Lab - 5

Soil Temperature

- Soil temperature is an important plant growth factor like Air, water and Nutrients.
- Soil temperature affects plant growth directly and in directly.
- It is expressed as Celsius (ºC) and Fahrenheit (ºF) and Kelvin (just use K).

Source of Soil Heat

- Solar radiation
- Microbial decomposition of organic matter
- Respiration by soil organisms

Internal source of heat

Role of Soil Temperature

Soil temperature has some effects on fertility of soil and plant growth, directly and indirectly, as follows:

1. Germination of Seed
2. Plant Growth
3. Availability of Nutrients
4. Soil Microorganism
5. Decomposition of Soil Organic Matter
6. Soil Formation and Physical Properties of Soil

Factors Affecting The Soil Temperature

- Solar radiation
- Evaporation
- Rainfall
- Color of the soil
- Moisture content

Loss of Soil Temperature

The factors responsible for loss of soil temperature are as follows:

1. **Radiation** – The same portion of temperature absorbed by surface soil is lost by radiation to the atmospheric environment.
2. **Conduction** – The soil temperature is lost from the soil by the process of conduction which means transmission of anything from one point to the other point.
3. **Precipitation** – During summer months, precipitation has generally a cooling action in soil, because rain water usually has a lower temperature than soil.
4. **Evaporation** – The major portion of soil temperature is used for evaporation of soil moisture and transpiration of plant, i.e., evapotranspiration. The evapotranspiration is a process by which soil moisture is lost from soil by evaporation and transpiration of plant.

Using Soil Temperature to Decide When to Plant

Soil Temperature & Seed Germination

Crop	Minimum Temp	Best Temp Range
Beans	60 F	75-85 F
Beets	40 F	65-85 F
Cucumber	60 F	65-95 F
Lettuce	32 F	60-75 F
Peas	40 F	65-75 F
Spinach	32 F	65-75 F
Squash	60 F	85-95 F

Measurement of Soil Temperature

Soil temperature can be measure by different thermometer as follows:

1. Mercury thermometer
2. Bimetallic thermometer
3. Resistance thermometer
4. Thermal Scanner (Thermal Conductivity Meter)

The equation to convert between **Kelvin** and **Celsius** is:

$^{o}C = {}^{o}K - 273.15.$
$^{o}K = {}^{o}C + 273.15.$

Fahrenheit and **Celsius** Conversion Formula:

$$^{o}\mathbf{F} = (\mathbf{1.8} \times {}^{o}\mathbf{C}) + 32$$

$$^{o}\mathbf{C} = 0.5556 \times ({}^{o}\mathbf{F} - 32)$$