

Pusa Tomato (Protected)-1: New promising tomato variety for protected cultivation

Pusa Tomato (Protected) -1 is the first indigenous open pollinated variety of polyhouse tomato, suitable for naturally ventilated polyhouse / protected cultivation. It is characterized by completely dark green stem, indeterminate growth habit, and straight plant flowering at every 3rd node petiole. The average vine length ranges between 8-10 m with an average flower truss of 9-10. The leaves are dark green with medium lobes and serration. The flowers are yellow coloured, whereas the fruits are round, deep red in colour with an average fruit weight of 80-85 g. The ripe red fruits have TSS 5.6° brix and lycopene content 8.0 mg/100 g. The fruits get ready for first harvest is about 80-85 days after transplanting and the crop duration may last 270-300 days, depending upon the climatic condition of the area. The fruits possess thick flesh, and hence are suitable for long distance transportation. The average yield / m² is about 12-14 kg in 9-10 month crop duration. The average yield potential is 120-140 q in 1000 m² area.

WITH the release of this variety, the long-standing farmers' demand of for an exclusively improved variety for Polyhouse Tomato, will be met. As there was no indigenous variety of polyhouse tomato, the seeds of polyhouse tomato varieties in the country were imported and sourced from the private sector, whereas demand of such varieties is increasing day by day due to increase in area under low cost polyhouses. This variety is recommended for cultivation in National Capital Region of Delhi under naturally ventilated and environmentally controlled greenhouse conditions from Mid-August to Mid-May. Hence, the polyhouse/net house tomato growers will be benefitted immensely because of its yielding ability and feasibility of seed production in the North Indian plains. Moreover, it is characterized by highly desirable marketable attributes like attractive red colour, high TSS, non-cracking of fruits up to picking stage, uniform ripening, thick pericarp having smooth surface and good keeping quality.

Package of practices for Polyhouse condition

Climate

It requires relatively warm season for its growth and development. The ideal night and day temperature for fruit set and colour development is 20-25°C.

Soil

Well drained sandy loam soil is ideal for growing good crop, with pH preferably between 6-7. This variety is responsive to normal soil fertility status.

Sowing time

It can be grown round the year under fully controlled environment polyhouse, whereas transplanting is done in September and crop may last up to May under naturally ventilated polyhouse / low cost polyhouse structures.

Seed rate

The seed rate is 125 g /ha; 10-12 g seed is sufficient for growing a commercial crop in 1000 m² greenhouse.



Pusa Tomato (Protected)-1



Field view



Mature fruits of Pusa Tomato (Proected)-1

Nursery raising

For nursery raising, seed should be sown in an insect proof nursery/in multi-celled plug tray using soil-less medium (cocopeat, perlite and vermiculite mixture) in July-August for the production of healthy and vigorous seedlings. The protrays should be kept inside the polyhouse/insect proof net house. One seed should be sown in each hole of protray during second week of July to August after treating with thiram @ 3 g/kg seed. Subsequent to sowing, light irrigation should be given immediately by watering can containing Captaf @ 2 g/litre of water. Afterwards, the protrays are piled on each other and the upper one is covered with an empty protray. The seeds start germinating 45 days after sowing and the protrays are spread over benches or floor. In soilless medium, nutrients are applied in the form of water soluble fertilizers N:P:K (1:1:1), 16:16:16 grade @ 2 g/litre once a week through a fine sprinkler to maintain the uniformity in application of nutrients. After 22-25 days of sowing, when the seedlings attain a height of 10-12 cm and four true leaves have emerged, they should be kept for hardening by withholding irrigation for 2-3 days. The hardening of seedlings before transplanting is very effective in reducing transplanting shocks, thus resulting in better plant stand establishment.

Transplanting

Transplanting should be done on both sides of 10 cm raised bed of 0.75 m width. There should be 30 cm distance between two beds. The 25-30 days old seedlings should be transplanted at 0.60 m distance within row on both sides of the raised bed. It should be planted under drip irrigation system for the efficient use of water and fertilizers.

Manure and fertilizers

Soil testing must be done to determine the soil fertility of protected environment and the deficient nutrients must be supplemented, as and when required. In general,

about 25-30 tonnes per hectare of well rotten farm yard manure should be added at the time of land preparation. In addition, 80 kg phosphorus and 90 kg potash are added before transplanting. Nitrogen (150 kg) is applied in split doses, one-third at the time of transplanting and other two-thirds in the form of four top dressings, first at 25-30 days after transplanting, second after 50-60 days after transplanting or flowering, third after first picking and after every picking later on. A mixture of micronutrients (especially calcium and boron) should also be applied at the time of flowering @ 0.5% water solution.

Irrigation

It is necessary to maintain uniform moisture supply, as overwatering is harmful. Water is essential at the time of flowering and fruiting, and adequate moisture facilitates better colour development. The frequency of irrigation during winter season is 8-10 days, whereas, irrigation is applied at 3-4 days interval during summer months, depending upon the weather conditions. If possible, drip system should be installed for efficient irrigation and fertigation. The use of black polythene for mulching helps in conservation of soil moisture and weed management.

Interculture

Weeds are often a limiting factor in tomato production as they compete for light, water, nutrients and space as well as harbour insect-pests and diseases. Frequent hoeing should be done as often as necessary to control weeds. The bed should be drenched with Stomp @ 2 ml/litre solution before mulching and transplanting for controlling pre-emergence weeds.

Training, pruning and trellising

Staking is an important operation for tomato under protected condition. Staking should be done 20 to 25 days after transplanting. The plants should be loosely tied on vertical stakes and the timely staked plants produce better fruits, qualitatively and quantitatively.

All the side branches should be removed/pinched at early stage to maintain a single stem. The plants are supported by plastic wires or blinder twine loosely anchored with plastic clip at base of plant to overhead support wires running along the length of rows in a bed. The overhead wires running over the rows of the bed are fitted at 8 to 10 feet height and firmly supported with structures. The stem /vine of plant is either fitted in a round plastic clip of 1 inch diameter with hanging twine or twine is wrapped around a stem below the leaves clockwise, leaving top 15 cm shoot of the growing plant. The regular pruning of side shoots should be done for entire crop duration. After first harvest, the leaves touching the ground (up to 1 feet from ground) should be removed, which improves air circulation and reduce disease incidence. The crop should be vertically trained and regularly pruned for better growth and yield in green house cultivation.



Training of tomato

Pollination

Since tomato is a self-pollinated crop and produce bisexual flowers, normal flowering and fruiting takes place in sunny weather. However, supplementary pollination is recommended in green house during winter season for better fruit setting in foggy or cloudy weather, which is done by manual shaking or using an air blower or electric vibrator (during morning hours 10 to 11 AM and in the afternoon 2 to 3 PM) on alternative days.

Harvesting

Harvesting can be done 80-85 days after transplanting, depending upon end use of the harvested produce and time period during transit. The fruit are harvested at mature green stage for long distance transportation. For short distances, fruits are harvested at pink stage whereas, fully ripe, red coloured tomatoes are preferred for processing.

Average yield

The crop yield depends on climatic factors and cultural practices. However, average fruit yield of around 120-140 q can be realized in 1000 m² area of polyhouse.

Plant protection

The warm humid conditions and abundant food under protected condition provide an excellent and stable environment for pest development. Hence, frequent sanitation, soil solarization, mulching and fumigation are done to manage the pests under protected conditions. Major pests of tomato under polyhouse include whiteflies and mites, which enter due to frequent entry of workers

in the polyhouse. Nematode is also a major problem in polyhouse. The polythene used as cladding material should be UV stabilized with 200-micron thickness. Similarly, insect proof net should be of 40 mesh size. The construction of a screen foyer to create a double door entry may partially resolve the problem of wind-borne insects. Our major emphasis should be to prevent the entry of pests inside the protected structures. The seedlings should be raised in a protected environment for transplanting. The lower or damaged leaves should be removed to make ground clear for proper ventilation and also to avoid spread of pests. For whiteflies, aphids and leaf miner adults, yellow sticky cards (8" × 12") should be placed @ 5 card / 100 sq. m. area for control of pests, which may be hanged in the crop with the help of a string about 4 - 6" above the plant canopy. As the crop grows, the card can be moved up or may be changed when more than 60-70% of the area is covered by trapped insects. For effective management of insect-pests and diseases, integrated management (IPM/ IDM) strategies should be followed. If required, apply Dicofol @ 2 ml per litre and Trizophos 0.3 ml/litre of water to control mites and whiteflies, respectively. For fungal diseases, soil drenching with a solution containing mixture of 1g carbendazim and 1 g mancozeb per litre of water can be applied.

For further interaction, please write to:

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