

Horticulture CDE Written Exam

General Knowledge Things You Should Know

Horticulture- the cultivation of plants for food, comfort, and beauty

1. **Olericulture-** vegetables
2. **Pomology-** fruit and nuts
3. **Ornamental Horticulture-** growing plants for beauty
 - a. **Floral design**
 - b. **Floriculture** (foliage and flowering plants)
 - c. **Landscape horticulture**

Botany – study of plants

Botanical nomenclature – scientific classification of plants

Horticulture Industry – all of the activities that support meeting the needs of consumers for horticulture products

Plant Parts and Functions

Leaves- The site of photosynthesis and respiration. Known as the food factory.

- **Monocot-** a plant with only one seed leaf
- **Dicot-** a plant with two seed leaves.
- **Seed leaf-** the first leaf or leaves grown by the embryo of a seed
- **Respiration-** the conversion of stored energy into usable energy in plants.

Formula: $C_6H_{12}O_6 + 6 O_2 \Rightarrow 6 CO_2 + 6 H_2O + \text{Energy}$

Photosynthesis	Respiration
<ul style="list-style-type: none"> • produces food • stores energy • uses water • uses carbon dioxide • releases oxygen • occurs in sunlight 	<ul style="list-style-type: none"> • uses food • releases energy • produces water • produces carbon dioxide • uses oxygen • occurs in the dark as well as light

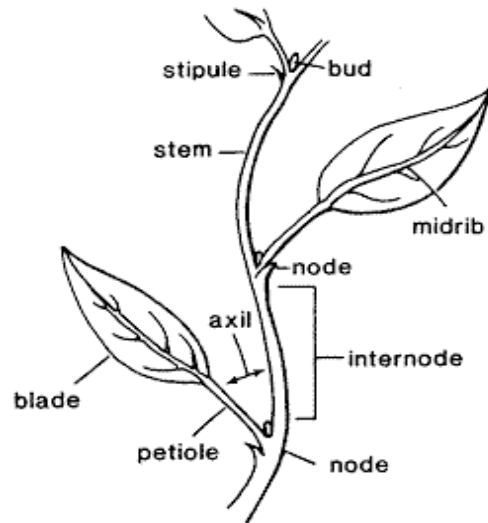
Photosynthesis- the conversion of light energy to chemical energy by plants. (the process by which chlorophyll, carbon dioxide, sun, and water creates oxygen and sugars.

i. **Importance-** creates food for the plant

ii. **Equations:** LIGHT + WATER + CARBON DIOXIDE = ENERGY + OXYGEN

iii. $6CO_2 + 6H_2O + \text{Energy} \rightarrow C_6H_{12}O_6 + 6O_2$

Transpiration- the loss of water from the plant through the leaves in the form of water vapor.



Leaf Parts:

Petiole- leaf stalk

Blade- the flat surface of a leaf. Used to capture the most sunlight

Margin- the edge of a leaf (a great way to identify plants.)

Epidermis- the waxy surface of a leaf that reduces water loss

Guard Cells- cells on the bottom surface of a leaf that controls gas and water exchange

Stomata- cells found on the bottom side of a plant used in gas exchange. The site of transpiration and respiration.

Chloroplast- the site of photosynthesis in plants.

Chlorophyll- the green pigment in chloroplasts (must be present for photosynthesis)

Plant Stems- support the plant and transport water and minerals

Lenticels- pores on the surface of stem that allow for gas exchange

Xylem- the woody portion of the stem that conducts water and nutrients throughout a plant.

Phloem- vascular tissue that moves food from where it is manufactured to other parts of a plant.

Cambium- stores food and moisture in the center portion of a dicot plant

Node- a point along the plant where leaves or other stems are attached

Leaf Margins



entire



serrate



undulate



lobed

Leaf Shapes



lanceolate



oval



cordate
(heart-shaped)



triangular

Venation



parallel



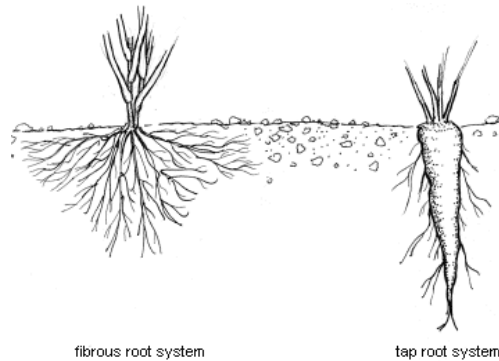
palmated



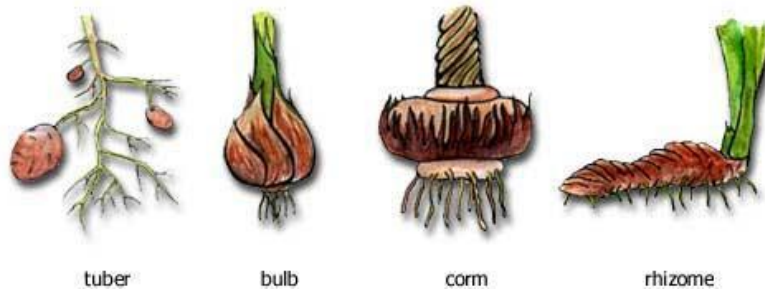
pinnately
net-veined

Roots-

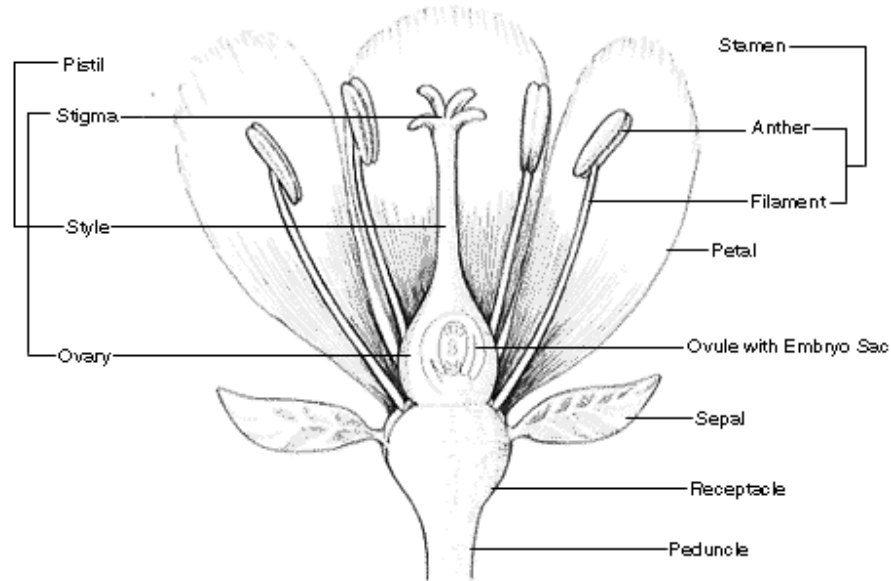
- anchor the plant
- take in water and nutrients
- store energy (food)
- **Root bound-** when roots begin to fill the container and halt plant growth (needs to be transplanted)
- **Tap root-** the larger, main root of the plant that grows deep into the soil
- **Fibrous root-** fine root hairs that are very small (increase surface area for water uptake)



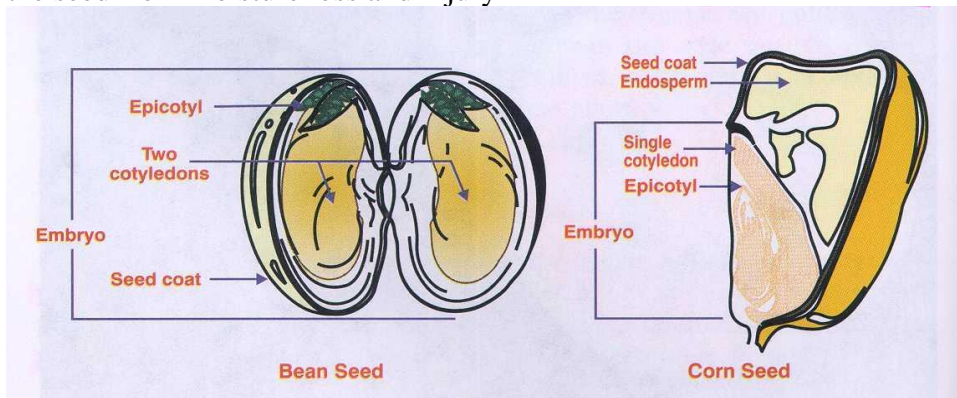
Root Storage Systems



- b. Flowers-**
- attracts insects for pollination
 - produces fruit
 - site of the male and female plant parts
 - **Female Parts (Pistol)= stigma, style, and ovary**
 - **Male Parts (StAMEN)= anther and filament**
 - **Complete flower-** contains both male and female parts
 - **Incomplete flower-** is lacking either the male or the female flower parts



- c. **Seed** – are the mature, fertilized ovules, or eggs, that are contained in the fruit
- **Seed Embryo** – has a root, stem, and seed leaves
 - **Endosperm** – specialized tissue in a seed which contains stored food
 - **Seed Coat** – the tissue that surrounds the embryo and endosperm which functions to protect the seed from moisture loss and injury



Propagation

Propagation- the deliberate reproduction of plants

Sexual Propagation- producing plants from seed

- i.**Stratification** – placing seeds in a moist soil medium at temperatures between 32 and 50 for a certain period of time
 - ii.**Scarification** – breaking or softening a seed coat to allow absorption of moisture
 - iii.**Direct Seeding** – sow directly into the ground
 - iv.**Indirect Seeding** – sow into containers such as flats or cells
 - v.**Seedlings** – plants grown from seeds
 - vi.**Percent Germination** – percentage of seeds that will grow and sprout
 - vii.**Damping Off** – disease which stems rot at the soil line
 - viii.**Hardening Off** – seedlings are placed in an area with cooler temperature and less watering to help them acclimate to the outdoors
- Asexual Propagation-** producing plants from parts of old plants (create a clone)
- ix.**Clone** – genetically identical to the parent plant
 - x.**Cuttings-** pieces of stems or roots used for propagation (best if planted in peat-perlite mixture under a mist system)
 - xi.**Layering-** producing a plant while still attached to the parent
 - xii.**Division-** physically dividing the plant.
 - xiii.**Separation-** a natural division
 - xiv.**Tissue culture-** sterile propagation technique (micro propagation)
 - xv.**Transplanting-** breaking up the root ball of a plant and plant in a larger container

Plant Life Cycles – refers to the length of a plant's life

Annual – plants that germinate from seed, grow to maturity, flower, and produce seed in ONE growing season

Biennials – plants that complete their life cycle in TWO growing seasons, usually in first season grow vegetative and the following season produce flowers or fruit then die.

Perennials – plants that may be herbaceous or woody and live for more than two growing seasons.

Vegetative phase – begins when a plant seed germinates and grows producing leaves, stems, and roots

Reproductive stage – when a plant flowers and produces fruit

Dormancy – slowed or inactive growth

Plant Care

Fertilizer:

- **Two basic forms:** liquid (water soluble) and granular
- **Slow release** – granular and dissolves over a period of time, releasing nutrients into the growing media – most common Osmocote

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- **Plants need 16 nutrients to survive.**
- **Primary Nutrients** – Nitrogen, Phosphorus, and Potassium
- **N-P-K** = represents the percent of each substance in the fertilizer out of 100 lbs. For example: a fertilizer bag weighing fifty lbs labeled 10-30-20 would contain 5 lbs of nitrogen, 15 lbs of phosphorus, and 10 lbs of potassium.
- **N (Nitrogen)**- produces leaves, keeps plants green
- **P (Phosphorous)**- flower development
- **K (Potassium)**- root health, Vitamin C
- **Secondary Nutrients** – Calcium, Magnesium, and Sulfur
- **Water is the most important plant element by far.** It makes up approximately **90%** of the weight of the plants and is the one most limiting factor.

Hydroponics- growing plants in the absence of soil (water or gel usually)

- no soil is needed, it usually conserves water
- plant year round
- fewer insects and disease problems

The Two most important factors in growing horticulture crops.

- Maintain adequate water
- Temperature control

Soiless Media:

- **Vermiculite**- heat-treated mica that is lightweight and has high nutrient and moisture holding capacity.
- **Perlite** is a heat-treated lava rock that is lightweight and has low nutrient and moisture-holding capacity.
- **Peat**- partly decayed plant material of natural occurrence, composed chiefly of organic matter that contains some nitrogen of low activity.
- **Bark**
- **Sand**
- **Sphagnum moss**- dehydrated remains of acid bog plants that is lightweight, controls diseases well and has an excellent moisture holding ability.

Soil- the top layer of the earth crust, produced by the breakdown of parent material.

- Soil is classified according to the percentage of sand, silt, or clay.
- **Loam**- a mixture of sand, silt, and clay
- **With four major components:**

- organic matter (living or once living)
- mineral matter
- air space
- water space

Pesticides

IPM- Integrated Pest Management- a pest management strategy that uses a combination of measures to reduce pest damage with the least disruption to the environment.

BMP – Best Management Practices – those practices that combine scientific research with practical knowledge to optimize yields and increase crop quality or aesthetics while minimizing environmental impact

Pesticide – a chemical used to control pest

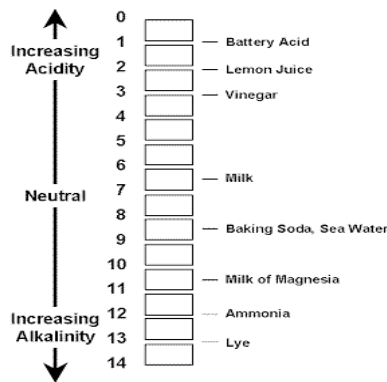
- a. Types of Pesticides
- a. Insecticides – controls insects
- b. Nematicides – controls nematodes
- c. Herbicides – controls weeds
- d. Fungicides – controls plant diseases
- e. Bactericides – controls plant diseases caused by bacteria
- f. Miticide – controls Mites
- g. Rodenticides – controls rodents
- h. Molluscide – controls snails and slugs

Preemergence – herbicide applied to the soil before planting

Postemergence – herbicide applied to the soil after planting

PH

1. The pH scale measures how acidic or basic a substance is. The pH scale ranges from 0 to 14. A pH of 7 is neutral. A pH less than 7 is acidic. A pH greater than 7 is basic.



2. You can make your soil more alkaline (increase its pH value) by adding a form of lime
3. To make your soil more acidic (decrease its pH value) you can use either aluminum sulphate or sulphur. Aluminum sulphate is the quickest acting.
4. Most plants grow best in soil with a pH from 5.5 – 7.0.

Landscaping

Landscape

- **What types of plants are mostly used in landscaping- woody ornamentals**
- **Types of woody landscape plants:**

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- i. **Evergreen**- a plant that keeps their leaves year round (spruce)
- ii. **Deciduous**- plants that lose their leaves during a portion of the year (oak)
- iii. Most woody landscape plants should be planted when dormant
 - **Nursery**- a place where outdoor plants are grown
 - **Grasses**
 - i. **Cool season**= fescue, rye, bluegrass
 - ii. **Warm season**= Bermuda, centipede
- iii. Best time to seed grass is **warm season (early spring)**
- iv. **Turf grass**- a collection of grass plants that form a ground cover
 - **Herbaceous plants**- plants that die back to the ground
 - **Three types of herbaceous plants**-
 - i. **Annual**
 - ii. **Biennial**
 - iii. **Perennial**
 - **Maintenance** – the care and upkeep of the landscape materials after installation
 - i. **Pruning** – the removal of certain plant parts
 - ii. **Mulching** – spreading material over the surface of the soil
 1. **reduces water loss**
 2. **keeps soil temperature**
 3. **reduces weeds**
 4. **improves general appearance**

Xeriscaping- a form of landscaping that uses plants that require small amounts of water

Interiorscaping- using plants indoors (indoor landscaping)

Safety

1. **MSDS- Material Safety and Data Sheet-** a sheet containing information about the safe use of a chemical and the steps to take in case of an accident (should be kept wherever any chemicals are stored or used)
2. **LD (Lethal Dose)-** indication of the lethality of a substance



Highly Hazardous



Moderately Hazardous

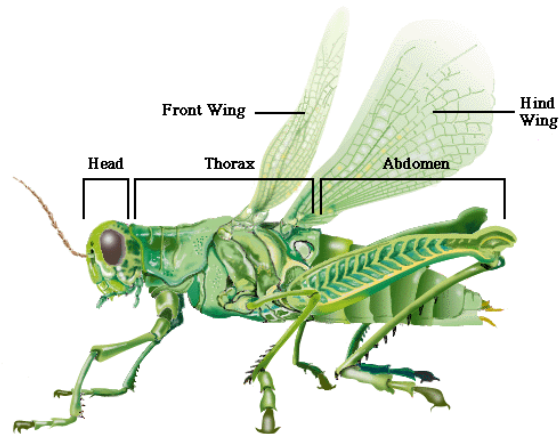


Slightly Hazardous



The most severely toxic (fatal) chemicals

Parts of an Insect



Insects go through basic life cycles.
Complete metamorphosis – egg-larva-pupa-adult
Incomplete metamorphosis – egg-nymph-adult ¹

Greenhouses

¹

Materials-

Greenhouse coverings must be clear enough to provide optimum light transmission and at the same time be durable as well as economical. Several materials have been developed to meet these needs on a commercial basis.

1. Glass- provides the best light transmission for greenhouse production. However, the structural components required to support glass are costly. **MOST EXPENSIVE**

2. Fiberglass-is another covering material that is frequently used on commercial greenhouses. Fiberglass is ridged, extremely durable, and does not require the extensive structural components of a glass house. Unfortunately, fiberglass is very susceptible to break down by ultra violet (UV) light. This causes the fibers to swell resulting in a significant decrease in light transmission. The life span of fiberglass can be as short as five years under certain conditions.

3. Double sheets of polyethylene- (PE) film, inflated with air, is the most common covering on greenhouses. PE is not rigid, but will provide the support necessary for normal operation. Most currently available PE film will last for approximately two years before it needs to be replaced. Although this frequent maintenance is costly, the reduced initial investment required, as well as the limited structural components needed to support this covering, has made PE most economical for producers. **CHEAPEST**

4. Polycarbonate (Acrylic)- advantage- excellent heat insulating ability and light transmission. Disadvantages- extremely flammable.

Greenhouses in Georgia should be faced North to South.

Types of Greenhouses-

- 1. Attached-** an attached greenhouse is connected to a building (usually a house or store front)
- 2. Free-standing (detached)-** separate from other buildings or greenhouses. These allow the maximum amount of sunlight.
- 3. Connected-** several greenhouses joined together. Less land and money needed. However, climate control is difficult in such a large space.

History

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Theophrastus – (377-288BC) discovered roots absorb nutrients and also observed the difference between monocot and dicot plant

Dioscorides – (77AD) wrote the first book describing roots, stems, leaves, and sometimes flowers, used for medical plants

C. V Linnaeus- developed a method of classification (binomial nomenclature)

Ex: *Genus species* (Genus is always capitalized and in italics or underlined and species is always lower case and in italics or underlined also written in Latin because Latin is the universal language) (1701-1778)

Charles Darwin- the first to present a scientifically sound explanation of evolution in his book “The origin of species” (1809-1882)

Gregor Mendel- his studies were the foundation of the study of genetics. He used garden peas to study heredity, genetics, and hybrids. (1822-1884)

Floriculture Industry

Floriculture is the cultivation, harvesting, storing, designing, and marketing of flowering plants.

Production

Grower- responsible for all stages of plant production

Production Superintendent – supervises growers and coordinates production activities

Marketing Manager – supervises the grading, handling, storage, packing, and shipping of cut flowers

Inventory Controller – schedules the flowering crops to coincide with the time of the greatest need and Price

Wholesale Florist

 Manager – responsible for entire operation

 Buyer – purchases cut flowers and hard goods

 Salesperson – markets flowers and supplies to retailers

Retail Florist

 Store Manager

 Sales Clerk

 Designer