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ASSESSMENT OF SENSORY ATTRIBUTES IN SWEET POTATO (*IPOMOEA BATATAS* L.) GENOTYPES FROM NORTHEAST INDIA

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ABSTRACT

The sweet potato is a primary food crop for scheduled tribes and is highly valued for its starch content, making it a key ingredient in the local food industry. Sensory appraisal underscores genotype preferences, offering insights for breeding and marketing, with CHFSP-1 and CHFSP-23 lauded for taste and color (4.70 and 4.80, respectively). CHFSP-06 showcasing the best texture with 4.30 score. Genotype CHFSP-5 outshone others with its impressive tuber size with scoring of 4.85. Large tubers are often preferred by consumers for ease of peeling and culinary uses, making CHFSP-5 a genotype of interest for farmers and marketers. CHFSP-21 recorded the highest overall acceptability score, closely followed by CHFSP-5 and CHFSP-22.

Key words : Sensory analysis, Sweet potato genotypes, Northeast India.

Introduction

Sweet potato (*Ipomoea batatas*), known as "Shakarkand," is a highly valuable tuber crop cultivated throughout the world belongs to the Convolvulaceae family with chromosome number (2n = 6x = 90). China and India are the largest sweet potato growing countries in the world. Among the major tuber crops cultivated in India, sweet potato ranks third next to potato and cassava in area and production. In India, it is grown in an area of 1.16 Lakh ha and produces 11.86 Lakh MT with a productivity of 10.22 t/ha (Anonymous, 2020). In India, it is largely cultivated in Uttar Pradesh, Bihar, West Bengal, Orissa, Madhya Pradesh, Tamil Nadu, Kerala, Karnataka and Andhra Pradesh (Hazra, 2015).

Sweet potatoes vary in skin colour, flesh colour and also in shape depending upon the variety. Colour ranges from orange, red, purple, yellow, brown, cream and white (Woolfe, 1992). Orange flesh sweet potato is rich source of (β) carotene which is a precursor of vitamin A which plays play major role in food system and helps in eliminating child death, blindness and stunting (CIP, 2019). Whereas, purple fleshed sweet potato is rich in anthocyanins, serves as a reservoir of natural antioxidants. The leaves, buds, vines and storage roots of sweet potato are rich source of antioxidants. The antioxidants primarily consist of phytochemicals such as phenolics, Anthocyanin, flavonoids and carotenoids along with various other beneficial components. They exhibit various benefits, including antimutagenicity, anti-hyperglycemic activity, hepatoprotective and antihypertensive properties, enhancement of memory performance, reduced risks of age-related macular degeneration and mitigating heart-related problems, which help in prevention of cancer, age related disease, cardiovascular disease along with good source of antioxidants are ideally suited as a bio-fortified crop to fight malnutrition in "Schedule Tribes" peoples and small-marginal farming communities. Additionally, it contains trace levels of vitamin E, thiamine, riboflavin, folate, calcium, iron, magnesium, phosphorus and zinc. (Chauhan *et al*., 2021 and Galvao *et al*., 2021).

Sensory analysis of sweet potato genotypes is crucial for evaluating consumer preferences and assessing quality

attributes like taste, texture, color, aroma and overall appearance. This analysis helps breeders select genotypes with desirable sensory traits, ensuring market acceptance and enhancing the consumer experience. It also provides insights into nutritional content, as certain sensory characteristics, such as deeper orange flesh, often indicate higher beta-carotene levels. By understanding how sensory qualities are affected by storage and processing, sensory analysis aids in selecting genotypes that maintain quality, reduce post-harvest losses and are suitable for specific value-added products. Overall, it plays a vital role in developing superior sweet potato varieties that meet consumer expectations and market demands.

Materials and Methods

Experimental materials

The experimental materials for the present study comprise 29 genotypes of sweet potato (*Ipomoea batatas* L.) collected from Northeast India along with 2 suitable checks, *viz*., Sree Bhadra and ST-14 collected from AICRP, Manipur, Imphal thereby comprising 31 genotypes in total. The experiment was conducted with proper cultural practices at Vegetable Research Farm of College of Horticulture and Forestry, Central Agricultural University, Pasighat, East Siang, Arunachal Pradesh, India, situated at an altitude of 154 meters above mean sea level, with geographical coordinates of approximately N 28° 04' 37.19" latitude and E 95° 19' 29.16" longitude. No pesticides are applied during crop growth. Tubers were harvested after 120 days after planting. Harvested tubers were collected, washed cleanly and stored at -20^{0}C in a refrigerator. All the sensory analysis were carried out in the Department of Basic Sciences & Humanities, College of Horticulture and Forestry, Central Agricultural University, Pasighat, East Siang, Arunachal Pradesh, India.

Organoleptic evaluation of tubers

The fresh tubers obtained from the experimental plot for each treatment were first boiled in a pressure cooker. After boiling, they were subjected to sensory evaluation to assess various quality parameters. The organoleptic test was conducted to evaluate characteristics such as skin colour, flesh colour, taste, flavour, texture, tuber size and overall acceptability of the tubers. During the evaluation, each tuber was assigned a numerical score based on its quality. The score values were determined according to the grading system on the organoleptic score card (Table 1). A panel consisting of twenty members from the College of Horticulture and Forestry in Pasighat was involved in the assessment of the organoleptic quality of the tubers.

Results and Discussion

Sensory evaluation of tubers

Sweet potato (*Ipomoea batatas*) is a staple food crop with high nutritional value, contributing significantly to dietary needs in many countries. Beyond its nutritive attributes, sensory characteristics such as taste, flavour, flesh colour, skin colour, texture, and tuber size play a significant role in consumer acceptability. The sensory evaluation provides crucial insights into understanding consumer preferences and aids in the development of genotypes with enhanced sensory attributes (Bovell-Benjamin, 2007). In the present investigation, sensory evaluation of taste exhibited genotype CHFSP-1 as the top performer with a score of 4.7, closely followed by CHFSP-5 and Sree Bhadra, both scoring 4.5 (Table 2). These genotypes could be prioritized for cultivation and promotion based on their superior taste profile. The lowest taste score of CHFSP-25 might necessitate further investigation into its phytochemical content and breeding strategies (Laurie *et al*., 2013).

Genotype St-14 and CHFSP-23 had commendable flavour profiles, indicating the presence of desirable aromatic compounds. Flavour is a composite sensory perception and is influenced by taste, aroma compounds, and mouthfeel. The metabolic pathways responsible for flavour formation in these genotypes can be explored further (Van Der Knaap and Tanksley, 2003). The visual appeal of food has a substantial influence on consumer choice. In this study, CHFSP-23 exhibited an outstanding flesh color score, followed closely by ST-14. Conversely,

Table 1 : Grading system on the organoleptic score card.

Scores	Taste	Flavor	Flesh color	Skin color	Texture	Tuber size	Overall acceptability
5	Excellent	Excellent	Excellent	Excellent	Dry mealy	Excellent	Excellent
4	Very good	Very good	Very good	Very good	Dry granular	Very good	Very good
3	Good	Good	Good	Good	Soft granular	Good	Good
2	Medium	Medium	Medium	Medium	Fine fibrous	Medium	Medium
1	Poor	Poor	Poor	Poor	Coarse fibrous	Poor	Poor

Table 2 : Variation in sensory parameters of cooked tubers.

Genotypes	Taste	Flavor	Flesh color	Skin color	Texture	Tuber size	Overall acceptability
CHFSP-01	4.70^{a}	4.10^{de}	4.00^{d}	4.10^{cd}	4.00^{cd}	4.4^{bc}	4.1^{ef}
CHFSP-02	4.20^{d}	3.20^{jk}	2.90^{m}	2.00^{m}	3.50^{hi}	3.56^{jkl}	3.2^{mn}
CHFSP-03	4.43^{bc}	4.30^{bc}	4.20^{c}	3.85^{efg}	3.40^{ij}	3.8^{hi}	3.95^{fgh}
CHFSP-04	4.20^{d}	4.00^{ef}	4.50^{b}	4.00^{de}	3.15^{lm}	4.1^{ef}	3.85^{ghi}
CHFSP-05	4.50^{b}	4.20^{cd}	4.50^{b}	4.50^{b}	4.20^{b}	4.85^{a}	4.5^{a}
CHFSP-06	4.40^{bc}	2.60^{o}	3.70^{f}	3.80^{fg}	4.50^{a}	3^{n}	3.6^{ik}
CHFSP-07	3.20^{klm}	3.20^{jk}	3.50^{gh}	3.90^{ef}	3.00^{m}	2.8^{o}	3.1^{n}
CHFSP-08	3.20^{klm}	3.25^{ijk}	3.60^{fg}	3.50^{i}	3.50^{hi}	3.9^{gh}	3.75^{ij}
CHFSP-09	3.80^{efg}	3.00^{lm}	3.60^{fg}	3.90^{ef}	3.10^{lm}	3.9^{gh}	3.8^{hi}
CHFSP-10	3.50^{ij}	2.60^{o}	4.20^{c}	3.90^{ef}	3.70^{fg}	3.5^{l}	3.95^{fgh}
CHFSP-11	3.39^{jk}	2.60^{o}	3.20^{jk}	3.60^{hi}	2.60^{n}	3.2^{m}	3.05^{n}
CHFSP-12	3.60^{fhi}	3.30^{ij}	3.60^{fg}	3.70^{gh}	3.40^{ij}	3.6^{jkl}	3.5^{k}
CHFSP-13	3.90^{e}	3.00^{lm}	3.90^{de}	3.80^{fg}	2.20^{o}	4^{fg}	4.45^{ab}
CHFSP-14	3.90^{e}	4.10^{de}	4.30^{c}	3.50^{i}	3.20^{kl}	4.2^{de}	4.05^{f}
CHFSP-15	4.30^{cd}	4.50^{a}	4.30^{c}	4.70^{a}	4.05^{c}	4.3^{cd}	4.3^{bcd}
CHFSP-16	3.40^{jk}	3.80^{gh}	3.10^{kl}	3.20^{jk}	3.40^{ij}	3.7^{ijk}	3.7^{ij}
CHFSP-17	3.80^{efg}	3.20^{jk}	3.30^{ij}	3.30^{j}	3.60^{gh}	3^{n}	3.3^{lm}
CHFSP-18	3.10^{lm}	3.10^{kl}	3.40^{hi}	3.50^{i}	3.50^{hi}	3.3^{m}	3.15^{mn}
CHFSP-19	3.30^{kl}	3.10^{kl}	3.00^{lm}	3.30^{j}	3.40^{ij}	3.7^{ij}	3.8^{hi}
CHFSP-20	4.10^{d}	3.00^{lm}	3.40^{hi}	3.80^{fg}	3.40^{ij}	3.3^{m}	3.45^{kl}
CHFSP-21	4.52^{b}	4.42^{ab}	4.50^{b}	4.50^{b}	4.01^{cd}	4.5^{b}	4.5^{a}
CHFSP-22	4.19^{d}	4.00^{ef}	4.60^{b}	4.20^{c}	3.90^{de}	4.3^{cd}	4.42^{abc}
CHFSP-23	3.80^{ef}	4.50^{a}	4.80^{a}	4.80^{a}	4.20^{b}	3.9^{gh}	4.25^{cde}
CHFSP-24	3.20^{klm}	2.90^{mn}	3.75^{ef}	3.70^{gh}	3.30^{jk}	3.2^{m}	3.5^{k}
CHFSP-25	3.00^{m}	3.70^{h}	4.00^{d}	3.90^{ef}	3.20^{kl}	3.8^{hi}	4^{fg}
CHFSP-26	3.80^{efg}	3.10^{kl}	3.30^{ij}	3.10^{k}	3.50^{hi}	3.9^{gh}	3.3^{lm}
CHFSP-27	3.25^{kl}	3.90^{fg}	3.90^{de}	3.25^{jk}	3.70^{fg}	3.55$^{j l}$	3.25^{mn}
CHFSP-28	3.70^{efgh}	3.90^{fg}	3.25^{ijk}	3.90^{ef}	3.70^{fg}	3.9^{gh}	3.5^{k}
CHFSP-29	3.20^{klm}	2.80^{n}	3.20^{jk}	3.80^{fg}	3.10^{lm}	3^{n}	3.3^{lm}
Sree Bhadra	4.50^{b}	3.40^{i}	3.90^{de}	2.40^{l}	3.80^{ef}	4^{fg}	4.23^{de}
St-14	4.20^{d}	4.52^{a}	4.50^{b}	4.70^{a}	3^{m}	4.3^{cd}	4.35^{abcd}

*alphabets in superscripts represents the significance of data at 5

CHFSP-2 had a considerably lower score (Table 2). For skin colour, CHFSP-23 again led, underscoring its potential as a genotype with high consumer appeal. Colour variations in sweet potatoes are attributed to the presence of carotenoids and anthocyanins, which also confer health benefits (Teow *et al.*, 2007). Texture is another determinant of consumer preference, with CHFSP-06 showcasing the best texture, followed closely by CHFSP-5 and CHFSP-23 (Table 2). Texture can be influenced by factors such as starch content, moisture, and cell wall components. Genotype CHFSP-5 outshone others with its impressive tuber size. Large tubers are often preferred by consumers for ease of peeling and culinary uses, making CHFSP-5 a genotype of interest for farmers and marketers (Dos Santos *et al.*, 2019). CHFSP-21 recorded the highest overall acceptability score, closely followed by CHFSP-5 and CHFSP-22. This holistic measure provides breeders with valuable insights for developing genotypes that align with consumer preferences.

Conclusion

The present investigation highlights the unexplored possibilities of twenty-nine lesser-known sweet potato varieties and two appropriate control varieties found in Northeast India, emphasizing their considerable potential benefits for human and environmental health. The findings of this research have important implications for agriculture, nutrition and food industries.

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