ORGANIC TOMATO CULTIVATION PRACTISES

ICCOA
Tomato Growing:
Rainfall, soil and sowing time

- Optimum rainfall - between 60-150 cm. Very high rainfall during growth period is harmful.
- Well drained sandy loam soil with pH 6-7 is ideal.
- Sowing time: Jun-Jul or Nov-Dec
- Seed rate: Hybrids 40-50 gm/ac. Open pollinated seeds- 150-160 gm/ac
Tomato sowing in open field nursery

• Prepare **raised beds**. 1m X 3m size with 20cm height.

• **Bed Treatment**: Take 100gm each of Azotobacter, Azospirillum, PSB, K-mobilizing bacteria, Trichoderma and Pseudomonas and mix with 50 kg of compost and moisten it. Let compost mature for 3-5 days.

• Mix this compost with soil in the raised bed @ 3 to 4 kg/Sq metre area.

• **Seedling treatment**: Mix 200 gm each of Azotobacter, Trichoderma and Pseudomonas in 10 lit water. Dip seedlings in this solution for one hour. Then sow the seeds and cover with soil and compost. Water the bed with rose can daily.
Shade-net protected Nursery

Seed treatment and preparation of nursery medium.

**Preparation of growing media:**
1 part virgin loam soil + 1 part sand + vermicompost 2 parts + rice husk or cocopeat 1 part. Mix with water and dry under sun for 4-6 weeks. This can be used to fill the portrays.

**Seed treatment:** Soak seeds in panchagavya solution for 1-2 hrs followed by coating of Trichoderma viride and Pseudomonas fluorescens @ 5gm/kg of seed.
Shade-net protected Nursery

Fill the portrays with the medium and dibble one seed in each cell. Cover it with growing medium. Water with rose can daily

Spray 5% cow urine or vermiwash solution when three leaves appear.

In 4-6 weeks seedlings are ready for transplant. Harden the seedlings for 4-5 days by withholding watering. Then transplant.
### Organic Nutrient Management for Tomato

<table>
<thead>
<tr>
<th>No.</th>
<th>Nutrient source</th>
<th>Quantity/ac</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Farm yard manure/ Compost</td>
<td>3 tonnes</td>
<td>Hybrid</td>
</tr>
<tr>
<td>2</td>
<td>Vermicompost/Biodynamic compost</td>
<td>1.5 tonnes</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Concentrated Manure* (see last slide)</td>
<td>200 kg</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Neem oil cake</td>
<td>100 kg</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Azotobacter, Azospirillum, Phosphate solubilizing bacteria, Potash mobilizing bact. (for mixing with compost)</td>
<td>1 kg each</td>
<td></td>
</tr>
</tbody>
</table>

Mix all the above ingredients and use as basal manure by placing in lines 1-3 days before planting.

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<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Cow urine with irrigation@10 days interval.</td>
<td>60 lit X 4 applications</td>
<td>60 lit X 4 applications</td>
</tr>
<tr>
<td></td>
<td>Foliar application: Panchagavya 5% or Vermiwash 5% +Protein hydrolysate*3g/lit</td>
<td>4 applications at 20, 35,50 and 60 days after transplanting.</td>
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</tr>
</tbody>
</table>

* - Explained in Organic Farming ppt.
Transplanting and irrigation

- **Plough the main field** 2 or 3 times. Form ridges and furrows. For hybrids give a space of 90 X 60 cm and for OP varieties, 60 X 45. Apply the recommended organic fertilizers as mentioned in previous slide.

- **Transplant seedlings** in July-Aug or Jan-Feb seasons.

- **Irrigation**: During summer 7-10 days interval; during winter 8-15 days interval. (Avoid heavy irrigation to avoid mosaic and leaf curl disease)

- Drip irrigation: Normally with an interval of 2-3 days. Younger plants require daily irrigation.
Staking and weeding

- **Staking** is important to keep the plant in position and to avoid diseases.
- **Weed control**: on 25th, 45th and 70th days weeding can be carried out. Mulching with straw or black polythene also controls weeds & moisture.
Aphids

- Removal of weeds like Amaranthus.
- Intercropping with onion, garlic. Grow maize as a border and catch crop.
- Remove and burn infested crops. Spray 10 tablespoons of liquid soap in 10 litres of water in the evening during wet weather. Continue till pest vanishes.
- Spray neem oil products once a week for 4 weeks (3ml/lit water).
- Conserve predators like ladybird beetle.
Thrips

*Thrips tabaci*

- Mulch with dry grass or polythene to prevent thrips to pupate in the ground
- Avoid planting tomatoes next to onions, garlic, or cereals.
- Use neem oil @3ml/lit water every 15 days. Spray Beauveria bassiana at the rate of 5ml per 10L of water.
- Spray late afternoon when thrips are active.
White flies

*Bemisia tabaci*

- Conserve natural enemies (wasps, ladybirds) by mulching or with hedge of flowering plants (e.g. *Tithonia, Lantana*)
- Plant repellent crops-coriander every 3 rows.
- Yellow sticky traps 1 per 5 plants
- Spray *Beauveria bassiana*. Repeat after 3 weeks.
- Take 30 chillies, chop them and soak them overnight. Dilute in 10 litres water + 10 drops of liquid soap and spray.
- Spray Azadirectin 0.03% @ 50ml/20 lit water.
- Use liquid soap solution @ 3 table spoons/lit.
- Spray neem seed kernel extract 4% or pongamia or neem oil (8-10 ml/l) or neem soap (10g/l). Rogue out the virus affected plants.
Red spider mite

*Tetranychus spp.*

- Red spider mites thrive under high temperature and dry weather.
- Remove and destroy the affected leaves.
- Spray wettable sulphur 80 WP @ 3g/lit
- Spray neem oil/neem soap/ pongamia soap 1%.
Gram pod borer  
*Helicoverpa armigera*

- Collect and destroy infested fruits and larvae.
- Spray before flowering 5% neem seed extract.
- 2 releases of *Trichogramma brasiliense* (tricho card)@100,000 parasitized eggs/ac during peak flowering stage at 10 days interval.
- Spray NPV-H @100LE/ac @20g/lit on 25,35 and 45 days after planting. Or
- Spray *Beauveria bassiana* @ 800g/ac or BT at 400g/ac (2g/lit water)
Cutworms on Solanaceae

*Agrotis* spp. Black cutworm

- Encourage presence of predators like beetles, lacewing bugs etc by planting flower plants around border. Also raise sunflower crop in the border as trap crop.
- Intercrop Tomato with onion and garlic in every 10 or 20 rows.
- Spray Neem preparation 3 times at weekly intervals. (@1 kg neem kernel powder+ 1kg neem leaves +40 lit water-soak over night-filter and spray)
- Release natural enemies - *Cotesia ruficrus*, *Snellenius manilae* or tachinid flies.
Fruit fly
*Bactrocera aquilonis, B. atrisetosa, B. cucumis, B. dorsalis, B. tryoni, B. dorsalis, B. latifrons*

- Expose pupae by inter-cultivation. Harvest fruits at physiological maturity. On ripe fruits flies will lay eggs.
- Place 4 pheromone traps per acre.
- Apply Neem kernel extract 5ml/lit water or neem oil 3 ml/lit
- Collect all infected/fallen fruits, put it in black polybag, tie it and dry it under sun. Otherwise, bury infected fruits in pits of 50cm depth.
Serpentine leaf miner
*Liriomyza trifolii*

- The incidence starts from nursery. Remove infected leaves while planting or within a week.
- Apply neem cake to furrows /beds @ 100 kg/ac at planting and repeat after 25 days.
- Spray neem seed powder extract 4% or neem soap 1% at 15-20 days after planting.
- Remove infected leaves.
Damping off on tomatoes

*Phytophthora, Pythium, Rhizoctonia, Fusarium spp*

- Minimise leaf wetness by irrigating in the morning or by drip. Maintain low soil pH by incorporating composts.
- Prevention better than control. Uproot diseased plants and bury deeply (50 cm).
- Do not compost diseased plants as the fungi may stay alive and spread.
- Drench with Trichoderma 5 gm/lit water.
Early blight

\textit{Alterneria solani}

- Small brownish leaf lesions on leaves and defoliation of older leaves. Remove infected leaves and bury deep.
- Seed treatment-with Trichoderma or pseudomonas 3 gm/100gm seed; Dip seedlings for 20 min Tricho/Pseudo solution (5gm/lit water)
- Spray 5% neem extract or 5% garlic extract or Bourdeaux mix 1%
• Remove infected plants, weeds and alternate host plants and burry.

• Seed treatment-Trichoderma /Pseudo 4gm/100 gm seed

• Soil application of 2kg Pseudo/ Trichoderma + 200 kg FYM/acre

• Spray of Onion-garlic extract.

• When heavy incidence-spray Bourdeaus mix. 1%

Late blight
Pytophthora infestans
Bacterial Wilt

*Ralstonia solanacearum*

- Rapid and complete wilting of normal grown up plants. Lower leaves may drop before wilting.
- (Cut Infected plant- immerse in water- a white streak of bacterial ooze comes out from cut ends)
- Removal and burial of crop debris.
- Apply 2 kg pseudomonas with 200 kg compost/ac.
- Spray cow urine 5 lit + vermiwash 5 lit in 100 lit water/ac.
- or spray *Aloe* or *vitex* extract.
Fusarium wilt
*Fusarium oxysporum*

- Lower leaves turn yellow and die. This spreads to other young leaves and entire plant wilts within a week.
- Remove and bury crop debris.
- Seed treatment-2gm Trichoderma/100gm seed. Seedling treatment -Trichoderma5-10 gm/ lit water -solution.
- Apply 80 kg Neem cake/ac
- Apply 200 kg compost treated with 2 kg of Pseudomonas or Trichoderma/ ac.
Phomopsis blight and fruit rot

*Phomopsis vexans*

- Fungus attacks stems, girdles them which causes wilting and drying. Infected fruits rot.
- Remove and dump affected plants.
- Soil application of Trichoderma or pseudomonas 2 kg/acre.
- Spray Bourdeaux mixture 1%
Tomato leaf curl disease
Tomato leaf curl virus

• Plants are severely stunted. No flowering and fruiting at later stage.
• Remove infected plants and bury.
• Spray Neem seed extract 5% or neem oil 3 ml/lit water.
• Spray cow urine-buttermilk spray. (15 days old cow urine 500 ml and fermented butter milk 500 ml in 15 lit water) Spray this mixture-100 lit/ac
Root knot nematode

*Meloidogyne ingognita* and *M. javanica*

- Crop rotation with groundnuts, cereals, napier and onions
- Apply 100 kg of neem cake mixed with one ton of compost to the soil before planting.
- Use *Paecilomyces lilacinus* 2 kg/ac mixed with 500 kg compost before planting.
- After harvest, solarize soil
Blossom end rot

- It is a symptom of calcium deficiency in the soil and therefore in the plant.
- In acidic soils, apply lime as recommended or bone meal @250gm/plant to increase pH levels and to enhance Calcium mobility.
- Remove affected fruits to avoid secondary infections
Harvest & Packing

- Ready for harvest about 60 days after planting. Harvest may spread over 50-60 days.
- Hybrids yield 25-40 MT/ac
- Open pollinated yield 12-20 MT/ac
- **Harvesting:** For long distance, harvest mature green fruits; for local market harvest when it turns red. For processing, fruits must be fully red.
- **Packing:** The fruits should be pre-cooled at 13°C immediately after harvesting or they should be kept in shade to remove field heat before packing for market.