**Tomato**

**Scientific name: (*Solanum lycopersicum* L.)**

**Family: *Solanaceae***

**Introduction:** Tomato belongs to the *Solanaceae* (the nightshade family) along with potatoes, peppers and eggplants. *Lycopersicon esculentum* is a perennial plant, but it grown as an annual. It is one of the most popular and widely grown vegetable crops in the world. Ripe tomato fruit is consumed fresh and utilized in the manufacture of a range of processed products such as paste, powder, ketchup, sauce, soup, and canned whole fruits. Tomatoes have significant nutritional value. In recent years, they have become known as an important source of lycopene, which is a powerful antioxidant that acts as an anticarcinogen. They also provide vitamins (A, C, B) and minerals (K, Fe, Ca). Tomatine occurs in toxic quantities in the tomato foliage but is converted enzymatically to a non-toxic form in the fruit. Because of these, the crop was not used for food until the 18th century in England and France. There are two types of tomatoes commonly grown *determinate and indeterminate.* Most commercial varieties are *determinate.* These “bushy” types have a defined period of flowering and fruit development. Most greenhouse tomatoes are indeterminate, which means they produce flowers and fruit throughout the life of the plant.

1. **Determinate varieties** grow to a certain height, set fruit, and then concentrate on ripening that fruit.
2. **Indeterminate varieties** keep growing taller and taller, setting and ripening fruit until they're killed by frost. These varieties require more support (from cages and stakes) and more a bit more attention from the gardener.

**Origin:** The tomatoes are originated in the area extending from Ecuador to Chile in the western coastal plain of South America.

**Health Benefits of Tomatoes:**

**1-Heart Health:** Evidence from clinical trials shows that lycopene supplementation is effective at lowering LDL cholesterol , benefit against inflammation and markers of oxidative stress .tomato products shown a protective effect on the inner layer of the blood vessels and may decrease the risk of blood clotting.

**2-Cancer Prevention:** Observational studies have found links between tomatoes, tomato products, and fewer incidences of prostate-, lung- and stomach cancers. The high lycopene content is believed to be the main reason for these protective effects**.**

**3-Skin Health:** Tomatoes are considered beneficial for skin health Tomato-based foods rich in lycopene and other plant compounds (like Vitamin C) may protect against sunburn.

**Environmental conditions:-**

**-Temperature:** Tomato is a warm-season crop reasonably resistant to heat and drought and grows under a wide range of climatic conditions. The minimum temperature for seed germination is 10 0C with a maximum temperature of 350C and an optimum range of 170C to 20 0C. Most field transplants should not be set out until the danger of frost is past. An optimum growth rate is obtained at 220C with reductions occurring above 300C and below 120C. Fruit setting is inhibited above 300C and below 160C. Rough fruit (cat faced) and root growth inhibition result from growing temperatures below 160C. Red color development in fruits occurs at 200C -240C.

**-Light:** Also light intensity affects pigmentation, fruit color, fruit set. Bright sunshine at the time of fruit set helps to develop dark red colored fruits.

**-Soil requirements:** Tomatoes can be grown on a wide variety of soils ranging from light-textured sandy or sandy loam to heavier clay soils. Like other vegetable crops, tomato also grows better and yields more when grown in a rich sandy loam or loamy soil. The soil should be rich in nutrients and organic matter. The ideal soil pH should be near neutral but never below 6.0 or above 7.0.

-**Irrigation**: Tomato needs reasonable supplement of water .The number of irrigations depends on whether condition and soil texture. Each irrigation is given every 4-5 days in the middle areas and 6-7 days in the northern area.

**-Too little water might lead to:**

Sub-optimum yields. Decrease in the photosynthetic rate. Plants developing stunted growth. No production of flowers. Low percentage of fruit set. Slow fruit development. Small fruit sizes, Poor quality, Flower abortion.

**-Too much water might lead to:**

Not enough oxygen in the soil. Plants may wilt. Root diseases may occur. No plant development .The most critical stages for watering are at transplanting, flowering and fruit development. Several types of irrigation may be used successfully on tomatoes production such as furrow, sprinkler and drip irrigation.

-**Fertilization**: Tomato is a heavy feeder of plant nutrients including nitrogen, phosphorus and potassium and it responds well to organic fertilizers. The amount of fertilizer applied is influenced by fertility status of the soil, season and the cultivar. If the soil is correctly balanced or high in nitrogen, you should use a fertilizer that is slightly lower in nitrogen and higher in phosphorus, such as a 5-10-5 or a 5-10-10 mixed fertilizer. If your soil is slightly lacking in nitrogen, use a balanced fertilizer like8-8-8or10-10-10.Other elements like zinc and boron can be added if it needed.

**-Ripening and harvesting:** Tomato is ripened after 85-150 days according to the varieties and weather conditions. Tomatoes for fresh consumption are harvested from mid-June to late October. It may be harvested at the mature green stage, semi-ripe or fully ripe, depending on market requirements. First pick is usually 2-3 months after sowing and further harvesting is normally every three days.

 **Harvesting Methods:** Hand picking

**Quantity of the yield:** The average of production in Iraq is about 5 ton/donum for the consuming tomato, 6-7 ton/donum for processing and 15-16 ton/donum for the tomatoes grown in plastic house

 **Different fruit have different ripening stages. In tomatoes the ripening stages are:**

* Green: When the surface of the tomato is completely green
* Breaker: When less than 10% of the surface is red
* Turning: When (10- 30%) of the surface is red
* Pink: When (30- 60% )of the surface is red
* Light Red: When (60-90%) of the surface is red
* Red: When the surface is nearly completely red.

 **- Storing:** Store fresh ripe tomatoes in a cool, dark place, stem-side down, and use within a few days, don’t refrigerate. Mature-green tomatoes should be stored at 130C to 210C. Optimum temperatures for ripening are between 18 0C to 210C, while 140C to 160C is most desirable for slowing ripening without increasing decay. Firm ripe fruit can be held as low as 70C to 100C (pink fruit are stored at intermediate temperatures, 10 0C to 150C). Relative humidity in all cases should be 90 to 95%. Mature green fruit can be held 2 to 6 weeks while ripe fruit can only be held 1 week in conventional storage. Controlled atmosphere storage may be used to delay ripening and extend storage life.



