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# Fertilizer injection



## What is in-furrow fertilization

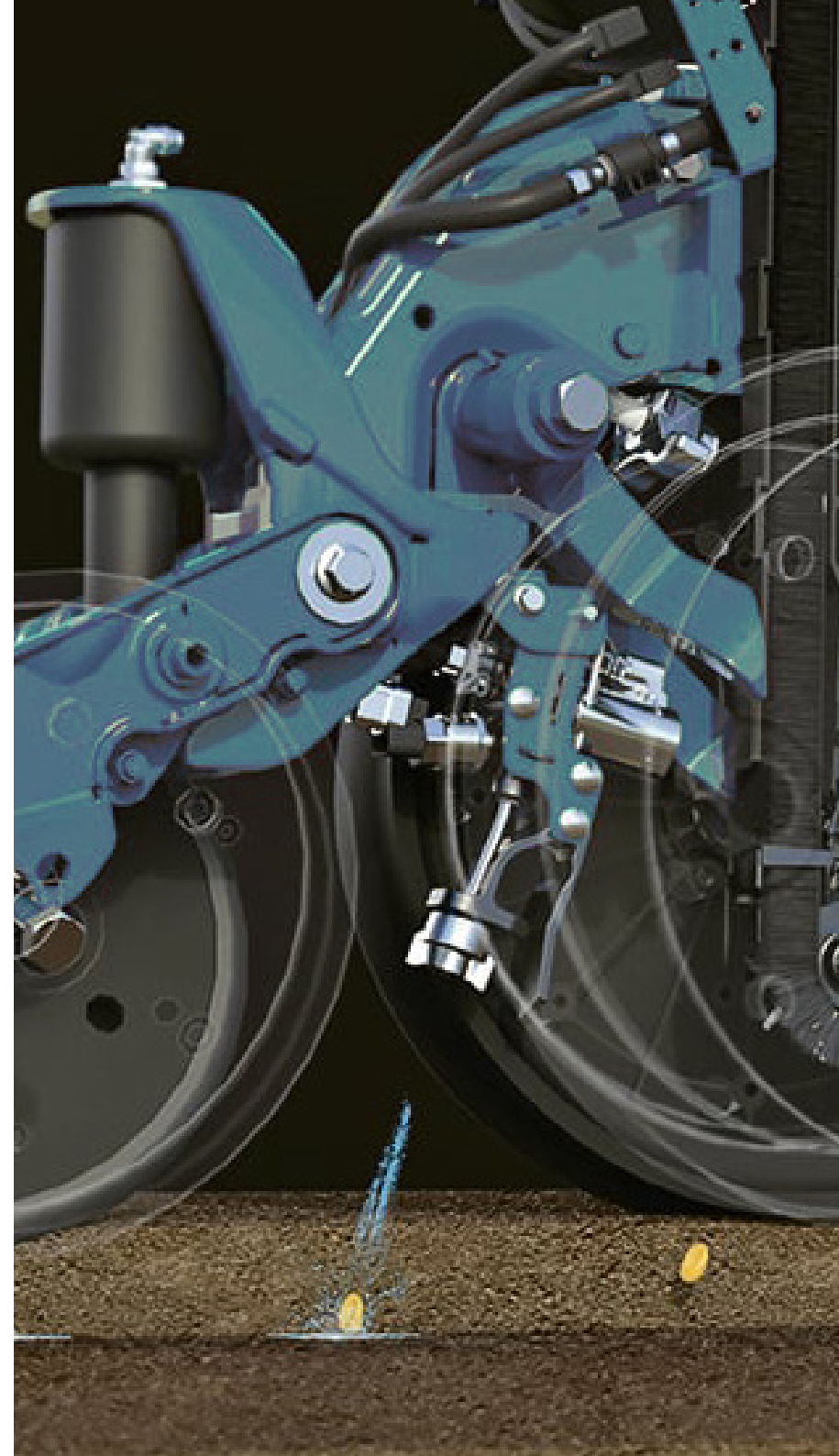
When fertilizers are sprayed directly on the seeds at planting, this is called **in-furrow fertilization**. This method of early season fertility has been shown to support crop growth while reducing overall fertility issues.

According to a study completed by South Dakota State University, **in-furrow fertilization increases yields by 10%** over the traditional broadcast method.

From Michigan State University, in-furrow fertilization also **reduces volatilization and leaching**, there-by increasing the efficiency over broadcast applications.



• <http://bit.ly/3XZBYZA>



## Why does in-furrow work so much

### better than broadcast?

The simplest reason is energy. When the seed is fertilized as it is planted, the **nutrients are located right at the seed's location**. Once germinated the required nutrients are already within reach of the crop roots.

Quite the opposite, in a broadcast system, the roots may have to grow significantly in order to reach the required nutrients in the soil. This energy expansion is "wasted".

Also, when fertilizer is applied to the soil by broadcasting, there are two major transformations that cause it to be out of the plants reach: volatilization and leaching. This takes to a loss of nutrients to the plant and a reduced return on your investment.

Other benefits of the in-furrow system is the **reduced need for nutrients** applied to the field and this will save you a lot of money and time in the field.



• <https://bit.ly/3L7NHCI>

The in-furrow fertilizers are immediately available to the seeds, as they are applied in **direct contact** to them.

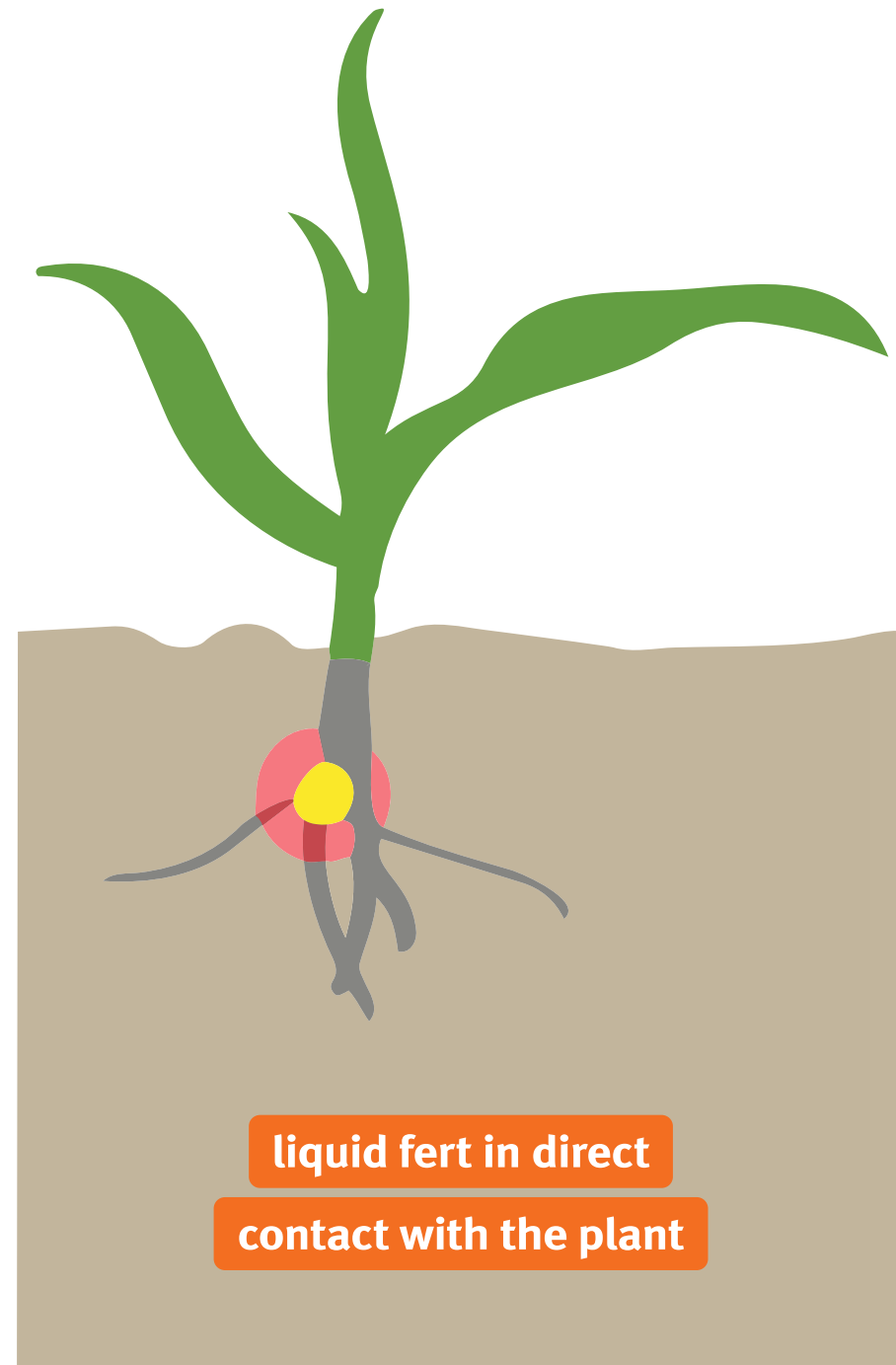
The result is a faster and more even development of the seedlings, with improved stand establishment. This will give the plant a jump start during the early growth stages.

Here we refer to the so called 'pop-up' effect or 'pop-up fertilizers'

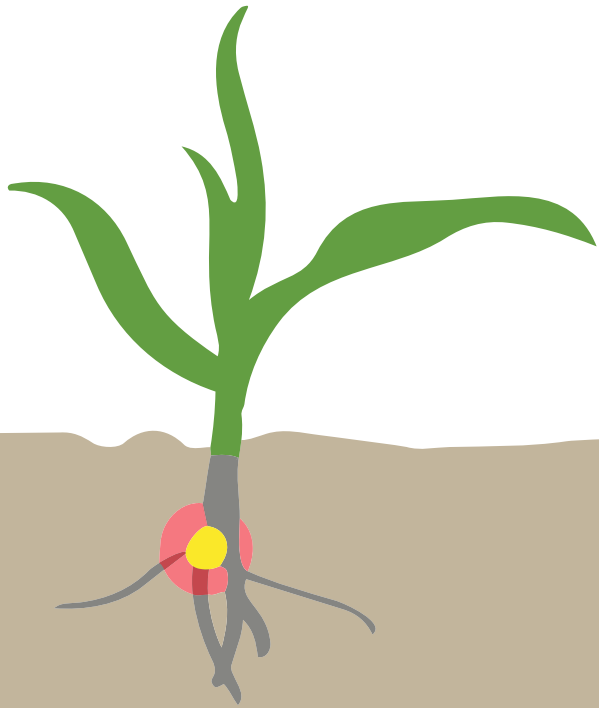
This becomes even more important in cool, wet soils where roots aren't growing as fast. Having a readily available source of nutrients close to the seed, keeps the plants growing through these unideal conditions.



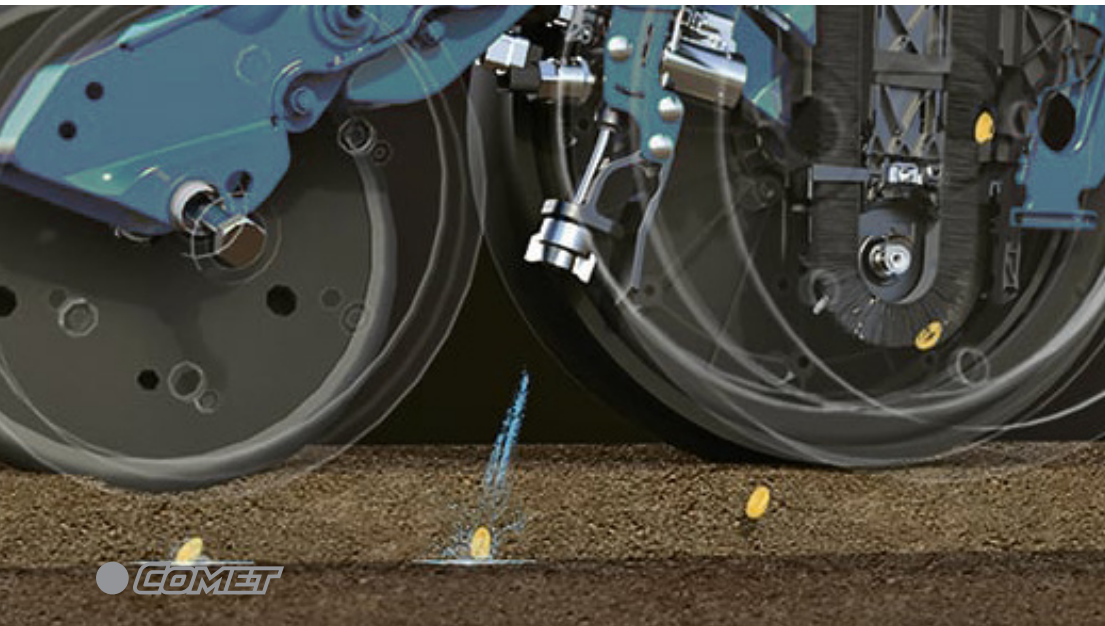
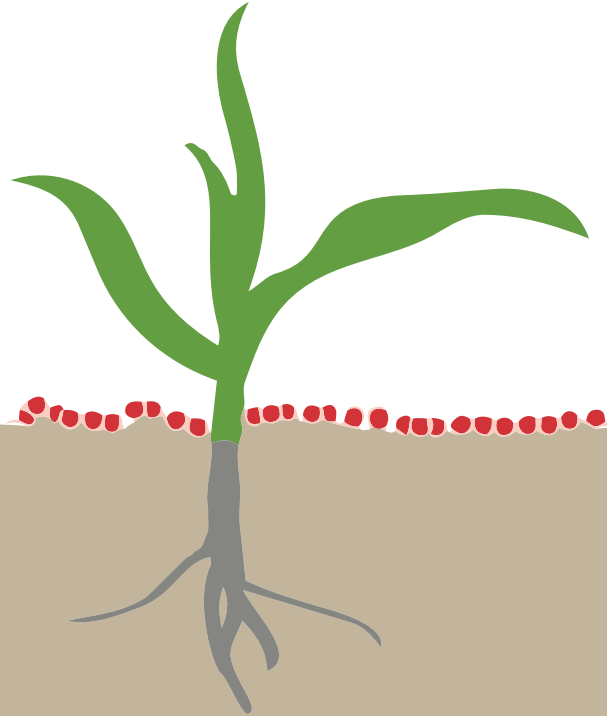
- <https://bit.ly/44vptbL>
- <https://bit.ly/3KPpsZE>



# Pop-up/in-furrow



# Surface/broadcast



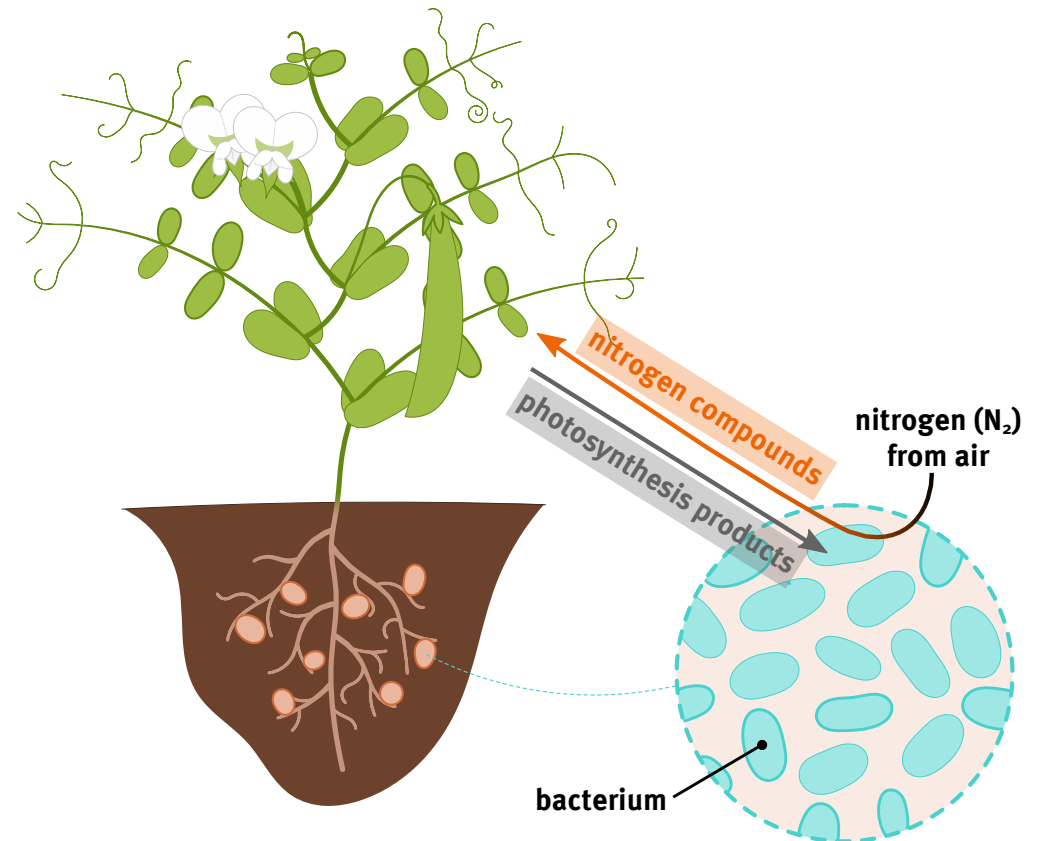
## Spray inoculation

Living organisms need nitrogen because it is a part of the amino acids that make up proteins, and the nucleic acids that make up DNA and RNA.

**BNF (biological nitrogen fixation)** refers to the conversion of atmospheric nitrogen gas into a form usable by plants and other organisms.

In case of legumes (soybeans etc.), BNF is conducted by a variety of bacteria of the genus **Rhizobium** in symbiotic association with plants.

**BNF is the principal source of the nitrogen for plants** and takes place after the rhizobia infect the roots of the plants and form nodules.



BNF – biological nitrogen fixation



- <https://bit.ly/49fvKeh>
- <https://tinyurl.com/48vw7m42>
- <https://tinyurl.com/y3wdxte5>

If the bacteria are not proving optimal, human intervention in the form of inoculation is recommended.

Inoculation may be defined as the process of **adding effective bacteria to the seed**, to make sure that a successful symbiosis is established.

Human intervention may be necessary in case of:  
1) Non optimal soil conditions (acidic soils, soils that are too hot, or waterlogged soils)  
2) Absence of the specific Rhizobium species or biovar needed for the forage crop in question.

If properly inoculated, BNF can fully cover the nitrogen needs of the crop and this can **increase the grain yield and the protein concentration by 40 – 60%**.

The return on this investment is therefore very high.



- <https://bit.ly/49fvKeh>
- <https://tinyurl.com/48vw7m42>
- <https://tinyurl.com/y3wdxte5>

Non-inoculated

Inoculated



The easiest way to inoculate bacteria is to buy pre-inoculated seeds, that have been coated with variable mixtures of bacteria. The main disadvantage is the cost since pre-treated seeds cost more than untreated ones. Also, the viability of the inoculant is very variable.

A second way is to inoculate the seed just prior to planting. The main disadvantage is that the bacterial population will decline over time and be less effective.

The third and most effective way is the in-furrow technology. The Rhizobium is mixed with water to make a liquid inoculant, which can be sprayed directly into the seedbed at the time of sowing.

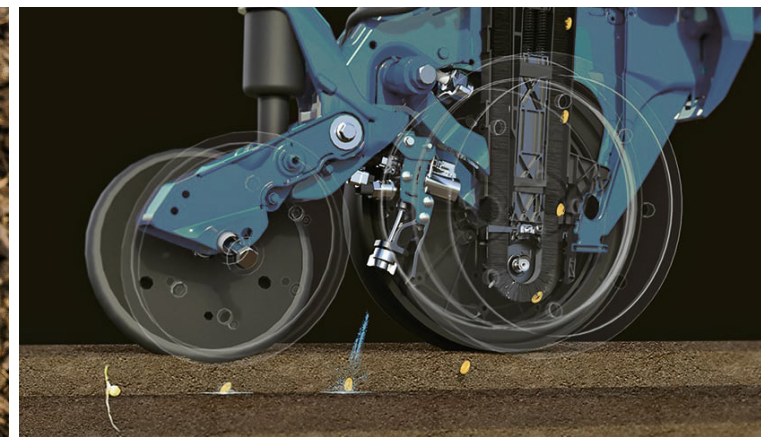
According to the University of New South Wales, **spray inoculation seems to be the best method of inoculation** for broadacre crop legumes, since it has consistently given excellent nodulation and high yielding crops.



Pre-inoculated seeds



Inoculation before sowing



In-furrow inoculation



- <https://bit.ly/49fvKeh>
- <https://tinyurl.com/48vw7m42>
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## In-furrow fertilization:

### how it works

A liquid spray system is normally mounted on a seed drill, as a separate kit.



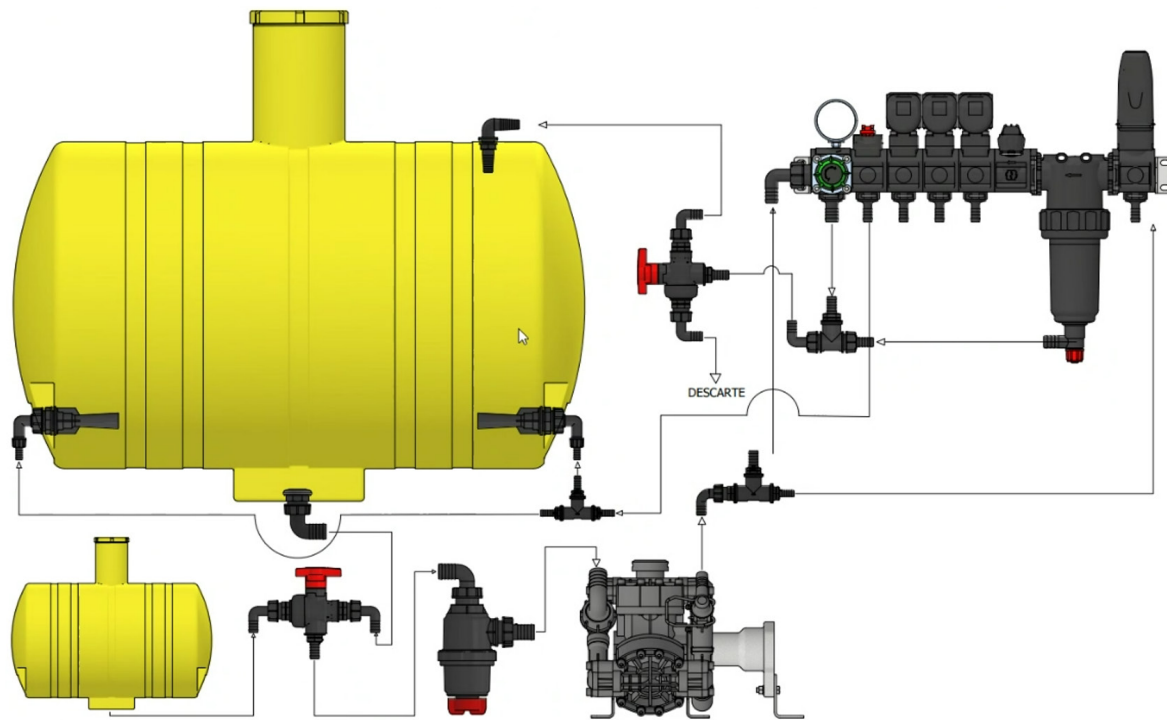
Example of liquid fert. kit



- <https://bit.ly/49fvKeh>
- <https://tinyurl.com/48vw7m42>
- <https://tinyurl.com/y3wdxte5>



this pump is Comet BP75



The spray kit consists of:

- a polyethylene tank, with a size such to match the seed delivery rate.

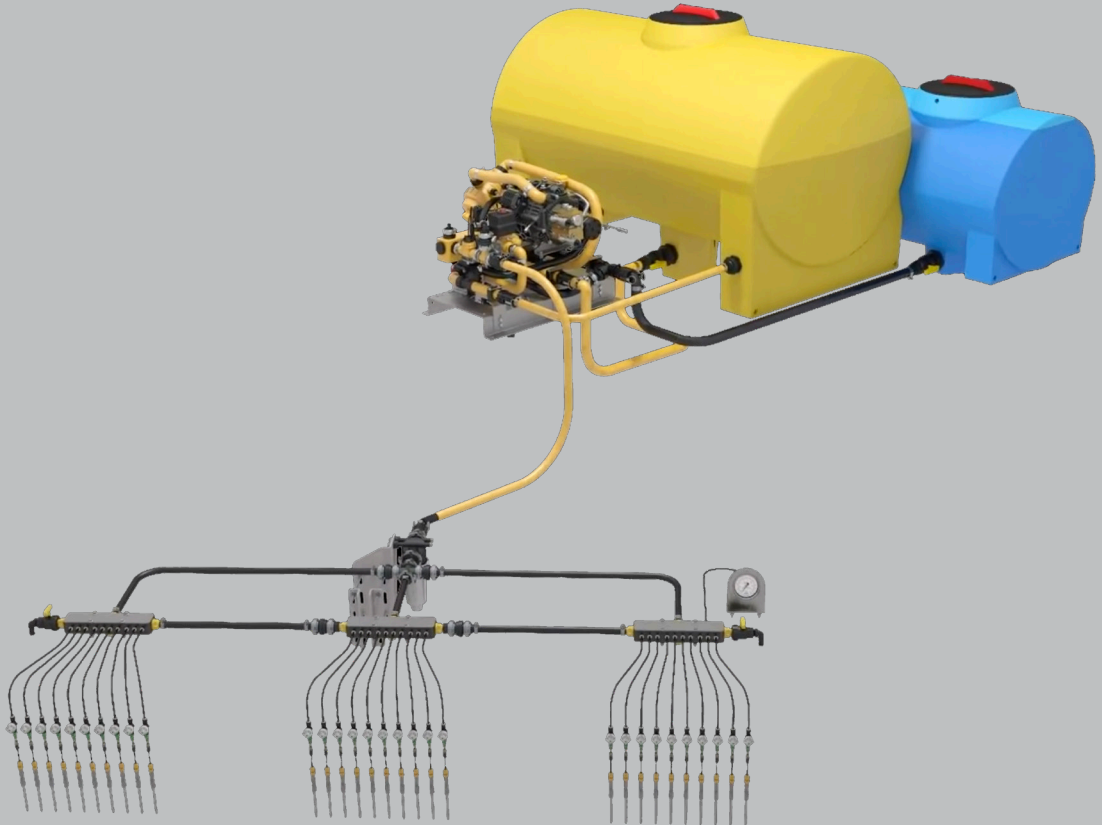
It is essential to provide it with a jet agitator to prevent sediments, specially in case of inoculants, as they would quickly set to the bottom.

- a DIAPHRAGM PUMP, as it is the the only one suitable. Quite the opposite, piston pumps have proven to have a short life, because of the abrasiveness of the liquid, and centrifugal pumps tend to kill bacteria, due to the excessive speed. The pump capacity should be three times the application rate to the soil, so that the rest can be bypassed to the agitator.

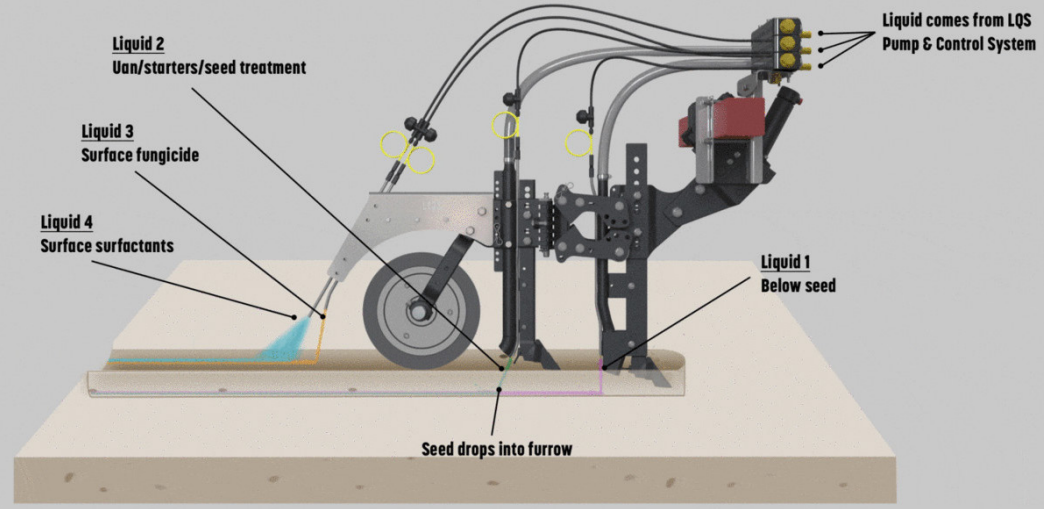
- delivery outlets, capable of delivering liquid ferts to the the seed furrows through capillary tubes or jet nozzles.

- a pressure regulator able to deliver one-third of the total flow to the spray nozzles and return the rest to the agitator.

In case of bacteria, the pressure should be set at 1,75 bar (25 psi) max, since any greater pressure may harm rhizobia.



**Multiple liquids can be applied independently**



Plumbing diagram

## Our solutions for in-furrow liquid fert. applications



# BPX25

### Characteristics:

- 25 lpm - 6.6 GPM
- 20 bar - 290 psi
- Nylon and stainless steel wet parts
- Desmopan - NBR - Viton diaphragms
- External manifolds and oil indicator
- Hex & allen-key compatible valve-plugs
- Drives: electric - hydraulic - gas - PTO

### Benefits:

- high corrosion and mechanical resistance, ensuring impeccable performance and durability, thus reducing downtime intervals.
- external manifolds and accessible valves lead maintenance to new standards of ease.
- the top-of-the-art architecture and the oversized pressure dumper allow an incomparable reduction of pulsations and a smooth, linear and silent flow, even at the lowest pressures (1 to 4 bar / 15 to 60 PSI)
- the hollow shaft can be connected to any standard hydraulic motors, with no need of adapters, thus reducing sizes and improving cost effectiveness.
- materials are perfectly compatible for the use of bacteria-based inoculants (living organism).

## Our solutions for in-furrow liquid fert. applications



# P36 & BP75

### Characteristics:

- BP75: 71 lpm / 19 GPM - 20 bar / 290 psi
- P36: 35 LPM / 9 GPM - 15 bar / 145 psi
- Nylon and stainless steel wet parts
- Desmopan - NBR - Viton diaphragms
- External manifolds and oil indicator
- Drives: electric - hydraulic - gas - PTO

### Benefits:

- high corrosion and mechanical resistance, ensuring impeccable performance and durability, thus reducing downtime intervals.
- external manifolds and accessible valves lead maintenance to new standards of ease.
- top-of-the-art architecture provides smooth, silent and very linear flow even at the lowest pressure range (1 to 4 bar / 15 to 60 PSI).
- materials are perfectly compatible for the use of bacteria-based inoculants (living organism).



## Our solutions for in-furrow liquid fert. applications

# BPX120 - 140



### Characteristics:

- BP115: 116 lpm / 31 GPM - 20 bar / 290 psi
- BP135: 132 lpm/ 35 GPM - 15 bar / 145 psi
- Nylon and stainless steel wet parts
- Desmopan - NBR - Viton diaphragms
- External manifolds and oil indicator
- Drives: electric - hydraulic - gas - PTO
- Anti-frost drain plug on both manifolds

### Benefits:

- high corrosion and mechanical resistance, ensuring impeccable performance and durability, thus reducing downtime intervals.
- external manifolds and accessible valves lead maintenance to new standards of ease.
- the top-of-the-art architecture and the oversized pressure dumper allow an incomparable reduction of pulsations and a smooth, linear and silent flow, even at the lowest pressures (1 to 4 bar / 15 to 60 PSI).
- materials are perfectly compatible for the use of bacteria-based inoculants (living organism).

## Our solutions for in-furrow liquid fert. applications

# BPX180



### Characteristics:

- 178 lpm / 47 GPM - 20 bar / 290 psi
- Nylon and stainless steel wet parts
- Desmopan diaphr.
- External manifolds and oil indicator
- Throughshaft:
- double M splined 1 1/8
- M splined 1 1/8 + hollow cyl. 25 mm
- Drives: hydraulic - PTO
- Anti-frost drain plug on both manifolds

### Benefits:

- high corrosion and mechanical resistance, ensuring impeccable performance and durability, thus reducing downtime intervals
- external manifolds and accessible valves lead maintenance to new standards of ease.
- the top-of-the-art architecture and the oversized pressure dumper allow an incomparable reduction of pulsations and a smooth, linear and silent flow, even at the lowest pressures (1 to 4 bar / 15 to 60 PSI)
- the hollow shaft can be connected to any standard hydraulic motors, with no need of adapters, thus reducing sizes and improving cost effectiveness.
- materials are perfectly compatible for the use of bacteria-based inoculants (living organism).

## Our solutions for in-furrow liquid fert. applications

# BPX270



ready summer 2025

### Characteristics:

- 270 lpm / 71 GPM - 20 bar / 290 psi
- Nylon and stainless steel wet parts
- Desmopan diaphragms
- External manifolds and oil indicator
- Throughshaft:
  - double M splined 1 1/8
  - M splined 1 1/8 + hollow cyl. 25 mm
- Drives: hydraulic - PTO
- Anti-frost drain plug on both manifolds

### Benefits:

- high corrosion and mechanical resistance, ensuring impeccable performance and durability, thus reducing downtime intervals
- external manifolds and accessible valves lead maintenance to new standards of ease.
- the top-of-the-art architecture and the oversized pressure dumper allow an incomparable reduction of pulsations and a smooth, linear and silent flow, even at the lowest pressures (1 to 4 bar / 15 to 60 PSI)
- the hollow shaft can be connected to any standard hydraulic motors, with no need of adapters, thus reducing sizes and improving cost effectiveness.
- materials are perfectly compatible for the use of bacteria-based inoculants (living organism).





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