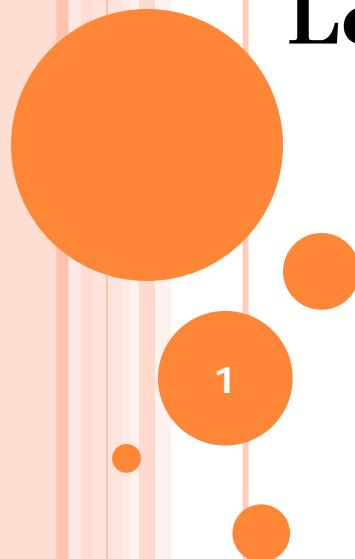


# **UNIT A: INTRODUCTION TO FRUIT AND NUT PRODUCTION**

## **Lesson 3: Future Development of Fruit and Nut Techniques**



# TERMS

- **genetic engineering**
- **biotechnology**
- **tissue culture**
- **mechanization**
- **micropropagation**

**Biotechnology:** the science to change organisms or their environment or to get products from organisms

- I. The characteristics of the fruit or nut tree being grown have important implications on the success of the farm and the quality of the fruit.
  - A. Growers need varieties that are hardy and tolerant of soil and climatic conditions.

- B. Varieties that are pest resistant and have high yields are important to producers.
- C. Research to develop new varieties involves biotechnology, tissue culture, mechanization, and the space program.

- II. One of the newest and most important techniques in fruit and nut production is genetic engineering.
  - A. ***Genetic engineering*** is a biotechnology technique that manipulates the genes in plant cells.
  - B. Genetic engineering allows scientist to transfer desirable genes to the chromosomes of other organisms.
  - C. Genetic engineering creates “designer” crops that can withstand sub-optimal soil and climatic conditions.

- D. New varieties are developed that are resistant to insects, diseases, and herbicides.
- E. Plant structures and shapes are improved to improve harvesting and maturing processes.
- F. Gene modification can improve yields, flavor, and nutrition of crops.



○ This is an eggplant which has been modified with Bt (*Bacillus thuringiensis*) and is resistant to insects.



- On the left is regular rice. On the right is golden rice. Golden rice was genetically modified to contain extra beta carotene which provides Vitamin A to the body.

- III. When a new type of fruit or nut tree is produced producers want as many of these new trees as possible. This can be achieved through ***tissue culture***.
- A. Tissue culture is an asexual ***micro propagation*** technique that involves taking a small piece of plant tissue and growing it in a sterile culture.
  - B. Many plants can be produced in a small area.
  - C. Specialized laboratory facilities are necessary to provide a sterile environment.



IV. Using machines to do the labor in fruit and nut production greatly increases the quality and quantity of fruit produced.

- A. ***Mechanization*** increases the level of production.
- B. It is involved in the growing, harvesting, processing, and storage of crops.
- C. Mechanization increases yields and profits.

# MECHANICAL HARVESTING OF GRAPES



V. One way to produce more food and to expand our exploration of space is to produce the food in space.

A. Scientists are developing technology to produce food crops in space.

B. The challenges of crop production in space include environmental conditions, crop selection, and waste recycling.

1. Environmental conditions must provide adequate light, moisture, plant nutrition, and temperature.
2. Crop selection involves nutrition, taste, and space requirements.
3. Crops must grow faster and produce more.
4. Inedible plant parts, water, and human waste must be recycled through plant production.

# **REVIEW/SUMMARY**

1. What is the role of biotechnology in developing new varieties of crops?
2. What is tissue culture and what are its advantages?
3. What is the role of mechanization in production?
4. What challenges do scientist face in producing crops in space?