

Agricultural wastes and eutrophication

Agricultural wastes

- **Agricultural waste** is waste produced as a result of various agricultural operations.
- It includes **manure and other wastes from farms, poultry houses and slaughterhouses**; harvest waste; fertilizer run-off from fields; pesticides that enter into water, air or soils; and salt and silt drained from fields
- In addition to meat, livestock and poultry operations produce another valuable **commodity—manure. Manure is a by-product containing many plant nutrients and organic matter.**

- Animal manure can be an asset rather than a liability for producers when effectively managed and properly used on field crops.
- Besides providing **valuable macro- and micronutrients to the soil, manure supplies organic matter to improve the soil's physical and chemical properties.**

Nutrient Contents in Manure

- The actual nutrient value of manure from a particular operation will differ considerably with the method of collection, storage facilities, and the species of animal. Chemical analysis on each sample should be obtained before applying manure in a field.
- **Factors Affecting Nutrient Composition of Manure:**
- Nutrients in waste may be lost or converted to other forms during treatment or storage and handling, affecting their availability for use by growing plants. The type of animal housing system and/or waste handling method is known to affect the final nutrient composition of the waste.
- Bedding and water have a diluting effect on the final nutrient concentration of waste and result in less nutrient value per unit quantity. In addition, the type of housing and waste handling system can decrease the final nutrient composition of waste materials.

- For instance, there can be considerable loss of nitrogen to the air, and there is a potential for runoff and leeching when animal waste is exposed to weather conditions in an open lot system.
- In contrast, there is considerably less nitrogen loss from a completely covered feedlot with manure pack or a liquid lagoon.

Waste production in agriculture

- The types and quantities of wastes vary between farms.
- Common agricultural wastes include:
 - * Packaging
 - * Silage plastics
 - * Redundant machinery
 - * Tyres
 - * Netwrap
 - * Oils
 - * Batteries
 - * Old fencing
 - * Scrap metal
 - * Building waste
- Other less common wastes include unused pesticides and veterinary medicines, horticultural plastics and spent sheep dip.

Eutrophication

- Aquatic plants and algae gradually fill in freshwater lakes and estuaries over time in a natural process called **eutrophication**.
- This process is controlled by low concentrations of certain nutrients (like **phosphate and nitrogen**) that the plants and algae require to grow.
- Usually, **phosphorus is the limiting nutrient in freshwater** and **nitrogen in estuaries and salt water**. However, when humans release nutrients like phosphate (agriculture ~50%, human metabolism ~20%, industry ~10%, detergents ~10% and natural erosion ~10%), the process of eutrophication is accelerated.

- In a worst-case scenario, the excess growth of plants and algae can smother other organisms when they die and begin to decay.

What is red tide?



Red tide is a naturally-occurring, higher than-normal concentration of the microscopic algae [Karenia brevis \(formerly Gymnodinium breve\)](#).

This organism produces a toxin that affects the central nervous system of fish so that they are paralyzed and cannot breathe.

As a result, red tide blooms often result in dead fish washing up on the beaches.

When red tide algae reproduce in dense concentrations or "blooms," they are visible as discolored patches of ocean water, often reddish in colour.

What causes red tide?

- Red tide is a natural phenomenon not caused by human beings. When temperature, salinity, and nutrients reach certain levels, a massive increase in **Karenia brevis (marine dinoflagellate)** occurs.
- No one knows the exact combination of factors that causes red tide, but some experts believe high temperatures combined with a lack of wind and rainfall are usually at the root of red tide blooms.
- There are no known ways that humans can control it, but many scientists around the world are studying red tide at present.
- Texas red tides have occurred from August through February. They typically begin in the **Gulf of Mexico**. Currents and winds then transport blooms toward shore. The blooms mainly come up along Gulf beaches, and less frequently into bays and estuaries.

Is it safe to eat oysters during a red tide?

- Oysters and other shellfish such as clams, mussels, whelks and scallops can accumulate red tide toxins in their tissues.
- People that eat oysters or other shellfish containing red tide toxins may become seriously ill with neurotoxic shellfish poisoning (NSP).
- There are, however, other risks associated with bacteria and other contaminants in raw oysters.

Algal blooms in Indian waters

- The red tide is not an unknown phenomenon in Indian waters. Until 1973, sporadic blooms of *Noctiluca scintillans*, *Trichodesmium erythraeum*, *Rhizosolenia sp.*, etc. have been reported, but none were of harmful algal bloom HAB type.
- However, since 1981, cases of paralytic shellfish poisoning (PSP) from coastal Tamil Nadu, Karnataka and Maharashtra were reported with adverse effects.
- In 1996, *Gymnodinium catenatum*, a potent PSP species both as planktonic cells and cysts in sediment, in the coastal waters of Karnataka .