MINERAL FERTILIZERS

AN EMPTY PROMISE TO END GLOBAL HUNGER

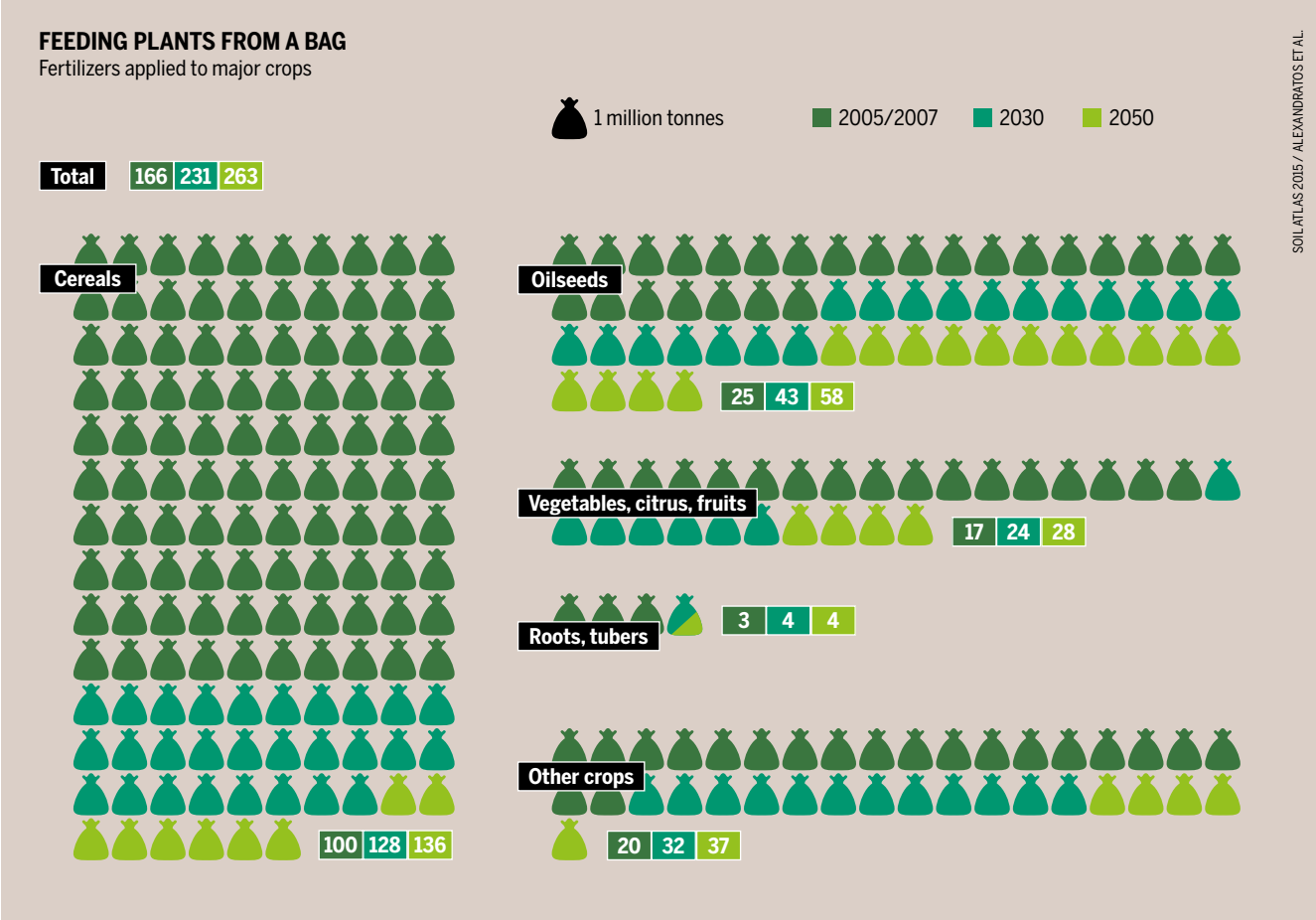
Fertilizers are often seen as a vital means to increasing food production and crop yields worldwide. But the long-term damage they cause to the soil is often forgotten.

Never before in the short history of mineral fertilizers have they been used as often as today. Consumption has risen more than fivefold in the last 50 years, but it is unevenly distributed around the globe. China, the biggest consumer, uses an average of 344 kg of mineral fertilizer per hectare per year; it is followed by Brazil and Japan. In contrast, consumption is very low in most of Africa: just 2.7 kg per hectare in Rwanda, and 7.5 kg in Ghana. In Europe and the United States, consumption has declined in recent years. Soils in the developed world are generally oversupplied with the nutrients nitrogen, phosphorus and potassium. This is not just because of mineral fertilizers; the nutrients also come from animal dung, and especially liquid manure.

Of course, plants need sufficient nutrients to grow. But are mineral fertilizers necessary? That depends on what nutrients, and in what form, they are needed to maintain the soil fertility, produce optimal yields and conserve the climate and environment. Worldwide, nitrogen accounts for 74 percent of mineral fertilizer use; in some countries it is as high as 90 percent. This has enormous negative effects on the environment: the most common nitrogen fertilizers, especially urea, are based on ammonia, a chemical that acidifies the soil . That in turn reduces the availability of phosphorus, another vital nutrient. Nitrogen also speeds the decomposition of humus, depriving soil organisms of their food.

Nitrogen is the only plant nutrient that is biologically renewable; it could therefore be produced in an environmentally friendly way. Growing legumes, which have symbiotic bacteria in their roots that fix nitrogen from the air, could make sufficient quantities of this nutrient available for other

Future crops will rely even more on artificial nutrients to produce bigger yields



In Africa, governments spend a big share of their agricultural budgets on nutrient subsidies

crops. That would not only secure food production but the fossil fuels needed to synthesize nitrogen fertilizer would no longer be required. Approximately one tonne of natural gas is needed to make one tonne of ammonia. The energy requirements are substantial. Replacing artificial nitrogen with legumes could reduce global energy consumption by 1.5 percent.

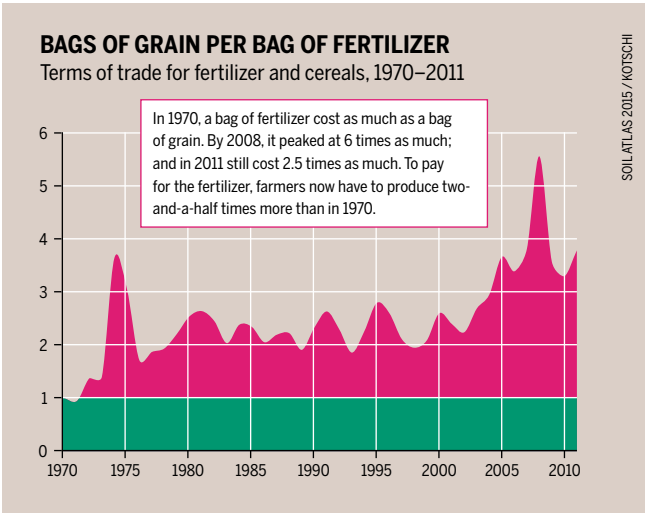
Even so, in developing countries synthetic nitrogen is increasingly subsidized to make it possible for small-scale farmers, who feed around 2.6 billion people, to increase their yield. But at best, such subsidies succeed only in the short term, and their effect is not permanent. At worst, fertilizers will eventually destroy the soil.

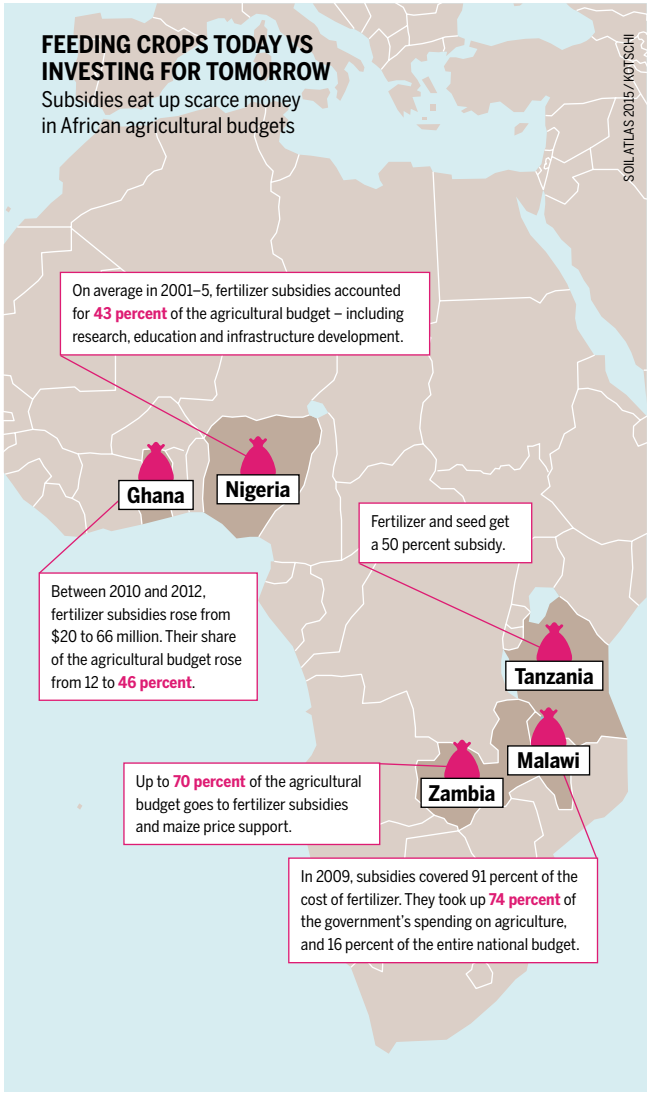
In addition, small-scale farmers tend to stop buying the fertilizers when they are no longer subsidized. The comparatively small extra yield does not make it profitable for these farmers if their costs go up – say, for energy or ever-scarcer resources such as phosphorus. So a strategy for agricultural intensification and food security based on mineral fertilizers is doomed to fail.

This has serious consequences for the economies of developing countries and food-deficit regions. Subsidizing mineral fertilizers is a poor investment. It yields low or negative interest rates, it is unsustainable, and it overburdens national budgets. In some African countries, subsidies account for 45 percent or more of government funding for agriculture. That money would be better invested in extension, education and infrastructure.

We cannot avoid using mineral fertilizers completely, but we have to use them in a different way. Here are four recommendations:

- Mineral fertilizer should complement organic manure. Improving soil fertility must aim first at building up the humus layer and enhancing the cycling of nutrients and energy. That can be done in various ways: applying animal manure or compost, using green manure or intensive fallows, or through agroforestry, including shrubs and trees in fields.





- Phosphorus is critically deficient in some places, and phosphate reserves are dwindling. New technologies have potential: for example the recycling of phosphate from sewage and less-wasteful mining of local deposits.
- We need an about-turn in how we use nitrogen. A complete switch from synthetic production to biological fixation is feasible – not overnight, but the change should begin as soon as possible.
- Strongly acidic soils need systematic liming. We should stop using fertilizers that cause acidification.

A shift towards sustainable intensification has to be a long-term process. Appropriate technologies must be developed and disseminated, and funded. Resistance can be expected. After all, these changes go against the economic interests of those who profit from the current system of using public money to fund mineral fertilizers – especially the few large, powerful fertilizer producers and distributors. But to make a meaningful contribution to food security, the production, trade and use of fertilizer must be completely re-oriented. ●

The exchange relationship between artificial nutrients and food has continuously worsened over the years