Plant Archives Vol. 25, No. 1, 2025 pp. 2137-2140 e-ISSN:2581-6063 (online), ISSN:0972-5210

Plant Archives

Journal homepage: http://www.plantarchives.org

DOI Url : https://doi.org/10.51470/PLANTARCHIVES.2025.v25.no.1.310

EFFECT OF TUBER AGE AND SIZE ON THE ORGANOLEPTIC QUALITIES OF PICKLE AND CANDY FROM SWALLOW ROOT (*DECALEPIS HAMILTONII* WIGHT & ARN)

Urati Mahesh*, K.M. Yuvaraj, M. Jayaprada, K. Swarajya Lakshmi, Lalitha Kadiri and M. Mayilvaganan

Dr. YSRHU- College of Horticulture, Anantharajupeta - 51605, Andhra Pradesh, India.

*Corresponding author E-mail : u.maheshreddy98@gmail.com

(Date of Receiving-21-02-2025; Date of Acceptance-21-04-2025)

ABSTRACT

An experiment was conducted to determine the optimal maturity stage and tuber size of swallow root (*Decalepis hamiltonii*) for the preparation of value-added products such as pickles and candies. Four treatment combinations were evaluated *viz*. T_1- three-year-old large size tuberous roots (>3 cm diameter), T_2- three-year-old small size tuberous roots (<3 cm diameter), T_3- two-year-old large size tuberous roots (>3 cm diameter) and T_4- two-year-old small size tuberous roots (<3 cm diameter). These tuberous roots were processed into pickles and candies and the resulting products were assessed for organoleptic qualities. Pickles prepared from T_4- two-year-old, small size tuberous roots (<3 cm diameter) received the highest sensory scores for appearance (8.0), colour (8.1), aroma (7.6), texture (7.5), taste (7.5), overall acceptability (7.8) and a total score of 53.4. Conversely, candies made from T_1- three-year-old, large sized tuberous roots (>3 cm diameter) obtained superior scores for aroma (7.6), texture (8.4), taste (7.6), after taste (7.6), overall acceptability (7.6) and a total score of 53.6. These findings indicate that two-year-old, small size tuberous roots (<3 cm diameter) are most suitable for pickle preparation, while three-year-old, large size tuberous roots (>3 cm diameter) are preferable for candy formulation.

Key words : Swallow root (*Decalepis hamiltonii*), Tuber Age and size, Organoleptic Qualities, Pickle and Candy.

Introduction

Swallow root (*Decalepis hamiltonii* Arn & Wight) is an endangered woody climbing perennial shrub belonging to the family Asclepiadaceae. It is native to the Deccan peninsula and forest areas of Western Ghats of India (Vedavathy, 2004). It is locally called with different regional names such as “Maredu kommulu” or “Nannari kommulu” or “Maredu gaddalu” in Telugu, “Makaliber” in Kannada, “Magalikizhangu” in Tamil and “Swollen root” in English. It is commercially cultivated in Andhra Pradesh (Prakasam, YSR, Chittoor, Annamayya, Palnadu, Ananthapur), Karnataka (Tumkuru, Savanadurga region) and in Tamil Nadu (Chengalpattu, Coimbatore, Dharampuri, Nilgiri) at an altitude from 300-1200 meters (Sharma and Shahzad, 2014).

The aromatic tuberous roots are the primary economic part of the plant, typically found in dense clusters. They are elongated, fleshy and cylindrical, exuding a unique vanilla-like aroma with a subtle bitterness. The roots are pale brown, featuring a fleshy outer layer surrounding a woody inner core. Each root can grow up to 150 cm in length and measures 2 to 5 cm in diameter. A single plant yields between 4 to 10 of these tuberous roots, making them a valuable resource for both culinary and medicinal applications (Vedavathy, 2004).

The tuberous roots of swallow root hold considerable economic value and are widely utilized in various medicinal and culinary preparations. In Ayurveda, the ancient Indian system of medicine, these roots are traditionally used to stimulate appetite, alleviate flatulence and serve as a general health tonic (Vedavathy, 2004). The root extract

also demonstrates potential as a natural food preservative and is increasingly explored for its application in nutraceuticals and pharmaceutical formulations in folk medicine. These tuberous roots are valued not only for their distinctive flavour but also for their blood-purifying properties. They are traditionally employed in the treatment of a wide range of ailments, including dysentery, cough, bronchitis, leucorrhoea, uterine haemorrhage, skin diseases, fever, indigestion, vomiting, chronic rheumatism, anaemia and various blood disorders. Ethnomedicinal studies have confirmed a variety of bioactive properties, such as antifungal, insecticidal, antioxidant, antibacterial, ulcer-preventive and antitumor activities (Harish *et al*., 2005). Among indigenous communities, particularly the Yanadi tribe, chewing the roots or consuming swallow root, a traditional herbal beverage prepared from the roots is believed to promote digestion and stimulate appetite (Reddy and Murthy, 2013).

The tuberous roots of swallow root emit a strong aromatic odour due to their volatile oil content (0.68%), which is predominantly composed (96%) of 2-hydroxy-4-methoxy benzaldehyde, a natural structural isomer of vanillin responsible for the root's vanilla-like fragrance (George *et al*., 2004; Nagarajan *et al*., 2001). Besides having many medicinal properties, there has been no proper investigation carried out on the value addition of swallow root tubers regarding the age and size of the tubers.

The present research aims to investigate the organoleptic qualities of pickle and candy prepared by using different ages and sizes of swallow root tubers. Specifically, it will access the correct age and size of the root tubers for the preparation of swallow root pickle and candy.

Materials and Methods

Materials

Tuberous roots of swallow root at two different maturity stages (two year old and three year old) were collected from the College of Horticulture, Anantharajupeta, Dr. YSR Horticultural University. Following collection, the roots were categorized based on age and further classified by diameter of the root into two groups *viz*. greater than 3 cm and less than 3 cm. These four distinct categories of roots were utilized for the preparation of pickle and candy. Pickles and candies were prepared in the department of Post Harvest Technology, College of Horticulture, Anantharajupeta, Dr. YSR Horticultural University with four treatments.

T_1 - Three year old and large size tuberous roots (>3cm diameter)

T_2 - Three year old and small size tuberous roots (<3cm diameter)

T_3 - Two year old and large size tuberous roots (>3cm diameter)

T_4 - Two year old and small size tuberous roots (<3cm diameter)

Preparation of swallow root pickle

The fresh tuberous roots were thoroughly washed to remove adhering soil and dirt and subsequently peeled and sliced into uniform pieces. The sliced roots were partially shade-dried for 1–2 hours to reduce surface moisture and improve textural stability during storage. The pickle was prepared using the following standardized formulation: sliced roots (1 kg), salt (100 g), red chilli powder (75 g), mustard seeds (25 g), fenugreek seeds (10 g), turmeric powder (10 g), lemon juice (200 ml) and groundnut oil (250 ml). For tempering, mustard and fenugreek seeds were added to pre-heated oil and allowed to splutter. Further, turmeric was then incorporated into the tempering mixture. The dried root slices were thoroughly mixed with the tempering, salt and chilli powder, followed by the addition of lemon juice as the acidifying agent. The mixture was allowed to cool and then transferred into sterilized glass containers under hygienic conditions. The pickle was stored at ambient room temperature where the contents were mixed daily to ensure uniform flavour development.

Preparation of swallow root candy

Fresh tuberous roots were thoroughly washed to remove adhering soil and debris. The cleaned roots were then peeled and sliced into small, uniform pieces. The sliced pieces were boiled in water until they softened to the desired texture, facilitating sugar absorption during candying. Post boiling, the root pieces were shade dried to eliminate surface moisture. The pre-treated root pieces were initially steeped in a sugar syrup with a Total Soluble Solids (TSS) concentration of 40 per cent for a duration of 24 hours. After this initial steeping, the pieces were removed and the syrup was concentrated by boiling to raise its TSS to 60 per cent. The root pieces were then reintroduced into the concentrated syrup and steeped for an additional 24 hours. Following this, the TSS of the syrup was increased incrementally by 5 per cent every alternate day, following a stepwise osmosis process. This gradual increase continued until the syrup reached a final concentration of 75% TSS. At this stage, the root pieces were steeped in the final syrup concentration for one week to ensure uniform absorption and flavor

development. Upon completion of the candying process, the pieces were removed and subjected to shade drying until the desired texture and moisture content were achieved. The fully dried Nannari candies were then packed in moisture proof containers and stored at ambient room temperature.

Procedure followed for organoleptic evaluation of pickle and candy

An organoleptic evaluation was conducted under laboratory conditions using a semi-trained panel consisting of fifteen judges, aged between 21 and 60 years. The sensory assessment was based on seven key quality attributes *viz*. appearance, colour, flavour, texture, taste, after taste and overall acceptability. A nine-point hedonic scale was employed for the evaluation of each attribute.

Statistical analysis

Organoleptic evaluation of pickles and candies were performed following Kendall's W test using SPSS software.

Results and Discussion

Mean score and mean rank score for various quality attributes of pickles prepared using different types of tuberous roots are given in Table 1. Among the treatments evaluated, T_4 achieved the highest total organoleptic score (53.4), indicating superior overall sensory quality. This was closely followed by T_1 (52.5), with T_2 and T_3 scoring slightly lower at 50.4. T_4 consistently recorded the highest mean scores across key sensory attributes, including appearance (8.0), colour (8.1), aroma (7.6), texture (7.5), taste (7.5) and overall acceptability (7.8). Notably, T_1 demonstrated a distinct advantage in terms of after taste (7.2), suggesting a favourable flavour profile that may appeal to specific consumer preferences. T_4 recorded higher mean rank scores for several key quality attributes,

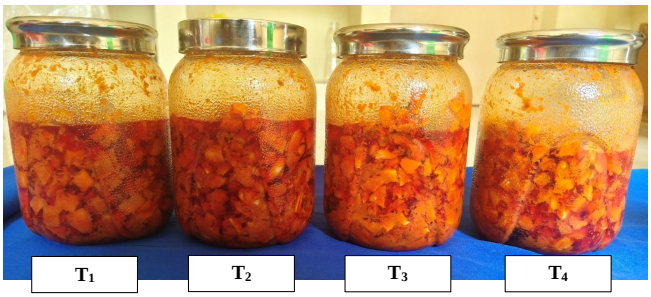

Fig. 1 : Pickles prepared using different age and size of tuberous roots.

including appearance (3.0), colour (3.0), aroma (2.8), after taste (2.75) and overall acceptability (3.0), indicating its strong performance in these sensory parameters. Interestingly, T_1 demonstrated superiority in texture (2.95) and taste (2.70), achieving the highest mean rank scores for these attributes. This suggests that while T_4 excelled in visual and aromatic appeal, T_1 was preferred in terms of mouthfeel and flavour experience. For the quality attribute of overall acceptability, T_4 recorded the highest mean score and mean rank score (7.8 and 3.0, respectively), followed closely by T_1 (7.7 and 2.80, respectively). Whereas, T_2 and T_3 exhibited lower scores, both obtaining a mean score of 7.1 and a mean rank score of 2.10.

Table 2 presents the mean scores and mean rank scores for various quality attributes of candies prepared using different types of tuberous roots. Among the treatments assessed, T_1 recorded the highest total organoleptic score (53.6), reflecting superior overall sensory quality. This was closely followed by T_2 (51.6), T_4 (51.4) and T_3 (48.2). T_1 consistently received the highest mean scores across several key sensory parameters, including aroma (7.6), texture (8.4), taste (7.6), after taste (7.6) and overall acceptability (7.6). Interestingly, T_4 exhibited a notable advantage in terms

Table 1 : Organoleptic qualities of various types of pickles.

Treatments	Appearance	Colour	Aroma	Texture	Taste	After taste	Overall acceptability	Total score
T_1	7.8(2.80)	7.7(2.45)	7.2(2.10)	7.5(2.95)	7.4(2.70)	7.2(2.65)	7.7(2.80)	52.5
T_2	7.4(2.20)	7.6(2.35)	7.3(2.40)	6.8(2.00)	7.3(2.45)	6.9(2.25)	7.1(2.10)	50.4
T_3	7.3(2.00)	7.5(2.20)	7.5(2.70)	7.1(2.20)	7.2(2.20)	6.7(2.35)	7.1(2.10)	50.4
T_4	8.0(3.00)	8.1(3.00)	7.6(2.80)	7.5(2.85)	7.5(2.65)	6.9(2.75)	7.8(3.00)	53.4
Kendall' W	0.177**	0.106**	0.097**	0.175**	0.037**	0.044**	0.194**	

Values in parentheses are mean rank score based on Kendall's W

**-Significant at 1% level

T_1 - Pickle prepared using three year old & large size tuberous roots (>3cm diameter)

T_2 - Pickle prepared using three year old & small size tuberous roots (<3cm diameter)

T_3 - Pickle prepared using two year old & large size tuberous roots (>3cm diameter)

T_4 - Pickle prepared using two year old & small size tuberous roots (<3cm diameter)

Table 2 : Organoleptic qualities of various types of candies.

Treatments	Appearance	Colour	Aroma	Texture	Taste	After taste	Overall acceptability	Total score
T_1	7.6(1.9)	7.2(1.9)	7.6(2.9)	8.4(3.4)	7.6(3.3)	7.6(3.4)	7.6(3.3)	53.6
T_2	8.0(2.6)	7.6(2.2)	7.4(2.7)	7.8(2.5)	6.8(2.4)	7.0(2.6)	7.0(2.5)	51.6
T_3	7.8(2.5)	7.8(2.7)	7.0(2.3)	7.2(1.8)	5.8(1.7)	6.4(1.9)	6.2(1.7)	48.2
T_4	8.2(3.0)	8.4(3.2)	7.0(2.1)	7.6(2.3)	6.8(2.6)	6.6(2.1)	6.8(2.5)	51.4
Kendall' W	0.182**	0.265**	0.167**	0.362**	0.333**	0.327**	0.320**	

Values in parentheses are mean rank score based on Kendall's W
**-Significant at 1% level
T_1 – Candy prepared using three year old & large size tuberous roots (>3cm diameter)
T_2 - Candy prepared using three year old & small size tuberous roots (<3cm diameter)
T_3 - Candy prepared using two year old & large size tuberous roots (>3cm diameter)
T_4 - Candy prepared using two year old & small size tuberous roots (<3cm diameter)

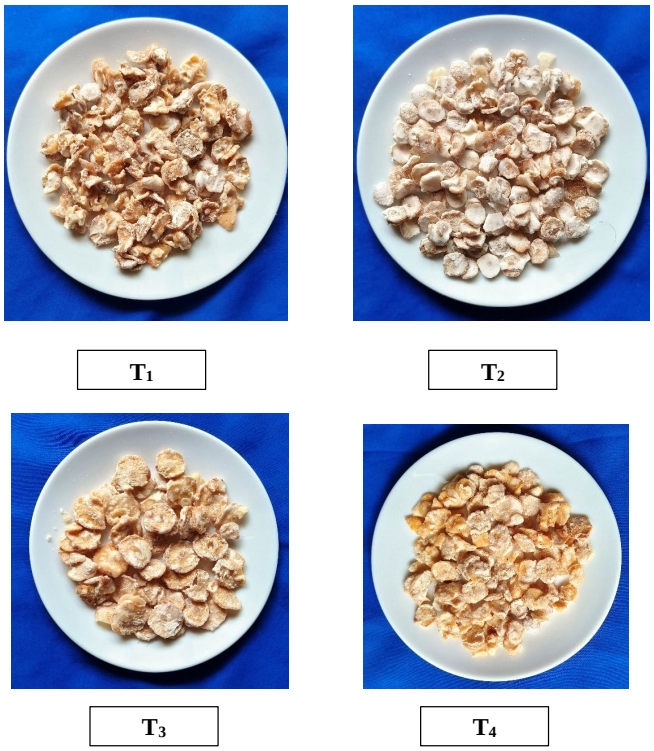

Fig. 2 : Candies prepared using different age and size of tuberous roots.

of taste (8.2) and colour (8.4), suggesting its potential appeal in these specific sensory aspects. The mean rank scores for quality attributes such as aroma (2.90), texture (3.40), taste (3.30), after taste (3.40), and overall acceptability (3.30) were found to be higher in T_1. In contrast, parameters like appearance (3.00) and colour (3.20) recorded higher scores in T_4. For the quality attribute of overall acceptability, T_1 recorded the highest mean score and mean rank score (7.6 and 3.3), followed closely by T_2 (7.0 and 2.5), T_4 (6.8 and 2.5) and T_3 (6.2 and 1.70), respectively.

Conclusion

Pickles prepared using two year old, small sized tubers (T_4) exhibited superior organoleptic qualities, as reflected in higher sensory scores. This was closely followed by pickles made from three year old, large sized tubers, suggesting that both categories of tubers are well suited for pickle production. Similarly, candies prepared from three year old, large sized tubers (T_1) demonstrated favourable organoleptic characteristics, indicating their suitability for candy formulation. Given the numerous health benefits associated with swallow root such as blood purifier, body coolant and natural antioxidant there is significant potential for its utilization in the development and popularization of various value added products like pickles, candies and other functional foods.

References

George, J., Pereira J., Divakar S., Udaysankar K. and Ravishankar G.A. (2004). A Method for the Preparation of a Biopesticide from the Roots of *Decalepis Hamiltoni*. *Indian Patent No*, 1301/Del/98.

Harish, R., Divakar S., Srivastava A. and Shivanandappa T. (2005). Isolation of antioxidant compounds from the methanolic extract of the roots of *Decalepis hamiltonii* (Wight and Arn.). *J. Agricult. Food Chem.*, **53(20)**, 7709-7714.

Nagarajan, S., Jagan Mohan Rao L. and Gurudutt K.N. (2001). Chemical composition of the volatiles of *Decalepis hamiltonii* (Wight & Arn). *Flavour and Fragrance J.*, **16(1)**, 27-29.

Reddy, M.C. and Murthy K.S.R. (2013). A review on *Decalepis hamiltonii* Wight & Arn. *J. Medicinal Plants Res.*, **7(41)**, 3014-3029.

Sharma, S. and Shahzad A. (2014). An overview on *Decalepis*: a genus of woody medicinal climbers. *J Plant Sci Res.*, **1(1)**, 104.

Vedavathy, S. (2004). *Decalepis hamiltonii* Wight & Arn. An endangered source of indigenous health drink. *National Institute of Science Communication and Information Resources*, **3(1)**, 22-23.