

Influence of Varieties and Pretreatments on Quality of Osmo-dehydrated Banana

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Abstract

Experiments were conducted to study the suitability of seven banana varieties for making osmo-dehydrated banana (crisps). The slices of mature healthy unripe bananas were pre-treated with sulphur fumigation (2g/kg for 30min.) followed by dipping in 70⁰B sugar syrup plus 2 per cent citric acid for 24 hours or dipping in 0.5 per cent potassium metabisulphate followed by dipping in 60⁰B sugar syrup plus 2 per cent citric acid for 24 hours. The crisps made from Yalakkibale pre treated with sulphur fumigation recorded lower dehydration ratio (1.74), moisture (2.83%) and higher recovery (57.49%). Maximum total sugars (64.79%) were obtained in the variety Grand Naine pretreated with sulphur. Crisps made from the variety Yalakkibale recorded lower titratable acidity under both the pre-treatments (T₉-1.40% and T₁₀-1.39%). Crisps of Yalakkibale scored maximum for overall acceptability (4.01 out of 5).

Keywords: Banana; osmo-dehydration; varieties; quality.

1. Introduction

Banana occupies an important position as a fruit crop sharing 39.8 per cent of the fruits grown in India. India ranks second in the production of fruits but ranks first in the production of banana. A Karnataka rank fifth in the production of banana with 2281.6 MT from an area of 111.8 thousand hectares (Anon., 2011). It is a climacteric fruit and deteriorates at faster rate after the harvest. Hence it is necessary to develop a product

which is shelf-stable and add taste and variety to enhance its utility as a snack food. Osmotic dehydration is a process of partial removal of water by dipping in a high osmotic solution and it is a pretreatment before being dried in other methods of drying. The products of osmotically dehydrated products are not only stable but also tasty.

The quality of the osmotically dehydrated products varies with many factors and variety is one of the important factors. Hence, in the present research an attempt is made to study the varietal difference on the physico-chemical and sensory qualities of the crisps.

2. Materials and Methods

Mature healthy bananas of different varieties were procured from orchard of AICRP on Tropical Fruits, K.R.C. College of Horticulture, Arabhavi, Belgaum, Karnataka in 2010-11. The crisps were prepared on 4th day after harvest after washing thoroughly in clean water. Two methods of preparations *viz.* 1. Sulphur fumigation of slices (2g/kg for 30 minutes) followed by dipping in 70°B sugar syrup + 2% citric acid for 24 hours and 2. Dipping slices in 0.5% potassium meta bisulphate followed by dipping in 60°B sugar syrup + 2% citric acid for 24 hours. These two methods were employed on the seven different varieties of banana *viz.* Grand Naine, Rajapuri, Yanagambi KM-5, Monthan, Yalakkibale, Kothia and Bluggoe. The design adopted in the experiment was completely randomised design with 14 treatments and three replications.

The dehydration ratio was calculated by using formula

$$\text{Dehydration ratio} = \frac{\text{Fresh slices weight}}{\text{Dried crisps weight}}$$

The recovery of crisps was calculated using the formula.

$$\text{Crisps recovery (\%)} = \frac{\text{Dried crisps weight}}{\text{Fresh slices weight}} \times 100$$

The moisture content of osmotic dehydrated banana crisps was determined using Ohaus Halogen moisture analyzer which records moisture in percentage. Total sugars were determined by following DNSA method (Miller, 1972). Titratable acidity was measured by titrating 10 ml of filtrate against 0.1N NaOH using phenolphthalein indicator till the appearance of pink colour and expressed as per cent of malic acid (Anon., 1984). Panel of six semi-trained panel were involved in organoleptic evaluation and overall acceptability was recorded on 5 point hedonic scale indicating 5 for excellent and less than 1 for unacceptable.

3. Results and Discussion

The variety Yalakkibale (T₉) recorded higher recovery (57.49%) of crisps and lower dehydration ratio (1.74). The variety Yalakkibale inherently has higher TSS, low moisture and high dry matter content than the other varieties leading to higher recovery (Table 1). Kanthakumari (2006) in grapes (var. Madu Angur), Sharma *et al.* (2004) in

apricot, Dattatray (2002) and Shobana (2003) in banana also reported similar results. Significantly lowest moisture content (2.83%) was found in crisps made from variety Yalakkibale (T₉). The mass and heat transfer depends on the variety which varies in their biochemical composition. Significant results were obtained with respect to titratable acidity. Varieties Kothia (1.80 and 1.83 %) and Monthan (1.71 and 1.74 %) recorded higher acidity, respectively for both the methods. This is attributed to the high acid content of the raw material.

Maximum total sugars were recorded in the variety Grand Naine (T₁) (64.79%). This was due to combined effect of varietal sugar composition and osmotic dehydration process leading to absorption of sugar. Similar findings were recorded in osmotically dehydrated products of banana (Shobana, 2003), apricots (Sharma *et al.*, 2004), sapota (Tiakum, 2008) and fig (Rajashekar, 2007).

Maximum scores (4.01) for overall acceptability were noticed in Yalakkibale slices dried after pre-treating with 0.5 per cent KMS + 60°B sugar syrup + two per cent citric acid for 24 hours. Irrespective of the varieties, the crisps involving pre-treatment with KMS have scored higher for overall acceptability than others involving SO₂ fumigation.

Table 1: Effect of varieties and pre-treatments on physico-chemical and overall acceptability of osmo-dehydrated banana.

Treatments	Dehydration ratio	Moisture (%)	Recovery (%)	Total sugar (%)	Titratable acidity (%)	Overall acceptability (score out of 5)
Grand Naine+1	1.86	4.85	53.67	64.79	1.55	3.37
Grand Naine+2	1.89	5.26	52.93	61.44	1.52	3.51
Rajapuri+1	1.87	4.95	53.20	61.98	1.53	3.37
Rajapuri+2	1.96	5.47	51.09	58.34	1.56	3.74
Yanagambi KM-5+1	1.92	4.69	51.86	59.66	1.69	2.93
Yanagambi KM-5+2	1.78	6.19	56.18	57.43	1.70	3.23
Monthan + 1	2.23	5.19	43.40	56.88	1.71	2.87
Monthan + 2	2.18	6.55	45.78	54.07	1.74	3.00
Yalakkibale + 1	1.74	2.83	57.49	60.42	1.40	3.95
Yalakkibale + 2	1.78	3.46	55.93	58.29	1.39	4.01
Kothia + 1	2.18	4.21	45.87	56.25	1.80	3.27
Kothia + 2	2.03	4.74	49.84	52.72	1.83	3.44

Bluggoe + 1	2.30	4.45	43.34	58.52	1.65	3.25
Bluggoe + 2	2.17	5.36	46.09	55.35	1.68	3.57
Mean	1.99	4.87	50.47	58.08	1.62	3.39
S.Em±	0.04	0.10	0.86	0.658	0.01	0.13
C.D at 1%	0.16	0.41	3.31	2.514	0.06	0.49

1. Sulphur fumigation of slices (2g/kg for 30 minutes) followed by dipping in 70°B sugar syrup + 2% citric acid for 24 hours
2. Dipping slices in 0.5% potassium meta bisulphate followed by dipping in 60°B sugar syrup + 2% citric acid for 24 hours

4. Conclusion

The type of the plant tissue and pretreatment has a profound effect on the quality of osmo-dehydrated product as evidenced in the study. A good healthy and quality crisp can be made from Yalakkibale with pretreatment of 0.5 % potassium meta-bisulphate. The osmo-dehydrated products of banana can be promoted as a healthy snack food this could also reduce the postharvest loss since banana is highly perishable commodity.

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