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SCREENING OF POTENTIAL INDIAN POTATO VARIETIES FOR EXPORT PROMOTION FROM WESTERN UTTAR PRADESH AND GUJARAT

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ABSTRACT: Indian potato production potential (54 million tonnes) strengthens the cause of export of this crop from the country. Government of India has identified districts of Agra and Farrukhabad in Uttar Pradesh, and Sabarkantha and Banaskantha in Gujarat for potato export promotion in the Agri- export policy-2018. However, issues like suitable varieties, sustainable production and protection technologies, and efficient marketing channel are challenges for acceleration of potato export in a significant way. One of the critical gaps, suitable export potential varieties was taken up in current study. Eight potato varieties were evaluated in replicated field trials at farmer's fields in district Agra and Gandhinagar. Based upon yield performance and feedback from exporters, potato varieties Kufri (K) Frysona (35.3), K Ganga (31.8), K Chipsona-3 (28.2), K Sangam (28.0) and K Bahar (24.0) have better export-grade (>55mm) tuber production potential (tha^{-1}) in western Uttar Pradesh. Variety K Chipsona-3 (30.7), K Sangam (29.6), K Ganga (27.2) and K Frysona (24.9) are exhibiting prospects of export from Gujarat. Newly released specialty potato cv. K Neelkanth has also attracted the attention of exporters. Suitable potato varieties acceptable for importing destinations and Good Agricultural Practices (GAP) developed by ICAR- CPRI holds a better future for Indian potato export.

KEYWORDS: Potato, export, main season, variety, GAP

INTRODUCTION

India is the second largest potato-producer contributing around 14.3% in global production. Despite the remarkable annual potato production of 54.2 million tonnes (MT), the quantum of export was only 0.41 MT, valued at around US$ 82.53 m in 2021-22, which was less than 1% of total production (APEDA, 2022). Indian potato export is dynamic and influenced by domestic production, market price, situation of glut *etc*. (Khurana, 2013; Chakrabarti *et al*., 2019). Major export destinations during 2021-22 were Nepal (47.5%), Indonesia (10.3%), Oman (9.4%), Malaysia (6.1%), Mauritius (5.2%), Sri Lanka (4.2%), Saudi Arab (3.1%), Kuwait (2.8%) and Maldives (2.3%).

Among Indian states, Uttar Pradesh produces approximately 30% of the country's total potato production (16. 2 MT) roughly from acreage of 0.62 m ha. Agra, Kannuj, Firozabad, Hathras, Farrukhabad, Aligarh and Kanpur are the main potato-producing districts. Well-established cold storage facilities and good infrastructure make western Uttar Pradesh a suitable destination for potato export promotion. On the other hand, Gujarat is one of the promising states producing about 3.7 MT of potatoes from an area of 0.13 m ha with higher productivity level of 29 tonnes per ha and is going on fast track in potato export despite short crop growing window (Anonymous, 2022). It is happening due to the adoption of advanced agro-technologies, viz., drip irrigation, raised bed cultivation, use of suitable varieties; adequate cold storage facilities, proximity to ports, and favourable business environment. Hence, in the Agri-

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export policy-2018 of Government of India, the clusters of Agra and Farrukhabad from Uttar Pradesh, and Sabarkantha, Banaskantha from Gujarat have been selected for potato export promotion.

Key constraints of potato export from the country are lack of knowledge of suitable varieties, optimum use of agrochemicals, pesticide residues, and post-harvest handling standards preferred by the importers, sometimes resulting in rejection of consignments (Pandey *et al*., 2000; CPRI, 2019). Hence, field trials were conducted at farmers' fields at village Banguri, Agra (Uttar Pradesh) and Dehgram, Gandhinagar (Gujarat) near the Sabarkantha district to screen suitable potato varieties for export from both the states.

MATERIAL AND METHODS

***Experimental site*:** Field trials were conducted consecutively for two years during 2020-22 at farmer's fields in the main season during October-March at village Banguri, Agra district (29° 05'19" N, 77° 41' 50" E, 237 m asl) and at Dehgram, Gandhinagar, Gujarat (23° 12′ 94″ N, 72° 78′ 88″ E, none m asl). The soil of experimental sites at both locations was sandy loam soil in nature with low organic carbon level (<0.5%) and neutral in pH (7.6-7.9). The climate of district Agra (UP) is semi- arid tropics with average annual rainfall of 750 mm, majority of which is received during July- September and potato growing winter season is generally dry receiving low precipitation occasionally. Atmospheric temperature varies from minimum of 4^0C during December-January to 48^0C in May-June, respectively. Climate of district Gandhinagar is also semi- arid tropics and receives rainfall through the southwest monsoon, which normally starts from the middle of June till August. Average rainfall is 665mm, wherein winters are generally dry; however, scanty and uneven rainfall patterns are common now. Atmospheric temperature varies from minimum of 7°C during December- January to 45°C in the month of April- May.

***Experimental details*:** Field evaluation of eight potato varieties *viz*., Kufri (K) Bahar, K Chipsona-3, K Chipsona-4, K Frysona, K Ganga, K Mohan, K Neelkanth and K Sangam was carried out in a randomized block design consisting three replications (Mankar *et al*., 2023). These were selected due to their tuber quality, storage behavior and specialty attributes **(Table 1)**. In Agra, well-sprouted 40-45 mm size whole seed tubers were planted during the second fortnight of October following crop geometry of 66 cm 20 cm in conventional ridge- furrow system. Recommended fertilizer dose of 180 N-80 P_2O_5 -100 K_2O kg ha $^{-1}$ for table purpose and 270 N-80 P_2O_5 -150 K_2O kg ha $^{-1}$ for processing purpose varieties was applied during whole crop growth period. Flood irrigation method was followed and first water application was done at 10-12 days after planting (DAP) and continued at the same interval up to 10 days before haulm cutting. The recommended herbicide, fungicide and insecticide application schedule was followed to maintain proper and uniform crop growth. The crop was dehaulmed as per varietal maturity ranging from 90 to 120 days, and harvested 15 days after haulm cutting for having tuber skin maturity. While in Gandhinagar, cut pieces of seed tubers consisting at least two eyes and treated with 0.25% mancozeb were planted in two row raised beds of 132 cm width, and method of drip irrigation was followed. Regional recommendation of fertilizer level of 220 N-110 P_2O_5 -220 K_2O kg ha $^{-1}$ and package of practices adopted to raise the successful crop. Alike Agra, the crop was dehaulmed as per varietal maturity ranging from 90 to 120 days, and harvested one week after haulm cutting.

Table 1. Important features of potato varieties evaluated for export purpose.

Variety	Duration	Tuber characters	Storability	Special features
K Bahar	90-100	White-cream skin, ovoid tubers, medium deep eyes, white flesh	Very good	Suitable for long-distance transportation
K Chipsona-3	100-120	White-cream skin, ovoid tubers, shallow eyes, white flesh	Good	Suitable for making chips and French fries
K Chipsona-4	100-110	White-cream skin, round-ovoid tubers, shallow eyes, white flesh	Very good	Suitable for making chips, field resistance for late blight
K Frysona	110-120	White-cream skin, long-oblong tubers, shallow eyes, white flesh	Good	Suitable for making French Fries
K Ganga	90-100	White-cream skin, ovoid tubers, shallow eyes cream flesh	Good	Tolerant to moderate water stress conditions
K Mohan	90-100	White-cream skin, ovoid tubers, shallow eyes, white flesh	Good	Early bulker
K Neelkanth	90-100	Purple skin, ovoid tubers, shallow eyes, yellow flesh	Very good	Antioxidant-rich potato variety, field resistance for late blight
K Sangam	100-110	White-cream skin, ovoid tubers, shallow eyes, cream flesh	Very good	Dual purpose (table and processing), field resistance for late blight

(Catalogue of Indian Potato Varieties for Export, ICAR-CPRI, Shimla, Mankar *et al*., 2023)

***Observations and analysis*:** Crop emergence was recorded at 30 DAP, while growth parameters *viz*., plant height, number of stem and compound leaves per plant were recorded at prime growth stage of 55-60 DAP. At harvest, tubers were graded in compliance with desired export requirements of size, shape and tuber quality. Tubers were graded for export grade (>55mm) and non-export grade but suitable for the domestic market (35-55 mm) for recording the tuber number and yield. Tuber dry matter content (TDMC) was estimated by drying a representative sample (50 g) of chopped tuber pieces drawn from three export-grade tubers from each treatment at 80°C until a constant weight was achieved in a forced hot air draft oven. Specific gravity was measured by the method described by Kumar *et al*. (2005). Data from two years of field trials were pooled, and statistical analysis was done using the statistical software IRRISTAT (IRRI, 1999).

RESULTS AND DISCUSSION

Growth parameters

***Agra*:** Under field evaluation, plant emergence was normal and uniform (>96%) for all eight varieties at Agra (Location-1) and the parameter did not vary statistically (**Table 2**). Highest plant emergence was recorded in K Ganga (98.8) followed by cv. K Chipsona-3 (98.6), K Chipsona-4 (98.5), K Sangam (98.4), K Mohan (98.2), K Neelkanth (97.5) and K Bahar (97.4). French fry variety K Frysona (96.9%) attained the lowest plant emergence. Growth parameters *viz*., plant height (cm) and compound leaves per plant exhibited significantly marked differences among the varieties, while number of shoots per plant remained statistically at par. Maximum plant height (70.8 cm) was observed in cv. K Frysona, while lowest was in K Bahar (53.4). Cultivars K Ganga (69.3), K Sangam (65.8), K Neelkanth (62.6) and K Chispsona-3 (62.3) had comparable plant height to K Frysona. Shoot number per plant were highest in cv. K Neelkanth (4.00), while the lowest shoot number were observed in cv. K Mohan (3.08). Variety K Chipsona- 3 (54.4) attained the highest compound leaf number per plant, which was statistically at par with K Ganga (47.1) and K Frysona (46.8), while the lowest of it was found in cv. K Neelkanth (42.1).

Table 2. Plant emergence and growth parameters of potato varieties.

Variety	Location-1 (Agra)				Location-2 (Gandhinagar)			
	Emergence (%)	Plant height (cm)	Shoot no./ plant	Leaf no./ plant	Emergence (%)	Plant height (cm)	Shoot no./ plant	Leaf no./ plant
K Bahar	97.4	53.4	3.33	44.4	98.7	68.2	4.26	47.7
K Chipsona-3	98.6	62.3	3.41	54.4	97.3	78.8	5.08	49.3
K Chipsona-4	98.5	58.5	3.41	45.7	98.0	64.5	3.71	51.7
K Frysona	96.9	70.8	3.16	46.8	98.2	75.8	3.83	51.3
K Ganga	98.8	69.3	3.40	47.1	97.0	71.3	4.23	52.8
K Mohan	98.2	60.1	3.08	44.0	97.2	69.5	4.04	53.3
K Neelkanth	97.5	62.6	4.00	42.1	98.2	70.0	4.33	44.7
K Sangam	98.4	65.8	3.66	42.3	97.6	70.8	3.50	47.2
$CD_{0.05}$	NS	9.26	NS	7.68	NS	4.49	NS	NS
SEM±	0.53	3.24	0.97	2.53	0.74	1.48	1.60	3.77

***Gandhinagar*:** Similar to Location-1, plant emergence was normal and uniform (>97%) for all eight varieties without exhibiting any significant variations (**Table 2**) and growth traits like number of shoots and compound leaves per plant also followed similar trend. Whereas, plant height (cm) varied markedly and it ranged between 64.5 cm (K Chispsona-4) to 78.8 cm (K Chipsona-3). Maximum shoot number per plant were recorded in cv. K Chipsoan- 3 (5.08), while the lowest were in cv. K Sangam (3.50). Although, compound leaf number per plant did not differ significantly, but variety K Mohan (53.3) attained the highest leaf number, while the minimum of this parameter was found in cv. K Neelkanth (44.7). Overall, eight evaluated cultivars recorded better plant growth which depends upon the genetic response of a genotype to the provided environmental conditions (Kumar and Minhas, 2013).

Yield performance

***Agra*:** Exportable, marketable and total tuber numbers (000 ha^{-1}) varied significantly among all the potential genotypes during field evaluation at Location-1(**Table 3**). Variety K Frysona and K Neelkanth (194) recorded

Table 3. Tuber number and yield of potato varieties at location-1 (District Agra).

Variety	Graded tuber number (000 ha^{-1})			Graded tuber yield (t ha^{-1})		
	Exportable	Marketable	Total	Exportable	Marketable	Total
K Bahar	84	567	651	24.0	19.2	43.2
K Chipsona-3	83	491	574	28.2	27.9	56.1
K Chipsona-4	150	533	683	28.4	19.6	48.0
K Frysona	194	449	644	35.3	28.0	63.4
K Ganga	167	548	715	31.8	25.0	56.7
K Mohan	133	485	618	24.8	19.2	44.0
K Neelkanth	194	522	717	32.0	33.6	65.6
K Sangam	97	489	585	28.0	17.4	45.5
$CD_{0.05}$	35.9	47.6	70.4	2.69	2.11	3.77
SEM±	11.85	15.69	23.21	0.89	0.69	1.24

maximum export-grade tuber number remaining at par with K Ganga (167), while the lowest found in K Chipsona-3 (83). Variety K Frysona, K Neelkanth, K Ganga, K Chipsona-4 and K Mohan attained 30, 27, 23, 22 and 22% of this grade out of total tuber number in the respective varieties (**Fig. 1**). Highest marketable size tuber number were observed in cv. K Bahar (567) which were comparable to K Ganga (548), K Chipsona-4 (533) and K Neelkanth (522) and K Frysona (449) attained the lowest marketable tuber number. Cultivar K Bahar, K Chipsona-3 and K Sangam had 87, 86 and 84% marketable tuber numbers out of their total tuber numbers, wheras lowest were in K Frysona (70). Total tuber number were highest in cv. K Neelkanth (717) remaining at par with K Ganga (715), K Chipsona-4 (684) and K Bahar (651), while the lowest were seen in cv. K Chipsona-3 (574). Variation in graded and total tuber number is a genetic trait of different genotypes of potato crop and has also been reported by Philipp *et al*. (2019) under *in vitro* and *in vivo* crop growth environments. However, agronomic interventions may help in increasing the proportion of export and marketable grade tuber number to improve their percentage to a significant level (Mankar *et al*., 2022).

Similar to tuber number, all eight varieties showed marked variation in graded tuber yield during field evaluation (**Table 3 & Fig. 2**). French fry variety K Frysona recorded highest and significantly superior export-grade tuber yield (35.3 t ha^{-1}), 56% of its total tuber yield. Cv. K Neelkanth and K Ganga recorded 32.0 and 31.8 t ha^{-1}, respectively export-grade yield, which was 49 and 56% of their total tuber yield. Lowest export-grade tuber yield (24.0 t ha^{-1}), 56% of its total tuber yield was observed in K Bahar. Processing variety K Chipsona-4 produced (28.4 t ha^{-1}) the highest proportion of export-grade (59%) of its total tuber yield (48.0). While considering export, the domestic market demand is equally important; hence, marketable tuber yields were also recorded for all the varieties and cv. K Neelkanth attained the significantly highest marketable tuber yield (33.6) among all the varieties with a proportion of 51% to its total tuber yield (65.6). Cv. K Frysona (28.0) and K Chipsona-3 (27.9) also performed fairly well, although marketable yields were markedly lower in comparison to K Neelkanth. Lowest marketable tuber yield (17.4) was observed in cv. K Sangam with a proportion of 38% to its total tuber yield (45.5). Total tuber yield was maximum in cv. K Neelkanth (65.6) and it remained statistically comparable to K Frysona (63.4). On the other hand, K Bahar attained the lowest total tuber yield (43.2). Genotypic potential and performance of a variety under a set of environmental conditions govern overall growth, translocation of photosynthates from source to sink, yield attributes and ultimately, the yield (Schafleitner *et al*., 2007).

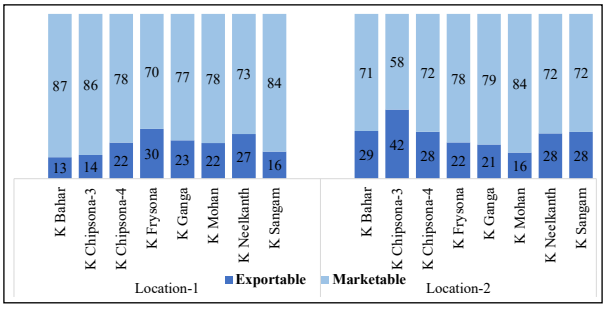

Fig.1. Percent distribution of exportable and marketable tuber number in total tuber number

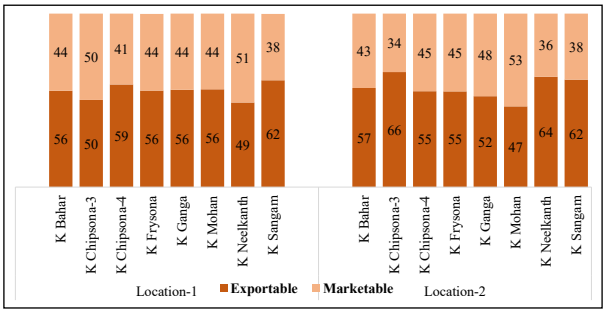

Fig.2. Percent distribution of exportable and marketable tuber yield in total tuber yield

***Gandhinagar*:** Significant variations were found in exportable, marketable and total tuber number (000 ha^{-1}) and yield (t ha^{-1}) among all the field-evaluated export potential Indian potato varieties at this location, too (**Table 5**). Variety K Chipsona-3 (237) recorded significantly highest export grade tuber number, which was comparable to K Bahar (207), K Neelkanth (193) and K Sangam (187), while the lowest of this trait was observed in K Mohan (111). The percentage of export-grade tuber number in K Chipsona-3, K Bahar, K Neelkanth and K Sangam were 42, 29, 28 and 28%, respectively (**Fig. 1**). Lowest proportion was found in K Mohan (16%). Cv. K Ganga (615) attained maximum marketable tuber number remaining statistically similar to K Frysona (589) and K Mohan (587), whereas, K Chipsona-3 (329) recorded the lowest one. All seven varieties produced marketable size tubers above 70% of the total number except for cv. K Chipsona-3 (58%). This indicates the scope for agronomic interventions in these varieties for improvement in export-grade size. It is established that managing macro-nutrients in potatoes affects their tuber size (Amarananjundeswara *et al*., 2020). Total tuber numbers were significantly highest in K Ganga (775) remaining comparable to K Frysona (756), K Bahar (715), K Neelkanth (701) and K Mohan (698). The lowest total tubers were exhibited in K Chipsona-4 (537).

During field assessment in Gujarat, K Chipsona-3 (30.7 t ha^{-1}) recorded the maximum exportable tuber yield and it was statistically at par with K Sangam (29.6 t ha^{-1}) and K Neelkanth (28.9 t ha^{-1}), while cv. K Mohan (21.5 t ha^{-1}) had the lowest export grade yield (**Table 5**). Variety K Chipsona-3 also attained the highest per cent of exportable tuber yield (66%) followed by K Neelkanth (64) and K Sangam (62) and cv. K Mohan (47) had the lowest proportion in total tuber productivity (**Fig. 2**). In case of marketable tuber yield, cv. K Mohan (24.7 t ha^{-1}) and K Ganga (24.7 t ha^{-1}) recorded significantly highest marketable yield as compared to other cultivars, whereas, K Chipsona-3 had lowest yield (15.6 t ha^{-1}). Similar trend was observed in proportion of marketable productivity to total tuber yield as cv. K Mohan (53) attained maximum of this trait followed by K Ganga (48) and lowest in K Chipsona-3 (34). In terms of total tuber yield, K Ganga (51.9 t ha^{-1}) recorded a significant and maximum yield followed by K Sangam (47.8 t ha^{-1}), K Bahar (46.9 t ha^{-1}) and K Chipsona-3 (46.3 t ha^{-1}). Variety K Neelkanth attained 45.4 t ha^{-1} of total tuber yield, while K Chipsona-4 (44.7 t ha^{-1}) had the lowest productivity. Similar productivity trends were also reported by Mankar *et al*. (2022) in their evaluation of potential varieties for export in the early season. Islam *et al*. (2022) conducted a similar field study in Bangladesh and screened sixty two potato varieties for selecting suitable one having export potential. They concluded that a genotype with higher productivity & percentage of export-grade tubers having uniform size and high tuber dry matter content could be selected for export from the country.

Quality attributes

***Agra*:** Tuber dry matter content (%), specific gravity, mean tuber weight (g) and tuber dry matter yield (t ha^{-1}) showed significant differences for the varieties evaluated in this field study **(Table 4)**. Tuber dry matter content ranged between 17.4% in cv. K Mohan to 21.6% in K Frysona. All the varieties except K Mohan attained tuber dry matter content above 18%. The specific gravity ranged between 1.050 in cv. K Mohan to 1.081 in K Sangam & K Chipsona-4. Indian potato exporters during harvest of the trials demanded a genotype having good storability and lower damages during transport to sustain the supply chain and thus a variety with 6-9 months of storability in cold storage is considered suitable. Gupta and Luthra (2020) reported a

Table 4. Tuber dry matter content (TDMC), specific gravity, mean tuber weight and tuber dry matter yield at location-1 (District Agra).

Variety	TDMC (%)	Specific gravity	Mean tuber weight (g)			Tuber dry matter yield (t ha^{-1})		
			Export grade	Market grade	Total	Export grade	Market grade	Total
K Bahar	21.2	1.064	284.0	33.9	66.3	5.10	4.10	9.2
K Chipsona-3	18.8	1.068	341.0	56.8	97.8	5.30	5.24	10.5
K Chipsona-4	20.8	1.081	189.3	36.7	70.2	5.90	4.10	10.0
K Frysona	21.6	1.079	181.5	62.4	98.5	7.62	6.04	13.7
K Ganga	19.9	1.067	190.8	45.6	79.3	6.33	5.00	11.3
K Mohan	17.4	1.050	185.9	39.6	71.2	4.32	3.34	7.7
K Neelkanth	19.7	1.065	164.5	64.3	91.5	6.30	6.62	12.9
K Sangam	19.0	1.081	290.2	35.6	77.7	5.32	3.31	8.6
$CD_{0.05}$	0.78	0.004	9.71	4.23	18.5	0.61	0.57	1.43
SEM±	0.26	0.001	3.54	2.17	5.88	0.19	0.36	0.98

Table 5. Tuber number and yield of potato varieties at location-2 (District Gandhinagar).

Variety	Graded tuber number (000 ha^{-1})			Graded tuber yield (t ha^{-1})		
	Exportable	Marketable	Total	Exportable	Marketable	Total
K Bahar	207	508	715	26.8	20.1	46.9
K Chipsona-3	237	329	567	30.7	15.6	46.3
K Chipsona-4	153	384	537	24.7	20.0	44.7
K Frysona	167	589	756	24.9	20.2	45.1
K Ganga	160	615	775	27.2	24.7	51.9
K Mohan	111	587	698	21.5	24.7	46.2
K Neelkanth	193	508	701	28.9	16.5	45.4
K Sangam	187	471	657	29.6	18.2	47.8
$CD_{0.05}$	64.9	82.5	113.0	2.75	2.18	3.50
SEM±	21.4	27.2	42.9	0.91	0.72	1.16

significant and negative correlation between the percent tuber rottage and tuber dry matter content while studying the storability of Indian and exotic potato collections. Highest mean exportable (341.0g), marketable (64.3) and total tuber weight (98.5) was observed in cvs. K Chipsona-3, K Neelkanth and K Frysona, respectively. Variety K Neelkanth (164.5g), K Bahar (33.9) and K Bahar (66.3) attained the lowest mean exportable, marketable and total tuber weight. Tuber dry matter yield varied markedly among evaluated varieties and highest of this parameter was observed in K Frysona (7.62 t ha^{-1}), K Neelkanth (6.62) and K Frysona (13.7) for exportable, marketable and total tuber dry matter yield. Whereas, lowest exportable (4.32) and total (7.70), and marketable tuber dry matter yield (3.31) was recorded by cvs. K Mohan, and K Sangam, respectively.

***Gandhinagar*:** Similar to Location-1, tuber dry matter content (%), specific gravity, mean tuber weight (g) and tuber dry matter yield (t ha^{-1}) varied markedly among the varieties evaluated in the trial (**Table 6**). Tuber dry matter content ranged between 18.9% in cv. K Mohan to 22.8% in K Bahar. Moreover, all

Table 6. Tuber dry matter content (TDMC), specific gravity, mean tuber weight and tuber dry matter yield at location-2 (District Gandhinagar).

Variety	TDMC (%)	Specific gravity	Mean tuber weight (g)			Tuber dry matter yield (t ha^{-1})		
			Export grade	Market grade	Total	Export grade	Market grade	Total
K Bahar	22.8	1.051	129.7	39.6	65.6	6.11	4.58	10.7
K Chipsona-3	19.5	1.044	129.3	47.4	81.7	6.91	3.51	10.4
K Chipsona-4	21.5	1.076	161.8	52.0	83.2	5.31	4.29	9.6
K Frysona	21.3	1.056	149.5	34.3	59.7	5.30	4.30	9.6
K Ganga	22.5	1.073	169.6	40.2	67.0	5.14	4.70	9.8
K Mohan	18.9	1.032	193.7	42.1	66.2	3.83	4.39	8.2
K Neelkanth	21.5	1.065	149.9	32.5	64.8	6.21	3.55	9.8
K Sangam	22.6	1.052	158.6	38.7	72.7	6.69	3.99	10.6
$CD_{0.05}$	0.49	0.006	1.53	3.46	5.87	0.74	0.49	0.75
SEM±	0.18	0.003	0.70	1.59	1.76	0.24	0.18	0.52

eight varieties had above 18% tuber dry matter content, which may contribute to long-term storage and transportation. The specific gravity ranged between 1.032 in cv. K Mohan to 1.076 in K Chipsona-4. Gupta *et al*. (2015) reported a negative correlation between weight loss due to rottage and tuber dry matter content in Indian potato varieties. Highest mean exportable (193.7g), marketable (52.0) and total tuber weight (83.2) was found in cvs. K Mohan, and K Chipsona-4, respectively. Variety K Chipsona-3 (129.3g), K Neelkanth (32.5) and K Frysona (59.7) recorded the lowest mean exportable, marketable and total tuber weight. Significant differences were also observed in case of tuber dry matter yield for evaluated cultivars and maximum of this trait was attained by K Chipsona-3 (6.91 t ha^{-1}), K Ganga (4.70) and K Sangam (10.8) for exportable, marketable and total tuber dry matter yield. Whereas, lowest exportable (3.83) and total (8.20), and marketable (3.51) tuber dry matter yield was observed in cvs. K Mohan, and K Chipsona-4, respectively.

Indian potato exporter's feedback

The field study carried out at both the locations had active participation for evaluating the suitable exportable variety from the state of Uttar Pradesh and Gujarat. From Uttar Pradesh, varieties K Frysona, K Sangam, K Chispona-3, K Ganga and K Bahar were found suitable for export, while under the specialty potato segment, K Neelkanth was preferred by the exporters. Cultivars K Sangam, K Chipsona-3, K Frysona, K Ganga and K Neelaknth were found suitable for export from the state of Gujarat. Indian potato exporters faced the challenge of maintaining the supply chain in hot summer season, so, capability of a genotype to sustain in storage is an important criterion to maintain the supply chain and thus a variety with 6-9 months of storability in cold storage is considered suitable.

CONCLUSIONS

Agri-export policy-2018 has identified potato as potential commodity for export from different states of the country, particularly Uttar Pradesh and Gujarat. Apart from several other factors, a suitable genotype shall always remain on top of the priority list. Conclusion of this study says that variety K Sangam, K Ganga, K Frysona, K Bahar, K Chipsona-3 have better export potential in Uttar Pradesh. And cultivar K Sangam, K Frysona, K Ganga, K Neelaknth

and K Chipsona-3 are the potential varieties for export from the state of Gujarat. In addition, the advantage of anthocyanin richness and taste makes K Neelkanth a potential variety in the specialty segment. Compilation of country-specific requirements, identifying suitable varieties, targeting the lean period of potato availability in different countries, fine-tuning & validating potato cultivation technologies, and integrating these different components into a supply chain shall provide momentum to potato export from the country.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest

ETHICAL STATEMENT

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

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