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Identify the suitable varieties of potato for growth and yield attributing characters

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Abstract

An experiment was conducted during 2016-17 at College of Agriculture, Indore to study the Identify the suitable varieties of potato for growth and yield attributing characters.

On the basis of present investigation, it is concluded that the potato variety Kufri Lauvkar responded well in terms of growth analytical, yield and quality parameters and suitable for commercial production in Malwa condition. potato variety Kufri Lauvkar was observed best for growth (i.e. days to 50% germination, number of sprouts plant⁻¹, plant height, number of leaves plant⁻¹, diameter of stem and leaf area plant⁻¹, yield characters (early days yield plot⁻¹, total tubers hectare⁻¹ and marketable tubers yield plot⁻¹ and q hectare⁻¹) was recorded maximum in this variety. It was observed best quality characters maximum dry matter was observed in the variety Kufri Chipsona-1 and colour of potato powder varieties Kufri Chipsona-1, Kufri Chipsona-2, Kufri Chipsona-3, Kufri Chipsona-4 and Kufri Chandramukhi exhibited light golden colour powder and remaining varieties was observed golden colour powder.

Keywords: Kufri Lauvkar, Kufri Chipsona-1, Kufri Chipsona-2, Kufri Chipsona-3, Kufri Chipsona-4 and Kufri Chandramukhi

Introduction

Potato (*Solanum tuberosum* L.) is an annual, herbaceous, tuber crop of Solanaceae family that contains all the essential food ingredients required for maintaining proper health. The widely cultivated potato is tetraploid with $2n = 48$ and origin of potato is Peru, South America. The potato grown underground on a specialized plant part (subterranean stem) known as stolon. The potato is one of the most important food crops both in developed as well as in developing countries due to its diversified uses in developed countries as food, feed raw material for producing starch. The potato was generally regarded to be a crop suited for western world. Potato popularly known as 'The king of vegetables' and has emerged as fourth most important food crop after rice, wheat and maize in the world. Therefore, it is a modified stem in a strict botanical sense. It consists of an inner flesh and an outer protective cover known as skin. There is a great variation in flesh colour and skin finish.

The area, production and productivity of potato in India are 1.97 Mha, 41.55 MT and 21.06 tonnes ha⁻¹. Madhya Pradesh is the 6th largest producer of potato in India. In M.P. total area under potato cultivation is 0.11 Mha, with production 2.32 MT and average productivity is 21.11 tonnes ha⁻¹ (Anonymous 2016). Major potato growing districts are Indore, Chhindwara, Shajapur, Dewas, Ujjain, Dhar, Sidhi, Satana, Sagar district in Madhya Pradesh has maximum total area and production of potato.

Potato is a nourishing and wholesome food. Its low energy density is advantageous when eaten without much added fat. Potato protein is superior to that of cereals and rich in essential amino acid 'lysine'. To a large portion of our population to whom citrus fruits are out of reach, potato remains a cheap and rich source of vitamin C. There is a misconception that potato causes obesity. In fact, that it a low energy and fat food and it cannot cause fattening. Potato produces highest dry matter, carbohydrates, edible protein, minerals and vitamin C and B per unit area and time among the major food crops. Potato is a low calorie food and its protein has a biological value almost equal to milk or egg. It is a wholesome, nutritious and versatile food which can come to the rescue of the developing countries for alleviating hunger and malnutrition especially in shrinking land resources. Potato content 80% water and the dry matter content is around 20%. A major portion of the dry matter is starch. Carbohydrates consisting of starch and sugar constitute 16% on fresh weight basis. Crude protein content is 2.0% and the fat content is very low 0.1%. The ash consisting of minerals constitutes 1.0% in addition potato tuber contains fiber, vitamins and glycol alkaloids in small quantities.

Most European varieties, introduced earlier in India performed poorly because conditions in

India are entirely different than those prevalent in temperate countries. A need was therefore, felt that potato cultivation in India cannot depend on exotic varieties and technologies and the country must have its own research and development programme for potato.

Post-harvest improvement such as fast and cheap transportation, storage and processing will help to make potato production more profitable for farmers by improving their access to markets, raising local value addition. Several products like chips, flakes, French fries, finger chips, granule, dice cubes and flour are made out of potato tubers.

Materials and Methods

The experimental trials "Evaluation of different potato (*Solanum tuberosum* L.) Varieties for growth, yield and quality in Malwa plateau zone of Madhya Pradesh." was carried out in the experimental area of the Department of Horticulture, College of Agriculture, Indore during the rabi season of 2016-17 under agro-climatic and soil conditions of Madhya Pradesh. The details of methods and technique followed during the experiment are described below:

Experimental site

The experiment was laid out in Randomized Block Design (RBD) with three replications. The topography of the experimental site was almost uniform with an adequate surface drainage. Indore is situated in malwa plateau region in the western part of the state of Madhya Pradesh at an altitude of 555.5 meters above mean sea level (MSL). It is located at latitude 22.43° N and longitude of 75.66° E. It has subtropical climate having a temperature range of 21° C to 45° C and 6° C to 31° C in summer and winter seasons, respectively. The rainfall in the region has been mostly inadequate and erratic in most of the recent past seasons. Late commencement, early withdrawal of monsoon and occurrence of two to three dry spells during the rainy season are the common features. The mean annual average rainfall is 964 mm.

The meteorological parameter during the crop season such as minimum and maximum temperature, rainfall, wind speed and relative humidity were recorded in AICRP for Dryland Agriculture; College of Agriculture, Indore (M.P.). There were no rains during SMW 45 to 09. The minimum and maximum temperature during crop growth period varied 7.9°C to 15.1°C and from 24.6°C to 33.3°C.

The soil of the experimental field has been grouped under medium black clay soil (Vertisols) belonging to Kamliakhedi series, which is a member of fine, smectitic, hyperthermic family of Vertic, Ustochrepts. In order to determine the textural class and fertility status of the experimental area, the soil samples were collected randomly from each plot with the help of soil auger before sowing from the experimental field. Sample from each replication was drawn to study physio-chemical properties of the experimental field.

Experimental material

The experimental material for this study comprised of 10 varieties as treatment is presented in Table.

Table: Details of Varieties

S.No.	Varieties	S.No.	Varieties
1	Kufri Chipsona-1	6	Kufri Lauvkar
2	Kufri Chipsona-2	7	Kufri Surya
3	Kufri Chipsona-3	8	Kufri Chandramukhi
4	Kufri Chipsona-4	9	Kufri Jawahar
5	Kufri Jyoti	10	Kufri Pukhraj

1. Growth Parameters

Days to 50% plant emergence

Average number of days required to 50% in emergence each variety was recorded.

Number of sprouts per plant

The total number of sprouts per plant of the tagged plants were counted at 30 DAP and averaged to get the number of sprouts per plant.

Plant height (cm)

The height of the main stem from the ground level to the apical bud (leaf apex) was measured with the meter scale at 30, 45, 60 and 75 days after planting and at harvest.

Diameter of main stem (cm)

Diameter of stem of the all observational plants from each plot was recorded by using the thread, this thread put on the scale to measure the readings and it was considered as diameter of stem and expressed in centimeter.

Number of leaves per plant

The numbers of leaves of each tagged plant in all the varieties were counted at 30, 45, 60 and 75 days after planting and at harvest.

Leaf area per plant (cm²)

At random three plants from each variety and replication were uprooted and cleaned. The assimilatory surface area (A) was recorded by using electronic leaf area meter (Li Cor 3000) at 30, 45, 60 and 75 days after transplanting.

2. Yield Parameters

Days to haulm cutting

The haulm cutting was done 15 days before harvesting.

Days to maturity

Potato crops show signs of maturity (like leaves turn yellow, and are shed in course of time and haulms dry up and die) which was taken to be an indication of maturity and the time of maturity indications differs from early, medium and late varieties.

Number of tubers per plant

The number of tubers harvested from five randomly selected plants in each variety was collected during harvesting counted and average tubers per plant were calculated.

Number of rotted tubers per plant

The tagged plants were harvested and the number of rotted tubers per plant was counted.

Weight of rotted tubers per plant

The tagged plants were harvested and the weight of rotted tubers per plant was recorded separately with the help of electronic weighing balance and average was worked out for each varieties.

Total tubers yield per plot

Tubers of all the plants in each plot including 5 observational plants were harvested and weighted separately for total yield per plot and expressed in kg per plot.

Total tubers yield per hectare (q ha⁻¹)

Total tuber yield (kg) per plot was converted in quintals per

hectare by multiplying with factor.

Marketable yield per plot

The total tubers obtained from each plot were sorted out into different grades according to weight i.e. small size < 50 g, medium 50 – 100g and big sized > 100g. The total weight of medium and big size tubers were recorded separately for marketable tuber yield per plot.

Marketable yield per hectare ($q\ ha^{-1}$)

Marketable tuber yield per plot was converted in quintals per hectare by multiplying with factor.

Harvest index

Harvest index is expressed as the ratio of economical yield and biological yield.

$$\text{Harvest index} = \frac{\text{Economical yield (gm)}}{\text{Biological yield (gm)}}$$

Results and Discussion

Various growth parameters, yield parameters and quality parameter of potato obtained under the study entitled "Evaluation of different potato (*Solanum tuberosum* L.) varieties for growth, yield and quality in Malwa plateau zone of Madhya Pradesh." are analyzed statistically and presented here as under

1. Growth parameter

a) Days to 50% plant emergence

The data on days to 50% plant emergence as influence by different varieties are given in Table 1 and clearly indicated that the days to 50% plant emergence responded significantly due to different varieties.

Table 1: Days to 50 % plant emergence and Number of sprouts per plant of different potato varieties

S.No.	Varieties	Days to 50% plant emergence	Number of sprouts per plant
1.	Kufri Chipsona-1	22.33	3.9
2.	Kufri Chipsona- 2	22.22	3.2
3.	Kufri Chipsona- 3	21.34	4.01
4.	Kufri Chipsona-4	23.15	2.93
5.	Kufri Jyoti	20.60	3.74
6.	Kufri Lauvkar	21.59	3.40
7.	Kufri Surya	21.49	3.46
8.	Kufri Chandramukhi	20.20	3.83
9.	Kufri Jawahar	22.15	3.27
10.	Kufri Pukhraj	19.00	4.14
	SEm±	0.44	0.16
	C.D. at 5% level	1.31	0.50

Significantly minimum days required for 50 % plant emergence was recorded in variety Kufri Pukhraj (19.00) which was at par with Kufri Chandramukhi (20.20 days) and followed by Kufri Jyoti (20.60 days) as compared to other varieties. While, maximum (23.16) days was recorded in Kufri Chipsona- 4.

b) Number of sprouts per plant

The data for different varieties with respect to the number of sprouts per plant is summarized in Table 1. At 30 DAP significantly maximum number of sprouts per plant was recorded in the Variety Kufri Pukhraj (4.14) followed by and at par with Kufri Chipsona-3 (4.01), Kufri Chipsona-1 (3.9),

Kufri Chandramukhi (3.83) and Kufri Jyoti (3.74). While, minimum number of sprouts per plant was observed in Kufri Chipsona-4 (2.93).

c) Plant height (cm)

The plant height of potato plant as influenced by different varieties is given in Table 2. The data clearly indicated that the plant height of potato responded significantly due to different varieties at all the growth stages under present studies.

Table 2: Plant height (cm) of potato varieties at different plant growth stages

S.No.	Varieties	Plant height (cm)			
		30 DAP	45 DAP	60 DAP	75DAP
1.	Kufri Chipsona-1	27.76	41.15	56.00	58.46
2.	Kufri Chipsona- 2	26.00	32.45	42.37	43.50
3.	Kufri Chipsona-3	28.29	33.68	42.81	56.51
4.	Kufri Chipsona- 4	28.20	37.28	43.77	45.10
5.	Kufri Jyoti	29.5	45.41	60.38	62.18
6.	Kufri Lauvkar	30.42	46.51	62.95	63.92
7.	Kufri Surya	27.3	43.31	54.18	59.12
8.	Kufri Chandramukhi	27.88	42.29	57.62	58.91
9.	Kufri Jawahar	27.08	40.54	47.43	53.53
10.	Kufri Pukhraj	28.44	43.47	59.68	61.45
	SEm±	1.07	1.16	0.90	2.40
	C.D. at 5% level	3.18	3.46	2.67	7.15

Plant height was recorded at 30, 45, 60 and 75 days after planting. At 30 days after planting, significantly maximum plant height was recorded in variety Kufri Lauvkar (30.42 cm) which was followed by and at par with Kufri Jyoti (29.50 cm) and Kufri Pukhraj (28.44 cm) over all other varieties. While, the minimum value of plant height was observed in variety Kufri Chipsona- 2 (26.00 cm).

At 45 days after planting, the significantly maximum (46.51 cm) plant height was recorded in variety Kufri Lauvkar followed by and were at par with Kufri Jyoti (45.41 cm), Kufri Pukhraj (43.47 cm) and Kufri Surya (43.31 cm) as compared to other varieties. While, the minimum plant height (32.45 cm) was recorded in variety Kufri Chipsona-2.

With regards to 60 DAP, the significantly maximum plant height was recorded in variety Kufri Lauvkar (62.95 cm), followed by and were at par with Kufri Jyoti (60.38 cm) over other varieties. However, the minimum value of plant height was observed in variety Kufri Chipsona- 2 (42.37 cm).

At 75 days after planting, significantly the maximum (63.92 cm) plant height was recorded in variety Kufri Lauvkar followed by and were at par with Kufri Jyoti (62.18 cm), Kufri Pukhraj (61.45 cm), Kufri Surya (59.12 cm) Kufri Chandramukhi (58.91 cm) and Kufri Chipsona-1 (58.46 cm) as compared to other varieties. While, the minimum plant height (43.50 cm) was recorded in variety Kufri Chipsona-2.

d) Diameter of stem (cm)

The diameter of stem of different varieties is given in Table 3. Diameter of stem was recorded at 30, 45, 60 and 75 DAP. At 30 DAP, the significantly maximum diameter of stem was recorded in Kufri Lauvkar (3.03 cm) followed by all other varieties and were at par with each other as compared to Kufri Chipsona-4 (2.70 cm) and Kufri Chipsona-3 (2.40 cm). However, minimum diameter of stem was recorded in variety Kufri Chipsona-3 (2.40 cm) and Kufri Chipsona- 4 (2.70 cm). At 45 DAP, the significantly maximum diameter of stem was recorded in Kufri Lauvkar (3.28 cm) followed by all other varieties and were at par with each other as compared to Kufri

Chipsona-3 (3.02 cm) and Kufri Chipsona-4 (2.94 cm). However, minimum diameter of stem was recorded in variety Kufri Chipsona-3 (3.02 cm) and Kufri Chipsona- 4 (2.94 cm). In case of 60 days after planting, the significantly maximum diameter of stem was recorded in variety Kufri Lauvkar (3.88 cm) which was followed by and at par with Kufri Jyoti (3.80 cm), Kufri Pukhraj (3.76 cm), Kufri Surya (3.65 cm) and Kufri Chandramukhi (3.60 cm) over other varieties. However, minimum diameter of stem was observed in variety Kufri Chipsona- 4 (3.00 cm).

Table 3: Diameter of stem (cm) of potato varieties at different plant growth stages

S.No.	Varieties	Diameter of stem (cm)			
		30 DAP	45 DAP	60 DAP	75 DAP
1.	Kufri Chipsona-1	2.82	3.11	3.41	3.82
2.	Kufri Chipsona- 2	2.76	2.99	3.33	3.90
3.	Kufri Chipsona-3	2.40	3.02	3.41	3.92
4.	Kufri Chipsona- 4	2.70	2.94	3.00	3.05
5.	Kufri Jyoti	2.97	3.18	3.80	4.03
6.	Kufri Lauvkar	3.03	3.28	3.88	4.09
7.	Kufri Surya	2.85	3.16	3.65	3.96
8.	Kufri Chandramukhi	2.77	3.06	3.60	3.86
9.	Kufri Jawahar	2.79	3.02	3.27	3.78
10.	Kufri Pukhraj	2.95	3.14	3.76	4.01
SEm±		0.10	0.05	0.12	0.05
C.D. at 5% level		0.32	0.17	0.38	0.16

Similar trend was recorded at 75 days after planting the significantly maximum diameter of stem was recorded in variety Kufri Lauvkar (4.09 cm) which was followed by and at par with Kufri Jyoti (4.03 cm), Kufri Pukhraj (4.01 cm) and Kufri Surya (3.96 cm) over all other varieties. However, minimum diameter of stem was observed in variety Kufri Chipsona- 4 (3.05 cm).

e) Number of leaves per plant

The number of leaves per plant of different varieties is given in Table 4.

Number of leaves per plant was recorded at 30, 45, 60 and 75 days after planting. At 30 days after planting, the significantly the maximum 11.14 leaves per plant were recorded in variety Kufri Lauvkar followed by Kufri Jyoti (10.74), Kufri Pukhraj (10.12) and Kufri Surya (9.83) as compared to other varieties. However, Kufri Jyoti was found at par with variety Kufri Lauvkar. While, the minimum leaves per plant (7.56) were recorded in variety Kufri Chipsona- 4.

The variety Kufri Lauvkar was recorded significantly maximum 17.35 leaves per plant followed by and at par with Kufri Jyoti (16.29 leaves) and Kufri Pukhraj (15.57 leaves) as compared to other varieties. However, the minimum number of leaves per plant (11.92) were recorded in variety Kufri Chipsona- 4 at 45 days after planting.

In case of 60 days after planting, the significantly the maximum 19.76 leaves per plant was recorded in variety Kufri Lauvkar followed by and at par with Kufri Jyoti (18.35) and Kufri Pukhraj (17.59) as compared to other varieties. While, minimum number of leaves per plant was observed in variety Kufri Chipsona- 4 (14.00) at this stage of crop growth.

Table 4: Number of leaves per plant of potato varieties at different plant growth stages.

S.No.	Varieties	No. of leaves per plant			
		30 DAP	45 DAP	60 DAP	75 DAP
1.	Kufri Chipsona-1	9.12	14.15	16.68	17.72
2.	Kufri Chipsona- 2	9.25	13.92	16.85	18.28
3.	Kufri Chipsona- 3	8.35	13.37	15.68	16.52
4.	Kufri Chipsona-4	7.56	11.92	14.00	15.06
5.	Kufri Jyoti	10.74	16.29	18.35	19.13
6.	Kufri Lauvkar	11.14	17.35	19.76	20.11
7.	Kufri Surya	9.83	14.62	16.86	17.99
8.	Kufri Chandramukhi	8.57	12.78	15.93	16.82
9.	Kufri Jawahar	9.37	14.34	16.56	17.41
10.	Kufri Pukhraj	7.12	15.57	17.59	18.37
SEm±		0.19	0.68	0.82	0.63
C.D. at 5% level		0.59	2.02	2.45	1.89

The similar trend was observed at 75 days after planting, the significantly maximum 20.11 leaves per plant were recorded in variety Kufri Lauvkar followed by and at par with Kufri Jyoti (19.13), Kufri Pukhraj (18.37) and Kufri Chipsona-2 (18.82) as compared to other varieties. While, it was observed that the minimum number of leaves were attained by variety Kufri Chipsona- 4 (15.06).

f) Leaf area per plant (cm²)

The leaf area per plant (cm²) of different varieties is given in Table5. The observation for Leaf area per plant (cm²) was recorded at 30, 45, 60 and 75 DAP.

The leaf area per plant (cm²) of potato increased significantly with the different varieties. Kufri Lauvkar (208.30 cm²) recorded significantly maximum leaf area per plant followed by Kufri Jyoti (205. 51 cm²). While, minimum leaf area per plant (cm²) was observed in Kufri Chipsona- 4 (142.82 cm²) at 30 DAP.

Table 5: Leaf area per plant (cm²) of potato varieties at different plant growth stages.

S.No.	Varieties	Leaf area plant (cm ²)			
		30 DAP	45 DAP	60 DAP	75 DAP
1.	Kufri Chipsona-1	152.20	267.62	364.88	410.82
2.	Kufri Chipsona- 2	149.98	252.71	370.06	397.93
3.	Kufri Chipsona- 3	148.91	276.71	324.08	382.75
4.	Kufri Chipsona- 4	142.82	244.07	298.76	378.78
5.	Kufri Jyoti	205.51	355.41	438.91	482.73
6.	Kufri Lauvkar	208.30	396.92	482.13	497.23
7.	Kufri Surya	186.82	298.24	379.89	430.12
8.	Kufri Chandramukhi	146.47	267.89	342.41	386.82
9.	Kufri Jawahar	151.78	322.26	362.74	394.31
10.	Kufri Pukhraj	155.26	322.52	418.39	430.42
SEm±		4.07	16.45	13.18	10.84
C.D. at 5% level		12.09	48.88	39.18	32.23

At 45 DAP, variety Kufri Lauvkar recorded the significantly maximum (396.92 cm²) leaf area per plant followed by and at par with Kufri Jyoti (355.41 cm²) as compared to all other varieties. However, the minimum value of leaf area per plant (cm²) was recorded in variety Kufri Chipsona- 4 (244.07 cm²).

In case of 60 DAP, variety Kufri Lauvkar (482.13 cm²) recorded the significantly maximum leaf area per plant as compared to all other varieties. While, the minimum value of leaf area per plant (cm²) was observed in Kufri Chipsona- 4 (298.76 cm²).

At 75 DAP, variety Kufri Lauvkar recorded the significantly maximum (49.23 cm²) leaf area per plant followed by and at

par with Kufri Jyoti (482.73 cm²) as compared to all other varieties. However, Kufri Chipsona- 4 (378.78 cm²) records the minimum value for leaf area per plant (cm²).

2 Yield parameter

a) Days to haulm cutting

The average days to haulm cutting of different varieties is given in Table 6.

Table 6: Days to haulm cutting and days to maturity of different potato varieties

S.No.	Varieties	Days to haulm cutting	Days to maturity
1.	Kufri Chipsona-1	84.51	100.23
2.	Kufri Chipsona- 2	104.07	119.91
3.	Kufri Chipsona- 3	84.33	100.04
4.	Kufri Chipsona- 4	93.35	108.19
5.	Kufri Jyoti	103.86	119.58
6.	Kufri Lauvkar	79.95	98.54
7.	Kufri Surya	84.38	99.55
8.	Kufri Chandramukhi	76.15	90.23
9.	Kufri Jawahar	83.40	99.69
10.	Kufri Pukhraj	93.28	110.34
SEm±		0.8	0.4
C.D. at 5% level		1.9	0.9

The days to haulm cutting increased significantly in the different varieties. The significantly early 76.15 days for haulm cutting was recorded in the variety Kufri Chandramukhi followed by Kufri Lauvkar (79.95 days) and Kufri Jawahar (83.40 days) as compared to other varieties. However, the variety Kufri Chipsona-2 (104.07 days) and Kufri Jyoti (103.86 days) exhibited the maximum days for haulm cutting.

b) Days to maturity

Days to maturity of different potato varieties is given in Table 6. Its graphical presentation has been shown in Fig. 13 and illustrated in Appendi-II.

The minimum days for maturity (90.23 days) were observed for Kufri Chandramukhi followed by Kufri Lauvkar (98.54 days) and Kufri Surya (99.55 days) as compared to other varieties. However, the varieties Kufri Chipsona- 2 (119.91 days) and Kufri Jyoti (119.58 days) required maximum days for maturity.

c) Number of tubers per plant

The number of tubers per plant was recorded variety wise and their data have been depicted in Table 7.

Table 7: Number of tubers per plant of different varieties of potato

S.No.	Varieties	Number of tubers per plant
1.	Kufri Chipsona-1	10.33
2.	Kufri Chipsona- 2	9.86
3.	Kufri Chipsona- 3	10.13
4.	Kufri Chipsona- 4	8.69
5.	Kufri Jyoti	12.60
6.	Kufri Lauvkar	12.67
7.	Kufri Surya	11.86
8.	Kufri Chandramukhi	9.88
9.	Kufri Jawahar	9.87
10.	Kufri Pukhraj	12.40
S Em ±		0.41
C.D. at 5% level		1.22

During harvesting, significantly maximum number of tubers per plant was recorded in the variety Kufri Lauvkar (12.67) followed by Kufri Jyoti (12.60), Kufri Pukhraj (12.40) and Kufri Surya (11.86) and were at par with each other. While, the minimum number of tubers per plant was observed in Kufri Chipsona- 4 (8.69).

d) Number of rotted tubers per plant

The number of rotted tubers per plant of different varieties is given in Table 8.

Significantly minimum number of rotted tubers per plant were recorded in the varieties Kufri Lauvkar (1.0) followed by and at par with Kufri Jyoti (1.23), Kufri Pukhraj (1.29), Kufri Surya (1.58), Kufri Chipsona-1 (1.60) and Kufri Jawahar (1.63), as compared to all other varieties. Therefore, number of rotted tubers per plant was observed to be maximum in variety Kufri Chipsona- 4 (2.56).

e) Weight of rotted tubers (g/plot)

The weight of rotted tubers per plant of different varieties is given in Table 8. Variety Kufri Lauvkar (41.09 g) noted significantly minimum weight of rotted tubers followed by and was at par with Kufri Jyoti (45.10), as compared to all other varieties.

Table 8: Number and weight of rotted tubers of different varieties of potato.

S.No.	Varieties	Number of rotted tubers/plant	Weight of rotted tubers (g/plot)
1.	Kufri Chipsona-1	1.60	58.00
2.	Kufri Chipsona- 2	2.00	86.68
3.	Kufri Chipsona- 3	2.25	95.72
4.	Kufri Chipsona- 4	2.56	105.59
5.	Kufri Jyoti	1.23	45.10
6.	Kufri Lauvkar	1.08	41.09
7.	Kufri Surya	1.58	54.38
8.	Kufri Chandramukhi	1.87	79.81
9.	Kufri Jawahar	1.63	61.14
10.	Kufri Pukhraj	1.29	49.10
SEm±		0.25	2.63
C.D. at 5% level		0.76	7.84

While weight of rotted tubers per plant was found maximum in Kufri Chipsona- 4 (105.59 g per plant).

f) Total yield of tubers (kg/plot)

The total yield of tubers per plot was recorded variety wise and their values are depicted in Table 9. Variety Kufri Lauvkar was recorded significantly superior and gave maximum (27.46 kg) total yield of tubers per plot followed by Kufri Jyoti (26.29 kg), Kufri Pukhraj (25.57 kg) and Kufri Chipsona-1 (25.08 kg). While, the lowest total yield of tubers per plot was noted in variety Kufri Chipsona- 4 (20.25 kg).

g) Total yield of tubers (q/ha)

The yield of any crop is the final index of the experiment which indicates the success or failure of any treatment. With this view the tuber yield of potato was recorded. The data for the total yield of tubers per plot under different varieties were recorded and converted into total yield of tubers hectare⁻¹ (quintals).

The data was analyzed statistically and depicted in Appendix-II. The total yield of tubers hectare⁻¹ as affected by different varieties is presented in Table 8.

Table 8: Total yield of tubers (kg/plot) and (q/ha) of different varieties of potato

S.No.	Varieties	Total yield of tubers (kg/plot)	Total yield of tubers (q/ha)
1.	Kufri Chipsona-1	25.08	279.44
2.	Kufri Chipsona- 2	20.77	225.23
3.	Kufri Chipsona- 3	24.61	267.42
4.	Kufri Chipsona- 4	20.25	223.61
5.	Kufri Jyoti	26.29	292.89
6.	Kufri Lauvkar	27.46	305.31
7.	Kufri Surya	23.44	262.81
8.	Kufri Chandramukhi	22.46	248.26
9.	Kufri Jawahar	24.30	272.73
10.	Kufri Pukhraj	25.57	286.38
SEM±		0.3	0.5
C.D. at 5% level		0.8	1.1

Variety Kufri Lauvkar was recorded significantly superior and gave maximum (305.31 q) total yield of tubers hectare⁻¹ and which was with Kufri Jyoti (292.89 q), Kufri Pukhraj (286.38 q) and Kufri Chipsona-1 (279.44 q) as compared to all other varieties. While, the lowest total yield hectare⁻¹ was noted in Kufri Chipsona- 4 (223.61 q).

h) Marketable yield of tubers (kg/plot and q/ha)

The data was analyzed statistically and is depicted in Appendix-II. The marketable tuber yield per plot and per hectare as affected by different treatment is presented in Table 9.

Table 9: Marketable yield of tubers (kg/plot) and q/ha of different varieties of potato.

S.No.	Varieties	Marketable yield of tubers (kg/plot)	Marketable yield of tubers (q/ha)
1.	Kufri Chipsona-1	22.12	245.44
2.	Kufri Chipsona- 2	17.09	189.51
3.	Kufri Chipsona- 3	20.60	229.13
4.	Kufri Chipsona- 4	16.18	180.11
5.	Kufri Jyoti	24.23	269.33
6.	Kufri Lauvkar	25.26	281.07
7.	Kufri Surya	19.18	213.12
8.	Kufri Chandramukhi	20.56	228.23
9.	Kufri Jawahar	19.71	219.39
10.	Kufri Pukhraj	24.02	266.48
SEM±		0.40	0.76
C.D. at 5% level		1.00	1.61

Significantly maximum 25.26, kg per plot and 281.07, q/ha marketable tuber yield were recorded under the varieties Kufri Lauvkar followed by Kufri Jyoti (24.23 kg per plot, 269.33 q/ha) as compared to all other varieties. However, the lowest marketable tuber yield was observed in Kufri Chipsona- 4 (16.18 kg per plot and 180.11 q per ha).

I) Harvest index

The data was analyzed statistically and is depicted in Appendix-II. The harvest index as affected by different treatment is presented in Table 10.

Significantly maximum Harvest index (0.76) was recorded under the variety Kufri Lauvkar followed by and at par with Kufri Jyoti (0.74), Kufri Pukhraj (0.72), Kufri Surya (0.70), Kufri Chipsona-1 (0.69) and Kufri Chandramukhi (0.67) as compared to all other varieties. However, the lowest Harvest index was observed in Kufri Chipsona- 4 (0.58).

Table 10: Harvest index of tubers of different varieties of potato

S.No.	Varieties	Harvest index
1.	Kufri Chipsona-1	0.69
2.	Kufri Chipsona- 2	0.63
3.	Kufri Chipsona- 3	0.67
4.	Kufri Chipsona- 4	0.58
5.	Kufri Jyoti	0.74
6.	Kufri Lauvkar	0.76
7.	Kufri Surya	0.70
8.	Kufri Chandramukhi	0.67
9.	Kufri Jawahar	0.66
10.	Kufri Pukhraj	0.72
SEM±		0.029
C.D. at 5% level		0.087

The production or yield is an ultimate result of the plants which depends on the genetic constitution of the plant and environmental factors which consists of different weather components and soil characteristics. Varieties play an important role in increasing the productivity of crops. Improvement in crop varieties and suitability according to climatic conditions for high yield is essential to increase the productivity of crop at sufficient level.

Keeping this in view, the present investigation was carried out to evaluate the comparative performance of different varieties. Various observations were recorded periodically on morphological parameters, yield and qualities. The inferences obtained from these observations were critically described in the previous chapter. Some of the findings have been focused on the most valuable information of basic and applied importance. These findings are being discussed in this chapter with the support of the data, scientific facts and views of other researchers. The discussion is centered around the effect of potato cultivars on the various characters.

Conclusion

Among the different varieties of potato Kufri Lauvkar recorded the maximum growth, yield attributing, quality as well as yield over other varieties. The Kufri Jyoti and Kufri Pukhraj were also performed almost equally as Kufri Lauvkar. Thus, it can be concluded that Kufri Lauvkar, Kufri Jyoti as well as Kufri Pukhraj are the most suitable varieties of potato under Malwa agro-climatic conditions.

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