

**I-Year, I-Semester**

**L      T      P      Credits: 4**  
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## **CH553 PLANT FOOD TECHNOLOGY**

(Fruits, Vegetables, Cereals & Pulses)

### **UNIT-I**

Production of fruits and vegetables in India., Composition of each of the major fruits and vegetables produced in the country - Mangoes, Pineapple, Guava, Papaya, Grapes among fruits - Beans, Carrot, Tomatoes, Potato, Onion, Brinjal among vegetables. Causes for heavy losses. Spoilage factors, post harvest field operations including methods to reduce the post harvest losses, General methods of preservation of fruits and vegetables. Mushroom technology, production of mushroom processing.

Canning of fruits and vegetables Reception, sorting and storage operations for fruit and vegetables. Preparation of fruits and vegetables for canning. – Washing, peeling, grating, slicing, dicing, deseeding, blanching -Importance of blanching operations - Batch and continuous blanching.- Hot water and steam blanching.- Canning operations – Precautions in canning operations, Spoilage of canned foods. Common machinery for operations like Peeling, Slicing/Dicing, Pulping, Grating and canning process.

### **UNIT-II**

Storage of cereals, Infestation measures; Drying of grains, Processing of rice and rice products. Milling of wheat and production of wheat products, including flour and semolina. Milling of corn, barley, oat, coarse grains including sorghum, ragi and millets; Processing of tea, coffee and cocoa.

Production and preservation of fruits and vegetable juices, preservation of fruit juice by hurdle technology. Preparation of Jam, Jelly and marmalade, pickles, vinegar and tomato product. Juice and pulp extraction – various extractors used including Hydraulic Press - Hot and Cold Break processes - Clarification Clarification centrifuges – Decanters and desludgers. Preparation and packaging of pulps, Jams, Jellies, Marmalades, Squashes Pickles, Puree, Ketchup, Sauce - Different types Glass and Plastic Containers, Large capacity

### **UNIT-III**

Specialty products - Fruit Bars, Fruit juice concentrates – methods of concentration - evaporators used for concentration of fruit juices and pulp - Tubular, Plate and scraped surface evaporators and Fruit Powders - Preparation of Fruit material for powder production - Working of Spray Dryer and Drum Dryer - Fruit juice aroma Recovery and its importance. Brief on Aroma Recovery equipment

### **UNIT-IV**

Milling of Pulses: Major Pulses grown in the country and their application, Status of Pulse milling industry in India, need for modernization, Traditional milling process - merits and demerits. Drying of legumes - Sun drying, Traditional Processing steps – Pre-cleaning, Pitting, Oil application, Conditioning, Dehusking and splitting - Machinery and equipment employed, mass balance, losses during milling. Modern milling process - Process flow chart - Mechanical hot air drying and conditioning - merits and demerits, Dehusking in Pulse Pearler, Water conditioning, splitting of pulses in Pulse splitter, Merits and demerits. Mini dhal mill - working principle - advantages and disadvantages. Grinding of split pulses, pulse flour products, their applications, and equipment used.

Milling and Processing of Maize: Dry milling of maize: Storage and drying, Pre-cleaning, cleaning equipment, Degermination and Dehusking, Roller milling, Sifting, Purifying, Aspiration, Pneumatics in a maize mill. Products of milling - Flour, Semolina, Brewers' grits etc and their applications. Wet milling of Maize and corn: Modern methods of processing, Cleaning, Steeping, Degermination, Bran and Fibre separation, Gluten and Starch Separation,. Equipment needed for Degermination, Debraning and starch separation. Starch conversion into other value added products – Acid Hydrolysis, Enzyme Hydrolysis, Isomerization processes. Processing for Dextrose, Malto Dextrin and other products. Extraction and refining of Corn oil in brief.

#### **UNIT-V**

Grain Storage and Handling: Bag Storage - Advantages and Disadvantages - Bag Storage structure design. Parameters of good storage structure, Cover Plinth Storage Structures, CAP storage (Ceiling and Plinth Storage), Plans for Bag storage, lay outs, Dunnage, Materials for Dunnage, Pallets, Protection against Rodents, Fungi, Pests and Mites. Fumigation Processes for bag storage piles. Bulk Storage in silos and large bins - Problems of Silo storage, Construction of Silos - concrete and Metal Silos, Physical load and mechanical strength of Silos, Silo flow problems, Relative merits and demerits of Silo storage to Bag Storage, Relative Costs of Silo and Bag Storage. Conveyors and Elevators for feeding and discharging into Silos. In silo Aeration and Drying, Problems of Dust Explosion in Grain Storages, Quality Changes of Grains during storages and remedial measures to prevent unwanted quality changes.

#### **Text Books:**

1. Lal, G., Siddappa, G. and Tondon G.L. : Preservation of Fruits and Vegetables, Indian Council of Agricultural Research, New Delhi. (1986).
2. Vijaya Khader, "Textbook of Food Science and Technology", ICAR, New Delhi (2001).
3. N L Kent and A D Evers, "Kent's Technology of Cereals : An Introduction for students of Food Science and Agriculture", 4<sup>th</sup> Ed., Woodhead Pub. Ltd., Cambridge, UK (1994).

#### **References:**

1. Dauthy, M.E.: Fruit and Vegetable Processing. International Book Distributing Co. Lucknow, India. (1997)
2. Hamson, L.P: Commercial Processing of Vegetables. Noyes Data Corporation, New Jersey. (1975)
3. Jagtiani J., Chan, H.T. and Sakal, W.S.: Tropical Fruit Processing Academic Press, London. (Ed. 1988)
4. Srivastava,R.P., and Sanjeev Kumar: Fruit and vegetable preservation; principles and practices.: International Book Distributing Co., Lucknow. 1998
5. A.K.Thompson (2003): Fruit and Vegetables – Harvesting, handling and storage. 2<sup>nd</sup> edition Blackwell Publishing.
6. Er. B. Pantastico : Post harvest Physiology, handling and utilization of tropical and subtropical fruits and vegetables. AVI Publishing Company, Inc.
7. W.V Cruess (1997) : Commerical Fruit and Vegetable Products.Allied Scientific Publishers. Bikaner (India)
8. Girdharilal (1996) Preservation of Fruits and Vegetables. ICAR, New Delhi