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Evolution of quality traits in red skinned and heat tolerant hybrids of potato (*Solenum tuberosum* L.)

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Abstract
The present investigation "evolution of quality traits in red skinned and heat tolerant hybrids of potato (*Solenum tuberosum* L.)" has been carried out at Research Cum Demonstrational Farm, College of Agriculture, IGKV, Raipur, Chhattisgarh in the *Rabi* season during the year of 2020-21 and 2021-22 with sixteen red skinned and heat tolerant hybrids of potato. The experiment was laid down in Randomized Block Design with four replications. The quality indicators, total soluble solids, dry matter content, and specific gravity, were found to be significant. The total soluble solid was measured highest in the genotype P-78 and P-75 (6.48%). While, the genotype P-45 (18.75%) was found highest dry matter content%. However, the Specific gravity was recorded highest in genotype P-78 (1.088 g cm^2).

Keywords: Potato, genotypes and quality parameters

Introduction
Potato (*Solanum tuberosum* L.) is the highest cultivated tuber crop and fourth important vegetable crop in the world, after wheat, rice and maize. (Haan *et al.* 2016) [5] Processed foods may also be made with potatoes. It is also used in industries for manufacturing starch, alcoholic beverages. One of the biggest problems for potato breeders is improving the quality of the tubers, even though variety development is an essential attribute. A tuber for potato contains likely 13-37% dry matter, 13-30% carbohydrates, 0.7-4.6% protein and 0.02- 0.96% lipids. Due to the inclusion of high-quality proteins, vitamins, and minerals, it is regarded as a balanced diet.

The greatest part of the crop is taken in before to the start of the hot, dry summer, which is followed by the hot, humid rainy season. The main potato crop on the Indian plains is cultivated during the winter.

The demands for potato quality vary depending on the intended use, and cultivar fit for a certain product plays a significant role. The consuming market can be split into the culinary and industrial sectors. There are certain criteria regarding which potato genotypes can be deliberate an industrial potato. These can be divided in to traits such as the specific gravity of the tuber, dry matter ratio, the amount of reduced sugar, the starch ratio and color and exterior properties of the tuber.

However, cultivars that will provide a consistent and regular supply and maintain high processing quality are preferred by the potato processing industry. To meet a huge and growing demand for industrial purposes, it is therefore necessary to identify the appropriate genotypes of potatoes. The purpose of the current study was to examine the quality of sixteen potato genotypes in relation to the facts mentioned above.

Materials and Methods Plant materials
The present experiment has been carried out at Research Cum Demonstrational Farm, College of Agriculture, IGKV, Raipur, Chhattisgarh in the *Rabi* season during the year of 2020-21 and 2021-22 with sixteen red skinned and heat tolerant hybrids of potato. The experiment was laid out in Randomized Block Design with four replications. The pre and post sowing cultural operations schedules are followed during the growing season. Quality parameters *i.e.* Dry matter content%, Total soluble solids and Specific gravity were measured during course of investigation.

Result and Discussion

TSS Brix (%)

The information is provided on the total soluble solids as significantly affected by several potato genotypes over both years are presented in Table 1.

The TSS was varied from 4.09 to 7.02%. The TSS (%) was recorded highest in genotype P-78 (7.02%) followed by P-75 (7.72%) and P-53 (6.35%) in first year. Second year of experiment this was found highest in genotype P-45 (6.79%) followed by P-48 (6.38%), P-75 (6.25%) and Kufri Mohan (6.12%). Pooled mean showed that the P-78 and P-75 (6.48%) had highest TSS followed by P-48 (6.01%), P-42 (5.96%) and P-53 (5.93%). However, the lowest TSS was recorded in genotype P-46 (4.09%) in first year, C-6 (4.16%) in second year and P-46 (4.23%) in pooled mean.

Another reliable indication for sustaining quality in processed potato products is the amount of total soluble solids. The genotype with high total soluble solid (brix%) maintained thick juice and indicated as suitable one for the preparation of juice, malt and flavors (Sohail *et al.*, 2013) [14]. So, the genotypes containing high percentages of total soluble solid would be suitable for making potato juice that was supported by Solaiman *et al.* (2015) [15] who claimed the ranges from 7.5 to 8.1% is appropriate for juice preparation. In conformity of this, similar tends was reported by Singh *et al.* (1973) [12], Ciecko and Mazur (1974) [3] and Jatav *et al.* (2013) [7].

Dry matter content of tubers (%)

The information shown among the genotypes for first year, second year, and pooled mean of dry matter content per cent and data are presented in Table 1.

The dry matter content per cent was varied from 17.52 to 19.22. The dry matter content per cent was recorded highest in genotype P-45 (19.22%) followed by Kufri Lalit (19.06%) and P-78 (18.86%) in first year. Second year of experiment this was found highest in genotype C-17 (19.20%) followed by Kufri Lalima (18.99%) and C-16 (18.72%). Pooled mean showed that the genotype P-45 (18.75%) had highest dry matter content (%) followed by P-78 (18.73%) and C-17 (18.52%). However, the lowest dry matter content (%) was recorded in genotype P-46 (17.52%) in first year, Kufri Surya (17.62%) in second year and P-46 (17.72%) in pooled mean.

Dry matter content of the genotypes ranged from 20 to 26% and is suitable for chips production. High dry matter in potatoes results into lower content of fat and sugar suitable for maintaining good crispiness in chips and other fried products. Suitable proportion of dry matter content in the potato tubers results in less frying time as well as lesser oil absorption (Pavlista and Ojala, 1997) [11]. The results was supported by other findings of Kita *et al.* (2009) [8]; Lisinska and Eszczynski (1989) [9]; Talburt and Smith (1987) [16].

Specific gravity (g cm^{-2})

The information given on the genotypes' specific gravity (g cm^2) values for the first year, second year and pooled means data are presented in Table 1

The specific gravity was varied from 1.020 to 1.095 g cm^2. The Specific gravity was recorded highest in genotype P-78 in first year, second year and pooled mean *i.e.* 1.082, 1.095 and 1.088 g cm^2, respectively followed by P-45 (1.080, 1.082 and 1.081 g cm^2, respectively) and P-42 (1.073, 1.077 and 1.075 g cm^2, respectively). However, the lowest specific gravity was recorded in genotype Kunfri Mohan (1.020 g cm^2) in first year, P-52 (1.022 g cm^2) in second year and Kufri Mohan (1.021 g cm^2) in pooled mean.

Tuber specific gravity, which is a measure of dry matter content, is a critical processing quality trait. Cultivars with high dry matter are required for the production of fries, chips, and starch. Asmamaw *et al.* (2010) [1], Elfnesh *et al.* (2011) [4], Tesfaye *et al.* (2012) [17] and Ismail *et al.* (2015) reported that dry matter content and specific gravity of tubers are significantly influenced by the interaction effect of growing environment and cultivars.

Table 1: Total soluble solids Brix%, Dry matter% and Specific gravity (g cm^2) of different potato genotypes

S. No.	Treatments	TSS (ºBrix)			Dry matter content%			Specific gravity (g cm^2)		
		2021	2022	Pooled	2021	2022	Pooled	2021	2022	Pooled
1.	C-16	5.74	5.68	5.71	18.24	18.72	18.48	1.045	1.044	1.044
2.	C-17	5.09	4.39	4.74	17.85	19.20	18.52	1.052	1.051	1.052
3.	C-6	6.08	4.16	5.12	18.79	17.77	18.28	1.054	1.047	1.051
4.	P-48	5.64	6.38	6.01	17.92	17.83	17.87	1.061	1.063	1.062
5.	P-78	7.02	5.94	6.48	18.86	18.60	18.73	1.082	1.095	1.088
6.	P-75	6.72	6.25	6.48	18.31	18.08	18.20	1.055	1.061	1.058
7.	P-42	5.94	5.98	5.96	18.68	18.34	18.51	1.073	1.077	1.075
8.	P-45	4.37	6.79	5.58	19.22	18.29	18.75	1.080	1.082	1.081
9.	P-46	4.09	4.37	4.23	17.52	17.92	17.72	1.064	1.065	1.065
10	P-53	6.35	5.51	5.93	18.07	18.29	18.18	1.023	1.022	1.022
11.	Kufri Lima	6.01	4.91	5.46	18.04	17.85	17.95	1.030	1.034	1.032
12.	Kufri Surya	4.95	4.23	4.59	18.51	17.62	18.06	1.037	1.041	1.039
13.	Kufri Khyati	5.40	5.49	5.44	18.38	18.62	18.50	1.032	1.029	1.030
14.	Kufri Lalima	4.73	4.19	4.46	17.65	18.99	18.32	1.059	1.067	1.063
15.	Kufri Mohan	4.49	6.12	5.31	18.49	18.02	18.26	1.020	1.023	1.021
16.	Kufri Lalit	4.95	5.22	5.08	19.06	17.74	18.40	1.049	1.052	1.051
SEm (±)		0.27	0.27	0.27	1.24	1.33	1.29	0.059	0.068	0.064
CD (5%)		0.76	0.78	0.76	3.53	3.80	3.66	0.168	0.194	0.181

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