

A new method of pest management (**Integrated Pest Management-IPM**) which is based on the minimal use of chemical pesticides to control insects was introduced in the 1980s. IPM seeks to integrate several techniques to control insects and other pests, instead of relying solely on chemicals.

The concentration of residues that can be found in foods produced from treated crops is being regulated (**maximum residue levels-MRL**) in such a manner that strict compliance is demanded.


3. Naturally occurring Toxicants

- ✓ They are those produced by organisms that contaminate the food products.
- ✓ Microorganism such as dinoflagellates, fungi, and bacteria can produce toxicants that upon consumption can cause diseases.
- ✓ Some toxin-producing organisms produce toxins in the food matrix (which can cause **intoxication** if consumed), while others produce toxins inside the victim (**intoxification**).
- ✓ some able to **withstand heating** temperature used in cooking, while others are able to **tolerate extremes of pH** without losing activity.

Some of these Micro organisms cause very serious diseases such as typhoid, dysentery, salmonellosis, cholera and food intoxications.

They are generally **specific** depending upon the type of food and particular conditions of storage.

e.g **moulds** (*Aspergillus*) are commonly associated **with cereal** product spoilage, **Lactic acid bacteria** (*Lactobacillus*) spoils **raw milk** and **yeasts** (*Saccharomyces*) spoil **fruit juice** when stored under unfavourable conditions.



The undesirable changes caused by microorganisms can be divided into: those that cause food spoilage not usually associated with human disease and those that cause **food poisoning** which could be:

- i. food infection,
- ii. food intoxication or
- iii. food intoxicification.

i. **Food infections** are caused by disease organisms which are carried to the host through foods; they multiply in the intestinal tract, vaginal tract etc and cause diseases through infection of their tissues.

Examples of these diseases are cholera, salmonellosis, shigellosis, ameobiosis.

Cholera is caused by *Vibrio comma*, transmitted through drinking water and contaminated food.

The symptoms are diarrhoea, watery stools and vomiting.

Salmonellosis is caused by salmonella bacteria transmitted through foods such as meat, egg and fish. They are easily killed by normal good cooking, and must be eaten alive in sufficient number to cause infection.

Symptoms are abdominal pain, diarrhea, frequent vomiting and occasional death may occur when untreated.

ii **Food intoxication** is caused by organisms which grow in food and produce chemical substances in the food which is toxic. Examples are

Staphylococcal poisoning, caused by *Staphylococcus aureus*.

Symptoms are salivation, nausea, vomiting, diarrhea and abdominal cramps. Sources of contamination are mouth, throat, nose through coughs and sneezes.

Botulism which could be very fatal is caused by *Clostridium botulinum* transmitted through home canned foods which are not properly processed.

Symptoms are vomiting, constipation, difficult of eye movement, difficulty in speaking. Death could result due to the paralysis of the muscles responsible for respiration.

iii **Food Intoxification**: is caused by ingestion of bacteria that once inside the small intestine, begin to produce toxin.

The organism *E. coli* O157:H7 is a good example of this type of **pathogen**, able to produce toxin after **damaging the lining of the intestine**. These toxins are absorbed by the body, reaching the **kidneys** where they cause substantial damage to the convoluted tubules.

In addition to serotype O157:H7, other **enterohemorrhagic *E. coli* serotypes** are O145:H-, O26:H11, O104:H21, and O111:NM.