



In the beginning of each season at spring, the grower faces a lot of challenges with regards to fertilization management; when to start fertilizing, what nutrients composition and how much, this is especially true for early deciduous orchards. Things get even more complicated after winters with heavy precipitation, especially if soils temperature still low.

At the beginning of the season for planning the best fertilization management , need to consider the orchard data: plant type, species, soil texture, lime levels, soil profile depth, irrigation water quality, and of course consider to the fall fertigation management and foliage lab nutrient analysis from previous season.

After a winter with high precipitation, there is undoubtedly a deficit of nitrogen in the upper soil roots zone due to leaching nitrates to deeper soil layer , and especially from denitrification: the process in which bacteria decompose nitrate into volatile nitrogen lost to the atmosphere.

In low soil temperatures below 10° C the nutrient absorption by roots becomes limited, As the soil temperature increases, so the absorption rate does; an increase of 10 °C in the soil the absorption rate double for phosphorus and triples for potassium (1).

The low rate nutrient absorption by roots in low temperature due to low presence active roots and inhibition of absorption system in roots cells, mainly by plant sensitive to chilly.

When the soil temperature increases ,there has been a vigorous development of roots and increased the volume of the active root that significantly increases the surface area for the nutrient's absorption from soil solution. Furthermore, the cells enzymatic activity increase and hence the uptake rate.

In low soil temperatures, the mechanism for ammonium absorption is more efficient than that of nitrate, especially in crops that are more affected by low temperatures. On the other hand, in crops that are more resistance low soil temperatures, like spring wheat and barley, the preference for ammonia decreases (2).

The soil texture has a significant effect on the movement of the cation nutrients through the soil profile, as the soil more clay texture the mobility of cations more limit., such as ammonium (NH_4^+) and Potassium (K^+) adsorbed to clay minerals in the soil and they can leached down only few millimeters.

From that reasons, early fertilization during low soil temperature is usually ineffective, and it's preferable to wait until the temperature rises above 15° C.

Still, there are other reasons why it can be better to precede the fertilization in spite of low soil temperatures, even during a prolonged precipitation period, when irrigation is unnecessary.

deciduous trees that have intensive blooming and especially early variety , even the soil temperatures still low, they growth branches and buddings which will require a





supply of nutrient. This process originates from reserves that are accumulated in the trunk and roots from previous season, this storage usually lasts for a month, sometimes longer. Nevertheless, it's better to start the fertilization earlier; in March for early-blooming variety and at April for the rest of the plantation. Especially after a long cold winter.

The bed aeration condition In saturated soil slow down root's development, besides the issues due to low temperatures. It can be tempting to postpone the first technical irrigation for fertigation purposes, but that would longer the period of an aeration conditions, which increases the risk for chlorosis during the early plant's growth, especially for species sensitive to chlorosis . So, for supply the nutrient needs to the top layer of the soil it's better to preceding technical fertigation treatment, while the soil is already saturated with water. This will allow to delay the first irrigation then roots can grow more vigorously through maximum usage of the available water from winter season.

In the first stage, after a heavy winter rain it's important to load the soil with more nitrogen than what is traditional (40-50 kg/hectare instead of 20-30 kg/hectare). In low temperatures it's preferable to fertilized with ammonium form the problem that ammonium is a cation, fertigation with ammonium in medium to heavy soils it adsorbed in the top layer of the soil (up to 1 cm) where the amount of active roots are miniscule for deciduous trees. Therefore, fertigation with ammonium sulfate or ammonium sulfate-nitrate is ineffective, as the nitrogen won't be available to plant . The nitrogen will become available only when the soil temperature rises, and the nitrification process will turn the ammonium into nitrate which will leach to the layer of active root-zone by rain or irrigation water, so the nitrogen absorbed as nitrate by the roots.

A fertilizer solution based on urea is preferable; urea 21% and Uran 32% will provide the best solution for the supply of ammonium in the active root zone (10-30 cm). In saturated soils, a small amount of water as 50 m³/hectar would sufficient for a technical fertigation treatment. The urea will be transported by the water into the wet depth, and within one day it will be mineralized to ammonium and then get adsorbed by the soil and stay in its desired layer. To further increase the ammonium availability, it's very efficient to supply it with a nitrogen preserver that prevents the ammonium nitrification to nitrate for a longer period. Therefore, its highly recommendable fertigation with our Blue brand product that is tailored for this purpose; **Urea 21%Blue, Uran 32%blue.**

In early fertigation, it's of course sometimes required to use a compound fertilizer with phosphorous as well, together with occasional additives based on the plantation's specific requirements, soil texture and soil or leaves analyzed. When the results of phosphorous deficit or root growth restricted, it is best to use our **"TOV Blue"** product that contains both nitrogen/phosphorous on required ratio. In addition, to invigorate root growth, it is recommended to add our biostimulant **"Bio-homigat"** that encourages root developing.





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Orchard fertigation decisions after a rainy winter

In deciduous plantations that are sensitive to iron deficiency and show signs of chlorosis during season, it's recommendable to supply chelated iron together with the nitrogen, by adding "**Ferogat**" to our "**Spring Nitrogen – Blue**" series with ammonium stabilizers. In fact, after a long rainy winter it would be advised to fertigate plantations with this solution even if they aren't sensitive the chlorosis. Finally, we need to touch on some special cases. It should be noted that for evergreen plantations with a deep and active root area, the considerations for early spring fertigation are similar to deciduous ones, such as mango and citrus, etc. In plantations with a shallow root area, like avocado or banana, it's recommendable with some different ammonium-based fertilizers from the Blue series; **Ammonium Sulfate 8% Blue**, or **Ammonium Sulfate-Nitrate 12% Blue**.

In summary, after a rainy winter it's recommended to precede the regular fertigation plan with the Blue series which contain ammonium stabilizers.

As always, if you want to optimize your fertilization program according to your own specific situation, please contact a Gat Fertilizers agronomist in your local area, and we would be happy to help.

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References

¹ [Temperature dependence of the concentration kinetics of absorption of phosphate and potassium in corn roots](#)

² Marschner Horst (1995); Mineral Nutrition of Higher Plants. Second Edition
ACADEMIC PRESS 35-38, 1995.