

Science for Environment Policy

How to increase the uptake of environmentally friendly fertilisers in Germany

Fertilisers have boosted crop yields but at the same time can have negative effects on the environment. This study investigates fertiliser 'eco-innovations', with reduced environmental impact, in Germany. By gathering the views of experts, producers, traders and farmers, the researchers make recommendations for increasing uptake of environmentally friendly fertilisers, including increasing knowledge and awareness among traders and farmers.

Over the past century, agricultural productivity has increased significantly. Almost half of the increase in agricultural output can be attributed to the use of fertilisers, which supply essential plant nutrients to soil and crops. While fertilisers have helped food production to keep pace with population growth, there are growing concerns that their increased use has negative effects on the environment, including generating greenhouse gases, increased leaching of nutrients and using finite natural resources.

As a result of these concerns, there is a growing movement to develop new agricultural practices that enhance food production without such costs to the environment. These can be classed as eco-innovations, which result in a reduction of environmental risk, pollution and the negative impacts of resource use.

This study investigated fertiliser eco-innovations in Germany. The researchers assessed three innovations that have been around for some time, but have not been widely adopted in Germany.

These eco-innovations were:

1) Stabilised Nitrogen Fertilisers (SNF)

According to the authors, the use of SNF can reduce nitrogen leaching and increase the efficiency of nitrogen use. They can also reduce emissions of carbon dioxide and nitrous oxide, both of which are greenhouse gases.

2) Fertigation (FG)

FG is the application of soluble fertiliser via irrigation water. Applying nutrients in a water-soluble form and just before they are needed can reduce nutrient losses and give producers more control over plant nutrition.

3) Fertilisers Made from Secondary Raw Materials (FRSM)

Fertilisers can be made from secondary raw materials, such as sewage sludge, compost or leftovers from meat or food production. These are expected to become more important as non-renewable materials (such as rock phosphate) become scarce.

To investigate these eco-innovations, the researchers first held interviews with experts in the field, including CEOs of fertiliser producers and plant-nutrition experts. Based on the results of these interviews, they developed a questionnaire which was answered by 57 people in the German fertiliser supply chain, including fertiliser producers, traders and farmers. Questions addressed the drivers for eco-innovation: market pull/technology push, perceived need for action to mitigate climate change, regulation awareness and knowledge of eco-innovations. Additionally three open questions were used to get a deeper insight into the ideas of the respondents about environmental challenges and solutions.

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The results showed that groups perceive eco-innovation differently. Farmers were overall the most sceptical of new technologies. This indicates that the adoption of eco-innovation is more likely to be due to 'technology push' than 'market pull' driven by farmer demand, although results suggested this could change if consumers increased their willingness to pay for crops grown using environmentally friendly fertilisers.

All groups generally agreed that extreme weather will increase and that fertilisation management has to adapt. All groups were also aware of regulation as a driver for eco-innovation. However, while producers anticipate regulatory changes in order to remain compliant, traders and farmers appeared to be less pro-active. All supply-chain partners agreed that environmental regulations are likely to become stricter, and especially farmers expected further restriction of the use of nitrogen and phosphorous, which should increase eco-innovation adoption.

Although experts were aware of general developments, such as an increased use of organic fertilisers, knowledge of specific eco-innovations was limited and decreased along the supply chain. SNF was the best known by all partners in the supply chain. While FG was well known by producers, only 65% of traders and 30% of farmers were aware of it. FSRM was known by over half of producers but fewer than 30% of traders and farmers. Of concern, farmers — those who apply the eco-innovations — had the lowest knowledge overall, which may be caused by the low market diffusion of these products.

The researchers conclude that each fertiliser faces specific problems, but that the main barrier for all of them is cost; they are simply more expensive than their conventional competitors. As well as reducing cost, the researchers make several recommendations to stimulate the development and use of fertiliser eco-innovations. For example, they suggest that regulation could limit the acceptable nutrient surplus in farms.

They also suggest that plant-nutrient experts could improve knowledge and awareness of eco-innovations among traders and farmers, for example by organising seminars and workshops for them. They also conclude that the different stages of the fertiliser supply chain in Germany are not well connected and recommend creating local networks of peers, suppliers, customers and institutions to increase trader and farmer awareness of eco-innovations.

