

TOMATO

B.Sc. (Ag.) II<sup>nd</sup> Sem.

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Tomato

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B.N. : *Lycopersicon esculentum* Mill

Family : Solanaceae

Chromosome No. :  $2n=24$

Origin : Peru of South America

Plant is annual with herbaceous prostrate stem having determinate or indeterminate growth habit. In determinate growth, terminal bud ends in a floral bud and further growth is arrested resulting in dwarf and bushy structure.

Indeterminate growth, terminal bud is a leafy bud and terminal and lateral buds continue to grow and there are less production of flowers and fruits on main stem. Flowers are hermaphrodite. Flower are borne in racemose cyme.

Soil:

Tomato cannot withstand water logging. Hence well drained fairly fertile soil rich in organic matter is preferred. It is moderately tolerant to acid soil having pH 5.5 and ideal pH requirement is 6-7.

Climate:

Tomato is a day neutral warm season crop, which cannot tolerate frost. Optimum temp. is 21-28°C during day and 15-20°C during night. Night temp. is more critical than day temp. Optimum temp. for colour development of fruit is 21-24°C. Development of colouring pigment, will be hampered above 27°C. Seed germination and pollen germination are adversely affected below 10°C.

Seed rate and Sowing time

Seed rate : Open pollinated variety : 400-500 gm/ha

Indeterminate F<sub>2</sub> Hybrids : 125-175 gm/ha

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seed sown in an area of 4-5% (200-240m<sup>2</sup>) will be sufficient to plant one hectare. Four to five weeks old seedlings are used for transplanting. Hardening of seedling is essential for their establishment in main field and is done by withholding irrigation for one week before transplanting.

### Field Preparation & Transplanting:

Seedlings are transplanted on raised beds or on sides ridges. Field is ploughed 4-5 times and raised bed of 80-90 cm width or ridges and furrows are prepared. Spacing depends on the growth habit determinate (60x45 cm) and indeterminate (75x60 cm or 75x75 cm).

### Manure and Fertilizers

Manure and fertilizer recommendation for tomato depends on the growth habit and productivity of variety. In addition 15-20 tonnes of FYM, 100-125 kg N, 50-60 kg P<sub>2</sub>O<sub>5</sub> and 50-60 kg K<sub>2</sub>O are recommended for one hectare and F<sub>1</sub> hybrids is 250 kg : 250 kg : 250 kg NPK/ha.

### Varieties

S.N. 120 (Resi. to nematode), Pusa Utkar, Pusa Sheetal (8°C or below), Pusa Gaurav, Pusa Rohini, Jaski Amrit, Jaski Vishesh, Pant Bahar, Punjab Chuhara, Swarna Naveen (Resi. to bacterial wilt), Arka Vardhan, Arka Abhijit.

### Irrigation:

Furrow irrigation is the most common method in tomato and the crop require adequate moisture throughout growth period. During summer season crop should be irrigated at 3-4 days

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interval. Water stress at flowering stage will adversely effect fruiting and productivity. A long spell of drought followed by heavy irrigation leads to cracking of fruits. Similarly a dry spell after regular irrigation causes blossom end rot.

### Training and Pruning:

All indeterminate varieties are trained with wires strings or stocks to prevent lodging and loss of fruits by coming in contact with soil.

### Plant Growth Regulators:

Plant growth regulators are beneficial for early ~~crop~~ yield. ~~Some of the growth regulators~~ increased fruit set at extreme temperature. Some of the growth regulators found useful in tomato production are GA<sub>1</sub> (5-25 ppm), PCPA (10-20 ppm), DNDA (25-50 ppm) seed treatment and NAA (1000 ppm), PCPA (50 ppm) for foliar spray.

### Harvesting:

The crop starts yielding by 70 days after planting. Usually fruits are harvested with hand by gentle twist so that the stalk is retained on plant. Interval of harvests depend on season and it is twice in a week during summer and weekly during winter and rainy days. Following maturity standards are recognized in tomato;

- Mature green : Harvested for long distance market.
- Turning stage : Harvested for long distance market.
- Pink stage :  $\frac{3}{4}$ <sup>th</sup> of whole fruit surface turns pink colour.  
Harvested for local market.
- Light Red : Harvested for local market.
- Red ripe : Fully ripened and coloured. Harvested for processing and for seed extraction.

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### Yield:

Open pollinated varieties : 20-25 t/ha

F<sub>1</sub> hybrids : 50 t/ha

### Physiological Disorders:

#### Fruit Cracking ⇒

Fruit cracking is caused both by genetic and environmental factors. Following four types of cracking are noticed tomato:

- Radial Cracking: Usually seen at ripe stage and crack radiate from pedicel end to styler end.
- Concentric cracking: Seen around shoulder of fruit even at green stage.
- Cuticular: Seen on outer skin of fruit.
- Burst: Burst occurs at certain points on shoulder of fruits

Radial and concentric cracking are more common of which former is more damaging. A long spell of drought followed by sudden heavy irrigation may cause cracking. Deficiency of calcium also causes this disorder. Balanced irrigation cultural practices to conserve soil moisture and spraying of 0.5% calcium chloride at fruit development stage are recommended for control of blossom end rot.

- Sun scald: Due to extreme heat, tissues on exposed fruit development a blistered appearance leading to sunken areas, which have a light or grey colour on green fruit and yellow colour on red fruit. Fruit are shaded and

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incidence of sun scald is less.

### Diseases of Tomato

- Damping off (*Pythium aphanidermatum*): Damping off occurs in two stages, i.e. the pre-emergence and post-emergence phase. In the pre-emergence phase the seedlings are killed just before they reach the soil surface. The young radical and the plumule are killed and there is complete rotting of the seedling. The post-emergence phase is characterized by the infection of young, ~~primary~~ juvenile tissues of the collar at ground level.

Drench with copper oxychloride 0.2% or Bordeaux mixture 1%. Seed treatment with fungal culture Thiram 3g/kg seed and spray 0.2% Metalaxyl.

- Fusarium Wilt (*Fusarium oxysporum* f. sp. *lycopersici*):

The first symptom of the disease is clearing of the veins and chlorosis of the leaves. The younger leaves may die in succession and the entire plant may wilt and die in a course of few days.

The affected plants should be removed and destroyed.

Spot drench with Carbendazim (0.1%). Crop rotation with a non-host crop such as cereals.

- Early Blight (*Alternaria solani*):

Early blight is first observed on the plants as small, black lesions mostly on the older foliage. Tissue surrounding the spots may turn yellow.

spray the crop with Mancozeb 0.2% for effective disease control.

- Leaf curl of Tomato leaf curl Virus (ToLCV)

Leaf curl is characterized by severe stunting of the plants with downward rolling and crinkling of the leaves. The newly emerging leaves exhibit slight yellow colouration and later they also

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- show curling symptoms.

Protected nursery in net house or green house. Spray Dimethoate 0.05% @ 15, 25, 45 days after transplanting to control vector.

### Pest of Tomato:

More than 80% of the fruit get damaged under severe infestation of fruit borer and fruit sucking moth. Whitefly and thrips act as vector for certain viral disease, which cause considerable yield reduction.

- Fruit borer (*Helicoverpa armigera*):

Single caterpillar can destroy 2-8 fruits. Collect and destroy the infected fruits and grown up larvae. Grow resistant variety like BT-1, Punjab Kestri, Pant Bahar and Azad Pusa hybrid-4. Spray ~~with~~ Carbaryl 50 WP 1 kg with 500 L. water per hectare.

- Thrips (*T. tabaci*):

Vector of tomato spotted wilt virus. Lacerate leaf tissue and leaves become spotted and pale. Feeds on flowers resulting in pre-mature dropping of flowers and also cause bud necrosis. spray with monocrotophos 0.05% solution.

- Whitefly (*Bemisia tabaci*): It is a vector of leaf curl virus. Spray of Novaluron 10EC 750 ml with 500 litre/hectare.

- Fruit sucking moth: Adult suck the juice of fruits by piercing. Infected fruits will shrink, rot and ultimately drop, causing direct loss to harvestable produce. Spray Carbaryl 50 WP 1 kg with 500 litre/hectare.

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