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Cadmium governance in Europe's phosphate fertilizers: Not so fast?

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ABSTRACT

The European Union has been concerned about cadmium (Cd), because of its toxic nature, since the 1970s. While many anthropogenic sources of Cd were regulated early on at the community level, and most member states later established national limits, Cd content in widely used mineral fertilizers remains uncontrolled across the EU. In 1997, the European Commission first suggested phased Cd limit values in mineral fertilizers as a promising approach to reducing Cd content in soils and harmonising national measures. For over 20 years, however, no harmonised measures have been adopted because confusion remains about the basis for, and level of, such limits. We comment on the latest deadlock over the revision of the Fertilisers Regulation and strengthen assumptions as to why such limits are timely, pertinent, and possible.

After much attention was paid to unfounded alarmism about the continued long-term supply of phosphate rock used in the manufacturing of mineral fertilizers during the past decade (Ulrich, 2016; Van Kauwenbergh et al., 2013), the focus has since broadened to the wider meaning of phosphate (P) stewardship, including environmental, health, and quality considerations. Notable is the European Union's current focus on heavy metals in fertilizers, particularly on cadmium (Cd), which is reflected in the revision of Fertilisers Regulation (EC) No 2003/2003. The revised regulation was proposed in 2016 and has two central goals. First, it aims to allow free movement of all fertilizers, including by levelling the playing field between recycled fertilizers (from waste-based phosphorus sources) and mineral fertilizers (from primary phosphate rock sources). Second, it aims to set harmonised environmental standards to minimise any adverse health and environmental effects. One component of the regulation is a rule to reduce Cd in fertilizers, which is currently unrestricted, to an initial limit of 60 mg/kg P_2O_5. The limit would be tightened to 40 mg after three years and then to 20 mg after 12 years. Following intense debate in the autumn of 2017, the European Parliament finally adopted the European Commission's (EC) proposal but with a longer time frame: 16 years instead of 12. The European Council's position, however, is much more conservative, as it suggests a single limit of 60 mg/kg P_2O_5 within 10 years only due to a small group of member countries (Bulgaria, Romania, Poland, Spain, Portugal and the U.K.) opposing the EC's proposal. In early 2018, the revised regulation entered the so-called trialogue phase, where the three EU institutions negotiate their positions (Fig. 1). No consensus was reached under the Bulgarian presidency, however, so the dossier has now been transferred to Austria. Because a major point of contention remains the controversial Cd limits, the adoption of a revised regulation has been delayed.

Cd is a toxic chemical, considered a class 1 carcinogen by the World Health Organization (WHO). Exposure presents a risk to the environment and human health. Cd is known to accumulate in soils, leach into ground and surface water, and be taken up by crops, resulting in increased levels in animals and in food, which could cause damage to human health. The WHO and the Food and Agriculture Organization (FAO) have therefore established safe exposure levels for food in the Codex Alimentarius. The European Food Safety Authority (EFSA) recommends reducing Cd exposure because certain subpopulations are close to or exceed the tolerable weekly maximum intake. Recent studies estimate that 45% of total inputs into EU agricultural land stem from mineral phosphate fertilizers and that 55% of total dietary intake of Cd is related to soil Cd.

This article comments on the current deadlock in setting Cd limits based on what we know from the past and on current trends, and strengthens assumptions regarding why these limits are timely, pertinent, and possible. It is argued that a realistic and much more balanced or holistic debate on Cd limits is needed. Such a debate must include the following arguments: that concerns about Cd in phosphate rock were initially addressed in the 1980s, and harmonised EU limits been proposed for more than 20 years; that national limits have been an established practice in Europe since the mid-1980s; that science is providing sufficient arguments for a precautionary approach; that markets can provide for appropriate resources; and that the international agenda is increasingly committed to protecting soils and human health. Experts are well aware of these arguments, but they typically get lost in the public debate.

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	European Commission		European Parliament		Council of the EU
Cd limit					
< 60	2020		2020		2028
< 40	2023	(after 3 years)	2026	(after 6 years)	
< 20	2032	(after 12 years)	2036	(after 16 yers)	
Mandatory labelling	✗		✗		✗
Green labelling	✗		✓		✗
National derogations	✗		✓		✗

Fig. 1. Positions of the three EU institutions in the 2018 trialogue.

1. Background

Cd and specifically its introduction into soils via mineral phosphate fertilizers is an old problem (Schroeder and Balassa, 1961). Since it is not an urgent problem due to Cd`s low rate of accumulation in soils, however, tackling it has been shifted to future generations, although general Cd control in the EU and beyond has been discussed since the late 1970s. Many scientists from different disciplines, leading institutions, and EU establishments have looked into Cd soil accumulation, including the contribution from fertilizers (e.g. WHO, 1992; OECD, 1996). For the EU, drivers to reduce accumulation and dissipation in the environment to achieve sustainable development were initially laid out in a Council resolution in 1988, which stressed the need for a community action programme to combat environmental pollution by Cd, followed by the EC's Fifth Environmental Action Programme in 1993. While this stimulated extensive Cd regulation, e.g., in sewage sludge, drinking water, electronic waste, and foodstuffs, the presence of Cd in fertilizers remained unaddressed. One of the main reasons it was placed on the agenda appears to have been environmental concerns raised by Austria, Finland, and Sweden, which had applied to become EU members at the turn of the 1990s and wanted to maintain their own national fertilizer provisions for Cd.

According to Hutton and de Meeûs (2001), the EC initially proposed Cd limit values in fertilizers in 1997, including control mechanisms, penalties, and transition periods. Risk assessment reports from eight member states plus Norway argued that this regulatory measure was justified because in soils fertilized with products containing 1–-20 mg Cd/kg P_2O_5, Cd tends to accumulate very slowly or even decrease after 100 years, whereas at a concentration of more than 60 mg/kg P_2O_5, soil accumulation would be relatively high. In contrast to today's regulatory approach, a progressive five-year interval approach was chosen (a limit of 60 mg five years after entry into force, 40 mg 10 years after entry into force, and 20 mg 15 years after entry into force) to give the industry sufficient time to adapt. Twenty years later, however, these limits have still not entered into force.

The delay seems to be partly related to challenged knowledge across the EU on Cd exposure and risk, as well as to uncertainties related to the potential economic and social impacts resulting from implementation. The delay also stems from fervent industry lobbying against Cd limits because some actors of the fertilizer sector are concerned that these measures will lead to disproportionate punitive measures against some important producers, mainly from developing countries in Africa. More information and data on the impact of exposure is now available, and the implications have been assessed and are now understood reasonably well. Still, no specific action has been taken, as several EU member states still oppose the proposal. Discussions took place in 2007 and 2009, but it was agreed to await future revision of Regulation 2003/2003. A post-evaluation of the regulation concluded that while the legislation was successful in achieving its goal of simplifying the regulatory framework, it lacked sufficient provisions for environmental protection and public safety (in terms both of heavy-metal content in fertilizers and of innovation), and it needed to cover all fertilizers. Interviews with most member states showed that the introduction of specific limits was indeed necessary, yet most industry actors did not agree (CSES, 2010).

It is important to point out that many of the arguments used against Cd regulation today have in fact been discussed in the past. Questions about whether or not Cd in fertilizers could potentially be dangerous, whether or not the industry is capable of providing resources or adapting to limits, or whether there is a need for the industry to inform consumers about the heavy-metal content in their products have all re-emerged today in the context of the proposed revision—and the answers have largely remained the same. The only notable exception seems to be about alternatives to secure a continued supply of phosphorus for EU farmers.

What prompted the 2016 regulatory proposal to take on new energy is arguably its relation to the Circular Economy Action Plan and the desire to harmonise the EU market to allow innovative recycled products to enter the market. This appears to be the single most important change from the past: local alternatives involving low-Cd P sources stemming from recycled P coming on stream. These nutrient sources are commonly referred to in the EU as STRUBIAS (recovered P salts, biochar, and ashes), and they can be used either directly as fertilizers or as ingredients in the fertilizer production process. It is predicted that the market demand for, and trade in these materials will significantly increase in the future. While their own economic, environmental, and social challenges have yet to be overcome (Amann et al., 2018; Ulrich, 2017), they open up a domestic resource pool that is meant to decrease the dependence on phosphate rock as a critical material for the EU, for which the region is almost entirely dependent on imports. This new arena was opened by the debate about peak phosphate and the need to close the phosphorus cycle (Elser and Bennett, 2011), stressing the replacement of non-renewable commodities with recovered waste products.

2. Established national policies

In the past, the EU has assessed different regulatory measures for reducing the risk stemming from Cd in fertilizers: these include taxation, voluntary provisions, soil management, and the declaration of vulnerable areas (Oosterhuis et al., 2000). The EU has concluded that setting a limit value as a classic steering tool in environmental policy and the application of the precautionary principle are the most practical in terms of effectiveness, practicability, low economic impact, and monitorability. It has also been proposed that measures to introduce limit values are most effective if accompanied by labelling (Cupit et al., 2002; Hutton and de Meeûs, 2001). Opponents of the limit-value approach should go back to these analyses before claiming that limit values are of no use.

According to a survey by the European Commission (EC, 2016a), a large number of member states have found it necessary to take legal action to address the issue of Cd in fertilizers. Provisions to limit Cd in national mineral phosphate fertilizers exist on a national level in 21 EU countries and to a lesser extent around the world. Fig. 2 shows the range of these provisions, indicating how highly fragmented the market is and demonstrating the need to harmonise these values. Some countries also have more advanced regulations, with higher quality