



## Seed production technology in tomato

Shivangi Negi<sup>1</sup> and Priyanka Bijalwan<sup>2</sup>

<sup>1</sup>Department of Seed Science and Technology, Acharya Narendra Deva University of Agriculture and Technology, Kumarganj, Ayodhya (U.P.) India

<sup>2</sup>Department of Vegetable Science, Dr. Y.S. Parmar University of Horticulture and Forestry Nauni, Solan (H.P.) India  
(Email : [shivanginegi002@gmail.com](mailto:shivanginegi002@gmail.com))

Botanical name : *Solanum lycopersicum* L.

Family : Solanaceae

Origin : Peru South America

Method of seed production : Seed to seed.

**Stages of seed production:** Breeder seed - Foundation seed I - Foundation seed II - Certified seed

**Varieties: Indeterminate varieties:** Pusa Ruby, Solan Gola, Yaswant (A-2), Sioux, Marglobe, Naveen, Ptom-9301, Shalimar-1, Shalimar-2, Angurlata, Solan Bajr, Solan Sagun, Arka Vikas, Arita Saurbh.

**Determinate varieties:** Roma (EC-13513), Rupali, MTH-15, Ptom-18, VL-1, VL-2, HS 101, HS 102, HS 110, Pusa Early Dwarf, Pusa Sheetal, Floradade, Arka Meghli, Co.1, Co.2, Co.3 (Marutham), PKM.1, Py1,

**Hybrids:** COTH-1, Pant Hybrid-2, Pant Hybrid-10, Kt-4, Pusa Hybrid-1-4, Arka Shreshta, Arka Vardan, Arka Abhijit, Navell 1 and 2 (Sandoz), Rupali, Sonali, MTH 6.

**Season:** May - June and November - December

**Land requirement:** Selection of suitable land for tomato seed production is important where the previous crop should not be the same variety to avoid the contamination due to the volunteer plants.

**Isolation requirement:** For seed production of tomato, varieties require minimum of 50 M for foundation seed and 25 M for certified seed. For hybrid seed production, it requires minimum of 200 M for foundation (parental line increase) and 100 M for certified hybrid seeds.

**Seed rate:**

– Varieties - 300- 400 g/ha

– For *F<sub>1</sub>* hybrid - Male parent 25 g/ha, Female parent 100 g/ha.

**Nursery:** Sow the seeds in raised nursery bed of 20 cm height, in rows of 5 cm gap and covered with sand. Eight and ten nursery beds will be sufficient to transplant one acre. Apply 2 kg of DAP 10 days before pulling out of seedling.

**Transplanting:** Transplanting should be done with the seedlings are 20-25 days old, preferably at evening time.

Spacing is 60 x 45 cm (90 x 60 cm for female parent and 60 x 45 cm for male parent of hybrids).

**Manuring:** After thorough preparation of a field to fine tilth, apply 25 tons of FYM per ha. Apply 100 : 100: 100 Kg of NPK/ha of which, 50 per cent of the N is applied as

**Roguing:** The roguing should be done based on the plant characters (determinate/indeterminate), leaf, branching and spreading characters and also based on fruit size, shape and colour. The plants affected by early blight, leaf spot and mosaic (TMV) diseases should be removed from the seed production field.

**Planting ratio:** For hybrid seed production, the female and male parents are normally planted in the ratio of 12:1 or 12:2.

**Harvesting seed extraction and processing:** The fruits are harvested after full maturity of the fruit when turn in to red colour fruits from first and last one or two harvests should not be used for seed extraction.

**Stages of maturation:** Mature green, breaker, turning, pink, red, dark red/over ripe. The fruits from in between 6-7 harvest should be used for seed extraction. The seed viability is depends on the method on which the seeds were extracted and 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 acid method of seed extraction is the best method for tomato seed extraction. In this method, the fruits are to be crushed into pulp and taken in a plastic containers (or) cement tank. And then add 30 ml of commercial Hydrochloric acid per kg of pulp, stir well and allow it for ½ hour. In between this duration the pulp may 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. While following acid method we must 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. For large scale seed extraction we can use the tomato seed extractor developed by Tamil Nadu Agricultural University. The

seeds extracted by this machine may again be treated with commercial Hydrochloric acid @ 2-3 ml/kg seed with equal volume of water for 3-5 minutes with constant stirring. And then seed should be washed with water for to four times. It is easy to dry the seeds extracted by acid method and also remove the fungus growth over the seed coat, thus seeds possess golden yellow colour and high vigour. The seed extracted by fermentation method posses



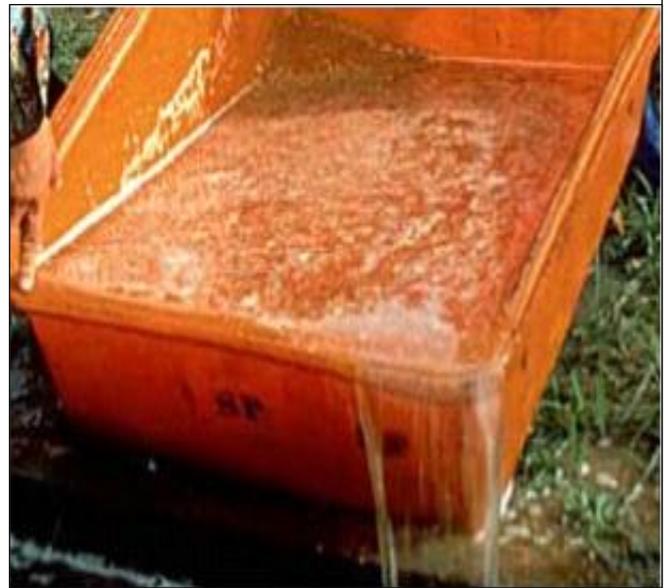
Mechanical crushing



Extracted seed



Acid treatment



Washing of seeds

Acid seed extraction

poor vigour and off colour due to fungal activity.

**Drying and grading:** Seeds are to be dried in the shade. It should never be dried in hot sun. The safe moisture content of the seed for grading is 8 to 9 per cent. Seeds can be graded using 6/64” round perforated sieve.

**Storage:** The seeds dried to safe moisture content after treating either with captan or thiram @ 2 g/kg can be stored for 15 months in moisture vapour pervious containers, while it can be stored in moisture vapour proof containers for 30 months.



Manual crushing



Fermentation



Washing



Extracted seed

**Fermentation method**

Comparison of different seed extraction methods			
Method	Fermentation	Acid	Alkali
	Mix fruit pulp with water -24-48 h	HCl@ 10ml/kg of pulp-20-30 minutes	Washing soda @900mg/4l of water-equal volume-overnight soak
Salient features	<ul style="list-style-type: none"> <li>• Low cast</li> <li>• Unskilled labour</li> <li>• More time taken</li> <li>• Low seed recovery (0.5 to 0.6%)</li> <li>• Dull seed colour</li> <li>• Seed.. borne.. pathogens</li> </ul>	<ul style="list-style-type: none"> <li>• Cost is more</li> <li>• Skilled labour</li> <li>• Lesser time</li> <li>• High seed recovery (0.8 to 1%)</li> <li>• Bright colour market value higher</li> <li>• Seed borne pathogen- removed</li> <li>• Improper washing leads to injury to seeds</li> </ul>	<ul style="list-style-type: none"> <li>• Recovery 0.7 to 0.8 per cent</li> <li>• Luster of the seed will be lost</li> <li>• Improper washing leads to injury to seeds</li> </ul>

**Hybrid seed production:** In tomato the hybrid seed production is normally done by ‘Emasculation and Hand Pollination’. However use of chemical hybridizing agents (MH-1000 ppm) or CMS lines are also practiced.

**Emasculation and dusting:**

– Emasculation is done before the anthers are mature and the stigma has become receptive to minimize accidental self pollination.

– Thus, emasculation is generally done in the evening, between 4 PM and 6 PM one day before the anthers are expected to dehisce or mature and the stigma is likely to become fully receptive.

– Emasculate the bud by hand with the help of needle and forceps. Remove the calyx, corolla and staminal column or anthers, leaving gynoecium *i.e.*, stigma and style intact in the flower.

– Emasculated flowers should be covered immediately with red coloured paper cover to protect against contamination from foreign pollen and also for easy identification of emasculated bud during dusting.

– Remove the red paper cover of the emasculated bud and dust the pollen gently over the stigmatic surface using cotton or camel brush, etc.

– After dusting, the emasculated flowers are again covered with white or other coloured paper cover for two to three days.

– Pollen collected from

one male flower can be used for dusting 5 to 7 emasculated flowers.

**Seed yield:** 100 -120 kg/ha

**Seed certification:** *Number of inspections:* A minimum of three inspections shall be made as follows:

– The first inspection shall be made before flowering on order to verify isolation, volunteer plants and other



Selection of flower



Removal of anther cone



Removal of corolla



Emasculated flower



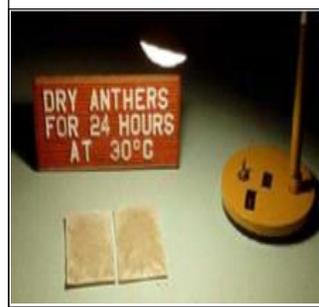
Dusting of pollen



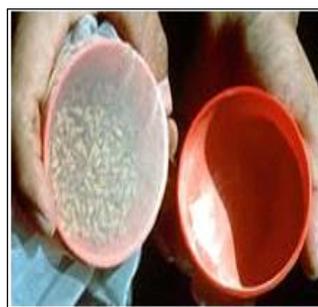
Male flower



Collected flower



Drying of flower



Collection of pollen I



Collection of pollen II



Pollen for hybrid crosses

**Pollen collection**

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

relevant factors,

– The second inspection shall be made during flowering to check isolation, offtypes and other relevant factors

– The third inspection shall be made at maturity and prior to harvesting to verify true nature of plant and other relevant factors.

*Received : 04.03.2020*

*Revised : 01.04.2020*

*Accepted : 01.05.2020*

RNI : UPENG/2008/24310 An International Research Journal ISSN : 0974-2662  
Accredited By NAAS : NAAS Rating : 4.43

# INTERNATIONAL JOURNAL OF AGRICULTURAL ENGINEERING

Visit : [www.hindagrihorticulturalsociety.co.in](http://www.hindagrihorticulturalsociety.co.in)

RNI : UPENG/2006/18360 ISSN: 0973-4899  
Accredited By NAAS : NAAS Rating : 3.54

# ASIAN JOURNAL OF BIO SCIENCE

An International Research Journal Visit : .....[www.researchjournal.co.in](http://www.researchjournal.co.in)