International Workshop
on

Environmental Management in North-East of Sri Lanka

December 1 - 4, 2003

Venue :

Kailasapathy Auditorium,
University of Jaffna, Sri Lanka

Abstracts of Papers

Jointly organized by

UNIVERSITY OF JAFFNA
EASTERN UNIVERSITY OF SRI LANKA
&
THE ECONOMIC CONSULTANCY HOUSE (TECH)

Impact of Fertiliser and Manure Use on the Environment

P Loganathan[1] and S.Mohanadas[2]

Fertiliser and manure application to agricultural land has markedly increased agricultural production in the world including the North-East (NE) of Sri Lanka. However, improper use of fertiliser and manure with respect to rate, form, method and frequency of application can have adverse effects on the environment and food safety. This paper presents overseas experiences, on the effects of fertiliser and manure misuse on soil and water pollution, to assist farmers in the NE of Sri Lanka gain a better understanding of these issues and to enable them to adopt best fertiliser and manure management practices. Best practices are those that are sustainable, environmentally friendly and economically viable.

Excessive use of nitrogen (N) fertilisers can cause nitrate pollution of drinking waters in wells which has been linked to a illness known as methemoglobinemia (blue baby syndrome). In addition, the ammonium based N fertilisers cause soil acidification leading to reduced crop yields. Soil acidification increases heavy metal mobility in soil resulting in elevated concentrations of certain toxic heavy metals in agricultural products. Nitrate concentration in many bore-holes in the NE has been reported to be much higher than the WHO levels, which has been linked to both agricultural practices and leakage from pit latrines.

Application of high rates of phosphorus (P) and N fertilisers to agricultural lands have caused nutrient runoff to surface waters in many countries leading to eutrofication of lakes and streams.

Soluble nitrates mainly leave agricultural soils in drainage waters but in storm events some N is transported in runoff waters as soluble inorganic and organic N forms as well as organic N in suspended solids. Phosphorus is transported in surface runoff both as dissolved P and P in suspended solids. The bioavailability of P in the suspended solids may be significant depending upon depth, retention time and the chemistry of the receiving water body.

---

[1] *Fertilizer and Lime Research Centre, Massey University,New Zealand.*

[2] *University of Jaffna, Sri Lanka*

In lands having high potential for surface runoff of N and P (rainfall and irrigation exceed infiltration, steeper and bare lands), riparian buffer strips can be constructed in between the water bodies and the agricultural land to reduce nutrient loading in runoff. In most cases P is the main limiting nutrient, rather than N, for the eutrification of waters.

Soil P tests used to determine fertiliser needs of crops may be useful indicators for identifying soils likely to pose an environmental threat.

Phosphate fertilisers have many contaminants derived from the phosphate rocks used to make these fertilisers. Of these contaminants, cadmium (Cd) and fluoride (F) are the elements of most concern. Cadmium can enter the food chain and at elevated concentration can be toxic to humans. An obvious method of reducing Cd accumulation in soils is to use phosphate fertilisers containing a low Cd concentration. The Sri Lankan Eppawela phosphate rock has very low Cd concentration and, therefore, it is a safe phosphate fertiliser with respect to Cd. Plant uptake of Cd from high Cd soils is higher in acidic (Cd uptake increases with acidity) and saline soils (uptake as $CdCl^+$). Use of cultivars with low Cd uptake characteristics can reduce the Cd risk in the crop produce.

Large quantities of F are added to soils in P fertilisers which contain 1.5-4% F (Eppawela phosphate rock, 3-4% F). Fluoride is essential for animals and humans for healthy bone and teeth formation but at high concentrations it can lead to fluorosis (bone damage and teeth deformities).

Animals grazing soils having high F concentration have a higher risk of fluorosis if they ingest large quantities of soils. Humans and animals drinking water containing high F concentration can also suffer from fluorosis.

High F concentrations have been identified in tube wells in Puttalam, Vavuniya and Ampara districts. The source of this high F concentration (P fertilisers or F containing rocks) needs to be investigated.

Use of some agricultural, industrial and municipal wastes as nutrient sources for crops also have potential to pollute soils and water and, therefore, require careful management.