

EVALUATION OF POTATO GERMPLASM IN NORTHERN PLAINS OF INDIA

Babita Chaudhary^{1*}, SK Luthra¹, VK Gupta¹, Dalamu², A Bhatnagar¹ and V Kumar³

ABSTRACT: The research experiments were conducted at ICAR-Central Potato Research Institute, Regional Station, Modipuram, Meerut, Uttar Pradesh during the early (2022) and main (2022-23) crop season to evaluate 50 potato (*Solanum tuberosum*) germplasm for tuber yield components in the North-central plains of India. On the pooled basis, the highest germination (%) was recorded for 12 genotypes namely, CP1454, CP1631, CP1651, CP3252, CP3334, CP3355, CP3414, CP3464, Kufri Bahar, Kufri Mohan, Kufri Garima and Kufri Ganga. The best performance for plant vigour was observed in Kufri Lima (4.3) followed by Kufri Mohan (4), Kufri Arun (3.9), Kufri Bahar, Kufri Garima, Kufri Surya and CP3085 (3.8). Early maturity was observed in CP3469 (3.75) followed by the genotypes namely, CP3469, CP1454, CP1471, CP3255, CP1651, CP2094, CP3266, CP3048, CP3050, CP3326, CP1648, CP3361, CP3252, CP3288, Kufri Mohan, Kufri Bahar, Kufri Surya, Kufri Pukhraj and Kufri Neelkanth (3.5). The highest marketable tuber numbers/plant were recorded for CP3353 (7) followed by CP3469, CP1651 and Kufri Sinduri (6). The highest total tuber number/plant was found in CP3353 (13) followed by CP3469, Kufri Sinduri, CP3385, CP3464 and Kufri Lalit (9), Kufri Ganga and CP1651 (8), Kufri Pukhraj, Kufri Lima, Kufri Garima, Kufri Mohan, Kufri Arun and CP3361 (7). The genotype Kufri Lima (310.8g) produced highest marketable yield/plant followed by Kufri Mohan (306g), Kufri Ganga (302g), Kufri Garima (294g), CP3294 (293g) and CP3413 (290g), Kufri Lalit (274g), CP3326, CP3469 (268g), Kufri Pukhraj (257g). The genotype like Kufri Mohan (360g) produced highest total tuber yield/ plant followed by Kufri Arun (358g), Kufri Lima (352g), Kufri Ganga (344g), Kufri Garima (336g), Kufri Lalit (323g), CP3413 (308g), Kufri Pukhraj (307g) and CP3294 (304g), CP3469 (288g) and CP3326 (277g). Overall, four genotypes CP3294, CP3469, CP3353 and Kufri Mohan were found promising genotypes in terms of germination, marketable tuber number/plant, total tuber yield/plant and total tuber numbers /plant.

KEYWORDS: Potato, germplasm, plant characters, tuber yield, North-central plains

INTRODUCTION

Potato (*Solanum tuberosum*) plays a significant role in human food security and it is a crop with fascinating genetic traits and cultural history (Swaminathan, 1999). Potato is the third most important food crop after wheat and rice in the world (FAOSTAT 2020). Potato is used as a staple food among the vegetables and is utilized throughout the

year in India. It belongs to family Solanaceae with chromosome number $2n=48$. Due to its great utility, the potato is acknowledged as the “King of Vegetables”. Due to its high yield potential in a short time, it is one of the most profitable and remunerative crop (Kashyap *et al.* 2021). Potato is also rich in several micronutrients, iron and potassium. It is a good source of dietary antioxidants, which may play a preventing role in diseases

*Corresponding author; email: babchaudhary4@gmail.com

¹ICAR-Central Potato Research Institute, Regional Station, Modipuram, Meerut - 250110, Uttar Pradesh, India

²ICAR-Central Potato Research Institute, Kufri-Fagu Unit, Shimla -171012, Himachal Pradesh, India

³ICAR-Central Potato Research Institute, Shimla - 171 001, Himachal Pradesh, India

related to ageing and a source of dietary fiber (Mulatu *et al.* 2005). It contains minerals and vitamins B1, B3, B6 and C and composition of 20.6% carbs, 2.1% protein, 0.3% fat, 1.1% crude fiber along with tryptophane and isoleucine. Potato produces more energy and protein per unit area and per unit time than other food crops (Lutaladio & Castaldi, 2009). Potato is a cheap food of human diet. During 1948-1949, India produced 1.54 million tonnes of potatoes from 0.234 million ha area at an average productivity level of 6.58 t/ha. Now India produces nearly 60.14 million tonnes of potatoes (Department of Agriculture & Farmers Welfare, Government of India) from 2.3 million ha with a productivity of 25.79 t/ha (2022-23). The latest (2022) global annual production of potatoes is 375 million tonnes, with an average productivity of 21.1 t/ha. (FAOSTAT, 2022), and thus average productivity of potatoes in India is higher than that of the world's average potato productivity. Presently, India is the second largest annual producer of potatoes after China. Together, six states *viz.* Uttar Pradesh, West Bengal, Bihar, Gujarat, Madhya Pradesh and Punjab contribute more than 90% of total potato production in India. In terms of total production, Uttar Pradesh, West Bengal and Bihar, occupy the top three positions with total annual potato production of 20.126 million tonnes (33.46%), 14.508 million tonnes (24.12%), and 9075 million tonnes (15.09%), respectively.

In India, 90% of potatoes are produced in sub-tropical plains during the winter season. High temperature during crop growth and tuberization restricts the adoption of potatoes in early planting conditions of north-western plains and peninsular India (Luthra *et al.* 2006). The early planted crop is vulnerable to attack of sucking pests like leafhoppers (*Amrasca biguttula* Ishida) and mite (*Polyphagotorsonemus latus* Banks) resulting in significant yield

reduction (Malik and Luthra 2007). The yield and quality of potatoes are very sensitive to high temperatures (Bodlaender 1963; Ewing 1981). Minimum night temperature plays a crucial role during tuberization, which is reduced at night temperatures above 20°C with complete inhibition of tuberization above 25°C. Optimum temperatures for tuber formation are widely regarded as being in the range of 10-17°C (Bodlaender 1963; Moorby and Milthorpe 1975). Climate change is likely to lead to an overall temperature increase of 1-1.4 °C (Hijmans 2003) and the development of potato cultivars with increased heat tolerance appears to be important to cope with climate change. To expand potato cultivation in non-traditional warmer areas, there is a need to evolve varieties that could germinate, grow and tuberize well under high temperature (Luthra *et al.* 2013). The objective of the study was to evaluate potato genotypes for tuber yield components under early and main planting seasons for use in varietal development programme.

MATERIALS AND METHODS

The present investigation was carried at the experimental field of ICAR-Central Potato Research Institute Modipuram, Meerut, Uttar Pradesh (altitude of 230m amsl) during the early season of 2022 and the main season of 2022-23. The experimental materials was comprised of 50 germplasm CP1454, CP1471, CP1631, CP1648, CP1651, CP2094, CP3048, CP3050, CP3085, CP3247, CP3252, CP3255, CP3259, CP3266, CP3270, CP3288, CP3294, CP3326, CP3334, CP3337, CP3353, CP3355, CP3360, CP3361, CP3365, CP3385, CP89, CP3395, CP3413, CP3414, CP3415, CP3421, CP3437, CP3437, CP3438, CP3464, CP3465, CP3469 along with controls namely, Kufri Lalima, Kufri Surya, Kufri Sinduri, Kufri Pukhraj, Kufri Neelkanth, Kufri Mohan, Kufri Lima, Kufri Lalit, Kufri Garima, Kufri Ganga,

Kufri Chipsona, Kufri Bahar and Kufri Arun. The data on 12 traits such as germination percentage, plant vigour (1-5 scale where 1 is very poor & 5 is highly vigorous), foliage maturity (1-5 scale where 1 is very late & 5 is very early), marketable tuber number per plant, marketable tuber yield per plant, total tuber number per plant, total tuber yield per plant were recorded to understand the yield potential of genotypes. Tuber characters like tuber colour, shape, eye depth and flesh colour were also observed. The data was recorded on plant vigour at 60 days after planting, however foliage maturity and tuber yield components were recorded at 75 days after planting in early crop and 90 days in main season crop.

The annual rainfall averages between 0.1–4.2 mm during the period from September to February. The average temperature ranged from 6.5–33.4°C in January to 33.4°C in September. Relative humidity varied from 50.7% to 94.9% during the crop season. The research field had clay loam soil, and the soil pH ranged from 6.9–7.4. The experiment was planted in last week of September, 2022 in early season and the second fortnight of October during 2022-2023 in main crop

season. The row-to-row distance of 60cm and the plant to plant distance of 20 cm were maintained. The 15 tubers of each genotype were planted in a row of 3 meters. The crop was harvested after 75 days in the early season and 90 days in the main crop season.

RESULTS AND DISCUSSION

Performance of genotypes under early planting season

In early season 50 potato germplasm lines were evaluated at 75 days (Table 1). Plant stand ranged from 53-100% and 42 genotypes achieved full germination with 100% followed by CP3415, CP3438, and Kufri Sinduri with 93% germination. The data of foliage maturity was recorded at 75 days on the scale of 1 (late)-5 (very early) and ranged from 3 to 4. Two genotypes CP1648 and CP3288 emerged as early maturing with a score of 4. The plant vigour was recorded on scale of 1 (poor)-5 (very good) and ranged from 2 to 4. The genotypes namely, CP3085, Kufri Surya, Kufri Mohan, Kufri Arun and Kufri Lima showed good plant vigour with scale 4. The highest total tuber yield ranged from 26 to 267 g/plant and high total tuber yield was recorded in Kufri Lima (267g)

Table 1. Germplasm evaluation in early sowing season (2022)

S. No.	Genotypes	PS (%)	PV	FM	Tubers/plant		Tuber yield (g/plant)		hopper burn (%)	Mite damage (%)
					Marketable	Total	Marketable	Total		
1	CP1454	100	3.5	3.5	3.0	3.7	80.9	88.2	40	0
2	CP1471	100	3.5	3.5	2.7	3.8	83.3	94.7	20	0
3	CP1631	100	3.0	3.5	2.1	3.5	74.7	89.3	20	0
4	CP1648	87	2.5	4.0	3.5	8.5	62.9	99.3	20	0
5	CP1651	100	3.0	3.5	3.1	4.5	76.8	89.1	40	0
6	CP2094	100	3.0	3.5	2.5	3.7	82.0	94.1	40	0
7	CP3048	100	2.0	3.5	2.7	5.7	73.3	89.3	40	0
8	CP3050	100	2.0	3.5	1.6	3.3	36.0	48.4	60	0
9	CP3085	100	4.0	3.0	2.3	2.7	62.7	68.1	20	0
10	CP3247	87	2.5	3.5	1.8	4.2	29.7	54.5	60	0
11	CP3252	100	2.5	3.5	1.8	2.8	69.4	78.0	80	0

Evaluation of potato germplasm in northern plains

S. No.	Genotypes	PS (%)	PV	FM	Tubers/plant		Tuber yield (g/plant)		hopper burn (%)	Mite damage (%)
					Marketable	Total	Marketable	Total		
12	CP3255	100	3.5	3.5	2.6	4.5	71.8	88.7	40	0
13	CP3259	73	3.0	3.5	2.0	3.8	65.9	86.1	80	0
14	CP3266	100	2.5	3.5	2.1	3.9	61.3	74.7	80	0
15	CP3270	100	2.5	3.5	1.5	4.3	35.3	57.2	80	0
16	CP3288	100	2.0	4.0	2.0	3.5	47.0	62.3	100	0
17	CP3294	100	3.0	3.0	2.9	3.1	109.1	112.4	40	0
18	CP3326	100	3.0	3.0	3.1	4.0	116.5	128.3	60	0
19	CP3334	100	3.0	3.0	2.7	4.5	62.9	81.3	60	0
20	CP3337	100	3.0	3.0	2.3	4.9	76.8	96.8	60	0
21	CP3353	100	3.5	2.5	3.0	10.9	55.1	111.7	20	0
22	CP3355	100	2.5	3.0	1.7	5.3	35.8	68.1	100	0
23	CP3360	100	2.5	3.0	1.5	4.0	26.1	44.9	100	0
24	CP3361	100	2.5	3.0	0.8	4.7	15.3	40.0	100	0
25	CP3365	100	3.0	3.0	0.5	3.3	10.7	25.5	40	0
26	CP3385	100	3.0	3.0	2.0	9.3	33.6	85.1	20	0
27	CP3389	100	3.0	3.0	2.1	5.3	42.5	58.9	40	0
28	CP3395	100	3.0	3.0	3.6	5.1	82.2	95.2	80	0
29	CP3413	100	3.5	2.5	2.8	4.9	113.7	136.5	40	0
30	CP3414	100	3.0	2.5	3.1	4.7	112.5	128.0	40	0
31	CP3415	93	3.0	2.5	2.1	2.6	100.0	103.9	40	0
32	CP3421	100	3.5	3.0	3.7	5.3	98.7	109.5	40	0
33	CP3437	53	3.0	3.0	3.0	4.3	100.0	112.5	20	0
34	CP3438	93	3.0	3.0	3.3	4.7	77.9	90.6	20	0
35	CP3464	100	3.5	2.5	2.9	5.7	86.2	103.5	20	0
36	CP3465	100	2.5	2.5	1.6	3.6	30.1	43.5	40	0
37	CP3469	100	3.5	3.0	3.9	7.5	108.7	120.8	20	0
38	K Arun	100	4.0	3.5	3.0	4.7	233.3	254.7	20	0
39	K Bahar	100	3.5	3.5	2.7	4.2	73.5	87.5	100	0
40	K Chipsona 3	100	3.0	3.5	2.0	3.7	75.8	96.4	40	0
41	K Ganga	100	3.5	3.0	4.8	7.4	216.7	241.3	20	0
42	K Garima	100	3.5	2.5	4.3	5.9	195.2	212.1	0	0
43	K Lalima	100	3.0	3.0	5.3	7.9	151.8	173.5	20	0
44	K Lalit	100	3.5	3.0	5.4	9.0	170.3	208.3	40	0
45	K Lima	73	4.0	3.5	5.0	6.2	257.3	267.3	20	0
46	K Mohan	100	4.0	3.5	4.0	5.7	198.0	213.8	20	0
47	K Neelkanth	100	3.0	3.5	4.0	6.2	129.3	149.3	60	0
48	K Pukhraj	100	3.0	3.5	3.7	5.8	128.3	152.1	60	0
49	K Sinduri	93	3.0	2.5	4.9	6.4	136.4	154.6	60	0
50	K Surya	100	4.0	3.5	3.3	4.3	116.6	128.1	20	0

followed by Kufri Arun (255g), Kufri Ganga (241g), Kufri Mohan (214g), Kufri Garima (212g), Kufri Lalit (208g), Kufri Lalima (174g) Kufri Sinduri (155g), Kufri Pukhraj (152g) and Kufri Neelkanth (149g). The Marketable tuber yield (g/plant) ranged from 11 to 257 and high marketable tuber yield found in Kufri Lima (257g) followed by Kufri Arun (233g), Kufri Ganga (217g), Kufri Mohan (198g), Kufri Garima (195g), Kufri Lalit (170g), Kufri Lalima (152g), Kufri Sinduri (136g), Kufri Neelkanth (129g) and Kufri Pukhraj (128g) respectively.

The total tuber/plant ranged from 3 to 11. The highest total tuber number was recorded for Kufri Sinduri and CP3353 (11), CP3385, Kufri Lalit, CP1648 and Kufri Lalima (9), CP3469 (8), Kufri Ganga (7), Kufri Sinduri, Kufri Neelkanth and Kufri Lima (6). In the case of Marketable tuber number ranged from 0.47 to 5. The highest tuber number/plant, the highest marketable tuber no. were recorded for Kufri Lalit, Kufri Lalima, Kufri Lima, Kufri Sinduri and Kufri Ganga (5) and Kufri Garima, followed by Kufri Mohan, Kufri Neelkanth, CP3469, CP 3421 and Kufri Pukhraj (4). The incidence of hopper burn ranged from 0 to 100%. Only Kufri Garima

showed complete resistance (0%). All 50 genotypes were found highly tolerant with 0% mite damage incidence. A similar kind of study for the evaluation of potato genotypes in the early season for yield and yield traits was conducted by Luthra *et al.* 2008 and Chaudhary *et.al.* 2023.

Performance of genotypes under the main planting season

In the Main sowing season (2022-23) the germplasm lines were evaluated at 90 days (Table 2). The plant stand range of 50 genotypes was 60 to 100%. Total 15 genotypes namely, CP1454, CP1631, CP1648, CP3247, CP3252, CP3334, CP3355, CP3414, CP3415, CP3437, CP3464, Kufri Bahar, Kufri Mohan, Kufri Garima and Kufri Ganga were showed 100% germination followed by 14 genotypes with 93% germination. The plant vigour ranged 3 to 5. The two genotypes CP3048 and Kufri Lima were highly vigorous with value of 5 followed by nine genotypes namely, CP3050, CP3266, CP3355, CP3395, CP3438, CP3465, Kufri Bahar, Kufri Mohan and Kufri Garima with a value 4. The foliage maturity ranges from 3 to 5. One genotype CP3469 (5) was very early maturing followed by 21

Table 2. Germplasm evaluation in main sowing season (2022-23)

S. No.	Genotypes	PS (%)	PV	FM	Tubers/plant		Tuber yield (g/plant)	
					Marketable	Total	Marketable	Total
1	CP1454	100	3.5	3.5	4.3	5.2	253.3	266.7
2	CP1471	87	3.5	3.5	5.9	8.1	314.6	330.0
3	CP1631	100	3.5	3.0	5.0	5.9	307.7	316.7
4	CP1648	100	3.5	3.5	8.8	11.1	283.3	299.5
5	CP1651	93	3.5	3.0	5.5	6.4	364.3	372.1
6	CP2094	93	3.5	3.5	5.0	6.1	353.6	362.9
7	CP3048	67	4.5	3.5	4.6	6.3	235.0	255.0
8	CP3050	87	4.0	3.5	4.8	6.2	261.5	278.5
9	CP3085	80	3.5	3.0	5.1	5.1	333.3	333.3
10	CP3247	100	3.0	3.0	5.5	6.8	260.0	272.0
11	CP3252	100	3.0	3.5	4.0	4.9	277.3	284.0

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S. No.	Genotypes	PS (%)	PV	FM	Tubers/plant		Tuber yield (g/plant)	
					Marketable	Total	Marketable	Total
12	CP3255	80	3.5	3.5	5.8	6.8	316.7	329.2
13	CP3259	80	3.5	3.0	4.8	6.7	344.2	363.3
14	CP3266	87	4.0	3.5	5.5	7.1	434.6	452.3
15	CP3270	87	3.0	2.5	4.4	5.0	215.4	230.8
16	CP3288	87	3.5	3.0	7.5	7.5	267.7	267.7
17	CP3294	73	3.0	3.0	6.6	7.2	477.3	495.5
18	CP3326	87	3.0	4.0	5.2	5.7	418.5	426.2
19	CP3334	100	3.5	3.0	5.1	6.2	286.7	300.0
20	CP3337	93	3.5	3.5	5.5	6.4	353.6	361.4
21	CP3353	93	3.5	3.0	10.5	14.4	292.9	314.3
22	CP3355	100	4.0	3.0	4.7	6.7	140.0	160.0
23	CP3360	87	3.5	3.5	6.9	8.5	346.2	361.5
24	CP3361	80	3.5	4.0	7.3	8.7	363.3	378.3
25	CP3365	67	3.5	3.0	3.9	4.9	220.0	230.0
26	CP3385	93	3.5	3.0	6.9	8.7	309.3	330.7
27	CP3389	93	3.5	3.0	4.1	5.6	207.1	228.6
28	CP3395	87	4.0	3.5	4.8	5.5	292.3	300.0
29	CP3413	93	3.0	3.0	4.6	6.4	467.1	479.3
30	CP3414	100	3.0	3.5	4.8	5.7	358.7	374.0
31	CP3415	100	3.0	3.0	4.8	6.8	346.7	360.0
32	CP3421	87	3.0	3.0	6.2	7.3	376.9	386.2
33	CP3437	100	3.5	3.5	4.1	5.9	357.3	378.6
34	CP3438	93	4.0	3.0	5.4	6.9	364.3	378.6
35	CP3464	100	3.0	3.5	6.8	11.8	403.3	450.7
36	CP3465	60	4.0	3.0	5.4	6.0	331.1	337.8
37	CP3469	80	3.5	4.5	8.6	10.8	425.0	455.0
38	K Arun	87	3.8	3.0	4.5	7.2	423.1	461.5
39	K Bahar	100	4.0	3.5	4.4	7.2	373.3	426.7
40	K Chipsona 3	93	3.5	3.3	8.6	10.8	285.7	335.7
41	K Ganga	100	3.8	3.3	4.7	7.7	386.7	446.7
42	K Garima	100	4.0	3.3	4.9	8.2	393.3	460.0
43	K Lalima	93	3.5	3.3	4.6	7.4	307.1	357.1
44	K Lalit	87	3.8	3.3	4.1	7.0	376.9	438.5
45	K Lima	93	4.5	3.3	4.7	7.8	364.3	435.7
46	K Pukhraj	87	3.5	3.5	7.0	11.9	384.6	461.5
47	K Mohan	100	4.0	3.5	3.9	6.7	413.3	506.7
48	K Neelkanth	93	2.5	3.5	5.0	8.3	300.0	357.1
49	K Sinduri	93	3.0	3.5	5.7	7.1	264.3	314.3
50	K Surya	93	3.5	3.5	5.4	8.8	221.4	257.1

genotypes with a value of 4. The range for Marketable tuber number /plant was 4 to 11 tubers. The genotype CP3353 (11) achieved the highest tuber number followed by CP1648, Kufri Chipsona 3 and CP3469 (9), CP3288, CP3361 and Kufri Pukhraj (7). The marketable tuber yield ranged was 140 to 477 g/plant. The highest Marketable tuber yield/plant was produced by the genotype CP3294 (477g) followed by CP3413 (467g), CP3266 (435g), CP3469 (425g), Kufri Arun (423g), CP3326 (415g) and Kufri Mohan (413g).

The total tuber number ranged was 5 to 14/plant. The highest Total tuber number per plant was recorded by only one genotype CP3353 (14) followed by Kufri Pukhraj and CP3464 (12), CP1648, CP3469 and Kufri Chipsona 3 (11). Total tuber yield per plant ranged 160 to 507 g/plant. The Highest Total tuber yield per plant was recorded in Kufri Mohan (507g) followed by CP3294 (477g), CP3413 (467g), Kufri Arun (423g), Kufri Pukhraj (385g) and Kufri Garima (393g).

Performance of genotypes over the season

In pooled data from early (2022) and main sowing season (2022-23), the plant stand ranged from 77-100% (Table 3). As many as 12 genotypes CP1454, CP1631, CP1651, CP3252, CP3334, CP3355, CP3414, CP3464, Kufri Bahar, Kufri Mohan, Kufri Garima and Kufri Ganga were recorded with 100% germination. Plant vigor ranged from 3 to 4. Nine genotypes Kufri Lima, Kufri Mohan, Kufri Arun, Kufri Bahar, Kufri Garima, Kufri Surya, CP3085, Kufri Ganga and Kufri Lalit were highly vigorous (4). Foliage maturity ranged from 3 to 4. Early maturity was found in genotypes namely CP3469, CP1454, CP1471, CP3255, CP1651, CP2094, CP3266, CP3048, CP3050, CP3326, CP1648, CP3361, CP3252, CP3288, Kufri Mohan, Kufri Bahar, Kufri Surya, Kufri Pukhraj and Kufri Neelkanth with a value 4.

Marketable tuber number/plant ranged from 2 to 7/plant. The highest Marketable

Table 3. Mean performance of genotypes in pooled data (2022 and 2022-23)

S. No	Genotypes	PS (%)	PV	FM	Tubers/plant		Tuber yield (g/plant)		Tuber characters
					Marketable	Total	Marketable	Total	
1	CP1454	100	3.5	3.5	4.0	4.0	167.1	177.4	Wc, O, S, W
2	CP1471	93	3.5	3.5	4.0	6.0	199.0	212.3	Wc, O, Md, Cr
3	CP1631	100	3.3	3.3	4.0	5.0	191.2	203.0	Wc, O, S, Cr
4	CP1648	90	3.0	3.5	4.0	7.0	213.6	235.7	Wc, O, Md, Cr
5	CP1651	100	3.3	3.5	6.0	8.0	180.1	194.3	Wc, O, S, W
6	CP2094	97	3.3	3.5	4.0	5.0	217.8	228.5	Cr, O, S, Cr
7	CP3048	83	3.3	3.5	4.0	6.0	154.2	172.2	Cr, O, Md, W
8	CP3050	93	3.0	3.5	3.0	5.0	148.8	163.4	Cr, O, Md, W
9	CP3085	90	3.8	3.0	4.0	4.0	198.0	200.7	Cr, R, S, W
10	CP3247	93	2.8	3.3	4.0	6.0	144.9	163.2	Wc, R, Md, Cr
11	CP3252	100	2.8	3.5	3.0	4.0	173.4	181.0	Y, R, S, Cr
12	CP3255	90	3.5	3.5	4.0	6.0	194.2	209.0	W, R, S, Cr
13	CP3259	77	3.3	3.3	3.0	5.0	205.0	224.7	Cr, R, Md, Cr
14	CP3266	93	3.3	3.5	4.0	5.0	248.0	263.5	P, R, S, Cr
15	CP3270	93	2.8	3.0	3.0	5.0	125.4	144.0	Cr, O, S, W

S. No	Genotypes	PS (%)	PV	FM	Tubers/plant		Tuber yield (g/plant)		Tuber characters
					Marketable	Total	Marketable	Total	
16	CP3288	93	2.8	3.5	5.0	5.0	157.4	165.0	Cr, O, S, Cr
17	CP3294	87	3.0	3.0	5.0	5.0	293.2	303.9	Cr, O, S, W
18	CP3326	93	3.0	3.5	4.0	5.0	267.5	277.2	W, O, S, W
19	CP3334	100	3.3	3.0	4.0	5.0	174.8	190.6	Wc, O, S, W
20	CP3337	97	3.3	3.3	4.0	6.0	215.2	229.1	Y, O, S, Cr
21	CP3353	97	3.5	2.8	7.0	13.0	174.0	213.0	Wc, R, Md, W
22	CP3355	100	3.3	3.0	3.0	6.0	87.9	114.1	Cr, R, D, Cr
23	CP3360	93	3.0	3.3	4.0	6.0	186.1	203.2	Wt, R, Md, W
24	CP3361	90	3.0	3.5	4.0	7.0	189.3	209.2	Wc, R, Md, Cr
25	CP3365	83	3.3	3.0	2.0	4.0	115.3	127.8	Y, R, S, Y
26	CP3385	97	3.3	3.0	4.0	9.0	171.4	207.9	Re, O, Md, Cr
27	CP3389	97	3.3	3.0	3.0	5.0	124.8	143.8	Wc, O, S, W
28	CP3395	93	3.5	3.3	4.0	5.0	187.3	197.6	Cr, O, S, Cr
29	CP3413	97	3.3	2.8	4.0	6.0	290.4	307.9	Cr, Ov, Sl, Wt
30	CP3414	100	3.0	3.0	4.0	5.0	235.6	232.0	Cr, O, Md (pink), Cr
31	CP3415	97	3.0	2.8	3.0	5.0	223.3	247.8	Cr, O, Md (pink), Cr
32	CP3421	93	3.3	3.0	5.0	6.0	237.8	247.8	Wc, O, S, W
33	CP3437	77	3.3	3.3	4.0	5.0	228.7	245.6	Cr, R, S, Cr
34	CP3438	93	3.5	3.0	4.0	6.0	221.1	234.6	Cr, R, Md, Cr
35	CP3464	100	3.3	3.0	5.0	9.0	244.8	277.1	Cr, R, S, W
36	CP3465	80	3.3	2.8	4.0	5.0	180.6	190.6	Cr, O, S, Cr
37	CP3469	90	3.5	3.8	6.0	9.0	266.8	287.9	Wc, O, S, W
38	K Arun	93	3.9	3.3	4.0	7.0	328.2	358.1	Re, R, S, Y (pink VB)
39	K Bahar	100	3.8	3.5	4.0	6.0	223.4	257.1	Cr, R, S, W
40	K Chipsona 3	97	3.3	3.4	3.0	5.0	180.8	216.1	Wc, O, S, W
41	K Ganga	100	3.6	3.1	5.0	8.0	301.7	344.0	Wc, R, S, Cr
42	K Garima	100	3.8	2.9	5.0	7.0	294.3	336.1	Cr, R, S, Y
43	K Lalima	97	3.3	3.1	5.0	7.0	229.5	265.3	Re, R, S, Wc
44	K Lalit	93	3.6	3.1	5.0	9.0	273.6	323.4	Re, R, Md (pink), Y
45	K Lima	83	4.3	3.4	5.0	7.0	310.8	351.5	Cr, R, S, W
46	K Mohan	100	4.0	3.5	4.0	7.0	305.7	360.2	W, R, S, W
47	K Neelkanth	97	2.8	3.5	4.0	6.0	214.7	253.2	P, R, S, Wc
48	K Pukhraj	93	3.3	3.5	4.0	7.0	256.5	306.8	Cr, O, S, Y
49	K Sinduri	93	3.0	3.0	6.0	9.0	200.4	234.4	Re, R, Md, W
50	K Surya	97	3.8	3.5	4.0	6.0	169.0	192.6	Cr, O, S, Cr

PS-Plant Stand%, PV-Plant vigour, FM-Foliage maturity, TTN/P-Total tuber no. per plant, MTN/P-Marketable tuber no. per plant, MTY/P-Marketable tube yield per plant, TTY/P- Total tuber yield per/plant; Tuber traits: Cr-cream, Re-Red, R-Round, S-Shallow, WC- white cream, Md-medium deep, Y-Yellow, O-oval, W-white, D-deep, P-Purple, VB-Vascular bundle

tuber number was recorded for CP3353 (7) followed by CP3469, CP1651 and Kufri Sinduri (6) and 8 genotypes namely, Kufri Lalit, CP3421, CP3464, Kufri Lima, Kufri Lalima, CP3294, CP3288 and Kufri Ganga (5). Total tuber number per plant (ranged from 4 to 13/plant). The Total tuber number per plant was recorded highest by CP3353 (13) followed by 9 genotypes CP3469, Kufri Sinduri, CP3385, CP3464 and Kufri Lalit (9), Kufri Ganga and CP1651 (8), Kufri Pukhraj, Kufri Lima, Kufri Garima, Kufri Mohan, Kufri Arun and CP3361 (7).

Marketable tuber yield ranges 88 to 328 g/plant. In Marketable tuber yield per plant, Kufri Arun (328g) produced the highest marketable yield followed by Kufri Lima(311g), Kufri Mohan (306g), Kufri Ganga (302g), Kufri Garima (294g), CP3294 (293g) and CP3413 (290g), Kufri Lalit (274g), CP3326 (268g), CP3469 (268g), Kufri Pukhraj (257g). Total tuber yield ranged from 114-360 g/plant. Total tuber yield per plant was recorded in Kufri Mohan (360g) followed by Kufri Arun (358g), Kufri Lima (352g), Kufri Ganga (344g), Kufri Garima (336g), Kufri Lalit (323g), CP3413 (308g), Kufri Pukhraj (307g) and CP3294 (304g), CP3469 (288g) and CP3326 (277g).

CONCLUSION

During the Early sowing season (2022) overall basis genotypes only Kufri Garima was found promising genotype in terms of germination, total tuber yield, and total tuber number, nil hopper burn and mite damage. During the Main season planting (2022-23) on an overall basis, genotype CP3353 appears to perform the best overall, given its leading position in both marketable and total tuber numbers per plant. Additionally, Kufri Mohan and CP3294 also show exceptional performance in terms of tuber yield, making them strong candidates for high yield potential. Based on the pooled data (2022-23)

the performance across all traits, Kufri Mohan emerges as the best overall performer. This genotype demonstrates a 100% germination percentage, indicating robust initial growth. It also exhibits high plant vigor with a rating of 4.0, suggesting strong and healthy plant development. Kufri Mohan excels in yield, producing a high marketable tuber yield per plant of 306 grams and achieving the highest total tuber yield per plant at 360 grams. This consistent performance across multiple important traits makes Kufri Mohan a strong genotype and can be used in further breeding programme.

Overall, the germplasm CP3353, CP3294, Kufri Garmia and Kufri Mohan were the best performers in terms of Germination, total tuber yield, marketable tuber yield, total tuber number and acceptable tuber attributes.

ACKNOWLEDGEMENT

We thank ICAR for financial and infrastructural support.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest

ETHICAL STATEMENT

This article does not contain any studies with human participants or animals performed by any of the authors

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(MS Received : October 4, 2024; Accepted : July 16, 2025)