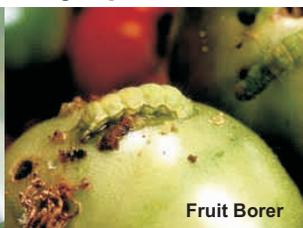


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| | Root knot nematode | As said above, planting of 1 row of marigold on the border will help in managing the problem of root knot nematode. |
| (b) | Disease management | Generally for managing the insect problems, any one of the following bio control agents can be used at an interval of 10 days. <i>Beauveria bassiana</i> (10g/lit.of water) <i>Verticillium lecanii</i> (10g/lit.of water) <i>Metarhizium anisopliae</i> (10g litre of water) |
| | Wilt | Root related diseases: fusarium wilt, verticilium wilt, bacterial wilt, rhizoctonia. Stem and foliage diseases: early blight, leaf spot, bacterial canker, late blight. Fruit diseases: bacterial spot, bacterial speck, anthracnose. Thus, the disease control programme is important at each stage of growth. |
| | Leaf Spot Powdery Mildew Fruit Rot | For the management of foliar diseases such as leaf spot, powdery mildew and fruit rot any one of the following bio control agents can be used at an interval of 10 days. <i>Trichoderma harzianum</i> (10g/ litre of water). <i>Pseudomonas fluorescens</i> (10g/ lire of water). <i>Bacillus subtilis</i> (2g/litre of water). |
| 15. | Harvesting and storage | Harvest 2- 3 months after planting when pink colour appears on fruits and picking is generally done at 2-3 days interval. In a typical season, more than 10 pickings are done. Harvest during late afternoon or early in the morning and store the fruits in a shaded area or room with good ventilation. |
| 16. | Yield | Open pollinated (Improved) varieties: 30 - 35 t/ha. Hybrid varieties: 40 - 45 t/ha. |

Common Insect and Disease Symptoms of Tomato Crop



Leaf Miner



Fruit Borer



Fruit Rot

Leaf Spot

Powdery Mildew

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Organic Package of Practices for Tomato



INTERNATIONAL COMPETENCE CENTRE FOR ORGANIC AGRICULTURE (ICCOA)
BANGALORE

Organic Tomato Cultivation

| S.No. | Organic Activity | Details |
|-------|--|--|
| 1. | Selection and preparation of land | Soils with a pH range of 6-7 and more than 1% of organic carbon are well suited for tomato cultivation. It is required to test the soil once a year to check the levels of pH, organic carbon, macronutrients (NPK) and microbial population in the field. If the organic carbon content is less than 1%, apply 25-30 tons/ha of FYM and plough the field 2-3 times to mix the manure thoroughly. Adequate buffer zone must be provided between certified organic fields and non-organic fields at a distance of about 7 meters from non-organic fields to prevent drift of prohibited materials on to certified organic fields. |
| 2. | Sowing season and time | Tomato can be grown during all the three seasons: Summer (Zaid), Kharif and Rabi. The best time for sowing the seeds: Summer – Feb-March; Kharif – June-July; Rabi – Oct-Nov. |
| 3. | Variety selection | For organic farming, open pollinated varieties are preferred. Seed selection is an important step in organic tomato production. Seeds should be carefully selected from certified organic farms or from farmers' own field which is raised organically. The seeds (which are not treated with chemicals) from local high yielding varieties can also be used in the absence of organically produced seeds. Select disease resistant and locally demand varieties. There are both short and long duration varieties. Open pollinated (Improved) varieties are best suited for short duration whereas hybrid varieties require longer period. Open Pollinated (Improved) varieties: Arch Sorab, Pusa Rubi, PKM-1, S-7, S-22, Arka Ananya, Arka Shreshtha. Hybrid varieties: Avinash-2, Shakti and Roma. |
| 4. | Seed rate | Open Pollinated (Improved) varieties: 400g/ha. Hybrid varieties: 200g/ha. |
| 5. | Seed treatment | Prior to sowing, the seeds should be treated with Trichoderma viride @ 4g/kg of seeds. Seeds should not be treated with any chemical fungicides or pesticides. |
| 6. | Nursery raising | Prepare beds of 1 m x 3 m with a height of 20 cm to which FYM @ 20 to 25 kg, Trichoderma harzianum @ 4g/kg and 1.2 kg Karanj (Pongamia)/Neem cakes are incorporated. 30 beds and 400gms (improved) and 200 gms (hybrid) of seeds are required for raising nursery for planting one hectare of tomato. Seed treatment with 1% Panchagavya for 12 hrs is good. |
| 7. | Seed spacing (nursery) | Seeds should be sown approximately at a spacing of 5 cm x 2 cm and at a depth of 0.5 cm to 1 cm. After watering, the beds should be covered with straw and dry twigs to preserve the moisture. This practice will also help in controlling pests and diseases. |
| 8. | Seedling treatment | Neem soap spray (7g/l) is given once for 15 day old seedlings to protect the seedling from sucking pests like white fly and thrips. Hardening of seedlings is to be done by slightly reducing water 3 to 4 days before transplanting (20 days after sowing) and exposing them directly to sunlight 1-2 days before transplanting. Thoroughly water the seedlings about 12 hours before transplanting in the field. A good seedling will be vigorous and stalky with 4 to 5 leaves (about 4 weeks old). Seedlings are drenched with Pseudomonas fluorescens (10g/l) before transplanting to prevent foliar diseases. Dip the root |

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| | | portion of nursery seedlings of tomato in asafetida suspension (add about 100 grams of asafetida in 5 litres of water in a container and mix thoroughly) for 15 – 30 minutes and transplant the seedlings in the main field to prevent soil-borne pathogens causing wilt diseases. |
| 9. | Soil fertility management | Rotation with non-solanaceous crops like pulses/legumes enriches the nitrogen status of the soil. About 40 tonnes of well decomposed Farm Yard Manure or vermi compost/compost @ 8-10 t per hectare is applied at the last ploughing. FYM can be treated with Trichoderma at the rate of 500 g per 2 tons of manure. Ridges and furrows are opened at 1 m spacing and neem cake @250kg/ha is applied while forming ridges and also at six to seven weeks after transplanting. |
| 10. | Transplanting and spacing (main field) | Wider spacing of 100 cm x 50 cm (20,000 plants/ha) is recommended for organic cultivation of tomato for better aeration and to minimize rapid spread of foliar diseases. |
| 11. | Irrigation and water requirement | Tomato is most sensitive to water deficit immediately after transplanting, during flowering and during fruit development. For a good crop growth, well timed furrow/ drip irrigation is effective. Wilting in the early morning indicates that the crop should be irrigated. During dry season, irrigate at an interval of 3-4 days for first month after transplanting and then at every 5-7 days interval until crop completion. |
| 12. | Cultural practices and weed management | Hand weeding will loosen soil. Weeding can be done on 3rd and 7th week after transplanting. Earthing up is done during second weeding. Practice crop rotations, cover cropping and mulching to control weeds. In-row mulches control weeds by excluding light and forming a physical barrier to growth. These can be either organic mulches from straw or weeded grass. |
| 13. | Staking | Provide support to hybrid plants with wooden sticks / eucalyptus poles of 1.5 m height at spacing of 3 m in the plant row. Staking reduces foliar and fruit diseases. It makes spraying effective and harvesting will be convenient. |
| 14 | CROP PROTECTION | Management of soil tilth, moisture and nutrient status is the first step in effective pest and disease management. Rotations with non-solanaceous crops like pulses/legumes are usually recommended to avoid pests and diseases affecting tomato crop. |
| a) | Insect management | |
| | Leaf miner | Sow two rows of maize/sorghum seeds and one row of marigold seeds along the border 15 days earlier to planting of tomatoes to promote natural predators like Chrysoperla and Coccinellids which control insect vectors that carry leaf miner virus. Apply Neem cake @ 250 kg/ha and 5% NSKE (Neem Seed Kernel Extract) at 6-7 weeks after transplanting. Neem cake/extract may have repellent qualities and interfere with egg laying activities. Install yellow sticky traps to catch egg laying adults 25 days after transplanting. |
| | Fruit Borer | Spray a Bio pesticide NPV (Nuclear Polyhedrosis Virus) in the evening @ 625 lit/hectare with 2% jaggery at 4th, 5th and 6th week after transplanting. Place Tricho card (2 cards/ha) which can release parasite Trichogramma chilonis @ 50000/ ha/ week (upto 6 weeks) coinciding with flowering time and when one egg/ Heliothis larva or when 8 egg masses of Spodoptera is observed. If the intensity of pest attack increases spray 4% solution of neem seed extract on plants at 15 days interval to control the insect. |