

Extension Folder

**Utilization of True Potato Seed for Potato
Production
in
North-Eastern States of India**



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UTILIZATION OF TRUE POTATO SEED (TPS)

Potato is traditionally grown vegetatively through seed tubers. This results in continuous accumulation of tuber borne diseases especially viruses in seed tubers and consequent reduction in crop yield. To maintain high yields the potato varieties released from time to time need constant support of a well developed disease free seed production programme. To overcome various problems associated with traditional system, a new potato production technology making use of true potato seed (TPS) has been developed by Central Potato Research Institute (CPRI), Shimla and International Potato Center (CIP). The results have shown that TPS could serve as a low cost and highly productive material for raising commercial potato crop in areas especially NEH region, where availability of good quality seed tubers at reasonable price is a major constraint. TPS could be used as an alternative technology to increase productivity and reduce the cost of potato production in NEH region. The technology of potato production through TPS has been found suitable for adoption in all the potato growing areas of the country.



CROP PRODUCTION USING TPS

Two methods of raising a commercial potato crop from TPS are described below:

- A) Using seedlings as planting material
- B) Using seedling tubers as planting material

Potato production through seedling transplants

This method is successful where irrigation is assured and winters are mild. Assam and Tripura in NEH region are suitable for growing potato crop through seedling transplants.

The procedure followed is as under:

Preparation of nursery beds

- i) About 125 g TPS and a nursery area of 75 sq. m is required for raising seedlings for transplanting in one hectare.
- ii) Mark the nursery bed area keeping its breadth as 1 m and the length as per convenience. Remove 2-3 inches of top soil from the area marked for preparation of nursery bed.
- iii) Prepare substrate by mixing soil and well decomposed FYM or

compost or bio-gas slurry in 1:1 (v/v) ratio. Use a higher proportion of FYM for heavy or sub soils. Add chemical fertilizers @ 4-5 g N, 6-8 g P₂O₅ and 10 g K₂O/m² in the substrate and mix well.

- iv) Fill the lower 7-8 cm depth of the nursery bed with the above substrate. Cover the top of nursery bed with 2-3 cm thick layer of sieved FYM. The height of the bed is thus raised to about 10 cm from the field level. Put border around nursery bed using bricks or any other locally available material to avoid washing away of soil.

(In areas where brown rot is endemic, the seed bed should be raised by about 25-30 cm above the field level so that the seedlings do not root in the native infested soil and for substrate preparation use sub-soil taken from 2 feet below top soil)

Seedling raising

- i) Sowing of TPS early in the *rabi* season in the plains may be done when minimum daily temperature is around 20±2°C.
- ii) The freshly extracted seeds have a dormancy period of 5-6 months. Fresh seeds, therefore, need to be treated with 1500 ppm Gibberellic acid (GA₃) solution (150 mg Gibberellic acid in a few drops of alcohol and final volume made up to 100 ml by adding water) for 24 hrs for releasing the dormancy.
- iii) Remove the seeds from Gibberellic acid solution, wash/ rinse with water and dry in shade.
- iv) Water the nursery beds lightly day before seed sowing. Hoe and level the beds next day to get the soil in proper texture and moisture level for seed sowing.
- v) Sow TPS either in 1/2 cm deep furrows drawn 10 cm apart across the breadth of the bed or thinly broadcast the seeds in nursery bed @ 2-3 g seeds/m² area and cover them with about ½ cm thick layer of sieved FYM.
- vi) Water seed beds gently using a sprayer or watering can until substrate becomes thoroughly wet and ensuring that seeds are not dislocated from their place and there should be no water run off.
- vii) Irrigate the seed beds 3-4 times a day (if not covered with mulch) for about a week after TPS sowing. Subsequently, spray water once or twice a day.
- viii) In areas where maximum day temperature is above 30°C, protect the nursery beds from direct sunlight by covering beds with hessian cloth or nylon net of proper mesh from 10 a.m. to 5 p.m. for 15 days after TPS sowing. Remove the covers after 15 days (preferably in the evening).
- ix) At 2 leaf stage onward, spray the seedlings on every 2-3 days with

0.1 % urea (1gm urea/lit of water) till seedlings reach 4-5 leaf stage which is ideal for transplanting.



Field preparation for seedling transplanting

- i. Pre-irrigate the field if needed. Apply FYM @ 20 t/ha and plough the field 3-4 times.
- ii. Broadcast half the dose of nitrogen (130 kg urea) and full dose of P_2O_5 (750 kg SSP) and K_2O (100 kg MOP) and mix these well in soil at the time of field preparation.
- iii. Level the field with wooden plank and make about 20 cm high ridges spaced 45-50 cm apart in East-West direction. Prepare long beds as these facilitate seedling transplanting. The beds can be subsequently divided into smaller units to facilitate proper irrigation. Provide a 45 cm wide path/irrigation channel after each bed.
- iv. Irrigate furrows to $\frac{1}{2}$ the level of small ridges a day before transplanting of seedlings.



Seedling transplanting

- i. Remove seedlings carefully from nursery beds and carry them to the field in small baskets.
- ii. Seedling transplanting in field may be done preferably in the evening to reduce damage due to heat stress.
- iii. Transplant seedlings spaced 10-15 cm apart with the help of Khurpa (Hand held hoe) at the water mark on northern side of the ridge. Place the roots of the seedlings in well moist soil. Plant only one seedling per hill.
- iv. Give light irrigation in furrows immediately after seedlings

transplanting. Irrigation and transplanting are successive operations and are to be done row by row.

- v. Irrigate the furrows every third/fourth day till the seedlings are established. The frequency of irrigation, thereafter, can be reduced to once in 8-10 days.
- vi. Earthing up should be done after about 30-35 days of transplanting. Apply remaining half dose of urea i.e. 130 kg/ha at the time of earthing. Earthing up should be done in such a way that the seedlings come in the centre of newly formed ridge covering lower most 2-3 nodes with soil.
- vii. All subsequent cultural operations and plant protection measures may be taken as per cultivation practices for potato crop in the region.
- viii. Stop irrigation 10 days before dehaulming. Cut the haulms of the crop on the date recommended for dehaulming of the seed crop, if the produce is to be used for seed purposes.
- ix. Harvest the crop and grade the tubers in 10 - 40 g size for use as seed in the next season. The large size (>40 g) tubers may be disposed off for table purpose. Soak the seed tubers in 3% boric acid solution for 30 min., dry in shade and store in a cool place with proper ventilation.

Potato production from seedling tubers

This method involves two major steps, *viz.*, seedling tuber production and crop production using seedling tubers as planting material. The seedling tubers can be produced either by transplanting seedlings in the field or by direct seeding in the nursery beds. Transplanting method is successful only in few regions. Method of seedling tuber production in nursery beds has been found successful in all potato growing regions.



Preparation of nursery beds and sowing of TPS

- i. The same procedure as described for raising seedling transplants may be used for preparing nursery beds for seedling tuber production.
- ii. Sow TPS in the plains early in *rabi* season when minimum day temperatures are around $20\pm 2^{\circ}\text{C}$.
- iii. Irrigate the nursery beds a day before sowing of TPS. On the day of TPS sowing dig the beds with hoe and level the beds with

- wooden plank.
- iv. Mark 0.5 cm deep furrows in the nursery beds at 25 cm apart. Put 0.5 cm deep holes 4 cm across on the marked furrow. Sow 2-3 seeds in each hole. Cover the seeds with fine/sieved FYM.
 - v. Irrigate the seed beds using a sprayer or water-can ensuring that the soil is made thoroughly wet without any run-off of water.
 - vi. If the day temperatures are above 30°C, cover the nursery bed area with nylon net of proper mesh size to cut the solar radiation from 10 a.m. to 5. p.m. for next 15 days after TPS sowing. Leaf or straw mulch can also be used to protect the beds from direct sunlight and heat stress if nets are not available. This will hasten the germination by conserving moisture and reducing soil temperature.
 - vii. Irrigate the seed beds 3-4 times a day for about a week after sowing if beds not covered with mulch. Subsequently, do watering once or twice a day and keep the nursery beds moist.
 - viii. Spray the seedlings with 0.1 % urea (1 g urea/ litre of water) on every third or fourth day, starting after 15 days of emergence.
 - ix. When seedlings are about 8-10 cm in height or have 4-5 leaves, thinning may be done by uprooting extra-seedlings and leaving one seedling per hill. Extra seedlings may be transplanted elsewhere or used for gap filling to maintain a density of 100 seedling/m² in 25x4 cm inter & intra-row spacing.
 - x. When the seedlings attain a height of about 15 cm, cover the lower most 3 nodes of the seedlings with soil of inter row space divulging half of it on either side. Thus making ridges and furrows in place of flat bed. Add remaining dose of nitrogen well mixed with soil of inter-row space while earthing.
 - xi. Follow usual cultural practices like flood irrigation, weeding *etc.* from time to time.
 - xii. Stop irrigation and cut the haulms on the dates recommended for seed crop in the area.
 - xiii. Harvest the seedling tubers after about 12-15 days of haulm cutting and grade the tubers in four grades *viz.* below 5g, 5-10 g, 10-20 g and above 20 g.
 - xiv. Treat the seedling tubers by soaking in 3% boric acid (30g boric acid/1 litre of water) for 30 minutes, dry and store these for use as *seed* in the following season.
 - xv. Plant the seedling tubers below 5 g size in production nursery beds *next* year. Use other grades for planting in field using normal practice.

Crop production in field

- i) Use the seedling tubers produced in the previous crop season as seed for raising the commercial crop for ware use.
- ii) For mechanical cultivation, keep the inter-row distances at 60 cm and for manual cultivation at 45 to 50 cm. Keep the intra-row

distance (plant to plant distance in a row) according to the size of seedling tubers.

- iii) Follow all the cultural and manurial practices for raising the crop as recommended for the region.
- iv) Follow the seed plot technique *viz.* timely spray of insecticides and haulm cutting before the critical level of aphids is reached in the crop, as the produce is to be used for seed purposes. Production of seedling tubers may be done simultaneously every year for use as healthy planting material in the following crop season. This cycle may be used continuously to harvest rich crop.



TPS Source

Besides, limited quantities from Central Potato Research Institute and its stations at Shillong, Patna, Modipuram, TPS can be obtained from:

1. Director, Horticulture, Govt. of Tripura, Agartala – 799 001.
2. M/S Bejo Sheetal Seeds Pvt. Ltd. PO Box 77, Jalna – 431 203, Maharashtra.