

POTATO CULTIVATION IN NORTH EASTERN HILLS

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CULTIVATION PRACTICES

North-eastern India comprises, Assam, Meghalaya, Manipur, Tripura, Nagaland, Sikkim, Arunachal Pradesh and Mizoram. The topography of the region is variable consisting flat plains, undulating hillocks, hills, high plateau and mountains. The area under potato in North-eastern India is about 70,000 ha. Of this, about 50,000 ha is in the plains where potato is grown during winter months (November-March) and the rest in the hills where it is grown under the longer days of spring, summer and autumn months. In the hilly areas, the potato is raised as a summer (March-July) autumn (August-December) crop. The yields are generally higher in the summer crops. The present bulletin deals with the cultivation practices and package of practices of potato cultivation in north-eastern Indian hills.

The annual rainfall of north-eastern hills region varies from 1000 to 4450 mm. The rainy season spreads over six months from April. High rainfall and humidity coupled with acidic soils present a distinct agro climatic condition for potato cultivation. The high rainfall and humidity and moderate temperature conditions are congenial for the development of several potato diseases and luxuriant weed growth, both of which affect potato cultivation. The traditional but unscientific method of shifting cultivation or *jhooming* is still practised in this region. The practice promotes soil erosion and loss of soil nutrients.

MAJOR PROBLEMS Late blight and brown rot diseases are the two major diseases limiting potato cultivation in this region. Late blight in the summer crop appears after mid May after the onset of monsoons. It kills the foliage of the crop and also infects the tubers. The period from second week of May to fourth week of August is favourable for the development of brown rot disease due to the prevalence of high temperature and high soil humidity. Infected tubers and soils are primary sources of the diseases. Among insect pests, cutworms and white grubs are the major ones causing severe damage throughout the region and potato tuber moth in Meghalaya.

RESEARCH ACHIEVEMENTS

The Central Potato Research Station (CPRS), Shillong was established in 1959 to conduct research on the regional problems of potato cultivation. It is one of the 11 stations of CPRI, Shimla. It is located at an elevation of 1800 meters above Mean Sea Level. Its farm area is 12.8 ha. The CPRS, Shillong is engaged in multi-disciplinary research on (i) breeding for high yielding, late blight and brown rot resistant varieties suitable for the region; (ii) developing suitable agronomical and manurial practices; (iii) conducting basic studies on the prevailing diseases and pests of potato, with special reference to late blight and brown rot diseases and potato tuber moth; and (iv) producing breeder seeds of potato required for the region. The station has evolved a few hybrids which combine high yields and variable degrees of resistance to late blight and brown rot. Four of them are SS/C 562, 606, 1025 and 1101. Recent work carried out for the control of potato tuber moth indicated that the leaves of *Lantana* and *Eucalyptus* plant have possess repellent action.

Under indigenous storage conditions covering of the tubers with dried and crushed leaves of *Lantana* reduced the tuber and sprout damage to 5% and 3% as compared to over 70% and 45% respectively, when no treatment had been given. Since these plants are readily available in the region, they may be collected

by the farmers without any difficulty. They are easy to use for protecting potato tubers against tuber moth. Work carried out on soil fertility aspects has shown that most of the areas of Meghalaya, Manipur, Tripura and Arunachal Pradesh and more than half the area of Mizoram are deficient in phosphorus. This is the result of the acidic nature of the soil and the presence of exchangeable aluminium. The soils of Tripura, Nagaland, Arunachal Pradesh and Meghalaya are low to medium in available potassium.

Work on aphid vectors showed that autumn potato crop is more suitable than summer crop for seed production in Meghalaya because the aphid population remains low. Besides, manurial and cultural practices for optimum potato production, management practices for controlling of brown rot disease have also been worked out.

RECOMMENDED PRACTICES OF POTATO PRODUCTION

1. Cultivars

Kufri Jyoti and Kufri Khasi Garo are recommended for main and autumn crops.

2. Seed source

Seed should be procured from a reliable source, preferably from a government agency. It is better to replace the seed every 3-4 years.

3. Seed size

Best seed size for raising summer and autumn crops is 40-50 gm.

4. Seed preparation Seed from the previous year's harvest should be kept in seed trays or baskets or spread out on the floor or on racks in a store and exposed to natural diffused light to ensure proper sprouting.

Unsprouted and rotten tubers are sorted periodically. The sprouted seed tubers should be taken to the fields in trays for planting to minimize sprout damage. Seed should not be kept in gunny bags as it results in production of lanky, fragile and etiolated sprouts.

5. Planting time The main crop is planted in the first fortnight of March and autumn crop is planted in the last week of August to first week of September.

6. Manuring

Apply @ 100 q/ha farmyard manure (FYM) in furrows before planting. Apply 75 kg nitrogen (3.75 q ammonium sulphate or 3 q calcium ammonium nitrate), 120 kg phosphate (7.5 q single phosphate) and 60 kg potash

(1 q muriate of potash) per hectare. The fertilizers are mixed and applied in furrows at the time of planting.

At the time of earthing up, apply an additional dose of 25 kg nitrogen/ha (1.20 q ammonium sulphate or 1 q calcium ammonium nitrate). The furrows should be covered with soil to avoid direct contact of the tubers with the fertilizers.

7. Method of planting

Make furrows against the slope keeping 50 cm distances between the rows. *It is important to make the furrows and ridges against the slope to avoid soil erosion.* Place tubers in furrows keeping 20-25 cm distance between tubers depending upon seed size. Cover the seed tubers with soil immediately after planting, making ridges to a height of 8-10 cm.

8. Interculture

Weeding should be done as soon as the weeds appear. The final earthing up should be done when the plants are 10-15 cm high. While earthing up, the remaining dose of nitrogen (25 kg/ha) should be applied.

9. Plant protection measures

- (a) *Control of insect pests:* Occasionally cutworms and defoliators damage the crop particularly during the dry season. If cut worm appear in significant numbers drench the ridges with Chlorpyrifos (Dursban) 20 EC @ 2.5/ha in 800-1000 liters water. For controlling defoliators and leaf eating caterpillars, spray the crop with endosulfan @ 1.5 a/ha or with carbaryl @ 2.5 kg/ha in 1000-1200 liters water. If needed, additional sprays should be given. *Chlorinated hydrocarbon insecticides*

(e.g. Heptachlor, Aldrin) dust should not be applied because of residual toxicity problems.

Potato tuber moth (PTM) damages the potato both in the field and in the store. To control tuber moth in the standing crop, spray the crop with carbaryl @ 2.5 kg/ha in 1000-1200 liters water. In Country stores, the tubers should be covered with dried and chopped leaves of *Lantana* or *Eucalyptus* plant for protecting them from the attack of potato tuber moth.

- (b) *Control of fungal and bacterial diseases:* In the North-eastern hill region, fungal diseases such as late blight, *P. homa* and early blight damage the potato severely. To control them periodic sprays with 0.2% solution of mancozeb at 8-10 days interval should be given from mid May. While spraying, it should be ensured that the lower surface of the foliage is thoroughly drenched with the fungicide solution particularly when sprayings are done during rainy days.

Brown rot is another important disease in North-eastern hill region. Infected seed tubers and soil are the primary sources of infection carrying the disease from one season to another. It is, therefore, important that healthy seed, free from brown rot infection, is used for planting. The severity of the disease can be reduced by planting the crop between the second weeks of February to first week of March and harvesting before first week of June. Apply bleaching powder 12 kg/ha mixed with fertilizer at planting. The incidence of this disease can also be reduced by adopting crop rotation with maize. Soil burning is also recommended for sick soils infected with this disease.

10. Harvesting

Crop should be harvested as soon as it matures. Harvesting should be done preferably on bright sunny days. All the damaged and rotted tubers are sorted out and marketable tubers are graded in different sizes, packed in gunny bags and keep in cool place till it is marketed.

SEED POTATO PRODUCTION

If a seed crop is to be grown, the following extra steps should be followed in addition to the above practices:

1. Apply a granular systemic insecticide such as phorate (Thimet 10 G @ 10 kg/ha) at the time of earthing up to prevent infestation by aphid vectors.
2. Spray the crop with dimethoate @ 1.0 l/11a in 1000 liters water when the aphid count reaches 3 aphids/100 compound leaves. This happens usually by the first week of May. Repeat the spray at 10 days intervals according to the aphid build-up.
3. During the growing season, the seed plot should be inspected twice or thrice to remove all off-type and diseased plants showing mottling, mosaic, crinkle, necrosis and leaf rolling symptoms. The first inspection may be done when the plants attain 10-15 cm height and the second at flowering stage. During the later stages of the crop, if plants show any symptoms of purple top roll, they should be also removed along with the tubers.
4. Towards the beginning of June, cut the haulms at the ground level. At this time, the crop also starts maturing. The cut haulms should not be left as such in the field. Ensure that there is no growth on stumps after dehauling as tender and succulent leaves are even more attractive to the aphids.
5. Harvest the crop when the skin of the tuber has become firm. Harvesting is best done on sunny days. Sort the tubers according to their sizes, preferably into four grades-small, medium, large and extra large depending upon their weight and diameter.

11. Seed treatment

After grading, wash the tubers in water. Then dip the tubers in 1% chlorocin solution followed by rinsing in water and treating in 3% solution of boric acid for 30 minutes to control surface borne diseases. The solution for this treatment can be used 20 times if the tubers have been thoroughly washed. After the treatment, ensure that the tubers are dried properly. Pack the seed tubers in gunny bags with proper labelling for marketing as seed. Treated tubers being poisonous should not be used for table purposes.

6. Keep your own seed from your produce. Such seed should be stored in wooden trays of convenient sizes or baskets or spread on floor in well-ventilated rooms. To avoid tuber damage from tuber moth in the store, cover the potato tubers with a thin layer of dry sand and dust it with 1 % Malathion dust. Seed potato should not be stored in gunny bags as it encourages development of etiolated and lanky sprouts. Only seed potatoes should be treated with Malathion. Such treated potatoes should not be consumed.
7. If the seed is meant for sale, the State Seed Certification Agency should be consulted before taking up the planting.

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