

ORGANOLEPTIC QUALITY OF FRUIT SORBETS CONTAINING YACON (*SMALLANTHUS SONCHIFOLIUS* Poepp. and Endl.)

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ABSTRACT

Due to the growing consumer interest in functional food, sorbets containing yacon root powder as a source of many valuable compounds, especially fructans, may be a desirable alternative to traditional ice cream desserts. The aim of this work was to evaluate organoleptic quality (taste, color, aroma as well as consistency and structure) of fruit sorbets containing *Smallanthus sonchifolius* (Poepp. and Endl.) root powder in dependence on kind of fruit (orange, cherry, strawberry), and its share in sorbet's recipe, using a 9-point hedonic scale (1 point = „I do not like it at all“, 9 = „I like it very much“). The results showed that organoleptic quality was depended on the kind and the share of fruit used to the sorbet production. Strawberry sorbets gained over 80% of maximal scores. One can conclude that yacon root powder can be used as the ingredient of fruit sorbet, with increased consumer liking.

Keywords: Sorbets, yacon, strawberry, orange, cherry, fruits, organoleptic evaluation

INTRODUCTION

Yacon (*Smallanthus sonchifolius* Poepp. and Endl., *Asteraceae*) is a native Andean crop, cultivated mostly for its tubers (Valentová and Ulrichová, 2003). It is still little known in Europe and Northern America; however one can observe its growing popularity as food supplement (Valentová et al., 2008). This plant is rich in glucose, fructose, and sucrose. It can be used as a source of natural sweeteners and syrups (Lachman et al., 2003). One of the most valuable compounds of yacon are fructans. They are not absorbed into the intestines, but are fermented in the colon by beneficial species of gut bacteria (Duncan et al., 2002; Pedreschi et al., 2003). Potential health benefits of prebiotics include inter alia constipation relief, improvement of calcium bioavailability, reduction of osteoporosis risk and anti-atherosclerotic effect (Lum and Albrecht, 2008). Because of its healthy properties, *Smallanthus sonchifolius* (Poepp. and Endl.) can be a valuable component of functional food, mainly for some risk groups of the population, e.g. women after menopause, seniors, diabetics, etc. A healthy diet plays an important role in the prevention of chronic diseases, so the consumption of vegetables and fruits is strongly recommended. This is why, growing popularity of fruit sorbets among consumers is observed. Indeed, frozen desserts are the most popular products eaten in or out the home (El Owni and Khater, 2010). Sorbet is a frozen dessert consisting of sugar syrup and fruit puree, providing a rich, smooth, creamy product without fat (Hong and Nip, 1990).

Developing a product that will survive in the market is challenging. Such factors as price, brand name loyalty, advertising and promotion are important. However consumer acceptability is needed to guarantee product success. Acceptability is dependent on those sensory attributes such as appearance, color, flavor, and others (Walker, 2002).

The aim of this work was to evaluate organoleptic quality of fruit sorbets containing yacon root powder in dependence on kind of fruit (orange, cherry, strawberry), and its share in sorbet's recipe.

MATERIAL AND METHODS

Research materials, sorbets production

The research materials were: yacon (*Smallanthus sonchifolius* Poepp. and Endl.) root powder, origin: Oxapampa, Peru, Lot N° Y-0306118-11-221111, production

date: November 2011, purchased from UK; sorbets (strawberry, cherry and orange taste) with yacon root powder. Fruits (frozen strawberries and cherry fruits, fresh oranges) and sugar were purchased from local market in Krakow, Poland.

The study was conducted in the laboratory of Food Technology and Nutrition Department, Faculty of Food Technology, as described previously (Topolska et al., 2013).

Production of sorbets (extract: 26%, share of fruits: 50 or 60%) was proceeded in the following steps: fruits were crushed by a universal multifunctional machine (type Zelmer 175.5), mixed with sugar and water, and stored for 0.5 h. Next, the mixture was freeze-dried using Frezer Mirkoz (Hungary) type MHFU/5A. Prior to the test, the sorbet containers were transferred to a freezer set at -22 °C.

Organoleptic evaluation

Organoleptic evaluation of sorbets (taste, color, aroma, consistency and structure) was performed by 15 panelists, with verified sensory sensitivity. The samples (30 mL) were served in white plastic coded cups. Water at room temperature was provided for mouth-rinsing. A 9-point hedonic scale (1 point = „I do not like it at all“, 9 = „I like it very much“) was used.

Statistical analysis

The analysis of variance (Statistica Software, ver. 9.0) was performed to determine differences in organoleptic quality for each sensory attribute. Post-hoc Duncan's test was used.

RESULTS AND DISCUSSION

Results

Mean scores for the tested organoleptic attributes of sorbets were shown in Tables 1-4.

Of the all samples, cherry sorbet with 60% fruit share had the lowest mean score for taste (Table 1). Orange sorbets containing yacon root powder were characterized by significantly better taste, independently of the fruit level in the recipe. The taste showed the best results ($p < 0.05$) in yacon sorbets made from strawberry (7.33±1.18 for sorbet with 50% fruit share and 7.47±0.92 for dessert with 60% fruit share, respectively).

Table 1 Mean scores (\pm SD) for acceptability of sorbet taste in dependence on fruit kind and share in the recipe

Kind of fruit	Fruit share	
	50%	60%
Orange	6.07 ^b \pm 1.67	6.33 ^b \pm 1.29
Cherry	5.53 ^{ab} \pm 1.41	4.87 ^a \pm 1.51
Strawberry	7.33 ^c \pm 1.18	7.47 ^c \pm 0.92

Mean values in the same column not followed by the same letter are significantly different ($p < 0.05$)

The color of cherry as well as strawberry sorbets with yacon root powder was not significantly differed, independently of fruits share (Table 2). However, the color of orange sorbets gained significantly lower scores than the other samples.

Table 2 Mean scores (\pm SD) for acceptability of sorbet color in dependence on fruit kind and share in the recipe

Kind of fruit	Fruit share	
	50%	60%
Orange	5.67 ^a \pm 1.68	5.87 ^a \pm 1.60
Cherry	7.73 ^b \pm 0.46	7.60 ^b \pm 0.63
Strawberry	7.60 ^b \pm 0.99	7.73 ^b \pm 0.96

Mean values not followed by the same letter are significantly different ($p < 0.05$)

According to organoleptic panel evaluation, strawberry sorbet had significantly better aroma than cherry one (Table 3). Orange sorbets did not differ significantly ($p > 0.05$) from strawberry and cherry samples, independently of fruit share.

Table 3 Mean scores (\pm SD) for acceptability of sorbet aroma in dependence on fruit kind and share in the recipe

Kind of fruit	Fruit share	
	50%	60%
Orange	5.67 ^{ab} \pm 1.35	5.40 ^{ab} \pm 1.30
Cherry	4.80 ^a \pm 1.93	4.60 ^a \pm 1.96
Strawberry	6.20 ^b \pm 1.78	6.27 ^b \pm 2.09

Mean values not followed by the same letter are significantly different ($p < 0.05$)

Moreover, the highest score of the consistency and structure was obtained in strawberry sorbets (Table 4). Simultaneously, it was no difference between

orange and cherry sorbets, taking into consideration 50% or 60% fruits used for their production.

Table 4 Mean scores (\pm SD) for acceptability of sorbet consistency and structure in dependence on fruit kind and share in the recipe

Kind of fruit	Fruit share	
	50%	60%
Orange	6.20 ^a \pm 1.37	6.47 ^a \pm 1.30
Cherry	6.13 ^a \pm 1.36	5.67 ^a \pm 1.35
Strawberry	7.33 ^b \pm 1.18	7.20 ^b \pm 1.26

Mean values not followed by the same letter are significantly different ($p < 0.05$)

Discussion

Interactive Market Research Institute conducted the project "Functional Foods 2012 - what the Polish has got on the plate", among 1,000 respondents aged 15 years and older, who were asked, among others, about motives for functional food choice. The composition of the product is the most important for 50% respondents, followed by nice flavor/taste, and the information about healthy properties (Siewierska, 2012). The evaluation to identify specific organoleptic attributes driving product acceptance is necessary to the introduction of new product.

Our study showed that yacon root powder had a potential to be an ingredient of fruit sorbets. However, organoleptic quality of products significantly depended on the kind of fruit, and - in some cases- also on its share in the recipe.

Thus, the development of frozen desserts that satisfy consumers' eating desire, yet provide potential health benefits, is a challenge (Walker, 2002). According to Lum and Albrecht, (2008), fructan presence in the product is good, not only from nutritional, but also technological point of view. In this respect, inulin-type fructans lower the freezing point in frozen desserts, but also enhance fruit flavor, and balance the sweetness profile.

Color is probably the first characteristic of a food evaluated by a consumer (Walker, 2002). It was observed, that color of strawberry and cherry sorbets with the addition of yacon root powder obtained high scores, according to panelists evaluation (Table 2). Additionally, the taste of strawberry sorbets containing yacon gained the highest scores. The lowest marks of this attribute were obtained for cherry desserts (Table 1).

It is known for a long time that fresh fruit is good for sorbet production because it creates a taste as close to the fruit as possible (Stogo, 1998). Simultaneously, freezing of fruit affects sensory attributes only in small range, and frozen fruits are easy to achieve for all seasons. This is why, they are ideal raw material for frozen dessert production.

Our results confirmed that usage of frozen strawberry allow to obtain product of high quality. Sorbets made of this fruit had the highest scores in organoleptic evaluation, standing about 80% of maximum value (Tables 1-4). However, we

observed that taste of sorbet made from fresh orange was not good accepted by panelists.

Good acceptance of strawberry desserts was in the agreement with the data of TNSOBOP (Andrzejewska, 2009). According to Mrowiec-Mateja, (2011), raspberry and citrus sorbets are also acceptable by the consumers. However, our study showed that orange sorbets with yacon had worse organoleptic quality, and gained about 65% of maximum scores. Among sensory attributes, aroma of these products gained the lowest scores (Table 3).

According to Walker, (2002), flavor and texture were identified as the most critical attributes affecting acceptance. It is to emphasize, that consistency and structure of strawberry sorbets containing yacon, with 50% and 60% fruit share were evaluated as very good (Table 4). Also Owni and Khater, (2010) reported that the best texture score was found in ice cream made from strawberry. Simultaneously, they observed also the lowest scores of flavor and taste in strawberry samples. We did not observed this tendency in our study.

Obtained results indicated that production of cherry sorbets with yacon should be modified (by flavour ingredients), taking into consideration all organoleptic attributes, except from color.

CONCLUSION

The results showed that yacon root powder may be a potential ingredient for use in sorbets production. Organoleptic evaluation of sorbet indicated that the most acceptable was strawberry one. Continued research needs to be conducted to determine the ideal amount of yacon as well as fruits to produce frozen dessert from orange and cherry.

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