PRODUCT INFO & DATASHEET

SICO ECOTEC

Ecological NPK fertilisers with ammonium stabiliser DMPP

Ecological fertiliser innovation.
New method for nitrogen fertilisation based on the advantage of ammonium-stabilization.

A new era of innovative fertilisation methods has dawned.
After realising extensive testprograms in Westeurope, we are pleased to offer you new fertilisers, based on scientific research and using the advantages of the ammonium stabiliser DMPP.

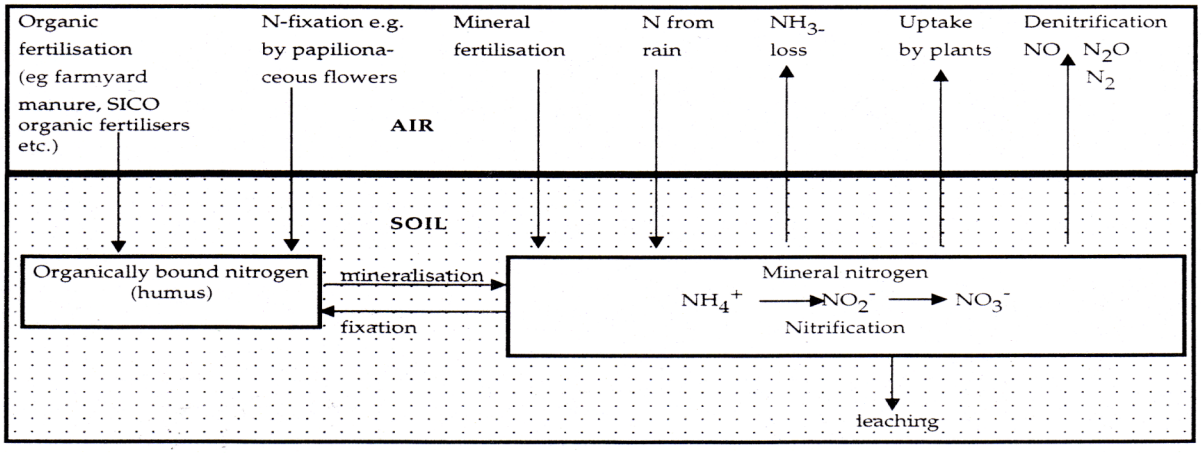
The efficiency of SICO ECOTEC fertilisers can be expressed as follows :

- The SICO ECOTEC fertilisation system utilises the applied nitrogen more efficiently._
- The number of strewing applications can be limited, which is economically advantageous.
- Reduces the risks of leaching of nitrates and the emission of nitrogenoxide.

Nitrogen dynamics in the soil

In the moderate climate of Mid-Europe, the 20 to 35 cm thick soilprofile used for agriculture contains already 3,000 to 15,000 kg nitrogen/ha. Besides this we distinguish between two fractions : organically bound nitrogen and mineral nitrogen.

The largest part of the soil nitrogen is bound in organic compounds, namely humus. The type and number of N-compounds are determined by numerous transformation processes in the soil organic N-sources.



After the harvest, also the harvest remnants and rootmasses which contain both nitrogen, get into the fraction of organic compound material.

The same is true for the not yet mineralised nitrogen from organic fertiliser (eg. farmyard manure) and the nitrogen from the air bound by the green fertilisation (eg. Papilionaceous flowers).

Nitrogen from mineral fertilisers and nitrogen oxide from rain are directly added to the fraction of mineral nitrogen.

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*** Soilbacteria transform nitrogen compounds**

- Both N-fractions in the soil are not static, but both are influenced by constant microbial changes.
Mineral nitrogen is taken up by plants and bacteria and fixed as biomass (immobilisation).
Other micro-organisms release this organically bound nitrogen again as mineral nitrogen.
This process is called mineralisation. The endproduct of this breakdown is ammonium and finally nitrate.

- Ammonium originating from the organic material (humus, organic fertilisers, harvest remnants) as well as the ammonium (NH_4^+) originating from mineral fertilisers is fairly quickly transformed in the soil by the Nitrosomonas soil bacteria to nitrite (NO_2^+).

The Nitrobacter soil bacteria use this nitrite and transform it to nitrate (NO_3^-).

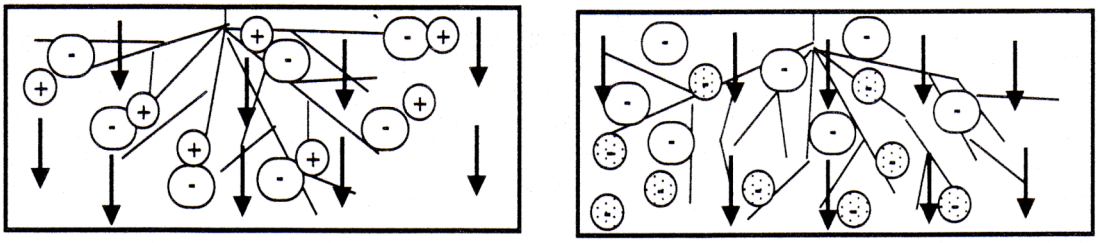
The transformation from ammonium to nitrate is called "nitrification". Under normal circumstances this transformation takes a few days (summer) to 2 weeks (spring). In principle the plants can use both ammonium and nitrate.

Ammonium is however less mobile in the soil, because, thanks to its positive charge, it is bound to the negatively charged surface of humus and clay minerals (see fig. 2). This is why the plantroots have to grow towards the ammonium before it can be taken up by the roots. On the other side ammonium is little mobile and hence doesnot leach.

The nitrification process that under normal circumstances is finished in a few days, applies to the released ammonium originating from organic material (humus, organic fertilisers and harvest remnants) as well as to the mineral fertilisers.

- Nitrate on the other hand is very mobile in the soil and can reach the plant roots quite easily (see fig. 2). On basis of this favourable property, the uptake of nitrate is dominant with most kinds of plants.
However the risk of N-leaching of this type of ntrogen is very high, due the high mobility of the nitrate.

Fig. 2 : Behaviour of ammonium and nitrate in the soil



A. Thanks to the positive charge ammonium (NH_4^+) is bound to the negative surface (-) of clay minerals.

B. In a few days ammonium is transferred into nitrate (NO_3^-). NO_3^- is not bound anymore, is very soluble in water and thus very mobile in the soil (risk of leaching).

(+) NH_4^+ = Ammonium

(-) NO_3^- = Nitrate

Water

Clay / humus (-)

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*** Limited rooting promotes nitrate movement**

In case of missing or limited rooting, the risk of nitrate-movement to the deeper soil layers and possibly to the subsoil water increases. This is particularly true for soils without vegetation (eg. in periods between 2 cultures), for plants with limited development (eg. at the beginning of a cultivation) and with cultures with large sowing- or planting distance (eg. maize, various types of vegetables, potatoes) as long as the soil is not yet rooted over the whole surface.

*** Gaseous N-losses**

Next to the above mentioned nitrate movement to deeper soil layers, also gaseous N-losses can result caused by denitrification: in this process nitrate is transformed by other soil bacteria into volatile nitrogen compounds. This occurs especially after heavy rainfall or in soils with condensed soil structure. Next to N_2 (elementary nitrogen, 78% of the air consists hereof) also nitrogen oxides (N_2O, NO, NO_x) are created. These nitrogen oxides which influence the climate, favour the production of low pending ozon and reinforce the global warming effect.

SICO ECOTEC : Fertilisers with the new, powerful nitrification curber DMPP (dimethylpyrozolphosphate), an efficient ammonium-stabilisator.

What is an ammonium-stabilisator?

An ammonium-stabilisator is a substance which curbs the nitrification, this is the transformation of ammonium (NH_4^+) to nitrate (NO_3^-), during a certain period (see fig. 3).

Figure 3 : Influence of DMPP on nitrification

This happens when the ammonium-stabilisator curbs the activity of the bacteria (Nitrosomonas) responsible for this nitrification-process, without thereby influencing negatively the bacteria (Nitrobacter) responsible for the second step which transform nitrite (NO_2^-) into nitrate(NO_3). Thanks to the situation of the ammonium, the advantages of the mineral nitrogen forms ammonium and nitrate, which are dominently present in the soil, are optimally utilised and disadvantages at the same time liquidated.

The N-supply is adapted according to the needs of the plant.

The risk of nitrogen loss by leaching or evaporating is especially great in the period after the fertilisation, when the plants donot yet need so much nitrogen. It is then that the ammonium stabilisator protects the nitrogen from the fertilisers so that it does not leach out or evaporates.

During cultivation the needs for nitrogen increase. Simultaneously the active substance of DMPP which was applied at the beginning of the culture, is broken down, which weakens the stabilisation.

Gradually always more ammonium is transformed into nitrate. In this way the increasing nitrate-offer needs the increasing N-needs of the plant without increasing the risk of N-loss.

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DMPP, dimethylpyrazolsulphate, belongs to the group of pyrazols, occurring frequently in nature.

DMPP
- is well supported by the plants
- is completely broken down
- doesnot damage soil life
- doesnot leach
- is not irritating for skin or eyes
- is active in the soil during 4 - 8 weeks
- is very efficient (only a very small quantity is necessary for optimum activity

SICO ECOTEC : guarantees extra yields

The part of quick acting nitrate-N in SICO ECOTEC fertilisers, covers the direct needs of young plants. The largest nitrogen part under the form of ammonium (NH_4^+) is stabilised by DMPP. Thanks to the large stabilised NH_4^+ content, plants take this up better.

This gives an energetic advantage, as it is transformed directly into aminoacids and proteins.
The saved energy (compared to normal nitrate feeding) can be used for other metabolism processes (higher yield).
Moreover the liberation of nitrate nitrogen corresponds in many cultures with their nitrogen uptake curb.

SICO ECOTEC : assures a better quality

- The leaf green is darker (leek, cabbage)
- Low nitrate content in the harvested product (vegetables, potatoes)
- Solid vegetation, more resistant to disease or frost (winter leek)

SICO ECOTEC : modern ecological technology to meet E.C. nitrate directives

- SICO ECOTEC lowers the rest-nitrogen after the culture. Due to the delayed transformation of ammonium to nitrate, the chance of nitrate leaching during the cultivation is very small.
  The favourable consequence is a lower rest-nitrogen in the 0 - 90 cm soil profile at the end of the culture.
- Thanks to the more efficient N-uptake, the N-fertilisation can be reduced in many cultures; without negative effect on the yields.

Notice

Warranty of this material, either expressed or implied, is limited to a guarantee of the composition as shown in this datasheet in as much as uses are beyond the seller's control. For the same reason, seller is not liable for any injury to living beings, crops, soils or materials which may result from the use or storage of this material.

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