

**Sensory Acceptability of Squash (*Cucurbita maxima*) Cupcake in The Municipality of Isabel, Leyte**

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**ABSTRACT**

Squash (*Cucurbita maxima*) or also known as kalabasa in Filipino, is one of the abundant vegetables in the Philippines. Squash is well known for being a healthy vegetable that contains vitamins A and C. This study aimed to ascertain the sensory acceptability of squash cupcakes. This study utilized a quantitative-descriptive research design as a primary tool in determining the level of acceptability of squash cupcakes and utilized a purposive sampling technique in the selection of participants who are consumers of squash cupcakes. The participants of the study were 100 Isabelanon people. The data gathered by a modified sensory evaluation score sheet was analyzed and interpreted on the five-point hedonic scale. The findings led to the conclusion that the participants accepted the squash cupcake in terms of its appearance, texture, color, taste, aroma, fluffiness, and including its general acceptability. This study serves as the basis for future researchers to study the shelf-life of squash cupcake and their marketability.

**Keywords:** Squash cupcake; Sensory acceptability; Five-point hedonic scale; Food product; VSU-Isabel.

**INTRODUCTION**

Squash (*Cucurbita maxima*), also known as kalabasa in Filipino, is a highly recommended vegetable due to its richness of minerals, nutrients, vitamins, and organic compounds that keep people's lives healthier (Staughton, 2020). Maintaining a healthy immune system is one of the significant roles of squash. Among the advantage of squash is its affordability and availability in the market throughout the world.

Central American farmers were the first persons who cultivated North American squash over 8,000 years ago (Kavasch, 2022). As time passed by, this healthy vegetable made its way across thousands of miles, and American Indian tribes set this healthy vegetable into their gardens. Furthermore, it was grown and eaten by the Pueblo tribes of the southwestern united states, Apaches, Hopi, Navajo, Havasupai, Papago, Pima, and Yuman tribes (Niethammer, 2021).

Squash is one of the vegetables that are well-known to be nutritious food in the Philippines. A great way to acquaint squash with Filipinos in a delectable manner is by serving them in the form of tasty snacks such as puto or cupcakes. It is better to produce a variety of food products by combining boiled mashed squash with standard recipes of food products, such as cupcakes, a native delicacy made of wheat or rice flour, sugar, eggs, and a leavening agent that is steamed (Valencerina, 2019). Cupcake becomes tastier by adding flavor (Sanchez, 2021). Having high-quality food products can make consumers satisfy and can also improve the reliability of the product. Squash cupcake is a unique version of the cupcake, which is getting tastier and more popular due to its fluffy and soft texture and also due to its attractive appearance.

In China, cupcakes are one of the widely available products and are frequently offered as a dessert at any celebration table. The manufacture, mouthfeel, texture, flavor, and attributes of the cupcakes are unique from those of the steamed sponge products consumed in China, such as water content and appearance. Cupcake has about

120-150 calories depending on the toppings and has approximately 6 grams of fats, 88 mg of sodium, and 9 grams of carbohydrates what makes it healthier is that it contains Vitamin A, Calcium, Iron, Protein, and Fiber (Nusselder, 2022). Filipinos satisfy eating different and innovative tasty foods, but most do not care about the nutritional benefits they can get from the foods they eat. Researchers studied cupcakes with squash a healthier version of a cupcake, and this product can quickly be adopted in the market because of its authentic taste and healthier version (Boñaga et al., 2019).

This study aimed to ascertain the sensory acceptability of utilizing squash as an ingredient in making cupcakes in terms of its appearance, texture, color, taste, aroma, fluffiness, and general acceptability by collecting data that will help to achieve the desired outcome or goal of this study.

## ❖ METHODOLOGY

### **Research Design**

This study focused on the sensory acceptability of the *squash cupcake*. To obtain a general overview of the subject and to observe the respondents without affecting their behavior, this study used a quantitative-descriptive research design to identify, analyze and determine the main objective of this study.

### **Participants and Sampling**

The respondents were ten (10) VSU-Isabel students, ten (10) VSU-Isabel Teachers, ten (10) Parents, ten (10) habal-habal drivers, ten (10) market vendors, ten (10) bakery workers, ten (10) senior citizens, ten (10) LGU workers, ten (10) store workers, and ten (10) hardware workers. A total of one hundred (100) respondents from Isabel, Leyte, Philippines established the sensory acceptability and squash cupcakes. Researchers utilized the purposive sampling technique in selecting participants who are consumers of squash cupcakes. These respondents were from purposively chosen sectors such as students, teachers, parents, habal-habal drivers, market vendors, bakery workers, senior citizens, LGU workers, thrift store workers, and hardware workers who were identified as consumers of cupcakes.

### **Research Instrument**

A modified sensory evaluation score sheet called the five-point Hedonic Scale was used to collect the data. This made it for the respondents to rate the product. The treatment of the respondents was by their descriptive scores: five (5) for liked very much, four (4) for liked moderately, three (3) for liked slightly, two (2) for disliked, and one (1) for disliked very much.

## ❖ RESULTS AND DISCUSSIONS

This section presents the analysis and interpretation of the data gathered from one hundred respondents from Isabel, Leyte, Philippines, who tasted the squash cupcakes.

### **Appearance of the Squash Cupcake**

A squash cupcake product should have an attractive appearance. Its physical appearance can affect its acceptability level because most of the customers of the product matter the taste of the products based on how its looks.

**Table 1.** Acceptability of the Appearance of Squash Cupcake

Respondents	Mean	Standard Deviation	Description
Bakery workers	4.00	0.87	Liked moderately
Teachers	4.90	0.32	Liked very much
Parents	4.90	0.32	Liked Very Much
LGU workers	4.90	0.32	Liked Very Much
Students	5.00	0	Liked Very Much
Habal-habal drivers	5.00	0	Liked Very Much
Market vendors	5.00	0	Liked Very Much
Senior citizens	5.00	0	Liked Very Much
Thrift store workers	5.00	0	Liked Very Much
Hardware workers	5.00	0	Liked Very Much
<b>Average</b>	<b>4.74</b>	<b>0.15</b>	<b>Liked Very Much</b>

**Legend:** Liked Very Much – 4.3 - 4.50; Like Moderately – 3.5 - 4.2; Liked Slightly – 2.7 - 3.4; Disliked – 1.9 - 2.6; and Disliked Very Much – 1.0 - 1.8

Table 1 shows the acceptability of the appearance of squash cupcakes. As shown in the table, teachers, parents, habal-habal drivers, market vendors, senior citizens, LGU workers, thrift store workers, and hardware workers are the respondents who *liked squash* appearance cupcakes very much. Only the bakery respondents *liked* the appearance of the squash cupcake moderately. The overall mean score of the appearance of squash cupcakes is **4.74**, which is liked very much. This meant that the appearance of a squash cupcake was acceptable.

The appearance of the squash food products was also liked in terms of appearance in the study by Valencerina (2019) entitled "*Formulation and Quality Shelf evaluation of squash food products*". Squash cupcake is one of her chosen squash food products that obtained a weighted mean of 8.50 for the appearance, which the respondents liked very much. These findings revealed that in terms of appearance, the squash cupcakes are made acceptable to the consumers. These promote to increase more squash cupcake production in the market. Staughton (2020) cited that adding boiled, mashed squash to cupcakes can further give health benefits to various people, and it is a potentially rich source of carotenoids which can help prevent cardiovascular disease and neurodegenerative disease.

As mentioned by the respondents from LGU "*Nindot kaayo inyo cupcake ba kay lahi ra sa uban nga gibutangan ug food colors sama sa green og violet. Pero ang inyoha kay natural ra gyud nga lami ug healthy pa samot nas mga bata*" (Your cupcakes are great because they are different from the others which are mixed with food colors such as green and violet. Your cupcake is still natural, tasty and healthy even for children). Other respondents from faculty members of VSU-Isabel Department of Teacher Education said, "*Mo-patok ni inyo product especially sa pandemic*

*tungod kay healthy, clear gyud nga adunay squash na gi- sagol*” (Your product will be popular especially during the pandemic because it is healthy. It is clear that there is squash mixed in).

### Texture of the Squash Cupcake

The right texture of the cupcake should be moist, spongy, soft or smooth, and delicious. To achieve better texture cupcakes, it is essential to carefully and properly follow the procedures.

**Table 2.** Acceptability of the Texture of Squash Cupcake

Respondents	Mean	Standard Deviation	Description
Bakery workers	4	0.74	Liked Moderately
Thrift store workers	4.5	0.7	Liked Very Much
Teachers	4.6	0.7	Liked Very Much
LGU Workers	4.4	0.7	Liked Very Much
Parents	4.9	0.32	Liked Very Much
Students	4.9	0.32	Liked Very Much
Senior citizens	4.9	0.32	Liked Very Much
Students	4.9	0.32	Liked Very Much
Habal-habal drivers	5	0	Liked Very Much
Markets vendors	5	0	Liked Very Much
Hardware workers	5	0	Liked Very Much
<b>Average</b>	<b>4.77</b>	<b>0.34</b>	<b>Liked Very Much</b>

**Legend:** *Liked Very Much* – 4.3 - 4.50; *Liked Moderately* – 3.5 - 4.2; *Liked Slightly* – 2.7 - 3.4; *Disliked* – 1.9 - 2.6; and *Disliked Very Much* – 1.0 - 1.8

Table 2 shows the acceptability of the texture of squash cupcakes. As shown in the table the respondents from the groups of teachers, students, parents, habal-habal drivers, market vendors, senior citizens, LGU workers, thrift store workers, and hardware workers **liked very much** the texture of squash cupcakes except bakery workers who **like moderately** the texture of squash cupcake. The texture of the squash cupcake obtained the overall mean score of 4.77 which is **liked very much**. This means that the texture of the squash cupcake is acceptable.

These findings revealed the high acceptability of the squash cupcakes. These suggest that the texture of the cupcake has to be considered to be acceptable. Kubala (2018) cited that adding too much sugar or too little is one of the causes of overly dense cupcakes. That is why it is important to follow the process, including how to properly measure the ingredients. The texture of the cupcake can be described through the senses in which the sense of

touch and taste can be used. According to Lewis (1990), the texture of a product plays a crucial role in determining the eating quality of food.

### Color of the Squash Cupcake

The color of the squash cupcake should be natural. Food colorings or liquid flavorings should be avoided.

**Table 3.** Acceptability of the color of Squash Cupcake

Respondents	Mean	Standard Deviation	Description
Bakery workers	4.30	0.95	Liked Moderately
Thrift store workers	4.50	0.42	Liked Very Much
Teachers	4.90	0.32	Liked Very Much
LGU Workers	4.90	0.31	Liked Very Much
Parents	4.90	0.31	Liked Very Much
Students	4.90	0.32	Liked Very Much
Senior citizens	5.00	0	Liked Very Much
Students	5.00	0	Liked Very Much
Habal-habal drivers	5.00	0	Liked Very Much
Markets vendors	5.00	0	Liked Very Much
Hardware workers	5.00	0	Liked Very Much
<b>Average</b>	4.85	0.23	Liked Very Much

**Legend:** Liked Very Much – 4.3 - 4.50; ; Like Moderately – 3.5 - 4.2; Liked Slightly – 2.7 - 3.4; Disliked – 1.9 - 2.6; and Disliked Very Much – 1.0 - 1.8

Table 3 shows the acceptability of the color of squash cupcakes. As shown in the table the respondents from the groups of teachers, students, parents, habal-habal drivers, market vendors, senior citizens, LGU workers, thrift store workers, and hardware workers *liked very much* the color of squash cupcakes.

Only bakery workers *liked moderately* the color of squash cupcakes. It is also shown that the squash cupcake's color obtained the overall mean score of **4.85** which is *liked very much* by the respondents. This meant that the color of the squash cupcake is acceptable.

The squash cupcake product is lightly colored yellow because of the moderate mashed squash that is added as the main ingredient. The color of the puto squash will depend on the amount of mashed squash that will be added to the puto product. A few bakery workers respondents said that "*Mas maayo ug adunay food color.* (It would be better if there is food coloring)". It is believed that adding artificial food color to any food product can make your food more

attractive to customers. However, adding artificial food color to any food products should be avoided because it can cause serious side effects such as hyperactivity in children, as well as cancers and allergies (Bell, 2017).

A number of respondents said that “*Sa iyaha nga color makita na nga natural ug wala gyud halo nga food color. Maayo ni sya sa mga bata.* (Its color looks natural and doesn't contain any food color. It is good with children)”.

### Taste of the Squash Cupcake

The taste of puto squash has to be moderately sweet, delicious, and satisfying.

**Table 4.** Acceptability of the taste of Squash Cupcake

Respondents	Mean	Standard Deviation	Description
Bakery workers	4.10	0.88	Liked Moderately
Senior citizens	4.80	0.70	Liked Very Much
Teachers	4.80	0.70	Liked Very Much
Market vendors	4.90	0.32	Liked Very Much
Students	4.90	0.32	Liked Very Much
Parents	5.00	0	Liked Very Much
Habal-habal drivers	5.00	0	Liked Very Much
LGU workers	5.00	0	Liked Very Much
Thrift store workers	5.00	0	liked Very Much
Hardware workers	5.00	0	liked Very Much
<b>Average</b>	4.85	0.29	Liked Very Much

**Legend:** *Liked Very Much* – 4.3 - 4.50; ; *Like Moderately* – 3.5 - 4.2; *Liked Slightly* – 2.7 - 3.4; *Disliked* – 1.9 - 2.6; and *Disliked Very Much* – 1.0 - 1.8

Table 4 shows the acceptability of the taste of squash cupcakes. As shown in the table, the respondents from the groups of teachers, students, parents, habal-habal drivers, market vendors, senior citizens, LGU workers thrift store workers, and hardware workers **liked very much** the taste of squash cupcakes. Only the workers from the bakery **liked moderately** the taste of squash cupcakes. The overall mean score of 4.85 which is **liked very much** by the respondents shows that the squash cupcake is acceptable in terms of taste. Indeed, the flavor of pumpkin is unique (Broyles, 2017). When boiled, it has a flavor that is fairly similar to sweet potatoes, its earthy sweet flavor can further give a sweet taste to the cupcake. The simplest puto also seems to be one of the best. The respondents attest this from the group of senior citizens, parents and other categories who said that “*Lami siya kay sakto ra ang katam-is. Bagay sya for senior citizens and for those nga dili hilig og tam-is.* (It is delicious because the sweetness is just right. It is good for senior citizens and for those who do not like sweets)”. Other respondents from different

groups also said that “*Kuwang sya ug gamay nga sugar pero okay naman sya (He lacks a little sugar but it is okay)*”.

### Aroma of Squash Cupcake

The aroma of puto squash should have a natural smell of squash. Its natural scent can make the customers recognize that this product is healthy.

**Table 5.** Acceptability of the Aroma of Squash Cupcake

Respondents	Mean	Standard Deviation	Description
Bakery workers	4.00	0.67	Liked Moderately
Senior citizens	4.60	0.70	Liked Very Much
Students	4.60	0.51	Liked Very Much
Teachers	4.80	0.42	Liked Very Much
Market vendors	4.80	0.42	Liked Very Much
Parents	4.90	0.32	Liked Very Much
Habal-habal drivers	4.90	0.32	Liked Very Much
LGU workers	4.90	0.32	Liked Very Much
Thrift store workers	5.00	0	liked Very Much
Hardware workers	5.00	0	liked Very Much
<b>Average</b>	4.75	0.37	Liked Very Much

**Legend:** *Liked Very Much* – 4.3 - 4.50; *Like Moderately* – 3.5 - 4.2; *Liked Slightly* – 2.7 - 3.4; *Disliked* – 1.9 - 2.6; and *Disliked Very Much* – 1.0 - 1.8

Table 5 shows the acceptability of the aroma of squash cupcakes. As shown in the table the respondents from a group of teachers, students, parents, habal-habal drivers, market vendors, senior citizens, LGU workers, thrift store workers, and hardware workers **liked very much** the texture of squash cupcakes except bakery workers who **liked moderately** the texture of squash cupcake. The overall mean score of the aroma of squash cupcakes is 4.75 which is liked very much and shows that it is acceptable in terms of aroma.

The aroma of the squash cupcake has to be considered when baking since puto's aroma is an essential sensory cue, a key element of flavor perception, and it affects how people perceive taste and texture (Liem, et al., 2016). Before the customer sees the food, the aroma serves as a signal of its presence. To entice and attract potential customers, numerous culinary establishments have appealing aromas for their products. Attracting customers with very pleasant aromas can promote prospects of consumption and increase appetite, Zoon et al (2016). As shown in the table, only respondents from bakery shops liked moderately the aroma of squash cupcakes. They mentioned that it



should be better to add a few drops of vanilla extract that can enhance the flavor and scent of the squash cupcake. In addition, all groups of respondents except for bakery workers like very much the aroma of squash cupcakes due to the essence of squash. The description shown in the table, the aroma of squash cupcakes is acceptable.

### Fluffiness of Squash Cupcake

Squash cupcakes should be springy or foamy. It will spring back when it is pressed.

**Table 6.** Acceptability of the fluffiness of Squash Cupcake

Respondents	Mean	Standard Deviation	Description
Teachers	4.80	0.42	Liked Very Much
Students	4.80	0.42	Liked Very Much
Bakery workers	4.90	0.32	Liked Very Much
LGU workers	4.90	0.32	Liked Very Much
Thrift store workers	5.00	0	Liked Very Much
Parents	5.00	0	Liked Very Much
Habal-habal drivers	5.00	0	Liked Very Much
Market vendors	5.00	0	Liked Very Much
Senior citizens	5.00	0	liked Very Much
Hardware workers	5.00	0	liked Very Much
<b>Average</b>	4.94	0.14	Liked Very Much

**Legend:** Liked Very Much – 4.3 - 4.50; Like Moderately – 3.5 - 4.2; Liked Slightly – 2.7 - 3.4; Disliked – 1.9 - 2.6, and Disliked Very Much – 1.0 - 1.8

Table 6 shows the acceptability of the fluffiness of squash cupcakes. As shown in the table all groups of respondents *liked very much* the fluffiness of squash cupcakes. The fluffiness of squash cupcakes obtained an overall mean score of 4.94 which is *liked very much*. This implies high acceptability.

Bakers of squash cupcakes have to consider a cake flour that is more finely ground and lower in protein since it significantly determines how fluffy a puto is. The fluffiness of puto is considered as a texture which refers to those qualities of a food that can be felt with the fingers, tongue, or teeth, and it is also one of the major criteria that consumers use to judge the quality and freshness of food. Food products like squash cupcakes can be described in a variety of ways, such as soft, fluffy, mushy, hard, or smooth. Squash cupcake acceptance and enjoyment are both influenced by the texture.

Several respondents from all the groups mentioned that "*Fluffy man inyo cupcake kay kung pisliton mo bounce back man.* (Your cupcakes is fluffy because if I squeeze them, it bounced back)".



## General Acceptability of Squash Cupcake

**Table 7.** Acceptability of the general acceptability of Squash Cupcake

Respondents	Mean	Standard Deviation	Description
Bakery workers	4.50	0.85	Liked Moderately
Teachers	4.80	0.42	Liked Very Much
Students	4.90	0.32	Liked Very Much
LGU workers	5.00	0	Liked Very Much
Thrift store workers	5.00	0	Liked Very Much
Parents	5.00	0	Liked Very Much
Habal-habal drivers	5.00	0	Liked Very Much
Market vendors	5.00	0	Liked Very Much
Senior citizens	5.00	0	liked Very Much
Hardware workers	5.00	0	liked Very Much
<b>Average</b>	4.92	0.16	Liked Very Much

**Legend:** Liked Very Much – 4.3 - 4.50; ; Like Moderately – 3.5 - 4.2; Liked Slightly – 2.7 - 3.4; Disliked – 1.9 - 2.6; and Disliked Very Much – 1.0 - 1.8

Table 7 shows the general acceptability of squash cupcakes. As shown in the table the general acceptability of squash cake obtained the average mean of 4.92 which is *liked very much*. This shows the high general acceptability of the squash cupcakes.

The product was evaluated into six characteristics appearance, texture, color, taste, aroma, and fluffiness, and for all general acceptability. The food product does not contain any chemical ingredients like artificial food or any liquid colorings to promote a healthy product. In addition, the ingredients of squash cupcakes are readily available in the market at a very affordable price and also the process of making squash cupcakes is easily adaptable.

## CONCLUSION AND RECOMMENDATIONS

Squash cupcake is acceptable in Isabel, Leyte, Philippines, in terms of their appearance, texture, color, aroma, fluffiness, and taste. Mass production of squash cupcakes can be made considering its health benefits to children and adults. Parents and canteen owners can consider squash cupcakes in their list to promote vegetable consumption among kids which could provide health benefits to them. Bakery owners may produce enough squash cupcakes in a day to maintain the freshness of the product. Future scientific researchers may conduct an intensive study to establish the shelf life of squash cupcakes.

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### *Competing Interests Statement*

*The authors declare no competing financial, professional, or personal interests.*

### *Consent for publication*

*The authors declare that they consented to the publication of this research work.*

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