

4.0 Apply scientific skills and principles in plant science. Students who demonstrate learning can:

- 4.01 Describe and differentiate between plant industry sectors (floriculture, nursery, forestry etc.).

Horticulture- Branch of agriculture concerned with growing plants that are used by people for food, medicinal purposes, and aesthetic gratification. (USDA)

Floriculture- Area of horticulture concerned with the cultivation, arrangement, and sale of flowering and ornamental plants

Olericulture- the production of vegetable crops.

Pomology- the production of fruit crops

Landscape Horticulture- design, installation, and care of landscapes, zero-scapes, and interoscapes for homes, businesses, and public places.

Nursery Production- Propagation and production of plants to be used in landscape horticulture applications

Silviculture- the art and science of controlling the establishment, growth, composition, health, and quality of forests and woodlands to meet the diverse needs and values of landowners and society. (Includes wildlife, timber, restoration, and recreation)

<https://www.fs.usda.gov/forestmanagement/vegetation-management/silviculture/index.shtml>

- 4.02 Examine products and by-products produced commercially in plant industries.

<https://www.fnpla.org/2022-Economic-Impact-Florida%20s-Nursery-Landscape-Industry.Optimized.pdf>

Florida's largest export commodities are:

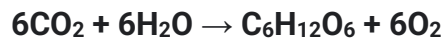
- 1- Foliage
- 2- Cuttings and slips
- 3- Bulbs, tubers (in growth)
- 4- Roses (cut, fresh)
- 5- Trees and shrubs

Florida's largest employment sectors in horticulture are:

- 1- Landscape services
- 2- Greenhouse and nursery production
- 3- Lawn and Garden Supply Stores

- 4.03 Distinguish cellular processes in plant science including photosynthesis, respiration, transpiration.

Photosynthesis- The process of converting water and CO₂ into sugar for plant functions. Utilizes energy from the sun for activation energy. Produces Oxygen as a by-product. Occurs in the chlorophyll of the cell.



Respiration- Biochemical process where cells break down food (sugar) and release energy



Exchange of gases takes place through the stomata, typically on the underside of the leaf. These stomata can open and close to control respiration rates.

Respiration typically takes place under dark (no light) conditions. It can also be referred to as the dark cycle or Krebs cycle.

Transpiration- The physiological loss of water from the plant.

Most of the water plants absorb through their roots is lost through transpiration.

Humidity can have a significant impact on transpiration

This uptake of water and release through the leaves allows plants to:

- Take up nutrients from the soil
- Allow plants to cool off during hot conditions
- Absorb water to be used for photosynthesis
- Maintain structure through turgor pressure

- 4.04 Categorize plants based on specific characteristics according to industry and scientific standards.

Grasses- Monocotyledonous plants with a narrow blade shaped leaf
Zoysiagrass

St. Augustine
Bermuda
Bahia grass

Ground Covers- Any plant that grows over an area of ground (can include grass, but is separated here)

Liriope

English Ivy

Annuals- Plants that complete their growing cycle in on year

Petunia

Coleus

Marigold

Pansy

Perennials- A plant that persists for more than one growing season (for the plants in this list, the top portion "dies back" but the roots remain viable)

Caladium

Daylily

Lantana

Shrubs- A woody plant with multiple stems that retains structure above ground year round

Boxwood

Croton

Heartleaf Philodendron

Azalea

Landscape Rose

Saw Palmetto

Trees- a woody perennial plant with a long single stem (trunk) of considerable height.

Red Maple

Flowering Dogwood

Crape Myrtle

Southern Magnolia

Slash Pine

Live Oak

Sabal Palm (Cabbage Palm)

Crops (can be any of the species above, but these are typically grown in commercial settings for food production)

Citrus (Juice Oranges, Grapefruits etc.)

Peanuts

Sweet Corn

Field Corn

Soybeans

Strawberries

Tomatoes

Sugarcane

Watermelons

Bell Peppers

- 4.05 Investigate and compare methods of plant reproduction.

Sexual reproduction- Propagation of plants through the fusion of gametes from two parent cells

Male parts of a flower- Stamen and anther

Produce pollen (gamete)

Female parts of a flower:

Stigma- Collects the pollen

Style- Tube that connects the stigma and the ovary

Ovary- Holds the ovum (gamete) and is the site of fertilization

Asexual reproduction- Formation of offspring without the fusion of gametes, usually through cuttings, division, layering, etc.

- 4.06 Identify nutrient requirements for optimal plant growth, their functions within plants, and nutrient sources.

Plants need Water and Sunlight for photosynthesis. They also need macro and micronutrients.

Macronutrients-

- Nitrogen- Key component of chlorophyll, helps plant growth, encourage nutrient and water uptake
- Phosphorus- needed for cell division and growth of the plant
- Potassium- Associated with movement of water, nutrients, and carbohydrates in plants



Micronutrients-

- Plants have 16 micronutrients. These are only needed in very small amounts
 - 4.07 Manage plant production facilities, equipment, and supplies with a safety mindset.

Types of plant production facilities in Florida-

<https://www.fdacs.gov/Agriculture-Industry/Florida-Agriculture-Overview-and-Statistics>

[https://www.nass.usda.gov/Statistics_by_State/Florida/Publications/Annual Statistical Bulletin/2021/A1thru10Over-2021.pdf](https://www.nass.usda.gov/Statistics_by_State/Florida/Publications/Annual_Statistical_Bulletin/2021/A1thru10Over-2021.pdf)

Field Crops

Forestry

Citrus

Vegetables, melons, and berries

Horticulture

Wholesale

Greenhouse

Nursey

Turf

Retail

- 4.08 Evaluate advances in plant related biotechnology that impact consumers and production.

Improvements have been made to plants since the advent of agricultural production. Corn as we know it today was developed from a grass called Teosinte. Through selective breeding, varieties of plants can be improved to have traits we deem desirable. Recently, advances in our understanding of biotechnology have given scientists the ability to accelerate advancements. These advancements have the ability for producers to increase yield, create disease and drought tolerant plants, and grow plants with fewer inputs. There are some potential risks and tradeoffs associated with the advancements including consumer perception, safety concerns, and the possibility of creating pesticide resistant weeds.

Possible advancements to consider are:



Recombinant DNA Techniques
Transgenic plants
Crispr technology
Improvement through selective breeding

- 4.09 Explore employment and entrepreneurship opportunities and identify potential paths to careers in plant science.