



Knowledge, Attitude and Practice on Handling and Storage of Bananas among the Household

¹Dharshini Priyaa H, ²Jothiswari V, ³Mariyam Fathima S, ⁴K Indirani

^{1,2,3} PG student, Clinical Nutrition and Dietetics, PSG College of Arts & Science, Coimbatore.

⁴ Assistant Professor, Clinical Nutrition and Dietetics, PSG College of Arts & Science, Coimbatore

ABSTRACT

Banana is the most important fruit of the world. It suitable to all age group for consume with high nutrients. It was estimated that 100 million people survive on banana which is their main energy source. They were consumed raw fruits as a dessert format and by preserving with new technology or converted to value-added products. Most of them not accept the raw consumption(unripen) because it leads to indigestion with gastro intestinal problems especially in infants and children. It is rich in potassium, fiber and low in sodium. The ripe banana is highly perishable which may lead to microbial contamination and get spoiled easily within 2 to 3 days after ripen periods. The present study was carried out to assess banana fruits handling and storage practices among the household by distributing questionnaires, and to know the knowledge about usage of the large number of banana and storage method by using refrigerated or outside of room temperature after buying from the market. The data was collected from 150 participants to whom questionnaires were distributed. The survey says that 80.6% of people purchase bananas from street vendors, 15.3% people buy banana from Fruit markets and only 4% people buy bananas from the super markets. Bananas release ethylene gas during respiration. This gas secretion accelerates its maturing. That's why the most critical factor in storing bananas is based on the level of ethylene during storage. Among 150 participants, revealed that 64% of the people claimed to store their banana in the refrigerators while rest of the 36% people needed to stored their banana in Room temperature, then 71.3% of the consumer choose the bananas which appear to have black spots in yellow colored skin, 28.6% of household choose completely yellow bananas. Their choices may different and also differ from consumption. This study shows that 98.6% of participants consume the whole banana and rest of 1.4% consume from juice. One to two bananas per day is considered a moderate intake for most healthy practices. Being sure to eat this fruit as part of a balanced diet which will provide all the nutrients with high source energy and water content to our body. Mostly it will act as therapeutic diet and help to prevent underweight and constipation in all the age group.

Keywords: Banana, Therapeutic diet, Balanced diet, Microbial contamination, Purchase

1. Introduction

The plant cuticle covers almost all the outermost surface of aerial plant organs, which play a primary function in limiting water loss and responding to the environmental interactions. Banana fruit is susceptible to thermal changes with chilling injury below 13°C and green ripening over 25°C. Herein, the changes of surface morphology, chemical compositions of cuticle, and the relative expression of cuticle biosynthesis genes in banana fruit under low-temperature storage were investigated. Banana fruit exhibited chilling injury rapidly with browned peel appearance when stored at 4°C for 6 days. The surface altered apparently from the clear plateau with micro-crystals to smooth appearance. As compared to normal ones, the overall coverage of the main cuticle pattern of waxes and cutin monomers increased about 22% and 35% respectively in browned banana which stored under low temperature for 6 days. Fatty acids (C16-C18) and ω -OH, mid-chain-epoxy fatty acids (C18) dominated cutin monomers. The monomers of fatty acids, the low abundant ω , mid-chain-di OH fatty acids, and 2-hydroxy fatty acids increased remarkably under low temperature. The cuticular waxes were dominated by fatty acids (> C19), n-alkanes, and triterpenoids; and the fatty acids and aldehydes were shifted to increase accompanied by the chilling injury. Furthermore, RNA-seq highlighted 111 cuticle-related genes involved in fatty acid elongation, biosynthesis of very-long-chain (VLC) aliphatics, triterpenoids, cutin monomers, and lipid-transfer proteins were significantly differentially regulated by low temperature in banana. Results obtained indicate that the cuticle covering on the fruit surface was also involved to respond to the chilling injury of banana fruit after harvest. These findings provide useful insights to link the cuticle on the basis of morphology, chemical composition changes, and their biosynthesis regulations in response to the thermal stress of fruit during storage.

2. Methodology

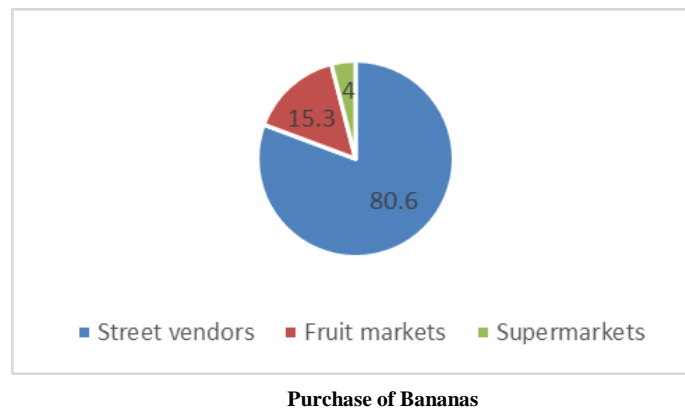
The study conducted at different area in Coimbatore and the 150-household people were participated. The objective was to know the knowledge of the household people about, purchase of banana, usage of the large number of bananas, storage method by using refrigerated or outside of room temperature after buying from the market and spoilage of the banana. The information framed regarding the preference, purchase, storage conditions and storage space

of Bananas. The data were collected by using the questionnaire. The received responses were analyzed by using Microsoft Excel sheets and the results were expressed in percentage.

3. Results and Discussion

3.1 Purchase of Bananas:

From the study it is found that most of the people that is 80.6% of people purchase bananas from street vendors, 15.3% people buy banana from Fruit markets and only 4% people buy bananas from the super markets. When we think about the contamination risk of getting contamination is high in street vendors when compared to Fruit markets and Super markets. Factors such as Air, Handling and Hygiene are compromised on the great scale comparatively to the street vendors.



3.2 Storage of Bananas:

After purchasing every product should be stored for their usage. Similarly, bananas are also stored. Through this study we studied about the How and Where the bananas are stored. It reveals that 76% people store bananas for only 1-3 days, 20% of people store them for 3-5 days and 4% people store them for 5-7 days. And it is found that no one has stored banana for more than 7 days.

Duration of storage of Bananas	No. of Participants	Percentage of Participants
1-3 days	114	76%
3-5 days	30	20%
5-7 days	6	4
>7 days	0	0
TOTAL	150	100

Table 1: Duration of storage of Bananas

Regarding the storage method, we also questioned the people whether they store bananas in Refrigerator or not, to the same we got 1.40% of peoples saying yes, (5.30% of peoples saying no and 3.3% of peoples who may or may not store bananas in refrigerator condition.

Are Bananas stored in Refrigerator	No. of participants	Percentage of participants
Yes	2	1.40%
No	143	95.30%
May be	5	3.30%
TOTAL	150	100

Table 2: Bananas stored in Refrigerator

In case of bananas storing in household level, we also raised question that whether they store bananas separately or with other fruits and we got the answer of 28% peoples saying yes, 64% peoples saying no and 8% of people who store bananas separately as well as together other fruits in times.

Are Bananas stored with other fruits	No. of participants	Percentage of participants
Yes	42	28%
No	96	64%
May be	12	8%
TOTAL	150	100

Table 3: Bananas stored with other fruits

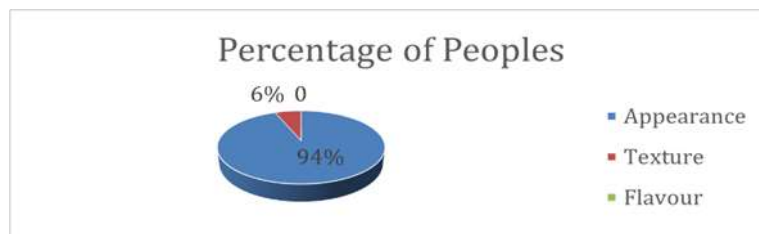
Finally, we also queried about their storage practice during summer and received their responses as follows, 37.3% of people hang the bananas in rope, 14.6% of people cover the ends of banana with aluminum foil, 36% of people place the bananas in room temperature just away from direct sunlight and 12% of people are not storing bananas, they consume it, as they purchase or buy only limited quantity of bananas.

Storage of Bananas in summer	No. of participants	Percentage of participants
Rope	56	37.3%
Foil	22	14.6%
Room temperature	54	36%
No storage (Immediate consumption)	18	12%
TOTAL	150	100

Table 4: Storage of Bananas in summer

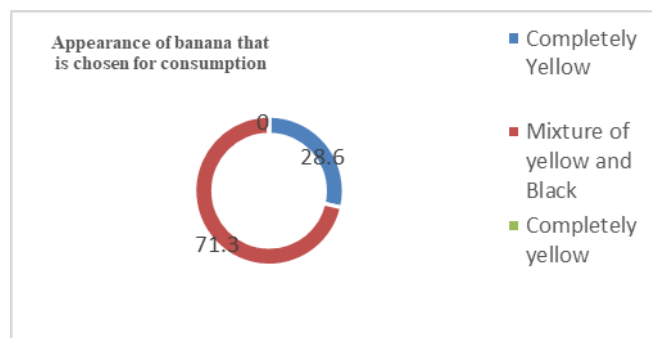
3.3 Consumption of bananas:

As every fruit, banana should also be consumed only after it gets ripen. Certain parameters are used to find the ripen ones out of unripe bananas, which are different from parameters used to identify the contaminated bananas. We included the question to find which parameter the people use to find the ripe bananas for consumption. It revealed the following, 94% people use the appearance of the banana to select the ripen ones for consumption, 6% of people use texture as parameter to find the ripen ones and no one uses the flavor of the fruit to find the ripen ones from the unripe ones.



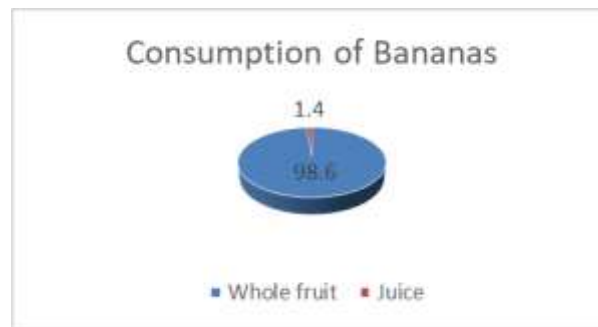
Choosing of banana for consumption

Since, maximum people use appearance to find out the ripe bananas for the consumption, we further enquired about the specification they use to find them out. From that it is found that 71.3% of people choose the bananas which appear to have black spots in yellow bananas, 28.6% of people choose completely yellow bananas and no people choose the bananas which are completely black as well as in greenish yellow color.



Appearance of banana that is chosen for consumption

When it comes to consumption of fruit, they are consumed by the people in two different ways either as whole fruit or as juice. Here we also had studied about the consumption form of bananas of the people. From that we got the result as 98.6% people consume the whole banana and only 1.4% of people consume it in the form of juice.

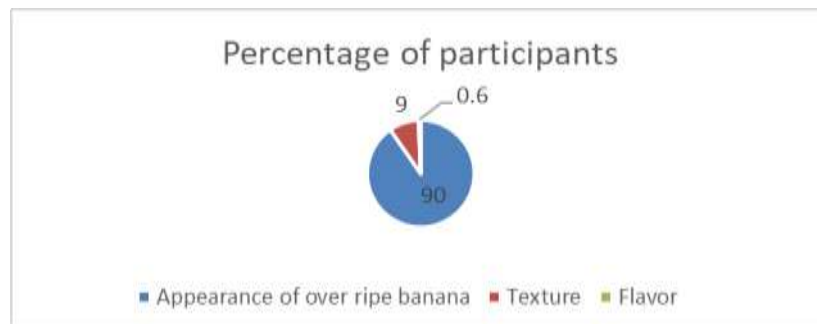


Consumption form of bananas

3.4 Contamination of bananas:

Whatever the fruit or any other food products, after a certain period of time it starts their spoilage process or gets contaminated. In the case of bananas, the contamination starts as soon as it comes in contact with the atmosphere, or when it over ripens. Some people even consume the over ripe bananas, some people use over ripe bananas as a ingredient for preparing any other recipes. This conditioned were investigated among the people and their responses are as follows;

First, we queried about how they identify the over ripe bananas from normal or ripe bananas. It is found that 90% of people identify over ripe bananas through the appearance as the color changes to black and intensifies, 9% of people finds the over ripe bananas by their texture and 0.6% of people find by their flavor.



Identification of over ripe Banana

Regarding the consumption of over ripe bananas, 72% of people consume them, 28% of people are not consuming it.

Consumption of over ripe Bananas	No. of participants	Percentage of participants
Yes	108	72%
No	42	28%
May be	0	0
TOTAL	150	100

Table 5: Consumption of over ripe Bananas

Further, choice of usage of over ripe bananas as an ingredient in any other recipes are received and we found that 72% of people uses over ripe bananas as an ingredient for the preparation of recipes, 24% of people are not using it and 4% of people either use or not.

Usage of over ripe Bananas as ingredient in recipes	No. of participants	Percentage of participants
Yes	108	72%
No	36	24%
May be	6	4%
TOTAL	150	100

Table 6: Usage of over-ripe Bananas as an ingredient in recipes

4. Conclusion

From the present study, knowledge, attitude, and practice on bananas among the household are questioned and received responses. These answers reveal that peoples' actions towards purchase, storage, consumption, and contamination are influenced by two major parts one is the traditional method and

other social media-based method. The new techniques and methods that people follow are learned by them through the internet and social media. The effective way for the storage and consumption of Bananas are not appropriate to the standardization and hence most of the participants in the study reveal that, they have consumed the contaminated bananas. And hence, the effective storage practices can be taught to the whole sellers and vendors, and suggest them to practice in their daily order. So, that those practices can be passed on to the consumers and thus by the way the effective storage and consumption can be ensured. Hence, the nutritional consumption of Bananas can be ensured among the people.

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References

1. <https://timesofindia.indiatimes.com/life-style/food-news/how-to-increase-the-shelf-life-of-bananas-by-freezing/photostory/76547525.cms?picid=76548328>
2. https://www.researchgate.net/publication/327136284_Bananas_as_underutilized_fruit_having_huge_potential_as_raw_materials_for_food_and_non-food_processing_industries_A_brief_review
3. https://www.researchgate.net/publication/236484197_Prediction_of_banana_quality_during_ripening_stage_using_capacitance_sensing_system
4. Adeniji TA, Tenkouano A. Effect of processing and storage on the color of plantain and banana products. *Agro-Science*. 2008; 7:88-92.
5. Adeniji TA, Empire CE. The development, production, and quality evaluation of cake made from cooking banana flour. *Global Journal of Pure and Applied Sciences*. 2001; 7:633-635.
6. Adeniji TA, Tenkouano A, Ezurike JN, Ariyo CO, Vrohbi I. Value-adding post-harvest processing of cooking bananas (*Musa* spp. AAB and ABB genome groups). *African Journal of Biotechnology*. 2010; 9(54):9135-9141.
7. Arora A, Choudhary D, Agarwal G, Singh VP. Compositional variation in carotene content, carbohydrate, and antioxidant enzymes in selected banana cultivars. *International journal of food science & technology*. 2008; 43:1913-1921.
8. Aurore G, Parfait B, Fehrasmane L. Bananas, raw materials for making processed food products. *Trends in Food Science & Technology*. 2009; 20(2):78-91.
9. Carvalho VS, Conti-Silva AC. Cereal bars produced with banana peel flour: evaluation of acceptability and sensory profile. *Journal of the Science of Food and Agriculture*, 2018.
10. Crowther PC. The processing of banana products for food use. *Tropical Products Inst*, 1979
11. Abbas FMA, Saifullah R, Azhar ME. Differentiation of ripe banana flour using mineral composition and logistic regression model *International Food Research Journal*, 2009b ; 16:83-87
12. Enwefa C. Biomass production from banana skins. *Applied microbiology and biotechnology*. 1992; 36(2):283-284
13. Mohapatra D, Mishra S, Sutar N. Banana and its byproduct utilisation: an overview, 2010.
14. Ovando-Martinez MS, Sáyago-Ayerdi E, AgamaAcevedoGofii I, Bello-Pérez LA. Unripe banana flour as an ingredient to increase the undigestible carbohydrates of pasta. *Food Chem*. 2009; 113(1):121-126.