

Lab - 5

## Soil Temperature

- ◆ Soil temperature is an important plant growth factor like Air, water and Nutrients.
- ◆ Soil temperature affects plant growth directly and indirectly.
- ◆ It is expressed as Celsius (°C) and Fahrenheit (°F) 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

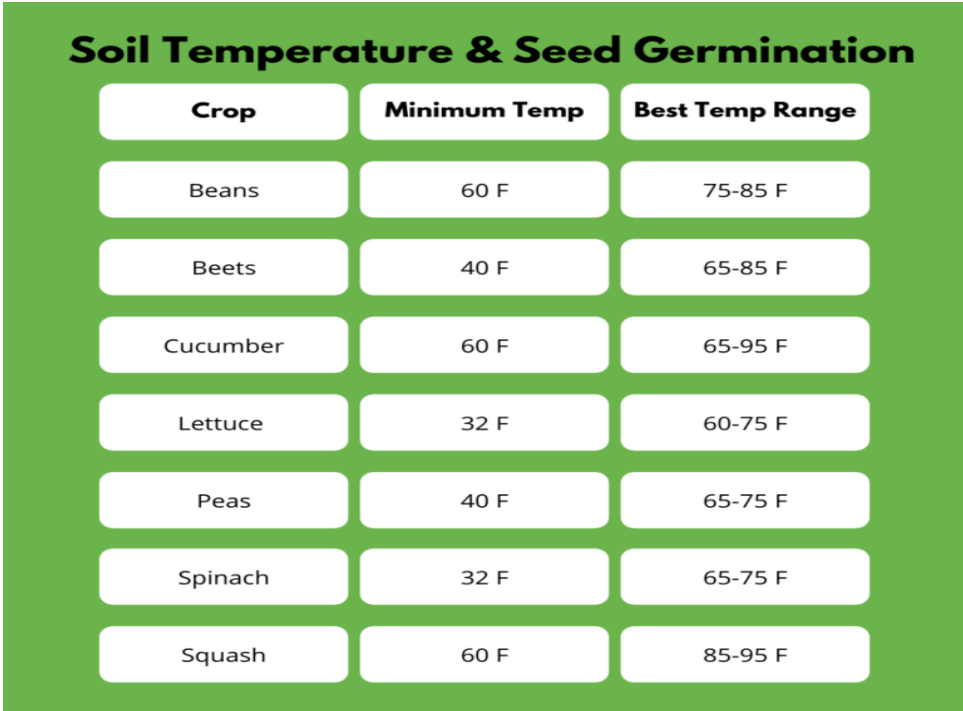
- ❖ Solar radiation
- ❖ Evaporation
- ❖ Rainfall
- ❖ Color of the soil
- ❖ Moisture content

### 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



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 measured by different thermometers 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:

$$^{\circ}\text{C} = ^{\circ}\text{K} - 273.15.$$

$$^{\circ}\text{K} = ^{\circ}\text{C} + 273.15.$$

**Fahrenheit** and **Celsius** Conversion Formula:

$$^{\circ}\text{F} = (1.8 \times ^{\circ}\text{C}) + 32$$

$$^{\circ}\text{C} = 0.5556 \times (^{\circ}\text{F} - 32)$$

