Position Paper

Mission Soil Health and Food

Nutrient Platform supports the embracement of Soil Health and Food as one of the Missions for Horizon Europe. A healthy soil is crucial for sustainable food production and of supply of crops for production of biobased materials and it is of utmost importance to maintain optimal soil functions. Creating and maintaining a healthy soil is not only a technical issue but also a societal challenge, viz. to define measures that create benefits for stakeholders, especially farmers, to manage soils sustainably.

The current draft of the Mission has many important aspects covered. However, the Nutrient Platform believes that micronutrients as an important subject in this mission deserves more attention and could be made more specific. With this position paper a couple of points are highlighted.

Soil health and quality of food

Soil health has been defined as *…"the continued capacity of soils to provide ecological functions for all forms of life, in line with the Sustainable Development Goals and the Green Deal"*

It should be noted that healthy soils and healthy food, are not only referring to the capacity of producing food but also the quality of the produced food. Especially the quality with respect to micronutrients tends to be overlooked, while deficits of micronutrients in diets can lead to wide array of diseases, or a less than optimal physical and mental condition.

Soil health indicators

In the draft proposal 6 soil health indicators have been proposed for soil health and we would like to give our reaction on two of the indicators.

Indicator 1 'Presence of soil pollutants, excess nutrients and salts states: *When present in higher concentrations than allowed by health regulations or plant requirements: soils are unhealthy. A reduction in levels below recognized threshold values indicates an improvement in soil health'.*

The Nutrient Platform wants to highlight that it is important not only to talk about concentrations but also about bioavailability and chemical speciation of nutrients and the risk of run-off of nutrients. The latter is related amongst others to the retention of nutrients by soil organic matter. The concentration alone does not give all the information necessary to ensure sustainable production of healthy nutritious food, with a high nutrient use efficiency. Nutrients should be, depending on the amount and the bioavailability of the nutrients, considered necessary nutrients or polluting materials. We also believe that the term 'excess nutrients' might lead to misinterpretation, and propose to use 'nutrient disbalance' instead, meaning that nutrient supply matches the nutrient uptake by plants + unavoidable losses. An excess on the supply side ultimately leads to environmental pollution, but this is not necessarily pollution in the soil compartment, as also water pollution is relevant depending on the nutrient.

Indicator 6 'Soil nutrients and pH' states:

Essential nutrients for plant growth in part at least, derived from soils include N, P, K, S, Ca. A range of plant micro-nutrients usually found at very low concentrations (parts per million) in soils may limit plant growth, such as boron (B), chlorine (Cl), cobalt (Co), copper (Cu), iron (Fe), manganese (Mn), molybdenum (Mo) and zinc (Zn). Soil pH affects many chemical and biological processes, including plant nutrients availability and the balance and functions of soil microbial communities. In farmland and forestry soils, an optimal balance is required for growth.

These micronutrients, and a few more, are not only essential for plant growth but also for livestock and humans. Therefore, it is an important aspect for feed and nutritional foods. Food production should not only be optimization of the total amount of food production, but also on the nutritional value of food, providing essential nutrients, including micronutrients, for humans.

Size and sustainability of circular approaches

Manure, organic streams, streams from (waste) water treatment and other types of residual or side-streams are sources of **essential nutrients** such as phosphor (P), kalium (K), nitrogen (N), micronutrients and organic matter. These 'renewable' streams can be used to provide the soil with the nutrients that are needed for crop growth. By using renewable streams, the EU agrosystem becomes less dependent on the import of nutrients extracted from the earth crust. It should be noted that this is not only relevant for phosphorous, but also for micronutrients such as zinc, copper, boron, and molybdenum.

The recycling of organic waste can contribute to closing nutrients cycle, however, there is no general guideline for this, as the sustainability of bringing the nutrients of these streams back to soil depends on various local aspects, such as availability of other nutrient rich streams, amount of transport, the presence of micropollutants and effect on current value chains. A circular system needs to be built on the thought: closing nutrient cycles as small as

possible, but as big as needed. Circularity is a means. In the long term, establishing availability of nutrients should be a guideline, to create more resilient food chains. The impact of COVID-19 has shown the potential detrimental effects of distorted value chains. When using new products from different type of sources, these products should be measured by objective parameters, such as impact on climate, on water quality, on soil and on air (emissions) and throughout the whole value chain to be able to compare different routes

Valorization and knowledge development
The Nutrient Platform considers the Mission Soil Health and Food as an inspiration and opportunity to work towards a new agro-food system in which healthy sustainable food, based on sustainable soil and nutrient management, is key.
The circular approach provides opportunities for businesses to valorize residual streams (from wastewater, manure, agro-food processing, industrial processes) and to optimize them in such a way that the complete material chain is used to create the most added value for society, and not only in monetary value.
A circular approach requires to understand the effect changes have on the agro-food system. Thus, a system approach should be kept in mind, to understand the material flows in the current system and the effect of changing these flows in a wider system. The current proposal of the Mission Board shows that the board is well aware that research & innovation is needed on different levels, such as field, farm, landscape, national and global scale and throughout the value chain. Experimental projects on small scale will be needed to find better solutions than current approaches and to become less dependent on other geographic regions and climate change.

In developing new technologies and designing new food systems and value chains, safety is an important aspect. There is an urgent need to fill in the knowledge gaps, create an overview on current knowledge and share expertise on this topic.

Legislation
Current (national) legislation needs an update, based on insights from the latest research. Knowledge, insights and use of soils have developed over time. Research done under SH&F mission should support changing current legislation to these new insights. One of the ways to make this possible is to strive for goals instead of restrictions and process descriptions. These means defining the concept of safety and allow for different routes to reach a safe and circular system.

Examples of projects that contribute to developing circular systems:

- ➔ Inventory of micronutrient rich streams
- ➔ Substance or material flow analyses of micronutrients throughout the whole food systems or in regions
- ➔ Determination of ‘healthy soils’ with respect to presence of micronutrients, especially in terms of bio-availability of the nutrients for plant growth.
- ➔ Monitoring of micronutrient flows in agricultural systems
- ➔ Use of various side-streams in combination with mineral fertilizers to improve soil health and food production

To conclude, the Nutrient Platform asks to:
1. Include micronutrient research with respect to nutritious soils as part of soil health
2. Include the possibility for experiments and more research on sustainable sourcing of micronutrients
3. Work on what soils and plants need to provide nutritious food
4. More attention to the nutrient content of produced food, to ensure healthy and nutritious crops
5. Focus on nutrient availability of the soils
6. The possibility to reuse micronutrients or micronutrient rich flows in safe ways to close the loops or to use them in fertilizer production.

Nutrient Platform
www.nutrientplatform.org
info@nutrientplatform.org
+31 70 304 3700