Plant nutrition & soil fertility

Key to deliver Europe's Green Deal objectives

The different plant nutrition and soil fertility solutions grouped under the heading "fertilizing product" in Regulation (EU) 2019/1009 play different and complementary roles in helping farmers produce plentiful, high-quality crops while helping the EU move towards more sustainable agriculture.

This factsheet explains the importance of combining a full range of fertilizing products to ensure an optimum impact on plant yield and quality and minimal environmental impact.

EBIC European Biostimulants Industry Council

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Fertilizers Europe

1

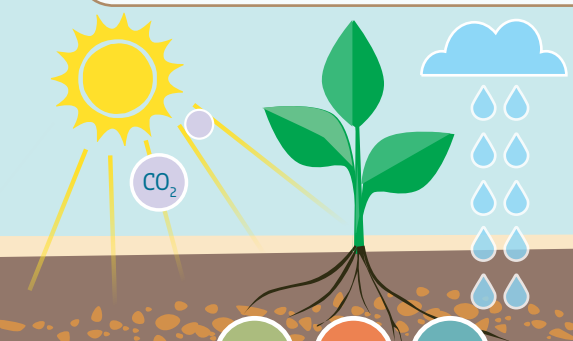
Plant growth factors

Crop growth requires sunlight, carbon dioxide, water, and a balanced supply of the primary nutrients (nitrogen, phosphorus and potassium), secondary and micronutrients. Water and nutrients are primarily absorbed from the soil via the plant's root system.

2

Harvest

When the plant is harvested, the nutrients it has absorbed are removed from the soil. Unless these nutrients are replenished, the soil's productivity will decline leading to drastic reduction in yields in the long-term.



1 → N P K

PRIMARY NUTRIENTS

2 → Ca Mg S

SECONDARY NUTRIENTS

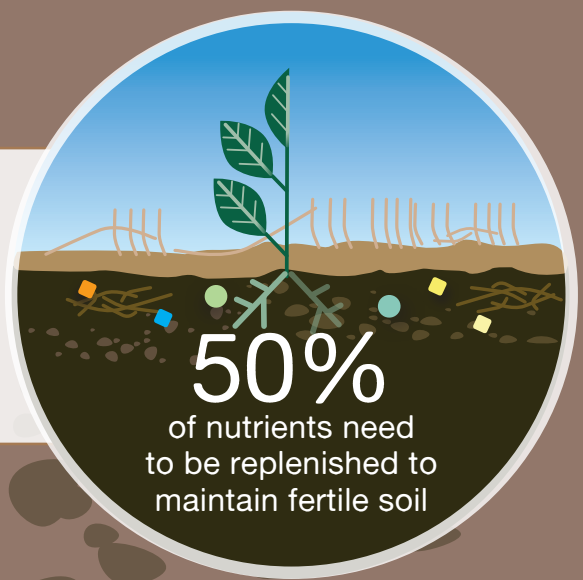
3 → Fe Mn B Zn Cu Mo Na Co Cl Ni Si ...

MICRONUTRIENTS

3

Balanced nutrients

Although crop residues in soils tend to break down and replenish some of the nutrients, on average, soils only provide half of a new crop's nutrient needs. This is where additional inputs play their part.



The roles of different **plant nutrition** and **soil fertility products**

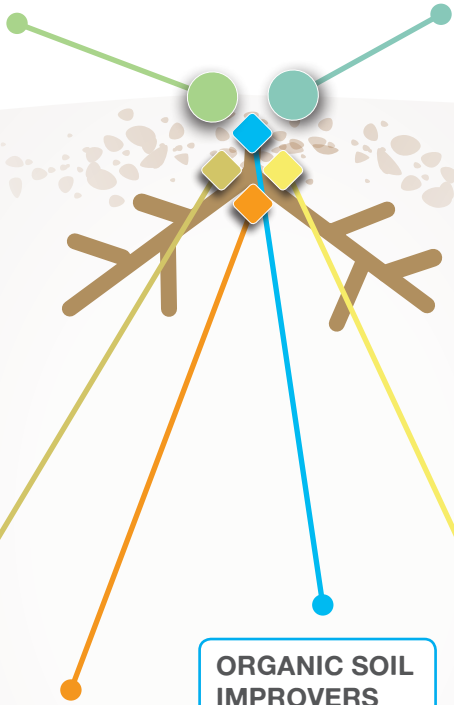
ORGANIC AND ORGANO-MINERAL FERTILIZERS

> Contain predictable amounts of **designated nutrients.**

> Provide nutrients which are not always in immediately plant-available forms, but **continue to release nutrients throughout the growth cycle**

> Stimulate microbial activity and improve soil structure by **introducing soil organic carbon**.

> Increase soil organic matter, which also **improves the carbon capture capacity of soils.**



MINERAL FERTILIZERS

> Bridge the gap between the nutrient supply from the soil and the plant's nutrient requirement for **optimum development.**

> Provide nutrients that can be **immediately taken up** by the plant.

> Define the exact nutrient contents and a **precisely calculable nutrient supply.**

> Maximize plant nutrient uptake and ensure healthy and productive growth for the crop while **minimizing nutrient losses through targeted mineral fertilizer application.**

INHIBITORS

> **Improve** nitrogen use efficiency.

> **Help to reduce environmental losses** such as nitrate leaching, ammonia losses to the air and greenhouse gas emissions thanks to compounds added to nitrogen-based fertilizers.

> **Increase flexibility for farmers** as the number of fertilizer applications can be reduced.

LIMING MATERIALS

> **Catalyse soil nutrient release.**

> **Correct the soil pH** by making it less acidic.

> **Protect** the environment by **preventing the leaching** of water from acid soils.

ORGANIC SOIL IMPROVERS

> **Increase organic matter** content in soil to make it **more fertile**.

> **Enhance** the physical structure of the soil.

> **Support** water retention of soils.

> **Nourish worms and micro-organisms** that contribute to soil fertility.

PLANT BIOSTIMULANTS

> **Improve nutrient use efficiency** and **help improve crop quality.**

> **Improve tolerance to harsh growing conditions** such as drought, excess heat and volatile conditions caused by climate change.

> **Provide** additional beneficial micro-organisms to help **convert nutrients into plant-available forms.**

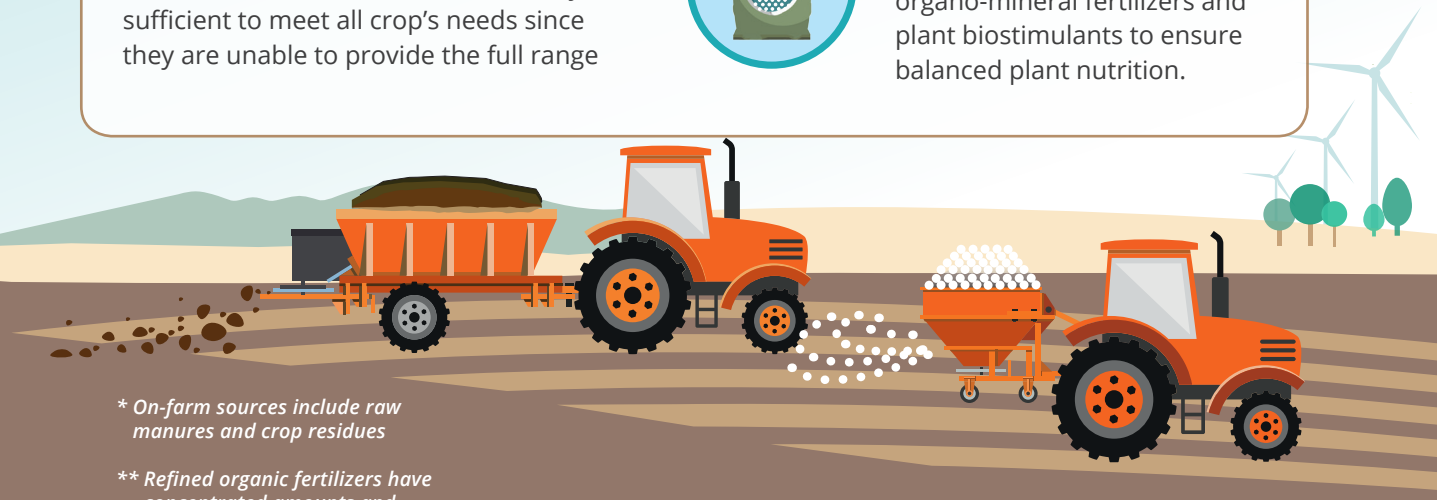
> **Stimulate root production** of substances that help plants absorb nutrients and enhance early root growth to improve a plant's interactions with the soil, worms and micro-organisms.

4

How can farmers replenish the missing nutrients?

> Start with on-farm* sources of nutrients such as manures and composts. These organic sources provide organic matter as well as nutrients, which is crucial for soil fertility. However, on-farm sources of nutrients are rarely sufficient to meet all crop's needs since they are unable to provide the full range of nutrients in the right balance to match plant growth requirements. These sources are not directly available to crops.

> Apply a combination of mineral, refined organic** and organo-mineral fertilizers and plant biostimulants to ensure balanced plant nutrition.



** On-farm sources include raw manures and crop residues*

*** Refined organic fertilizers have concentrated amounts and predictable ratios of nutrients*

SOIL FERTILITY

Soil fertility is made up of **three core aspects**: physical structure, chemical composition and biological diversity. All of these aspects are essential for healthy and fertile agricultural soils.

BIOLOGICAL DIVERSITY

The biological diversity of the soil can enhance soil structure and improve the availability of nutrients for plants. A fertile soil is one that has good structure, plenty of organic matter to foster biodiversity, and a balanced pH level.

CHEMICAL COMPOSITION

The acidity of the soil (pH) directly affects whether nutrients can be extracted and absorbed by plants, and can adversely affect the soil's biological diversity – which, in turn, can impact nutrient availability and soil structure.

PHYSICAL STRUCTURE

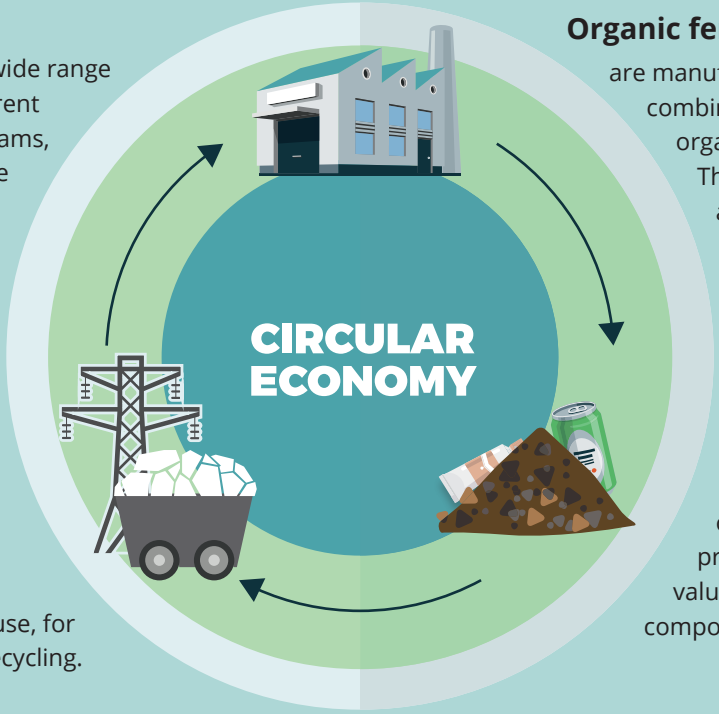
This is strongly influenced by the presence of organic matter in soil, as well as its biodiversity. Roots, insects, worms and other creatures loosen and mix the soil, improving its structure and fertility.

Towards more circular food systems

The plant nutrition sector's role in the circular economy is well established. Both mineral and organic fertilizers have an important role to play in the circular economy, recycling waste products for reuse and promoting sustainability.

Mineral fertilizers

manufacturers recycle a wide range of by-products from different industrial production streams, turning them into valuable plant nutrients. They use surplus energy and raw materials that derive from other production processes on both fertilizer production sites and/or through industrial symbiosis. The mineral fertilizer industry is also stepping up its efforts to "close the loop" through greater product recycling and re-use, for example via phosphate recycling.



Organic fertilizers

are manufactured using a combination of various organic raw materials. These include manures, and also plant and animal by-products from a range of industries, instead of discarding them.

Plant Biostimulants

often re-valorise by-products from other value chains as raw component materials.

Fertilizers Europe, EBIC and ECOFI have joined forces to promote integrated plant nutrition and soil fertility. The combined use of mineral fertilizers, organic fertilizers, and plant biostimulants as part of an integrated plant nutrition approach delivers growth and sustainability benefits which are more than the sum of their parts to farmers and society.

Fertilizers Europe

Fertilizers Europe represents the majority of fertilizer producers in Europe and is recognized as the dedicated industry source of information on mineral fertilizers. The association communicates with a wide variety of institutions, legislators and members of the public who seek information on fertilizer technology and topics relating to today's agricultural, environmental, climate and economic challenges.

www.fertilizerseurope.com

EBIC
European Biostimulants Industry Council

The European Biostimulants Industry Council (EBIC) promotes the contribution of plant biostimulants to a more sustainable and resilient agriculture and in doing so promotes the growth and development of the European Biostimulants Industry.

www.biostimulants.eu

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The European Consortium of the Organic-Based Fertilizer Industry represents European producers of organic fertilizers, organo-mineral fertilizers and organic soil improvers. ECOFI promotes the contribution made by the organic-based fertilizer sector to the emergence of a knowledge-intensive, environmentally sustainable and high-employment economy in Europe.

www.ecofi.info