

Standardization of Processing Technique for Tumba (*Citrullus colocynthis*)

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ABSTRACT Tumba is a perennial desert creeper, which has a great medicinal value and is also a good source of protein and fat, but is still an under-utilized fruit due to its bitter taste. Thus, in order to standardize the processing technique to reduce its bitterness, Tumba fruits were subjected to three different treatments of buttermilk and saline solution and deflourinated lime solution at various concentrations. The processed fruits were then evaluated for their sensory characteristics on nine point hedonic ranking scale. The scores of organoleptic acceptability showed that the application of buttermilk and saline solution, and saline solution failed to make them acceptable. However, application of deflourinated lime solution reduced the bitterness significantly hence, made them acceptable for consumption purpose.

INTRODUCTION

India is a veritable emporium of medicinal plant since ancient times, these plants have been used to attempt cures for disease and to relieve physical suffering. Tumba is a perennial, trailing, scabrid herb, belonging to the family cucurbitaceae and genus *Citrullus*. It is a desert creeper which spreads rapidly after monsoon on the desert land. Its fruits are available in the month of October and November. It is one of the important cucurbits having better xerophytic adaptation, found in warmer climate and tropical areas.

In Biblical times, Tumba was known as a source of seed oil and its fruits were used as a remedy of various diseases. Its seeds constitute the drug colocynth, which is used for acute and chronic constipation and for liver and gall bladder ailments (American Botanical Council 1990). Tumba also acts as a blood purifier and thus, is a good remedy in cases of poisoning like snakebite and scorpion bite. The other uses include scrapping out the corns and warts on the skin, against menstrual disorders, joint pain, ascites, fever and urogenital disorders. It is more pronouncedly used in anti-cancerous drugs as it contains anti-tumour ingredients (Duke 1978) and in management of diabetes mellitus as its saponin glycoside has a hypoglycemic property thus helpful in reducing the blood glucose level.

Though it has great medicinal value and is also a good source of protein and fat, but is still an under-utilized fruit due to its bitter taste. Thus, the present study was undertaken to standardize the processing technique to reduce its bitterness and motivate its utilization in the community.

METHODOLOGY

Processing of Tumba: In order to reduce bitterness of Tumba, the processing technique was standardized. Tumba fruits were washed properly to remove material adhered to it, peeled and cut into small pieces and then subjected to three different types of treatments.

Treatment I-Dipping in Buttermilk and Saline Solution: Tumba pieces were dipped in three different saline solutions of buttermilk, with varying concentration, which were changed after each 24 hours (daily) up to 8 days. The three solutions were:

- Ø T₁A : Buttermilk and 3% saline solution in ratio of 1:1
- Ø T₁B : Buttermilk and 4% saline solution in ratio of 1.5:1
- Ø T₁C : Buttermilk and 5% saline solution in ratio of 2:1

Treatment II-Dipping in Saline Solution: Tumba pieces were treated with three different saline solutions, with varying concentration, which were changed after each 48 hours (2 days) up to 8 days. The three solutions were:

- Ø T₂A : 3% saline solution
- Ø T₂B : 4% saline solution
- Ø T₂C : 5% saline solution

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Treatment III-Dipping in Deflourinated Lime Solution: Tumba pieces were immersed in three different deflourinated lime solutions, with varying concentration, which were changed after each 48 hours (2 days) up to 6 days. The three solutions were:

- Ø T₃A : 1.5% deflourinated lime solution
- Ø T₃B : 2.5% deflourinated lime solution
- Ø T₃C : 3% deflourinated lime solution

RESULTS AND DISCUSSION

Processing of Tumba: The processed Tumba fruits were evaluated for sensory characteristics like colour, appearance, aroma, texture, taste and overall acceptability by a panel of ten semi-trained judges using nine point hedonic ranking scale (Swaminathan 1987).

Treatment I-Dipping in Buttermilk and Saline Solution: Table 1 reveals the organoleptic scores of the Tumba samples subjected to the buttermilk and saline solution in varying proportions and concentration. Findings suggest that the application did not bring any significant change in taste of Tumba fruit, this process developed unpleasant sour aroma in the samples and also failed to reduce the bitterness even after a period of 8 days hence, "Disliked extremely" by the panel members on the nine point hedonic ranking scale. Similar results were reported by Bala in 1998, during the processing of Ker

(*Capparis decidua*) with butter milk and saline solution.

Treatment II-Dipping in Saline Solution: The application of treatment T₂, i.e. dipping in 3% saline solution (T₂A), 4% saline solution (T₂B) and 5% saline solution (T₂C) also failed to make it acceptable even after 8 days and scored in range of 1.0 to 1.8 for taste on nine point hedonic ranking scale (Table 2). The mean overall acceptability of processed Tumba fruit samples T₂A, T₂B and T₂C were found to be 1.3, 1.2 and 1.2 respectively thus "Disliked extremely". This is line with the work of Bala (1998) which stated that application of saline solution on Ker (*Capparis decidua*), was failed to make the samples acceptable by the panel members on nine point hedonic scale.

Treatment III-Dipping in Deflourinated Lime Solution: Table 3 unfolds the organoleptic scores obtained by the samples treated with various deflourinated lime solutions. Results suggest that the treatment T₃A (1.5% deflourinated lime solution), T₃B (2.5% deflourinated lime solution) and T₃C (3% deflourinated lime solution) developed changes in various sensory characteristics of Tumba fruits. Though, significant changes were seen in case of treatment T₃A, but the bitterness was quite higher and not up to the acceptable level. However, treatment T₃B (2.5 per cent deflourinated lime solution) and T₃C (3 per cent deflourinated lime solution) found to be most effective in all sensory attributes and also reduces

Table 1: Organoleptic acceptability of Tumba fruit processed with buttermilk and saline solution

Treatment	Mean scores of sensory characteristics on nine point scale					
	Colour	Appearance	Aroma	Texture	Taste	Overall Acceptability
T ₁ A	2.0 ± 0.66	2.1 ± 0.73	1.4 ± 0.63	1.5 ± 0.81	1.0 ± 0.67	1.2 ± 0.55
T ₁ B	2.0 ± 0.78	2.1 ± 0.73	1.4 ± 0.74	1.5 ± 0.63	1.0 ± 0.48	1.2 ± 0.57
T ₁ C	2.2 ± 0.33	2.2 ± 0.48	1.7 ± 0.56	1.9 ± 0.47	1.0 ± 0.47	1.2 ± 0.57

Values are ± SD of ten panelists

T₁A: Buttermilk and 3% saline solution (1:1)

T₁B: Buttermilk and 4% saline solution (1.5:1)

T₁C: Buttermilk and 5% saline solution (2:1)

Table 2: Organoleptic acceptability of Tumba fruit processed with saline solution

Treatment	Mean scores of sensory characteristics on nine point scale					
	Colour	Appearance	Aroma	Texture	Taste	Overall Acceptability
T ₂ A	2.2 ± 0.70	2.2 ± 0.47	2.0 ± 0.67	2.0 ± 0.47	1.0 ± 0.47	1.3 ± 0.47
T ₂ B	2.2 ± 0.33	2.0 ± 0.48	2.0 ± 0.73	1.8 ± 0.67	1.0 ± 0.43	1.2 ± 0.45
T ₂ C	2.3 ± 0.57	1.9 ± 0.51	2.0 ± 0.33	1.5 ± 0.69	1.0 ± 0.48	1.2 ± 0.41

Values are ± SD of ten panelists

T₂A: 3% saline solution

T₂B: 4% saline solution

T₂C: 5% saline solution

Table 3: Organoleptic acceptability of Tumba fruit processed with deflourinated lime solution

Treatment	Mean scores of sensory characteristics on nine point scale					
	Colour	Appearance	Aroma	Texture	Taste	Overall Acceptability
T ₃ A	5.2 ± 0.16	6.1 ± 0.67	4.0 ± 0.48	5.0 ± 0.33	3.8 ± 0.44	4.5 ± 0.16
T ₃ B	8.6 ± 0.51	7.8 ± 0.57	7.2 ± 0.82	7.9 ± 0.87	8.5 ± 0.57	8.5 ± 0.27
T ₃ C	8.5 ± 0.52	7.4 ± 0.51	7.2 ± 0.42	7.8 ± 0.57	8.5 ± 0.32	8.4 ± 0.74

Values are ± SD of ten panelists

T₃A: 1.5% deflourinated lime solution

T₃B: 2.5% deflourinated lime solution

T₃C: 3% deflourinated lime solution

the bitterness after the 6 days of treatment. The mean scores obtained through treatment T₃B and T₃C for sensory characteristics like colour (8.6 and 8.5), appearance (7.8 and 7.4), aroma (7.2 and 7.2), texture (7.9 and 7.8), taste (8.5 and 8.5) were found in harmony and fall in category of “Liked very much” for overall acceptability on nine point hedonic ranking scale. This is in conformity with the study of Sharma (2005), which stated that the treatment of anola (*Amblica officinalis*) with salt solution followed by lime solution in the preparation of anola preserve was well- accepted by the panel members.

CONCLUSION

Tumba is an herbaceous weed with great therapeutic value. It is grown in huge amount in arid region s. However, it is an under-utilized crop due to the bitterness it possesses, which makes it unacceptable for consumption. Thus in order to reduce its bitterness, a processing technique was standardized. Tumba fruits and seeds were subjected to three different treatments i.e. treatment with buttermilk and saline solution (T₁), treatment with saline solution (T₂) and treatment with deflourinated lime solution (T₃). The findings suggested that the application of T₁ (buttermilk and saline solution) in varying proportions and concentration i.e. T₁A (buttermilk and 3 % saline solution in ratio of 1:1), T₁B (buttermilk and 4 % saline solution in ratio of 1.5:1), and T₁C (buttermilk and 5 % saline solution in ratio of 2:1) did not bring any significant change in taste of Tumba fruit and fall in the category “Disliked extremely” and “Disliked very much” on nine

point hedonic ranking scale. Similarly, the application of treatment T₂ i.e. dipping in 3% saline solution (T₂A), 4% saline solution (T₂B) and 5% saline solution (T₂C) also failed to make it acceptable and scored in range of 1.2 to 2.3 for various sensory characteristics. However, application of various deflourinated lime solutions i.e. T₃A (1.5% deflourinated lime solution), T₃B (2.5% deflourinated lime solution) and T₃C (3% deflourinated lime solution) developed significant change in various sensory characteristics of Tumba fruit. Though, the samples treated with T₃B and T₃C were found to be best accepted by the panel members. Hence, it can be concluded that the application of deflourinated lime solution can reduce its bitterness and hence can make it acceptable for consumption purpose.

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