

# Chemical Composition and Consumer Acceptance of Balinese Snake Fruit during Marketing

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## ABSTRACT

*The research has been conducted based on chemical composition and consumer acceptance to Balinese Snake Fruit during marketing through three retailers, i.e., traditional markets, fruit shop and supermarkets within the province of Bali. This research was conducted with laboratory research. The sampling was conducted using the stratified random sampling. Balinese Snake fruit that are sold in fruit shops have the best quality with a chemical composition of water content 83.91%, acid content 3.56% db, total sugar content 84.54% db, total content of tannin 1.07% db, fruit size relatively larger (average 13 fruits/kg), panelist acceptance of color 6.90 (between "rather like" and "like") scale, aroma 6.90 (between "rather like" and "like"), texture 6.70 (between "rather like" and "like"), taste 6.95 (between "rather like" and "like"), and total acceptance of 6.95 (between "rather like" and "like") scale.*

*Key words: Chemical composition, Consumer acceptance, Snake fruits.*

## INTRODUCTION

Snake fruit (*Salaca edulis*, Reinw) is categorized within Palmae family and is among Indonesia's exclusively horticultural plant. Balinese Snake Fruit is a specific horticulture product from Bali, which is one of the main commodities from this province. According to data from Indonesian Statistics (1996) the production of snake fruit in Indonesia during the year 1996 is quite significant, which was 285,745 tons, 56,327 of which was Balinese Snake Fruit.

The development of Bali as a main tourist destination of Indonesia also provides an opportunity to promote snake fruit as an exclusive gift for tourists. The increase in demand must be followed by the increase of production and a more thorough and professional post harvest handling in order to maintain the quality of fresh snake fruit until it reaches to the consumer. This is important, noting that snake fruit is more often consumed in the fresh form than in a processed form. According to Mahendra and Janes (1996) the Balinese Snake Fruit as well as other horticultural products is among fruits that can easily rot during storage at room temperature for about 5-6 days.

The quality of fresh fruit depends on the condition and its exclusive characteristic, which is its physical appearance like color, existence of damage, shape and texture, taste and its chemical composition. The decrease of the fruits quality is usually caused by mishandling during harvest, distribution and complex trading order, which mainly concerns inconducive shipment and storage that result in physical, biological and microbiological damage. This kind of damage eventually results in change of shape and nutritional value.

Research on the level of Balinese snake fruit quality decrease during shipment has never been done. Due to this the distribution of snake fruit which is one of the factors responsible for the decrease of quality needs to be examined more deeply, in order to determine constructive steps so that the Balinese Snake Fruits quality could be maintained until it reaches the consumers.

The marketing of fruit in Bali can be divided in three, which are retail salesmen through traditional markets, semi modern markets in terms of fruit stores and modern

markets (supermarkets).

So far the impression of people is that supermarkets has products in a higher quality compared to traditional markets, which encourages consumers to purchase these fruits with a higher price. This is made possible due to the good handling done to the fruit during storage and preservation of its freshness.

Based on the problems faced, research on the chemical composition and condition of the Balinese Snake Fruit when reaches the consumer from the producer to the consumer through the three types of markets has been done.

The goal of this research is to discover the chemical composition and the acceptance of the consumers to the Balinese Snake Fruit during marketing.

## MATERIALS AND METHODS

### Materials

The Balinese Snake Fruit (*Salacca edulis*) use in this experiment were produced by farmers from Sebetan and East Selat Duda Village, Karangasem Regency, Bali then distributed by them to distributors at all other regencies within Bali.

The chemical material used in this research is NaOH 0.1 N, standard glucose solution, standard tanat acid solution, enthrone reactor, reagen folin denish, saturated  $\text{Na}_2\text{CO}_3$ , phenolphthalein indicator (pp) taken from Chemistry Laboratory of Agricultural Products, Department of Agricultural Technology of Udayana University.

The equipment used in this research is: model Blue M oven, Milton Ray Spectronic 20 spectrometer, Mettler Toledo model AB 204 scale, Lion Star Plastic brand bread scale.

### Research Realization

The research was done by taking samples (Balinese Snake Fruit) from each stage of marketing to be analyzed at the Chemistry Laboratory of Agricultural Products, Department of Agricultural Technology of Udayana University, Denpasar Bali.

The marketing path that was observed in this research can be seen in Figure 1.

### Sampling Technique

Sampling technique was done using the stratified random sampling (Scheaffer et al. 1990). The Bali province which consists of 8 regencies and 1 medium city was

taken 3 regencies/medium city that was used as samples. The decision was made based on dividing the distance from the producer into 3 stratas.

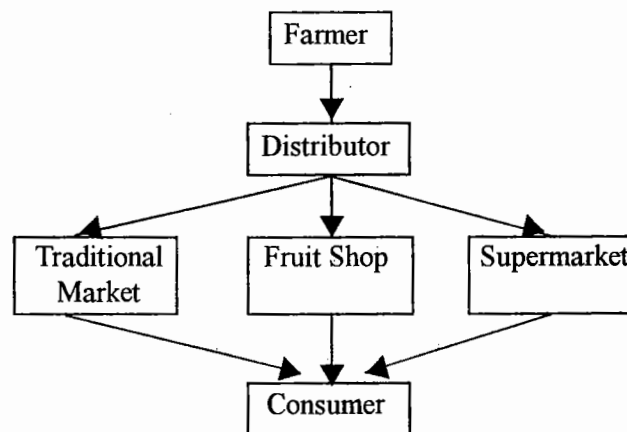


Figure 1. Diagram of Marketing Path Observed in Research

At the producer level 2 largest snake fruit producing subdistricts within Karangasem Regency which are Bebandem Subdistrict represented by Sibetan Village and Selat Subdistrict represented by East Selat Duda Village was taken. The amount of producer samples taken was 3 farmers so the total of producer samples is 6.

At the retailer level, the amount of samples used for traditional markets were 2, and for semi modern and modern markets each were taken 1 sample so that the total of samples was 28.

This procedure was repeated 3 times.

### Parameters Observed

The parameters observed in this research can be divided into 2 categories, which are from the *chemical and organoleptic aspect*. The analysis was done for moisture (AOAC, 1980), total organic acid (AOAC, 1980), sugar (Anthrone Method, AOAC, 1980), and tannin (Renggana, 1979). Organoleptic evaluation was done recording to Larmond (1977).

Data obtained from chemical and physical tests were analyzed using the simple random group design (RAK) form, if there is a significant difference further tests will be conducted using the smallest significant difference test. The average value of the organoleptic test data was taken

in order to illustrate the consumers taste towards Balinese Snake Fruit tested and furthermore to be discussed descriptively.

## RESULTS AND DISCUSSION

### General View of Research Object

This research is carried out beginning from place of harvest to retailers being spread in the 3 regencies chosen as samples beginning from December 1999 till May 2000. This research began with surveying the farmers, distributors and retailers. Afterwards, sample taking was done in order to do laboratory tests towards the quality characteristics of Balinese Snake Fruit marketed.

### Distributor

Distributors surveyed were distributors that directly distribute Balinese Snake Fruit to retailers (traditional markets, fruit stores and supermarkets) in Bali. These distributors are mostly inhabitants surrounding the producer area.

### Traditional Market

The traditional market concerned is the public market in which all kinds of transactions for all types of items is done. The environmental condition surrounding the traditional market usually is out of control especially for sanitary, types of product and there is no introduction of technology in handling of products.

The traditional market taken as sample in this research were those that directly receive supply of Balinese Snake Fruit from Karangasem Regency through the hands of the distributors that have also been selected as samples.

### Fruit Shop

A fruit shop is a place for trade owned by personal individuals that only sell fruit, local or even imported. These fruit shop's environment now can be controlled with or without technological touch.

### Supermarket

Supermarkets is a place to find all sorts of merchandise, where environmental condition, like sanitation also handling done uses modern technology such as coolroom, air conditioner, etc. This is why supermarkets is more recognized as modern markets.

### Water Content

Based on Balinese Snake Fruit various water content examination analysis, there is a significant difference

( $p < 0.05$ ). The average water content of Balinese Snake Fruit during distribution can be seen in Table 1. The highest water content was shown from the sample taken from farmers 84.99 %. In all 3 retailer markets observed, the snake fruit experienced a loss of water content.

The greatest water content loss is experienced by Balinese Snake Fruit in supermarkets with an average of 83.79 %, then fruit stores with an average of 83.91 % and traditional markets with an average of 84.02 %.

Table 1. **Balinese Snake Fruit Chemical composition During Marketing**

Treatment	Water Content	Total Acid Content (%db)	Total Sugar Content (%db)	Total Tannin Content (%db)
Farmer	84.99 a	5.34 a	83.78 a	1.44 a
Traditional Market	84.02 b	3.60 a	84.15 a	1.21 b
Fruit Shop	83.91 b	3.56 a	84.54 a	1.07 b
Supermarket	83.79 b	3.49 a	84.53 a	1.10 b

Explanation :

\*) Values followed with the same letter within the same column shows there is no significant difference  $p > 0.05$ .

The decrease in water content is caused by respiration and transpiration after harvest and during distribution. According to Apandi (1984), the decrease of water content is caused by evaporation through the pores through the process of respiration and transpiration. According to Kusumo et al. (1995) between the temperature of 28-30°C the rate of transpiration of the snake fruit is very high.

### Total Acid Content

Based on various examination analyses towards total acid content of the Balinese Snake Fruit, it is shown that there is no significant difference ( $p > 0.05$ ). The total acid content during marketing is 3.49-5.34%db. In Table 1 it is shown that there was a decrease of total acid of the Balinese Snake Fruit during marketing. This decrease of total acid according to Will et al., (1981) is caused by the usage of the organic acids for the respiration process.

### **Total Sugar Content**

The result of analysis show that there is no significant difference in total sugar of the Balinese Snake Fruit ( $p>0.05$ ). The total sugar of the Balinese Snake Fruit during marketing is between 83.78-84.54% db. The decrease of total sugar is caused by the breaking of carbohydrates into simple sugar compounds. According to research done by Suter (1988), the total sugar increases during the early stages of storage then further decreases if storage is continued. The increase of the total sugar content during the early stages of storage is caused by the accumulation of sugar because of the degradation of the starch becoming simple sugar, oppositely the decrease of the total sugar content during the continuation of storage is because some of the sugar is used for respiration or transformed into other kinds of compounds (Winarno and Wirakartakusuma, 1981).

### **Total Tannin**

The result of analysis show that there is a significant difference between total tannin of the Balinese Snake Fruit ( $p<0.05$ ). The average total tannin content can be seen in Table 1.

The average tannin content of the Balinese Snake Fruit during marketing is between 1.07-1.44% db. The table clearly shows that the tannin content tends to decrease at the beginning from the farmer to the retailers. Degradation and oxidation cause the decrease of the tannin content. According to Suhardi (1997) the tannin content will decrease along with the increase of the snake fruits' age and with old snake fruit the polymerization of tannin into compounds with a high molecule weight will occur and will not dissolve in water.

The excellent sorting in fruit shops and supermarkets can decrease the tannin content so that the snake fruit sold is truly ripe.

## **Organoleptical Acceptance**

### **Color**

The color organoleptic test data of the Balinese Snake Fruit during marketing can be seen in Table 2. The acceptance of the panelists towards the color of snake fruit is between 6.05-7.30, which means in the scale of "rather like" to "like a lot". The decrease of acceptance of color of Balinese Snake Fruit from the farmer to the three retailers. The decrease of acceptance of the panelists after

it reaches the markets is because the change of color and brightness. This change during ripening and storage according to Will et al.(1981) is caused by degradation, synthesis or both. According to Suter (1988), wounds, bruises and the peeling of the snake fruits skin can speed up the formation of the brown color of the snake fruit during storage.

### **Aroma**

Snake fruit that is freshly picked by the farmer is given a score of 7.09 ("like"), on the hand when the snake fruit reaches the markets the panelists score decreases between 6.45-6.90% ("rather like" to "like").

The decrease in acceptance of the panelists towards the aroma is possibly caused by the evaporation of the volatile characteristic components forming the aroma which is usually present in fresh snake fruit during a couple of days of marketing. According to Suter (1996) various components of the aroma of the snake fruit's meat varies between 14-30 components and it generally decreases during storage.

### **Texture**

Panelists give the highest score of 7,45 (between "like" and "like very much") towards the sample taken from the farmers. The panelists score tend to decrease towards the three samples from the retailers which score 6.55-6.70 (between "rather like" and "like").

The decrease of score towards the texture of the Balinese Snake Fruit is caused by the texture becoming more brittle and no longer crunchy. According Eskin et al. (1971), during storage of the fruit the pectin compound experience depolymerization and deesterification so that the pectin compound which formerly insoluble in water becomes water soluble and the fruit becomes soft.

### **Taste**

Panelists give the highest score of taste towards the snake fruit taken from the farmers which was 7.09 ("like") and gives a lower score towards the snake fruit form retailers which was between 6.50-6.95 (between "rather like" and "like").

The decrease of acceptance of the panelists towards the taste of the Balinese Snake Fruit during marketing relates a lot with the sharp decrease of the aroma scored by the panelists, even though we can see the sugar acid ratio increases with the increase of the total sugar content and the decrease sourness and tannin. According to

Kusumo et al. (1995), the criteria of the Balinese Snake Fruit is sweet, sour, astringent, which is even with the rather sharp aroma.

### General Acceptance

General acceptance is a unification of the panelist scores towards the entire organoleptic attributes consisting of color, aroma, texture and also taste.

The highest score is given by the panelists to the snake fruit taken from the farmers which is 7.16 (between "like" and "like very much") and the score tends to decrease towards the snake fruit which is already in the retailers which is between 6.45-6.95 (between "rather like" and "like"). The highest score among the three retailers existing is given by the panelists to the fruit shop, this means the panelist like the Balinese Snake Fruit which is sold in fruit shops the most based on the organoleptic scoring as a whole.

## CONCLUSION

The Balinese Snake Fruit sold in fruit shops gives the best quality attribut with its chemical composition, water content 83.91%, total acid content 3.56% db, total sugar content 84.54% db, total tannin content 1.07 % db, the size of the fruit is relatively larger (average of 13 pieces/kg), acceptance of panelists towards color is 6.90 (between "rather like" and "like"), aroma 6.90 (between "rather like" and "like"), texture 6.70 (between "rather like" and "like"), taste 6.95 (between "rather like" and "like") and also acceptance as a whole 6.95 (between "rather like" and "like").

Further research must be done about the decrease in the quality of the Balinese Snake Fruit in each stage of marketing especially at the retailers and the collectors from every path of marketing in order to lessen the decrease of the Balinese Snake Fruit in markets.

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