Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

E-ISSN: 2278-4136
P-ISSN: 2349-8234
www.phytojournal.com
JPP 2020; 9(3): 1632-1634
Received: 05-03-2020
Accepted: 09-04-2020

Seerat Rizvi
Division of Vegetable Science, Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Shalimar, Srinagar, Jammu and Kashmir, India

Faheema Mushtaq
Division of Vegetable Science, Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Shalimar, Srinagar, Jammu and Kashmir, India

K Hussain
Division of Vegetable Science, Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Shalimar, Srinagar, Jammu and Kashmir, India

Syeda Farwah
Division of Vegetable Science, Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Shalimar, Srinagar, Jammu and Kashmir, India

Baseerat Afroza
Division of Vegetable Science, Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Shalimar, Srinagar, Jammu and Kashmir, India

ZA Dar
Division of Vegetable Science, Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Shalimar, Srinagar, Jammu and Kashmir, India

Syed Mazahir Hussain
Division of Vegetable Science, Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Shalimar, Srinagar, Jammu and Kashmir, India

Majid Rashid
Division of Vegetable Science, Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Shalimar, Srinagar, Jammu and Kashmir, India

Corresponding Author:
Seerat Rizvi
Division of Vegetable Science, Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Shalimar, Srinagar, Jammu and Kashmir, India

Mean performance of various potato (*Solanum tuberosum* L.) genotypes

Seerat Rizvi, Faheema Mushtaq, K Hussain, Syeda Farwah, Baseerat Afroza, ZA Dar, Syed Mazahir Hussain and Majid Rashid

Abstract
The present investigation was carried out at the Experimental Field, Division of Vegetable Science, SKUAST-K, Shalimar, during Kharif 2018. The experiment was laid out in complete randomized block design with three replications. Twelve potato genotypes were evaluated for various qualitative and quantitative traits. Analysis of variance revealed significant differences among genotypes for all the traits. The observations were recorded on days to initiation of germination, plant height (cm), plant spread (cm), stem diameter (cm), number of stems hill^{-1}, leaf area (cm^2), number of tubers plant^{-1}, total tuber yield hectare^{-1} (q), specific gravity, dry matter (%), soluble solid content (^{0}Brix), vitamin C (mg100g^{-1}), reducing sugars (%) and non reducing sugars (%). The genotypes which showed highest yield potential were P-18 (309.00 qha^{-1}) followed by P-20 (307.81qha^{-1}), Shalimar potato-1 (305.11 qha^{-1}) and CP-2187 (304.50 qha^{-1}).

Keywords: Performance of various, *Solanum tuberosum* L.

Introduction
Potato (*Solanum tuberosum* L.) (2n = 4x = 48), belonging to family solanaceae, is native to Andean plateau of South America. It was introduced to India in early seventeenth century most probably by Portuguese sailors and spread by the Britishers to the hills of North India where it flourished in the colonial home gardens (Singh *et al*., 2016) [7]. It comprises about 200 species mostly confined to American continent. Potato can grow from sea level up to more than 4000 meter altitude. Most of the species of potato produce tubers but there are some which do not. Two tuber forming species namely *Solanum tuberosum* sub species *tuberosum* and to a lesser extent, *Solanum tuberosum* sub species *andigena* have been exploited worldwide for commercial cultivation. Among the wild *Solanum* species, there is a lot of variability in plant type, tuber shape, size, colour, cooking quality, taste, etc. and also in their adaptability to different climates. The large variability available among the species has not yet been fully exploited.

The potato is one of the most important vegetable and is consumed widely throughout the world (Mathur, 2003) [5]. It is a balanced food containing proteins, essential vitamins, minerals and has high calorific value (Mehdi *et al*., 2008) [6]. Potato has been recognized as wholesome food and having an energy value of 321kj, carbohydrates 17.47 calorie per 100g, starch 15.44g, dietary fiber 2.2g, protein 2g and water 75g per 100g besides vitamins and nutrients (Drewnowski, 2013) [4]. Moreover, it is a staple diet in many areas in india and abroad and its utilization both in processed and fresh food form is increasing considerably (Brown, 2005) [3]. Due to increase in number of industries and potato products the demand of specific varieties for processing is also more. It is one of the most efficient plant source of starch and yields much more carbohydrate per unit area per unit time. It is also used as a feed for livestock and in the industry for manufacture of starch and alcohol. Potato starch is used in the food industry as a thickener and binder for soups and sauces, in textile industry as an adhesive, and for the manufacturing of papers and boards. Main companies are exploring the possibilities of using waste potatoes to obtain polylactic acid for use in plastic products; other research projects seek ways to use the starch as a base for bio degradable packaging. Potato skin, along with honey, are a folk remedy for burns in India. Burn centres in India have experimented with the use of the thin outer skin layer to protect burns while healing.

Potato ranks 4th in world and 3rd in India in production. World acreage of potato is 18.2 million hectares with an average productivity of 17.2 tonnes ha^{-1}and production 314 million tonnes. In India it is cultivated over an area of 21.64 lakh ha. The production is about 480.96 lakh mt with productivity 23.07 t ha^{-1} (Anonymous, 2017a) [2].

Jammu and Kashmir occupies an area of 6500 hectares under potato crop with production and productivity of 99600 tonnes and 15.32 t ha^{-1} respectively. In Kashmir potato is grown in an area of 1745 hectares with a production of 2171 tonnes and productivity of 14.27 t/ha (Anonymous, 2017b) [1].

The conditions under which potatoes are grown in Kashmir are very similar to those in Europe and North America. But due to lack of suitable high yielding varieties the productivity is far below as compared to the productivity of some of the leading potato growing states of the country. The major potato contributing states in India are Uttar Pradesh, West Bengal and Bihar.

Materials and Methods

The present investigation was conducted during 2018 in Vegetable Experimental Farm, Sher-e-Kashmir University of Agricultural science and Technology. The experimental field is located at the main campus, Shalimar, Srinagar which is 15 km away from Srinagar city on the foot hills of Mahadev. The altitude of the location is 1685 meters above mean sea level and situated at 34°.1´ North latitude and 74°.89´ East longitude. The experiment was laid in a completely randomized block design with three replications at each location. The experimental material consists of twelve genotypes maintained at a spacing of 60cm × 20 cm. The observations related to various growth parameters and yield attributing traits were recorded from five randomly selected competitive plants of each plot from each replication. The mean of five plants was used for statistical analysis. The collected data was analyzed using software windostat 9.1.

Result and Discussion

In this study, Potato genotypes showed wide range of variability for most of the growth and yield characters. The estimates of mean values from Table 1a and 1b revealed that no genotype was superior for all the characters under study. However Red Hybrid-2 and Red Hybrid-3 (41.33 each), CP-30 (41.77), CP-2187 (46.11) and Shalimar Potato-1 (46.22) were superior for days to initiation of germination; Shalimar Potato-1 (66.64) followed by Kufri Himalini (65.80 cm), CP-2187 (65.26 cm) and Red hybrid-1 (64.65cm) for plant height; CP-2187 (48.67 cm) followed by Shalimar Potato-1 (47.10 cm), Red Hybrid-1 (46.60 cm) and Red Hybrid-3 (44.17 cm) for plant spread; Kufri Himalini (1.95 cm) followed by CP-2187 (1.93 cm), CP-30 (1.89 cm) and Shalimar Potato-1 (1.87 cm) for stem diameter; CP-2035 (4.08)followed by Red Hybrid-3 (4.05), CP-2187(3.97) and Red hybrid-1 (3.96)For number of stems $hill^{-1}$;Shalimar Potato-1 (76.40 cm^2) followed by CP-2187 (76.27cm^2), Red hybrid-1 (76.21cm^2), CP-2035 (74.96 cm^2) and P-20 (74.95 cm^2) for leaf area; CP-30 (6.62) followed by Red Hybrid-2 (6.58), CP-2187 (6.56) and Red Hybrid-3 (6.55) for number of tubers $plant^{-1}$; P-18 (309.00 q) followed by P-20 (307.81q), Shalimar potato-1 (305.11 q) and CP-2187 (304.50 q) for tuber yield. In case of quality parameters, the highest specific gravity was recorded in Red Hybrid-2 (1.23) followed by Red Hybrid-3(1.21), CP-30 (1.17) and Kufri Himalini (1.12); highest soluble solid content was recorded in Red hybrid-1 (5.36ºBrix) followed by Shalimar Potato-1 (5.34 ºBrix), CP-30 (5.31ºBrix) and CP-2187 (5.30 ºBrix); highest dry matter content was recorded in CP-30 (21.16%) followed by Red Hybrid -3 (21.09%), Red Hybrid -2 (21.07%) and Kufri Himalini (20.86%); highest Vitamin-C content was recorded in Red hybrid-1 (20.99 $mg100g^{-1}$) followed by Shalimar potato-1, CP-2187 (20.92 $mg100g^{-1}$ each) and P-18 (19.24 $mg100g^{-1}$); highest percentage of reducing sugars was found in genotypes Chipsona-2, Red Hybrid -20, Kufri Himalini (0.92% each) followed by CP-2035 (0.87%), P-20 (0.86%) and CP-2187 (0.69%) and highest percentage of non reducing sugars was found in genotype Shalimar potato-1 (1.63%) followed by CP-2187 (1.61%), Red hybrid-1 (1.60%) and Red Hybrid -20 (1.49%).

Mean performance of genotypes revealed that none of the genotypes exhibited superior performance for all the traits however, certain genotypes exhibited superior performance for some economically important traits *viz*., CP-2187 was superior for number of tubers $plant^{-1}$, total tuber yield, for plant height, plant spread and stem diameter while Shalimar Potato-1 for days to initiation of germination, plant height, plant spread, stem diameter and leaf area. Since no genotype could be identified to have superior performance for all the characters, the genotype with maximum good characteristics could be used in a well planned hybridization programme to select superior performing lines in the successive segregating lines.

Table 1a: Mean performance of growth, yield attributing and quality traits in potato (*Solanum tuberosum* L.)

S. No	Genotypes	Days to initiation of germination	Plant height (cm)	Plant spread (cm)	Stem diameter (cm)	Number of stems $hill^{-1}$	Leaf area (cm^2)	Number of tubers $plant^{-1}$	Total tuber yield $hectare^{-1}$ (q)
1	CP-30	41.77	59.83	43.18	1.89	3.86	73.10	6.62	287.30
2	Chipsona-2	51.22	62.72	39.42	1.77	3.72	70.62	5.78	277.32
3	CP-2035	46.44	60.66	41.30	1.74	4.08	74.96	6.26	304.48
4	Red Hybrid-1	47.77	64.65	46.60	1.86	3.96	76.21	6.42	302.93
5	Red Hybrid-2	41.33	58.99	42.99	1.75	3.77	72.29	6.58	290.70
6	Red Hybrid-20	51.11	63.47	39.28	1.77	3.64	70.45	5.96	278.51
7	P-18	48.22	61.99	41.76	1.76	3.85	73.89	6.42	309.00
8	Shalimar Potato-1	46.22	66.64	47.10	1.87	3.86	76.40	6.42	305.11
9	Red Hybrid-3	41.33	61.68	44.17	1.84	4.05	73.52	6.55	286.37
10	Kufri Himalini	52.66	65.80	41.47	1.95	3.70	71.69	5.87	274.87
11	P-20	49.11	61.93	42.75	1.76	3.68	74.95	6.46	307.81
12	CP-2187	46.11	65.26	48.67	1.93	3.97	76.27	6.56	304.50
	Mean	46.94	62.81	43.23	1.83	3.85	73.70	6.33	294.08

Table 1b: Mean performance of growth, yield attributing and quality traits in potato (*Solanum tuberosum* L.)

S. No.	Genotypes	Specific gravity	Soluble solid content (^{0}Brix)	Dry matter (%)	Vitamin C (mg100g^{-1})	Reducing sugars (%)	Non reducing sugars (%)
1.	CP-30	1.17	5.31	21.16	17.15	0.68	1.37
2.	Chipsona-2	1.08	4.95	20.85	18.40	0.92	1.44
3.	CP-2035	1.08	5.12	20.40	19.20	0.87	1.27
4.	Red Hybrid-1	1.07	5.36	20.58	20.99	0.67	1.60
5.	Red Hybrid-2	1.23	5.28	21.07	17.11	0.68	1.36
6.	Red Hybrid-20	1.09	4.84	20.82	18.34	0.92	1.49
7.	P-18	1.08	5.20	20.32	19.24	0.83	1.31
8.	Shalimar Potato-1	1.08	5.34	20.52	20.92	0.68	1.63
9.	Red Hybrid-3	1.21	5.29	21.09	17.17	0.68	1.37
10.	Kufri Himalini	1.12	4.76	20.86	18.48	0.92	1.48
11.	P-20	1.06	5.17	20.39	19.23	0.86	1.32
12.	CP-2187	1.10	5.30	20.39	20.92	0.69	1.61
	Mean	1.12	5.16	20.71	18.93	0.79	1.44

References

1. Anonymous. Information regarding district wise yield details. Directorate of Agriculture Jammu and Kashmir, 2017b, 17-24.
2. Anonymous. All India area and production of potato Indian Horticulture Database, NHB, Gurgaon, 2017a, 189.
3. Brown CR. Antioxidant in potato. American Journal of Potato Research. 2005; 82:163-72.
4. Drewnowski A, Colin DR. Vegetable Cost Metrics Show That Potatoes and Beans Provide Most Nutrients Per Penny. Public Library of science One. 2013; 8:3277-3279.
5. Mathur A. Studies on phosphorylation status of starch in potato tubers (*Solanum tuberosum* L.). MSc. Thesis, Department of Biotechnology and Environmental Sciences, Thapar Institute of Engineering and Technology, Patiala, 2003, 10-14.
6. Mehdi M, Saleem T, Rai HK, Mir MS, Rai G. Effect of nitrogen and FYM interaction on yield and yield traits of potato genotypes under Ladakh condition. Potato Journal. 2008; 35:126-129.
7. Singh H, Madhu S, Aakash G, Monika B. Effect of nitrogen and sulphur on growth and yield attributes of potato (*Solanum tuberosum* L.). International Journal of Plant and Soil Science. 2016; 9:1-8.