

## IMPORTANCE OF TRUE POTATO SEEDS (TPS) NURSERY

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Spanish explorers first introduced potatoes to Europe in the sixteenth century. Potatoes are annuals and require a frost free growing season of 90-120 days. The ideal climate is a cool summer, especially at the end of the summer when potatoes reach their maturity. Plant early potatoes just before the last killing frost when soil can be worked, usually about 450F.



Potato has emerged as an important cash crop, which is not only grown, as vegetable but also has become staple food crop in many countries. As a crop, it can yield up to 15-25 tones/ha and is amongst the most promising food crops, particularly for areas of high human population density like Asia. It produces well-balanced protein and more calories per unit area and per unit time than any other major food which makes it the most suitable non-traditional crop to ward off hunger.

In order to optimize potato productivity and quality, various aspects of production chain should be considered in an integrated way. These aspects include potato seed quality, soil quality, irrigation management, fertilization techniques, forecasting of pests and diseases, as well as determination of proper planting dates. The traditional method of planting potato crops is to use whole or sectioned tubers. The use of tubers as seed, compared with the normal practice of planting botanical seed, presents problems for potato production that generally are more serious in developing countries than in developed countries.

Tubers are bulky and perishable, requiring costly storage, handling, and transport. In tropical zones, with year-around high temperatures, storage is a major constraint, often requiring expensive refrigeration. In the tropics, seed tubers are often imported or produced at great distances from production areas. Tubers also carry with them a number of diseases from one generation to the next, a particularly acute problem in the tropics.

Most food crops are planted with seed that has been produced by the pollination of flowers and the subsequent development of the seed in the flowers or the fruit of the plant. This botanical or “true” seed is free of most of the

problems and expense of tuber seed. The true seed is light in weight, easier to store, much less expensive to handle and transport, and relatively free of disease.

Potato seed as is used in common parlance refers to the modified vegetative stem, which is its storage organ but is also used for propagation. However, potato also produces fruits and seeds as in the case of other solanaceous crops such as tomato, brinjal, chilli, capsicum etc. This seed was not normally used for raising a crop due to it being more delicate than other similar seeds. Therefore, except for breeding purposes where special care was taken to raise the seedlings, the true seed of potato was not used. However, as the cost of cultivation increased and profit margins decreased, research to use TPS for raising a crop was intensified. This was because use of TPS has several advantages. Exploitation of the advantages is expected to make potato cultivation profitable and help extend its cultivation to other areas. However, use of TPS also has many constraints, which have to be overcome before a crop can be successfully raised from TPS. Most importantly, the agronomic practices for the utilization of TPS have to be standardized. Presently its use either for transplanting or for producing seedling tubers, which in turn can be used as seed, has been advocated. Many TPS families possessing favourable traits have been recommended for cultivation. Success of TPS technology is expected to boost potato production in the country.

The total cost of production for potatoes in developing countries tends to be high, relative to developed countries and the cost of seed often reaches 75 percent of all production costs. To avoid these costs, farmers save tubers from a ware crop for seed in their next crop. This practice, common in India, leads to loss of vigor (phenotypic deterioration) and the transmission of diseases. Availability of good quality, low cost seed tubers is the major constraint to the expansion of potato production in the developing countries, including India.

### Advantages of TPS:

- Except for potato virus T (PVT) and potato spindle tuber viroid (PSTVd) no other major pathogen is transmitted through TPS as they are filtered out during

pollination and fertilization. Therefore use of TPS is expected to mitigate the problem of degeneration.

- The tubers which are used presently as seed would be released for consumption since they no longer would be required for planting and thus more produce would be available for consumption.

- Cost of planting material produced through TPS is approximately one-tenth of the cost of quality seed tubers and this is expected to decrease the cost of cultivation.

- TPS with 3-5% seed moisture can be stored for many years under ambient conditions in dark with practically no loss in germination ability at least up to 5 years which is expected to reduce cost on storage.

- Only 100 g of TPS can replace 2-3 tonnes of seed tubers required for planting one-hectare land therefore transportation problems would be mitigated.

- TPS crop possess multi-line effect, consequently less amount of pesticides is needed in TPS crop. Thus TPS is not only cost effective but also environment friendly.

#### Constraints of TPS:

TPS presents following disadvantages, which have been the major bottlenecks in adoption of TPS technology.

- Raising a crop from TPS requires more labour and greater skill. Therefore it has not found favour with farmers.

- TPS produced crop takes about 20-25 days more for maturity compared to that from seed tubers.

- Potato seedlings are vulnerable to environmental stress and need more care/labour input especially during the initial phases of growth and establishment in transplanted crop.

- Crop from TPS populations are less uniform in plant type/maturity, tuber shape, size and dry matter. Varieties are highly heterozygous and therefore show high variability from one generation to the next.

- The lack of sufficient quantity of quality seed is a major bottleneck to improve potato productivity and quality.

- New seed must be introduced every year.

- True potato seed is not known to be used anywhere for the commercial production of ware potatoes.

- The only practical applications are in breeding programs, family gardens and to a limited extent, seed multiplication programs.

- As one might expect, interest in true seed technology is very high among plant scientists who work with potatoes, especially in the developing countries where the problems and costs associated with tuber seed represent a major constraint to potato production.

- True seed is not directly sown in the field because of the demanding requirements for soil condition, temperature, and moisture to achieve adequate germination and early plant vigor.

#### True Potato Seed (TPS):

The shortage of good quality seed tubers, high seed cost, transportation of bulky potato seed, and virus infiltration in seed tubers are some of the important problems associated with use of seed tubers as planting material.

To overcome the above problems True Potato Seed (TPS) is used as planting material. TPS is a botanical seed developed in the berry of the plant as a result of fertilization. The technology basically consists in production of TPS and raising commercial potato crop from it. It has been shown that the use of TPS seedling transplants and seedling-tubers as seed are economical and successful approaches to commercial potato production. In TPS technique, the normal seed rate (2.5 t/ha) of potato is drastically reduced to only about 200g of TPS, thereby, saving huge quantities of food material for table purposes. About 40-50 g of TPS costing Rs.3000/- is sufficient to

plant one hectare of potato as against 2-3 tonnes of seed tuber per hectare costing Rs.20,000-30,000/-

Potato crop can be raised from TPS using seedling transplants or through seedling-tubers produced in preceding crop season. In former method, the TPS seedlings raised in nursery beds are transplanted in the field and grown to maturity. While, in latter, the TPS

seedlings are grown to maturity in nursery beds to obtain seedling-tubers. These seedling-tubers are used as a seed for raising normal potato crop in next season.

TPS technology is likely to gain momentum in future particularly in the non-seed producing areas viz. Karnataka, Maharashtra, Madhya Pradesh, Orissa and the states of north-eastern region where good quality seed tubers are either not available or are too expensive.

#### Conclusion:

Potatoes have a high nutritional value compared with other staple commodities. They also have the potential for very high yields per unit of land and water and a high return on labor and capital. If the constraints of tuber seed could be reduced or eliminated by introducing true seed technology, potato production in developing countries such as India would become considerably more profitable for farmers and the total production of potatoes would increase, contributing significantly to national food production and nutrition.

