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Protected Cultivation of Tomato (*Solanum lycopersicum*) Under Polyhouse

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Abstract

India is the second largest vegetable producer in the world and Tomatoes are one of the most versatile and consuming vegetable because of its unique nutritive value. To make the cultivation more efficient and successful, controlled and protected cultivation techniques are most suitable solutions. Hence, production of tomato in green house can play a better role in improving quality as well as increase its productivity, which may further lead to get favourable market price to the farmer.

Introduction

Tomato *(Solanum lycopersicum)* belongs to the Solanaceae family. The red fruits are harvested for consumption. It plays an important role in daily life of human beings. Its chromosome number is 2n = 24. It is one of the most important vegetable used in India. It contains vitamin A, vitamin C and antioxidant in high quantity. Because of its unique properties, it is cultivated throughout the year (Chouhan *et al.*, 2018). Tomatoes are used as raw in salads, juices and they are cooked in curries, sauces, ketchup, chutneys, pickles, soups etc. China, India, USA, Turkey, Egypt, Iran, Italy and Spain are the leading producing countries in the world. Its area is about 4.73 million hectares with the production of 163.96 million tonnes in the world (Cheema *et al.,* 2004).

Cultivars

Improved Cultivar

Pant Bahar, Pant T3, Narendra Tomato 1, Narendra Tomato 2, CO-1, CO-2, CO-3, S-12, Arka Saurabh, Arka Vikas, Arka Ashish, Arka Arbha, Arka Alok, Arka Meghal, HS101, HS102, HS110, Hisar Arun, Hisar Lalima, Hisar Lalit, Hisar Anmol, KS.2, Pusa Red Plum, Pusa Early Dwarf, Pusa Ruby, Punjab Chhuhara, PKM 1, Paiyur-1, Shakthi.

Hybrids Cultivar

Pusa Hybrid 1, Pusa Hybrid 2, Arka Abhijit, Arka Shresta, Arka Vishal, Arka Vardan, COTH 1 Hybrid Tomato, MTH 4, Rashmi, Rupali, Naveen, Avinash 2, Sadabahar, Gulmohar, Vaishali and Sonali (Figure 1).

Climate

The Tomato is a warm season crop but usually it is grown in a controlled condition (*i.e.*, polyhouse, greenhouse). Its average temperature is 21 °C to 23 °C for better production. Temperature affects the pigmentation, fruit-set and nutritive value of the fruit.

Figure 1: Cultivation of Tomato under Polyhouse

Figure 2: Tomato Fruits

Soil

The Tomato usually grows in all soil types but Light soils are better for an early crop. For best production soil should be of pH 6.0-7.0. If the soil is acidic in nature lime is required and if the soil is basic in nature gypsum is required.

Seed Rate

300-400 gm seeds per hectare are required for nursery seedlings.

Time of Planting

The Tomato can be grown in any season throughout the year. In the case of Southern plains, the first transplanting is done in December-January, second in June-July and third in September-October depending on the irrigation facilities. In northern plains the Kharif crops are transplanted in July, Rabi crops transplanted in October-November and Zaid crop transplanted in February.

Nursery Propagation

The seeds should be raised in nursery beds, germination trays or seed boxes. The seeds should be thinly drilled in rows 20 cm apart and 1 cm deep.

Field Preparation

The soil should be dug to 1.5 feet deep to loosen the soil. Then the land should be divided into beds of 1 m wide, after that Di-Ammonium Phosphate (DAP) or NPK fertilizers are drop on the top of each bed by sprinkling mildly at the rate of 100-110 gm/m^2.

Spacing

Seedlings are planted at a spacing of (60x45) cm, (60x30) cm or (60x60) cm. Single stem are recommended for narrow spacing and double stem for wider spacing.

Transplanting

Transplanting is done 30 days after germination. The seedlings are supposed to pull up with a cohesive ball of soil with at least 4 to 6 leaves on.

Pruning

- ***De-foliation*** - Too much leaves leads to increase the canopy which may develop in high relative humidity hence more prone to diseases.
- ***De-suckering*** - All suckers are removed by hand.
- ***Truss pruning*** - Any leaves around the fruit cluster is removed immediately when they appear.

Training / Support

It is very important to support Tomato plants to avoid its bending. Its most accurate time is when the crop is 6-7 inches high. And for support, Plastic sling is twiddled around the plant on a weekly basis.

Fertilizer Application

Enrich with CAN or Urea, to enhance the vitality and vigour after its first harvesting. Trenches are made between rows where fertilizer is applied.

Irrigation

Best irrigation method is drip irrigation system that should specially be done in the morning and in the evening.

Pollination

In the field, tomatoes are self-pollinated by the wind. In the greenhouse, the flowers must be lightly shaken to get effective pollination. Daily shaking is necessary, especially during damp and cloudy weather because the pollen does not release well.

Harvesting

Harvesting starts at least 10 weeks after transplanting and when tomatoes have about 10 trusses and each truss with 7-8 fruits.

Yield

Each plant is expected to have at least 20 kg of tomatoes after 8 months.

Insects and Pest

There are many pests of Tomato plant: Aphids, Blister beetles, Cutworms, Flea beetles, Leafhoppers, Spider mites, White fly.

Controls

Spray 5% neem seed kernel extract to kill early stages larvae, Effected plants removed and burned, use of resistant variety.

Disease

Tomato plants can get affected by fungus, bacteria and as well as by viruses. The most important diseases are Bacterial blight, Bacterial spot, Bacterial canker, Anthracnose, Buck eye rot, Damping off, Early blight, Late blight, Powdery mildew, Mosaic etc.

Controls

Crop rotation with non-solanaceous crops, Seed treatment with trichoderma 5-10 gm or carbendazim 2 gm or thirum 3 gm/kg seed.

Conclusion

Tomato production in protected cultivation is way more cheaper and requires less man power. And due to production in protected cultivation there is less chances to get insects, pests, and diseases. Hence, more income can be generated in less input amount by farmers.

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