Potato J (2024) 51 (1): 62-77

SELECTION OF POTENTIAL CHIPPING ADVANCED POTATO CLONES FOR THE PROCESSING INDUSTRY IN SOUTHERN AND EASTERN INDIA

VK Gupta, Salej Sood, Vinay Bhardwaj[2], Vikas Mangal[2*], SK Luthra[1] and Bandana[1]

ABSTRACT: A multi-location evaluation of 60 advanced processing clones was undertaken in the selected locations of south viz., Karnataka (Rabi and Kharif), Tamil Nadu (Kharif), Telangana (Rabi) and in Rabi crop season of West Bengal. Based on four-year trials, among advanced clones, viz., MP/12-126 consistently outperformed others during 2020-21, 2021-22 and 2022-23 in the Rabi season at different locations in Karnataka. However, MP/12-126 had almost similar yield but acceptable quality parameters as compared to controls in the Kharif seasons of Karnataka and Tamil Nadu. MP/14-171 was found to have higher yield and acceptable quality traits during 2020-21, 2021-22 in the rabi season of Karnataka and Kharif season of Tamil Nadu during 2023. During the rabi season of West Bengal (2020-21, 2022-23) and the rabi season of Karnataka (2022-23) advanced clone MP/15-698 had superior performance. MP/15-651 was found to be the most widely adapted clone as it has superior performance in all states either in Rabi/Kharif or both. Based on a four-year field trial at multiple locations (6 locations) and seasons (rabi and kharif), advanced clones namely MP/12-126, MP/14-171, MP/15-651 and MP/15-698 have the potential to provide a suitable alternative to the potato growers of south and eastern India as against the existing variety/ varieties with acceptable chip colour, high dry matter (>20%) and lesser total potato defects including higher process grade potato yield as compared to controls.

Keywords: Potato, advanced clones, chipping, processing, Southern India, Eastern India

INTRODUCTION

Potato is the world's leading non-grain food crop, ranking fourth after wheat, maize, and rice (Devaux *et al*., 2014). Potato varieties are classified into four types based on their intended use: table potatoes, food processing, industrial (starch and alcohol) production, and others like colourful potatoes (Mori *et al*., 2015). Potato processing has been increasing in India at a rapid pace due to the changing habits of consumers, the growing interest of farmers and rapid expansions of the processing industry (Gupta *et al*., 2021a). Processed products cannot be made with any potato variety and need varieties with specific traits. The tuber specific gravity, dry matter, chip colour, reducing sugars, glycoalkaloids and starch contents of a variety are critical features determining the quality of processed potato products (French fries and chips) (Kaur and Aggarwal, 2014; Wayumba, 2019). Therefore, the selection of varieties should not be limited only to high yield but also to the desired aforementioned traits (Hussen, 2019).

The industry requirements for processing chips regarding tuber appearance are shallow eyes, appropriate size, and round-oval shape. In addition, tubers should be free from hollow hearts, cracks, secondary damage, rusty spots, and greening. Tubers ranging from 45 to 85 mm diameter are ideal for producing the desired chip size. To make uniform chips round tubers are preferred; however, oval tubers can also be used for chip production. A dry matter content of >20 per cent is considered acceptable for chips, French fries and dehydrated products. Higher dry matter or solids content results in higher processed

[1]ICAR-Central Potato Research Institute, Regional Station, Modipuram, Meerut - 250110, Uttar Pradesh, India
[2]ICAR-Central Potato Research Institute, Shimla - 171 001, Himachal Pradesh, India
*Corresponding author; email: vikas90bharatpur@gmail.com

product recovery, lower oil absorption, less energy consumption, and a crispy texture in the finished products. The reducing sugars (glucose and fructose) found in tubers play an important role in the colour of fried products such as chips and French fries. Processing potatoes recorded moderate tuber yield but had high soluble protein and high ascorbic acid, low reducing sugars, low sucrose, low phenols and low total free amino acids (Luthra *et al.*, 2018). Reducing sugar content below 100 mg/l00g fresh tuber weight is acceptable for producing chips. On the Colour score card, a colour up to 3 is desirable for chips and a colour up to 4 is desirable for French fries (Luthra *et al*., 2020).

The potato processing industry has expanded all across the country and in that line several processing units have been established in Southern and Eastern India. There are several challenges in growing processing potatoes in Southern India including poor quality and low yield. Similarly, the availability of processing varieties is a major issue in Eastern India. The processing potatoes are transported from Central India to Southern potato processing units, which incur huge losses in transportation. Moreover, the industry has the viewpoint that either they have to transport air or water to these places. Therefore, CPRI in collaboration with Industry started the evaluation of advanced processing clones for their suitability in south and east Indian conditions where late blight and high temperatures during growth and development are major limiting factors. This study was designed to identify specialized potato clones with acceptable tuber quality for processing into chips under different Eastern and South Indian locations.

MATERIALS AND METHODS:

The material included in the study varied across the locations and years based on the availability of tuber material of selected clones. Multi-location field experiments were conducted across three locations, *Viz*., Karnataka (Hiriyalachenahalli- Chikkaballapur District), West Bengal (Kotulpur – Bankura District) and Telangana (Zaheerabad District) in 2020-21, 2021-22 and 2022-23 during rabi season. In addition, the field experiments were also conducted across three locations, Viz., Kamalappur, Dharwad District & Lingadahalli, Chikmagalur District in Karnataka and Thalavadi- Erode District in Tamil Nadu during Kharif season 2021, 2022 and 2023. The entries' details are provided in Tables 1 to 17. The field trial locations in the North Eastern Plain Zone and Southern Plateau & Hills Zone were at an altitude of 78-915 meters above mean sea level (Chikkaballapur-915m, Zaheerabad-622m & Bankura-78 m). The soil was light red sandy loam in Chikkaballapur, clay loam in Zaheerabad, Dharwad, Chikamagalur, light sandy in Bankura and red sandy loam in Thalavadi. The experiment was laid in larger strips in entry row order. The plot size was 21.6 m^2. The good, healthy and pre-sprouted tubers were planted at a spacing of 6020 cm in all the locations. NPK fertilizers were supplied with urea, diammonium phosphate and muriate of potash respectively. A recommended package of practices was followed along with need-based plant protection measures. Tubers collected from each plot were weighed in kg for yield determination. The weight obtained per plot was then converted to tonnes per hectare. The yield (t/ha) data were recorded for process grade size (t/ha), undersize (t/ha) as well as total tuber yield (t/ha). The samples were analysed for standard quality attributes like dry matter (solid %), chip colour, external defects (ED), internal defects (ID) and total potato defects (TPoD).

The data collected from the multi-location field experiments were analyzed using mean values to compare the performance of the advanced potato clones. Mean yield and

quality parameters were calculated for each clone across different locations and seasons using Microsoft Excel to identify superior clones based on overall performance.

RESULTS AND DISCUSSION

A total of 60 genotypes including 6 controls (Kufri Jyoti, K Kiran, K Surya, K Chipsona-5, K Sangam and Kufri Pukhraj) comprising popular/newly recommended heat tolerant, processing and table varieties over different years, seasons and locations were evaluated. The details of genotypes, locations and years are given in Table 17. The potential genotypes shortlisted in one season based on yield and quality parameters were assessed subsequently along with newly added entries during the next year. This is done continuously for six seasons and four potential entries were selected based on overall results.

Rabi 2020-21

In Karnataka and Telangana, the incidence of late blight was high due to mid-season rain

Table 1: Yield and quality parameters of advanced clones and varieties at Chikkaballapur, Karnataka (Rabi 2020-21)

Genotypes	Yield (t/ha)		% Increase Over Kufri Jyoti	Quality parameters (%)				
	Processable	Total		Solid	UC	ED	ID	TPOD
HT/12-830	11.8	17.2	-44.5	19	0	1.3	1.3	2.6
HT/12-834	13.6	22.2	-28.3	16.6	NA	NA	NA	NA
MP/9-73	17.7	27.0	-12.6	22.1	0	0	0	0
MP/10-172	15.7	22.3	-27.8	19	0	0	0	0
MP/13-1045	19.0	22.7	-26.7	16.8	NA	NA	NA	NA
MP/13-662	13.8	16.7	-46.1	22	8.1	0	0	8.1
MP/9-28	24.8	28.0	-9.4	22.6	0	0	0	0
MP/11-142	8.4	16.9	-45.4	21.5	1.7	0	0	1.7
MP/12-126	28.7	33.3	7.5	22	0	0.7	1.8	2.5
MP/14-1003	19.2	26.1	-15.6	19.8	0	0	0	0
MP/14-171	28.9	32.6	5.5	19.7	0	0	0	0
MP/14-1029	16.8	21.6	-30.2	20.6	0	0.6	0.7	1.3
MP/15-207	19.1	24.3	-21.4	19.6	0	0.7	1.4	2.1
MP/14-169	21.9	28.8	-6.9	23	0	0	0	0
MP/14-332	7.7	14.9	-52	19.9	0	5.4	0	5.4
MP/12-105	21.8	27.9	-9.9	22.7	1.6	0.9	0.5	3
MP/15-667	16.1	20.2	-34.8	23.1	0	0	0	0
MP/13-602	19.5	29.1	-5.8	21.5	4.2	3.2	5.3	12.7
MP/15-750	24.4	28.2	-8.9	22.8	0	0	0	0
MP/15-698	19.5	25.3	-18.2	20.3	0	0	0	0
K. Bhaskar	23.3	29.7	-3.9	18	24	7	2.3	33.3
K. Kiran	12.2	15.0	-51.7	19	1.5	3.6	1.5	6.6
K. Surya	11.8	12.8	-58.5	18.9	0	0	0	0
K. Chipsona-5	16.8	23.8	-23	21.9	0	0	7.1	7.1
K. Sangam	18.8	25.3	-18.3	17.9	0	0	0	6.5
K. Jyoti	27.7	30.9		17.5	8.3	2.8	2.2	14

***UC:** Undesirable Colour; **ED:** External Defects; **ID:** Internal defects; **TPOD:** Total Potato Defects; **NA:** Not Available

and cloudy weather due to cyclonic depression. In West Bengal, the weather was conducive to potato growth and development, leading to successful cultivation. Based on yield potential and processing quality parameters, the promising entries were short-listed for further evaluation. Advanced clones viz., MP/12-126, MP/14-171 (33 t/ha) recorded 8% and 6 % higher total tuber yield and acceptable quality traits than the popular variety Kufri Jyoti in Karnataka (**Table 1**). In Telangana MP/13-1045 (31 t/ha), and HT/12-830 (36 t/ha) were found to be promising concerning total tuber yield and acceptable quality parameters (**Table 2**). K Chipsona-5 (32 t/ha), MP/13-662 (29 t/ha) and MP/15-698 (46 t/ha) outperformed others in total tuber yield and quality parameters in West Bengal (**Table 3**). Out of the selected entries across the locations three genotypes K. Chipsona-5 (West Bengal), MP/14-171 (Karnataka) and MP/15-698 (West Bengal) exhibited zero TPoD which is a desirable character for the chip industry, while the control variety Kufri Jyoti showed 14 and 46.2 TPoD at Karnataka and West Bengal, respectively (**Table 1, 2, 3**).

Kharif 2021

All the shortlisted entries of the previous season (Rabi 2020-21) along with new entries were evaluated in this season. The weather conditions were very conducive across all the trial locations for optimum growth and

Table 2: Yield and quality parameters of advanced clones and varieties at Zaheerabad, Telangana (Rabi 2020-21)

Genotypes	Yield (t/ha)		% Increase Over Kufri Pukhraj	Quality parameters (%)				
	Processable	Total		Solid	UC	ED	ID	TPOD
HT/12-830	31.5	35.7	6.7	17.3	0	0.8	0.7	1.5
HT/12-834	29.0	38.4	14.9	16.1	NA	NA	NA	NA
MP/9-73	11.6	19.3	-42.3	20.7	0	0	0	0
MP/10-172	14.3	18.9	-43.6	18.2	0	1.1	1.6	2.7
MP/13-1045	26.6	30.7	-8.3	19.5	0	0.9	0.6	1.5
MP/13-662	23.2	27.6	-17.6	19.4	0	0	0	0
MP/9-28	22.1	27.9	-16.5	21.3	0	0.8	0	0.8
MP/11-142	16.7	26.5	-20.7	18.6	0	1.6	0	1.6
MP/12-126	22.9	24.5	-26.7	19.6	5	1.6	1.5	8.1
MP/14-1003	14.7	19.6	-41.5	16.7	NA	NA	NA	NA
MP/14-171	19.1	21.8	-35	18.3	0	0	0	0
MP/14-1029	9.1	16.3	-51.4	19.2	0	0.5	0	0.5
MP/15-207	9.5	16.0	-52.3	17.6	3.8	2.2	2.7	8.7
MP/14-169	14.2	19.9	-40.6	19	0	0	0	0
MP/14-332	11.2	16.3	-51.2	17.5	24	3.4	1.2	28.6
MP/13-602	9.7	13.8	-58.8	19	2.1	2.7	3.7	8.5
K. Bhaskar	22.3	24.1	-27.9	16.1	NA	NA	NA	NA
K. Kiran	18.0	19.5	-41.6	18.5	0	5.4	0	5.4
K. Surya	28.3	30.8	-7.9	16	NA	NA	NA	NA
K. Chipsona-5	16.5	19.9	-40.6	20	0	0	0	0
K. Sangam	17.1	24.8	-25.9	18.1	0	0	0	0
K. Pukhraj	31.2	33.4		16.4	NA	NA	NA	NA

Table 3: Yield and quality parameters of advanced clones and varieties at Bankura, West Bengal (Rabi 2020-21)

Genotypes	Yield (t/ha)		% Increase Over Kufri Jyoti	Quality parameters (%)				
	Processable	Total		Solid	UC	ED	ID	TPOD
HT/12-830	36.0	40.4	27.9	18.7	29.7	3.4	2.3	35.4
HT/12-834	25.9	32.0	1.3	16.8	NA	NA	NA	NA
MP/9-73	17.7	23.2	-26.7	20.1	0	0	0	0
MP/10-172	22.0	26.3	-16.7	17.8	0	0	0	0
MP/13-1045	22.8	25.1	-20.6	15.9	NA	NA	NA	NA
MP/13-662	25.3	28.9	-8.5	20.5	0	0	0.5	0.5
MP/9-28	21.1	25.3	-19.9	20.3	1.2	0	0	1.2
MP/11-142	12.8	21.9	-30.5	18.6	33	4.3	6.3	43.6
MP/12-126	26.8	30.1	-4.7	20.4	3.4	26.4	0.8	30.6
MP/14-1003	20.2	25.1	-20.5	16.8	NA	NA	NA	NA
MP/14-171	20.0	23.1	-27	21	4.9	0.6	0.4	5.9
MP/14-1029	19.2	26.5	-16.2	20	0	2.3	0.9	4
MP/15-207	15.5	18.0	-42.9	18.9	37	0	13.2	50.2
MP/14-169	18.5	21.3	-32.5	17.2	2.2	0.7	0.8	4.8
MP/14-332	19.0	22.9	-27.4	20.2	0	0	0	0
MP/12-105	21.9	26.3	-16.6	21.2	49.7	12.6	14.6	76.9
MP/15-667	15.4	18.5	-41.4	20.6	0	0	0	0
MP/15-750	15.4	17.1	-45.9	19	37.3	0.9	4.4	42.6
MP/15-698	39.4	46.1	46.1	19	0	0	0	0
K. Bhaskar	31.9	35.3	11.7	16	NA	NA	NA	NA
K. Kiran	22.6	27.1	-14.2	18.6	0	0.7	0	0.7
K. Surya	19.8	25.1	-20.5	17.8	0	0.7	0	0.7
K. Chipsona-5	26.7	31.8	0.8	20.2	0	0	0	0
K. Sangam	14.6	17.6	-44.2	18.2	10.6	3.3	0	15.4
K. Jyoti	26.5	31.6		17.2	4.1	16.7	25.4	46.2

development in the initial crop growth period. This resulted in good early vigour and a lower incidence of disease. However, in the later stages of crop growth, high rainfall was received across all the trial locations, severely impacting the quality. Differential response of experimental entries was observed across locations for disease tolerance, bulking, tuber yield, grade outturn, quality, and sensory parameters. Among all, field tolerance to the hopper, mite and late blight was observed in MP/12-126, MP/12-105, MP/13-1045, MP/13-662 and earliness in MP/15-651. In trial entries, early tuberization and fast bulking were observed in the MP/12-126, MP/15-651 and MP/13-662 clones. Advanced clone MP/13-662 showed fast bulking and performed better in multiple locations. Based on field performance, yield and quality specifications two entries MP/13-662 (27 t/ha) and MP/15-651 (25 t/ha, **Table 4**) at Thalavadi and two clones MP/13-662 (13 t/ha) and MP/9-28 (15 t/ha, **Table 5**) at Dharwad locations were selected for further evaluation. Genotype MP/12-105 and MP/15-651 were noted for higher yield but MP/15-667, MP/16-334 and MP/16-173

Table 4: Yield and quality parameters of advanced clones and varieties at Thalavadi, Tamil Nadu (Kharif 2021)

Genotypes	Yield (t/ha)		% Increase Over Kufri Jyoti	Quality parameters (%)				
	Processable	Total		Solid	UC	ED	ID	TPOD
MP/10-172	16.0	20.1	-4.9	16.1	-	-	-	-
MP/13-1045	13.9	16.9	-34.2	21	2	1.5	0.7	4.2
MP/12-105	19.6	23.0	-10	18.2	7	26	15	48.0
MP/13-662	24.4	27.0	5.4	21.7	0	4.7	5.8	10.5
MP/9-28	16.9	19.0	-25.8	19.5	1.1	0	1.5	2.6
MP/12-126	20.6	23.5	-8.2	16.7	0	-	-	-
MP/14-171	12.2	16.4	-35.9	16.8	-	-	-	-
MP/15-207	9.7	12.1	-52.9	16.1	-	-	-	-
MP/15-698	12.4	12.6	-50.8	18.8	4.5	29	0	33.5
MP/15-667	8.4	10.0	-61.1	18	0.7	0	0.8	1.5
MP/14-635	15.5	18.9	-26.3	20	20	18	15	53
MP/16-104	10.0	13.4	-47.5	-	-	-	-	-
MP/16-86	19.0	24.3	-5	16.3	-	-	-	-
MP/16-334	1.5	1.9	-92.5	-	-	-	-	-
MP/16-185	9.3	11.8	-53.8	-	-	-	-	-
MP/16-178	7.2	10.3	-59.7	-	-	-	-	-
MP/16-431	10.7	21.8	-15	16.8	-	-	-	-
MP/16-171	4.9	5.4	-70	-	-	-	-	-
MP/16-173	11.0	15.1	-40.8	19	0	9.5	0	9.5
MP/15-651	24.2	25.3	-1	19.5	2	12	5.6	19.6
MP/15-699	5.3	6.6	-74.2	-	-	-	-	0.0
MP/16-315	14.5	18.6	-27.5	18.1	0	2.1	0.6	2.7
MP/16-157	7.8	10.5	-58.9	20.5	0	2	3.5	5.5
MP/16-316	7.8	10.8	-57.9	17.8	1.6	17.6	1	20.2
K. Chipsona-5	15.1	18.5	-27.7	17.8	3	12	6	21.0
K. Jyoti	23.2	25.6		16.1	-	-	-	-

exhibited 0, 0 and 1.7% undesirable colour (UC), respectively, whereas, Kufri Jyoti showed 35.9% (**Table 6) N**one of the clones/varieties were accepted due to moisture-induced tuber rot and related internal defects.

Rabi 2021-22

The trial was conducted in Karnataka and Telangana. In Karnataka, shortlisted entries *viz.*, MP/12-126 (40t/ha, field resistant to late blight) and MP/14-171 (26 t/ha) were promising for tuber yield and processing quality (**Table 7).** In Telangana, MP/15-651 (46 t/ha) and MP/17-745 (40t/ha) were promising in yield and quality parameters for making chips. However, MP/16-334 produced a higher yield (42 t/ha) but had high total potato defects 31% as against the permissible 15 % hence, it was not short-listed. (**Table 8**). Out of the selected entries at Karnataka and Telangana, four clones viz., MP/15-651, MP/16-315, MP/17-745 and MP/14-171 exhibited zero TPoD which is a desirable character for the chip industry.

Table 5: Yield and quality parameters of advanced clones and varieties at Dharwad, Karnataka (Kharif 2021)

Genotypes	Yield (t/ha)		% Increase Over Kufri Jyoti	Quality parameters (%)				
	Processable	Total		Solid	UC	ED	ID	TPOD
MP/10-172	14.5	16.8	-7.6	16.7	-	-	-	-
MP/13-1045	12.9	15.6	-13.8	-	-	-	-	-
MP/12-105	10.3	15.9	-12.3	18.8	2.15	4.83	0	7.0
MP/13-662	11.4	13.4	-26.2	17.8	0	20.4	7.2	27.6
MP/9-28	12.5	15.0	-17.1	19.1	0	4.7	1.1	5.8
MP/12-126	14.9	18.1	-0.4	16.8	-	-	-	-
MP/14-171	9.1	10.6	-41.6	-	-	-	-	-
MP/15-207	3.3	4.8	-73.7	-	-	-	-	-
MP/15-698	7.7	9.9	-45.3	-	-	-	-	-
MP/15-667	8.0	9.6	-47	-	-	-	-	-
MP/14-635	9.0	13.1	-28	-	-	-	-	-
MP/16-104	10.0	13.4	-47.5	-	-	-	-	-
MP/16-86	7.8	10.8	-40.7	18.5	0	0	0	0
MP/16-334	6.0	7.6	-58	-	-	-	-	-
MP/16-185	3.0	4.7	-73.9	-	-	-	-	-
MP/16-178	8.9	12.7	-29.9	-	-	-	-	-
MP/16-431	4.3	6.0	-67.1	17.5	0	28	12	40
MP/16-171	4.9	5.4	-70	-	-	-	-	-
MP/16-173	9.2	12.9	-28.7	21	-	-	-	-
MP/15-651	10.4	13.5	-25.5	18.8	0	0	33.4	33.4
MP/16-315	4.6	5.8	-68	-	-	-	-	-
MP/16-157	2.8	3.8	-79.1	-	-	-	-	-
K Chipsona-5	6.3	8.3	-54	-	-	-	-	-
Kufri Jyoti	14.5	18.1	-	-	-	-	-	-

Kharif 2022

All the trial locations received continuous and excessive rainfall throughout the cropping season. Rainfall intensity was high in Dharwad, followed by Chikmagalur and Thalavadi. Previously shortlisted entries viz., MP/12-126, MP/15-651 performed better in terms of both yield and quality at Thalavadi. Similarly, a new clone, MP/17-746 was found superior and stable across locations in terms of yield. However, it failed to qualify in the quality test due to high TPoD and bitter taste. Few entries exhibited some special traits like field tolerance to the hopper, mite & late blight (MP/12-126, & MP/13-1045), earliness in maturity (MP/15-651), faster bulking (MP/12-126 & MP/15-651) and exceptionally high yield potential (MP/17-746). Advanced clones MP/13-662, MP/12-126, MP/16-178, MP/15-651, MP/17-428, MP/17-60, MP/17-216, were found to be promising at Thalavadi (**Table 9**). Low yield was found at Dharward (**Table 10**) except in clone MP/17-746 (25 t/ha). Clones MP/13-1045, MP/13-662, MP/16-178, MP/17-610, MP/17-60 & MP/17-216 were found to be the best at Chikmagalur (**Table 11**).

Table 6: Yield and quality parameters of advanced clones and varieties at Chikamaglur, Karnataka (Kharif 2021)

Genotypes	Yield (t/ha)		% Increase Over Kufri Jyoti	Quality parameters (%)				
	Processable	Total		Solid	UC	ED	ID	TPOD
MP/10-172	11.3	13.9	-52.1	-	-	-		-
MP/13-1045	23.8	26.5	-8.6	16	-	-	-	-
MP/12-105	28.8	32.4	11.6	22.3	22.3	0	0	22.3
MP/13-662	13.3	18.1	-37.6	-	-	-	-	-
MP/14-171	6.5	8.0	-72.4	16.1	-	-	-	-
MP/15-207	14.5	20.8	-28.2	-	-	-	-	-
MP/15-698	13.6	15.6	-46.3	-	-	-	-	-
MP/15-667	8.4	14.5	-50.1	21.4	0	0	-	0
MP/16-104	4.8	5.6	-80.8	-	-	-	-	-
MP/16-334	17.1	23.0	-20.8	19.2	25.8	0	0	25.8
MP/16-431	12.4	14.7	-49.4	18.2	47.8	-	-	47.8
MP/16-171	6.0	8.6	-70.5	17.1	97.5	0	0	97.5
MP/16-173	14.1	20.5	-29.5	21.3	1.7	0	0	1.7
MP/15-651	24.8	29.3	1	21.3	42.8	-	-	42.8
MP/15-699	6.0	8.1	-72	-	-	-	-	-
MP/16-315	2.9	3.8	-86.9	-	-	-	-	-
MP/16-157	1.1	1.5	-95	-	-	-	-	-
MP/16-316	8.1	11.5	-60.5	18	37.6	-	-	37.6
K Chipsona-5	15.9	20.2	-30.4	18.1	18.8	-	-	18.8
Kufri Jyoti	26.8	29.0	-	23.4	35.9	-	-	35.9

Rabi 2022-23

The trial locations in Karnataka and Telangana experienced adverse weather conditions resulting in reduced yield. The short-listed entries viz., MP/12-126 (21 t/ha), MP/14-171 (19 t/ha), MP/15-698 (21 t/ha) and MP/15-651 (20 t/ha) confirmed their consistency in yield and quality in Karnataka (**Table 12**). Similarly, the previously shortlisted entries MP/15-651 in Telangana and MP/12-126, MP/15-698 in West Bengal were found superior concerning yield and quality. The entries viz., MP/12-126 & MP/15-698 showed field tolerance to the hopper, mite and late blight. Similarly, natural senescence was observed in the clone MP/12-126, early maturity in MP/15-651, faster bulking in MP/12-126, MP/16-431 and MP/15-651and high tuber yield in MP/15-698. The clone MP/15-651 was observed natural senescence and better yield and quality performance across diverse environments and seasons. In West Bengal (**Table 13**), MP/15-698 (36 t/ha), MP/12-126, MP/15-651 (35 t/ha), MP/16-315 (34 t/ha) and MP/14-171 (27 t/ha) were found promising. In Telangana (**Table 14**), MP/15-651 (21 t/ha) and MP/17-155 (22 t/ha) showed promise for yield and quality traits.

Kharif 2023

In the Kharif season of 2023, previously shortlisted entries viz., MP/12-126, MP/15-651 and MP/17-746 outperformed others in yield and quality. Similarly, a new clone MP/18-285 was found superior and stable across locations in yield. The location-wise quality accepted clones were MP/13-662 (14 t/ha), MP/12-126

Table 7: Yield and quality parameters of advanced clones and varieties at Chikkaballapur, Karnataka (Rabi 2021-22)

Genotypes	Yield (t/ha)		% Increase Over Kufri Jyoti	Quality parameters (%)				
	Processable	Total		Solid	UC	ED	ID	TPOD
MP/16-334	17.0	20.7	-18.2	20.5	12.3	0	3	15.3
MP/16-185	23.3	26.4	4.5	21.3	0	0	0	0
MP/16-178	24.2	33.2	31.6	22.4	0	0	0	0
MP/16-173	28.4	37.8	49.8	22.4	0	7	0	7
MP/15-651	24.4	30.0	18.7	22	0	0	0	0
MP/15-699	9.3	11.1	-56	19	0	14.8	0	14.8
MP/16-315	23.6	26.0	2.9	22.3	0	0	0	0
MP/16-157	7.3	7.3	-71.3	21.9	18.9	0	13	31.9
MP/16-316	11.8	16.8	-33.5	21.3	3	2.1	9.9	15.0
MP/17-296	23.3	31.1	23	22.3	0	0	0	0
MP/17-709	19.6	23.6	-6.7	22.4	0	16.4	0	16.4
MP/17-745	21.6	25.9	2.4	23.1	0	0	0	0
MP/12-105	29.0	32.1	27.3	21.3	0	0	0	0
MP/12-126	37.0	40.4	60	22.3	0	2	4.8	6.8
MP/14-171	23.6	25.9	2.4	20.5	0	0	0	0
MP/14-169	8.1	11.8	-53.1	22.3	0	0	0	0
MP/14-635	17.4	21.0	-16.7	23.5	0	3.9	6.4	10.3
MP/16-104	18.9	26.7	5.7	21	0	22.2	0	22.2
MP/16-431	5.6	5.6	-78	19.2	3	7.6	0	10.6
Kufri Jyoti	22.6	25.3		19.2	0	0	6	6

Table 8: Yield and quality parameters of advanced clones and varieties at Zaheerabad, Telangana (Rabi 2021-22)

Genotypes	Yield (t/ha)		% Increase Over Kufri Jyoti	Quality parameters (%)				
	Processable	Total		Solid	UC	ED	ID	TPOD
MP/16-334	35.3	41.6	12.4	20.5	0	12.8	17.7	30.5
MP/16-185	25.1	30.0	-18.9	20.3	0	19.2	7.1	26.3
MP/16-178	28.5	33.4	-9.8	18.6	0	0	0	0
MP/16-173	16.7	23.7	-35.7	19.2	0	6.9	0	6.9
MP/15-651	41.1	45.9	24.2	19	0	4.2	2.1	6.3
MP/15-699	32.4	34.8	-5.9	18.7	0	0	0	0
MP/16-315	26.6	33.8	-8.4	18.7	0	0	0	0
MP/16-157	13.1	20.3	-45.1	22.3	0	22.2	0	22.2
MP/16-316	14.3	20.3	-45.1	19.6	0	2.7	11.8	14.5
MP/17-296	12.6	15.0	-59.4	19.5	0	0	0	0
MP/17-709	31.9	39.2	5.9	18.6	3	4.8	8.7	16.5
MP/17-745	31.4	39.6	7.2	21.3	0	3.9	6.6	10.5
MP/13-1045	34.1	37.5	1.4	16.1	0	8.3	1.6	9.8
MP/16-86	21.3	23.7	-35.9	19.4	0	0	0	0
MP/16-171	23.2	32.9	-10.9	19.4	0	0	0	0
HT/12-830	22.2	31.9	-13.7	17.5	0	6.3	0	6.3
Kufri Pukhraj	36.5	37.0		15.7	0	32.5	25.2	57.7

Table 9: Yield and quality parameters of advanced clones and varieties at Thalavadi, Tamil Nadu (Kharif 2022)

Genotypes	Yield (t/ha)		% Increase Over Kufri Jyoti	Quality parameters (%)				
	Processable	Total		Solid	UC	ED	ID	TPOD
MP/13-662	6.1	12.9	-30.6	19.2	4.8	1.1	6.3	12.2
MP/12-126	12.6	18.3	-1.4	18.6	5.6	3.2	6.9	15.7
MP/15-207	2.3	4.8	-73.9	18	8.6	3.2	4.8	16.6
MP/16-178	6.7	13.1	-29.4	17.5	3.4	3.1	2.9	9.4
MP/16-431	14.7	16.0	-13.9	20.2	7.2	2.9	5.6	16.4
MP/15-651	12.9	18.5	-0.3	20.2	4.8	1.2	2.1	8.3
MP/17-610	4.1	9.7	-47.6	18	11.2	2.1	3.9	17.2
MP/17-155	3.0	10.4	-21.5	19.2	7.7	3.2	5.6	17.4
MP/17-378	6.8	14.0	-24.3	20.2	5.2	1.2	3.6	10
MP/16-442	4.4	7.1	-61.4	18.2	100	0	0	100
MP/17-428	5.9	13.5	-27	18.2	2.3	3.1	3.9	9.3
MP/17-157	5.8	11.1	-40	18.2	3.9	2.1	11.3	17.3
MP/17-60	7.9	16.1	-13.3	18.7	4.6	2.4	5.5	13.4
MP/17-746	19.2	31.4	69.6	17.5	6.7	2.3	11.1	20.1
MP/18-747	7.5	13.3	-28.3	19	12.5	3.9	2.9	19.9
MP/17-216	5.3	6.8	-63.5	19.1	3.6	1.7	8.4	13.7
MP/15-750	2.5	4.1	-78.1	18.8	6.8	3.2	6.7	18.6
K Chipsona-5	9.1	17.8	-3.8	18.2	6.7	2.7	5.4	15.6
K. Jyoti	14.0	18.5		19.2	9.6	4.5	5.4	20.3

Table 10: Yield and quality parameters of advanced clones and varieties at Dharwad, Karnataka (Kharif 2022)

Genotypes	Yield (t/ha)		Quality parameters (%)				
	Processable	Total	Solid	UC	ED	ID	TPOD
MP/13-662	2.7	4.1	NC	6.7	2.1	6.4	15.2
MP/16-178	3.0	6.1	NC	9.3	6.9	6.7	22.9
MP/15-651	6.2	7.3	20.2	16.7	6.1	3.2	26.0
MP/17-265	1.5	2.2	NC	45.3	6.6	0	51.9
MP/17-428	5.2	7.2	18	3.2	6.9	0	10.1
MP/17-746	15.8	24.9	20.2	19.3	0	4.1	23.4
MP/15-750	3.4	5.3	NC	12.3	6.3	2.1	20.7
K. Chipsona-5	2.7	5.1	17.5	28.3	18.7	0	47.0

(16 t/ha), MP/17-746 (25 t/ha), MP/18-285 (22 t/ha) at Thalavadi (Table 15), MP/13-662 (25 t/ha), MP/15-651 (22 t/ha) at Hasannur **(Table 16).** The results over the years and locations along with short-listed entries are presented in **Table 17**. The evaluation across the locations and years helped to identify the best clones for processing quality with good tuber yields. The preliminary data of some of the clones mentioned above has already been published as an abstract at the international conference (Gupta *et al.,* 2021).

Based on the four-year field trial at multiple locations (6 locations) and seasons, advanced clone MP/12-126 consistently outperformed others during 2020-21, 2021-22 and 2022-23

Table 11: Yield and quality parameters of advanced clones and varieties at Chikamagalur, Karnataka (Kharif 2022)

Genotypes	Yield (t/ha)		Quality parameters (%)				
	Processable	Total	Solid	UC	ED	ID	TPOD
MP/13-1045	15.3	21.2	23.2	0	1.7	1.2	2.9
MP/13-662	1.8	2.7	23.2	0	1.1	0	1.1
MP/12-126	2.9	4.6	-	-	-	-	-
MP/15-207	4.1	8.9	20.8	7.2	7.9	5.6	21.35
MP/16-178	3.6	8.6	20.8	0	0	0	0
MP/15-651	1.3	1.4	-	-	-	-	-
MP/16-315	1.0	2.1	19.2	14.5	3.9	6.7	25.9
MP/17-610	6.3	9.8	20.8	1.2	2.3	6.2	9.93
MP/17-155	1.9	3.3	NC	10.2	5.4	3.2	18.8
MP/17-378	3.9	6.6	21.8	7.8	4.9	3.4	17
MP/17-265	2.0	3.6	NC	7.8	4.5	10.1	23.18
MP/17-428	4.4	9.9	22.3	9.7	6.7	3.2	19.6
MP/17-157	0.9	1.5	-	-	-	-	-
MP/17-60	8.0	12.6	23.2	1.1	0	1.2	4.2
MP/17-746	11.0	14.7	20.2	7.9	5.6	2.9	16.4
MP/17-216	0.9	1.8	18.2	28	10.3	6.2	44.5
MP/15-750	2.5	5.1	23.2	0	0	0	0
K. Chipsona-5	1.2	3.0	NC	14.5	23.2	8.9	46.6

Table 12: Yield and quality parameters of advanced clones and varieties at Chikkaballapur, Karnataka (Rabi 2022-23)

Genotypes	Yield (t/ha)		% Increase over Kufri Pukhraj	Quality parameters (%)				
	Processable	Total		Solid	UC	ED	ID	TPOD
MP/12-126	16.1	21.3	5.8	22.5	1.2	0.8	0.3	2.3
MP/14-171	14.2	19.4	-3.9	22.5	0	0	0	0
MP/15-207	7.3	12.7	-36.7	20.2	0	0	0.3	0.3
MP/15-698	14.3	20.6	2.2	20.7	0	0	0	0
MP/16-178	10.4	16.3	-19.1	24.4	0	0	0	0
MP/16-431	9.1	12.4	-38.6	19.5	0	0.8	0.9	1.7
MP/16-173	8.8	16.7	-17	23.4	0.3	0	0.6	0.9
MP/15-651	15.6	19.6	-2.5	21.2	0	0	0	0
MP/16-315	6.9	11.2	-44.1	19	0	0	0	0
MP/17-745	10.1	16.6	-17.5	23.5	0	0	0	0
MP/17-610	11.2	15.0	-25.4	21.5	0	0	0	0
MP/17-378	6.4	10.3	-48.8	20.6	0	0	0	0
MP/17-155	6.3	12.8	-36.3	23.4	0	0	0	0
MP/17-265	3.2	8.4	-58.4		0	0	4.9	4.9
MP/16-442	13.5	17.9	-11.2	22.3	nc	nc	nc	nc
MP/17-428	9.0	14.3	-29.1	23.4	0	0	0	0
MP/17-157	10.0	14.1	-30.1	23	0	0	0	1.2
MP/17-60	10.2	15.8	-21.5	24.4	0	0	0	0
MP/15-750	15.7	21.8	8	23.4	0	0	0	0
K. Jyoti	17.0	20.1		18.5	0	0	0	0

Table 13: Yield and quality parameters of advanced clones and varieties at Bankura, West Bengal (Rabi 2022-23)

Genotypes	Yield (t/ha)		% Increase over Kufri Pukhraj	Quality parameters (%)				
	Processable	Total		Solid	UC	ED	ID	TPOD
MP/12-126	31.4	35.0	11.3	22.2	0	1.4	0.8	2.2
MP/14-171	21.0	27.0	-14.4	22.3	0	1	0	1
MP/15-207	23.0	30.1	-4.4	19.5	0	4.8	2.3	7.1
MP/15-698	28.5	36.3	15.3	22.4	0	3	2.4	5.4
MP/16-178	12.1	22.0	-30.1	22.6	0	4.4	1.9	6.3
MP/16-431	25.0	35.4	12.6	22.2	0	2.8	2	4.8
MP/15-651	24.1	34.7	10.3	21.3	0	2.8	0	2.8
MP/16-315	24.9	34.4	9.2	21.1	0	0	0	0
MP/17-610	15.8	23.0	-26.8	21.3	0.4	3.8	0	4.2
MP/17-378	19.4	26.0	-17.5	23.4	0	0.8	1.8	2.6
MP/17-155	21.2	28.7	-8.7	22.3	2.6	3.8	3.2	9.5
MP/17-265	18.6	26.8	-15	22.3	0	6	1.2	7.2
MP/16-442	14.6	16.3	-48.2	NA	NA	NA	NA	NA
MP/17-428	19.6	26.3	-16.6	24	0	1	2.4	3.4
MP/17-157	20.7	22.7	-27.9	25.2	0	9.9	0	9.9
MP/17-60	20.2	24.1	-23.5	24.4	0	0	4.4	4.4
MP/15-750	19.1	22.8	-27.6	21.2	0	0.8	0	0.8
MP/13-662	22.8	26.3	-16.6	22.3	0	0.8	0	0.8
K. Jyoti	28.0	31.5		19.3	25	7.4	6.6	39

Table 14: Yield and quality parameters of advanced clones and varieties at Zaheerabad, Telangana (Rabi 2022-23)

Genotypes	Yield (t/ha)		% Increase over Kufri Pukhraj	Quality parameters (%)				
	Processable	Total		Solid	UC	ED	ID	TPOD
MP/15-207	9.3	12.4	-38	22.3	0	0	0	0
MP/15-698	12.0	14.9	-26	21.3	0	0	0	0
MP/16-178	11.5	13.8	-31.4	21.8	0	0	0	0
MP/16-173	12.8	15.9	-21	20.8	0	0	0	0
MP/15-651	14.3	21.4	6.5	21.3	0	0	0	0
MP/16-315	4.0	4.7	-76.5	NA	NA	NA	NA	NA
MP/17-745	5.6	9.5	-52.6	22.3	0	0	0	0
MP/17-610	14.6	20.2	0.8	23.4	0	0	0	0
MP/17-378	10.9	13.2	-34.3	21.3	0	0	0	0
MP/17-155	16.5	21.6	7.6	23.1	0	0	0	0
MP/17-265	8.9	11.4	-43.1	21	0	0	0	0
MP/16-442	7.5	9.6	-52.2	NA	NA	NA	NA	NA
MP/17-428	11.8	15.8	-21.3	20.2	0	0	0	0
MP/17-157	2.6	2.9	-85.8	NA	NA	NA	NA	NA
MP/17-60	12.3	16.0	-20.2	22.3	0	0	0	0
MP/15-750	9.1	12.0	-40.3	22.1	0	0	0	0
MP/13-662	6.0	9.1	-54.7	22.3	0	0	0	0
MP/17-746	17.9	19.0	-5.2	21.8	0	0	0	0
MP/18-747	13.5	15.0	-25.1	21.3	0	0	0	0
Kufri Pukhraj	14.6	20.1		19.2	0	0	0	0

Table 15: Yield and quality parameters of advanced clones and varieties at Thalavadi, Tamil Nadu (Kharif 2023)

Genotypes	Yield (t/ha)		% Increase over Kufri Jyoti	Quality parameters (%)				
	Processable	Total		Solid	UC	ED	ID	TPOD
MP/13-662	9.1	13.8	-28.6	20.5	1.2	0	0	1.2
MP/12-126	11.9	15.8	-18.5	17.5	4.8	13.4	3.3	**21.5**
MP/14-171	20.2	23.3	20.2	17.2	16.3	6.7	6.5	29.5
MP/15-698	6.9	9.1	-53.2	21.2	3.7	3.2	4.9	**11.8**
MP/16-431	11.1	14.9	-23.2	18.5	0	5.5	9.5	15
MP/17-155	4.6	7.7	-60.2	19.2	1.2	1.2	3.2	**5.6**
MP/17-428	4.6	6.4	-67	19.2	4.1	4.3	8.9	17.3
MP/17-157	1.1	1.7	-91	-	-	-	-	-
MP/17-746	18.9	25.2	30.1	19.2	0	0	0	0
MP/18-786	14.8	17.9	-7.4	21.1	1.2	4.2	2.3	**7.7**
MP/18-136	12.0	14.2	-26.6	20.8	1.2	3.9	28	33.1
MP/18-87	2.1	2.7	-85.8	-	-	-	-	-
MP/18-534	5.9	9.4	-51.3	21.3	2.3	1.9	3.6	**7.8**
MP/18-285	16.3	21.8	12.6	17.4	0	3.1	3.8	6.9
Kufri Jyoti	16.3	19.4		17.1	7.8	6.2	0	14

Table 16: Yield and quality parameters of advanced clones and varieties at Hasannur, Tamil Nadu (Kharif 2023)

Genotypes	Yield (t/ha)		% Increase over Kufri Pukhraj	Quality parameters (%)				
	Processable	Total		Solid	UC	ED	ID	TPOD
MP/13-662	20.1	24.9	34.6	21.6	0	0	1.3	1.3
MP/12-126	13.8	18.6	0.7	20.8	0	0	1.2	1.2
MP/14-171	21.6	24.6	32.9	19.2	0	6.2	19.4	25.6
MP/16-431	16.3	20.5	11.1	19.8	0	4.1	9.1	13.2
MP/15-651	18.9	21.9	18.5	19.6	0	0	0	0
MP/18-136	6.9	8.8	20.2	20.2	0	0	8.5	8.5
MP/18-534	7.9	9.7	-47.7	16	NA	NA	NA	NA
MP/18-285	19.1	23.4	26.5	17.8	0	1.9	0	1.9
MP/16-315	3.3	4.4	-76.5	16.1	NA	NA	NA	0
Kufri Jyoti	15.7	18.5		18.6	3.2	9.8	14.7	27.7

in the Rabi season at different locations of Karnataka. However, MP/12-126 had almost similar yield but acceptable quality parameters as compared to controls in the Kharif seasons of Karnataka and Tamil Nadu. On an overall basis, MP/14-171 had a higher yield and acceptable quality traits during 2020-21, 2021-22 in the rabi season of Karnataka and Kharif season of Tamil Nadu during 2023. Advanced clone MP/15-698 performed well in West Bengal (rabi 20220-21 and 2022-23) and Karnataka (rabi 2022-223). MP/15-651 was found to be the most widely adapted clone as it has superior performance in all states either in Rabi/Kharif seasons or both (**Table 18, 19**). Photographs of selected clones namely MP/12-126 (**Fig.1)**, MP/14-171(**Fig.2)**, MP/15-651(**Fig.3)** and MP/15-698 (**Fig.4)** and characteristic features are given in the **Table 19.**

Table 17: Advanced potato clones evaluated at different locations

Trial and Year	Trial Location	No. of tested entries
Rabi 2020-21	Hiriyalachenahalli, Chikkaballapur-Karnataka	26
	Ranzole, Zaheerabad –Telangana	22
	Kotulpur, Bankura –West Bengal	25
Kharif 2021	Thalavadi (Tamil Nadu)	26
	Dharwad (Karnataka)	24
	Chikamagalur (Karnataka)	20
Rabi 2021-22	Hiriyalachenahalli, Chikkaballapur-Karnataka	20
	Magidi, Zaheerabad - Telangana	20
Kharif 2022	Thalavadi- Erode (Tamil Nadu)	19
Rabi 2022-23	Hiriyalachenahalli, Chikkaballapur-Karnataka	20
	Magidi, Zaheerabad - Telangana	20
	Kotulpur, Bankura –West Bengal	19
Kharif 2023	Thalavadi- Erode (Tamil Nadu)	15
	Hasanur, Erode (Tamil Nadu)	10
	Lingadahalli, Chikamagalur – Karnataka	7

Fig.1. MP/12-126-Leaf, tubers and chips

Fig.2. MP/14-171-Leaf, tubers and chips

Fig.3. MP/15-651-Leaf, tubers and chips

Fig.4. MP/15-698-Leaf, tubers and chips

CONCLUSION

Earlier no specific processing variety was available for these areas and raw material was transported from distant places. The selected new processing clones exhibited outstanding chip processing attributes, including high dry matter content (>20%), fewer total potato defects, and higher yields compared to existing varieties. The availability of the selected new processing clones viz., MP/12-126, MP/14-171, MP/15-651 and MP/15-698 in these areas of southern and eastern India can provide a suitable alternative to farmers and better sustenance for the potato processing industry.

ACKNOWLEDGEMENT

The authors are highly grateful to Director, ICAR-CPRI and Head, ICAR-CPRI, RS, Modipuram for their support and guidance

Table 18: Yield and quality of four shortlisted potential advanced potato clones along with control over the locations

Year	Location	Yield (t/ha)		% Increase over controls#	Quality Parameters (%)				
		Process Grade	Total		Solid	UC	ED	ID	TPOD
MP/12-126									
Rabi 2020-21	Karnataka	28.7	33.2	7.5	22	0	0.7	1.8	2.5
Kharif 2021	Karnataka	14.9	18.1	-0.4	16.8	-	-	-	-
Rabi 2021-22	Karnataka	37.0	40.4	60	22.3	0	2	4.8	6.8
Kharif 2022	Tamil Nadu	12.6	18.3	-1.4	18.6	5.6	3.2	6.9	15.7
Rabi 2022-23	Karnataka	16.1	21.3	5.8	22.5	1.2	0.8	0.3	2.3
Rabi 2022-23	West Bengal	31.4	35.0	11.3	22.2	0	1.4	0.8	2.3
Kharif 2023	Tamil Nadu	13.8	18.6	0.7	20.8	0	0	1.2	1.2
MP/14-171									
Rabi 2020-21	Karnataka	28.9	32.6	5.5	19.7	0	0	0	0
Rabi 2021-22	Karnataka	23.6	25.9	2.4	20.5	0	0	0	0
Kharif 2023	Tamil Nadu1	20.2	23.3	20.2	17.2	16.3	6.7	6.5	13.2
Kharif 2023	Tamil Nadu2	21.6	24.6	32.9	19.2	0	6.2	19.4	25.6
MP/15-698									
Rabi 2020-21	West Bengal	39.4	46.1	46.1	19	0	0	0	0
Rabi 2022-23	Karnataka	14.3	20.6	2.2	20.7	0	0	0	0
Rabi 2022-23	West Bengal	28.5	36.3	15.3	22.4	0	3	2.4	5.4
MP/15-651									
Kharif 2021	Tamil Nadu	24.2	25.3	-1.0	19.5	2	12	5.6	19.6
Kharif 2021	Karnataka	24.8	29.3	1.0	21.3	42.8	-	-	-
Rabi 2021-22	Karnataka	24.4	30.0	18.7	22	0	0	0	0
Rabi 2021-22	Telangana	41.1	45.9	24.2	19	0	4.2	2.1	6.3
Kharif 2022	Tamil Nadu	12.9	18.5	-0.3	20.2	4.8	1.2	2.1	8.3
Rabi 2022-23	Karnataka	15.6	19.6	-2.5	21.2	0	0	0	0
Rabi 2022-23	Telangana	14.3	21.4	6.5	21.3	0	0	0	0
Rabi 2022-23	West Bengal	24.1	34.7	10.3	21.3	0	2.8	0	2.8
Kufri Jyoti									
Rabi 2020-21	Karnataka	27.7	30.9		17.5	8.3	2.8	2.2	14
Rabi 2020-21	West Bengal	26.5	31.6		17.2	4.1	16.7	25.4	46.2
Kharif 2021	Tamil Nadu	23.2	25.6		16.1	-	-	-	-
Kharif 2021	Karnataka	14.5	18.1		-	-	-	-	-
Kharif 2021	Karnataka	26.8	29.0		23.4	35.9	-	-	35.9
Rabi 2021-22	Karnataka	22.6	25.3		19.2	0	0	6	6
Rabi 2022-23	Karnataka	17.0	20.1		18.5	0	0	0	0
Rabi 2022-23	West Bengal	28.0	31.5		19.3	25	7.4	6.6	39
Kufri Pukhraj									
Rabi 2020-21	Telangana	31.2	33.4		16.4	NA	NA	NA	NA
Rabi 2021-22	Telangana	36.5	37.0		15.7	0	32.5	25.2	57.7
Rabi 2022-23	Telangana	14.6	20.1		19.2	0	0	0	0
Mean									

Kufri Jyoti/ Kufri Pukhraj

Table 19: Characteristics of shortlisted advanced potato clones

Advanced clones/characters	MP/12-126	MP/14-171	MP/15-651	MP/15-698
Parentage	CP 4047 × MP/99-322	K Chipsona-3 × MP/9-68	MP/9-90 × MP/9-11	MP/9-90 × MP/9-11
Maturity	Medium	Medium	Early-Medium	Medium
Late blight resistance	Field resistant	Field resistant	Field resistant	Field resistant
Tubers	Round	Round	Ovoid	Round
Skin-set	Good	Good	Good	Russet
Yielders	Good	Good	Good	Very Good
Tuber dry matter	21%	21%	21%	21%
Chip colour score	Acceptable (<3)	Acceptable (<3)	Acceptable (<3)	Acceptable (<3)
Internal defects	Low	Low	Low	Low
Adaptability	Rabi season in southern & eastern plains	Diverse southern environments/ seasons	Diverse environments and season	Eastern plains.

during the entire study period. We sincerely thank the ITC R&D team particularly, Dr. Sai Prasad and Dr. Mahavishnan K. for evaluation (under MoU) of the CPRI bred processing clones at different locations in Southern and Eastern India. The technical help by CPRI, RS Modipuram staff, Mr. Gyan and Mr. Himanshu in tuber multiplication and maintenance of clones is duly acknowledged.

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

LITERATURE CITED

Devaux, A., Kromann, P. & Ortiz, O. (2014) Potatoes for sustainable global food security In Kiptoo S, Kipkorir EC, Kiptum CK. Effects of Deficit Irrigation and Mulch on Yield and Quality of Potato Crop. *African Journal of Education, Science and Technology*, vol 4(4).

Gupta VK, Vinay Bhardwaj, SK Luthra and Bandna (2021) Advanced potato processing hybrids identified through public-private collaborations. in International Potato e-Conference New Paradigms in Food Security and Industrial Applications 23-26 November. IPeC2021: APBSR_19

Gupta VK, Vinay Bhardwaj, SK Luthra, Sanjay Rawal, Bandna, Salej Sood, Mehi Lal and Arvind Jaiswal (2021a) Two-decade journey of potato processing in India and future prospects. in International Potato e-Conference New Paradigms in Food Security and Industrial Applications 23-26 November. IPeC2021: ES_02

Hussen, E. S. (2019) Review on Genetic Variation in Potato (Solanum Tuberosum L.) for Processing Quality Traits. *Journal of Natural Sciences Research*, Vol.9, No.12.

Luthra SK, VK Gupta, Bandana Kaundal and JK Tiwari. (2018) Genetic analysis of tuber yield, processing and nutritional traits in potato (Solanum tuberosum). Indian Journal of Agricultural Sciences 88 (8):1214-1221.

Luthra SK, VK Gupta, JK Tiwari, V Kumar, V Bhardwaj, S Sood, Dalamu, RP Kaur, R Kumar, G Vanishree, D Kumar, P Mhatre and SK Chakrabarti. (2020) *Potato Breeding in India*. CPRI Technical Bulletin No 74 (revised), ICAR-Central Potato Research Institute, Shimla, Himachal Pradesh, India, 214p.

Mori K, Asano K, Tamiya S, Nakao T and Mori M. (2015) Challenges of breeding potato cultivars to grow in various environments and to meet different demands. *Breeding Science* 65: 3–16.

Wayumba, B. O., Choi, H. S., & Seok, L. Y. (2019) Selection and evaluation of 21 potato (*Solanum tuberosum*) breeding clones for cold chip processing. *Foods*, *8*(3), 98.

MS Received : May 08, 2024; Accepted : July 29, 2024