



## Evaluation of Sweet Potato (*Ipomoea batatas* [L.] Lam.) varieties for Growth and Yield under Mid Central Table Land Zone of Odisha

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**ABSTRACT:** A field experiment was conducted at the Regional Research and Technology Transfer Station (RRTTS), Mahisapat, Dhenkanal to find out the suitable Sweet potato varieties under Mid Central Table Land Zone. Ten numbers of Sweet potato varieties i.e., Gouri, Sankar, Kishan, Kalinga, Bhukanti, Sree Bhadra, Bhusona, Gautam, Bhu Ja and Kanchangarh were selected and vines were planted in the instructional farm of RRTTS, Mahisapat during late kharif, 2018. The vegetative growth parameters and tuber yield were recorded. The results revealed a significant difference among the vegetative as well as yield parameters among the Sweet potato varieties. The vine length in different varieties varied from 63.40 cm to 152.90 cm. The number of branches per plant was maximum (8.20) in the variety Kanchangarh whereas the average tuber weight was maximum (166.30g) in Kishan. The maximum tuber yield per ha was recorded in the variety Kalinga (198.0q/ha) followed by Kishan (186.0 q/ha) and Gautam (182q/ha). Three sweet potato varieties i.e., Kalinga, Kishan and Gautam are performing well under Mid Central Table Land Zone of Odisha.

**Keywords:** Sweet potato, variety, tuber yield.

### INTRODUCTION

Sweet potato (*Ipomoea batatas* L.) is an important economic crop and is a potential staple food in developing countries. It is a dicotyledonous angiosperm plant belongs to the Convolvulaceae family. The crop is capable of producing nutritious tuberous roots eaten worldwide. Sweet potato has the potential to make greater contribution to agriculture because of its caloric yield, nutritive value, adoptability to versatility tropical origin. The tubers are rich in fibers, micro nutrients and an excellent sources of energy for the consumers. Its tubers provide carbohydrates while the leaves are major sources of vitamins, dietary fibres, essential amino acids and antioxidants (Geneva *et al.*, 2014). Besides carbohydrate, proteins, enzymes, lipids, polyphenols, organic acids, vitamins, minerals and pigments are also present in the tuber. Depending on the variety, the pulp colour may be white, yellow, orange or purple. Not only the tubers but the leaves also are excellent sources of vitamins like riboflavin, ascorbic acids, thiamine, folic acid and minerals like Ca, K, Fe and P. The leaves also contain high amount of phenol, 2-4 mg /g<sup>-1</sup> of fresh weight. Sweet potato requires well drained loose soil with pH ranging from 5.5 to 6.5. Being a photosensitive crop, it requires sunny days and cooler nights for tuber initiation and development. The crop shows very high genetic diversity and a number of its varieties have been released for cultivation. However, the response of these varieties varies widely depending on soil and climatic factors (Mary *et al.*, 2022). In Odisha the crop

is mainly raised in the post monsoon season (October-February) in some area in rainy seasons. Orissa being the leading state in area and production followed by West Bengal and Uttar Pradesh, while Andhra Pradesh recorded highest productivity (Hejjegar *et al.*, 2022). The average productivity of sweet potato in Odisha is only 9.3 t ha<sup>-1</sup> compared to the Asian average of 15 t ha<sup>-1</sup> (Maharana *et al.*, 2015). Selection of varieties which are suitable for specific climatic condition is an important step towards enhancing productivity of this crop. Scientists are currently working on evolving new varieties that would perform better under changing climate scenario (Mary *et al.*, 2022). The main sweet potato growing districts of Odisha are Ganjam, Gajapati, Rayagada, Koraput, Nabarangpur, Kalahandi and Dhenkanal. Sweet potato was traditionally grown as a food crop after cereals in major sweet potato growing districts in Odisha as it gives more returns with less inputs (Prakash *et al.*, 2016). The soil and climate of Dhenkanal district, particularly in the high and medium land are quite suitable for growing sweet potato in kharif as well as rabi season. The temperature ranging from 28°C to 34°C is ideal for sweet potato plants. The local varieties are low yielders. Sweet potato is a cross pollinated and highly heterozygous crop resulting in large variability for crop improvement, knowledge on genetic diversity helps the breeder in choosing desirable parents for use in the breeding program (Wani *et al.*, 2023). Considering all these factors the possibility of growing sweet potato in Dhenkanal area could very well be explored for

production as well as fodder point of view. Keeping these objectives in view the present investigation was undertaken to screen ten varieties of sweet potato during late kharif, 2018.

## MATERIALS AND METHODS

The present study was carried out at the Regional Research and Technology Transfer Station (OUAT), Dhenkanal late during kharif, 2018. Ten sweet potato varieties *i.e.*, Gouri, Sankar, Kishan, Kalinga, Bhukanti, Sree Bhadra, Bhusona, Gautam, Bhu Ja and Kanchangarh were evaluated for growth, yield attributes and yield. The field experiment was conducted in a Randomized Block Design with three replications. The RRTTS instructional farm situated at latitude of 20°3' to 21°16' N and longitude 84°6' to 86° 6' E with an average annual rainfall of 1428.8 mm with 138.01 rainy days. The soil of the experimental field is

sandy loam and slightly acidic in nature. The experimental soil pH = 5.60, EC = 0.012 dsm<sup>-1</sup>, OC = 0.64% (low), with available N-255.00 kg/ha, P<sub>2</sub>O<sub>5</sub> – 11.80kg/ha, K<sub>2</sub>O –168.00kg/ha. The climate of Dhenkanal district is warm and humid. As per the recommendation, basal dose of 30 kg N, 60 kgP<sub>2</sub>O<sub>5</sub> and 60 kg K<sub>2</sub>O along with 25 t FYM ha<sup>-1</sup> were applied at the time of land preparation. The plot size was 3.5m × 2.5m. Healthy 3 to 4 node cuttings from top and middle portion of the vine were planted at 20 cm spacing on the ridge. The remaining 60 kgN was applied in two split doses at 30 and 60 days after planting. Observations were recorded on Vine length, no. of branches/plant, no. of leaves/plant, no. of tubers/ plant, average tuber wt., average tuber length, tuber breadth and yield.

**Table 1: Vegetative growth parameter of different Sweet potato varieties.**

Treatments	Vine length (cm)	No. of Branches /plant	No. of leaves per plant
Gouri	63.20	3.50	34.00
Sankar	71.00	3.60	31.60
Kishan	90.00	4.60	80.70
Kalinga	92.50	4.90	75.40
Bhukanti	67.20	4.00	61.40
Sree Bhadra	80.60	2.60	58.20
Bhusona	152.90	4.90	78.00
Gautam	132.20	3.90	81.00
Bhu Ja	66.60	4.10	56.20
Kanchangarh	68.60	8.20	131.90
SEM (±)	<b>1.64</b>	<b>0.16</b>	<b>3.45</b>
CD (P=0.05)	<b>4.86</b>	<b>0.49</b>	<b>10.25</b>

**Table 2: Yield and yield attributing characters of Sweet potato varieties.**

Treatments	No. of tubers/ plant	Average tuber wt. (g)	Average tuber length (cm)	Average tuber breadth (cm)	Yield (kg/Plot)	Yield (Q/ha)
Gouri	1.80	116.50	14.00	4.40	7.0	140.0
Sankar	2.00	127.20	13.10	6.90	8.6	172.0
Kishan	1.70	166.30	18.20	6.30	9.3	186.0
Kalinga	1.90	157.40	14.90	6.50	9.9	198.0
Bhukanti	1.70	150.60	15.00	6.40	8.8	176.0
Sree Bhadra	1.60	133.00	14.60	5.80	7.3	146.0
Bhusona	1.70	127.20	13.60	5.40	7.6	152.0
Gautam	2.00	139.80	13.40	4.80	9.1	182.0
Bhu Ja	1.70	142.80	15.80	5.90	8.2	164.0
Kanchangarh	1.60	154.40	18.00	4.60	9.0	180.0
SEM ( ±)	<b>0.06</b>	<b>3.83</b>	<b>0.50</b>	<b>0.26</b>	<b>0.29</b>	<b>5.89</b>
CD (P=0.05)	<b>0.19</b>	<b>11.38</b>	<b>1.50</b>	<b>0.77</b>	<b>0.87</b>	<b>17.50</b>

## RESULTS AND DISCUSSIONS

The vegetative growth parameters of sweet potato varieties reveals that maximum (152.90cm) vine length recorded in the variety Bhusona followed by Gautam (132.20cm) and minimum (63.20cm) in Gouri (Table 1). The maximum (8.20) number of branches per plant was recorded in variety kanchangarh and the minimum (2.6) in Sree Bhadra. The numbers of leaves per plant varied from 31.60 in 131.90. The minimum (31.60) number of leaves per plant was recorded in Sankar whereas the maximum (131.90) in Kanchangarh.

Significant difference was recorded among the varieties with respect to the numbers of leaves per plant. Similar finding also reported by Rahman *et al.* (2015). The number of tubers per plant was maximum (2.0) in the sweet potato varieties Sankar and Gautam while the minimum (1.60) in Shree Bhadra and Kanchangarh. The Kishan variety of sweet potato showed the maximum average weight (166.30g) followed by Kalinga (157.4 g) and minimum in Gouri (116.50g). The numbers of tubers per plant and average tuber weight are the important yield attributing characters

(Naskar, 1987). The length of the tuber was highest (18.20cm) in the variety Kishan followed by Kanchangarh (18.0cm). The breadth of the tuber was highest (6.90cm) was recorded in the variety Sankar and the lowest (4.40cm) in the variety Gouri. The yield per kg was maximum (9.9kg/plot) recorded in the variety Kalinga followed by Kishan and minimum (7.0 kg/plot) in Gouri (Table 2). There was significant difference observed with respect to the tuber yield. Similar finding was also report by Gajanayake *et al.* (2014). The average weight of tuber per plant as well as tuber yield was greatly influenced by the soil and environment. Among the ten varieties, maximum yield (198.0q/ha) was recorded in the variety Kalinga followed by Kissan (186q/ha) and Gautam (182.0 q/ha). Wide variability in tuber yield among sweet potato varieties has been attributed to environmental and edaphic factors (Ravi and Indra 1999). Among the varieties, significantly higher tuber yield was obtained from variety Kalinga under mid central table land zone of Odisha.

## CONCLUSIONS

Based on the findings of the experiment, it was observed that among ten varieties evaluated, three varieties *i.e.*, Kalinga, Kishan and Gautam are performing well in the Mid Central Table Land Zone of Odisha and these three varieties can be recommended for getting higher productivity as well as enhancing the production of sweet potato under Mid Central Table Land Zone of Odisha.

## FUTURE SCOPE

The future scope of research is to evaluate varieties for drought tolerant and on biofortified varieties for enhancing food security and livelihoods. The sweet potato varieties included under the investigations may be evaluated at different agro-climatic zones of Odisha to recognize the most suitable varieties for Odisha.

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**Conflict of Interest.** None.

## REFERENCES

- Gajanayake, B., Reddy, K. R., Shankle, M. W. and Arancibia, R. A. (2014). Growth, developmental, and physiological responses of two Sweet potato (*Ipomoea batatas* L. [Lam]) cultivars to early season soil moisture deficit. *Scientia Horticulturae*, 168, 218-228.
- Geneva, O., Nkongho, Aduni U., Achidi, Nelson N., Ntonifor, Festus, A., Numfor, Beatrice, N., Dingha, Louis, E. N. Jackai and Conrad, K. Bonsi (2014). Sweet potatoes in Cameroon: Nutritional profile of leaves and their potential new use in local foods. *Afr. J. Biotechnol.*, 9 (18), 1371-1377.
- Hejjegar Iranna, Hiremath S. M., Ramachandra Naik K., Patil V. S., Kachapur R. M. and Shekharappa (2022). Morphological characterization of Sweet Potato (*Ipomoea batatas* (L.) Lam.) genotypes. *Biological Forum – An International Journal*, 14(1), 1204-1209.
- Mary, J., Prameela, P., Menon, S. S. and Vijayan, V. D. (2022). Performance of High Yielding Sweet Potato Varieties under Different Seasons. *International Journal of Plant & Soil Science*, 794-802.
- Maharana, J., Acharya, P., Jakhar, P. and Dass, A. (2015). On-farm evaluation and adoption of improved Sweet potato (*Ipomoea batatas*) cultivation among tribal farmers in Koraput region of Odisha, India, *Ann. Agric. Res. New Series*, 36(3), 324-330.
- Naskar, S. K. (1987). Promising sweet potato cultivars for laterite soil of Bhubaneswar in Orissa. *J. Root Crops*, 13 (1), 47-48.
- Prakash, P., Avinash, K., Roy, D. and Behura, D. (2016). Economic analysis of sweet potato farming and marketing in Odisha. *Journal of Root Crops*, 42(2), 163-167.
- Rahman, H. P., Islam, A. F. M., Maleque, M. D. and Rehenuma, T. (2015). Morpho-physiological evaluation of Sweet potato (*Ipomoea batatas* L.) genotypes in acidic soil. *Asian Journal of Crop Science*, 7(4), 267-276.
- Ravi, V. and Indira, P. (1999). Crop Physiology of Sweet Potato. *Hortic. Rev.*, 23, 277-338.
- Wani, P., Ambresh and Shantappa, T. (2023). Genetic Variability, Heritability and Genetic Advance for Growth, Yield and Quality Parameters among Orange-Fleshed Sweet Potato [*Ipomoea batatas* (L.) Lam.] Genotypes. *Biological Forum – An International Journal*, 15(1), 405-411.

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