

Varietal Evaluation of Potato Under Northern Hilly Zone of Chhattisgarh

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Abstract: The field experiment was conducted at the Potato & Temperate Horticulture Research Station, Mainpat Surguja Indira Gandhi Krishi Vishwavidyalaya, Chhattisgarh during Rabi season design of Randomize Block Design. Potato (*Solanum tuberosum* L.) is one of the most important vegetable crops having high production per unit area per unit time. Evaluation and screening of a wide range of potato variety is necessary to identify cultivars that are adopted to the locality high yielding, consistently resistant to late blight and have good quality. The evaluation of twelve varieties of potato for northern hill zone of Chhattisgarh during 2014-15 and 2015-16 revealed that potato variety Kufri Pukhraj gave highest yield (325 q/ha) followed by Kufri Khyati (316 q/ha), Kufri Arun (250 q/ha), respectively in Rabi seasons and in Kharif season gave highest yield in the variety of Kufri Pukhraj (156.2q/ha), Kufri Khyati (137.5q/ha) and Kufri Jyoti, Laddy Rosseta and Kufri Surya (131.2q/ha). It is also notable that Kufri Pukhraj and Kufri Jyoti have been found relatively resistant against early and late blight. The early duration variety Kufri Pukhraj has fast growing and heavy bulking ability (Yield) gives higher yield. The developed package and practices has been widely demonstrated under Front Line Demonstration (FLD) in Surguja district.

Key words: *Solanum tuberosum*, varieties, late blight and high yielding.

INTRODUCTION

Potato (*Solanum tuberosum* L.) is one of the most important food crops after wheat, maize and rice, contributing to food and nutritional security in the world. This tuber crop of the family solanaceae has about 200 wild species. Potato is an annual, herbaceous, dicotyledonous and vegetatively propagated plant. It can also be propagated through botanical seed known as True Potato Seed (TPS). Potato is a highly nutritious, easily digestible, wholesome food containing carbohydrates, proteins, minerals, vitamins and high quality dietary fibre. A potato tuber contains 80 per cent water and 20 per cent dry matter consisting of 14 per cent starch, 2 per cent sugar, 2 per cent protein, 1 per cent minerals, 0.6 per cent fibre, 0.1 per cent fat, and vitamins B and C in adequate amount. Thus,

potato provides more nutrition than cereals and vegetables. Keeping in view the shrinking cultivable land and burgeoning population in India, potato is a better alternative to deal with the situation. It is a rich source of carbohydrates (22.6 g/100g) as well as starch (16.3 g/100 g) containing protein, which provides raw material for processing industries. Potato is a short duration crop which is highly responsive to high inputs and capable to produce high yield under wide range of soil and climate.

MATERIALS AND METHODS

The field experiment was conducted during the year 2014-15 and 2015-16 at Potato Research Station, Mainpat, Surguja district, Indira Gandhi Krishi Vishwavidyalaya, Chhattisgarh. The Mainpat Block, district Surguja is situated at latitude 22°45 N,

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longitude 83°18 E and height 1075 meter from the mean sea level (MSL) with average rainfall 1125-1230 mm per year. Twelve potato varieties namely Kufri Pukhraj, Kufri Khyati, Kufri Jyoti, Kufri Sinduri, Kufri Bahar, Kufri Lavkar, Kufri Surya, Kufri Anand, Kufri Arun, Lady Roseta, AICRP-C-18 and Kufri Chipsona-1 were used in the study. A unit plot size of the land was 4 x 3m², which represented each variety. The experiment was conducted in randomized complete block design (RCBD) with three replications. The plot was fertilized @ of 150 Kg N, 80 Kg P, 100 Kg K, 120 Kg S, 25kg Zinc sulphate, 5 tonnes Lime and 25kg bleaching powder per hectare addition to 15 tons FYM per hectare. Entire amount of Zinc sulphate, Bleaching powder, Lime and half of urea and potash were applied as basal dose before final land preparation. The remaining half of urea and potash was applied as side dressing at 45 days after planting (DAP).

First generation seed of each variety were received from the Central Potato Research Institute, Shimla, Central Potato Research Station, Jalandhar, Patna and were kept under diffuse light to have healthy and good sprouts. Well sprouted tubers were planted at 7-10 cm depth in 80cm (*Kharif season*) 60 cm (*Rabi season*) apart in furrows on the first week of July for *Kharif season* and Second week of October for (*Rabi season*) in both year. Seeds were covered with soil immediately after planting. Plant to plant distance was 20 cm in both seasons. Weeding, earthing up, plant protection and irrigation were performed as per recommendation when needed. The crop was harvested after 90-100 DAP in both years. Data on yield and yield contributing characters were recorded from 5 randomly selected plants in each plot. The data were analysed as per procedures of Gomez and Gomez (1993).

Kharif Seasons

Plant height

Wide variation was observed among the varieties in respect of plant height. The tallest (75.50cm) plant was observed in the variety Kufri Pukhraj and the Shortest (50.28 cm) in the variety Kufri Sinduri. The

maximum plant height was observed in the variety Kufri Pukhraj followed by Kufri Khyati (65.20 cm), Kufri Jyoti (62.20), Kufri Arun ((56.50 cm) and Laddy Rosseta (55.25 cm) and the shortest (50cm) in the variety Kufri Sinduri. The variation in plant height of the same variety in different studies was probably due to variation in growing environment and quality of planting materials.

% Emergence at 30 days DAP

The maximum per cent emergence was observed in the variety of Kufri Pukhraj (95.75%) followed by Kufri Jyoti and Kufri Khyati (92.35%), Kufri Bahar (91.20%) and (91.10%) found in variety Kufri Lavkar and minimum per cent emergence in Kufri Sinduri (88.25%) 30 days after planting of potato. Findings of the present investigation, Singh (1995) also reported that the highest germination per cent at 30 days after planting with the application of nitrogen @ 200 kg/ha in potato. .

No of Shoots per Plant

The maximum number of shoots was found in the variety of Kufri Sinduri (9.67) followed by Kufri Pukhraj (9.20), Kufri Jyoti (8.20), Kufri Surya (7.25) and Kufri Bahar (7.22%) and minimum number of shoots in the variety of Laddy Rosseta (5.52). On the contrary to the present findings have been reported by Gupta and Pal (1989) and Malik *et al.* (1997).

Number of tubers per plant

The maximum number of tubers was found in the variety of Kufri Sinduri (14.20) followed by Kufri Pukhraj (10.50), Kufri Surya (9.30) and Kufri Khyati (9.25) and minimum number of tubers in the variety of Laddy Rosseta (6.50). This may be due to increased absorption of nutrients which increased photosynthetic activity as well as translocation of photosynthates for formation of tubers.

However, Shah and Sahay (1978), Kumar and Singh (1979), Anand and Krishanappa (1988), Kushwah (1989) and Bhowmik and Dandapat (1991) reported the highest number of tubers per plant with 150 kg N/ha.

Table 1
Performance of different varieties of potato under hill zone of Chhattisgarh in Kharif seasons

Varieties/Characters	Plant height (cm)	% emergence at 30 days DAP	No. of Shoots/ plant	No of stolens per plant	No. of tubers/ plant	Tuber diameter (cm)	Tuber yield/ plant (g)	Tuber yield q/ha	Fresh weight of tuber/ plant	Dry weight of tuber/ plant (g)	Days of maturity
Kufri Pukhraj	75.50	95.75	9.67	21.60	10.50	15.20	250	156.2	320	61	85
Kufri Khyati	45.50	92.35	6.80	19.30	9.25	14.67	220	137.5	310	60	86
Kufri Jyoti	55.00	92.25	8.20	12.00	9.00	12.30	210	131.2	240	55	84
Kufri Sinduri	50.00	88.25	9.20	23.10	14.20	10.12	185	115.50	240	53	122
Kufri Bahar	53.5	91.20	7.20	16.30	9.20	12.00	190	118.75	290	57	88
Kufri Lavkar	52.3	91.10	6.90	11.50	8.50	10.60	195	121.8	280	55	85
Kufri Surya	52.4	88.50	7.20	12.50	9.30	12.34	210	131.2	290	52	86
Kufri Anand	54.2	89.90	6.30	14.10	8.25	11.25	200	125.00	280	54	114
Kufri Arun	56.5	89.5	6.50	12.60	8.20	13.58	240	150.0	258	55	116
Lady Roseta	55.25	89.2	5.52	12.30	6.50	11.34	210	131.2	230	54	92
AICRP-C-18	52.3	88.7	7.20	12.50	7.50	12.20	200	125.00	288	51	89
Kufri Chipsona-1	32.2	75.25	4.2	10.50	7.25	11.20	195	121.8	240	53	84
SEM±	2.10	0.40	0.44	5.5	5.75	8.52	0.68	2.4	5.7	4.8	5.8
CD at 5%	1.20	1.16	1.28	2.2	2.70	1.58	1.99	1.32	2.8	1.2	1.8

Table 2
Performance of different varieties of potato under hill zone of Chhattisgarh in Kharif seasons

S. No.	Varieties/Characters	Colours of tuber	Colour of flower	Colour of berry
1.	Kufri Pukhraj	White	White	Dark green
2.	Kufri Khyati	White	White	Light green with white strip
3.	Kufri Jyoti	White	Pink blue	Dark green
4.	Kufri Sinduri	Pink/Red	Pink/Red	green
5.	Kufri Bahar	White	White	green
6.	Kufri Lavkar	White	White	green
7.	Kufri Surya	White	White	green
8.	Kufri Anand	White	White	green
9.	Kufri Arun	Pink/Red	Pink	Light green with white strip
10.	Lady Roseta	Pink/Red	Pink	Light green
11.	AICRP-C-18	White	White	green
12.	Kufri Chipsona-1	White	White	green

Tuber yield/plant (g)

The maximum tuber yield per plant was found in the variety of Kufri Pukhraj (250 g) followed by Kufri Arun (240 g), Kufri Khyati (220 g), Kufri Jyoti, Kufri Surya and Laddy Roseta (210 g) and minimum tuber yield per plant in the variety of Kufri Sinduri (185 g).

Tuber yield q/ha

The variety Kufri Pukhraj gave highest yield (156.2 q/ha) followed by Kufri Khyati (137.50 q/ha), Kufri Arun (150 q/ha), Kufri Khyati

(137.5 q/ha) Kufri Jyoti, Kufri Surya and Lady Roseta (131.2 q/ha) respectively. It is also notable that Kufri Pukhraj and Kufri Khyati have been found relatively resistant against early and late blight. The data indicates that the variety Kufri Pukhraj recorded significantly higher total tuber yield (305.21 q/ha) than the rest of the variety. The variety Kufri Khyati also recorded significantly higher total tuber yield (268.62 q/ha) than the variety Kufri Khyati, which may be due to higher fresh weight of tuber, large size tubers and marketable tuber yield. The result of the present investigation are confirmed with the findings of

Sharma *et al.* (1995) and Bhat *et al.* (2005) who were reported that the highest total yield of tubers quintal per hectare.

Fresh weight of tuber/plant (g)

The maximum Fresh weight of tuber per plant was found in the variety of Kufri Pukhraj (320g) followed by Kufri Khyati (310g), Kufri Bahar and Kufri Surya (290g), Kufri Lavkar, Kufri Anand(280g) and minimum Fresh weight of tuber/plant in the variety of Laddy Rosseta (230g). Thus, the findings of the present investigation are close to the reports of Roy and Jaiswal (1998) who found significantly higher fresh weight of tubers per plant.

Dry weight of tuber/plant (g)

The maximum dry weight of tuber per plant was found in the variety of Kufri Pukhraj (61g) followed by Kufri Khyati (60g), Kufri Bahar (57g) Kufri Jyoti, Kufri Lavkar and Kufri Arun (55g) and minimum dry weight of tuber per plant in the variety of AICRP-C-18 (51g).

Rabi Seasons

Plant height

Wide variation was observed among the varieties in respect of plant height. The tallest (58.78 cm) plant was observed in the variety Kufri Pukharaj and the Shortest (27.50 cm) in the variety Kufri Khyati .The maximum plant height was observed in the variety Kufri Pukhraj (58.78 cm) followed by Kufri Bahar (45.50 cm), Kufri Lavkar (40.50 cm), Kufri Anand ((37.50 cm) and Kufri Surya (36.50 cm) and the shortest (27.50 cm) in the variety Kufri Khyati. The variation in plant height of the same variety in different studies was probably due to variation in growing environment and quality of planting materials.

% Emergence at 30 days DAP

The maximum per cent emergence was observed in the variety of Kufri Pukhraj (87.75%) followed by Kufri Khyati (85.35%), Kufri Jyoti (85.25%),Kufri Arun (85.20%) and Kufri Lavkar (84.50%) and minimum per cent emergence in Kufri Kufri Bahar (82.50%) after 30 days planting.

Number of shoots per plant

The maximum number of shoots per plant was found in the variety of Kufri Sinduri (7.90) followed by Kufri Pukhraj (7.67), Kufri Jyoti, Kufri Surya (6.90), Kufri Lavkar (6.75) and minimum number of shoots in the variety of Laddy Rosseta (4.2).

Number of tubers per plant

The maximum number of tubers was found in the variety of Kufri Sinduri (19.50) followed by Kufri Pukhraj (12.50), Kufri Jyoti (12.00) and Kufri Khyati (11.25) and minimum number of tubers in the variety of Laddy Rosseta (5.26).

Tuber yield per plant (g) The maximum tuber yield per plant was found in the variety of Kufri Pukhraj (390 g) followed by Kufri Khyati (380 g), Kufri Jyoti (350 g), AICRP-C-18 (310g), Kufri Bahar, Kufri Surya, Kufri Arun (300g) and minimum tuber yield per plant in the variety of Kufri Lavkar (245 g).

Tuber yield quintal per ha

The variety Kufri Pukhraj gave highest yield (325 q/ha) followed by Kufri Khyati (316q/ha), Kufri Jyoti (291q/ha) and Kufri Bahar, Kufri Surya (250q/ha) respectively. It is also notable that Kufri Pukhraj and Kufri Khyati have been found relatively resistant against early and late blight.

Fresh weight of tuber per plant (g)

The maximum Fresh weight of tuber per plant was found in the variety of Kufri Khyati (360 g) followed by Kufri Pukhraj (358 g), Kufri Jyoti (330 g), Kufri Lavkar, Kufri Anand and AICRP-C-18 (300 g) and minimum Fresh weight of tuber per plant in the variety of Kufri Sinduri (240 g).

Dry weight of tuber per plant (g)

The maximum Dry weight of tuber per plant was found in the variety of Kufri Khyati (62 g) followed by Kufri Pukhraj, Kufri Bahar, Kufri Lavkar and Kufri Anand (60 g) and minimum Dry weight of tuber per plant in the variety of AICRP-C-18 (51 g).



Varietal performance of Potato at Potato Research Station, Mainpat, Surguja, Chhattisgarh

References

- Anand, S. and Krishnappa, K.S. (1988), Effect of different levels of N and K on the growth, yield and quality of potato in sandy loam soil. *Mysore J. Agric. Sci.*, 22: 483-488.
- Bhat, M.M., Lankar, G.M., Ahmed, N. and Gupta, A.J. (2005), Response of potato cultivars to varying levels of nitrogen and phosphorus. *Journal of Research, SKUAST*, 4(2): 164-169.

- Bhomik, N.N. and Dandapat, A. (1991), Studies on yield parameters and yield of potato (*Solanum tuberosum* L.) cultivars under varying levels of nitrogen. *Indian Agril.* 35(1): 21-26.
- Gomez, K.A. and A.A. Gomez, (1993), *Statistical Procedures for Agricultural Research*. 3rd Ed., John Wiley and Sons, New York, pp: 680.

Table 3
Performance of different varieties of potato under hill zone of Chhattisgarh in Rabi seasons

Varieties/Characters	Plant height (cm)	% emergence at 30 days DAP	No. of Shoots/plant	No of stolens per plant	No. of tubers/plant	Tuber diameter (cm)	Tuber yield/plant (g)	Tuber yield q/ha	Fresh weight of tuber/plant	Dry weight of tuber/plant (g)	Days of maturity
Kufri Pukhraj	58.87	87.75	7.67	23.60	12.50	14.25	390	325	358	60	80
Kufri Khyati	27.50	85.35	5.90	21.00	11.25	13.20	380	316	360	62	82
Kufri Jyoti	34.50	85.25	6.90	15.00	12.00	11.10	350	291	330	55	79
Kufri Sinduri	27.90	83.30	7.90	26.00	19.50	11.25	250	208	240	53	118
Kufri Bahar	45.50	82.50	6.25	16.50	10.50	11.00	300	250	290	60	85
Kufri Lavkar	40.50	83.50	6.75	12.50	9.50	10.20	245	204	300	60	81
Kufri Surya	36.50	84.50	6.90	14.50	10.50	12.25	300	250	290	56	80
Kufri Anand	37.50	83.90	5.67	15.20	9.25	10.20	290	241	300	60	110
Kufri Arun	28.20	85.20	5.50	12.60	5.56	12.58	300	250	258	61	114
Lady Roseta	29.5	86.20	4.5	12.30	5.26	10.34	280	233	260	58	86
AICRP-C-18	30.25	85.70	6.25	14.50	9.5	12.20	310	258	300	51	82
Kufri Chipsona-1	32.2	75.25	4.2	11.20	7.25	11.10	250	208	240	53	82
SEM±	4.10	6.20	6.52	6.5	5.70	6.25	0.68	5.4	6.5	5.4	7.5
CD at 5%	2.20	2.16	1.35	3.2	2.3	1.52	1.99	2.25	3.2	2.5	2.2

Gupta, A. and Pal, K. (1989), Response of potato varieties to nitrogen fertilizer under rainfed condition. *Indian J. Agron. Sci.*, 34(4): 478-480.

Kumar, R. and Singh, H. (1979), Effect of different rates of nitrogen and phosphorus on the growth and yield of potato (Var. Kufri Chandramukhi). *Indian J. Agric. Sci.*, 24(4): 425-426.

Kushwah, V.S. (1989), Effect of different levels of nitrogen and planting density on production of seed potato (*Solanum tuberosum* L.). *Indian J. Agric. Sci.*, 59(9): 561-565.

Malik, Y.S., Singh, N., Nehra, B.K. and Khurana, S.C. (1997), Effect of spacing, nitrogen and potash on growth and yield of potato. In: Proceeding of National seminar on potato production constraints in low productivity areas. pp. 47.

Patel, J.C. and Patel, L.R. (2001), Effect of irrigation and nitrogen on yield attributes in potato. *J. Indian Potato Assoc.*, 28(2/4): 285-287.

Roy, S.K. and Jaiswal, V.P. (1998), Response of potato (*Solanum tuberosum* L) to planting dates and nitrogen. *Indian J. Agronomy*, 43(3): 484-488.

Shah, R.S. and Sahay, R.K. (1978), Effect of nitrogen, CCC and spacing on the growth and yield of potato. *Indian J. Hort. Sci.*, 35(4): 359-363.

Sharma, R.C., Sharma, T.R. and Nandekar, D.N. (1995), Response of nitrogen levels and planting dates on potato yield and economics in Madhya Pradesh. *J. Indian Potato Assoc.* 22(3/4): 129-132.

Singh, M.V. (1995). Nitrogen needs of potato when planted on different dates. *J. Indian Potato Assoc.*, 22(3-4): 101-104.