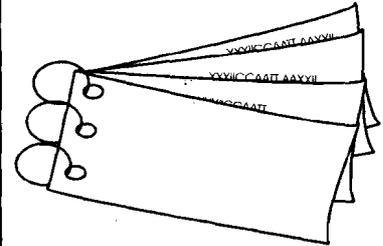


UNIT 3 RECENT CONCERNS RELATED TO FOOD SAFETY

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- The variety of foods available in the country is expanding significantly and food no longer needs to be seasonal or locally grown.
- Globalization of the World's food supply is also contributing to changing patterns in food consumption. It is also minimizing traditional geographic barriers to existing and emerging food safety hazards.
- The rising worldwide human travel and global distribution of foods is facilitating the introduction and flow of pathogens and other hazards into human and animal populations. Moreover, global sourcing also can move pathogens and toxins from areas in which they are indigenous to places in which they have not previously existed.

3.1 Newer Approaches to Food Safety

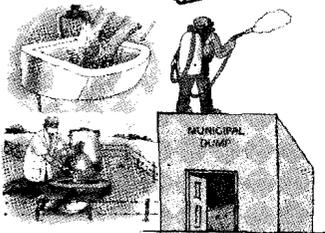
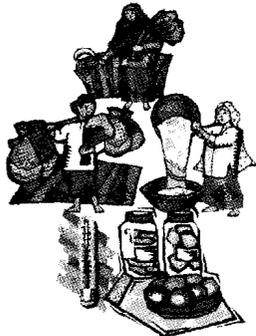
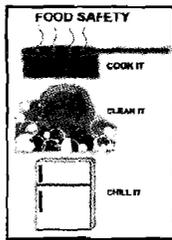
- The approach to food safety is fast changing and this can be attributed to:
 - globalization of food supply;
 - shift in focus from chemical residues to microbial pathogens;
 - emergence of HACCP principles as a conceptual framework for food safety across the world's regulatory services;

Thus, food safety needs a greater role for scientific and technological solutions, greater reliance on 'systems' approaches and a new set of food safety standards as nothing is available at 'zero risk' or 'absolute safety'.

- Food safety control authorities should determine compliance policies based on Risk Analysis (entails risk assessment, risk management and risk communication).
- Risk assessment is the most critical and has taken the form of Microbial Risk Assessment (MRA). It is a stepwise analysis of hazards that may be associated with a particular type of food product permitting an estimate of the probability of occurrence of adverse effects on health from consuming the product in question.

3.2 Hurdle Technology

- Hurdle technology employs the intelligent combination of different preservation factors or techniques to achieve multi-target, mild but reliable preservation effects.
- Hurdle technology deliberately combines existing and new preservation techniques to establish a series of preservative factors (hurdles) that the microorganisms in question are unable to overcome (jump over).
- Preservative factors functioning as hurdles disturb one or more of the homeostasis mechanisms preventing microorganisms from multiplying and causing them to remain inactive or even die. Homeostasis is the constant tendency of microorganisms to maintain a stable and balanced (uniform) internal environment. The best way to preserve food is to deliberately disturb several homeostasis mechanisms simultaneously.
- This multi-targeted approach is the essence of hurdle technology. It is more effective than single targeting and allows hurdles of lower intensity, improving product quality. There is the further possibility that different hurdles in a food not only have an added effect on stability but also can act synergistically.
- The most important and commonly used hurdles include: temperature, pH, water activity, redox potential, preservatives. Other hurdles of potential value include: ultrahigh pressure, mano-thermosonication, photodynamic inactivation, modified atmosphere packaging, edible coatings, ethanol, maillard reaction products and bacteriocins.



3.3 Genetically Modified Foods

- Genetic modification is the technique of changing by inactivation, deleting or inserting genes to produce a desired characteristic. In this technique selected individual genes are transferred from one organism (microbe, plant or animal) to another organism. When genes are transferred from one species to another, a transgenic organism is produced.
- Foods produced by genetic modification techniques are called Genetically Modified or GM foods or transgenics. Crops have been modified to make them resistant to particular insects or virus attack, tolerant to herbicides or nutritionally enhanced such as containing more carotene or iron.
- The four crops that dominate the GM market in the world are soybeans, maize, cotton and canola. 70% of the GM crops raised were meant for herbicide tolerance and 15% were aimed at resistance to insects.

- The risks and uncertainties surrounding the process of genetic engineering and the resulting GM products has resulted in considerable public debate and consumer groups have been vociferous in demanding labeling of GM products.

GM Work in India

From the Indian point of view, more than herbicide resistance, stress resistance to drought, temperature and poor soils, nutritional enrichment, more production and increased productivity and pest resistance are important.

- Three hybrids of cotton containing a Bt gene produced by Monsanto have been approved in 2002. One variety again containing the Bt gene produced by Rasi seed was allowed seed production.
- Other GM crops undergoing field trials include mustard, rice, potato.

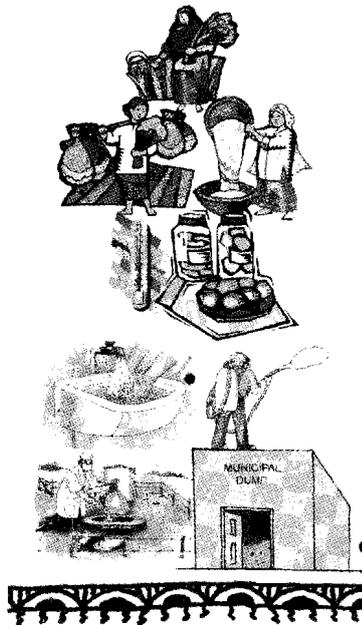
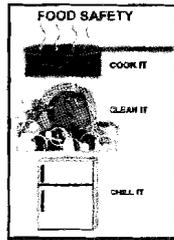
3.4 Organic Foods

- Organic foods are grown using bio (weed, pest and disease) control and microbial fertilizers. No growth enhancers or antibiotics are used.
- Organic foods are produced without using most conventional pesticides or commercial petroleum-based fertilizers or sewage sludge based-fertilizers, bioengineering or ionizing radiation.
- Management practices include crop selection and rotation, water management, tillage and cultivation recycling plant nutrients. Pest and disease management attained by means of a balanced host/predator relationship, augmentation of beneficial insect population, biological and cultural control, mechanical removal of pests and affected plants.

Features of Organic Foods

- Organic foods are good for health as they have far less residues of pesticides, growth promoters and antibiotics. Also, it is shown that organic foods contain more vitamins, nutrients, and cancer-fighting antioxidants than non-organic food. Organic food is, therefore, better for human health as confirmed by researchers. Eating organic foods might reduce risk of heart attacks, strokes, and cancer. Consumers should make well-informed choices about the food they consume.
- Organic food tastes better as it is grown in the most natural way without any or much external inputs that affect the food quality.
- Organic food growers practice farming that emphasizes animal welfare and that is more animal friendly. Animals are not treated with synthetic growth hormones or drugs.
- Organic foods are the products of organic agriculture. Genetically modified organisms (GMO) are not allowed. Hence, organic foods are GMO free.
- Organic foods are produced through sustainable management of natural resources, soil, water and biodiversity. Organic farming is less dependent on non-renewable energy and other resources.
- Organic foods are produced using a combination of modern and scientific understanding of ecology and soil science and traditional agricultural knowledge.

- India has tremendous opportunities in production of organic foods. Spice Board of India has taken a major initiative in promotion and export of organic spices. The Board organizes training programmes in organic principles and practices, demonstrations to educate and motivate prospective organic spice growers. The country exports around 50 tons of different varieties of organic spices.
- INDOCERT is a nationally operating charitable trust accredited by Government of India for certification of organic farmers, processors and traders. INDOCERT functions as a platform for training, awareness creation, information dissemination and networking.



3.5 Prions

- Prions are the cause of Bovine Spongiform Encephalopathy (BSE) or mad-cow disease and Creutzfeldt-Jakob Disease (CJD).
- Prions (abbreviation for proteinaceous infectious particles) are modified forms of a normal protein. These harmful particles accumulate in the brain causing holes or plaques and subsequent clinical symptoms leading to death.
- BSE is a progressive neurological disorder of cattle resulting from infection by an unconventional transmissible agent. BSE has a long incubation period of 4-6 years before cattle show signs such as disorientation, clumsiness and occasionally aggressive behaviour towards other animals and humans. BSE may have been transmitted to cattle through meat and bone meal from infected animals used in their animal feed.
- CJD is the most commonly known disease in the family of prion diseases affecting humans. It is a rare and fatal form of dementia mainly occurring in individuals between the ages of 40 and 80.

3.6 Avian Influenza

- The highly pathogenic H5N1 strain of the bird flu has been reported from Asia. It mutates rapidly and seems to acquire genes from viruses infecting other animal species. This strain may be able to jump the species barrier causing severe disease in humans.
- There is no evidence that the virus is being passed through eating chicken or any poultry product till date since we consume cooked poultry products and heat sterilizes the virus.
- Chicken products must be cooked thoroughly.
- All those involved with poultry handling should use oral and nasal disposable masks, disposable gloves and washable boots during handling.
- Poultry carcasses should not contaminate other objects. Infected birds must be killed and incinerated in isolation.

Key Terms

Bioconservation : Protection of biodiversity and biological elements.

Bacteriocins : Bacteriocins are agents which are encoded in the genetic material carried by plasmids, with the purpose of killing or inhibiting closely related species or even different strains of the same species.

Contamination : The condition of land or water where any chemical substance or waste has been added and represents, or potentially represents, an adverse health or environmental impact.

Tillage : The operation, practice, or art of tilling of land for seed, and keeping the ground in a proper state for the growth of crops.

Redox potential : A measure of the tendency of a system to donate or accept electrons.

Water Activity : An expression of the relative availability of water in a substance.

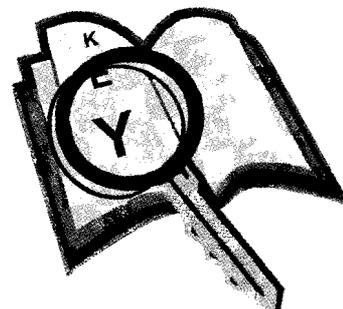
Ecology : The science of the relationships between organisms and their environment.

Habitat : The area or environment where an organism or ecological community normally lives or occurs.

BSE : Bovine Spongiform Encephalopathy (BSE) is a progressive neurological disorder of cattle that results from an infection by an unconventional transmissible agent.

Diarrhoea : Frequent passage of soft or liquid stool (no blood); may be caused by any parasite or infection normally found in any part of the intestine.

Preservative : A substance used to prevent the growth of microorganisms in or on an organic base.



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