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Compiled by : H S Chauhan

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Potato cultivation in Nilgiri hills

Cultivation practices

The potato was first introduced into Ootacamund in the Nilgiri hills by John Sullivan an Englishman in 1822. The Botanical Gardens, Ootacamund gave a boost to its cultivation in this region in 1848 by supplying seed to the cultivators. By 1876, potato was being grown in about 300 hectares in the area. Thereafter, the area under cultivation of potato began to increase steadily. At present, potato is cultivated in Nilgiri hills in about 7000 hectares out of a total of 13,000 hectares under this *crop* in Tamilnadu state. The temperature in the Nilgiri hills remains mild throughout the year (mean maximum about 30° C; minimum zero°C) with about 1400 mm annual rainfall. These conditions are congenial for potato production almost round the year.

The soils in this region are mostly red-laterite formed from lateritic rocks. They are generally poor in plant nutrition. In some part black soils also occur. They are highly acidic (pH 4.6) and contain large amounts of iron and aluminium, which render the phosphate unavailable to the plants. The texture varies from sand to clay, the soil being mainly loamy. The soils are well drained because of the
Topography.

In the Nilgiris, the potato is cultivated almost round the year. During summer, autumn and winter. Often two crops of potato are taken on the same land in one year. The summer or main crop (March-April to August) occupies the largest area. This crop is dependent on the southwest monsoon. The autumn crop (August to December) is raised during the northeast monsoon. Both these crops are rain-fed. The winter crop (January-May) occupies a small area. It is raised under irrigated conditions. Presently, the area under this crop appears to be increasing.

Major problems

Generally, the seed harvested from the winter crop in May is used for planting the autumn crop in August and the produce of this crop is used for planting the summer crop in April. The seed from the summer crop harvested in August is stored for about five months and utilised for planting the winter crop in January. The winter crop does not provide sufficient seed for the autumn crop due to two main reasons: (1) The area under this crop is small. (2) due to prevailing prices during May-June in the Nilgiris, the cultivators sell most of their produce as table potatoes. Thus, obtaining seed for the autumn crop is always a problem to the farmers.

Late blight disease and cyst nematodes are the two major problems limiting potato cultivation in this region. Late blight was first recorded in these hills during 1870-1880, but it was not a major problem till the 1960's. During June 1961, the disease appeared in an epiphytotic form, and since then, it has become a major constraint in potato productions in the summer and autumn crops. The south-west monsoon beginning in May increases the humidity and this enhances the development and spread of late blight disease.

The presence of cyst nematodes in this region was first noticed in 1961. At present, they are estimated to be present in about 3050 hectares in the Nilgiris. Cyst nematodes are very difficult to control since the cysts can remain viable in the soil for 10-15 years. To prevent further spread of the malady, the Tamilnadu government has banned the movement of seed potatoes from the Nilgiris since 1971. In addition to these two maladies, the potato tuber moth and brown rot disease are also prevalent in this area, but they do not as yet pose any major problem to potato production.

In the early decades of this century, imported cultivars such as Great Scot, Red-eyed President, Rose-Mary, Holland, etc. were being cultivated in the area. All of them are early maturing

Cultivars possessing only short dormancy and are susceptible to late blight disease. The high yielding late blight resistant cultivars evolved by the CPRI are now being increasingly cultivated in the Nilgiris.

Central Potato Research Station (CPRS) Ootacamund

This Station was established in April 1957 to conduct research on regional problem and meet the seed needs of potato cultivation in south India. It is one of the eleven research stations of CPRI, Simla. It has a farm of 16 hectares area. The Research Station is located 8 km from Ootacamund on the Ootacamund-Emerald road near Muthurai village and its elevation is 2130 meters above MSL. The average maximum temperature ranges from 8.4 to 25.0°C and the minimum from 1.5 to 10.6°C. The annual average rainfall is 1430 mm. About 50% of this is received during the southwest monsoon Season.

The CPRS is engaged in multi-disciplinary research on: (1) breeding high yielding late blight and cyst nematode resistant varieties; (2) developing suitable agronomic and manurial practices; (3) conducting studies on diseases and pests of potato and evolving suitable management practices.

Research achievements

1. The CPRI has so far released for cultivation in Nilgiri hills three late blight resistant cultivars, Kufri Neela in 1963; Kufri Neelamani in 1968 and Kufri Muthu in 1971. In addition, the late blight resistant cultivar Kufri Jyoti bred originally for north Indian hills has become very popular in this locality also.
2. A culture SON-110 has been evolved which combines resistance to late blight and cyst nematodes and yields 15-25% more than Kufri Jyoti. This hybrid was tested in adaptive research trials in farmers' fields at different locations in the region.

3. The manurial and cultural practices for optimum potato production in this region have been worked out. These include the working out of the optimum dates of plantings for summer and autumn crops, the best seed size, and optimum seed rate and weed control schedules.

4. Several fungicides have been screened for the control of late blight.

5. Chemical control measures to minimize the damage caused by cyst and root knot nematodes, cut worms, camel beetle and tuber moth have been worked out.

RECOMMENDED PRACTICES

1. Cultivars: Kufri Jyoti is recommended for summer and winter crops and Kufri Muthu for autumn crop.

2. Seed source: Seed should be procured from a reliable source. The incidence of aphids, which are the vectors of viral diseases, is high in the autumn and winter crops and low in the summer crop. Hence, the product of the summer crop is a good seed source. If the farmers are using their own seed, it is better to replace it every 3-4 years.

3. Seed size: Best seed weight for raising summer crop is 50-60 gm, and for autumn crop, 25-40 gm.

4. Seed preparation: The seed should be kept in baskets or sprouting trays or spread in a store to ensure proper sprouting. Unsprouted and rotted tubers should be periodically sorted out. Sprouted tubers should be taken to the field for planting in baskets or sprouting trays only to avoid or reduce damage to sprouts.

5. Planting time: The best time for planting summer crop is 1-20th April, and autumn crop 1-20th August.

6. Manuring: Apply farm yard manure (FYM) @ 150-200 q/ha in furrows before planting. The best fertilizer dose is 90 kg nitrogen, 135 kg phosphate and 90 kg potash/ha. This amounts to 450 kg ammonium sulphate, 850 kg single superphosphate and 150 kg muriate of potash in one hectare. The fertilizers are mixed and applied in furrows at the time of planting.

7. Spacing: The best spacing for summer crop is 50 cm from row to row and 30 cm from plant to plant; for the autumn crop, it is 40 cm from row to row and 25 cm from plant to plant.

8. Planting depth: For the summer crop, it is 10 cm and for the autumn crop, it is 5 cm.

9. Seed rate: For the summer crop, it is 33q/ha and for the autumn crop, 25 q/ha.

10. Nematicide application: For controlling cyst and root knot nematodes, apply 10 kg Aldicarb 10 G per hectare in furrows at the time of planting. An additional dose of 10 kg could be given at the first earthing up time.

11. Method of planting: Make furrows against the slopes at the recommended distance. Apply the recommended quantities of FYM and fertilizer mixture in these furrows. Mix them in the soil with a hand *gudli* and apply the nematicide granules before placing the seed tubers at appropriate distance. Cover the tubers with soil by making small ridges of 10-15 cm height after planting.

12. Weed control: If weeds are a problem, spray the soil with Paraquat @ 1.5 litre/ha in 5000_litres water before emergence of the crop.

13. Cut worm control: If cutworm damage is noticed, drench the ridges with Chlorpyrifos 20 EC @ 2 litres/ha or Endosulfan 35 EC @ 1.25 litres/ha in 1250 litres water. This will also control camel beetles.

14. Late blight control: spray the crop with Mancozeb 0.2% at an interval of 7-10 days with the onset of monsoons. It should be ensured that the lower surfaces of the foliage are covered with the fungicidal spray. When spraying is done during the rainy seasons a sticker (Triton AE at 0.1%) may be used as an adhesive. This spray schedule will control other foliar diseases also.

15. Harvesting & marketing: The crop is harvested as soon as it matures. The harvesting should be done preferably on bright sunny days to minimize the soil sticking to tubers, as this soil may contain nematode cysts. If the crop is to be marketed earlier, the haulms are then cut and the tubers are allowed to remain in the soil for at least 10 days. This will help in curing the tuber skin. All the damaged and rotten tubers are sorted out and marketable tubers graded into different sizes, packed in gunny bags and kept in cool place till the produce is marketed.

16. Storage: Treat potato tubers with Quinalphos 1.5% @ 2.5 kg/ton to prevent tuber moth incidence.

17. Crop rotation: Adopt long term crop rotations with wheat cauliflower, carrot, peas, beans and green manuring crops like lupin and buck wheat to reduce cyst nematode and brown rot incidence.

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For further information, contact:

Scientist-in-Charge,

Central Potato Research Station,

Muthurai Ootacamund-643053.

Niligiri Hills, Tamilnadu ". Phone: 2320

Grams: POTA TOSEARCH, Ootacamund

Or Director

Central potato Research Institute, Simla-171001, Himachal Pradesh

Phone: 2088

Grams: POTATOSEARCH, Shimla Telex: 0391.240