

# Impact Assessment of Potato Technologies in Indo-Gangatic Alluvial Plains of Bihar



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### Abstract

Studies conducted on the assessment of improved varieties of potato viz; Kufri Ashoka, Kufri, Sutlej, Kufri Pulkraj, Kufri Aanand on 54 farmers field indicated that Kufri Ashoka fetched maximum yield (242.16q/ha) followed by Kufri Sutluj (240.00q/ha). About 72.88 per cent increase in tuber yield of potato was reported due to balanced fertilizer application followed 72.66 percent due to late blight management. In TPS tuberlets, though the yield was comparatively low as against the farmers practice but considering the seed cost, TPS technology was found economical on the farmers field.

**Keywords:** Technology, Potato Varieties, Kufri, Assessment

### Introduction

Potato is an important crop of Bihar. Sustainability of region for potato cultivation was realized long back with this background when Central potato research institute was established at Patna in 1949. The average productivity of the state has reached to 19,0 ton/ha during recent years. This increase in productivity is the result of latest potato production technologies evolved as well as the training and development work being done by the Central Potato Research Institute (CPRI) . Alongwith the close collaboration with the state government and farming groups. Keeping in view, CPRI has developed several high yielding short , medium and long duration potato varieties for the agro- climatic conditions of the state. It also includes the processing varieties like Chipsona - 1, 2 and 3 .Besides this Balanced fertilizer application, Integrated pest management practices, Seed Plot Technique (SPT) for quality seed production, forecasting of late blight disease package of practices for ware and seed potato production were also evolved by the Institute. Lack of remunerative price, bad seed quality, occurrence of late blight, expensive seed and labour shortage were the major constraints faced by the noncontract farmers (Pandit, A. et .al,2015) A total of forty potato varieties were analyzed for different physico-chemical attributes and processing quality. On the basis of morphological and physiological traits such as, tuber shape, size, average weight, eye depth, color and general appearance of tuber, (Md. Mahfuzar Rahman, Tuhin Suvra Roy, Mahfuza Afroj, 2016). Relationships were established between yields in various grades and stem population, and are used to explain the response of yield to changes in seed size and spacing. Comparisons between any two levels of the same treatment were affected by the size grade in which they were made (DCE Wurr (1974 ) Yields of total, marketable, maingrade and small tubers decreased and yields of oversize tubers increased with wider spacings. Specific gravity tended to decrease with increased spacing. With wider spacing the incidence of hollow heart tended to increase in oversize tubers, but did not vary in maingrade tubers (B. L. Rex, W. A. Russell and H. R. Wolfe, 1987) The contract farmers also experienced many problems like high cost of cultivation, late blight infestation, low yield, lack of clear contract agreement and difficulties in disposing off the leftover potatoes. The present study was conducted with the objective to evaluate the some of the latest potato production technologies which were transferred among the farmers of the state.

### Aim of the Study

The present study is undertaken to ascertain the performance of high yielding potato varieties on farmers condition. Their adoption constraints yield and economics ,suitability and possible refinement if any for better adoption among the farming community.

**Material and Methods**

The study was conducted in purposively selected villages of Kurkuri, Dhanaut and Newraganj of Phulwarisharif and Bihta, Patna and Hulaschak block of Vaishali districts of Bihar. Demonstration were laidout on 104 farmers' field who were selected after identification of technological gap in the areas of use of high yielding variety, seed preparation, plan ting operations, nutrient management, intercultural operations, irrigation management, insect/pest & disease management and harvesting & post harvest management.. Demonstrations were laid out on the use of high yielding variety of potato, balanced fertilizer application, cutworm management, late blight management and true potato seedling raising.. During the implementation phase adopted farmers were also supported by training, literature, field visits, Radio/T.V. talk etc.

**Results and Discussion****Technological gap in potato production technology on farmers field**

In order to assess the farmers status about latest potato production technologies technological gap was workedout. Data presented in table1 clearly indicates that the maximum gap (85.98%) was under insect pest management practices followed by intercultural operations (72.23%) and disease management (83.34%) respectively where yield loss is more if not managed properly on time. However planting operations (25.84%) and irrigation management (32.235) has least gap as reported by the farmers. Though quality seed is one of the major input for the potato cultivation but this could be due to the reason that farmers have better proximity to potato research station, thus they might be aware about the importance of quality farmers.

**Impact of improved seed of high yielding variety of potato**

Under the intervention improved seed of high yielding variety of potato i.e. Kufri Ashoka, Kufri Pukhraj, Kufri Sutluj, and Kufri Ananad were planted in 200 m<sup>2</sup> area on each farmers field. After maturity of the crop, yield was recorded. Finding indicated that potato variety Kufri Ashoka fetched maximum yield (242.16q/ha) followed by Kufri Sutluj (240.00q/ha) as against the framers variety "C-1" (140-170q/ha). There was also a significant increase in tuber yield (48.77% ) recorded in high yielding potato verities. The farmers were also get benefited by a net return of Rs. 37600/ha to Rs. 52000/ha by adopting the interventions.

**Impact of balanced fertilizer application**

Farmers of the area were applying imbalanced doses of chemical fertilizes. Therefore, under this intervention, balanced fertilizer application trial using nitrogen, phosphorous and potash was applied @ 150:60:100 Kg/ha respectively. Half dose of nitrogen and full doses of phosphorous and potash was applied at the time of planting. Rest dose of nitrogen was given at the time of erthing-up (35 days after planting). Perusal of data presented in table 1 clearly showed that there was 72.88 per cent increase in tuber yield of balanced fertilized potato crop as against the farmers practice (80:40:00).Further ,

farmers were also obtained a net return of Rs. 57352/ha due to the adoption of the practice.

**Impact of interventions on late blight management**

Late blight, a dreaded disease of potato causing a havoc in the area when it finds a favorable weather conditions.Approximately,40-80 per cent crop damage occurs due to this disease. Famers of the area are using fungicides indiscriminately to protect their potato crop against the disease. To overcome the problem, interventions were laidout with applying need based spraying schedule.Under the intervention, two spray of fungicide Dithane-M-45 was applied @ 2.00 Kg/ha at 10-12 days intervals. The first spray was applied on the crop between 15-20 December followed by second spray at 10-12 days interval. Similarly, third spray was done by applying Ridomil M.Z. @ 2.00 Kg/ha. Data were recorded at the time of maturity of the crop. Results indicated that there was a significant increase in crop yield (72.66 5) over the farmers practice (Table1).Further, by adopting the intervention farmers were also got a net return of Rs. 80,464/ha with a high B: C ratio of 2.46.

**Impact of True Potato Seedling Crop**

Keeping in view, the scarcity of cold storage facilities in the state, True Potato Seed (TPS) technology has a vast potential for wider adoption among the farmers. Therefore, under the project a nursery of TPS was raised at Central potato research station, Patna and the seedlings were transplanted (at a distance of 6 -10 cm plant to plant and 50 cm from row to row) in 200 m<sup>2</sup> area on the farmers field. The balanced doses of nitrogen, phosphorous and potash were applied @ 150: 60: 100 kg/ha. respectively. After the harvesting of the crop data on yield and economics was recorded. Data presented in Table 1 clearly showed that by adopting the technology, farmers had obtained a net return of Rs. 14200/ha as against the farmers practice. Though the yield was comparatively low(128.00q/ha) as against the farmers practice (140.00q/ha ) but considering the seed cost, TPS technology was found economical on the farmers field. Hence, has a good potential for its adoption among the farmers in those areas where cold storage facilities are scanty.

**Conclusion**

The participatory technology assessment and refinement of potato technologies have very good impact in enhancing yield and economics of the potato farmers and proved beneficial for the m as well as cost effective as compared to the local varieties and methods being adopted by the farmers with leads to not only yield enhancement but also improving their income.

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**Table 1.**  
**Technological gap in potato production technology**

	Technologies	Technological gap(%)	Rank
1.	Seed management	47.78	V
2.	Planting Operations	25.84	VIII
3.	Nutrient management	62.82	IV
4.	Intercultural operations	72.23	II
5.	Irrigation	32.23	VII
6.	Disease management	63.34	III
7.	I/P management	85.98	I
8.	Harvesting & Post harvest management	33.78	VI

**Table 2. Yield and economics of potato interventions on farmers field**

Sl.No.	Interventions	Av. Yield ( q/ha )		Yield adv. (%)	Net return Rs/ha	B:C ratio
		Farmers plot	Demo plot			
<b>A. High Yielding potato variety</b>						
1.	Kufri Ashoka	162.66	242.16	48.87	50972	1.87
2.	Kufri Sutluj	170.00	240.00	41.17	52000	1.92
3.	Kufri Pukhraj	165.00	224.00	35.75	44800	1.80
4.	Kufri Anand	140.00	208.00	48.57	37600	1.67
<b>B. Balanced fertilizer application ( n=31)</b>						
1.		208	280.88	72.88	57352	2.04
<b>C. Late blight management ( n=16)</b>						
1.	Improved potato varieties	267	338.66	71.66	80464	2.46
D.	TPS Seedling raising ( 92-pt-27	140.00	128.00	8.57	14200	1.38