



EVALUATION OF POTATO CULTIVAR FOR GROWTH AND YIELD PARAMETER

Mangesh R. Deshmukh, Ganesh M. Bansode, Pallavi Mahajan
AICRP (Potato), National Agricultural Research Station, Ganeshkhind, Pune, India

*Corresponding email address: mrdes101@yahoo.co.in

ABSTRACT

The present investigation on evaluation of varietal performance of various potato varieties under Pune Conditions was initiated in Oct 2012. Potato tubers of Kufri Lauvkar, Kufri Badshah, Kufri Pushkar, Kufri Surya, Kufri Khyati, Kufri Ashoka, Kufri Jyoti, Kufri Pukharaj were planted on ridges and furrows. The results revealed that Kufri Surya recorded significantly higher total tuber yield (20.67 t/ha) followed by Kufri Pukharaj (18.45 t/ha). However percent plant emergence and foliage senescence were found non-significant. Whereas results in respect of yield depicted that the variety Kufri Lauvkar produced the lowest tuber yield of 16.23 t/ha. Tuber dry matter (19.69%) was recorded to be the highest in Kufri Surya which was significantly superior in comparison to the remaining varieties. The least incidence of late blight (9.69%) was recorded on Kufri Khyati which was at par with K. Surya (9.74%). The least incidence of early blight (10.29%) was recorded on K. Lauvkar which too was at par with K. Surya. Keeping this in view K. Surya may be recommended as promising variety for Pune region.

Key word: Potato, tuber, emergence and dry matter.

INTRODUCTION

Potato (*Solanum tuberosum* L.) belongs to family Solanaceae and it is one of the important tuber crops in the Subcontinent including India and Pakistan (Singh and Rana, 2014; GOP, 2016). Importance of potato as vegetables in the human diet has been well recognized. It contains substantial energy of edible protein (1.6g), carbohydrate (22.6g), minerals (0.6g), crude fiber (0.4g), fat (0.10g), and Vitamin C (25mg) per 100 g fresh weight of tubers (Saini and Umrav, 2008.). It is estimated that about 65% of the potato harvest is consumed by humans, 15% is processed and used as fodder, 12.5 % is retained for "seed" and 7.5% is wasted due to spoilage (Horton and Sawyer, 1985). It captured its place from snacks to various dishes. So it is popular as a poor man's food with less expenditure. From the farmers' point of view, it is useful to grow potato as a cash crop which provides a reasonable amount of returns. In India production of potato is 414627 metric tons (Ashu et al., 2018). The yield of potato crop is continually decreasing in the subcontinent due to different biotic and a biotic factors. Among biotic factors, different types of fungi (Ashraf et al., 2012; Abbas et al., 2014), virus (Abbas et al., 2012; Abbas et al., 2013; Abbas et al., 2015; Abbas and Madadi, 2016; Qamar et al., 2016; Urooj et al., 2016), bacteria (Gupta and Thind, 2018) and nematodes (Sikora et al., 2018) have been reported as a causal agent of different disease in potato crop (Singh and Rana, 2014).

Starting from 1958 till date, the Indian Potato Improvement Program has developed and released as many as 34 improved varieties, of which 16 are presently under large scale cultivation. These varieties cater to the need of the farmers in the hills and the plains have superior agronomic attributes and resistances to different diseases and pest. The material from the Indian program has benefited not only this country, but several other countries like Afghanistan, Bangladesh,

Bhutan, Bolivia, Madagascar, Nepal, Philippines and Shri Lanka where the Indian varieties / hybrids have been adapted for commercial cultivation. Ever since the first catalogue of Indian Potato varieties was brought out in 1984, several new varieties suitable for different regions have been released. These include early maturing varieties for the plains capable of giving high yield in 75 to 80 days' time and main crop varieties of 90 to 100 days duration.

MATERIALS AND METHOD

The present study was conducted at AICRP in Potato, NARP, Ganeshkhind, Pune. Potato tubers of K. Lauvkar, K. Badshah, K. Pushkar, K. Surya, K. Khyati, K. Ashoka, K. Jyoti and K. Pukharaj were planted at 60 X 20 cm distance on ridges and furrows in the Rabi season for three consecutive years (2012-13, 2013-14 and 2014-15). Fertilizers @ 150 kg N in the form of Urea, 60 Kg P₂O₅ in the form of Single super phosphate and 120 Kg K₂O in the form of Muriate of Potash per ha were applied. The other cultural operations such as weeding, irrigation, spraying of insecticides, earthed up, etc. were carried out as and when required for all the treatments uniformly. Observation on growth characters such as plant emergence, plant vigor, mean canopy and foliage senescence were recorded for six randomly selected plants from each net plot at regular interval from planting. The data in respect of total yield at 60, 75 and 90 days and tuber dry matter percent was also recorded. Observations on disease incidence were recorded at 60 days stage of plant growth.

RESULTS AND DISCUSSION:

All the data is presented in table 1 to 5. The data revealed that growth in respect of per cent plant emergence was found to be non-significant. The minimum foliage senescence (78.78%) was recorded at K. Surya. The mean canopy cover was found to be maximum in K. Surya (33.78 No. of Squares) which indicates it is a vigorous growing variety. The

maximum tuber yield at 60 days (18.52 t/ha), 75 days (20.03 t/ha) and 90 days (20.67t/ha) was recorded in K. Surya. The yield recorded by K. Surya at 90 days stage was significantly superior over the remaining varieties. These results are in agreement with those of [Basavaraya et al. \(2009\)](#). The Least incidence of late blight (9.69%) was recorded at K. Khyati

which was at par with K. Surya (9.74%). Plants affected by the virus were found to be negligible. These results are in agreement with [Benargi and Naik \(2009\)](#). Keeping in view the total tuber yield and disease reaction towards early and late blight it can be recommended that K. Surya is a promising variety of Pune region.

Table 1: Plant emergence, vigor and foliage senescence of potato varieties.

Sr. No.	Treatment	Plant emergence				Plant vigor				Foliage senescence			
		2013	2014	2015	Pooled mean	2013	2014	2015	Pooled mean	2013	2014	2015	Pooled mean
1	K. Lauvkar	91.23	95.33	95.33	93.96	2.9	2.8	2.8	2.83	81	86	86	84.37
2	K. Sadabahar	90.37	91.33	91.11	90.94	2.93	2.9	3.12	2.98	81.43	82.67	81.58	81.89
3	K. Badshah	90.22	90.67	92.59	91.16	3.4	3.2	3.41	3.34	81.66	81.33	82.12	81.7
4	K. Pushkar	91.48	91.33	91.85	91.55	3.5	3.6	3.52	3.54	81.33	80.67	81.43	81.14
5	K. Khyati	91.85	90	92.22	91.36	3.23	3.15	3.25	3.21	81.82	81.67	80.98	81.49
6	K. Surya	94.45	94	91.11	93.19	3.9	3.95	3.47	3.77	77.35	76.67	82.33	78.78
7	K. Ashoka	90.74	92	91.48	91.41	3.7	3.71	3.38	3.6	78.56	77.33	78.72	78.2
8	K. Jyoti	90	92.67	90.74	91.14	3.37	3.4	3.86	3.54	79.63	77	76.3	77.64
9	K. Pukhraj	93.33	92	93.33	92.89	3.15	3.8	3.9	3.82	77.5	69.33	78.88	75.24
	SE	1.6	2.06	2.08	1.91	0.29	0.3	0.19	0.26	1.19	1.17	1.94	1.43
	CD at 5%	NS	NS	NS	NS	NS	0.9	0.41	0.64	2.58	3.34	4.15	3.36

Table 2: Mean canopy cover of potato varieties.

Sr. No.	Treatment	Mean Canopy Cover (No. of Squares)				Tuber dry matter (%)			
		2013	2014	2015	Pooled mean	2013	2014	2015	Pooled mean
1	K. Lauvkar	26.33	26.05	26	26.13	17.5	17.3	17.25	17.35
2	K. Sadabahar	32.33	31	32	31.78	17.39	17.29	17.3	17.33
3	K. Badshah	32	31.2	30	31.07	17.83	17.53	17.6	17.65
4	K. Pushkar	33	32	29	31.33	17.89	17.49	17	17.46
5	K. Khyati	32.33	30.43	31	31.25	17.31	17.01	16.8	17.04
6	K. Surya	34.67	34.33	32.33	33.78	19.51	19.75	19.8	19.69
7	K. Ashoka	32.67	32.1	27	30.59	18.27	18.32	18	18.2
8	K. Jyoti	33	31	29	31	18	17.8	17.05	17.62
9	K. Pukhraj	33.33	33.33	31.67	32.78	18.59	18.65	18.1	18.45
	SE	0.89	0.9	0.8	0.86	0.36	0.38	0.41	0.38
	CD at 5%	2.71	2.7	2.35	2.59	1.08	1.15	1.18	1.14

Table 3: Tuber yield of of potato varieties.

Sr. No.	Treatment	Total tuber yield at 60 days (t/ha)				Total tuber yield at 75 days (t/ha)				Total tuber yield at 90 days (t/ha)			
		2013	2014	2015	Pooled mean	2013	2014	2015	Pooled mean	2013	2014	2015	Pooled mean
1	K. Lauvkar	16.05	15.75	15	15.6	16.15	15.5	15.5	15.72	16.4	16.15	16.15	16.23
2	K. Sadabahar	16.22	16	16	16.07	16.57	17.56	17.86	17.33	16.78	16.6	16.78	16.72
3	K. Badshah	17.01	16.45	15.5	16.32	17.24	17.8	17.9	17.65	17.75	18.44	18.31	18.17
4	K. Pushkar	16.7	16.1	16	16.27	17.59	18.46	18.76	18.27	17.7	17.5	17.7	17.63
5	K. Khyati	17.3	17.3	16.3	16.97	17.83	17.62	17.82	17.76	17.94	17.75	17.95	17.88
6	K. Surya	18.9	19.1	17.58	18.52	20.1	19.5	20.5	20.03	21.25	19.68	21.1	20.67
7	K. Ashoka	17.02	17.57	17.25	17.28	17.46	18	18.12	17.86	18.31	18.5	18.56	18.45
8	K. Jyoti	15.89	15.35	15.1	15.45	16.26	16.26	16.73	16.42	17.2	16.73	16.26	16.73
9	K. Pukhraj	18.43	18.07	17.6	18.03	18.7	18.43	18.43	18.52	18.91	18.71	18.94	18.84
	SE	0.56	0.58	0.62	0.59	0.43	0.5	0.53	0.49	0.48	0.45	0.45	0.46
	CD at 5%	1.68	1.25	1.72	1.55	1.28	0.98	1.13	1.13	1.44	1.1	1.1	1.21

Table 4: Incidence of late blight, early blight and viral diseases.

Sr. No.	Treatment	Late blight (%)				Early blight (%)				Viral Disease (%)			
		2013	2014	2015	Pooled mean	2013	2014	2015	Pooled mean	2013	2014	2015	Pooled mean
1	K. Lauvkar	13.67	8.5	8	10.06	15.67	7.8	7.4	10.29	0.67	1	0.9	0.86
2	K. Sadabahar	14.65	9.9	6.9	10.48	17.75	7.65	8.55	11.32	1.25	0.5	0.6	0.78
3	K. Badshah	11.11	10.15	7.8	9.69	14.22	8	10.3	10.84	1.44	0.48	0.78	0.9
4	K. Pushkar	15.34	9.8	8.14	11.09	19.23	11.2	9	13.14	1.52	0.7	0.51	0.91
5	K. Khyati	10.56	8.75	6.7	8.67	12.1	10	11	11.03	0.71	1.25	1.15	1.04
6	K. Surya	12.37	8.55	8.3	9.74	14.45	10.02	10.05	11.61	1.47	0.75	0.65	0.96
7	K. Ashoka	14.06	11	10	11.69	18.7	10.7	11.8	13.73	2.14	1.1	1	1.41
8	K. Jyoti	16.18	9.3	7.5	10.99	19.64	11.08	9.8	13.51	1.43	1.3	1.1	1.28
9	K. Pukhraj	15.25	8.5	7.25	10.33	17.85	10.2	9.06	12.37	1.45	0.99	0.9	1.11s
	SE	0.97	0.94	0.91	0.94	0.87	0.82	0.85	0.86	-	-	-	-
	CD at 5%	2.93	2.69	2.69	2.84	2.64	2.4	2.42	2.49	-	-	-	-

Table 5: Effect of different potato varieties form 2013 to 2015.

Sr No	Treatment	2013	2014	2015	Pooled mean
1	K. Lauvkar	1.82	1.8	1.8	1.8
2	K. Sadabahar	1.84	1.83	1.84	1.84
3	K. Badshah	1.92	1.77	1.96	1.83
4	K. Pushkar	1.91	1.9	1.91	1.9
5	K. Khyati	1.93	1.92	1.93	1.92
6	K. Surya	2.16	2.05	2.15	2.12
7	K. Ashoka	1.96	1.97	1.98	1.97
8	K. Jyoti	1.88	1.84	1.8	1.84
9	K. Pukhraj	2	1.99	2	1.99

REFERENCE

- Abbas, M. F., Aziz-ud-Din, A. Ghani, A. Qadir and R. Ahmed, 2013. Major potato viruses in potato crop of Pakistan: A brief review. *International Journal of Biology and Biotechnology*, 10(3): 435-440.
- Abbas, M. F., S. Hameed, A. Rauf, Q. Nosheen, A. Ghani, A. Qadir and S. Zakia, 2012. Incidence of six viruses in potato growing areas of Pakistan. *Pakistan Journal of Phytopathology*, 24(1): 44-47.
- Abbas, M. F., F. Naz and G. Irshad, 2014. Important fungal diseases of potato and their management—a brief review. *Mycopath*, 11(1):45-50.
- Abbas, M. F., C. A. Rauf and G. Irshad, 2015. Nucleotide evidence of capsid protein gene of potato virus Y from a Pakistani isolate. *Pakistan Journal of Agricultural Sciences*, 52(4):881-886.
- Abbas, A. and M. Madadi, 2016. A review paper on potato mop-top virus (PMTV): Occurrence, properties and management. *World Journal of Biology and Biotechnology*, 1(3): 129-134.
- Ashraf, A., A. Rauf, M. F. Abbas and R. Rehman, 2012. Isolation and identification of *Verticillium dahliae* causing wilt on potato in Pakistan. *Pakistan Journal of Phytopathology*, 24(2): 112-116.
- Ashu, D. K., Bishnoi, J. K. Bhatia, Baskaur and P. Sheoran, 2018. Production and marketing challenges of potato cultivation in haryana, India. *International Journal of Current Microbiology and Applied Sciences*, 7(3): 1349-1355.
- Basavaraya, N., R. K. Naik and B. Chandravathi, 2009. Crop improvement in potato research highlight on potato., Directorate of research, division of horticulture, university of agricultural science, Dharwad, Karnataka: 1-9.
- Benargi, V. I. and K. S. Naik, 2009. Management of sclerotia with, viral and other disease of potato an overview of research uas dharwad, research highlight on potato. Directorate of Research, Division of Horticulture, University of Agricultural Science, Dharwad, Karnataka 26-34.
- Gupta, S. K. and T. Thind, 2018. Disease problems in vegetable production. Scientific Publishers.
- Horton, D. and R. L. Sawyer, 1985. The potato as a world food crop, with special reference to developing areas. *Potato Physiology*: 1-34.
- Qamar, M. I., S. Batool, W. Aurangzeb, R. Zainab and S. Menghwar, 2016. Different techniques for diagnostic of potato viruses: A brief review. *World Journal of Biology and Biotechnology*, 1(3): 123-128.
- Saini, G. S. and V. K. Umrav, 2008. Morden oleri and floriculture production. Rama Publication House: 82-83.
- Sikora, R. A., D. Coyne, J. Hallmann and P. Timper, 2018. Plant parasitic nematodes in subtropical and tropical agriculture. CABI.
- Singh, B. and R. K. Rana, 2014. History of potato and its emerging problems in India. In: *Souvenir-National seminar on emerging problems of potato*. pp: 1-2.
- Urooj, M., U. Arif and A. Intikhab, 2016. A brief review for identification and detection of potato viruses. *World Journal of Biology and Biotechnology*, 1(1): 33-37.