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PLANT FEED
MINERAL & ORGANIC FERTILIZER

FUNDAMENTAL DIFFERENCE BETWEEN ORGANIC PLANT**FEED** FERTILIZER AND MINERAL FERTILIZER

What for is the fertilizer required?

To provide plants with nutrition elements. Without a doubt. Plant consumes nutrient elements in the form of ions**. More than 90% of fertilizer and soil nutrients consumed by the plant's root system are transformed into ions thanks to enzymes of soil microorganisms.** Therefore, It is necessary to add fertilizers to the soil and ensure the rapid development of microorganisms so that the plant never feels hungry.

Is mineral fertilizer capable of doing it? No!

Why? Because the soil microorganisms need such basic elements as **carbon**, nitrogen, sulfur, phosphorus for their development. Mineral fertilizers **do not supply carbon to soil!** Only organic fertilizers can do this. But the plants grow somehow without organic fertilizers... Yes, because the main component of soil fertility (humus) is consumed for their growth. In such case hungry microorganisms mineralize humus. Without humus, the soil can not maintain its fertility, it is rapidly losing moisture, its structure and nutrients.

How is PlantFeed organic fertilizer different from the other mineral fertilizers in their impact on the soil?

1) **Effects on soil microorganisms:** mineral fertilizers strongly suppress the activity of soil microflora immediately after entering the soil, while organic – stimulates the development of effective microorganisms, serving as a substrate for development and source of nutrition;
2) **Percentage of assimilation of nutrients and their unproductive losses:** mineral nitrogen is absorbed by 15-25%, phosphorus – by 10-20%, potassium – by 65-85%, while the percentage of assimilation of nutrients of PLANT**FEED** organic fertilizers: nitrogen – 85-90%, phosphorus – 75-85%, potassium – 85-95%;
3) **Composition of nutrients:** mineral fertilizers contain only basic plant nutrients (NPK), whereas organic contain both NPK and microelements;
4) **Effects on the concentration of salts in soil solution and its pH:** when mineral fertilizers are introduced to the soil, concentration of salts of this fertilizer drastically increases in the soil solution (because mineral fertilizers are predominantly ready soluble), the pH changes to alkaline or acidic. It causes stress for plants and microorganisms. A large proportion of the soil microorganisms dies through several hours after application of fertilizer. Plants consume a large number of ions of mineral fertilizer at once. Since the concentration of soil solution is high, the plant can not take

enough moisture from the soil so that the nutrients it consumes are quickly transported to areas of photosynthesis and biosynthesis and turned into harvest. Meanwhile, the dissolved in the soil solution nutrients are not consumed by the plant. The nutrients then create a sort of ballast, disposed by the soil ecosystem through infiltration in groundwater (NK), through processes retrogradation and transition to insoluble and inaccessible plant forms (P), through denitrification of nitrogen – recovery of fertilizer ions (nitrates and ammonium) to molecular nitrogen.

5) **The presence of natural growth and developmental stimulants:** in PLANT**FEED** fertilizer such elements are humus-like organic substances, whereas mineral fertilizers do not contain such elements.

6) **The presence of agronomically valuable microorganisms:** PLANT**FEED** fertilizer contains agronomically valuable microorganisms which after being introduced into the soil, reproduce themselves even more and improve plants' resistance to diseases. Mineral fertilizers do not contain microorganisms.

7) **In addition PlantFeed fertilizer is absolutely safe in respect to sanitation,** since it has undergone the processes of high temperature fermentation during its production, therefore it does not contain pathogenic microflora, viable seeds of weeds and eggs of worms, which is not always the case with other organic fertilizers.

8) **PlantFeed perfectly solves the problem of plant phosphate nutrition,** because more than 90% of PlantFeed phosphorus is digested by the plant through microorganisms-phosphate-mobilizators, for which the paradise conditions are created when using PLANT**FEED**. In the case of mineral fertilizers about 75% of their phosphorus precipitates in the soil in the form of insoluble phosphates. This is unacceptable. Phosphorus determines the size of the crop, because it performs a titanic role in the formation of the flower, the duration of bloom and branching of the root systems, regulates the rate of photosynthesis. A plant with a powerful root system can not yield a small harvest.

Fig. 1 shows a comparative scheme of nutritional value of 1 ton of PLANT**FEED** fertilizer as opposed to complex mineral fertilizer such as ANP (ammonium nitrate phosphate fertilizer).

As we can see from the scheme, from 1 ton of PLANT**FEED** fertilizer the average amount that gets to the soil is in the soil comes in the average, kg: N-36, P_2O_5 – 25, K 2 O – 27, Fe – 1,16, Mg – 0,435, Ca – 0,30, S – 0,150, B – 0,07, Zn – 0,350, Cu – 0,041, Ni – 0,029.

Due to the fact that PLANT**FEED** is mineralized and humified in the soil gradually, the unproductive losses of nutrients are minimal: N 2-4 kg, P 2 O 5 - 1-2 kg.

PLANT**FEED** promotes the active development of effective microorganisms in the soil: nitrogen fixators of symbiotic group (bulbous bacteria of plants of the legume family) and non-symbiotic group of microorganisms, so that the microorganisms of the non-symbiotic group capture 30-50 kg/ha of nitrogen, while bulbous bacteria of legume family can fix 120-360 kg/ha of nitrogen.

In addition, PLANT**FEED** is responsible for the active development of microorganisms-phosphate-mobilizators that are capable of decomposing low-soluble soil and fertilizer

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phosphates and transforming them into ion forms accessible for the plants. As a result, we get an additional effect of mobilizing soil phosphates and supplying phosphorus to a plant at an average volume of 120 kg/ha.

Along with the mobilization of phosphates the processes of mobilization of fertilizer and soil micronutrients are also taking place.

Microorganisms that are actively developing due to PLANT**FEED** fertilizer exude to the soil such substances as antibiotics to pathogenic microorganisms, growth and developmental stimulators for the plant, which makes the development of the plant comfortable and safe.

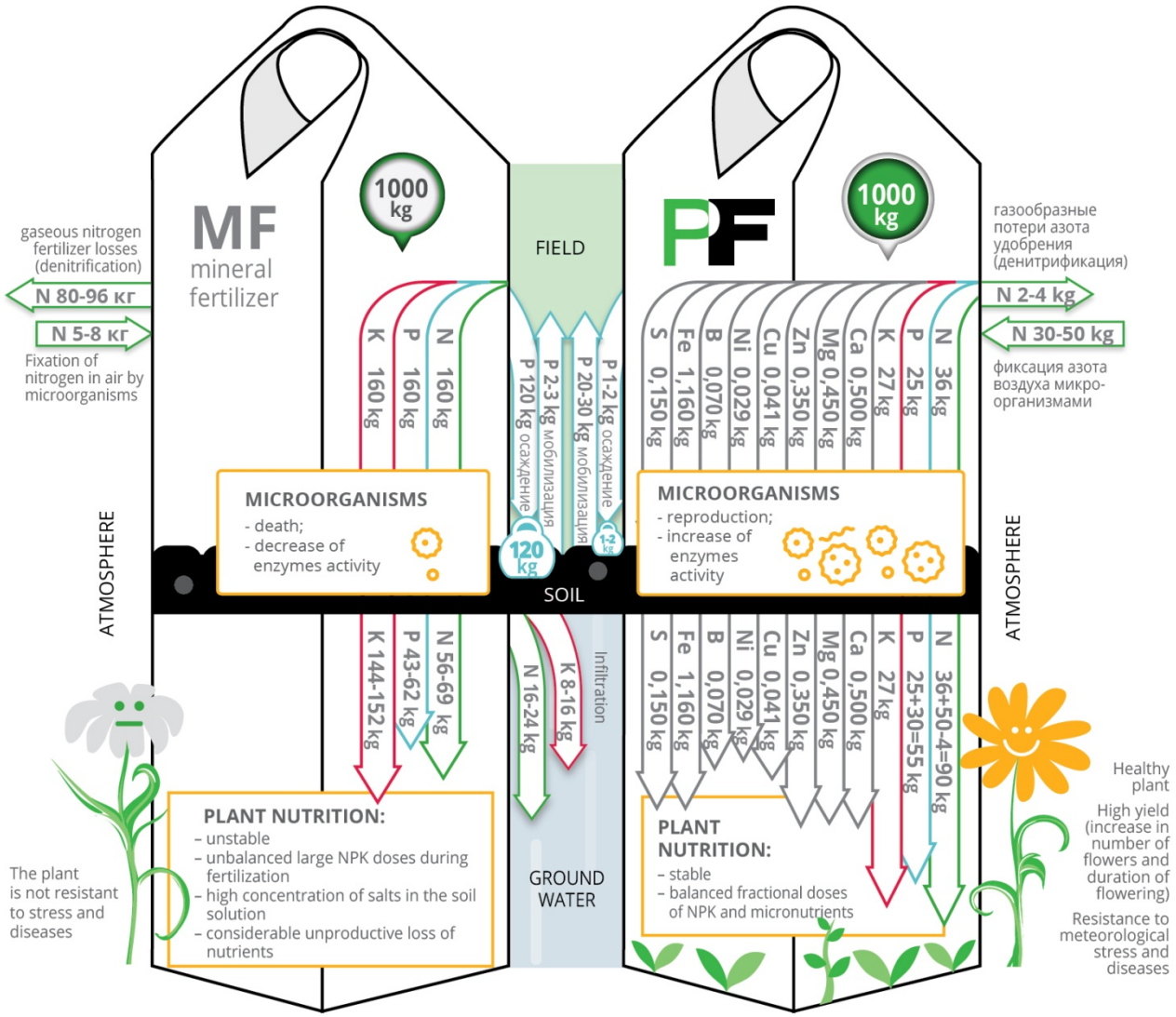

Fig. 1 Schematic processes of plant nutrition when complex mineral fertilizers are used

Fig. 2 Schematic processes of plant nutrition when PLANT**FEED** is used

Fig.1 Schematic plant nutrition processes when PLANT**FEED is used**

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Therefore, taking into account the amount of nutrients supply to the soil with PLANT**FEED** fertilizer and small unproductive losses of fertilizer nutrients, as well as the processes of nitrogen fixation and mobilization of soil phosphates, as a result, from 1 ton of PlantFeed fertilizer, the plant will receive, kg/ha: N-56 ... 69, P_2O_5 – 43 ... 62, K_2O – 27, and the microelements – more than, kg/ha: Fe – 1,16, Mg – 0,435, Ca – 0,30, S – 0,150, B – 0,07, Zn – 0.350, Cu – 0.041, Ni – 0.029. Legume cultures will receive significantly more nitrogen 152...394 kg/ha and not less than other nutrients compared to nonleguminous cultures. As we can see from the scheme, from 1 ton of mineral fertilizer such as ANP (ammonium nitrate phosphate fertilizer), much more nutrients get to the soil, kg: H – 160, P_2O_5 – 160, K_2O – 160, and almost none of microelements. However, will this entire mass of NPK get to the plant system?

Events unfold in the following way. When mineral fertilizer gets to the soil, it creates a high concentration of salts in the soil solution; it shifts pH and, as a result, a large part of the soil microorganisms dies. This creates a situation in which a large amount of NPK is available to the plant over a short period of time, but under the conditions described, the plant is not able to consume these elements. Therefore, the soil ecosystem is trying to balance the condition of the soil environment, resulting in large unproductive losses of nutrient elements of mineral fertilizers, which are on average: nitrogen – 96-120 kg/ha, phosphorus – 110-130 kg/ha, potassium – 8-16 kg/ha.

Under conditions described, the fixation of nitrogen by soil microorganisms is minimal – 60-180 kg/ha for bean cultures and 5-8 kg/ha for nonleguminous cultures. The mobilization of low-soluble phosphates of soil and fertilizers (which are quickly deposited by cations of soil) is minimal – 2-3 kg/ha.

Thus, taking into account the amount of nutrient input to the soil with mineral fertilizers and large unproductive losses of fertilizer nutrients, as well as minor amounts of nitrogen fixation and phosphate mobilization of the soil, the plant receives from 1 kg of mineral fertilizer, kg/ha: N – 56...69 , P_2O_5 – 43...62, K_2O – 144...152, but does not receive microelements using only their ground stocks that are mobilized very slowly because of the inhibition of microbiological activity of the soil. Legume culture will receive only 100…244 kg/ha of nitrogen and about the same amount of phosphorus and potassium as the nonleguminous culture.

The solution to this situation is use PLANT**FEED** fertilizer as basic fertilizer. It should be taken into account, that there is no organic or organic-mineral fertilizer, which is able to satisfy all the needs of plants in the nutrition elements in a balanced way.

Therefore, to ensure a balanced nutrition of crops and best possible yield we recommend combining the basic PLANT**FEED fertilizer with leaf fertilization with chelate forms of micro-element fertilizers based on the results of soil and plant diagnostics.**