



ADVANCED POTATO PRODUCTION TECHNOLOGY FOR EASTERN INDO-GANGETIC PLAINS OF INDIA



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INTRODUCTION

Potato cultivation is primarily practiced during the Rabi season in northern plains. In hills and southern India, it is cultivated as Kharif crop. The maximum contribution of production is shared by northern and Eastern Indo-Gangetic plains viz. Uttar Pradesh, West Bengal and Bihar. India is the second largest producer of Potato with production of 54.00 million tonnes from 2.16 million hectares area. The fertile lands of the state of Bihar in eastern Indo-Gangetic plains covers approximately 3.25 lakh hectares in the state, with an average yield of 17.5 tonnes/ha. In the state about 30-35% of the total potato area is under clones of indigenous potato varieties such as C-1,

C-40, C-140, Bhura Aloo, Lal Gulab, Phulwa while the rest area is cultivated with the improved varieties Kufri Pukhraj, Kufri Jyoti, Kufri Khyati, Kufri Ashok, Kufri Lalit, Kufri Surya, Kufri Mohan, and Kufri Chandramukhi. There is scope to cover 100% area with newly released improved varieties (Kufri Khyati, Kufri Uday, Kufri Neelkanth, Kufri Manik, Kufri Jamunia etc.) of potato and advance production technology in Eastern Indo-Gangetic plains of India.

Main Producing Districts

The main potato-producing districts in the state are Nalanda, Samastipur, Patna, Muzaffarpur, East Champaran, Siwan, Purnia, Katihar, Vaishali, and Bhojpur etc. Farmers in these districts have a



Photos: Important potato varieties

high demand for better-yielding varieties. Red-tuber potatoes are the most popular in the state and consumers often pay a premium price for them. Due to the favourable soil and climate, there is significant potential for increasing potato productivity in this region. The important practices like adopting scientific cultivation methods, farmers can achieve higher yields, leading to greater profits and economic prosperity. The main factor in every crop cultivation is selection of varieties, especially improved varieties and its agronomic practices.

incorporation of green manure can reduce chemical fertiliser application by 20-30% in the potato crop. Potato cultivation thrives best in sandy loam and loamy soils with proper drainage. Ploughing of the field with disc plough i. deep ploughing, followed by shallow ploughing are required for field preparation. After each ploughing, it is advisable to harrow the field to loosen the soil and keep it weed-free and levelling with plunker to retain available soil moisture in the field. After field preparation the ridges are made to sow the seeds, as seed is basic unit in crop production.



Seed tubers



Planting of potato on ridges



Close view of potato sprout

Improved Varieties

There is recommendation of varieties suitable for cultivation, the following high-yielding varieties in the state are performing well and give high yield under the existing climatic conditions.

Source of Pure Tuber Seed

The source of seed is always an authentic and reliable. Normally tuber seeds from reliable sources like ICAR CPRI, Shimla and regional stations, State Agriculture universities, state government agencies, seed-producing agencies will be procured and utilised for sowing of the crop. The Replacement of tuber seeds after 3-4 years is very essential to maintain the production. As using the same seed every year reduces the yield with passage of time due to reduction in purity in the seed lot. After procurement of quality seed, the important activity is preparation of the field for planting of the tubers are very important in potato cultivation.

Field Preparation

To achieve higher yield with lower fertilizer use, planting of green manure crops like Dhaincha (*Sesbania* spp), jute and moong etc. in the field play important in nutrient enrichment after allowing them to decompose properly and release beneficial plant nutrients in the soil. The

Seed Size

In potato cultivation the well-chitted whole or cut tubers weighing 30-40 grams are used for planting. However, it is preferred to use whole seed tubers as compare to cut tubers as they are sometimes carrier of viral diseases. It is important to note that the seed of cut tubers have 2-3 eyes, approximately 25-28 quintals of seed potatoes are required for sowing one hectare. For smaller tubers (15-20 grams) about 25-26 quintals of seed is sufficient to plant one hectare. The spacing between tubers depends on the size and weight of the tubers normally it is 15-20 cm. The seed preparation is very important activity in planting of potatoes.

Seed Preparation

The seed tubers from cold storage are taken to farm 15-20 days before sowing. After removing seed bags from cold storage, keep them in a cool ventilated room for at least 24 hours i.e. in pre cooling chamber. The Immediate exposing of cold-stored tuber to high ambient temperatures can cause potatoes to rot and decay very fast. These seed tubers spread in cool, shady, and well-ventilated area to germinate. The germination of tubers takes 7-10 days during this period the decayed, rotten, diseased tubers and non-germinated are sorted out and removed from the

lot. Before planting these tubers were transported carefully to the field i.e. in baskets or trays for sowing.

Sowing Time

The ideal time for sowing the main potato crop in the state is from the last week of October to mid-November. The time for sowing potatoes in different areas depends on the atmospheric temperature, soil conditions and availability of the land. In some areas the early crop is planted in the last week of September or the first week of October and late crop after the paddy harvest, in the first week of December.

Seed Spacing

The ideal weight of the tubers are 30-50 grams for planting of potatoes, the row-to-row distance should be 60 cm. The distance between tubers should be 20 cm. sometimes spacing is adjusted as per the size of the tubers. For larger tubers we can increase the spacing from 20 to 25 cm.

Manures and Fertilizer

The manures and fertilizers play very important role in plant growth and development. In potato crop cultivation if green manure is not used, then we may go for application of 20-25 tonnes FYM per hectare of decomposed cow dung manure. The cow dung manure should be incorporated thoroughly into the soil during land preparation. The use of chemical fertilizers should be based on soil testing, and soil type. The recommended fertilizer dose is 180 kg of nitrogen, 80 kg of phosphorus, and 100 kg of potash per hectare. Half of the nitrogen and the entire amount of phosphorus and potash should be applied during land preparation i.e. before formation of ridges for planting. The remaining half dose of the nitrogen should be applied during earthing up operation after weeding and hoeing interculture operation. The chemical fertilisers are applied carefully and they do not come into direct contact with the tubers.

Sowing Method

Apply fertilisers in the furrows and plant the seed tubers on ridges. If sowing is done with a tractor, maintain a row-to-row distance of 60 cm and a seed-to-seed distance of 20 cm. Cover the tubers with soil using a shovel. The tubers should be planted approximately at a depth of 7-8 cm. The planting of potatoes with a potato planter is best

as compare to manual planting. Care should be taken not to leave the tubers exposed on the soil surface after planting.

Irrigation

Irrigation plays important role in crop growth from germination to tuber formation and buking. Pre sowing irrigation is given for uniform germination. If this is not done, light irrigation is done after planting for good germination and growth. The amount of water application also plays important role in plant growth and development, the level of water applied will be two third height of the ridge and ensure the top one-fourth of the ridge remains dry. Subsequent irrigations should be done according to the soil structure, requirement and weather conditions. In sandy loam soil, irrigation is needed every 8-10 days, and in heavy soil, irrigate every 15-20 days. A total of 6 to 8 irrigations is required in potato crop from planting to harvest. The care should be taken before harvesting that field should have optimum level of moisture which can help in easy digging of the tubers. Normally irrigation is stopped ten days before the harvesting the crop.

Weed Control

The weeds are competitors of the planted crop they can be controlled by application of 0.5 litres of Oxyflurofen (goal) or 500 g of Metribuzin in 800 litres of water per hectare should be sprayed per hectare. Manual weeding can also be done by labourers but it is costly and there is scarcity of labours during cropping season. The first weeding can be done 25-30 days after sowing and the second at 45-50 days after planting. Using rice straw or wheat stubble as mulch on the ridges where the tubers are planted conserves moisture and suppresses weed growth.

Crop Protection

The important disease which can hamper the production of potato crop is late blight of potato. It is caused by fungus *Phytophthora infestans*. The planted crop is generally affected by late blight and *Phoma* blight in early December to January due to presence of fungus in the environment and conducive environment like cloudy weather and high humidity etc. In such a situation, crop can be saved by prophylactic spray of solution of 2.0 kg of Mancozeb in 1000 litres of water should be sprayed over one hectare of standing crop area. If symptoms of the disease appear, a solution of 2.5 kg of Carzet / Ridomil

containing cymoxanil in 1000 liters of water should be sprayed on the crop at 15-day intervals.

Pest Management.

Generally, pesticides should not be used in edible potato production. However, in certain circumstances, a solution of 3 ml of Imidacloprid in 10 liters of water can be sprayed on the crop. This controls the aphid. To protect crop against leaf-eating caterpillars, spray 1.2 liters of Monocrotophos 40 EC on the plants or 2.5 liters of Chlorpyrophos 20 EC in 1000 liters of water per hectare on the ridges can be used.

Harvesting

Harvesting is very important agronomic practice can be performed at crop maturity and at low temperatures (below 28°C). Proper care should be taken during harvesting with the help of spade, cutting of tubers should be avoided. The potato harvester can be used for efficient harvesting. After harvesting produce is spread in the shade and grading and sorting is done to remove diseased as well as cut rotten tubers. Potatoes for cold storage should be harvested in cool weather. Keep in mind that when temperatures exceed 28 degrees Celsius, the tubers begin to develop black rot (charcoal rot). After digging, avoid exposing the potatoes to sunlight and immediately stack them in a shady place.

Grading

Grading help in categorization of produce. In potato four grades are common very small (less than 30 g), small (30-50 g), medium (51-80 g) and more than 80 g are large tubers.

Production:

A good potato crop can yield 350-400 quintals/hectare, depending on the variety. The yield of different varieties varies from 250-400 as per performance of variety and crop condition with management.

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Local potato variety 'Badamia'



Dehaluming



Harvesting of potatoes