

TECHNOLOGY FOR TOMATO PRODUCTION IN BHUTAN

I. PRE-PRODUCTION STAGE

A. Growing Conditions

| Criteria | Description |
|-----------------|--|
| 1. Altitude | <ul style="list-style-type: none">• Between 300 metres above sea level (masl) such as in southern Dzongkhags to above 2,200 masl like Paro and Thimphu Dzongkhags• Growing seasons:<ol style="list-style-type: none">a) Below 1,000 masl, from October to middle of April. Start nursery sowing from first week of October to mid- December.b) At 1,000-1,500 masl, from March to October. Start nursery sowing from first week of March to end of May.c) Above 1500 masl, from April to September. |
| 2. Soil pH | <ul style="list-style-type: none">• Soil pH range is 6-7.• Apply dolomite powder at 1.5 t/acre if the soil pH is below 5. |
| 3. Soil texture | <ul style="list-style-type: none">• Grows ideally in loam and sandy loam soils. |
| 4. Temperature | <ul style="list-style-type: none">• Grows well when the day temperature is between 13o-35oC |

B. Choice of Variety

The choice of variety depends on the market requirements such as for fresh or table purposes. The recommended varieties are given below:

| Variety Name | Altitude (m) | Recommended Dzongkhags | Days to Maturity | Pest/ Disease Reaction | Potential Yield (t/ha) |
|--------------|--------------|------------------------|------------------|------------------------|------------------------|
| Roma | 300-2,300 | All Dzongkhags | 80-100 | | 20-30 |
| Ratan | 300-2,300 | All Dzongkhags | 80-100 | Tolerance to blight | 20-30 |
| CHT160 | 300-2,300 | All Dzongkhags | 60-100 | | 20-30 |

Characteristics of Main Tomato Varieties Grown in Bhutan

Roma

- Determinate or bush type
- Oval or pear-shaped and red fruit
- Fruit length is 5.8 cm; width is 4.3 cm
- Plant height is 85 cm
- Good for cooking and processing
- Can withstand long distance transport and have better shelf-life.



Ratan

- Determinate variety
- Deep red, round, and large fruits
- Fruit length is 5.7 cm; width is 5.62 cm
- Plant height is 81 cm
- Ideal for salad and cooking
- Need staking and raw mulching
- Need plastic roofing if rainy/cloudy periods prolonged during fruit maturity



CHT160

- Indeterminate variety
- Deep red, round, and medium size fruit
- Fruit length is 3.62 cm; width is 3.58 cm
- Plant height is 138 cm
- Ideal for salad and cooking
- Need staking and raw mulching

- Need plastic roofing if rainy/cloudy period is prolonged during fruit maturity



II. PRODUCTION STAGE

1. Nursery Preparation

- Prepare the nursery soil thoroughly two weeks before sowing. Raise nursery beds to 15 cm high and 1 m wide.
- Before sowing, treat the seeds with fungicide like Thiram or vitavax at 2 g/kg seed.
- Use seed rate of 200 g/acre of good quality seeds with 75% minimum germination.
- Sow seeds at 1.5 cm deep in rows at 10 cm apart.
- To produce good seedlings – particularly above 1,000 m for early planting – sow seeds in plastic tunnels. Use semi-circular structure of bamboo sticks lay over the nursery bed at 1 m apart. Lay the plastic sheet over the structure and cover the edge of the plastic with soil. Keep the tunnel open during sunny days. Irrigate daily using a sprinkler by opening the plastic cover.

2. Field Preparation

- Plough and level the field thoroughly.
- Raise 1 m wide beds and 15-20 cm above the ground and of convenient length depending upon the field condition.

3. Fertilizer Application

- Since tomato has a high nutrient requirement, determine the adequate fertilizer required for each plot during field preparation with the assistance of the National Soil Service Centre (NSSC) in Semtokha, Thimphu.
- Take note that fertilizer application depends upon soil fertility and other factors. In general, apply an indicative fertilizer requirement during field preparation on a per acre basis as 6-8 t of Farm Yard Manure (FYM) and 10:20:20 kg of N:P:K/acre as basal. Mix all the fertilizer thoroughly. Apply basally in hills (spot application) about 250-300 g of FYM and 6 g of fertilizer mixture. Mix with soil properly up to a depth of 20 cm.
- Thirty days after transplanting, top dress the crop with 10 kg additional N. Apply the nitrogen in rings around the plant and cover with soil. In light soil, split the top dress application into two at 30 and 60 days after transplanting.

4. Transplanting

- Place the seedlings in the baskets. Make sure not to damage the roots or dropping all the soil from the roots.
- Transplant when the seedling are 12-15 cm tall, normally in about 30-50 days after sowing depending on the elevation.
- Plant the seedlings at a spacing of 40 cm plant to plant within a row and 50cm between rows or row to row, or a population of at least 39,000 plants per acre.
- Transplant the seedlings preferably in the evening and irrigate immediately so as to reduce the transplanting shock.
- Since indeterminate varieties require stacking, use bamboo stake after flowering and tie the plants to it loosely as it grows.
- Regularly prune or pinch the side shoots and suckers for indeterminate or stacking type of tomatoes. For bush-type of tomatoes, do fruit thinning to get better size and quality fruits.
- For stacking type of tomatoes, remove all suckers on the lower 50 cm of the stem, then let the plant bush out with branches tied to a stake to achieve early and quality fruit production and to avoid sunscald.

5. Weeding

- During the first few weeks after transplanting and even throughout the growing season, frequently weed the plot to keep it free from weeds that will compete with water, nutrients, air and space, or light.
- Weed manually with hand or use garden hoe without damaging the shallow tomato roots.

6. Irrigation

- Water the young plants at field capacity for few weeks after transplanting to encourage good vegetative growth. Reduce the amount of irrigation and frequency in 4-5 weeks after transplanting to provide little water stress which will enhance tomato flowering and production.
- After the fruit set, maintain uniform soil moisture to avoid blossom-end rot and fruit cracking and to improve fruit quality.
- Reduce irrigation slightly towards the time of harvest to get good flavour and less watery fruits.

7. Harvesting

- Harvest the fruits 80-90 days after transplanting but it will largely depend on the type of tomato, varieties, and distance from the market.
- For best quality, harvest tomatoes at fully ripe stage, that is, when green fruit turns to normal varietal colour. However, for long distance market, harvest tomatoes at mature and half-ripe fruit stage.
- Pick tomatoes by twisting rather than pulling the fruits. Pack the fruits in crates lined with straw or similar materials which are placed at the bottom, sides, and at the top.

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