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Economic Assessment of Different Varieties of Sweet Potato (*Ipomoea batatas* (L.) Lam) under the Prayagraj Region of India

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

A research investigation was conducted during *rabi* season 2023 at Horticulture research field, SHUATS (Sam Higginbottom University of Agriculture Technology and Sciences) Prayagraj, Uttar Pradesh, India to determine the economic variation and benefit cost ratio of ten different sweet potato genotypes. The production output of ten different sweet potato genotypes was computed by Cost Benefit ratio (CBR).The Cost Benefit Ratio analysis indicated that the most promising and profitable variety was Sree Nandini followed by Sree Bhadra and Kishan. The highest Cost Benefit Ratio (CBR) of Sree Nandini was 10.82, followed by Sree Bhadra 10.53 and Kishan with 8.3 respectively. According to the agro climatic condition of Prayagraj Sree Nandini Variety of sweet potato is recommended to farmers as it gives a profitable output.

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Keywords: Benefit cost ratio; cost of production; genotype; sweet potato; tuber.

1. INTRODUCTION

Sweet potato [*Ipomoea batatas* (L.) Lam] is a very important tuber crop which belongs to family convolvulaceae. [1]. It is a starchy tuber crop which grows mostly in tropical and subtropical countries [2]. It is a dicotyledonous plant. It has high calorific value and gives have more yield potentials [3]. Sweet potato has hexaploid chromosome number 2n=6x=90, which is grown for its diverse uses for food, industrial raw matter and animal feed [4]. Sweet potato produces the highest amount of root dry matter for consumption of human [5]. It is rich source of Vitamin A, C, Carbohydrates, minerals and fibres [6,7]. The starch content is 70 % of the dry weight of sweet potato which is one of the important characteristic of the sweet potato variety [5]. The sweet starchy edible tuberous roots have economics values that contain about 20.1% carbohydrate, Starch 12.6 gm, and high concentration of vitamin A 0.078mg, Vitamin C 2.4 mg, Calcium 30 mg and Iron 0.61 mg. It is a rich source of carotene 8510 µg, protein1.57 gm and energy 86 kcal (United States Department of Agriculture (USDA) Nutrient Database). In India, Odisha is the largest producer of sweet potato [8] [9]. The total area in India under sweet potato is estimated to be 0.13 million ha with the production of 1.47 million tonnes and the productivity of 11.32t ha^{-1} respectively [10]. (FAO, 2016).

2. MATERIALS AND METHODS

An experiment was conducted at Horticultural research field, under department of Horticulture, Naini Agricultural institute, Sam Higginbottom University of Agriculture, Technology and Science, Prayagraj, Uttar Pradesh, India. The experiment was conducted during the *rabi* season 2023. A total of ten different genotypes of sweet potato (treatment) were replicated thrice by RBD designs. Ten different genotypes of sweet potato were collected from ICAR-CTCRI Regional centre, Bhubaneswar. They were Sree Nandini, Samrat, Kalinga, Gouri, Sankar, Pusa Safed, Sree Bhadra, Kishan, BHU Krishna, and BHU Sona. It was transplanted with spacing of 60 × 20 cm within the plot area of 26x5.5=143 m^2. The cultivated soil condition was properly well-drained with adequate doses of Fym and soil manure. The research site was situated in the sub tropical region with 25^0 57' N latitude, 81^0 57' E longitude and 98 meter above the mean sea level. The maximum temperature recorded highest up to 47 ^{0}C in summer with lowest recorded drops to 1.5^{0}C in winter month.

The data regarding different parameters on the sweet potato cultivation was taken randomly from five different selected plants. The parameters like vine length was recorded in between 30 days, 60 days and 90 days duration, while other parameters like, number of leaves, number of vines, internodal length, tuber length, tuber weight, tuber diameter and tuber yield were recorded on and after harvesting.

The yield of ten different genotypes of sweet potato was collected and separately weighed. The total cost of production from land preparation to Marketing of yields was recorded during the *rabi*2023 season. The manures and fertilizers were taken from Naini's local market. The cost of cultivation includes the land preparation, fertilizers and manure, plantings, irrigation, intercultural operations and harvesting. The overall expense of the sweet potato cultivation was maintained thoroughly and calculated. The total income for the sweet potato was calculated by multiplying the total yield per hectare with the local market price. The total net benefit was calculated by subtracting the total cost of cultivation from gross income. The Cost Benefit Ration (CBR) was obtained by calculating from formula

Gross return = Marketable Yield x Market price

Net return= Gross return – Total cost

$$B{:}\,CRatio = \frac{\text{net returns}}{\text{cost of cultivation}}$$

3. RESULTS AND DISCUSSION

There was a significant result from the total yield of the treatments. The highest yield was seen in genotype Samrat (103.46 q/ha), followed by Sree Nandini (88.59 q/ha), Sree Bhadra (86.37 q/ha), Pusa safed (84.56 q /ha), Kishan (69.66 q/ha), Sankar (69.52 q/ha), Gouri (65.11 q/ha) BHU Sona (64.24 q/ha), Kalinga (62.84 q/ha), BHU Krishna (61.44 q/ha). These findings are supported by kar et al. [8].

The cost benefit ratio was found highest in Sree Nandini (10:82), followed by Sree Bhadra (10:53), Kishan (8.3), Sankar (8:28), Pusa safed (7:78), BHU Krishna (7:65), Kalinga (7:39), Samrat (5:9), Gouri (4:11), BHU Sona (4:05).

Table 1. Total cost of cultivation of sweet potatoper hectare (Fixed Cost)

Serial number	Particulars	Quantity	Unit	Unit Rate (Rs)	Amount (Rs)/ha
A	**Land Preparation**				
1	Particulars with mould board plough	3	Hours	500	1500
2	Levelling of field (leveller)	4	Hours	300	1200
3	Layout of the field by labour	12	Labour	450	5400
4	Preparation of bunds	10	Labour	450	4500
B	**Fertilizers and Manure**				
1	FYM	20	Tonnes	500	10000
2	Urea	60	Kg	10	600
3	DAP	50	Kg	30	1500
4	MOP	65	Kg	40	2600
5	Labours for fertilizer application	4	Labour	300	1200
C	**Plantings**				
1	Cutting	800	No	1	800
2	Transplanting	20	Labour	350	7000
D	**Irrigation**				
1	Tube well charge	10	Hours	350	3500
2	Labour for irrigation	5	Hours	300	1500
E	**Intercultural Operation**				
1	Insecticides and pesticides	6	Litres	400	2400
2	Neem oil	2	Litres	1000	2000
3	Labour	12	Labour	350	4200
F	**Harvesting**				
1	Harvesting and other operation	30	Labour	350	10500
2	Supervision charge	7	Labour	1000	7000
Total cost of cultivation (Rs/ha)					**67,400**

Table 2. Economics of different genotypes and cost: benefit ratio of sweet potato

Serial Number	Genotypes	Total cost of cultivation	Yield (q/ha)	Selling price (Rs)	Gross return (Rs/ha)	Net Profit (Rs/ha)	Benefit: cost ratio
1	Sree Nandini	67,400	88.59	90	797310	729910	10:82
2	Samrat	67,400	103.46	45	465570	398170	5:9
3	Kalinga	67,400	62.84	90	565560	498160	7:39
4	Gouri	67,400	65.11	53	345083	277683	4:11
5	Sankar	67,400	69.52	90	625680	558280	8:28
6	Pusa Safed	67,400	84.56	70	591920	524520	7:78
7	Sree Bhadra	67,400	86.37	90	777330	709930	10:53
8	Kishan	67,400	69.66	90	626940	559540	8:3
9	BHU Krishna	67,400	61.44	95	583680	516280	7:65
10	BHU Sona	67,400	64.24	53	340472	273072	4:05

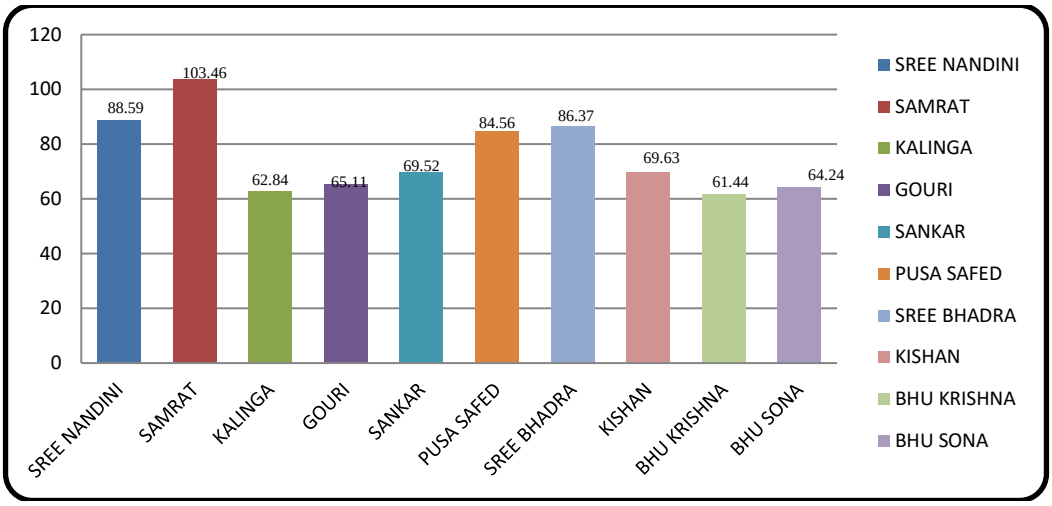

Fig. 1.Sweet potato tuber yield (q/ha)

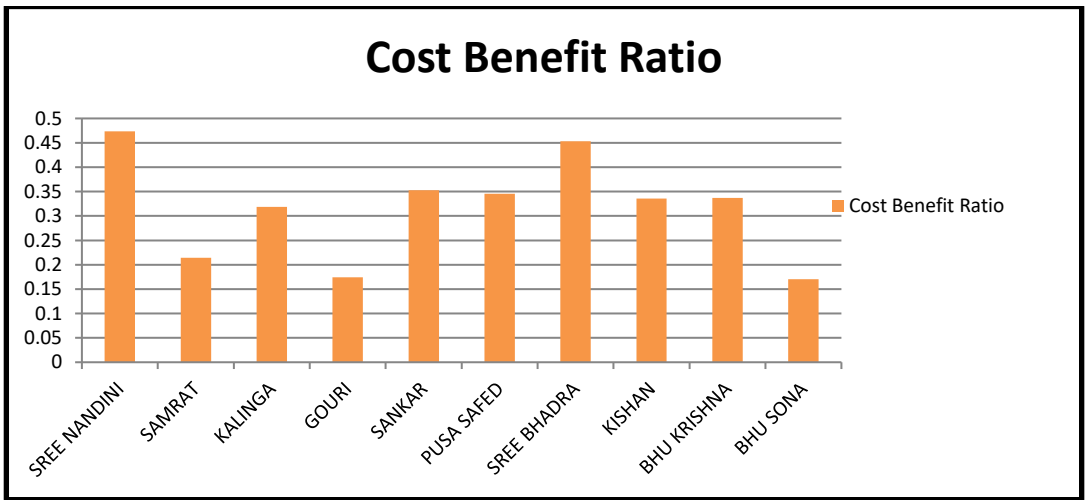

Fig. 2. Cost Benefit Ratio of Sweet potato yield

4. CONCLUSION

From the experiment it was observed that the yield was significant among the ten different genotypes. Among the ten different genotypes the highest Gross return (Rs/ha) (797310), Net return (Rs/ha) (729910), benefit cost ratio (10:82) was also obtained from genotype Sree Nandini. The yield was high from Genotype Samrat (103.46 q/ha). These two genotypes can be used for cultivating sweet potato in prayagraj conditions to give maximum benefit in yield and profit.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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