

Tomato Cultivation in GreenhouseDharmendra Bahadur Singh¹, Nimit Singh²**Introduction**

Tomato is widely cultivated for its fleshy fruits that have special nutritive value. It is the world's second-largest vegetable crop following potato, and it is the most canned vegetable. Tomatoes can be eaten raw or processed. It could be processed into paste, tomato ketchup, soup, juice, diced, sauce, puree, etc. It is rich in nutrients, dietary fibre and antioxidants such as lycopene and beta-carotene that prevent cells from cancer. It has high levels of vitamin A and C and some minerals such as iron and phosphorus. Tomato being one of the essential staple foods rich in minerals, carbohydrates, and vitamins is an important vegetable with premium and high processing values as well as a venture with production capacity to generate employment. To achieve food-secured status as a nation, it is therefore pertinent to improve the production of tomatoes in India. Because of their reliance on the climate and natural environment, crop plants are more vulnerable to a variety of risks, including insect and disease infestation and environmental stress from extreme weather.

This can lead to low yields and poor-quality crops. To grow particularly valuable or premium crops like tomatoes, it is increasingly essential to stress the adoption and usage of a protected agricultural system, such as screen houses and greenhouses. Thus, this chapter clarifies the fundamental ideas of tomato cultivation in greenhouses. The cost of growing the same crop in a greenhouse is more than it is in an open field. The most important factors determining costs are depreciation of the structure and equipment, labour, energy, and variable costs such as planting material, substrate, and fertilizer.

Advantages of greenhouse tomato production

1. The controlled atmosphere makes it possible to grow exotic fruits for export, including beefsteak.
2. The ability to control temperatures in a greenhouse enables optimum plant growth.
3. We all know that tomato plants like warm conditions, but warm conditions enable plants to feed regularly.

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4. It is an intensive system that maximizes limited space and water.
 5. Effective use of agrochemicals to manage illnesses and pests.
 6. This will enable you to still be picking tomatoes when plants that were grown outside have long finished.
 7. In a greenhouse, tomato plants are out of the rain, also temperatures won't drop so low at night.
1. Size of fruit desired.
 2. Disease resistance.
 3. Lack of physiological problems, that is, cracking, cat-facing, blossom-end rot.
 4. Uniformity of fruit size.
 5. Market demand.

Disadvantages of greenhouse tomato production

1. It is capital intensive
2. The energy requirement is high
3. Requires technical skills

Selection of variety

Selecting a high-quality variety is the first step towards a successful crop production operation. Your chances of success are lower from the start if you use low-quality seeds or grow a variety that is not the greatest option. Even if it means spending a little less money, it makes sense to start with the best potential rather than limiting oneself by purchasing subpar seeds. Though many tomato varieties are being introduced to the market, only a select number are good for growing in greenhouses. Indeterminate tomato varieties are advised for growers of tomatoes in greenhouses. Indeterminate tomatoes have continuous stem growth, which enables continued fruit production. The selection of the

best indeterminate seed to buy should be based on the following criteria:

1. Size of fruit desired.
2. Disease resistance.
3. Lack of physiological problems, that is, cracking, cat-facing, blossom-end rot.
4. Uniformity of fruit size.
5. Market demand.

Indeterminate varieties-: Pusa Ruby, Best of All (IC- 7466), DT-10, Co-1, Arka Vardan, Arka Vishal, Pant Bahar.

Preparing the Nursery Bed

Tomato seeds are put in nursery beds to grow seedlings for field transplanting. Raised beds with dimensions of 3 x 0.6 m and a height of 10-15 cm have been prepared. Watering, weeding, and other activities are carried out with a 70 cm gap between two beds. The surface of the beds should be smooth and level. On the seedbed, spread sieved FYM and fine sand. Raised beds are required to minimise water logging in thick soils. However, in sandy soils, seeding can be done in flat beds. To reduce seedling mortality due to damping off, soak the seed bed with water first, then add Bavistin (15-20 g/10 litres of water).

Transplanting

When tomato seedlings are between 8 and 10 cm tall, they are frequently transplanted into a greenhouse. Any kind of chosen media or substrate needs to be well moistened with

water or a diluted fertiliser solution several hours before planting. After planting, the plants should be examined for any individuals that do not establish. It will be necessary to alter them. Plants will need to be watered as often as necessary using a diluted fertiliser solution to keep the substrate moist. Maintaining moisture at a level where a few drops of water are sufficient to compact the soil into a clump is a good general rule of thumb.

Irrigation

Water is supplied to the greenhouse by subsurface or surface drip irrigation. When combined with fertiliser, this facilitates effective absorption of both water and nutrients. By reaching the active root zone, water and nutrients are provided, which minimises nutrient loss through soil fixation or leaching. Additionally, the plant's vegetative portion does not come into contact with water, which slows the spread of infection.

Fertilizer application

Fertigation or nutrition are the methods used to deliver nutrients to the greenhouse plants. The terms "nutrient" and "irrigation" are combined to form the acronym "nutrition," much as "fertiliser" and "irrigation" are combined to form "fertigation," which is the process of applying water-soluble fertiliser together with irrigation water. This makes it possible to give nutrients precisely and

frequently, particularly when water is delivered by drip lines. Furthermore, even in cases where the plant is unreachable, the nutrition is still supplied to it. The plant's developmental stage and the findings of the soil test determine which fertiliser should be administered when.

Staking and trellising

Three weeks after transplanting, staking is completed. Cut the rope into lengths of 3 m each so that the top and bottom binding wires are 2.5 m apart. To keep the plant upright, the rope is coiled around the stem and fastened to the top and bottom binding wires. Tie the twine into a loop in the middle to make it taut. The loop is repositioned and coiled around the newly formed shoot as the plant gets taller.

Harvest and storage of tomato fruits

The market that buys greenhouse tomatoes favours tomatoes that are picked pink or at the breaking stage. After being gently removed from the plant, the fruits are put in the basket. After being brought to the sorting room, the baskets are sorted by colour. The red fruits are classified as Grade B, and the pink fruits are designated as Grade A. After being taken out and given a Grade C label, the cracked tomatoes are placed in the cold room for storage.

Conclusions

The tomato is a perishable fruit that can be challenging to preserve. In addition, the abundance of pathogens during the rainy season makes it challenging to cultivate tomatoes. That is the cause of the strong market demand. Greenhouses provide a guaranteed way to grow high-quality tomatoes both in and out of season by offering the perfect climate required for the best possible growth and yield of every tomato variety planted. The chapter facilitates understanding of the principles of greenhouse tomato production for tomato farmers, individuals, and entrepreneurs interested in launching or growing a tomato production company.

