**Maharashtra Agricultural Universities Examination Board, Pune**
**Semester End Theory Examination**
**B.Sc.(Hons.) Agriculture**
**MODEL ANSWER SET**

Semester- :VI (New)
Course No. : HORT –366
Credits : 2(1+1)
Day & Date:

Academic year- 2023-24
Title : Post Harvest Management and Value Addition of Fruits and Vegetables
Total Marks – 40
Time: 2 hrs.

Note: 1. Solve ANY EIGHT questions from section "A".
2. All questions from section "B" are compulsory.
3. All questions carry equal marks.
4. Draw neat diagrams wherever necessary.

**MODEL ANSWERS**
**SECTION 'A'**

**Q.1 Explain in detail the importance of post-harvest management and value addition of fruits and vegetables.**

Answer: (4)

i. Post-harvest loss reduction techniques
ii. Backbone of horticultural industry as it take care of gluts and all possible wastes
iii. Higher employment generation potential
iv. Foreign exchange earnings- Contribution to economy
v. Processing and farming - making availability of fruits and vegetables
vi. Adding taste, variety and providing nutrition
vii. Waste utilization
viii. Home scale preservation
ix. Supply to defense forces
x. Canned fruits for infants and children etc.

(Above points should be explained in short)

**Q.2 Enlist different packaging materials and describe the importance of packaging.**

Answer: Different types of packaging materials: Natural materials, Natural and synthetic fibre, Wooden boxes,Wire Bound Crates, Corrugated Fibre Board (1)

Importance: (3)

i. Packaging serves as an efficient handling unit.
ii. It serves as a convenient storage unit.
iii. Packaging protects quality and reduces waste.
iv. Protects from mechanical damage,
v. Protects against moisture loss

vi. May provide beneficial modified atmosphere
vii. Provides clean produce
viii. May prevent pilferage
ix. Provides service and sales motivation.
x. Facilitates use of new modes of transportation.

**Q 3 Define fermented and un-fermented beverages? Explain in brief unfermented beverages.**

Answer:

i. Fermented beverages: Fruit juices which have undergone alcoholic fermentation by yeasts. (1)

Fermented fruit beverage is a fruit juice which has undergone alcoholic fermentation by yeast like *Saccharomyces cerevisae*. The product contains varying amount of ethyl alcohol. Apple cider, plum wine, grape wine, champagne, port, nira, cider etc are common fermented beverages.

ii. Un-fermented beverages: fruit juice which do not undergo alcoholic fermentation are termed as unfermented beverages. (1)

Un-fermented beverages: (2)

i. Fruit juices: Juices are of two types first is Natural juice and second is sweetened juice.
ii. Ready to serve (RTS)
iii. Nectar
iv. Cordial
v. Squash
vi. Crush
vii. Syrup
viii. Fruit juice concentrates
ix. Fruit juice powder
x. Barley water
xi. Carbonated beverages

(Above points should be explained in short)

**Q.4 Enlist the principles and different methods of preservation. Write in short about preservation by sugar.**

Answer: Principles of preservation (1)

i. Prevention or delay of microbial decomposition
ii. Prevention or delay of self-decomposition of the food
iii. Prevention of damage by insects, animals, mechanical causes etc.

Methods of preservation (2)

i. Asepsis (Absence of infection)
ii. Prevention by high temperature
iii. Pasteurization sterilization aseptic canning
iv. Preservation by low temperature
v. Preservation by chemicals
vi. Preservation by drying
vii. Preservation by filtration
viii. Preservation by carbonation
ix. Preservation by sugar
x. Preservation by fermentation
xi. Preservation by salt
xii. Preservation by acid
xiii. preservation by oil and spices
xiv. preservation by antibiotics
xv. preservation by irradiation

Preservation by sugar (1)

Syrups containing 66 per cent or more of sugar do not ferment. Sugar absorbs most of the available water with the result that there is very little water for the growth of microorganisms hence their multiplication is inhibited, and even those already present die out gradually. Thus sugar acts as a preservative by osmosis and not as a true poison for microorganisms. Fruit syrup, jam, jelly, marmalade, preserve, candy, crystallized fruit and glazed fruit are preserved by sugar.

**Q.5 Write in detail about the causes of post- harvest losses of fruits and vegetables.**

Answer: (4)

i. Metabolic
ii. Mechanical
iii. Developmental
iv. Parasitic diseases
v. Physiological deterioration
vi. Lack of market demand,
vii. Lack of clear concept of packing house operations
viii. Lack of awareness among the growers, contractors and even the policy makers
ix. Lack of infrastructure, Inadequate technical support
x. Wide gap in technologies available and in vogue
xi. Inadequate post-harvest quality control

xii. Unorganized marketing

xiii. Absence of pre-cooling and cold storage, Poor storage facilities.

xiv. Inadequate market facilities, market intelligence and market information service (MIS)

**Q. 6 Enlist and explain in brief intermediate moisture food.**

Answer: Intermediate moisture food: Jams, Jellies, Marmalades, Preserves, Candies and Crystallized fruits (2)

Explanation: (2)

i. Most of the fruits and vegetables contain enough moisture to permit the activity of enzymes and micro-organisms for spoilage and drying is necessary to reduce the water activity.

ii. Therefore, reduction in water activity of the food is the main principle of preservation by drying.

iii. Intermediate moisture (IMF) foods on the other hand contain 15 - 50% moisture with a water activity (aw) of 0.6 to 0.85.

iv. IMF is one that can be eaten as such without providing refrigeration. They are dry enough to be self-stable with out providing refrigeration and thermal processing in any hermatically sealed container.

v. IMF or semi moist foods, in one form or another, have important items of diet.

**Q.7 What is drying and dehydration of fruits and vegetables? Explain in detail about osmotic dehydration.**

Answer: Drying: Drying is removal of water from the food by non-conventional energy sources like sunlight and wind. (1)

Dehydration: dehydration means the process of removal of moisture by the application of artificial heat under controlled conditions of temperature, relative humidity and air flow. (1)

Osmotic dehydration: (2)

i. In osmotic dehydration the prepared fresh material is soaked in a heavy (thick liquid sugar solution) and /or a strong salt solution and then the material is sun or solar dried.

ii. During osmotic treatment the material loses some of its moisture.

iii. The syrup or salt solution has a protective effect on colour, flavour and texture.

iv. This protective effect remains throughout the drying process and makes it possible to produce dried products of high quality.

v. This process makes little use of sulphur dioxide.

**Q.8 Enlist the methods of storage of fruits and vegetables. Write in detail about zero energy cool chamber.**

Answer: Methods of storage of fruits and vegetables (2)

i. Cold storage
ii. Control atmospheric storage
iii. Modified atmospheric storage
iv. Hypobaric storage
v. Evaporative cool storage

Zero energy cool chamber:(2)

i. The great importance of this Low Cost Cooling technology lies in the fact that it does not require any electricity or power to operate and all the materials required to make the cool chamber are available easily and cheaply.
ii. It can be installed at any site by even an unskilled person as it does not require any specialized skill.
iii. Most of the raw materials used in the cool chamber are also reusable.
iv. Cool chamber is based on direct evaporative cooling.
v. Evaporating occurs when air that is not already saturated with water vapour is blown across any wet surface.
vi. Thus an evaporative cooler consists of a wet porus bed through which air is drawn, cooled and humidified by evaporation of water.
vii. Can also be used for mushroom cultivation, sericulture, storage of biofertilizers hardening of tissue cultured plants etc.
viii. It could maintain at least 14°C lesser than outside temperature and thereby can extendsthe shelf life of the produce.

**Q.9 Write a detail note on processing of Tomato**

Answer: (2)

i. Tomato is grown in our country in abundance, both in summer and winter seasons, but those grown in winter are superior in quality because they contain more total solids.
ii. They are a good source of vitamin C. Fresh tomatoes are very refreshing and appetizing but cannot be stored for a long period.
iii. Often they are sold at distress prices during the peak harvest season and most of the produce is spoiled due to miss-handling.
iv. Such losses can be avoided by converting tomatoes into delicious products.

Tomatoes can be processed into a number of products (2)

i. Tomato juice
ii. Tomato puree and paste
iii. Tomato sauce/ ketchup

iv. Tomato chutney
v. Tomato cocktail
vi. Tomato soup
vii. Canned Tomato
viii. Tomato chili sauce
ix. Tomato pickle
x. Tomato powder
xi. Whole peeled Tomatoes
xii. Diced Tomato

**Q.10 Define the term ripening. Write in detail about the changes associated with ripening of fruits and vegetables.**

Answer: Definition: Ripening can be defined as a sequential changes in the event of colour, flavour & texture, which leads to stage at which the fruits is acceptable to eat. (1)

Changes: (3)

i. Change in colour, flavour & texture
ii. Formation of abscission layer
iii. Seed maturation
iv. Change in respiration rate
v. Change in rate of ethylene production
vi. Alteration of cells or tissue permeability
vii. Softening: changes in composition of pectic substances
viii. Changes in carbohydrate composition
ix. Development of wax on skin

(Above points should be explained in short)

## SECTION 'B'

**Q.11 Do as directed.** (4)

One mark each

1. Which hormone is responsible for ripening?

Answer: Ethylene

2. State true or false: Flame peeling is used only for garlic and onion.

Answer: True

3. Give the full form of CFTRI

Answer: Central Food Technological Research Institute, Mysore

4. Define Blanching

Answer: Heat treatment of vegetables in boiling water or steam for 2-5 minutes prior to canning for inactivation of enzymes, removal of air, setting of natural color, improvement of texture, arresting changes in flavor, softening of the products etc.

Q.12 Fill in the blanks

1 ----**Nicholas Appert** ----- is known as "Father of Canning"

2. Pectin content is measured by--- **Jel meter** ---

3. The principles of--- **hypobaric** ----- storage is to remove ethylene gas from the storage atmosphere and lowering the partial pressure of O2 which leads to slow ripening, hence fruits can be kept longer.

4. A Fruit Preservation and Canning Institute was established at---**Lucknow**---- in 1949 by government of U.P.

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