



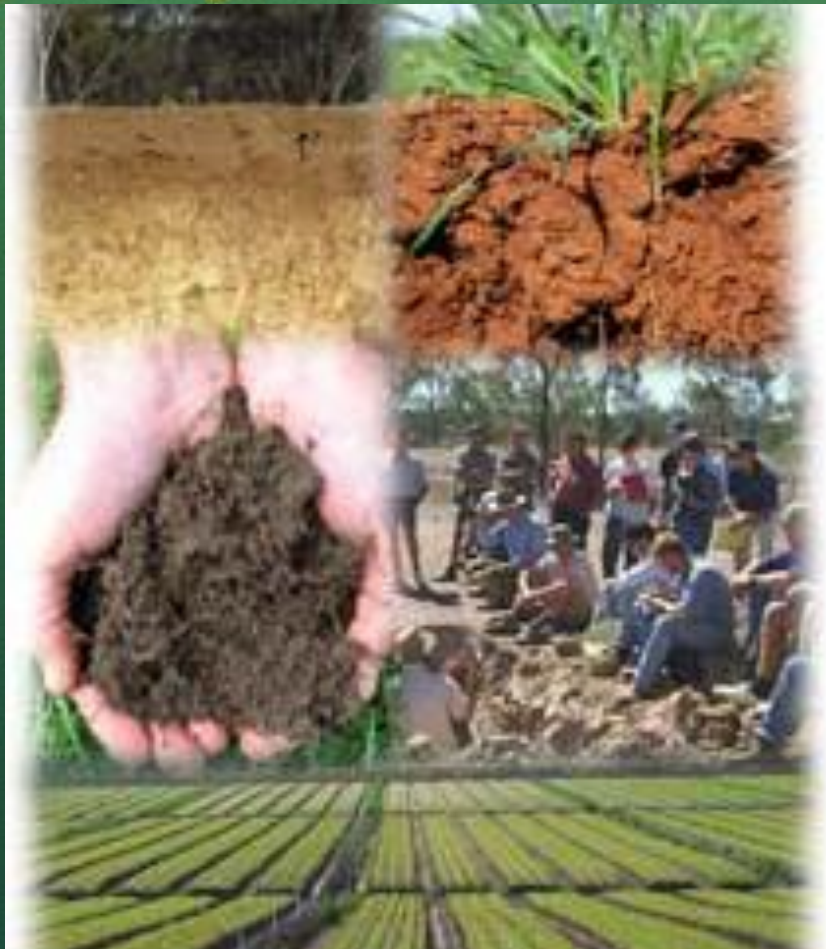
Contaminants in Agriculture: Threat Soil Health and Productivity

BY: PYP Exhibition group "Scientific Technology in soil contaminant of agriculture"

Abstract

- Agricultural, horticultural, and other industrial activities are major causes of contaminating the soils, sediments and waters in environments. Agricultural contaminants include organic and inorganic fertilizers, pesticides, herbicides, and insecticides; organic matters such as animals wastes and decaying plant materials; irrigation residues like salts and trace metals; microorganisms. Innovative management strategies are required to maximize the benefits from agricultural inputs , while minimizing their off-sites migration and impact on the receiving environments.
- Key words: Contaminated; soil productivity; management strategies

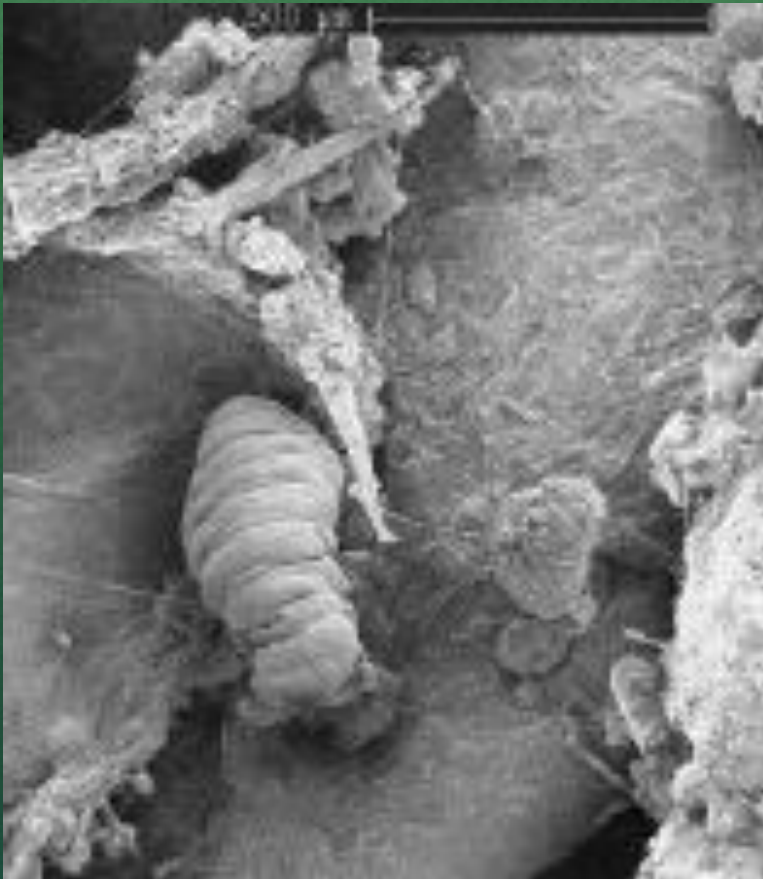
- Soil quality as the capacity of a specific kind of soil to function, within natural or managed ecosystem boundaries to sustain plant and animal production and support human health and habitation. (Doran. and Parkin,1994: Harries et al.,1996,Karlen et al.,1997)



Soil Properties

- Biology
- Organic matter
- Structure
- Nutrient
- Soil Type
- Ph
- What is soil biology? Soil biology is the study of soil biota and interactions they have with each other and their environment. Soil biota includes four broad groups, based on micro flora (e.g. Bacteria, fungi)
- Micro fauna (e.g. protozoa)
- Macro fauna (e.g. Earthworms and insects)

Collembola 'grazing' on decomposing plant material



- Litter transformer
- Litter transformers such as the micro arthropod Collembolans are involved in fragmenting plant residues and the organic substances making this material more available to microbes by increasing residue surface area for further chemical degradation and nutrient cycling.

Organic Matter

Organic matter is critical for soil health and for soil productivity:

- Provides energy for soil microbes
- Supports and stabilizes soil structure
- Increase water storage
- Stores and supplies nutrients
- Builds soil biodiversity
- Stores carbon
- Buffer chemical behavior such as pH

But ,what is it?

Organic matter derives from growth and death of organisms. Soil organic matter is:

- The living component of the soil (roots, micro-organisms, animals, and plants);
- Exudates from living organisms; and
- Dead, decaying and highly decomposed materials
- Decomposed organic matter has a black or dark brown colour and will darken soil colour.

- How does it get into soil?

Plant growth is the primary source of soil organic matter. Photosynthesis converts sunlight, carbon dioxide and water into plant material. On death, the plant material is steadily decomposed progressively incorporated into the soil.

What options are there to change organic matter in soil?

The key good management of soil organic matter is in the balance between decomposition and replenishment rate. Soil organic matter management.

Nutrient Status

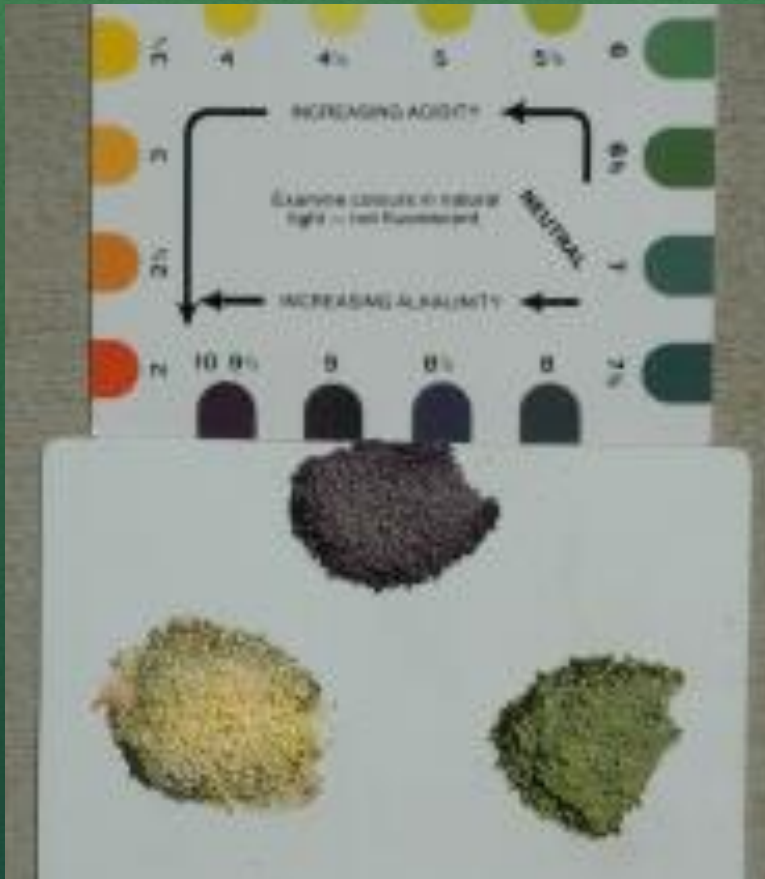
- A healthy status will provide sufficient nutrient for both plants and soil organisms. It is not just dependent on having nutrients existing in the soil as a chemical compounds, its is also depends on access to those nutrients.
- The conditions that can influence availability and accessibility of soil nutrients include: soil moisture content; soil porosity; soil conductivity; pH; temperature; and competitive demand between organisms.

Managing nutrient supply for agricultural production

What can we do to improve the nutrient availability (fertility) of our soil?

- Test your soil to check nutrient status
- Determines and improve possible constraints to nutrient access, such as
 - pH, drainage, toxicities
- Ensure adequate organic matter in your soil use fertilizer to supply nutrients to plants as appropriate

Soil pH (Measuring and Interpreting Soil pH)



- Soil pH is an indicator of acidity or alkalinity of a soil.
- Extremes in acidity or alkalinity may affect plant growth. Some plants can grow over a wide range of pH; others sensitive to acidity, or alkalinity.
- Soil pH is affected by soil chemistry and soil biology include soil water.

What ranges of pH occur in soil?

- While pH is measured on a scale of 1 to 14, most agricultural soils are found between the range 4 to 10 (when measured in water). For practical purposes, soil is neutral when pH is between 6 to 8, depending on plant requirement, and it is acidic when pH is less than 6 and alkaline when it is greater than 8.

Management strategies for agricultural contaminants including

- Recycling of agricultural waste

Methods to improve soil heaths are:

- Strengthen the nutrient cycle
- Conservation of soil, water
- Better ways to water harvesting, recycling and irrigation
- Use lime in case of high rainfall
- Use water soluble fertilizers
- Promote bio-fertilizers
- Ensure sufficient carbon content in soil
- Avoid compaction
- Use manure and fortified compost

Conclusion

- Agricultural soil contamination and its consequences result into biodiversity and posing major threats to soil health and its productivity. Strong actions need to be taken for the sustenance of soil quality. Environment education on soil technologies, toxicology, contamination management, protection and conservation is one of the important measures. Some practical and cost-effective measures should be developed to reduce uptake of contaminants by agricultural crops from contaminated soils.

- http://vro.agriculture.vic.gov.au/dpi/vro/vrosite.nsf/pages/soilhealth_measure_ph