

EVALUATION OF MEDIUM AND PROCESSING VARIETY OF POTATO FOR MALWA REGION OF MADHYA PRADESH

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ABSTRACT

A field experiment was conducted during rabi season of 2012-2013 at Indore (M.P.) to evaluate medium and processing variety of potato (*Solanum tuberosum* L.) for yield, quality and economics. The experiment consisted of seven varieties (Kufri Surya, Kufri Jyoti, Kufri Badshah, Kufri Sinduri, Kufri Chipsona -1, Kufri Chipsona -2, Kufri Chipsona -3) laid out in a randomized block design with three replications. Tubers were planted at a spacing of 60 x 20 cm. Results revealed that the highest total yield was recorded in Kufri Surya (31.33 t ha⁻¹) and Kufri Chipsona-3 (31.24 t ha⁻¹) and lowest in variety Kufri Badshah (25.50 t ha⁻¹). For processing purpose like chips and flour making Kufri Chipsona-1, Kufri Chipsona-2, Kufri Chipsona-3 and Kufri Surya were found superior to rest of the varieties. However, maximum net returns 231433 ha⁻¹ along with benefit cost ratio of 3.83 was obtained under Kufri Surya.

Keywords: Varieties, processed products, quality, economics, potato, Malwa region, Madhya Pradesh.

INTRODUCTION

Potato (*Solanum tuberosum* L.) is one of the most important food /vegetable crops both in developed as well as in developing countries. Potato is fourth major food crop after rice, wheat and maize in the world. Now, it has become an essential part of breakfast, lunch and dinner worldwide (Ganga *et al.*, 2013). Potato occupies the top most position among tuber crops followed by cassava, sweet potato and yams. On the fresh weight basis, potato contains about 80 % water and 20 % dry matter. Starch is the major component of dry matter accounting for approximately 70 % of the total solids. The average raw composition of a potato tuber is as follows: dry matter (20 %), starch (13-16 %), total sugars (0-2 %), protein (2 %), fibre (0.5 %), lipids (0.1 %), vitamin A (trace/ 100 g fresh weight), vitamin C (31 mg/ 100 g fresh weight). Potato tubers can be processed into several products like chips, flakes, French-fries, finger chips, granule, dice, cubes, and flour and providing added income for poor farmer and reduce storage requirements. Potato crop is grown throughout India, in almost all states, having varied soil type and environmental conditions which greatly affect the yield and processing qualities of tubers. So, a need was felt that potato cultivation in India cannot depend on exotic varieties. Keeping this in view, this investigation on potato varieties was undertaken to find out suitable medium and processing varieties of potato for Malwa Region.

MATERIALS AND METHODS

The experiment was conducted at Research farm of College of Agriculture, Indore (M.P.) during rabi season 2012-2013. Indore is situated in Malwa

Plateau in western part of Madhya Pradesh on latitude of 22° 43' N and longitude of 75° 06' E with an altitude of 555.5 meters above mean sea level, Indore region comes under sub-tropical and semi-arid region, having a temperature range from 29°C – 41°C as maximum and 7°C – 23°C as minimum in summer and winter season, respectively. It is hottest during April and May while coolest in December and January. Relative humidity generally fluctuates between 30 % - 85 %. In this area, most of the rainfall is received during mid - June to early October, while winter rains are occasional and uncertain. The annual rainfall is 941mm. The south – west monsoon is responsible for the major precipitation. The soil of the experimental field was medium black clay (Vertisols) with uniform topography. A field experiment was laid out in a randomized block design with seven varieties and replicated thrice. Healthy and pure seed tubers were used for planting (whole tubers) at 20 cm apart, in the shallow furrows, at 60 cm distance and covered immediately after planting. FYM (20 t ha⁻¹) was applied kg ha⁻¹) were applied through diammonium phosphate and muriate of potash, respectively. The remaining quantity of nitrogen was supplied through urea, after 35 days of sowing. The first 3 weeding and earthing up was done at 26 days after planting and second weeding and earthing up was done at 50 days after planting. The crop is harvested at maturity attained by varieties and yield recorded. The chips were prepared by the chip making machine. These chips were eaten by 10 to 15 persons and quality was measured according to its colour and taste. The potato flour was made from the actual potato excluding the potato skin, which have been cooked, dried and

ground. The quality of flour was measured according to its colour. The monetary returns were calculated on the prevailing market rates.

RESULTS AND DISCUSSION

Yield and yield attributing parameters

Haulm cutting was done at 15 days before harvesting of all types of varieties. Maturity at 100 days after planting was recorded for varieties Kufri Surya, Kufri Chipsona-1 and Kufri Chipsona-3, maturity at 120 days after planting for varieties Kufri Jyoti, Kufri Badshah, Kufri Sinduri and Kufri Chipsona-1, respectively. The crop is ready to harvest 10 to 15 days after haulm cutting when the skin of tuber has hardened. Pre-mature harvesting causes handling problems as the soft skin gets easily peeled off and further, such tubers cannot withstand long transportation and storage. Similar findings were reported by Raj Kumar (2004). The number of tubers per hill in potato varieties studied ranged from 8.5 to 12.7. Significantly a maximum tuber per hill was

recorded in the variety Kufri Surya (12.7) and minimum in Kufri Badshah (8.5). Out of processing varieties, Kufri Surya (12.7) and among medium varieties, Kufri Jyoti (12.6) had shown the maximum number of tubers per hill. Significantly highest total yield was found in Kufri Surya (31.33 t ha⁻¹) while, the lowest in Kufri Badshah (25.50 t ha⁻¹). Out of four processing varieties, Kufri Surya (31.33 t ha⁻¹) and out of three medium varieties, Kufri Sinduri (29.40 t ha⁻¹) produced the highest total yield. Difference in total yield is due to the variety and environmental factor. Significantly highest marketable yield was found in the variety Kufri Surya (25.30 t ha⁻¹) while, the lowest in Kufri Badshah (18.39 t ha⁻¹). Out of four processing varieties, Kufri Surya (25.30 t ha⁻¹) and out of three medium varieties, Kufri Jyoti (22.38 t ha⁻¹) produced the highest marketable yield. These findings are in agreement with the results reported by Verma *et al.* (2012).

Table 1: Days to haulm cutting, days to maturity, tubers per hill, total yield, marketable yield as affected by different varieties of potato

Varieties	Days to haulm cutting	Days to maturity	Tubers per hill	Total yield (t ha ⁻¹)	Marketable yield (t ha ⁻¹)
Kufri Surya	85	100	12.7	31.33	25.30
Kufri Jyoti	105	120	12.6	29.16	22.38
Kufri Badshah	105	120	8.5	25.50	18.39
Kufri Sinduri	105	120	11.8	29.40	22.49
Kufri Chipsona-1	85	100	10.1	29.72	23.49
Kufri Chipsona-2	105	120	9.9	27.37	22.97
Kufri Chipsona-3	85	100	12.4	31.24	24.17
SEm ±	0.75	0.78	0.85	1.14	0.94
C.D. (P= 0.05)	2.30	2.40	2.60	3.50	2.87

Qualitative parameters

Dry matter content of various varieties of potato ranged from 18.03 to 25.04 percent. Significantly highest dry matter (25.04 %) was found in Kufri Surya and the lowest in Kufri Sinduri (18.03 %). Out of four processing varieties, Kufri Surya and out of three medium varieties Kufri Jyoti had shown the highest dry matter production. Potato varieties differ in their dry matter; it is due to the genetical characters. It has been observed that processing varieties contain higher dry matter, as compared to the medium maturing varieties. The present findings on dry matter percentage in different varieties were supported by Jaiswal *et al.* (2008). Chips produced from Kufri Chipsona-1, Kufri Chipsona-2, Kufri Chipsona-3 and Kufri Surya was superior to the rest of the varieties. These varieties have shown superiority in 5 chip colour and taste, it is due to the low sugar percentage. While, Kufri Badshah

produced the low quality chips it is due to the high sugar percentage. A variety meant for processing should meet the minimum requirement such as shape, size, texture, dry matter and reducing sugars. Findings are in agreement with the results reported by Uppal and Khurana (2003).

Table 2: Dry matter, quality of chips and flour as affected by different varieties of potato

Varieties	Dry matter (%)	Quality of Chips	Flour
Kufri Surya	25.04	Fair	Light golden colour
Kufri Jyoti	20.00	Fair	Golden colour
Kufri Badshah	19.03	Fair	Golden colour
Kufri Sinduri	18.03	Fair	Light golden colour
Kufri Chipsona-1	24.17	Good	Light golden colour
Kufri Chipsona-2	23.90	Good	Light golden colour
Kufri Chipsona-3	24.27	Good	Light golden colour
S E m ±	0.26	-	-
C.D. (P= 0.05)	0.79	-	-

Light coloured potato flour is acceptable. Kufri Jyoti, Kufri Badshah, exhibited golden colour. Whereas, remaining varieties (Kufri Surya, Kufri Sinduri, Kufri Chipsona-1, Kufri Chipsona-2, Kufri Chipsona-3) exhibited light golden colour. The present findings were supported by Singh *et al.* (2005). Potato, as a genus (*Solanum*) differs in varieties from one another in morphology and chemical composition of plant and tubers which affects the yield and quality of the processed products.

Economics

Significantly highest total yield of 31.33 t ha⁻¹ and net return of Rs. 231433 ha⁻¹ along with B: C ratio of 3.83 was obtained in Kufri Surya. The lowest net return of Rs. 173140 ha⁻¹ and B: C ratio of 3.12 was observed in variety Kufri Badshah. Out of four processing varieties, Kufri Surya had shown the significantly highest total yield and out of three medium varieties, Kufri Sinduri had shown the significantly highest total yield of 29.40 t ha⁻¹ and net return of Rs. 212192 ha⁻¹ along with B: C ratio of 3.59. Similar result were reported by Lal and Sharma

(2006) who reported that the potato crop was found to be most capital and labour intensive due to substantial cost incurred on seed, fertilizer and human labour.

Table 3: Economics of different varieties of potato

Varieties	Total yield (t ha ⁻¹)	Gross income (ha ⁻¹)	Net income (ha ⁻¹)	B : C ratio
Kufri Surya	31.33	313263	231433	3.83
Kufri Jyoti	29.16	291585	209755	3.56
Kufri Badshah	25.50	254970	173140	3.12
Kufri Sinduri	29.40	294022	212192	3.59
Kufri Chipsona -1	29.72	297222	215392	3.63
Kufri Chipsona -2	27.37	273741	191911	3.35
Kufri Chipsona -3	31.24	312444	230614	3.82

On the basis of present investigation, it can be concluded that out of seven varieties, Kufri Surya and Kufri Chipsona-3 for yield and Kufri Chipsona-1, Kufri Chipsona-2, Kufri Chipsona-3 and Kufri Surya for processing purpose were identified as best varieties for cultivation in Malwa Plateau agro-climatic region of Madhya Pradesh.

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