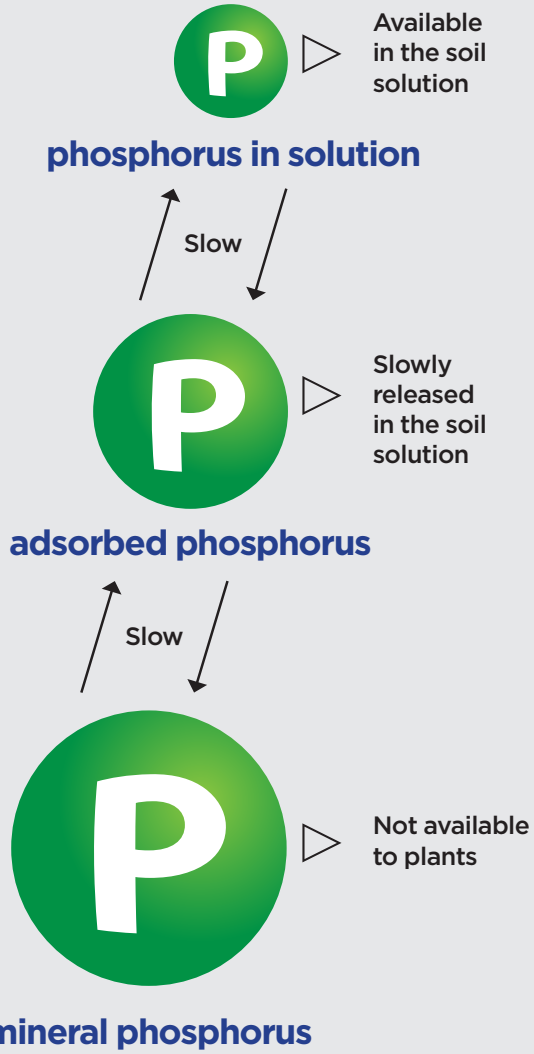
Meet the phosphorus challenge with **Nitro-C**

Nitro-C™/MC 6-2-0

Phosphorus in the soil

Soil phosphorus is either organic or inorganic. Total phosphorus concentrations in the soil vary between 20 ppm and 500 ppm, but most of it (approximately 80%) is not available to plants. Organic phosphorus constitutes 30% to 65% of the phosphorus contained in soils and it must be transformed by soil micro-organisms before it becomes available to plants. Soil conditions that increase the activity of micro-organisms (aeration, temperature, pH, etc.) will enable mineralization of organic phosphorus to inorganic phosphorus. The remaining phosphorus is inorganic and thus potentially available to plants. There are three types of inorganic phosphorus in the soil.

- **Phosphorus in solution** is available to plants. This phosphorus takes the form of $[H_2PO_4]^-$ (pH < 7) or $[HPO_4]^{-2}$ (pH > 7) anions. The concentration of phosphorus in the soil solution is generally between 0.001 mg/litre and 1 mg/litre.
- **Adsorbed phosphorus** is found on the surface of clay sheets and fixed to iron (Fe), aluminum (Al) and calcium oxide ions. This phosphorus is slowly released in the soil solution.
- **Mineral phosphorus**, composed of iron and aluminum phosphates and of tricalcium phosphates, is fixed in the soil and its release is extremely slow.



cultivating innovation

Meet the phosphorus challenge with **Nitro-C**

Nitro-C™/MC 6-2-0

Nitro-C

Nitro-C is a concentrate (29%) of the C-plex technology. This technology was developed to limit the phosphorus fixation in soils, therefore maximizing phosphorus concentration in the soil solution. **Nitro-C** works **by attaching to Ca, Al and Fe ions present in the soil**, thus limiting phosphorus fixation by these ions.

Nitro-C is a very small molecule, increasing its **contact surface** and allowing it to attach to the fixation sites on the clay particles. C-plex molecules present in **Nitro-C** are **charged positively and negatively**, allowing a temporary bind with phosphorus ions present in the soil solution, therefore preventing Al, Fe and Ca ions from fixing them.

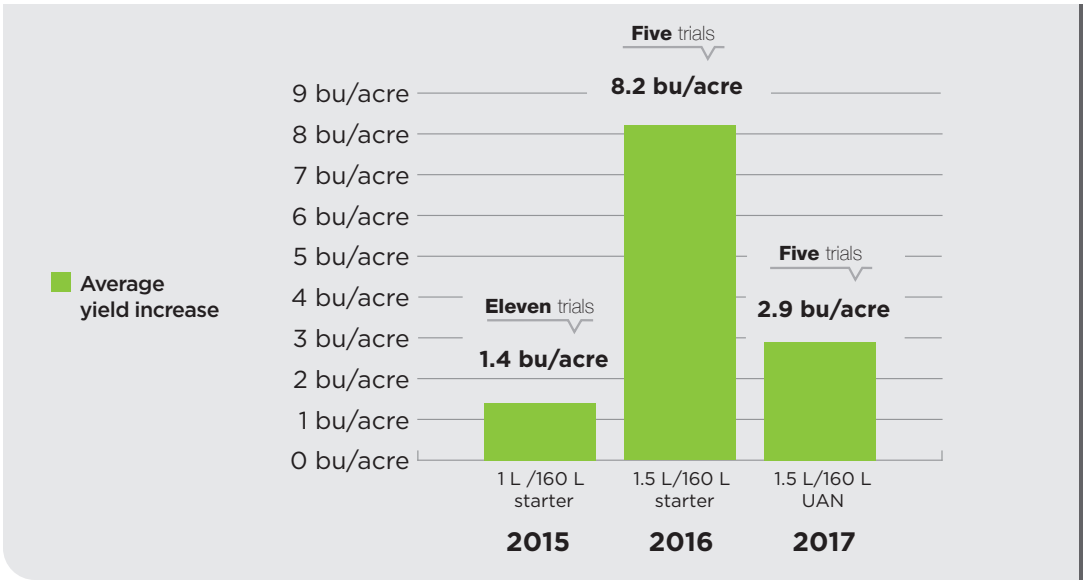
Agronomic results

Agro-100 added **Nitro-C** to liquid starters used by collaborating farmers in 16 corn trials conducted in Quebec and Ontario. The objective of these trials was to measure the impact of **Nitro-C** on final corn yield.

We also used **Nitro-C** in tank mix with UAN 32%, to evaluate **Nitro-C**'s ability to reduce nitrogen losses during the growing season.

Two doses were used: 1 litre of **Nitro-C**/160 litres liquid starter for the first year trials and 1.5 litre of **Nitro-C**/ 160 litres of liquid fertilizer (starter and UAN) for the second year.

The average yield increases obtained were 88 kg/ha (1.4 bu/acre), with a dose of 1 litre/160 litres of starter and 514 kg/ha (8.2 bu/acre) when a dose of 1.5 litre/160 litres of starter was used. The average yield increase obtained when using a UAN solution was 182 kg/ha (2.9 bu/acre). ($p = 0.082$)



Nitro-C corn trials

cultivating innovation

Meet the phosphorus challenge with **Nitro-C**

Nitro-C™/MC 6-2-0

Economic yield in corn trials

Using **Nitro-C** is profitable for the corn farmer. The economic analysis is done using the following parameters:

- An average inclusion rate of 6 kg/mt of **EcoSource** starter (1.2 litre/160 litres of starter);
- A suggested retail price of $20.70/kg of **Nitro-C**. The cost of the technology is $124.20/mt;
- The application rate of the **Ecosource** starter is 200 kg/ha. A metric ton will fertilize 5 hectares (12.4 acres). The cost of the technology is $24.84/hectare ($10.05/acre);
- An average yield increase of 220 kg/ha (3.5 bu/acre) was obtained in the 16 trials. Using a corn price of $350/mt ($8.90/bu), the increase in revenue is estimated at $76.80/hectare ($31.15/acre);

The estimated return on investment for the farmer is estimated at $2.70 for each dollar invested (2.7:1) in **Nitro-C**.

AVERAGE YIELD INCREASE

+220 kg/ha

16 trials

ESTIMATED INCREASE IN REVENUE

+$76.80 /ha

using a corn price of $350/mt

RETURN ON INVESTMENT

+$2.70 (2.7:1)

for each $ invested in Nitro-C

Feel free to contact us to discuss your needs:
we are confident that we will find productive solutions to them.

FOR MORE INFORMATION
email **info@agro-100.com** toll free **1 866 770.8887**

www.agro-100.com

// Nitro-C + Agro-100
a synergy for growth

Complete data and other information available from Agro-100 Ltd.