1. Variety

Late blight disease, caused by *Phytophthora infestans* in one of the major diseases affecting the tomato cultivation in Bhutan. Yusi Lambenda 4 is a variety that is tolerant to Late blight and can be grown in open field conditions. Farmers do not need protected structures for its cultivation.

This variety was introduced from the WorldVeg Centre in 2021 and evaluated across the country over three years.
Average weight per fruit is 57g and per acre yield is 16MT.

2. Recommended agroecological zone

Altitudes (masl)	Sowing	Transplanting	Harvest	Days to Maturity
Temperate (>1800)	February-March	April-May	July-September	98
Sub-temperate (1200-1800)	January-February	March-April	June- July	76
Sub subtropical (<1200)	October-November	December-January	February-March	60
	September-October	November-December	April-May	88

Climate

Tomatoes can be grown in a wide range of temperatures and soils, but it grows well when the day temperature is between 13oC to 35oC.Tomato is considered a warm season crop. It is sensitive to frost and high humidity will favour disease development. Ideal altitude for tomato production in the open field in Bhutan is between 300masl to 2200masl

Soil

They grow optimally in deep, medium texture loam and sandy loam soils, fertile, well-drained soil. The best soil pH range for tomatoes is 6.0 to 7.0.

3. Nursery

·Raise 15-20cm tall and 1 m wide nurseries of convenient length under protected structures or low-cost poly-tunnels. Amend with sieved well-decomposed manure. Seeds should be sown 1.5 cm deep and 8-10 cm apart in rows. Irrigate as and when required. Seed rate is 200g/ acre.

4. Land Preparation

Prepare raised beds of 15-20 cm height and 1 m width of convenient length. Ensure that the soil is well pulverized.

5. Transplanting

Seedlings are ready for transplanting when seedlings are about 12 cm high and attained 4-5 leaves, Harden seedlings before transplanting by withholding irrigation intermittently. Row to row distance of 50-60cm and plant to plant distance of 40-50 cm should be maintained. Transplanting should be done in the evening . An acre of land can accommodate 40,000 seedlings.

6. Irrigation

IIrrigate at field capacity and gradually reduce the amount and frequency after 5 weeks of transplanting. At fruit set stage, maintain uniform soil moisture to prevent fruit cracking. Ensure that irrigation is done to the rootzone and not the aerial parts of the plant.

7. Staking

Staking should be done to provide support to plant while keeping fruits off the ground. Wooden poles or bamboo stakes can be inserted near the plant right after planting and jute rope should be used to tie the plant to the stake at regular interval once 12-15 inches tall.

8. Pruning

Yusi Lambenda 4 is a determinate variety and hence require minimal pruning. However, prune off side shoots til the first flower cluster.

9. Weed management

Two - three weedings are necessary depending on weed pressure. Mulching is advantageous. Either organic mulches like paddy straw or artemisia leaves or polythene mulching can be done

10. Nutrient management

About 10 tonnes of Farmyard Manure (FYM) or vermi-compost/compost @ 1-1.5 t per acre should be applied. During transplantation, apply 250g per plant of vermi-compost/organic manure. In addition, during the plant developmental stage, tomato

plants needs to be fertilized twice with 250 g of vermicompost at 30 days after transplanting and 60 days after transplanting respectively.

Conventional growers should apply 20:24:15 kg of NPK per acre as basal dose in the form of Urea, SSP and MoP with top dressing of additional 26 kg nitrogen after one month of transplanting. Top dressing of nitrogen should be done in the forms of rings around the plants

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National Center for Organic Agriculture- Yusipang
Ministry of Agriculture and Livestock
Thimphu: Bhutan

10. Plant protection

Cutworms and fruit borers are the main pests. In addition diseases like late blight, blossom end rot and damping off severely impact production.

Damping off disease is caused by a complex of soil-dwelling fungus. It occurs in nursery resulting in complete destruction of seedlings

Management:

- Raising nursery in a well-drained soil.
- Partial sterilization of soil can be done by burning dry planting material on the nursery beds before sowing the seeds.
- Avoid sowing in the same nursery bed

Seed treatment with Thiram or Captan before sowing @ 2 g/kg of seed. Alternatively, drench the nursery with Mancozeb solution @ 3g/L of water as soon as the symptoms appear.

Blossom-end rot is a physiological disorder caused by deficiency of calcium aggravated intermitenet drying and wetting of soil.

Management:

- Good irrigation and drainage practices with consistent supply of moisture throughout the growing season
- Additional calcium supplements by adding crushed eggshell around the root zone of the plants can help.

Conventional growers should spray Calcium Chloride @ 100g/21 liters of water once a week for 6 weeks if there are symptoms.

Blight is a fungal disease resulting in complete death of the plant and rotting of fruits.

Management:

- Remove crop residues after the harvest reducing proliferation of disease in the next crop.
- Grow plants under protected conditions as wetting the plants either through irrigation or rainfall aggravates disease incidence.
- Practice crop rotation. Maintain at least three years rotation gap especially in the open field.
- Foliar application of Mancozeb @ 3 g per litre of water every two weeks.

Seed collection

Seeds of Yusi Lambenda 4 can be saved for use unlike hybrids. Seeds dhould only be harvested from fully mature fruits. Seeds should not be saved from the first and the last harvest. Store the extracted seeds in a sealed container with proper label. Store it at 2-4 degree Celcius.

PACKAGE OF PRACTICES YUSI LAMBENDA 4

A Late Blight Tolerant Variety for Open Fields