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Food Spoilage and major factors

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Food spoilage is a consequence of metabolism that causes foods to be unsuitable for human eating due to changes in sensory properties. Spoiled foods may be acceptable to consume, in the sense that there are no contaminants or pathogens present, but changes in smell, texture, texture or appearance causes them to be discarded. Some ecologists believe these terrible odours are produced by bacteria to repel large animals, allowing them to maintain the food supply for themselves. Food waste has significant environmental and economic consequences from farm to fork.

Postharvest losses in fruits and vegetables are as much as 30 to 40% worldwide, and even greater in some nations that are developing. Decreasing post-harvest losses is critical to making sure enough food, in both quality and quantity, is accessible to all inhabitants of our world. The world population is likewise expected to increase from 5.7 billion in 1995 to 8.3 billion in 2025. Vegetable production in the world totalled 486 million tonnes, while fruit production totalled 392 million tonnes. Reducing post-harvest losses decreases manufacturing, trading, and distribution costs, lowers consumer prices, and boosts farmer revenue.

Physical Spoilage:

The first sort of spoiling is caused by physical changes or instability. Physical damage might include bruising on freshly picked vegetables and fruits or breaking of hydrated while



brittle products like potato chips and cereal for breakfast. Fruit and vegetable bruising can occur during shipping and distribution, as well as when the items are dropped. If the physical damage is substantial, the consumer may find the goods unsatisfactory. Colour changes can occur due to enzymatic browning as cells burst, and there is frequently a loss of water content at the bruise. Furthermore, bruising damages cells and permits microbial growth to occur more easily.

Chemical Spoilage:

Food spoilage can also develop in food products as a result of reactions or degradation of the food's chemical substances such as proteins, lipids, and carbohydrates. The pace at which chemical reactions occur is determined by a variety of parameters, including water activity, temperature, ($T - T_g$), pH, and exposure to light or oxygen. The optimal circumstances for each reaction are different. Enzyme activity, for example, is considerably reduced at low a_w , particularly at levels of moisture below the monolayer.

Protein breakdown can involve protein-protein interactions or enzymatic activity. Enzymes are complex proteins that function as catalysts, considerably increasing the speeds of chemical reactions. There are several enzymes that react with various chemical components in food items, many of which are generated by microorganisms.

Microbial Spoilage:

Food spoilage by microbes is influenced by both intrinsic (pH, water activity, nutritional content, oxidation and reduction potential and antibacterial property) and extrinsic (temperature, relative humidity and pressure) variables. Microbes are biological agents that cause foodborne disorders when swallowed; yet, some microbes are good for food fermentation.

Bacteria: Gram-positive bacteria include *Staphylococcus aureus*, *Bacillus subtilis*, *Clostridium* spp, Lactic acid bacteria (LAB), *Leuconostoc* spp, *Streptococcus* spp, *Brochothrix* spp, *Weissella* spp, *Mycobacterium bovis*, etc.

Gram-negative bacteria include *Salmonella* spp., *Shigella* spp., *Vibrio* spp., *E. coli*, *Campylobacter jejuni*, *Yersinia enterocolitis*, *Brucella* spp., *Coxiella burnetii*, *Aeromonas* spp., *Plesiomonas shigelloides*, etc.

Fungi: Fungi are the most abundant category of microbes that contribute to food rotting. Fungi are osmotrophic, meaning they get their nutrients via absorption.

Moulds: Mucor, Aspergillus spp., Rhizopus spp., Penicillium spp., Alternaria spp., Bothrytis, Byssochlamys, and Fusarium spp. are the most frequent moulds that cause food deterioration.

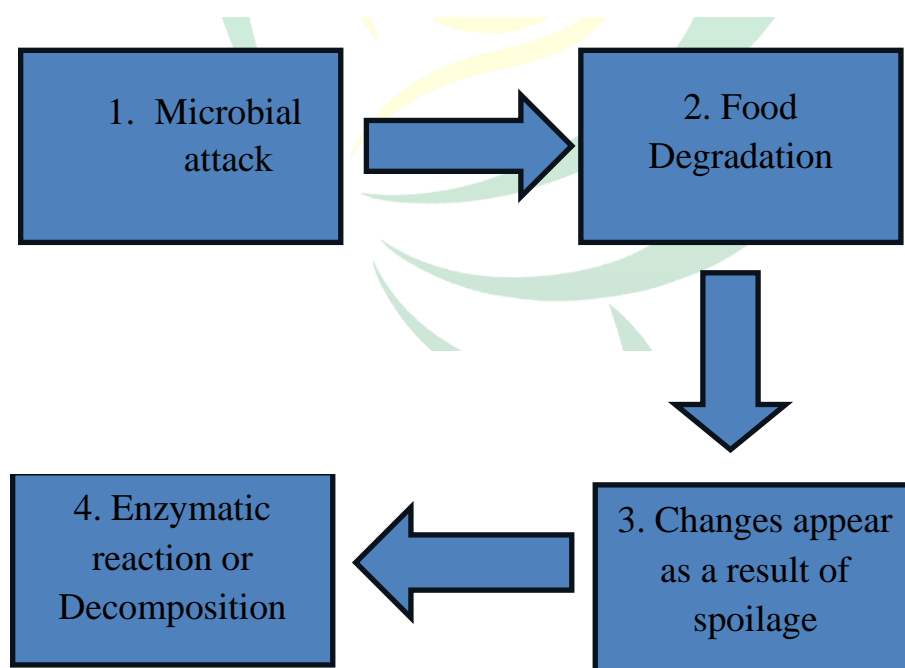
Yeast: The most frequent yeasts that cause food spoilage are Zygosaccharomyces spp., Saccharomyces spp., Candida spp. and Dekkera spp.

Parasite: The most common foodborne parasites are Giardia lamblia, Entamoeba histolytica, Cyclospora cayetanensis, Toxoplasma gondii and Trichinella spiralis.

Algae: Poisonous algae include Gonyaulax catenella, Gonyaulax tamarensis, Gambierdiscus toxicus, Ptychodiscus brevis, Microcystis aeruginosa and Blue-green Algae.

MICROBIAL FOOD SPOILAGE-

The following steps can be used to summarise microbial food spoilage:



Virus: Food spoilage viruses include Norovirus, Hepatitis A virus, Hepatitis E virus, Astrovirus, Rotavirus, Coronavirus and Sapovirus.

Prions: Prions are infectious disease-causing agents that are normal proteins in the brain that become misfolded and lose their genome, resulting in a pathological, infectious shape. Bovine spongiform encephalopathies (BSE), Scrapie, Chronic wasting disease (CWD) and Creutzfeldt-Jacob disease (CJD) are all forms of prion illness.

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