



PRODUCTION TECHNOLOGY OF CHERRY TOMATO IN KASHMIR



2017



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INTRODUCTION

Cherry tomato (*Solanum lycopersicum* var. *cerasiforme*) is a highly priced culinary as well as ornamental vegetable. One of the most popular high value exotics, it is a favorite among chef's who cook for high profile restaurants and hotels. Nevertheless, it is becoming increasingly popular among common people, who are now interested in garnishing their dishes and diversifying their nutritional intake. Cherry tomatoes look not only attractive in kitchen gardens but are commercially valuable horticultural commodity and have impressive nutritional and pharmaceutical properties. According to the USDA nutritional information, one cup of cherry tomatoes (149 g) provides 26.8 calories, 1.3 g protein, 4.5 mg omega-3 fatty acids, 119 mg omega-6 fatty acids, 1241 IU of vitamin A, 18.9 mg vitamin C, 22.3 mcg folic acid, 11.8 mcg vitamin C, 353 mg potassium, 35.8 mg phosphorus and 14.9 mg calcium. All these nutrients and additives put cherry tomato into the category of functional foods. Whole cherry tomatoes are sold afresh as well as preserved in brine. The fruit shape ranges from spherical to oblong to pear and the colors include red, pink, yellow, grape green and brown. Cherry tomato can be grown in open or protection in poly or glass or shade houses. However, yield and fruit quality are higher when cultivated under protection. Many varieties of cherry tomato have been popularized by private and public sector. Brief description of varieties released and/or popularized by public organizations is given in the following table.

Name	Brief description	Source
Punjab Red Cherry	Red fruited variety, suitable for protected cultivation, tolerant to leaf curl virus, yields 110 t/ha	Punjab Agricultural University, Ludhiana
Punjab Sona Cherry	Yellow fruits borne in clusters having TSS of 7.5%, 13 mg carotene/100 g fruits, yields 105 t/ha	Punjab Agricultural University, Ludhiana
Punjab Kesar Cherry	Orange fruits borne in clusters having TSS of 7.6%, 13 mg carotene/100 g fruits, yields 100 t/ha	Punjab Agricultural University, Ludhiana
Pusa Cherry Tomato-1	Red spherical fruits, suitable for protected cultivation, yields 150 – 180 t/ha, first harvesting takes 70-75 days, and crop lasts for 9-10 months, tolerant to root knot nematode	Indian Agricultural Research Institute, New Delhi



CLIMATE AND SOIL

Like slicing tomato, cherry tomato is a warm season crop that thrives during summer months in Kashmir. Optimum temperature for its growth and development is 20-30 °C with low humidity and plenty of sunshine. Temperature during March is congenial for seed sowing and transplanting is successful by the time temperature elevates in the month of April. Fruit setting, development and ripening takes place from May to August. However, under protected conditions, nursery production can be advanced by 15-20 days. Crop can also be produced in greenhouses, wherein the production window is stretched to a large extent. Pickings can continue till November-December compared to open cultivation where crop lasts till July-August only. Soil for cherry tomato production should be rich in organic matter, sandy loam to loam with pH 6.5 to 7.5, well aerated and well drained.



FERTILIZER REQUIREMENTS

General guideline for basal fertilizer dosage is 10 tonne FYM, 60 Kg DAP, 45 Kg MoP, 50 Kg secondary nutrient mixture and 10 Kg micronutrient mixture per acre of field. Urea is not required if above mentioned dose of DAP is applied, as the requirement of nitrogen will be met out of DAP itself. However, precise

requirement of fertilizers in a particular field should be calculated according to soil health card and on the basis of this general guideline. Half of the DAP and MoP may be applied as basal dose and remaining half at 15-20 days intervals throughout the crop life cycle. Biofertilizers like Azospirillum and Phosphobacteria can also be mixed with FYM to increase and sustain nutrient uptake for longer duration.



NURSERY PRODUCTION

Cherry tomato seeds are minute and delicate. So, their nursery should be raised very carefully. It is best to do plug tray nursery production using cocopeat medium. Plug trays ensure proper care of each seedling and least damage to root zone due to retention of soil ball while transplanting. Nursery should be protected from water logging and over nutrition. Seeds can be treated with Captan or Thiram or Carbendazim powder @ 1-2 g/Kg seed before sowing to protect from wilting and damping off. Alternatively, the medium or soil can be drenched with 1-2% Captan/Thiram suspension. Nursery should be well protected from cold. For the purpose, small polythene tunnels and polyhouses can be used. If not using plug trays, nursery should be sown on 15 cm raised or flat beds depending on water retention capacity of the soil, free of clods, stones, pebbles, plant debris etc. Soil should be well ploughed, leveled and nourished with FYM or vermicompost (10 Kg) and neem cake (1 Kg) and chemical fertilizers like enriched super-

phosphate (100 g) per square meter of bed. In case of varieties, 300-400 g seed is required per hectare while in hybrids; 100-150 g is enough. The seeds should be sown in shallow lines dug parallel to each other about 5-7 cm apart. After sowing, the lines should be well covered lightly with soil or vermicompost and immediately irrigated with sprinkler. Weed and insect-disease management of the nursery should be done on regular basis.



Vegetable Experimental Area
ICAR-CITH, Srinagar

Digging shallow lines on nursery bed



Vegetable Experimental Area
ICAR-CITH, Srinagar

Line sowing of treated seeds



Vegetable Experimental Area
ICAR-CITH, Srinagar

Placing vermicompost over sown seeds



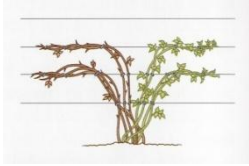
Vegetable Experimental Area
ICAR-CITH, Srinagar

Light irrigation of nursery



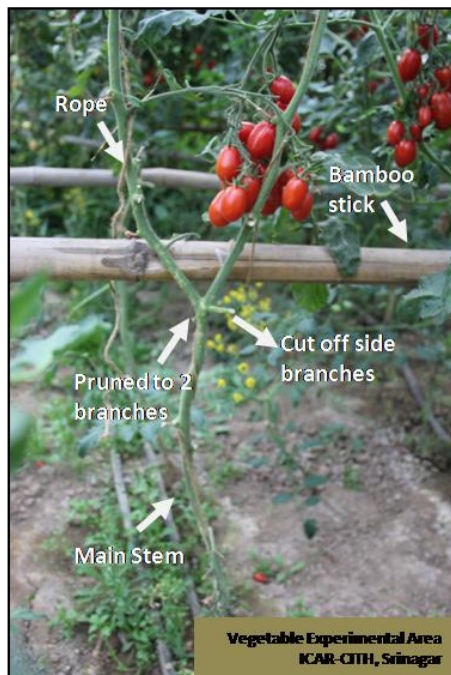
TRANSPLANTING PRACTICES

When seedlings reach 4-5 true leaf stage after about 30-45 days of sowing, irrigation should be withheld about 2-3 days prior to transplanting. Few hours before transplanting, light irrigation may be done to ensure safety of roots while pulling the seedlings. If there is intense sunshine and high temperature, transplanting may be done in the evening to minimize environmental shock to the establishing seedlings. Plough the soil thoroughly and finely incorporate FYM into the soil. Apply basal dose of fertilizers. Make ridges and furrows or raised beds or keep the field flat depending on moisture retention capacity of soil and availability of man power. In general, for open conditions, cherry tomato seedlings can be transplanted on ridges or raised or flat beds at 90 cm row to row and 60 cm vine to vine spacing. Under protection, spacing can be reduced to 60 cm row to row and 45-60 cm vine to vine for optimum space economy. The spacing should be optimized on the basis of experience with varieties, as they differ for vegetative growth, plant structure and shape.



PLANT ARCHITECTURE

Whether the crop is grown in open or protected condition, vines may require pruning and will definitely require staking with bamboos/wooden/iron rods and jute ropes to support the indeterminate growth habit. To prune, retain 2 or 3 main branches just below where first flower has blossomed. Cut away all other branches and ensure well ventilated and strong plant architecture. The thumb rule is that more the number of branches, smaller the fruit size and vice-versa.



Training and pruning of vines



DISEASE AND INSECT PEST MANAGEMENT

The diseases and insect pests common in Kashmir valley conditions are described below with respect to their symptoms and management strategies. The cultural and organic controls, wherever possible, should be given priority. In case of large scale cultivation, chemical control at judicious levels should be taken up.

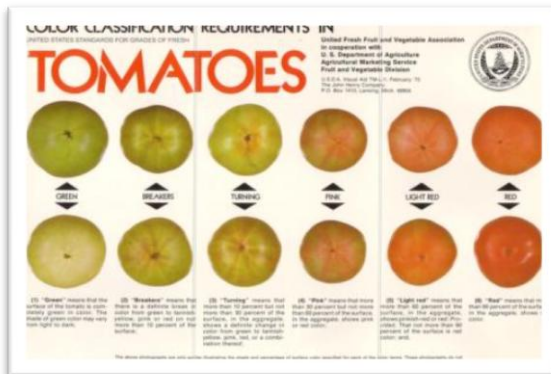
Common diseases and pests of tomato in Kashmir

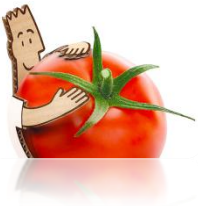
Diseases/Pests	Symptoms		Management
Early Blight (<i>Alternaria solani</i>)	Dark spots with concentric rings develop on older leaves and surrounding leaf area turns yellow. Affected leaves die prematurely, exposing the fruits to scald in sun.		- Field sanitation - Spray Blitox or Mancozeb or Propineb @ 3gm/L of water at the onset of symptoms.
Late Blight (<i>Phytophthora infestans</i>)	Spots are gray, greasy, irregularly shaped on leaves, which turn dry and papery. The fruits also develop such spots. Blackened areas may also appear on the stems.		- Remove all infected plant debris from fields. - Spray Metalaxyl @ 1gm/L of water at the onset of symptoms in the field.
Wilt (<i>Verticilium spp./ Fusarium spp.</i>)	Lower leaves turn yellow, often starting on only one side. Whole plant yellows. Wilted leaves fall off. Stem is discolored, showing dark brown streaks inside stem length-wise.		- Crop rotation with some cereal crops and lime application <i>Trichoderma</i> application along with FYM - Seed treatment with Carbendazim@ 2gm/Kg seed or field drenching with Carbendazim @ 1gm/L water 15 DAT
Septoria Leaf spot (<i>Septoria lycopersici</i>)	The papery patches on the leaves develop tiny, dark specks inside them. Older leaves are affected first.		- Field sanitation - Copper sprays like Blitox @ 3gm/L of water are effective against spread of disease
Anthraxnose (<i>Colletotrichum coccodes</i>)	Small, round, sunken spots appear, increase in size and darken in the centre, may cause fruit rot. Several spots may coalesce. Over ripe tomatoes touching wet soil are more susceptible.		- Planting on well-drained soil, field sanitation - Fungicide applications, like Heexaconazole5%+ Captan 70% @ 0.5gm/L or Carbendazim 12%+, Mancozeb 63% @ 2gm/L of water should begin when fruit are formed on the first cluster.
Buck Eye rot (<i>Phytophthora parasitica</i>)	The rotting area on fruits appears water-soaked, not dark in colour. The rot develops where fruit touches the soil. The spot enlarges and develops concentric rings resembling buckeye.		- Removal of affected fruits - Proper staking to keep fruits out of contact with the soil.
Tomato Fruit borer (<i>Helicoverpa armigera</i>)	Young larvae feed on tender foliage, mature larvae bore circular hole, thrust only a part of their body into fruit and eat the inner content.		- Spraying of 5 % Neem seed kernel extract to kill early stage larvae. - Spray of Cypermethrin 10 EC @ 2ml/ L at fruit development followed by repeated sprays at 10 or 15 days interval.
Cut worm (Variegated: <i>Peridroma sauci</i> , Black: <i>Agrotis ipsilon</i>)	Cutting off of seedlings in nursery or shortly after transplanting		- Field sanitation, flooding of field to collect floating worms <i>Bacillus thuringiensis</i> application to soil - Soil treatment with Chlorpyrifos 1.5% D dust and broadcasting with Carbofuron 3G or Cartap hydrochloride @ 25- 30 Kg/ha



HARVESTING

Harvest the fruits in bunches or individually, preferably with calyx intact in the early morning to avoid excess heat buildup that will increase the respiration rate in fruits during transportation and marketing. The increased respiration shortens shelf life, which affects both grower and consumer. Harvesting is done at different developmental stages of the fruit depending on distance of the market. For local market, cherry tomatoes are best harvested at pink or light red stage and for distant market at color break or turning stage. Harvesting at ripe and fully ripe stages is best suited to local processing markets.





POST HARVEST HANDLING

After harvesting, tomatoes should be properly washed with tap water and dried in shade before packaging. Washing removes any chemical residue and reduces microbial load on the fruit skin, if there is any. This enhances its shelf life and wholesomeness. Ensure proper grading according to fruit size, shape, color and quality. Fruits can be minimally packaged in plastic pouches/ bags or more ornately in plastic or PVC bowls, punnets and trays. Cardboard/corrugated cartons provide more protection during long distance transportation. Both these practices protect commodity, enhance its attractiveness and fetch higher prices in market.



Bag/pouch



Bowl



Tray



Punnet



Carton

ACKNOWLEDGEMENT

We are highly grateful for financial help provided by ICAR-Central Institute of Temperate Horticulture, Srinagar for the publication of this booklet.

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PUBLISHED BY :

DIRECTOR, ICAR-CENTRAL INSTITUTE OF TEMPERATE HORTICULTURE,
Old Air Field, Rangreth, Srinagar-191132 (J&K), Ph: 0194-2305044

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