

## HIGHLIGHTING THE INFLUENCE OF PEA SPROUTS (*Pisum sativum* L.) ADDED TO MANGO (*Mangifera indica* L.) OR KIWI (*Actinidia deliciosa*) SORBET ON THE FINAL CONSUMER'S PURCHASING PREFERENCES

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### Abstract

This paper contains theoretical and practical information that has allowed the experimental setup of an effective working protocol for obtaining food sprouts in peas (*Pisum sativum* L.), as well as obtaining mango (*Mangifera indica* L.) or kiwi (*Actinidia deliciosa*) sorbet. In order to create a new product, mango or kiwi sorbet were combined with pea sprouts. The experimental results obtained after performing a sensory analysis of the final products, as well as an online questionnaire filled by the panelists are presented in the paper based on charts, which are demonstrating the influence of pea sprouts on consumers preferences and its purchasing behaviour.

**Key words:** kiwi, mango, pea, sorbet, sprouts.

### INTRODUCTION

The pea (*Pisum sativum* L.) belongs to the family *Papilionaceae* (*Fabaceae*) ([www.britannica.com/topic/list-of-plants-in-the-family-Fabaceae-2021803](http://www.britannica.com/topic/list-of-plants-in-the-family-Fabaceae-2021803)). This is an annual herbaceous plant with a strong but poorly developed root system (Popovici et al., 2007). Due to the short growing season and the low heat requirements, the pea crop has spread rapidly in all countries. Thus, in 1906, Denaiffe described about 200 varieties of peas (Indrea et al., 2007). Peas (*Pisum sativum* L.) are mainly used for green beans, which contain a lot of protein, vitamins and minerals. In order to have a balanced diet, an adult should consume about 11 kg of peas *per* year, of which 8 kg should be in canned form (Ciofu et al., 2003). Light has a strong influence on the germination and growth processes of pea plants (*Pisum sativum* L.), due to its photosensitive pigments. It influences plant growth by duration, intensity and spectral composition (Dobrescu, 2003). Pea crops are the most common in their own households. The soil used for growing peas must be rich in nutrients, loose, permeable and also have a high water retention capacity. The pH of the soil must be neutral to alkaline, with values between 6.5 and 7.5 (Ciofu et al., 2003). Soil

moisture in the field should be maintained at 65-70% during the growing season (Indrea et al., 2007).

Sorbet is an extremely popular dessert with a long history. It is considered to be the vegetarian alternative of ice cream or smoothies usually eaten, but also a quick and unique snack (<https://sanovita.ro/blog/sorbet-de-citrice/>).

Sorbets typically include very few ingredients and do not include any dairy. Also, they are simply to produce (Whetzel, 2012).

In order to obtain the sorbet, all the ingredients (fruit, water and, if wanted, sugar), should be mix in a blender and place in the freezer. One hundred grams of mango fruit (fresh or frozen), contain 60 calories. Likewise, one hundred grams of kiwi fruit contain 58-68 calories (<https://www.nutritionvalue.org/nutritioncalculator.php>).

These may be reasons for which mango or kiwi sorbet can be consumed daily. Furthermore, if fresh fruits are used to obtain the sorbet, than the final product will have nutritional properties, such as antioxidant capacity which is well maintained in this product by freezing technology.

Mango (*Mangifera indica* L.) has become a well-known fruit and it has been considered the "king of fruits" in Asia (Purseglove, 1972).

The mango fruit is a large fleshy drupe, with an edible mesocarp. Its flavor can vary from sweet to turpentine. Mango fruit is rich in amino acids, carbohydrates, organic acids, fatty acids, proteins, vitamins and minerals. Ripe mango fruits contain moderate levels of vitamin C, but also a significant quantity of provitamin A and vitamins B<sub>1</sub> and B<sub>2</sub> (Litz, 2009).

Kiwi (*Actinidia deliciosa*), also called kiwifruit or Chinese gooseberry is an edible fruit, which has a slightly acid taste and belongs to the *Actinidiaceae* family.

The kiwi plant is a woody vine native to Asia mainland, respectively from China and Taiwan. (<https://www.britannica.com/plant/kiwi-fruit>).

Kiwi fruits contain high quantities of bioactive compounds, such as: ascorbic acid (vitamin C), total phenols, anthocyanins, chlorophylls, carotenoids, tannins and flavonoids. All these compounds are important for nutritional values preservation during the food products preparation (Park et al., 2016).

It is well known that kiwi fruits have strong antioxidant effects and may prevent the development and deterioration of diseases caused by oxidative stress (Iwasawa et al., 2011).

The aim of this work was to create a new product from mango or kiwi sorbet and pea (*Pisum sativum* L.) sprouts, as well as highlighting the consumer's purchasing preferences regarding the final product.

The objectives set were as follows:

1. Obtaining mango (*Mangifera indica* L.) and kiwi (*Actinidia deliciosa*) puree;
2. Obtaining pea (*Pisum sativum* L.) sprouts;
3. Obtaining the new product from mango or kiwi sorbet and pea sprouts;
4. Highlighting consumer preferences through sensory analysis and online questionnaire that was filled by the sensory analysis participants.

## MATERIALS AND METHODS

### Obtaining pea (*Pisum sativum* L.) sprouts

For this work, pea (*Pisum sativum* L.) seeds belonging to the *Carouby de Moussane* variety, purchased online from the Tulipshop store, were used. Approximately 150 pea seeds were used for the experiment.

Pea sprouts were obtained on a substrate from a commercial source - *Universal flower soil*: organic substrate dry product at least 70%, pH

value 6.5-7, humidity 60-70%, N 1.78%, P 0.21%, K 0.82% and organic carbon 13.96%.

The temperature during the germination and growth steps was a 19°C ± 1°C. The sprouts were collected for use after 10 days from planting in January 2022. After collecting, the pea sprouts were cleaned with sterile distilled water to separate them from the soil substrate.

### Obtaining mango (*Mangifera indica* L.) and kiwi (*Actinidia deliciosa*) puree

The mango and kiwi fruits used to prepare the puree were bought from the Carrefour hypermarket chain.

The fruit puree was obtained by blending mango and kiwi fruits with a blender purchased from a commercial source - *Tefal Blendforce*, with a total capacity of 2 liters and 600W maximum power. This, 400 g from each fruit were blended at maximum capacity for 3 minutes.

### Obtaining the new product from (*Mangifera indica* L.) and kiwi (*Actinidia deliciosa*) sorbet and pea (*Pisum sativum* L.) sprouts

After obtaining pea (*Pisum sativum* L.) sprouts and mango (*Mangifera indica* L.) and kiwi (*Actinidia deliciosa*) puree, the next step was to create the new product. For this purpose, pea sprouts were added whole to the fruits puree. In order to obtain the sorbet, the final product was put in the freezer.

Eight experimental sorbet variants were made, 4 for each fruit - mango/kiwi, as follows:

- + 10% pea sprouts
- + 20% pea sprouts
- + 30% pea sprouts
- control - no pea sprouts added

### Highlighting consumer preferences through sensory analysis and online questionnaire that was filled by the participants in the sensory analysis

In order to highlight the influence of pea sprouts on consumer purchasing preferences, a survey in the form of an online questionnaire was made. The platform used in the questionnaire design was "Google Forms", which has been distributed through social media platforms to be completed by the people.

Data collection through an online survey appears to have the potential to collect large amounts of data efficiently, economically and

within relatively short time frames (Regmi et al., 2016).

The information about the influence of pea sprouts on consumers preferences and its purchasing behaviour were achieved by answers to the questions *via* the online questionnaire. The first questions were used in obtaining socio-demographic information about the consumers, such as age, the environment they come from, monthly income, etc. The next part of the questionnaire included 16 questions about flavour, texture, quality of the new intended product and the decision of marketing this product.

## RESULTS AND DISCUSSIONS

After obtaining the novel product, the last step in highlighting the influence of pea (*Pisum sativum* L.) sprouts added in mango (*Mangifera indica* L.) or kiwi (*Actinidia deliciosa*) sorbet on the final consumer's purchasing preferences was to perform the sensory analysis and complete an online questionnaire based on it.

The questionnaire was completed by 59 people (whose socio-demographic profile is presented in Table 1).

Table 1. The socio-demographic profile of the respondents

Age group	66.10% - 18-25 years 18.60% - 26-35 years 6.80% - 36-45 years 6.80% - 46-60 years 1.70% - over 60 years
Gender	59.30% - feminine 40.70% - masculine 0.00% - other
Highest level of education completed	33.90% - High school 55.90% - University 10.20% - Postgraduate
Professional status	54.90% - student 38.00% - employed 4.90% - unemployed 1.60% - entrepreneur 0.50% - pensioner
Household's net monthly income	11.90% - under 2.500 RON 59.30% - 2.501-5.000 RON 28.80% - over 5.000 RON
Where do you live (living area)?	67.80% - urban area 32.20% - rural area

In the first part of the questionnaire, the participants were asked if they consume sorbet products (Figure 1).

The results obtained indicate that a majority of 61.00% of people are consuming sorbet products very rare and 35.60% of them are consuming it occasional. Only one of 59 respondents are consuming fruit sorbet once a month or once a week. This highlights the lack of consumers knowledge about the meaning of fruit sorbet, as well as the low interest in consuming a natural and healthy dessert.

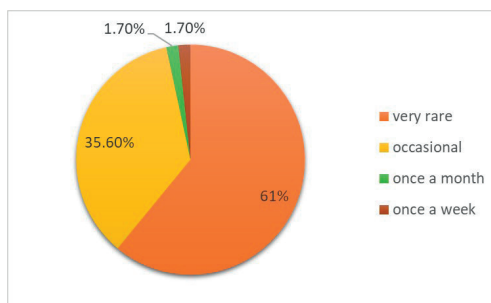


Figure 1. Q1 - How often do you consume sorbet?

In the next question (Figure 2), a 54.20% majority chose mango sorbet as a preference when buying such a product. With a percentage of 39.00%, it is followed in the preferences of consumers by kiwi sorbet. Other preferences mentioned by consumers were lemon, rose, quince and strawberry sorbet.

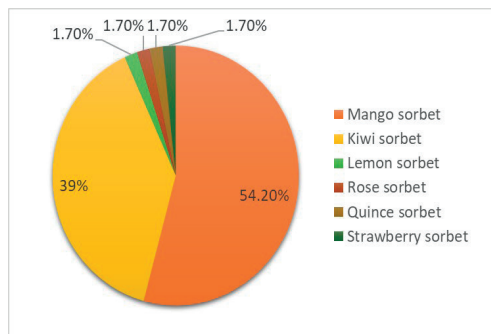


Figure 2. Q2 - What type of sorbet would you prefer to buy?

From Figure 3, it can be seen that most people (50.80), are influenced by many factors (brand, quality, price and packaging), in choosing to purchase a food product. Only 10.20% of those surveyed consider that these factors have a minor influence on the purchase decision of a food product.

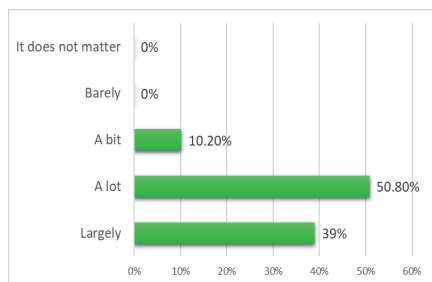


Figure 3. Q3 - How much are you influenced in the purchase of a food product by the following factors: brand, quality, price, packaging?

According to the illustrated data (Figure 4), 81.40% of people consider that the most important sense in choosing sorbet is the taste, while 13.60% of them consider the color or texture the most important factors and only 5.10% take into account the aroma of the product.

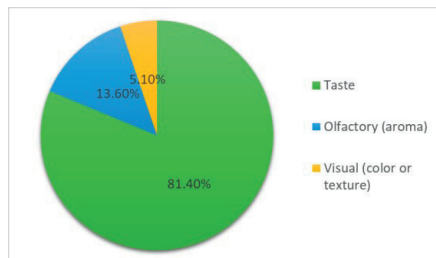


Figure 4. Q4 - From your point of view, what is the most important sense in choosing sorbet?

In terms of taste quality (Figure 5), the mango product with the addition of pea sprouts obtained majority results with a pleasant taste quality, and it was voted very satisfactory and satisfactory in proportion of 23.70% and 32.20% respectively. Only, 3 out of 59 people found the taste quality unsatisfactory.

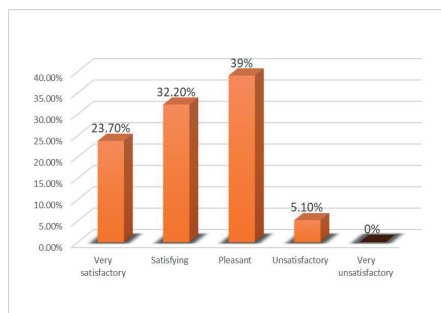


Figure 5. Q5 - What is the taste quality of the mango sorbet preparation with the addition of pea sprouts (*Pisum sativum* L.)?

Regarding the quality of the kiwi product taste (Figure 6), it was pleasant for a majority of 44.00% of people, satisfactory for 30.50%, very satisfactory only for 16.90%.

Four persons participating in the questionnaire declared the quality to be unsatisfactory, and only one person stated that they were not at all satisfied with the taste quality of this product.

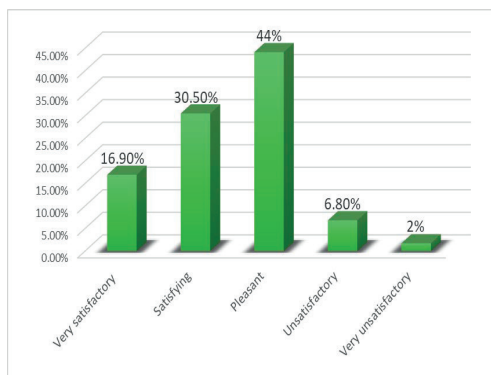


Figure 6. Q6 - What is the taste quality of the kiwi sorbet preparation with the addition of pea sprouts (*Pisum sativum* L.)?

In terms of the texture of the product obtained, the results were similar for both mango and kiwi sorbet (Figure 7 and Figure 8).

A majority of 42.40% answered that the change in texture by adding pea sprouts was insignificant in obtaining the final product.

Nearly a quarter of respondents thought that the texture was significantly altered by the presence of pea sprouts.

One person considered the texture changed a lot due to the addition of sprouts in both cases.

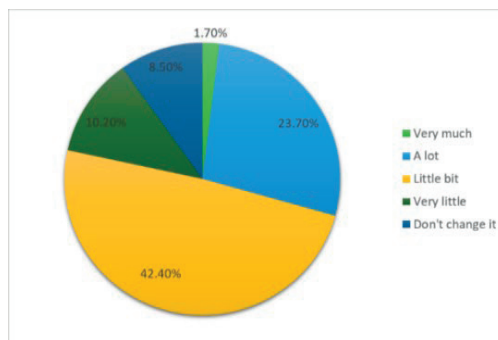


Figure 7. Q7 - Do you think that the pea sprouts (*Pisum sativum* L.) added to mango sorbet change its texture?

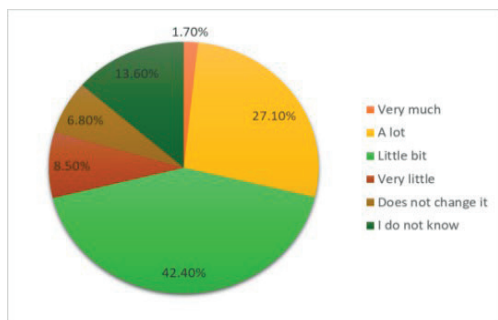


Figure 8. Q8 – Do you think that the pea sprouts (*Pisum sativum* L.) added to kiwi sorbet change its texture ?

In proportion to 40.70% (mango - Figure 9), respectively 50.80% (kiwi - Figure 10), of respondents considered that aroma of the product was less influenced by the presence of pea sprouts. Thereby, 33.90% respondents considered that the aroma changed after the addition of sprouts in mango sorbet, while 27.10% respondents for kiwi sorbet. Also, only 1.70% respondents considered that the aroma was very much changed by the presence of pea sprouts.

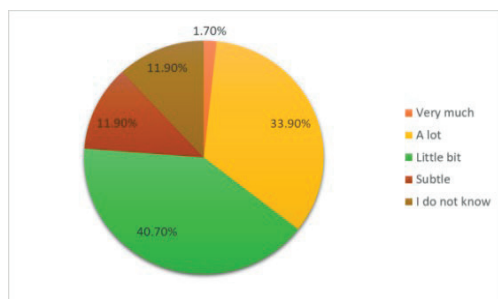


Figure 9. Q9 - Do you think that pea sprouts (*Pisum sativum* L.) added to mango sorbet change its flavor?

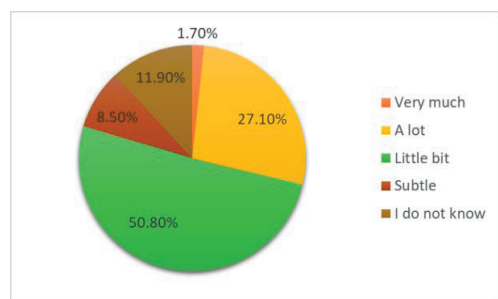


Figure 10. Q10 – Do you think that pea sprouts (*Pisum sativum* L.) added to kiwi sorbet change its flavor ?

About quantity of pea sprouts (*Pisum sativum* L.) from sorbet (Figure 11), 57.60% of the

respondents considered that the new fruit sorbet product with the pea sprouts should contain a moderate amount of sprouts (20% of the final product), while 37.30% of them would prefer a small amount of sprouts (10% of the final product), and 5.10% would like pea sprouts to be found in an large of 30% of the total amount of the product.

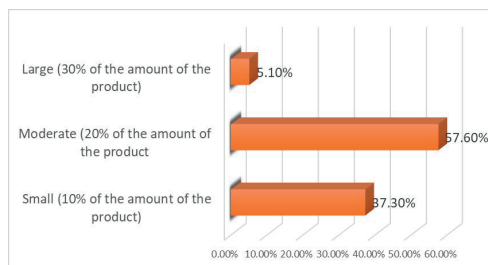


Figure 11. Q11 - Which quantity of pea sprouts (*Pisum sativum* L.) do you consider the sorbet must contain?

Compared to other marketed sorbets, the product with mango sorbet and pea sprouts has obtained positive results (67.80 good and 28.80 very good), in terms of quality (Figure 12), and 94.90% of people want this product to be marketed (Figure 13).

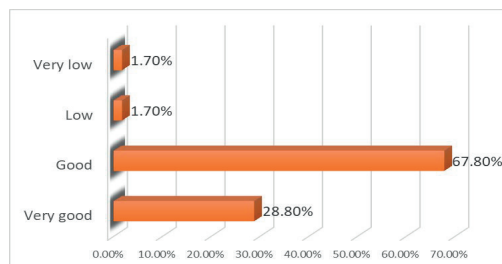


Figure 12. Q12 - What quality would you give to the mango sorbet with pea sprouts (*Pisum sativum* L.), compared to other marketed sorbets?

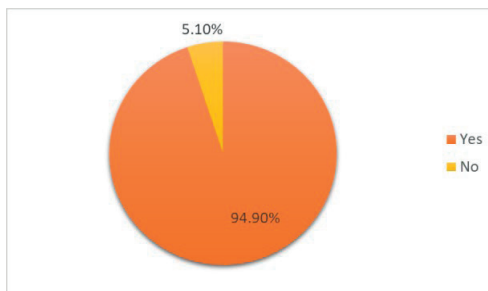


Figure 13. Q13 - Would you like this product to be marketed?



Like the mango sorbet with pea sprouts, the kiwi product enjoyed the appreciation of quality, a majority of 67.80% considering it of good quality (Figure 14), and 91.50% of the participants in the questionnaire want this product to be marketed (Figure 15).

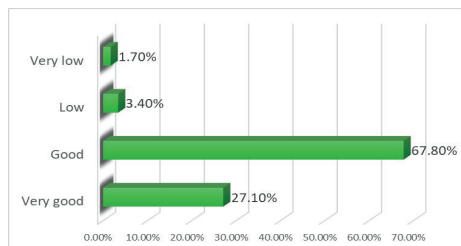


Figure 14. Q14 - What quality would you give to the kiwi sorbet with pea sprouts (*Pisum sativum* L.), compared to other marketed sorbets?

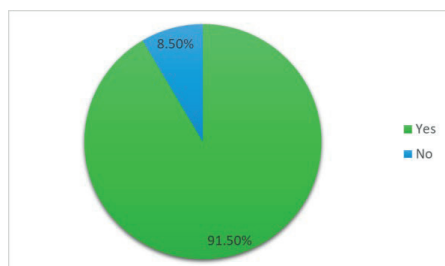


Figure 15. Q15 - Would you like this product to be marketed?

Because it is desired to market these new products from mango or kiwi and pea sprouts, the participants chose, in proportion of 44.10%, the amount of 9-10 RON to be the most suitable price for 100 grams of product. 35.60% of respondents would pay the amount of 8-9 RON, and 20.30% would prefer the price of 7-8 RON *per* 100 grams of product (Figure 16).

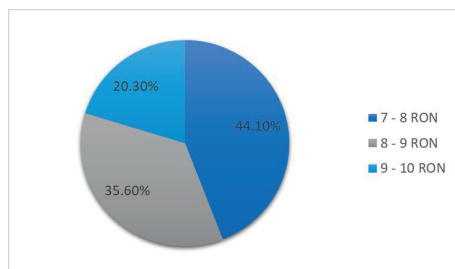


Figure 16. Q16 - What would be the maximum price you would be willing to pay for 100 g of mango or kiwi sorbet with the addition of pea sprouts (*Pisum sativum* L.)?

Following the questionnaire, the resulting data were obtained:

- 61.00% of people consume sorbet very rarely, this highlighting the limited knowledge about this healthy alternative dessert;
- half of consumers are greatly influenced by brand, quality, price and packaging in purchasing a product;
- 81.40% of the taste is considered the most important sense in choosing sorbet;
- sorbet texture is very little modified by the addition of pea sprouts (*Pisum sativum* L.) in mango sorbet in the case of 42.40% of consumers. Approximately the same preferences are observed in the case of kiwi sorbet with the addition of pea sprouts (*Pisum sativum* L.);
- 57.60% of consumers prefer a moderate addition of pea sprouts (*Pisum sativum* L.) to mango or kiwi sorbet, and
- in the case of both types of sorbet with the addition of pea sprouts (*Pisum sativum* L.), over 90.00% of consumers would like to purchase them.

## CONCLUSIONS

In order to formulate the novel food product, pea sprouts obtained from soil substrate and mango or kiwi sorbet obtained by blending the fruit were used. The novel food product preparation was followed by the sensory analysis of the product and an online questionnaire completed by 59 people.

The sensory analysis results presented in this paper showed the influence of pea sprouts (*Pisum sativum* L.) added to mango (*Mangifera indica* L.) or kiwi (*Actinidia deliciosa*) sorbet on the consumer preferences and the questionnaire results established the consumer's purchasing preferences. Thus, more than half of consumers considered the addition of pea sprouts (*Pisum sativum* L.) to mango or kiwi sorbet to be pleasant and satisfying in terms of taste quality and according to consumer preferences, a corresponding price *per* 100 grams of product would be between 9 and 10 RON.

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