

Agriculture weeds out cadmium

A national strategy for reducing cadmium levels in food crops will complement the efforts of fertiliser manufacturers to source low-cadmium phosphates by ensuring the future contribution of governments, horticulturists and farmers.

The National Cadmium Minimisation Strategy was established in July, 2000 by the Standing Committee on Agriculture and Resource Management (SCARM).

Major goals of the strategy are to standardise state regulations controlling cadmium in manufactured fertilisers, develop best-management practices for growers in high-risk industries, establish national quality assurance programs for cadmium analysis in crops and foods and contribute to international standards governing cadmium in traded foods.

Dr Mike McLaughlin of CSIRO Land and Water is the committee's national cadmium coordinator. He says cadmium represents a threat to Australia's reputation for clean agricultural production, and to free trade in international food commodities.



Plant breeders can play an important role in reducing food-chain transfer of cadmium. According to CSIRO's Dr Mike McLaughlin, it is important that they screen new crop cultivars to check on their cadmium uptake characteristics. 'Breeders may be able to select for very low cadmium accumulation traits in crops,' he says. 'They must also guard against inadvertent selection for cadmium accumulation tendencies. We want cadmium inefficient crops!'

'As well as using phosphate-based fertilisers, we add cadmium to our soils in livestock manures, sewage biosolids and other recycled organic materials,' he says.

'Some Australian soils – for example, those which are sandy, acidic, low in organic matter, deficient in trace elements or saline – also have a propensity to allow crops to accumulate cadmium to levels above or close to maximum permitted concentrations.'

Cadmium is a naturally occurring trace element that is present at low levels in all soils, rocks, waters, plants and animals. It exists in relatively high concentrations in

phosphate fertilisers and can enter the food chain via crop plants.

Most of the cadmium ingested or inhaled by humans is promptly excreted, but a small proportion is retained, mostly in the kidneys and liver, where it can accumulate. Problems can occur if the cadmium concentration exceeds 200 micrograms per gram of kidney tissue, and prolonged exposure to high cadmium concentrations can gradually affect kidney function.

This has been observed in population studies in Japan and Belgium, where renal dysfunction is statistically related to environmental and occupational exposure to cadmium. Such high levels of cadmium exposure are unlikely to occur in Australians.

Organic concerns

The push to reuse urban and animal wastes, such as sewage biosolids from sewage treatment works, to enrich agricultural soils, is also causing some concern. This is because permissible additions of cadmium to soils from biosolids far exceed typical application rates in phosphate fertilisers.

Perhaps the cadmium guidelines for sewage recycling need scientific review, especially given that the European Union is toughening its regulations for reuse of biosolids.

The fertiliser industry in Australia has already made good progress in minimising cadmium additions.

In the early 1990s, the industry established a program to reduce cadmium in fertilisers by switching to low-cadmium



Best-management practices are being developed for growers in high-risk industries to minimise cadmium in agricultural and horticultural produce. They include soil and irrigation testing for salinity, addition of trace element fertilisers or liming agents, crop rotations to boost soil organic matter, and changes in crop type or variety to minimise cadmium uptake.

sources of imported phosphorus fertilisers and by changing the source of phosphate rock used in superphosphate manufacture here in Australia. This has worked. The amount of cadmium introduced into agricultural soils from mineral fertilisers has been reduced by more than 80%.

'What's more, Australia's newest source of phosphate fertilisers at Phosphate Hill, in north-west Queensland, has one of the lowest cadmium contents in the world and this bodes well for the future,' McLaughlin says. 'An active collaborative approach to the problem of cadmium in Australia is essential if we wish to maintain our reputation as a clean and green supplier of food commodities.'

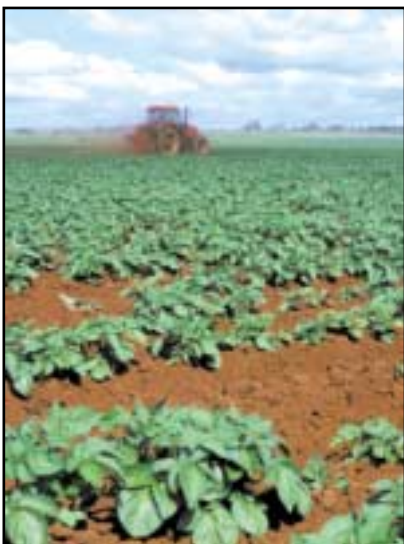
'Given that increasingly well-fed societies tend to be increasingly preoccupied with food quality and purity, minimising cadmium in our agriculture can only sharpen our competitive edge in world markets and, of course, ensures healthy food for consumers.'

More about the strategy

McLaughlin M (2001) Australia's National Cadmium Minimisation Strategy. *Fertilisers in Focus Conference*, Fertiliser Industry Federation of Australia Inc, 28–29 May.

Contact: Mike McLaughlin, (08) 8303 8433, mike.mclaughlin@csiro.au.

Steve Davidson



Cadmium occurs naturally in crop plants, and is no threat to human health provided the concentration stays below certain limits.