ECOLOGICAL REQUIREMENTS OF HORTICULTURAL PLANTS

RELATIVE HUMIDITY (RH)

- Relative humidity, often expressed as a percentage, indicates a present state of absolute humidity relative to a maximum humidity given the same temperature.
- Plant tissues have 40-95% relative humidity.
- Most of the horticultural plants needs a relative humidity of 60-70% in their environmental conditions.

IF RH IS OPTIMUM:

- Transpiration, photosynthesis and plant development are normal
- More leaf area occurs on the plant
- The fruit skin is thinner, fruit become more crisp and juicy,
- The leaves are thinner and this is important for plants having edible leavse , e.g., chard, lettuce, salads etc.

IF RH IS LOWER:

- Weak growth and development
- Shriveling and withering in leaves of the plant
- Shriveling in fruits
- Unsufficient olor formation on fruit
- Decrease in fruit set

IF RH IS HIGHER:

- Stomata close, transpiration decreases,
- Weakening in growth and development of plant,
- Diseases such as powdery mildew, mildew, black spot increase
- Drying of shoot tips, transparency of leaves

SOIL HUMIDITY = RAIN & IRRIGATION

- If soil humidity is lower:
- Germination of seeds decreases
- Root development is limited
- Nutrients cannot be taken from the soil
- Plant yield and development are reduced
- Poor development and at the end Death

- If soil humidity is higher:
- The roots are left without air, and root respiration is inhibited
- Root development is inhibited
- Nutrient uptake of roots from the soil is limited
- Plant development slows down
- The development of soil-borne disease agents is accelerated

WIND

- Winds with a speed of 2-5 m/s have a positive effect on respiration and transpiration.
- Accelerates plant growth and development
- Light winds increase pollination and fruit set.
- Winds faster than 10 m/sec cause mechanical damage onb shoots and fruits, damage to herbaceous vegetables, branch breakage in vines, and fruit drop.
- Fast and hot winds disrupt the plant-water balance, slows down photosynthesis and plant growth and development slows down, can cause drying in and branches and leaves.
- Very humid winds during the development period increase fungal infections.

SITE SELECTION FOR CULTIVATION OF HORTICULTURAL PLANTS LOCATION

- Topography,
- Altitude (elevation) (the height of an object or point in relation to sea level or ground level.)
- Latitude (the angular distance of a place north or south of the earth's equator, or of a celestial object north or south of the celestial equator, usually expressed in degrees and minutes.)
- Soil depth, soil properties etc.
- In general, places or sites at higher elevations are cooler than lower places at the same latitude. The temperature drops by 0.6-1°C every 100 m in elevation.

- The effect of altitude changes with temporary temperature changes or the effect of large water surfaces.
- Large water surfaces (lakes, etc.) cause the region to have a more temperate climate.
- **When selecting the site fo horticultural cultivation:**
- Species,
- Erosion status and type of soil
- Air flow
- Slope direction should be taken into consideration.

SPECIES

- Every ecology has its own unique plant species.
- Warm climate vegetables are grown in greenhouses in winter.
- Cool climate vegetables can be grown outdoors in warm ecologies in winters.
- Vegetables can be grown sucessfully on flat or slightly sloping areas (1-2%)
- Fruit trees or grapes can grown successfully in sloping areas.
- Lands with too sloping may hinder cultural managements in the orschards, in which case the land must be terraced.

EROSION

- Erosion leads to a decrease in soil fertility.
- Erosion can occur by water or wind.
- Precautions must be taken for erosion in areas where horticultural plants is grown.

WIND EROSION

- It is dangerous to soil and plants.
- **To reduce the wind speed;**
- Growing cover plants (Covering agriculture)
- Making windbreaks (Especially for prevailing summer winds)

WATER (RAIN) EROSION

- It is seen in areas with heavy rainfall and weak vegetation.
- In these areas:
- The flow rate of the water should be reduced,
- Terracing should be applied
- Contour planting should be preferred during orchard establishing
- Covering plants on the ground should be growth in order to decrease or inhibit water erosion.

AIR FLOW

- Airflow: The flow of air from high sections to low sections
- Cold air flows like water from high elevations to the areas at low elevations.
- In cases where there is slight air movement, the frost event decreases.
- There must be sufficient air drainage in the orchard for fruit growing.
- It is especially important for late spring frosts.
- Frost damage should be examined in the area where the orchard will be established.

DIRECTION= THE DIRECTION OF THE SLOPE

- ***South and East Directions:***
- Warms up sooner
- Earlier bud burst and flowering
- Provides early ripening
- More spring late frosts damages

SOUTH AND WEST DIRECTIONS:

- Have some cold winter winds,
- Sunburns can be seen in summer period,
- Yield and quality are significantly reduced.

NORTH:

- Flowering is delayed.
- The damage of late spring frosts is reduced.
- In areas with high light intensity, trees and fruits are protected from sunburn.
- If the prevailing winter winds blow from the northwest, the north and west directions are the directions most exposed to these cold winds. In this case, a resistant cultivar should be planted in the orchard and, east and south directions should be preferred in such places.

SOIL

- An important ecological factor limiting horticultural cultivation.
- It supports the plant.
- Provides water and nutrients.
- It is a physical mixture of minerals, organic matter, living organisms, and contains varying proportions of water and air.

A GOOD SOIL STRUCTURE SHOULD HAVE:

- Proper ventilation
- Water holding capacity
- 50% of soil should consists of pores and these pores should be filled with air or water.
- A fertile soil is alive.

THE MOST SUITABLE SOIL FOR HORTICULTURAL CULTIVATION IS LOAMY SOILS

- Loamy: denoting or relating to a fertile soil of clay and sand containing humus.
- Loam soil is composed of almost equal amounts of sand and silt with a little less clay. A good ratio is 40 percent each of sand and silt, and 20 percent of clay.
- Most of the horticultural species can be successfully growth on loamy soil.

SOIL REACTION AND SALINITY

- Soil reaction influences many physical and chemical properties of soil. The growth and activity of plant and soil organisms depend on soil reaction and the factors associated with it.
- **Soil pH:** pH is the negative logarithm of hydrogen ion concentration of soil solution.
- pH= 7, neutral soils, pH< 7 acidic soils, pH> 7 alcaline soils.
- **Acidity:** Soil acidity is common in regions where precipitation is high enough to leach appreciable amounts of exchangeable bases from the surface layers of the soil. The two adsorbed cations such as Hydrogen and Aluminium are largely responsible for soil acidity. The acid soil is generally found in humid region. In these kind of soils it is possible to see nitrogen, phosphorus, potassium, sulfur, magnesium and calcium deficiencies in horticultural plants.

- **Alkalinity:** The soil that contains absorbed sodium to interfere with the growth of most crop plant is known as alkali soil. The amount of exchangeable sodium in great quantities in the soil makes the soil alkalinity. The sodium ion easily displaced the calcium ion from clay colloid and makes the sodium mixed clay particles.
- In alcaline soils it is possible to see zinc, manganese, iron and copper deficiencies in horticultural plants.
- **Neutrality:** In those areas, where the soil contain hydrogen and hydroxyl ion almost in equal quantities, the soils are neutral in character.

- The important part of the horticultural plant species grows optimally between pH= 5.5-7.2 ranges. However, tea and blueberry needs a soil pH between 3 and 5, while olives, pistachios and almonds can grow best in soils with pH= 8.5 and above.

SOIL SALINITY

- Soil salinity is a measure of the minerals and salts that can be dissolved in water. In most cases, the following mineral ions are found in soil-water extract listed in order of importance:

$$Na^+, Cl^-, Ca^{++}, SO_4^=, HCO_3^-, K^+, Mg^{++}, NO_3^-$$

- Increased soil salinity has progressive and often profound effects on the structure, water movement, and microbial and plant diversity of soils. Soil salinity is measured by using electrical conductivity (EC) measurements of a water-saturated soil paste extract

- There are numerous sources of soil salinity. Natural soil salinity occurs in hot arid and semiarid climates with < 27 cm of annual rainfall. Soils and lands that have shallow water tables can develop saline soils due to excessive water evaporation and the concentration of salts. Poor water quality and irrigation practices also contribute to the salinization of thousands of acres of farmland each year around the world.

UNDER SALINITY CONDITIONS,

- The plant can not absorb the water from the, and at the end the plant will dries up.
- The ions in the soil causing to the salinity are toxic to the plant roots.
- **The most sensitive species to soil salinity is lemon, but the most resistant species is date.**