ORGANIC FARMING

FEEDING CROPS BY FEEDING THE SOIL

Conventional farming relies on fertilizer to feed the crops, but in doing so it wrecks the soil. Organic farming sees the soil as the basis of sustainable production.

In terms of production and area, organic farming represents a thin slice of the agricultural pie. However, its ideas and methods have a sizeable impact. They are pioneering a wave of innovation. This is especially true of its central idea: maintaining and increasing soil fertility as the key to sustainability and productivity. And that is where soil organisms come into play.

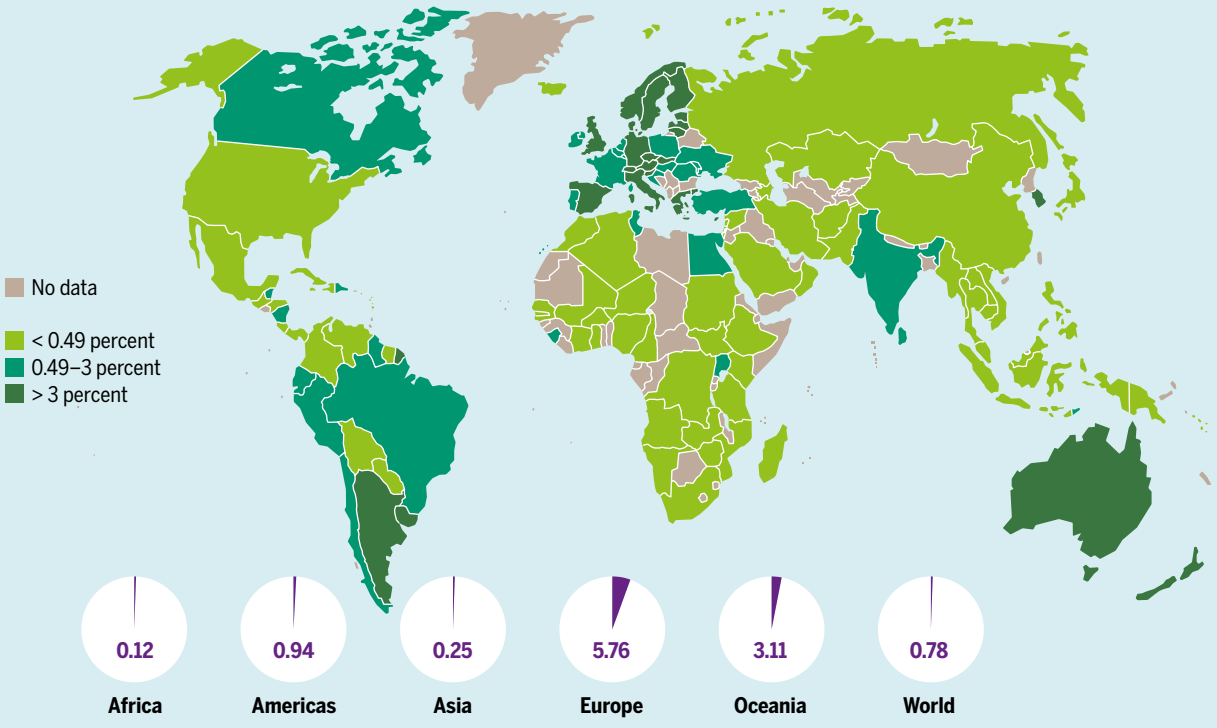
Soil organisms are capable workers; they provide the plants with healthy nutrients by working with nature to ensure good soil structure. These should not be overlooked – but that is exactly what conventional farming does. Spreading mineral fertilizers out of a bag may feed the crop, but it ignores the needs of the living organisms in the soil. Applying fertilizer reduces the amount of organic material that these organisms break down and recycle, and as a result, the organisms starve.

Artificial nitrogen is part of the problem; it speeds up the decomposition of organic substances in the soil. The higher the dosage, the faster the degradation occurs and the bigger the surplus of nitrogen. With the loss of humus many of the positive effects of soil organisms disappear. Crops become more susceptible to pests, and the quality of the soil decreases. Applying phosphate fertilizer can also be counterproductive: it damages the very mycorrhizal fungi that help plant roots absorb this nutrient.

In contrast, a core concept of organic farming is the creation of ideal conditions for soil organisms. Diverse crop rotations and year-round cover crops maintain a rich variety of life above and below the ground, protect the soil surface from erosion, and promote the growth of roots. This in turn feeds more organisms and improves the physical structure of the soil. A healthy soil can store up to four times its own weight in water. That enables it to compensate for periods of

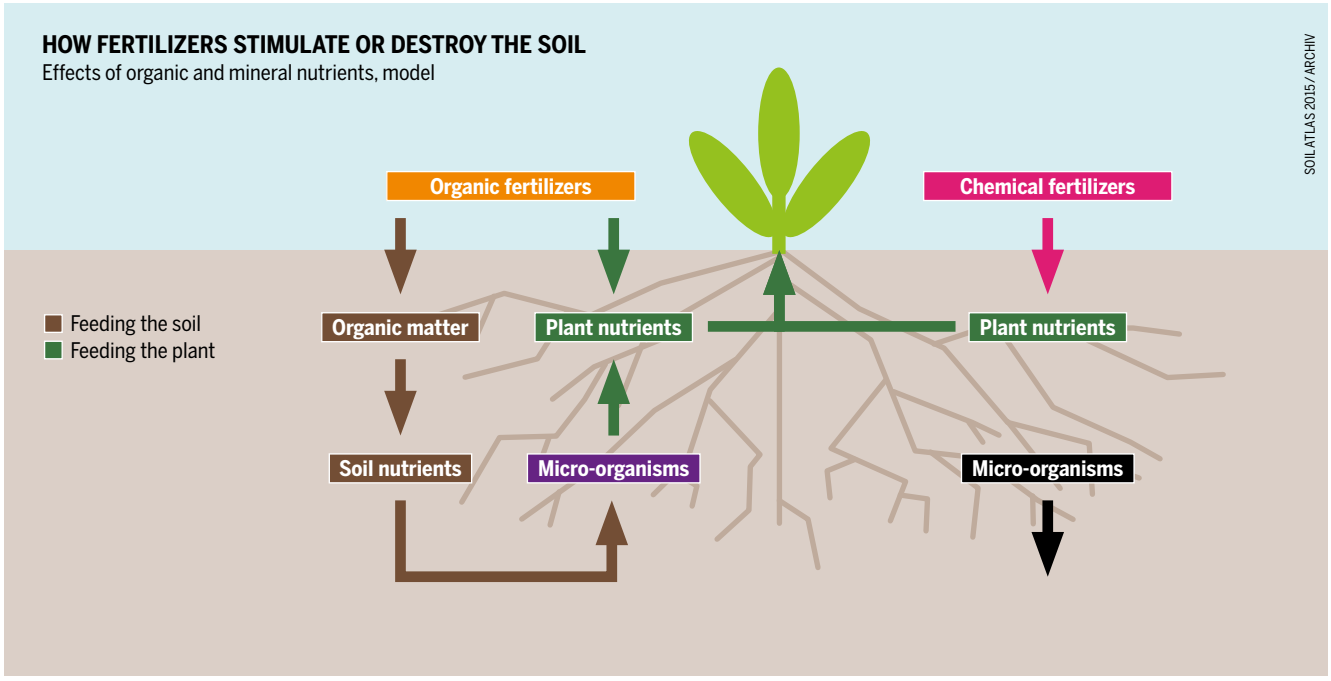
In many places the demand for organic quality exceeds the supply – a compelling incentive for farmers, if only land prices were not increasing

CERTIFIED ORGANIC AGRICULTURE
Share of total arable land, 2009, percent



SOIL ATLAS 2015 / FAO

Many small-scale farmers around the world are not certified as "organic" even though they do not use mineral fertilizers or pesticides



The shortest path is not always the most effective one. Micro-organisms die when fertilizers feed only the plants

heavy rainfall or drought, which depleted, compacted soils cannot handle.

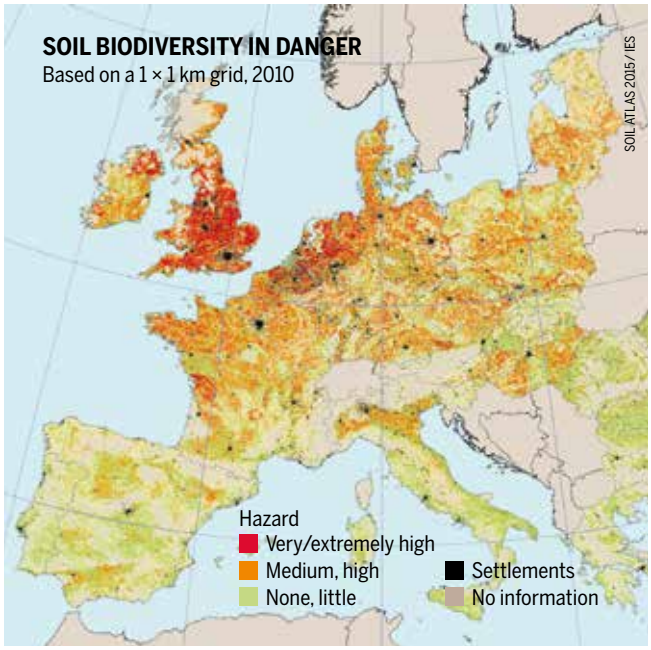
In the tropics, organic farming can ensure a rich species mix not only by crop rotations, but also through multiple cropping, i.e., growing several crops in a field at the same time. They may form several storeys: trees above, shrubs in the middle, shorter plants close to the ground. Soil organisms decompose the leaves that fall from the trees; they recycle the nutrients and make them available to other crops. These mixed cultures would also make sense in mid-latitudes – such as in viticulture or fruit-growing. The mix of crops suppresses pests and stimulates reciprocal growth. By decomposing and converting organic matter, these measures help create a high level of biological activity in the soil that nourishes the crops.

Because it avoids mineral fertilizers and improves the soil quality, organic agriculture uses one-third less fossil fuel per hectare than conventional farming, and on average it stores twice as much carbon dioxide in the ground. Organic matter binds nutrients and holds them in the soil. If there is little humus, the nutrients – especially nitrogen – can easily be washed into the groundwater, out of the reach of plants. Leaching rates on organic farms are half those in conventional production. In addition, organically grown crops can mobilize phosphorus from the soil itself, reducing or eliminating the need to apply phosphate fertilizer.

How about yields? An analysis of 160 studies has shown that in developed countries, the yields from organic farming methods were an average of 92 percent of those using conventional methods. In the tropics, an analysis of 133 studies showed organic farming boosted yields by up to 74 percent, without depleting the long-term soil fertility.

Organic farming has a basic approach and techniques for managing soils sustainably over the long term. However, it has to be developed further to combine modern science and practice. In particular, it is necessary to improve organic fertilization through modern composting methods. To dispense with synthetic fertilizer, mechanical, chemical, microbiological and biological techniques are required for small production plants that can convert rock phosphate into more soluble forms, as well as farming systems that produce high yields and fix sufficient biological nitrogen.

The benefits of organic farming are obvious. For the soil, it does not matter whether the production is "certified organic", but that it follows organic principles. ●



Soils organisms have a hard time – especially in England and the countries around the North Sea. Scientists are alarmed