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Evaluation of Biochemical Properties and Sensory Parameters of Short Duration Potato (*Solanum tuberosum* L.) Hybrids and Varieties

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

In present investigation, 13 (6 hybrids and 7 controls) different short duration potato (*Solanum tuberosum* L.) hybrids and varieties were evaluated for biochemical, quality and sensory parameters grown at ICAR-Central Potato Research Institute Research Station, Gwalior, Madhya Pradesh during 2019-20. Variation in biochemical parameters *viz*., reducing sugar, Total Soluble Solids, starch content, phenols and total free amino acids were recorded. Variation was also recorded in terms of tuber and haulm dry matter in hybrids and varieties and none of the hybrid/ varieties gave higher tuber dry matter at 60 and 75 days hence found to be not suitable for processing at early days. Different parameters for judging of boiled potatoes includes- color, taste, texture size and overall acceptability in scale of 1-10. The result revealed that overall acceptability of boiled tuber of Kufri Lauvkar found superior followed by hybrid P-31/J/7-37, Kufri Mohan, P-36/J/8-91 & P-27/J/-05 as compared to other hybrids and varieties. Texture is one of the most important quality attributes of potato tubers. It not only affects consumer preference, but it also influences the release of volatile flavour components during chewing. These characteristics are very important for marketing of potatoes as well as tubers intended for processing. The information from this study can be utilized for further research work for value addition and processing.

Keywords: Amino acids; haulm; phenols; reducing sugar; starch; TSS; tuber dry matter.

1. INTRODUCTION

The potato (*Solanum tuberosum* L.) crop is indigenous to Peru-Bolivian region where it is found to be growing as a wild and wildest forms of diversity belongs to Night shade family and introduced in India in early 17th century by Portuguese. The word 'Potato' comes from the Spanish word *patata.* In Indian language potato is called as '*aloo*'. It is an annual herbaceous plant, grown under a diverse range of climatological condition, having wider adaptability in sowing and harvesting time.

In times of changing climates, early maturing potato varieties which are ready to harvest in about 60-75 days, provide much needed food before grains are ready. These early maturing features facilitate the potato to incorporate into cropping system and also fit well in sequential cropping of paddy-potato-wheat during fallow periods, due to its high yield under early (75 days) and very early (60 days) harvest. It has the potential to produce highest quantity of food per unit time and area and has high nutritional value for ensuring food security to expanding population [1]. Earliness enables the farmers to take the potato crop anytime for two months, which can solve the problem of storage / glut to some extent, and helps to prevent several abiotic and biotic stresses. So developing early potato hybrids or varieties is most important in current situation [2].

From the farmers' point of view, it is useful to grow potato as a cash crop which provides a reasonable amount of returns. Quality attributes of potato tubers particularly size of tubers, dry matter, starch and sugar contents etc. are of prime concern of potato growers, in order to fetch good prices from processors [3]. If there would be more options of short duration, dual purposes varieties with good cooking quality, farmers can choose potato varieties and cultivate as per the need of consumers and can fetch profits by adopting such varieties. Short duration varieties having good yield potential (30-35t/ha) with high dry matter (21-23%) and low reducing sugars (150mg/100g fresh weight) are required.

2. MATERIALS AND METHODS

The experiment was conducted at the ICAR-CPRI-RS, Maharajpura, Gwalior (M.P.) during the *rabi* season, 2019 under agro-climatic and soil conditions of Chambal region (Madhya Pradesh).Total of thirteen genotypes (6 hybrids and 7 varieties) of potato tubers *namely* P-27/J/-05, P-29/J/7-15, P-31/J/7-37, P-36/J/8-91, P-40/J/8-85, P-55/J/10-148, Kufri Khyati, Kufri Lauvkar, Kufri Garima, Kufri Mohan, Kufri Ganga, Kufri Pukhraj and Kufri Pushkar were used as treatments and arranged in a Randomized complete block design with three replications.

Different hybrids and varieties were evaluated for biochemical parameters during experiment *namely* Reducing sugar (mg/100gm), Total soluble solids (°Brix), Total Starch Content (%), Total Phenols (mg/100gm) and Total free amino acids (mg/100gm) at 60 and 75 days after planting by the standard protocol (CPRI Bulletin

2 bio-chemistry). For quality assessment, tuber and haulm dry matter were recorded at 60 DAP, 75 DAP and at senescence. For tuber dry matter content, tubers of the tagged plant were harvested, thoroughly washed with water and dried. 100 gm weight of tubers were taken from each variety and replication and chopped with chip machine separately and then they were dried in the sun first and then in oven at 60°C for 48 hours and then weighed. And for haulm dry matter content, fresh haulm of the tagged plants weight of 250 gm were taken from each variety and replication separately. They were dried in the sun first and then in oven at 60°C for 48 hours and then weighed with the help of electronic weighing balance.

Organoleptic test of boiled tubers were also carried out after harvesting with panel consisting of 5 persons. The tubers after cooling were examined (colour, taste, texture, size and overall acceptability). Precaution was taken to wash the mouth before testing the sample [4]. The data on biochemical, quality and organoleptic test were recorded from randomly selected tubers from each replications. The data were analyzed statistically according to the least significant differences (LSD) at 0.05 level of probability (Gomez and Gomez (1993).

3. RESULTS AND DISCUSSION

3.1 Biochemical Parameters

3.1.1 Reducing sugar (mg/100gm)

Reducing sugar of different hybrids and varieties at 60 and 75 DAP has been presented in Table 1 and Fig. 1, It revealed from the data that hybrids and controls for Reducing sugar at 60 and 75 days after planting affect significantly. At 60 days after planting hybrid P-55/J/10-148 observed signifcantly highest reducing sugar over other hybrids and controls. Whereas, the lowest amount of reducing sugar observed in Kufri Lauvkar (188mg/100gm) followed by Kufri Pushkar & Kufri Garima (190mg/100gm),Kufri Mohan (201mg/100gm), hybrid P-29/J/7-15 (202mg/100gm) and P-27/J/-05 (204mg/100gm). At 75 DAP, Kufri Pushkar (240mg/100gm) followed by Kufri Khyati (230 mg/100gm) recorded significantly higher reducing sugar over other hybrids and controls. But among hybrids hybrid P-55/J/10-148 (220mg/100gm) recorded significantly higher amount of reducing sugar over control Kufri Garima (180mg/100gm), Kufri Mohan (194mg/100gm), Kufri Lauvkar (195mg/100gm) and Kufri Pukhraj (201mg/100gm). Present findings were accordance with Rajani and Dhirendra Singh [5] reveal that reducing sugar content varied from 113.960 to 242.160 mg/100g. Minimum reducing sugar was found in Kufri Surya (113.960 mg/100gram fresh weight of potato tubers) followed by C-1 (114.960 mg/100gram fresh weight of potato tubers) and maximum in genotype TPSK-05-06-117 (242.160 mg/100gram fresh weight of potato tubers) and TPSK-05-06-85 (221.360 mg/100g). Low reducing sugar (<0.15% in FW basis) is considered to be admissibe and important trait for making light coloured potato processed products [6]. Similar trend was also reported by Patidar et al. [7], Jatav et al.; [8], Kaur and Khurana [6] Pandey et al. [9], Kumar and Ezekiel [10] who noted that reducing sugar varied from one genotype to other.

3.1.2 Total soluble solids (°Brix)

The data revealed that (Table 1) Total Soluble Solids in different hybrids and controls at 60 and 75 days after planting found statistically changed and it range from 3.7 °Brix to 6.9 °Brix and 4.5 °Brix to 7.5 °Brix, respectively. Significantly highest TSS found in hybrid P-40/J/8-85 (6.9 °Brix) which was followed by and at par with control Kufri Garima (6.5 °Brix) over other treatments. While the lowest TSS found in hybrid P-31/J/7-37 (3.7 °Brix) at 60 days after planting. Similar result also observed in 75 days after planting, Significantly highest TSS found in hybrid P-40/J/8-85 (7.5 °Brix) which was followed by and at par with control Kufri Garima (7.1 °Brix) over other treatments. While the lowest TSS found in hybrid P-31/J/7-37 (4.5 °Brix) at par with Kufri Khyati (4.8 °Brix). Present response was supported by Katiyar et. al. [11] evaluated 15 genotypes reveals that significantly least TSS was obtained in genotype J/96-149 (5.29°Brix) whereas highest TSS found in J/92-159 (7.39°Brix) followed by and at par with Kufri Chipaona-1 and Kufri Pushkar (7.27 °Brix each) and J/95-242 (7.25°B). Higher values of Total Soluble Solids indicates presence of more sucrose [12]. Variation in TSS vary according to the genotypes had also been reported by Rahayu et al. [13], Rajani and Dhirendra Singh [5] and Jatav et al. [8].

3.1.3 Total Starch Content (%)

Starch is considered to be the main constituent of potato comprising 65-80% of the dry matter

content and the varieties having higher starch content can be used for processing purposes [6]. The data revealed that (Table 1) starch content in different hybrids and controls at 60 days after planting found statistically unchanged and it range from 69% to 78% in the present study. At 75 days after planting, significantly highest amount of starch % found in hybrid P-29/J/7-15 (75%) followed by Hybrid P-36/J/8-91 and control Kufri Lauvkar (74%). Whereas, Kufri Pukhraj (60%) recorded lower amount of starch % among all the hybrids and controls. Present findings are in accordance with Bekele and Haile [14] who reported significant variation, highest total starch content (14.69%) recorded in Gudanie followed by Chala, Gera and Gorebela (13.17%) and the lowest was observed in Maracharre and Jalanie (9.36%). Starch content is impacted by genotypes, NARC 1- 2006/1 (20.01%) and VR 90-217 (19.30%) was higher in contrast to variety Chipsona-3 (18.21%) [15]. The present result findings also line with that of Lemma Tessema et al. [16], Jatav et al. [8], Kaur and Khurana [6] and Tsegaye [17] that the starch percentage affect significantly by the genotypes.

3.1.4 Phenols (mg/100gm)

Phenols of different hybrids and varieties has been presented in Table 1. Phenolic compound (mg/100gm) has been associated with enzymatic discoloration of product which is undesirable character and decreases cooking quality of tubers. The data revealed that phenols in different hybrids and controls affect significantly at 60 and 75 days after planting. At 60 DAP, control Kufri Pukhraj (123mg/100gm) and Kufri Ganga (114mg/100gm) recorded significantly higher total phenol content over hybrid P-27/J/-05, P-29/J/7-15 & P-55/J/10-148 and other controls except Kufri Mohan (107mg/100gm) and hybrid P-40/J/8-85 (110mg/100gm) & P-36/J/8-91 (108 mg/100gm), which were at par. Whereas, at 75 DAP, control Kufri Pukhraj (128mg/100gm) recorded significantly highest total phenol content among hybrid and all the controls. And it was at par with hybrid P-36/J/8-91 (124 mg/100gm) and P-31/J/7-37 (120 mg/100gm). Present findings is accordance with Kumar et al [18], evaluated 21 genotypes and reported that at at 75 DAP, Hybrid J/7-37 (91.00 mg/100) had significantly lower mean phenol content than all other hybrids and varieties. In general, variety with low total phenol content would prefer for processing and with high phenol content preferred for table purpose because of health coverage [19]. Present finding was also supported by Patidar *et al*. [7] and Singh et al. [20].

Table 1. Biochemical parameters of different varieties and hybrids of potato after 60 and 75 days of planting

S.N	Treatments	Biochemical parameters									
		Total starch (%)		Reducing sugar (mg/100g)		Total soluble solids (°Brix)		Total phenol (mg/100g)		Total free amino acids (mg/100g)	
		60 DAP	75 DAP	60 DAP	75 DAP	60 DAP	75 DAP	60 DAP	75 DAP	60 DAP	75 DAP
1	P-27/J/-05	75	71	204	217	6.1	6.9	102	100	90	91
2	P-29/J/7-15	74	75	202	208	5.8	5.5	104	110	98	92
3	P-31/J/7-37	69	72	211	211	3.7	4.5	105	120	101	97
4	P-36/J/8-91	70	74	232	218	6	6.7	108	124	106	96
5	P-40/J/8-85	71	69	222	213	6.9	7.5	110	118	111	98
6	P-55/J/10-148	72	70	267	220	5.8	5.9	99	104	88	92
7	Kufri Khyati	74	71	217	230	4.4	4.8	94	108	94	90
8	Kufri Pushkar	76	72	190	240	5.4	6.2	96	94	104	101
9	Kufri Lauvkar	78	74	188	195	4.5	5.2	98	99	104	101
10	Kufri Garima	71	69	190	180	6.5	7.1	102	101	114	102
11	Kufri Mohan	74	71	201	194	5.1	6	107	104	102	108
12	Kufri Ganga	72	68	208	202	6.4	6.5	114	110	101	106
13	Kufri Pukhraj	70	60	210	201	5.4	6.1	123	128	100	94
	S.E.(m)±	2.248	2.109	6.294	6.362	0.164	0.181	3.119	3.28	3.114	2.971
	C.D. (at 5%)	NS	6.193	18.481	18.679	0.48	0.532	9.159	9.631	9.143	8.724

3.1.5 Total free amino acids (mg/100gm)

The data (Table 1) revealed that total free amino acids in different hybrids and controls affect significantly at 60 and 75 days after planting. At 60 DAP, control Kufri Garima (114mg/100gm) was at par with hybrid P-40/J/8-85 and P-36/J/8-91, recorded significantly maximum total free amino acids over all other hybrids and controls. Whereas at 75 DAP, control Kufri Mohan (108 mg/100gm) and Kufri Ganga (106 mg/100gm) recorded significantly higher amino acids over hybrid P-27/J/-05, P-29, P-36/J/8-91, P-55/J/10-148, control Kufri Khyati and Kufri Pukhraj. However, remaining hybrids and varieties were at par. Current performance was accordance with Kumar and Ezekiel [10] evaluated two early cultivar got higher mean values of total free amino acids in Kufri Lauvkar (872.2 mg/100g f. wt) than Atlantic (671.3 mg/100 g f. wt). Similar variation was also observed in present findings.

3.2 Quality Parameters

3.2.1 Tuber dry matter content

It is revealed from the data (Table 2 and Fig. 2) that the variation in tuber dry matter content (%) were significant for different potato hybrids and varieties at different days of harvesting. At 60 DAP, tuber dry matter content (%) ranged from 11.09 % to 15.32 %. Kufri Lauvkar (15.32%) observed significantly highest tuber dry matter over all hybrids and controls. Hybrid P-29 (13.62%), P-55/J/10-148 (13.57%), P-40/J/8-85 (13.26%) and P-36/J/8-91 (13.07%) observed significantly higher tuber dry matter content over control Kufri Mohan (11.64%) and Kufri Ganga (11.09%). However, these hybrids were at par with other remaining hybrids and controls except Kufri Lauvkar. At 75 days after planting, dry matter content (%) range from 12.17 % to 17.91 %. Kufri Lauvkar (17.91 %) observed significantly highest tuber dry matter over all hybrids and control and among different hybrids, P-40/J/8-85 (15.83 %), P-36/J/8-91(15.55 %) and P-29/J/7-15 (14.61 %) observed significantly higher tuber dry matter content over control Kufri Mohan and were at par with other remaining hybrids and control except Kufri Lauvkar. At senescence also highest dry matter % recorded in Kufri Lauvkar (21.41%). Hybrid P-31/J/7-37 (19.53%) and P-36/J/8-91 (19.62%) observed significantly higher tuber dry matter content over control Kufri Mohan, Kufri Pukhraj, Kufri Pushkar and Kufri Ganga and were at par with other treatments except Kufri Lauvkar. Arya et al. [21] evaluated eight CIP-bred potato clones along with two controls in arid and water scarce zone of Western Rajasthan reported that highest tuber dry matter recorded (22.7%) in CIP clone 397006.18 remaining at par with genotype 301029.18 (22.4%) also found significantly superior to both control Kufri Surya (21.4%) and Kufri Pukhraj (17.9%). Kaur and Aggarwal [22] reported that cultivars which are suitable for processing recorded higher dry matter content (%) *i.e*., >20%. Kaur and Aggarwal [22] reported that among 11 potato genotypes tested at PAU Ludhiana, lowest dry matter content was in Kufri Pushkar (14.06%) and highest in Kufri Chipsona-1 and Kufri Chandramukhi (24.30%) followed by Lady Rosetta (24.0%) and Atlantic (23.90%). Dry matter content (>20%) is one of the utmost crucial traits that determines the ultimate use of potatoes in the processing industries [23]. Luthra et al. [24] reported that mean tuber dry matter of advanced hybrid MS/5-1543 recorded 18% in eastern plains and 15% in northern plains. Among 21 potato cultivars dry matter content was significantly highest in hybrid PS/6-39 (25.07%), P-28 (22.20%) and in P-12 (19.71%) at different harvesting dates viz. 75, 90 DAP and senescence reported by Kumar et al. [18]. Current result was also supported by Lemma Tessema et al. [16], Khan et al. [25], Bekele and Haile [14], Mishra *et al.* [26], Sadawarti et al. [27], Deshmukh et al. [28] and Abbas et al. [15]. In the present study also variation was recorded in terms of dry matter in hybrids and varieties and none of the hybrid/ varieties gave higher dry matter at 60 and 75 days hence found to be not suitable for processing at early days.

3.2.2 Haulm dry matter content

It is revealed from the data (Table 2 and Fig. 2) that the differences in haulm dry matter (%) were significant for different hybrids and varieties at different days of harvesting. At 60 DAP, Kufri Ganga (11.91%) observed significantly highest haulm dry matter content over other hybrids and control. Hybrid P-40/J/8-85(10.53%) observed significantly higher haulm dry matter content over other hybrids and control Kufri Khyati (8.26%), Kufri Pushkar (8.5%), Kufri Lauvkar (8.78%), Kufri Garima (8.43%) and Kufri Mohan (8.62%). Control Kufri Pukhraj (10.31%) observed significantly highest haulm dry matter content over other hybrids except P-40/J/8-85, which was at par. At 75 DAP, hybrid P-27/J/-05 (18.61 %), P-31/J/7-37 (18.11%) and P-55/J/10-148 (18.36%) observed significantly higher haulm dry

matter content over other hybrids and control Kufri Pushkar (8.26%) only, and others were at par. Kufri Pukhraj (20.35%) observed significantly higher haulm dry matter content over hybrids P-29/J/7-15, P-31/J/7-37, P-36/J/8-91, P-40/J/8-85, and P-55/J/10-148 and other were at par. At senescence, hybrid P-29 (10.13 %) observed significantly higher haulm dry matter content over other hybrids and control Kufri Pushkar (6.84 %), Kufri Ganga (8.37%) and Kufri Pukhraj (8.5 %) and were at par with others. Under Gwalior condition highest haulm dry matter was reported in control Kufri Khyati (13.99 %) as compared to other hybrids and control and lowest in Kufri Pukhraj (11.00 %) at 60 DAP whereas at 75 DAP, highest haulm dry matter was recorded in control Kufri Mohan(12.90%) while the least haulm dry matter in Kufri Pushkar (9.95%) [29]. Similar significant variation in haulm dry matter was also recorded in current findings.

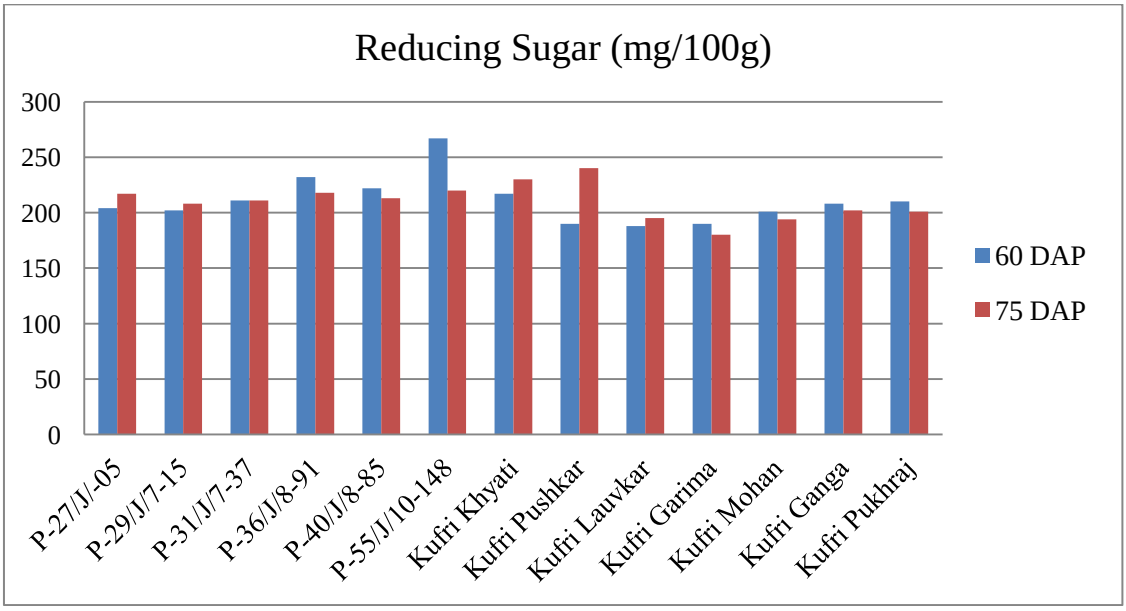

Fig. 1. Reducing sugar (mg /100 g) in different harvesting interval (at 60 DAP and 75 DAP) as affected by different hybrids and varieties of potato

Table 2. Quality parameter (tuber and haulm dry matter %) after 60, 75 days and senescence of plant for different varieties of potato

S.N	Treatments	Tuber dry matter (%) at			Haulm dry matter (%) at		
		60 DAP	75 DAP	Senescence	60 DAP	75 DAP	Senescence
1	P-27/J/-05	12.21	14.00	18.37	9.14	18.61	7.09
2	P-29/J/7-15	13.62	14.61	18.39	8.39	17.54	10.13
3	P-31/J/7-37	12.97	13.88	19.53	8.08	18.11	6.94
4	P-36/J/8-91	13.07	15.55	19.62	9.13	17.93	8.63
5	P-40/J/8-85	13.26	15.83	18.56	10.53	17.90	7.06
6	P-55/J/10-148	13.57	14.02	14.22	9.29	18.36	8.49
7	Kufri Khyati	13.05	14.34	18.91	8.26	19.15	9.63
8	Kufri Pushkar	12.45	14.39	17.46	8.50	15.77	6.84
9	Kufri Lauvkar	15.32	17.91	21.41	8.78	18.86	10.55
10	Kufri Garima	13.78	14.12	20.91	8.43	17.06	8.79
11	Kufri Mohan	11.64	12.17	13.40	8.62	17.67	9.39
12	Kufri Ganga	11.09	13.46	16.59	11.91	17.50	8.37
13	Kufri Pukhraj	13.16	13.79	16.26	10.31	20.35	8.50
	S.E.(m)±	0.360	0.486	0.513	0.367	0.601	0.509
	C.D. (at 5%)	1.057	1.427	1.505	1.077	1.766	1.495

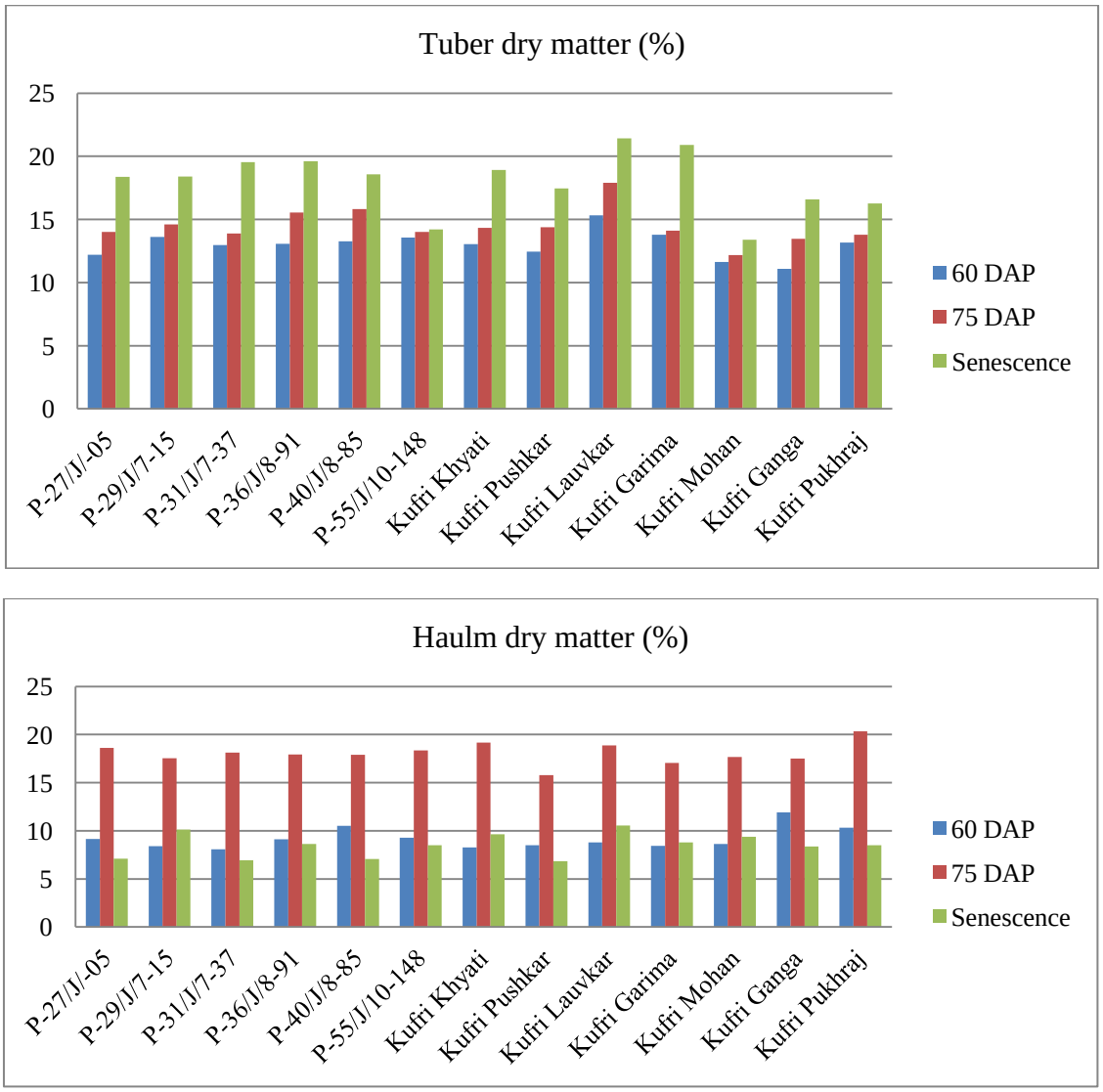

Fig. 2. Tuber dry matter (%) and Haulm dry matter (%) in different harvesting interval as affected by different hybrids and varieties of potato

3.3 Sensory Parameters

The data (Table 3) related to the quality parameters of boiled potatoes (color, taste, texture, size and overall acceptability) recorded statistically unchanged at 60 DAP and 75 DAP except overall acceptability at 75 DAP, range from 7.1 to 8 out of 10 score where significantly higher overall acceptability observed in Kufri Lauvkar (8) followed by hybrid P-31/J/7-37(7.85), K. Mohan (7.80), P-27/J/-05 and P-36/J/8-91 (7.7) while the least acceptability recorded in Kufri Garima (7.1). Similar result also found in 60 DAP. Among the 13 treatments (6 hybrids and 7 controls) at 60 and 75 DAP, maximum acceptance in boiled potato colour recorded in hybrid P-27 followed by Kufri Lauvkar, Kufri Mohan, P-36/J/8-91, P-40/J/8-85 and Kufri Khyati. While the minimum score recorded in Kufri Garima, Kufri Pukhraj and Kufri Lauvkar. In boiled potato taste, good taste recorded in Kufri Lauvkar followed by P-31/J/7-37, P-36/J/8-91, P-40/J/8-85 and Kufri Pukhraj. Whereas poor taste recorded in P-55/J/10-148 and Kufri Garima. In boiled potato texture, good texture observed in P-31/J/7-37 and Kufri Mohan followed by Kufri Pushkar, P-36/J/8-91, P-55/J/10-148 and Kufri Lauvkar and poor texture of boiled potato observed in P-40/J/8-85 and Kufri Garima. While, Kufri Lauvkar recorded significantly superior in size followed by P-31/J/7-37 and Kufri Pukhraj and minimum size recorded in Kufri Garima and Kufri Pushkar. Present findings was in agreement with Gupta et al. [30] evaluated 44

Table3. Sensory parameter (quality of boiled potato (score 1-10)) in different varieties of potato after 60 and 75 days of planting

S.N	Treatments	Quality of boiled potatoes									
		Color (scale 1-10)		Taste (scale 1-10)		Texture (scale 1-10)		Size (scale 1-10)		Overall acceptability	
		60 DAP	75 DAP	60 DAP	75 DAP	60 DAP	75 DAP	60 DAP	75 DAP	60 DAP	75 DAP
1	P-27/J/-05	8.2	8.4	7	7.2	7.2	7.4	7.6	7.8	7.5	7.7
2	P-29/J/7-15	7.4	7.6	6.8	7	6.8	7	7.6	7.8	7.15	7.35
3	P-31/J/7-37	7.4	7.6	7.2	7.4	8	8.2	8	8.2	7.45	7.85
4	P-36/J/8-91	7.6	7.8	7.2	7.4	7.6	7.8	7.6	7.8	7.45	7.7
5	P-40/J/8-85	7.6	7.8	7.2	7.4	7	7.2	7.6	7.8	7.55	7.55
6	P-55/J/10-148	7.2	7.4	6.4	6.6	7.6	7.8	7.6	7.8	7.2	7.4
7	Kufri Khyati	7.6	7.8	7	7.2	7.4	7.6	7.6	7.8	7.4	7.5
8	Kufri Pushkar	7.4	7.6	7	7.2	7.8	8	7.2	7.4	7.35	7.55
9	Kufri Lauvkar	8	8.2	7.4	7.6	7.6	7.8	8.2	8.4	7.8	8
10	Kufri Garima	6.8	7	6.6	6.8	7	7.2	7.2	7.4	6.9	7.1
11	Kufri Mohan	8	8.2	6.8	7	8	8.2	7.6	7.8	7.7	7.8
12	Kufri Ganga	7.4	7.6	6.8	7	7.2	7.4	7.6	7.8	7.25	7.45
13	Kufri Pukhraj	7.2	7.4	7.2	7.4	7.2	7.4	8	8.2	7.4	7.6
	S.E.(m)±	0.30	0.292	0.387	0.317	0.427	0.364	0.322	0.432	0.213	0.164
	C.D. (at5%)	NS	NS	NS	NS	NS	NS	NS	NS	NS	0.469

varieties and found that 15 were declared as mealy, 14 as waxy, 14 as floury and one soggy in texture. Colour after peeling in 28 varieties was cream, 9 white and light yellow colour in rest 7 varieties. Generally, waxy texture is preferred for boiling whereas floury is used for processing purpose. And soggy texture varieties liked for boiling, canning, salads, and pan frying. Present result is also supported by Khan et al. [25] reported that sensory evaluation is basic parameters for quality assesment to develop the products as well as to meet the consumer requirements. Nain Caroline Waingeh et al. (2019) reported that with regards to color, boiled Cipira variety indicates highest score and lower in Jacob 2005 followed-by Belo and Banso. The texture and flavour of boiled tubers of Belo variety more liked by panelist compare to Jacob 2005 and Mondial. Overall acceptability of boiled potatoes, lowest acceptability was registered in Jacob 2005 and higher in variety Cipra. Similar trend was also reported by Luitel et al. [31] and Das et al. [32], [33].

4. CONCLUSION

Present study concludes that variation was recorded in hybrids and varieties assessed for different biochemical and quality attributing characters but none of the hybrids and varieties posseses good quality attributes for processing purpose hence found not to be not suitable for processing at early days i.e., at 60 and 75 days. But sensory evaluation of boiled potato showed that overall acceptability of boiled tuber of Kufri Lauvkar found superior followed by hybrid P-31/J/7-37, Kufri Mohan, P-36/J/8-91 & P-27/J/-05 as compared to other hybrids and varieties. These evaluated characteristics are very important for tubers intended for processing as well as for table purpose. The information from this study can be utilized for further research work for value addition and processing.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Sadawarti M, Pandey KK, Singh SP, Singh YP. Generation performance of microplant based seed potato production in Gwalior region. Environment and Ecology. 2015;33(1A):275-278.

2. Kawar P, Kardile H, Raja S. Developing early-maturing and stress- resistant potato varieties. Achieving Sustainable Cultivation of Potatoes. 2018;1:143-167.
3. Pandey SK, Marwaha RS, Kumar D, Singh SV. Indian potato processing story: Industrial limitation, challenges ahead and vision for the future. Potato J. 2009;36:1-13.
4. Meitei WI, Barooah S Organoleptic of Potato Varieties under agro-climatic Conditions of Jorhat (Assam). J. Indian Potato Assoc. 1980;7(3):162-164.
5. Rajani, Singh D. Study of biochemical parameters in potato (*Solanum tuberosum* L.) germplasms under Tarai region of Uttarakhand. Asian Journal of Plant Science and Research. 2015;5(12):29-35.
6. Kaur R, Khurana DS. Growth, yield and quality of different processing cultivars of potato (*Solanum tuberosum* L.). Int. J. Pure App. Biosci. 2017;5(6):594-599.
7. Patidar P, Sadawarti MJ, Gurjar PKS, Gupta VK, Samadhiya RK, Singh SP, Lautre R. Evaluation of advanced processing hybrids and varieties of potato (*Solanum tuberosum* L.) for chipping performance and yield for North-Central India. The Pharma Innovation Journal. 2022;11(6):972-976.
8. Jatav AS, Kushwah SS, Naruka IS. Performance of potato varieties for growth, yield, quality and economics under different levels of nitrogen. Advances in Research. 2017;9(6):1-9.
9. Pandey PC, Luthra SK, Singh SV, Pandey SK, Singh BP. Kufri sadabahar: A potato variety for Uttar Pradesh. Potato J. 2008a;35(3-4):111-117.
10. Kumar D, Ezekiel R. Effect of physiological and biochemical attributes of potato cultivars kufri lauvkar and atlantic on their chipping quality. Potato J. 2006;33(1-2):50-55.
11. Katiyar H, Kumar V, Kalpana S, Chandra N, Lodhi SK, Verma SK. Physio-biochemical studies on thirty genotypes of potato (*Solanum* tuberosum L.). HortFlora Research Spectrum. 2015;4(2):116-122.
12. Nain CW, Njoya MA, Mahbou PY, Nde SN, Imele H, Nambangia JO, Lendzemo WV, Tata NP, Woin N. Assessing the processing attributes of some potato (*Solanum tuberosum* L) varieties grown in the North West Region of Cameroon. Journal of Food Science & Technology. 2019;4(9);946-955.
13. Rahayu ST, Handayani T, Levianny PS. Quality evalution of potato clones as processed material cultivated in Lembang. Earth and Environ. Sci. 2017;58:1755-1315.
14. Bekele T, Haile B. Evaluation of improved potato (*Solanum tuberosum* L.) varieties for some quality attributes at Shebench Woreda of Bench-Maji Zone, Southwestern Ethiopia. Afr. J. Agric. Res. 2019;14(**7**)389-394.
15. Abbas G, Frooq K, Hafiz IA, Hussain A, Abbasi NA, Shabbir G. Assessment of processing and nutrition quality of potato genotypes in pakistan. Pak. J. Agri. Sci. 2011;48(**3**):169-175.
16. Tessema L, Mohammed W, Abebe T. Evaluation of potato (*Solanum tuberosum* L.) varieties for yield and some agronomic traits. Open Agriculture. 2020;5(1):63-74.
17. Tsegaye B, Dechassa N, Mohammed W. Quality of potato (*Solanum tuberosum* L.) tubers as influenced by cultivar and plant spacing in Eastern Ethiopia. Journal of Biology, Agriculture and Healthcare. 2014;8(21):65-70.
18. Kumar H, Bajpai R, Sadawarti MJ, Tiwari S, Singh SP and Samadhiya RK. Evaluation of potato (*Solanum tuberosum* L.) hybrids and varieties for medium maturity and quality components for North - Central India. Biological Forum – An International Journal. 2023;15(2):1245-1250.
19. Marwaha RS, Singh SV, Pandey SK, Kumar D, Gupta VK. Evaluation of advanced potato hybrid MP/97-644 and processing varieties for yield and chipping quality in north-eastern hills. Indian J Hort. 2009;66(3):363-366.
20. Singh RK., Marwaha RS, Sharma J, Singh S. Antioxidant status and tuber yield in different potato cultivars. Potato Journal. 2005;32(3):199-200.
21. Arya S, Rawal S, Luthra SK, Sharma N, Gupta VK, Kadian MS. Participatory Evaluation Of Advanced Potato (*Solanum tuberosum*) Clones For Water Stress Tolerance. Indian Journal of Agricultural Sciences. 2017;87(11):1559–64
22. Kaur S, Aggarwal P. Studies on Indian Potato Genotypes for their Processing and Nutritional Quality Attributes.Int.J.Curr.Microbiol.App.Sci. 2014;3(8):172-177.
23. Mehta A, Raigond P, Dutt S, Kumar V, Singh B. Effect of Maturity Dates on

Processing Attributes of Potato Varieties Under North-Western Indian Plains. Potato J. 2018;45(1):59-68.

24. Luthra SK, Gupta VK, Lal M, Rawal S, Kumar V, Singh, BP. Kufri mohan-a new high yielding table potato variety. Potato J. 2017;44(1):65-73.
25. Khan A, Erum S, Riaz N, Ghafoor A, Khan FA. Evaluation of potato genotypes for yield, baked and organoleptic quality. Sarhad Journal of Agriculture. 2019;35(4): 1215-1223.
26. Mishra TS, Mishra US, Singh HM, Mishra NK, Mishra VK. Performance Evaluation of Potato (*Solanum tuberosum* L.) Varieties Under Northern Plains Of India. Journal Of Agrisearch. 2019;6(2):117-121.
27. Sadawarti M, Patel K, Samadhiya RK Gupta PK, Singh SP, Gupta VK, Roy S, Chakrabarti, SK, Verma D. Evaluation of table and processing varieties of potato (*Solanum tuberosum* L.) for North-Central India. International Journal of Chemical Studies. 2018;6(4):823-833.
28. Deshmukh M., Bansode G, Mahajan P. Evaluation of potato cultivar for growth and yield parameter. World Journal of Biology and Biotechnology. 2018;3(1):203-205.
29. Annual Report 2018-19, Project Coordinator Unit, ICAR-Central Potato Research Institute, Shimla – 171001 (HP): 431.
30. Gupta VK, Luthra SK, Singh BP Storage behaviour and cooking quality of Indian potato varieties. J Food Sci Technol. 2015;52(8):4863–4873.
31. Luitel BP, Khatri BB, Choudhary D, Kadian MS, Arya S, Bonierbale M. Evaluation of Advanced Potato Clones for Plant and Yield Characters at High Hills of Nepal. Potato J. 2016;43 (2):118-124.
32. Das B, Sarkar KK, Priya B, Dudhane AS, Pradhan AM, Das A. Evaluation of Early and Late Harvested Potatoes for Yield, Quality and Storability. International Journal of Bio-Resource and Stress Management. 2014;5(1):022-030.
33. Kaur P, Vashist VK, Kumar A. Evaluation of potato genotypes for processing traits in late autumn.J. Hortl. Sci. 2015;10(1):57-63.

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