

EXPERTS SOUND THE ALARM

Phosphate shortage ahead

Agriculturalist Bert Smit from Wageningen UR and Wouter van der Weijden, chair of a thinktank of the Dutch Ministry of Agriculture, Nature and Food Quality, alerted the Dutch government to a threatening phosphate crisis.

TEXT KORNE VERSLUIS PHOTOS TESSA PHOSTUMA DE BOER



‘Phosphate shortage threatens food production’, read an NRC headline in October 2009. In the article, agriculturalists Bert Smit and Wouter van der Weijden expand on the research report and policy advice which they presented to Minister Verburg in September. Verburg forwarded the reports to the lower house of the Dutch parliament. Both reports paint an alarming picture. Smit: ‘You hear a lot about running out of fossil fuels, but phosphate is a bigger problem.’ Although there is a growing demand for phosphate, the phosph-

ate mines are being exhausted and erosion is washing a lot of phosphate into the sea. ‘There are alternative sources of energy. There is no alternative for phosphate.’

WORLD STOCKS

It is not a new issue, says Smit. ‘That the world’s phosphate stocks are finite is something I heard when I was a student. And that’s quite a while ago – I started studying in 1967.’ Van der Weijden, too, began to write about phosphate a long time ago. ‘The first time was in 1984. Then I

wrote a report for the Science Council for Government Policy on the building blocks for integrated agriculture. I said that phosphate stocks would be exhausted in a couple of generations and that European agriculture was not self-sufficient. But I didn’t pursue it much after that.’ Nothing strange about that, as calculations at the time suggested that world stocks of phosphate were sufficient for another hundred years. That picture was changed in the 21st century by the rapid rise of the economy and of food production in countries such



Bert Smit and Wouter van de Weijden:
'There are no alternatives.'

as China, which also started to use more phosphate. In 2007 and 2008, speculation about an acute shortage of phosphate even sent the price of phosphate ore up by fourteen times.

EROSION

Smit is leading exploratory research into the implications of a phosphate shortage for the Dutch economy. 'We were shocked. A shortage was much closer than we thought. If nothing changes, stocks will be finished within the foreseeable future

and there are no alternatives. People should be more worried about this.'

He wrote an article in *Trouw* to draw attention to the issue. 'Trouw put it on the front page. That brought a lot of publicity; I was phoned by fertilizer manufacturers, sanitation people, and the steering committee on technology assessment (TA).' Van der Weijden, chair of the steering committee, an advisory thinktank for the Ministry of Agriculture, Nature and Food Quality: 'We read a few reports here and there; there was no great alarm but we thought it was an important subject. When we read Bert Smit's article in *Trouw* we thought, let's talk to him and give him an assignment. He seems to have quite a lot of knowledge already so we should be able to put some advice together quite quickly.'

The Wageningen researcher worked out several different scenarios. In the worst-case scenario, in which an expanding world population eats more and more meat, the more easily mined stocks are exhausted within 70 years. A realistic but more moderate growth scenario predicts that the easily mined stocks are exhausted within a century. One of the reasons is that every year erosion washes more phosphate into the oceans than is produced by all the mines put together.

EXCESS FERTILIZER

However, neither the Netherlands nor the rest of the world seems to be taking much notice of the looming shortage. The Dutch parliament talks about the excess phosphate that causes problems for the Dutch environment, not about shortages. The fertilizer overload in agriculture turns phosphate into waste rather than a valuable mineral resource. Dutch livestock farmers have to pay to dispose of their phosphate-rich waste, for example. Human excrement, which is also rich in phosphate, is not allowed to be reused in the food chain. For this reason, sewerage sludge is burnt, as are bones from slaughterhouse waste. Some of the phosphate-rich ash even goes into cement. 'Crazy', says Van der

Weijden. By reclaiming phosphate from sewerage sludge and fertilizer, the cycle could be largely closed. In response to this advice, Minister Verburg has said that she wants to stimulate experiments with reclaiming phosphate in the Netherlands, and will put the issue on the agenda of the FAO and the EU. Thanks to his research for LNV and the TA steering committee, Bert Smit got a research assignment for the European Union. 'After we had presented our research there was more attention to the issue from other quarters. There were articles in *Nature and Science* which shook up the EU. Now I'm working with the Stockholm Environmental Institute on a follow-up study. We are looking at the consequences of a shortage in Europe and mapping the phosphate balance for five regions.'

Van der Weijden hopes that there will soon be more attention for the phosphate issue: 'We've all got to change course, the world over. We need to learn fast how to use phosphate economically, and how to recycle it. Europe is one of the regions in the world that face a big problem in the long term. We've hardly got any stocks of our own, so the idea that European agriculture is self-sufficient is a myth.' ■

WHERE HAS ALL THE PHOSPHATE GONE?

Annually, the world uses about 18 million tonnes of phosphorus in artificial fertilizer. At the same time, 20 to 30 million tonnes are drained into the oceans, mainly through erosion from fertile soils. The phosphorus leeches into sediments and then into the sea water. At the moment we have no technology for reclaiming the fertilizer from the oceans. The 18 million tonnes currently used by humans could be reclaimed from 24,000 cubic kilometres of sea water.