

Science for Environment Policy

Food security depends on sustainable nutrient management of soils

Food security is being threatened by loss of soil nutrients that are essential for the high yield of crops. A recent study outlines strategies to ensure the sustainable production of food through a holistic approach to soil nutrient management.

In response to the rising demand for food from an increasing world population, high-yielding crops are being grown with the help of artificial fertilisers containing nitrogen, potassium and phosphorus macronutrients. However, the modern food chain may lead to soils being stripped of nutrients, including micronutrients, such as selenium, zinc and copper. Not only do micronutrient deficiencies affect the nutritional quality of food, but [soil](#) ecosystems may be damaged and less able to provide ecosystem services vital to food security.

To highlight the extent of the problem, the researchers explored practices which lead to an imbalance between the removal and replenishment of soil nutrients in the UK and India. The UK represents an example of a developed country with relatively young and fertile soils, whilst India is a developing country, with relatively old and depleted soils.

Most of the food produced in these countries is consumed in cities by an increasingly urbanised global population. This results in nutrients being transferred from rural to urban areas, with little opportunity to recycle the nutrients back to the land. Even in the UK, for example, tests suggest that soils are becoming depleted of micronutrients, although not yet by enough to limit crop yields.

Furthermore, intensification of agriculture often means that livestock rearing and crop production take place in different areas, as often happens in the UK. Potentially valuable sources of nutrients for crops, such as livestock manure and farm wastewater, are thus unavailable in crop-growing regions. In addition, the increasing application of fertilisers to improve yields, especially in developing countries with less fertile soils, often leads to surface and groundwater becoming polluted by excess fertilisers not taken up by the crops.

In the short-term (one year), the researchers suggest that there are a number of strategies that can be used to reduce the loss of soil micronutrients. At the local level, farmers can add micronutrients to fertilisers, use foliar sprays containing micronutrients, or inject a solution of micronutrients into seed rows. In the medium-term (two to five years), farmers can restore micronutrients levels in the soil by regularly applying micronutrients. Organic materials are good sources of micronutrients, although the application of animal manure, for example, is only economically feasible if supplies are nearby.

Other measures include applying industrial fertilisers with micronutrient supplements (e.g. with added selenium, as already happens with Swedish fertilisers) and promoting mixed farming (i.e. rearing animals and growing crops together), so that micronutrients in manure and farm wastewater can be recycled locally.

In the longer-term (more than five years) soil management strategies should be combined with plant breeding programmes that develop new crop varieties, which are better able to take up micronutrients, the study suggests. All measures can be supported by integrated policies that increase awareness and provide advice on soil nutrient deficiencies to relevant groups, e.g. farmers, crop breeders and fertiliser manufacturers, as well as to the public.



11 July 2013

Issue 336

**Subscribe to free
weekly News Alert**

Source: Jones, D. L., Paul Cross, P., Withers, P.J.A. *et al.* (2013). Nutrient stripping: the global disparity between food security and soil nutrient stocks. *Journal of Applied Ecology*. DOI: 10.1111/1365-2664.12089.

Contact:
paul.cross@bangor.ac.uk

Read more about:
[Agriculture](#), [Soil](#)

The contents and views included in Science for Environment Policy are based on independent, peer-reviewed research and do not necessarily reflect the position of the European Commission.

To cite this article/service: "Science for Environment Policy": European Commission DG Environment News Alert Service, edited by SCU, The University of the West of England, Bristol.