Comments from the International Fertilizer Industry Association (IFA) on the Draft European Commission (EC) Proposal Relating to Cadmium in Fertilizers

The European Commission (EC) proposal to regulate cadmium (Cd) in phosphate fertilizers claims to be aimed at "completing the Internal Market for fertilizers" and "protecting the environment from further accumulation of cadmium in cultivated soils". It proposes the progressive establishment of limits for the cadmium content of phosphate fertilizers, with an ultimate threshold of 20 mg Cd / kg P_2O_5, fifteen years after entry into force of the proposal. This proposal assumes that regulating the content of cadmium in phosphate fertilizers is the most appropriate risk management measure. The proposal is based on the conclusions of an impact assessment study stating that fertilizers containing 20 mg Cd / kg P_2O_5 or less are not expected to result in long-term soil accumulation. The risk assessment study further indicates that fertilizers containing 60 mg Cd / kg P_2O_5 or more could result in long-term soil accumulation.

The fertilizer industry supports the two objectives of the proposal. It is indeed important to (i) harmonize regulations among the EU member states in order to facilitate trade within the region and (ii) protect the environment from long-term accumulation of cadmium in soils. However, the fertilizer industry is of the opinion that the EC draft proposal does not provide the most appropriate method for achieving the stated goals. First, by focusing on a purely regulatory approach, the EC overlooks alternative risk reduction or management strategies that might be more cost-effective. Second, the current proposal regulates cadmium contained in phosphate fertilizers only, ignoring many other important sources of cadmium inputs, such as atmospheric deposition. Third, the unintended consequences of the proposed regulation might, in fact, be more detrimental than doing nothing.

The scientific information provided in the EC impact assessment study, upon which the proposal is based, does not include information on the potential cadmium accumulation in soils between 20 and 60 mg Cd / kg P_2O_5. There is no scientific evidence that cadmium would accumulate in soils between these two values. There is, therefore, no scientific justification for setting a limit at 20 mg Cd / kg P_2O_5.

Moreover, such a limit would render the supply of phosphate fertilizers unsustainable, since only 15% of the phosphate fertilizer currently produced has a low cadmium content (phosphate of igneous origin). The remaining 85% of world supplies (of sedimentary origin) contain quite often more than 60 mg Cd / kg P_2O_5. Known phosphate reserves of igneous origin represent less than 10% of the world reserves for this element. Therefore, with respect to the limited extent of igneous sources of phosphate, the proposed regulation provides a short- to medium-term solution only, which is contrary to the sustainability objective of the proposal.

From a human health point of view, the only case of toxicity due to cadmium confirmed up to now has concerned subsistence farmers growing rice in Japan on soils heavily contaminated by cadmium from industrial wastes (*itai-itai* disease). This disease can be explained by a combination of three factors: (i) the soils where rice was grown had high cadmium contents; (ii) the diet of these farmers was essentially based on rice and (iii) cadmium is highly bioavailable in rice grain. No other case of cadmium toxicity has been documented.

The scientific community[1] agrees that the specific situation of subsistence rice growers requires priority attention. Moreover, when considering potential effects of cadmium on human health, it is particularly important to consider the bioavailability of cadmium (i.e. its absorption and then retention in the vulnerable organ tissues). A very important factor regarding bioavailability is the interaction between cadmium and other minerals, in particular zinc, iron and calcium. Animal studies show that diets with low zinc, iron and calcium may multiply cadmium absorption and organ accumulation by as much as tenfold. Therefore, segments of the population with low zinc, iron and calcium diets may be more susceptible to cadmium risks than those that are well nourished.

With reference to environmental stewardship, the scientific community agrees that soils with already high cadmium contents should be given higher priority than the medium- to long-term accumulation of cadmium in soils with a low base level of the element.

The draft EC proposal does not respond to the two above-mentioned priorities, quite the contrary. First, it would probably lead to the use of low-cadmium phosphate fertilizers almost exclusively in countries where they would be of little or no benefit to human health and the environment. As a result, subsistence rice growers (the most sensitive sub-population) would be denied or have difficult access to these products. This would not be socially responsible. Second, the use of low cadmium phosphate fertilizers on soils with already high cadmium contents will not reverse the soil cadmium content to an acceptable level. Clearly, more appropriate management measures are needed for both these problems.

The following alternative risk management practices are recommended by the scientific community for the two priority situations:

- For subsistence rice farming:
  - Develop and grow rice varieties with lower cadmium content and higher contents of iron and zinc in order to reduce cadmium bioavailability;
  - Target, to the extent possible, the use of low-cadmium phosphate sources at subsistence rice growers.
- For soils with already high cadmium contents:
  - Grow food crops with low cadmium uptake on these soils;
  - Use plants with high cadmium uptake for phytoremediation purposes;
  - Transform these areas into either industrial or recreational estates.

As far as the future progressive accumulation of cadmium in soils is concerned, the scientific community recommends, among other options, to:

- Correct/prevent zinc deficiencies in order to minimize cadmium accumulation in grain;
- Apply limestone to acid soils, since acidity favours the cadmium uptake by crops;
- Reduce salinity or the chlorine content of soils, which also favours the cadmium uptake by crops;
- Reduce the cadmium content of phosphate sources (fertilizer, sewage sludge, manure) through cadmium removal (decadmiation) processes;
- Blend low and high cadmium sources.

The EC proposal relates to the last two bullets only, and only partially. Therefore, it does not provide a comprehensive answer to the problem.

The EC proposal should also take into consideration the analysis of the potential costs and benefits associated with any management option. The unintended impact of the proposal on

[1] "Scientific community" is used with reference to the Workshop on "Risk Assessment and Management of Environmental Cadmium" organized by the Scientific Committee on Problems of the Environment (SCOPE) on 3-6 September 2003 in Ghent, Belgium.

developing countries cannot and should not be ignored. In particular, the restriction of imports in Europe of phosphate fertilizers from certain countries (notably Morocco, Senegal, Togo and Tunisia), with serious implications on their national economies, should be weighed against the possible benefits to human health and the environment. It would seem inconsistent with European ideals to export a European problem to developing nations.

There are many other unintended consequences linked to restrictive regulations for cadmium in phosphate fertilizers:

- Increased phosphate fertilizer prices;
- Lower phosphate fertilizer use and resulting imbalances between nitrogen and phosphate, which would cause nitrogen losses to the environment;
- Issue of cadmium waste disposal (The battery industry is unlikely to absorb much cadmium);
- Reduced market competition, with the risk of a monopolistic situation.

Finally, many knowledge gaps still remain, in particular as regards cadmium leaching, cadmium atmospheric deposition, cadmium removal via soil erosion, cadmium/zinc and cadmium/iron ratios, cadmium bioavailability in foods, etc. Therefore, it is essential to stimulate research on the following:

- Breeding of crop varieties with low cadmium content and high iron and zinc content;
- Breeding of plants with high cadmium uptake, for phytoremediation purposes;
- Developing technically feasible and economically viable techniques to remove cadmium from phosphate fertilizers and other sources of the element;
- Developing reliable methods for measuring bioavailable cadmium.

Given the EC concerns on cadmium, it would seem appropriate that the Commission stimulates research on these topics, which are largely neglected by European scientists.