

Quality Seed Production of Tomato (*Lycopersicon esculentum*)

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Due to increasing population the demand for quality food is also increasing. Hence, scientists and researcher are working for new and better ideas of quality seed production. Seed production is not only a regular tactic for the production of seeds but it's consisting of numerous standards as prescribed by the central seed committee of India. For a successful production, seed is the most essential component. Therefore, maintaining the seed purity and seed standards throughout the stages of seed production is necessary. Seed production has gained importance in the recent years due to huge demand of good quality seed, for production of new varieties, for hybrid seeds and for better availability of seed. Tomato is one of the most important vegetable crops know as golden apple grown extensively in India. Tomato is the important vegetables of Solanaceae family. It can be cultivated all year long throughout India except higher altitudes. India is the world's second-largest producer of tomato after China. Tomato is mainly grown for fresh market and to a little extent for processing. Increased attention is now being bestowed to production of tomato. Production of tomato can be maximized further if improved cultural practices are combined with good quality seeds.

Botany

Tomato is a self-pollinated crop with chromosome number ($2n=24$). Tomato is a day neutral, annual with herbaceous prostrate stem having determinate or indeterminate growth habit. In the determinate growth, terminal bud ends in a floral bud and further growth in arrested resulting in dwarf and bushy stature. While in the 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 mains stem. Flowers are borne in racemose cyme. Flowers are hermaphrodite, pendulous, pentamerous and hypogenous. Stamens are six in number It requires temperature of 15-20° C for fruit setting.



Procedure of Quality Seed Production

Method of seed production: Seed to Seed.

Seed Production Stages: Breeder seed - Foundation Seed I - Foundation Seed II - Certified Seed

Field Selection and Preparation:

- Produce quality and quantity depends on the field selected for the cultivation of tomato seeds.
- Field with good drainage should be recommended to minimize the water logging.
- The soil of the selected field should have a fine tilth with pH value ranges from 6.0 to 6.8.
- Selected land for tomato seed production is very important where the previous crop should not be the same variety to avoid the contamination due to the volunteer plants.
- Selected field should not continuously grow same family (solanaceous) crops for the previous three to four years.

Season: May - June and November - December

Seed Selection and Treatment: The quality seed begins with seed selection. Seeds should be free from disease and pest infestation. To protect the crop from seed-borne diseases seed treatment is necessary. Seed treatment with *Trichoderma viride* @ 4g/ 1kg of seeds prior to sowing will eradicate all disease-causing microbes and boost seed vigour.

Seed Rate:

1. **Varieties:** 300- 400 g/ha
2. **Hybrids:** Male parent 25 g/ha; Female parent 100 g/ha.

Nursery Preparation and Sowing

Seedling Raising Techniques in Portrays:

Portrays must be filled with growing media (cocopeat, vermiculite and perlite in the ratio of 3:1:1). One-two seed should be planted per cell, followed by covering the seed with growing media. Coco peat having 300–400% moisture to minimize irrigation immediately after seeding and to maximize germination and plant stand.



Transplanting: Seedling are ready for transplanting when they are 20-25 days old, preferably at evening time. Seedling should attain 12 and 15 cm tall at the time of transplanting.

Planting Distances:

- 60 x 45 cm
- 90 x 60 cm for female parent and
- 60 x 45 cm for male parent

Nutrient Management: After preparation of a field to fine tilth, apply 25 tons of FYM per ha. Apply 100: 100: 100 Kg of NPK/ha.

Weed management

- **Soil Solarization:** Polyethylene film with a thickness of 50 to 100 microns is used and it is quite effective for the control of weed growth (Yaduraju, 1997).
- **Mulching:** Black silver LDPE of 25-30 micron is most frequently used for weed control.

Irrigation: The most efficient and effective drip irrigation is used. It is extremely important to irrigate plants during the flowering and fruit-setting stage.

Roguing: It is key practice to maintain the genetic purity. Field are examined and off types plants are removed

Plant Protection:

Tomato	Botanical Names	Symptoms	Control
Damping off	<i>Pythium ultimum</i>	Most serious in nursery stage due to water logged condition.	Seed treatment with cerason @2g/kg
Bacterial wilt	<i>Pseudomonas solanacerum</i>	Lower leaf drops before wilting. Plant with stunted growth with yellow leaves.	Use resistant varieties (Arka abha, Arka alok) and Crop rotation
Early blight	<i>Alternaria solani</i>	Circular angular brown spots on levaeas, stem and fruit	Seed treatment in hot water @ 52-55 ⁰ C.

Field Inspection:

A minimum of three field inspections is followed by the Seed Certification Officer namely:

- **At vegetative stage:** to cross check Isolation distance maintained, to check if any presence of volunteer plants and diseased pants based on the physical appearance.
- **At Flowering Stage:** The off-types are identified based on the flower colour and shape. The off types are roughed off.
- **At Fruiting Stage:** The off-types are identified based on the fruit colour and shape. The deformed or malformed fruit are removed. Third inspection at maturity stage performed to estimate yield.

Specific requirements:

Factors	Foundation	Certified
Off types- variety	0.1%	0.2%
Hybrid	0.01%	0.05%
Plants affected by seed borne diseases	0.1%	0.5%

Seed standard:

Factors	Foundation	Certified
Pure seed (minimum)	98%	98%
Inert matter (maximum)	2%	2%
Other crop seeds (maxi) 5/kg	5/kg	10/kg
Weed seeds (maximum)	None	None
Germination (minimum)	70%	70%
Moisture (maximum)	8%	8%
For VP container	6%	6%

Harvesting: For seed production fruits usually harvested when they turned bright red in colour.

Stages of maturation: Mature green—Breaker—Turning—Pink—Red--Dark red / over ripe

Seed extraction and processing: The fruits from in between 7-8 harvest are used for seed extraction. The seed viability is depends on the method of seed extraction used hence, it is more important to choose proper methods of seed extraction. Before seed extraction, the fruits are to be graded for true to type and selection of medium to large size fruits for getting higher recovery of quality seeds. The best method of seed extraction is acid method.

Acid method of seed extraction:

- The fruits are to be crushed and pulp and taken in a plastic containers (or) cement tank.
- Then add 30 ml of Hydrochloric acid per kg of pulp, stir well and allow it for ½ hour.

- Pulp must be stirred well for one or two times. This facilitates the separation of seed and pulp.
- After ½ hour, the seeds will settle down at the bottom and then the floating fraction is to be removed.
- The collected seeds should be washed with water for three or four times.

NOTE: In acid method of seed extraction, use only plastic or stainless-steel containers or cement tank. Care must be taken to avoid the usage of iron or zinc containers, which will affect the viability potential of the seeds and as well damage to the containers due to chemical reaction with acid.



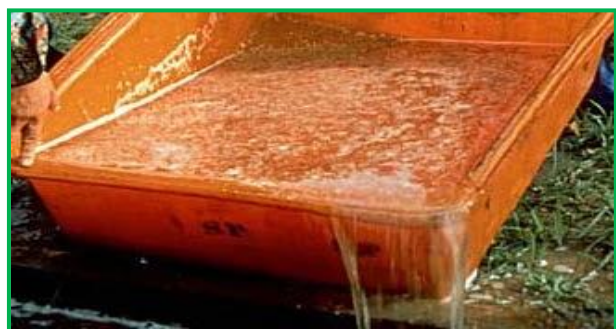
Mechanical Crushing



Extracted seed



Acid treatment



Washing of seeds

Drying and grading: Seeds should be shade dried, and never dry in the hot sun. The seeds are dried to 8 to 9 per cent. Seeds can be graded using 6/64" round perforated sieve.

Storage: The seeds can be stored for 15 months in moisture vapour pervious containers, while it can be stored in moisture vapour proof containers for 30 months.

Conclusion

Quality seed production is the main aim of researcher and scientists, mainly because most of seeds produced are prone to pest and diseases. A seed production is not successful until the seed purity, seed quality and seed standards are maintained. To fulfil the demands of quality production of seeds supervision of seed certification agency, seed certificate officers and seed inspectors is necessary along with advance technology of seed storage and packaging.

References

1. Selvakumar.R. (2022). A Text book of Glaustas olericulture. New vishal publications, New Delhi-110008
2. Yaduraju, N.T. (1997). Soil Solarization - A novel method of weed control. Division of Agronomy, IARI, New Delhi-110012, India.