CADMIUM LIMITS IN PHOSPHATIC FERTILIZERS

What is Cadmium?

Cadmium (Cd) is a non-nutritive trace element regarded as harmful to humans and environment.

It occurs naturally in soil, water, air and in several types of rocks including the sedimentary ones used to make phosphatic fertilizers.

It can also be found in sewage sludge, manure, incineration of municipal wastes, non-ferrous metal production, iron and steel production and combustion of fossil fuels.

The most common source of Cadmium pollution is improper waste disposal (municipal and industrial).

Research has not yet resolved the problems of origin and transformation of Cadmium in the soil and crops. It has been observed that deposition of Cd from air is higher than that from mineral fertilizers.

Where manure has been used, the total deposition of Cd has been higher than the combined atmospheric deposition and the contribution of mineral fertilizers.

Soil organic matter increases the retention of Cd in soils.

CADMIUM TOXICITY

Terry L. Roberts, 2014

The only known case of toxicity (i.e. ltai – ltai disease) occurred with subsistence farmers in Japan in 1950's growing rice on soils contaminated with industrial waste.

Cd accumulation in soils as affected by several factors (soil pH, organic matter, salinity, macro and micro nutrients fertilizers, crop species and cultivar and tillage. These factors influence the bioavailability and uptake of Cd.

Because fertilization increases the risk of Cd transfer to the food chain, some governments have imposed limits restricting Cd content of P fertilizers (see table attached).

Smolders & Six 2014 moduled future long term changes in soil Cd concentrations.

Considering arable land and two crops in Europe, the authors predicted soil Cd concentration to decrease on average by 15% over the next 100 years,

They further found that Cd accumulation only occurs with fertilizer Cd content more than 80 mg/Kg P_2O_5.

From the studies in Europe and given that farmers apply more than 100 nutrient Kg fertilizer/ha and in Kenya we are only at 27 nutrient Kg/ha, it would take a very long time for Cd concentrations to reach hazardous levels.

In the neighbouring countries (Tanzania, Burundi and Rwanda), they have set Cd levels at 30 ppm and it does not make any economic sense to lower our levels to 15 ppm because of the cross border trade in food and fertilizers.

Furthermore, Kenya consumes a lot of rice from Asia, foodstuffs from European Union, Asia, USA and Brazil where millions of Moroccan phosphate fertilizers (with Cd more than 15 ppm) are used.

The reduction of the Cd limit in Kenyan standards to 15 ppm was not based on any scientific basis.

Since we have not carried out any scientific studies and we have been following EU Standards where we export most of our agricultural produce, we should maintain our previous limit of 30 ppm just as EU has decided to maintain 60 mg/Kg P_2O_5.

If the current Cd limit (15 ppm) in phosphate based fertilizers is maintained, fertilizer imports will be restricted to Saudi Arabia thereby monopolising the trade which may lead to higher prices and which will definitely have a negative impact on our food security.

Table 3. Limits for Cd in P fertilizers in several countries expressed as Cd:P ratio, Cd:P_2O_5 or concentration of Cd in the fertilizer product. (adapted from Chaney [11]).

Country	Limits	mg Cd/kg P	mg Cd/kg P_2O_5	mg Cd/kg 45% P_2O_5 Product
Limits for Fertilizer-Cd				
USA-Washington	0.0889 kg Cd/ha/yr	2040	889	400
USA-Oregon	7.5 mg Cd/% P_2O_5	774	338	152
USA-California	4 mg Cd/% P_2O_5	412	180	81
Australia	300 mg Cd/kg P	300	131	59
Canada	0.0889 kg Cd/ha/yr	2040	889	400
Japan		340	148	67
Austria	75 mg Cd/kg P_2O_5	275	120	54
Belgium	90 mg Cd/kg P_2O_5	206	90	40.5
Denmark		110	48.0	21.6
Netherlands		40	17.5	7.9
Finland	21.5 mg Cd/kg P_2O_5	49	21.5	9.7
Sweden	43 mg Cd/kg P_2O_5	100	43.7	19.7
EU Proposal (2001)	20 mg Cd/kg P_2O_5	45.8	20	9
	40 mg Cd/kg P_2O_5	91.6	40	18
	60 mg Cd/kg P_2O_5	137	60	27

Roberts, 2014. Cadmium and Phosphorus Fertilizers: the issues and the Science.