

## *Tomato Production Technology*

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## Introduction

- ❖ Tomato (*Lycopersicon esculentum*) belongs to the genus *Lycopersicon* under Solanaceae family.
- ❖ Tomato is a native to Peruvian and Mexican region. Though there are no definite records of when and how it came to India , the Portuguese perhaps introduced it to India.
- ❖ Tomato is one of the most important "protective foods" because of its special nutritive value.
- ❖ Tomatoes are used for soup, salad, pickles, ketchup, puree, sauces and in many other ways It is also used as a salad vegetable.
- ❖ Tomato is the world's largest vegetable crop after potato and sweet potato, but it tops the list of canned vegetables.



## Climatic

- ❖ Requirement The tomato is a warm-season crop.
- ❖ The crop does well under an average monthly temperature of 21\* C to 23\* C.
- ❖ Temperature and light intensity affect the fruit-set, pigmentation and nutritive value of the fruit.
- ❖ Long dry spell and heavy rainfall both shows detrimental effect on growth and fruiting

## Soils

- ❖ The tomato grows on practically all soils from light sandy to heavy clay.
- ❖ Light soils are good for an early crop, while clay loam and silt-loam soils are well suited for heavy yields.
- ❖ Tomatoes do best in a soil that has a soil reaction from pH 6.0 to 7.0. If the soil is acidic liming is required.



## Seed rate

- ❖ For raising the seedlings in nursery bed 300 - 400 g/ha seeds are required.
- ❖ Hybrid seeds are very costly so it should be sown in plastic cups or ice cube tray, which require only 70-90 g

## Spacing

- ❖ The spacing recommended for the autumn-winter crop is 75 x 60 cm and for the springsummer crop 75 x 45 cm.

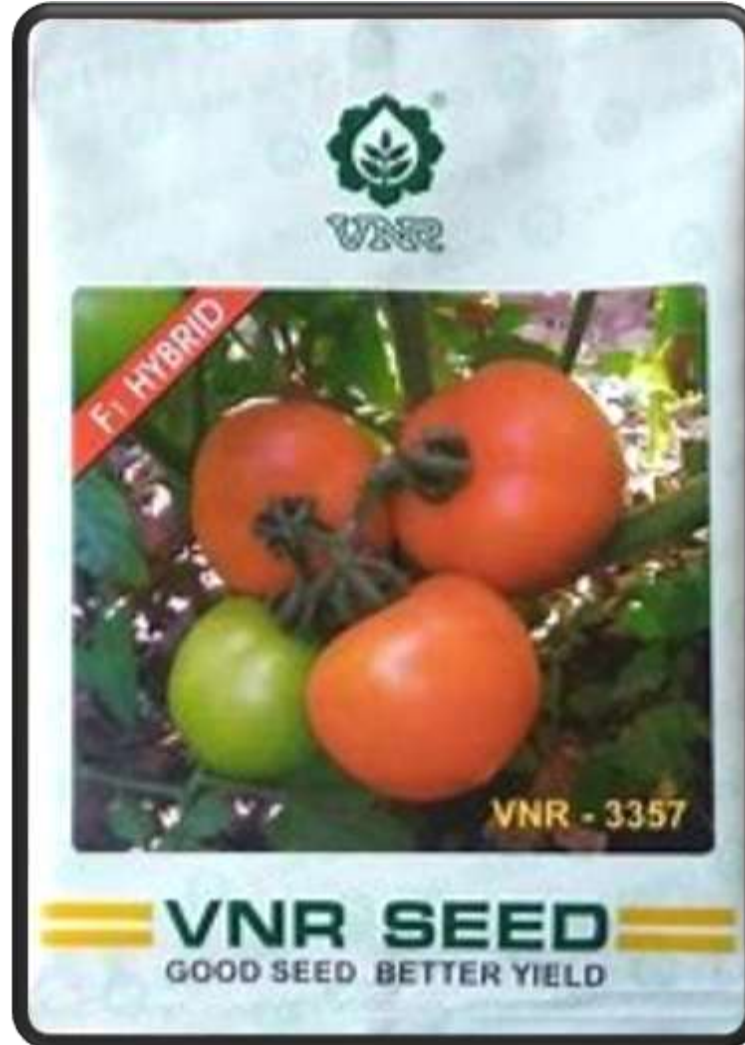
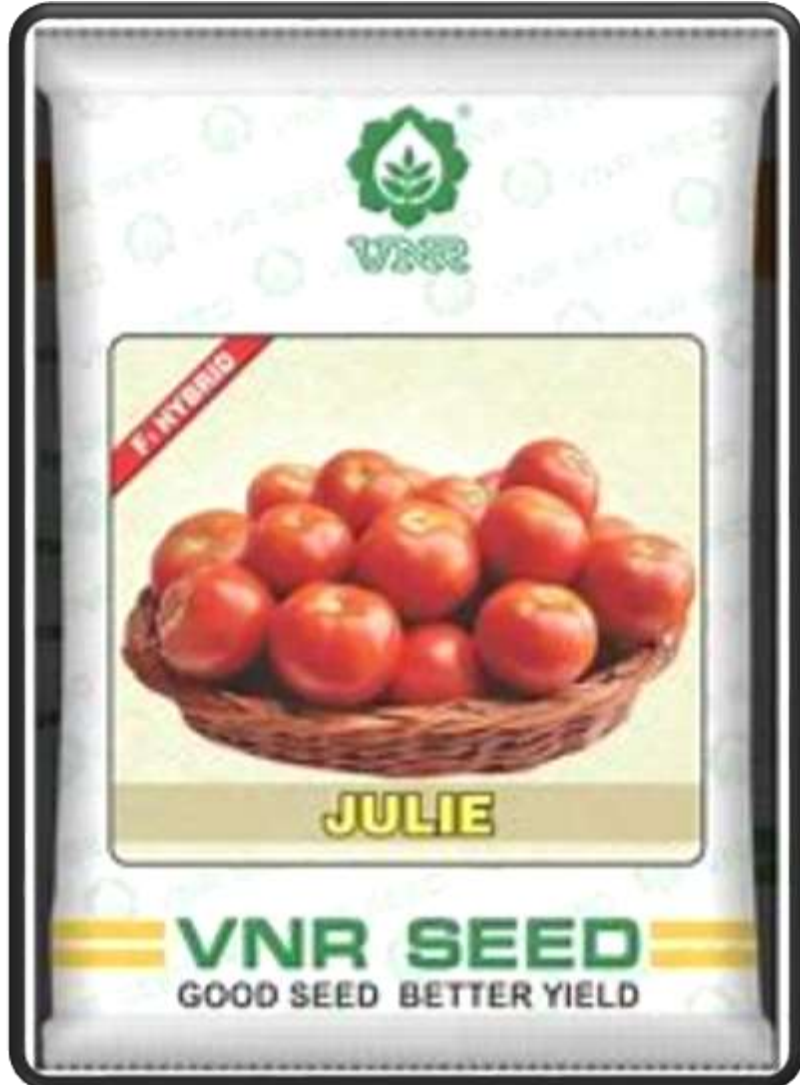
## Time of planting

- ❖ Tomato is a day neutral plant so widely it found grown in any season.
- ❖ In the northern plains three crops are taken but in frost affected area rabi crop is not fruitful.
- ❖ The kharif crop is transplanted in July, rabi crop in October - November and zaid crop in February months.
- ❖ In the southern plains where there is no danger of frost, The first transplanting is done in December-January, Second June-July Third in September-October depending on the irrigation facilities available





# High producing Hybrids



## Raising seedlings

- ❖ Seedlings are grown before one month of transplanting raised beds of 60-100 cm width and of convenient length.
- ❖ Soil solarization of nursery bed by covering them with white transparent polythene sheet for one month should be done in hot summer months. It will kill the disease causing organisms like fungus, bacteria, nematode as well as insects and seeds of weeds.
- ❖ For one sqm. of nursery area apply 5kg well rotten FYM and 20 g of each N, P and K fertiliser, and also apply 2.5g carbofuran or 200 g of neem cake and 10-25 g trichoderma.
- ❖ While preparing the nursery beds, neem cake /castor cake/ neem leaf/ castor leaf/ pongamia leaf/ calotropis leaf has to be incorporated @ 400 g/m<sup>2</sup> for protection against nematodes.
- ❖ After sowing the seeds, mulch with green leaves and irrigate with a rose-can daily in the morning. Remove the mulch immediately after germination of the seeds. Restrict irrigation one week before transplanting and irrigate heavily on the previous day of transplanting.
- ❖ Cover the nursery bed with fine nylon net to escape the damage by virus transmitting insects.



## Seed treatment

- ❖ To avoid damping off disease treats the seed with Tricoderma @ 5-10 g/Kg seed or carbendazim 2g/Kg seed.
- ❖ The treated seeds are dried in shade for 30 minutes and then sown sparsely along the lines in ½ cm depth and then covered by the topsoil

## Land preparation

Land is prepared to a fine tilth by thorough ploughing or digging 2 - 3 times. At the last ploughing organic manure and 10 kg carbofuran granules or 200 kg neem cake has to be applied

## Manuring and Fertilizers

- ❖ Apply well rotten farm yard manure / compost @ 8-10 t/acre at the time of land preparation and mix well with the soil.
- ❖ A fertilizer dose of 75:40:25 kg N:P<sub>2</sub>O<sub>5</sub>:K<sub>2</sub>O / ha may be given. Half the dose of nitrogen, full phosphorus and half of potash may be applied as basal before transplanting. One fourth of nitrogen and half of potash may be applied 20-30 days after planting. The remaining quantity may be applied two months after planting.

## Transplanting

- ❖ The transplanting is done in small flat beds or in shallow furrow depending upon the availability of irrigation.
- ❖ In heavy soil it is usually transplanted on ridges and during the rains also it is advantageous to plant the seedlings on ridges.
- ❖ For indeterminate varieties/hybrids, the seedlings have to be staked using bamboo sticks of two meter length or planted in broad ridge of 90 cm width and 15 cm height.
- ❖ The seedlings are planted in the furrows at a spacing of 30 cm and the plant is allowed to spread on the broad ridge

## Irrigation

- ❖ Tomatoes need very careful irrigation that is just sufficient water at the right time.
- ❖ It is necessary to maintain an even moisture supply.
- ❖ During summer season, irrigation at every 5 to 7 days interval is necessary, whereas in winter 10 to 15 days interval is sufficient.
- ❖ A period of drought followed by sudden heavy watering during the fruiting period may cause cracking of fruits.





## Weed Control

- ❖ There is need of light hoeing during first four weeks in the field which encourage the growth but also remove the weeds from the field.
- ❖ The surface soil is loosened 4 by hand hoeing as soon as it is dry enough after every irrigation or shower.
- ❖ All weeds should also be removed in this process.
- ❖ Mulching with straw, black polythene and many other materials has been found beneficial in moisture conservation, in controlling weeds and some diseases.

## Gram pod borer

C.O.- *Heliothis armigera*

- ❖ It is a polyphagous, attacks most of the cultivated crops, major pest of tomato, and widely distributed throughout the country.
- ❖ Young larvae feed on tender foliage, while advanced stages attack the fruits. Larva bore circular holes in fruits.
- ❖ Control by spraying of chlorantaniliprole (coragen) or Flubendiamide (fame) Cyfluthin (Solomon) or Lambda-cyhalothrin or Chlorfluazuron etc. containing chemicals.



## Serpentine leaf miner

C.O.- *Liriomyza trifolii*

- ❖ It is a polyphagous in nature very widely distributed throughout the India.
- ❖ Maggot mines into the leaf and feeds on the mesophyll of the leaves making serpentine mines/galleries.
- ❖ Leaf Miner – Flonicamid 50% (Ulala 0.5 g/l) or Viraat (Cypentime 3% + Quinalphos 20%) 1.0 ml/l or Phoskill (Monocrotophos 36%), 2.0 ml/l or Badge (1.0 ml/l, Cuproflix 3.0-4.0 g/l & Unilax 2.0. Cypermethin



## Tobacco caterpillar

*Spodoptera litura*

- ❖ It is also polyphagous in nature, major pest of tomato, distributed widely.
- ❖ Freshly hatched larvae feed gregariously, scraping the leaves from ventral side, later stages, feed voraciously at night on the foliage.
- ❖ Larvae may also feed on fruits hollowing these out.



## Root-Knot Nematode

*Meloidogyne spp.*

- ❖ This nematode has wide host range, widespread all over India, affects most of the vegetable crops, often tomato, brinjal, okra.
- ❖ Root-knot nematodes are small, microscopic, males are slender and females swollen.
- ❖ The most characteristic symptom on the root is production of root galls.
- ❖ Above ground symptoms are reduced growth, chlorosis of foliage, susceptibility to wilting, and reduced fruit production





## Insects Management

- ❖ Two rows of marigold for every 16 rows of tomato can be grown as a trap crop. Marigold flowers attract egg laying of *H. armigera*.
- ❖ Spray 5% neem seed kernel extract to kill early stages larvae.
- ❖ Placement of 15-20 bird perches (T shaped) per ha helps in inviting insectivorous birds.
- ❖ Spray NPV @ 625 LE/ha during evening hours.
- ❖ Jaggery @ 1 kg, sandovit or Teepol(100 ml) are to be mixed with NPV on need basis spray 2 ml Endosulfan, Chlorpyrifos or Quinolphos per litre of water.
- ❖ Application of chopped leaves of Pongamia or Crotalaria reduces disease severity caused by nematode.
- ❖ Farmers of the Andhra Pradesh uses garlic+ chilly extract and slurry of cow dung + urine for protection against pest and diseases.



## Disease

- ❖ Tomato is attacked vast range of fungus, bacteria and viruses.
- ❖ The most common diseases are anthracnose, bacterial spot, bacterial blight, bacterial canker, buck eye rot, damping off, early blight , fusarium blight, late blight, leaf curl, mosaic, powdery mildew, rots, and septorial leaf blight.
- ❖ Few major disease are discussed below. Bacterial Wilt *Pseudomonas solanacearum* Deadly disease of tomato. Wilting, stunting, yellowing of the foliage and finally collapse of the entire plant are the characteristic symptoms of the disease. The lower leaves may droop first before wilting occurs



## Early Blight

*Alternaria solani*

- ❖ Common disease of tomato occurring all over India.
- ❖ The characteristic leaf spots and blight first becomes visible as small, isolated, scattered pale brown spots on the leaf which later on also develop on stem and fruits.
- ❖ Fully developed spots are irregular, brown to dark brown in colour, and with concentric rings inside the spot.
- ❖ In severe attacks the entire plant may be defoliated.
- ❖ Damping Off *Pythium aphanidermatum*, *Rhizoctonia solani* Common in many parts of India, Occurring in nurseries of Tomato, Tobacco, Chillies, Cabbage, Cauliflower, Brinjal and Cucurbits.
- ❖ Young seedlings are killed before they emerge through the soil surface or collar region of grownup plants get rotten and toppling of small plants are seen in nursery bed



## Wilt Fusarium

*oxysporum f.sp. Lycopersici*

- ❖ It is a worst disease of tomato occurring all over India.
- ❖ First symptoms appear as chlorosis of the leaf.
- ❖ Soon the petiole and leaves droop and wilt.
- ❖ When plant roots and basal stems are split open dark brown or black discoloration of the vascular tissues may be seen.



## Tomato Mosaic

Tobacco mosaic virus,

- ❖ Cucumber mosaic virus The common symptom of mosaic is mottling of the leaves.
- ❖ The normal green colour of the leaf is interspersed with light green to pale yellow islands of irregular patches.
- ❖ The edges of the leaf turn downward and are stiffer than those of a healthy leaf





## **Powdery Mildew**

*Leveillula taurica*

- ❖ A light powdery covering of the lesions may occur on the lower surface.
- ❖ Heavily infected leaves die but seldom drop from the plant.



## **Septoria Leaf Blight**

*Septoria lycopersici*

- ❖ It is a Major disease of tomato throughout India.
- ❖ In young plants numerous spots appear on older leaves or on plants with poor growth.
- ❖ Small, circular spots are first observed as water soaked areas on the under surface of the lower leaves. As the spots enlarge, they develop dark brown marking and sunken, white or grey centers.



## Black mold rot

*Alternaria alternata*,

- ❖ *Stemphylium botryosum* Sunken or slightly flattened lesions with water soaked in appearance occurs on fruits.
- ❖ Soon these lesion become brown to black in colour.
- ❖ Tomato fruits coming in contact with the soil are attacked by soil-borne fungi causing rotting of the fruits.

## Disease Management

- ❖ Soil solarization or partial sterilisation of the soil by burning trash on the surface.
- ❖ Seed treatment with trichoderma 5-10g or carbendazim 2g or thirum 3 g/Kg seed.
- ❖ Field sanitation.
- ❖ Crop rotation with non-solanaceous.
- ❖ Providing better drainage, forming raised beds.
- ❖ Uproot the heavily infected or virus infected plants.
- ❖ Sanitation and crop rotation reduces the disease incidence.
- ❖ Spraying the plants with a mixture of Streptocycline 200 ppm and Copper oxychloride 3g per litre of water gives fairly good control of the disease.





**VNR SEED**  
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