Study on the Quality of Fruit Juices Innovated by Adding Rhubarb Extract

Steluța Radu
University of Science Agriculture and Veterinary Medicine Iași, Romania
stelaradu2010@yahoo.com
Mihaela Constandache
"Carol I" Commercial College from Constanța, Romania
mihaela_constandache@yahoo.com
Anca-Cristina Stanciu
"Ovidius" University of Constanța, Romania
castan22us@yahoo.com

Abstract

The research study carried out follows the effect produced by the natural invert substances extracted from the Rhubarb stems, on the acidity of the native fruit jellies. The identification of the acidic substances in the rhubarb stems does not allow the experimentation of their use for the replacement of the citric acid obtained by chemical synthesis. Thus, an aqueous extract of rhubarb was obtained which was successfully used to conserve indigenous fruit jellies experimentally obtaining stable of sugary products, which did not show changes in structure through saccharification. There were studied for types of jellies obtained from natural fruits: plums, nectarines, peaches and grapes to which it's were added different concentrations of rhubarb extract, following the sensory, physical and chemical characteristics of the preservation jellies. The applied scientific research aimed at both innovating baby jellies and consumer segments with different digestive disorders, as well as obtaining a technologically stable product.

Key words: jellies, acidification, rhubarb extract
J.E.L. classification: I2, I23

1. Introduction

Rhubarb is a plant native to Tibet (Central and Eastern Asia), but is found and cultivated in Europe. So that the rhubarb stems are used in the preparation of sweet products: jellies, sweets, compotes, as well as pies or rhubarb pies. By its benefits rhubarb reduces the risk of cancer, it is recommended for cases of indigestion, regenerates liver cells, lowers blood pressure and helps fight bad cholesterol. It is a good digestive and the consumption of this plant at a low temperature helps to balance the acids that produce digestion.

It is ideal to consume only the stem as the leaves contain a large amount of oxalates, which can become toxic in the context of consuming a large amount.

The plant is rich in mineral substances (magnesium, calcium, phosphorus, potassium, sodium, zinc, selenium, iron), proteins, fiber and carbohydrates. It also has a large amount of vitamins, the most important of which are Vitamin A is a powerful antioxidant that contributes to the health of epithelial cells, contributes to bone metabolism and ensures the body's immunity. In addition, vitamin C, vitamin K and calcium, help strengthen the immune system and teeth. (Mogos, 1999, p. 106). Due to the benefits of this plant it is recommended to be introduced into the diet as it helps the human body for normal functioning and harmonious development of the human body (www.sciencesdirect.ro). Today, the processing technology of fruit jellies uses as a manufacturing recipe: sugar, water, dye, citric acid, thickening agent, identical natural flavors that will taste the assortment after the fruit associated with the finished product (Radu, 2008).

2. Research methodology

The experimental research took into consideration the juice extracted from four types of fruits: grapes, plums, nectarines and peaches. We obtained for the raw material which was subsequently used for the innovated fruit jellies which used rhubarb extracts with acidifying effect and inverting sucrose.

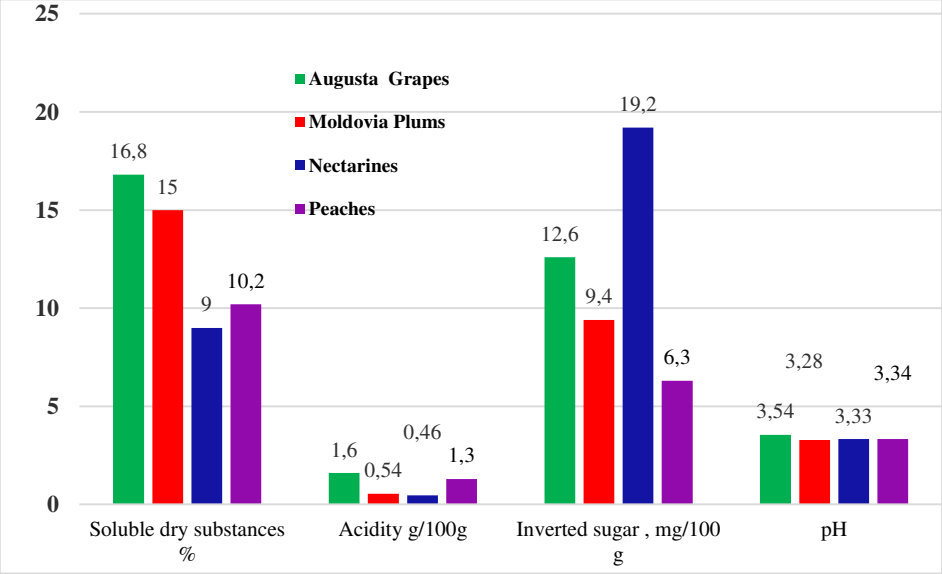
Thus, it was practiced to add rhubarb extracts in fruit juices in different concentrations of: 3% (samples 1, 2, 3, 4 - grapes, plums, nectarines, peaches), 5% (samples 5, 6, 7, 8 - grapes, plums, nectarines, peaches, 10% (samples 9, 10, 11, 12- grapes, plums, nectarines, peaches), 15% (samples-13, 14, 15, 16 - grapes, plums, nectarines, peaches), 20% (samples - 17, 18, 19, 20 - grapes, plums, nectarines, peaches). So that, the innovated samples were examined both from the sensory and from the physical and chemical characteristics. Regarding the carbohydrate/inverted sugar content, the acidity, the pH and the soluble dry substances we studied in the same time the fruit juices with different concentrations of rhubarb extract.

Following the laboratory experiments we obtained taste variations regarding the taste of sweet sour and we followed the behavior of the jellies innovated by comparative analysis during the storage period. The experimental methods used a number of 40 samples, coupled - the control sample - the sample to be analyzed for each type of fruit taken in the experimental research. Two types of acidifiers were used in the sample: natural acidifier, rhubarb extract, identical acidifier, citric acid. The determinations from the experimental research and the physical and chemical analyzes were performed according to analytical methods (Radu, 2010).

3. Findings

The results of the experimental are the following: the fruit juices recorded decreasing values from 16.8% soluble dry substances in Augusta Grapes, 15% in Moldova Plums, 10.2% in peaches and 9% in nectarine juices (figure no. 1).

Figure no.1. Dynamics of the quality characteristics of the indigenous fruit juices



Source: output graph by own contribution

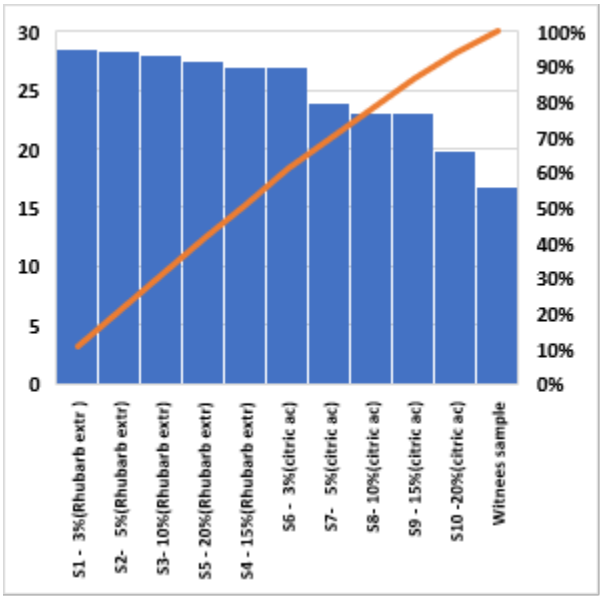
The glucose determined in the fruit juices are having an upward trend from 6.3 mg / 100g in peaches, 9.4 mg / 100g in plums, 12.6 mg / 100 g in grapes and 19.2 mg / 100g in nectarines.

The acidity of fruit juices also varies from 0.46 g / 100g in nectarines, to 0.54g / 100g in plums, 1.6 g / 100 g in grapes and 1.3 g / 100g in peaches. It is noted that grapes and peaches are more acidic in fruit juices, while nectarines and plums are less acidic. Regarding the pH it is observed that the values recorded are in the range 3.28-3.54, grapes having a pH of 3.54, plums a pH of 3.28, nectarines a pH of 3.33, and peaches a pH of 3.34 (figure no.1).

The analysis of the quality characteristics for the raw material of the fruit pulp led us experimentally to choose appropriate concentrations for the sampling. Thus, we obtained the first series of samples (samples 1, 2, 3, 4, 5) consisting of five types of fruit juices to which rhubarb extract was added in concentrations of: 3%, 5%, 10%, 15%, 20%. We performed the second series of samples (samples 6, 7, 8, 9, 10) in which the acidification with citric acid was performed in concentrations of: 3%, 5%, 10%, 15%, 20%.

The Pareto diagram graphically represents the distribution of data in decreasing order of frequency and the trend is given by a cumulative line represented on a secondary axis, as a percentage of the total. From the interpretation of the data, it follows that the samples 1, 2, 3, 4, 5 concentrated by boiling with rhubarb extract have a much higher solubility compared to the witness sample, sample 5 with 20% rhubarb extract had double pound of 32,4 %, while citric acid samples only reach the limit of 27%. From this, we can conclude that rhubarb extract contains other organic substances that enrich the nutritional value of the jellies, while the samples 6, 7, 8, 9, 10 acidified with citric acid solution are more aqueous, so they are less watery taste (figure no.2).

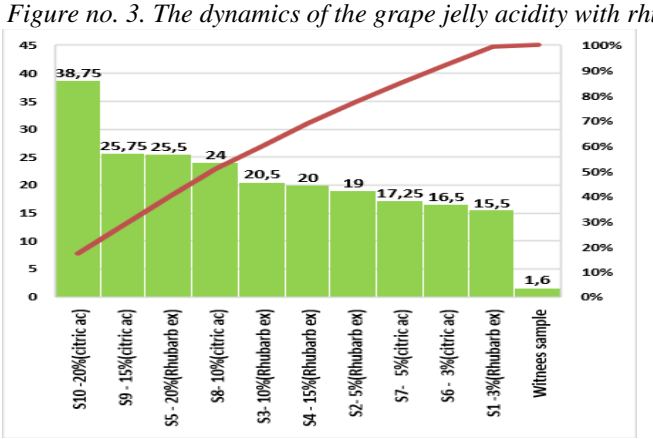
Figure no. 2. The dynamics of the soluble dry substance at the innovative fruit jellies depending on the concentration in nutrients



Source: output graph by own contribution

The dynamic of the acidity in the innovated fruit jellies indicates that the addition of rhubarb extract and concentration increased the acidity of the grape jelly from 5.2 g/100g acidity to 15-20.5 g/100 g acidity, in the case of samples 1, 2, 3, 4 in which the natural extract was used in different concentrations increasing by 3%, 5%, 10%, 15%, 20% (figure no.3).

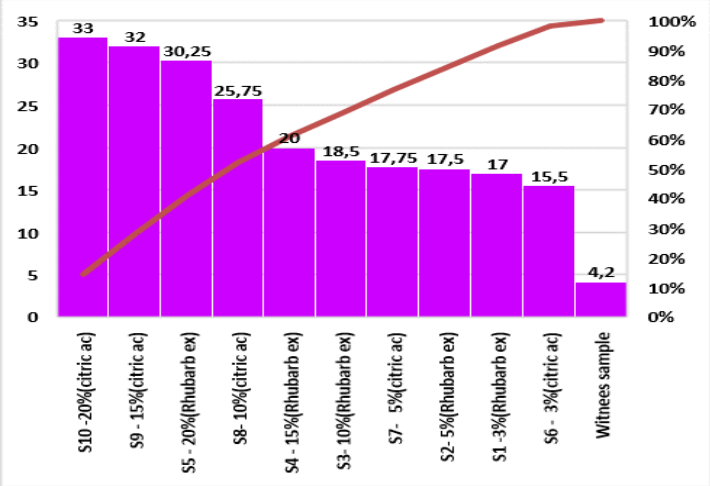
Figure no. 3. The dynamics of the grape jelly acidity with rhubarb extract / citric acid



Source: output graph by own contribution

The evolution of the acidity of the innovated fruit jellies indicates that by adding rhubarb extracts and by concentration, the acidity of the plum jelly increased from 1.3 g/100g acidity to 10.9-22 g/100 g, acidity in the case of samples 5, 6, 7, 8 in which the natural extract was used in different concentrations increasing by 3%, 5%, 10%, 15%, 20% (figure no.4).

Figure no. 4. The dynamics of the plums jelly aciditywith rhubarb extract / citric acid



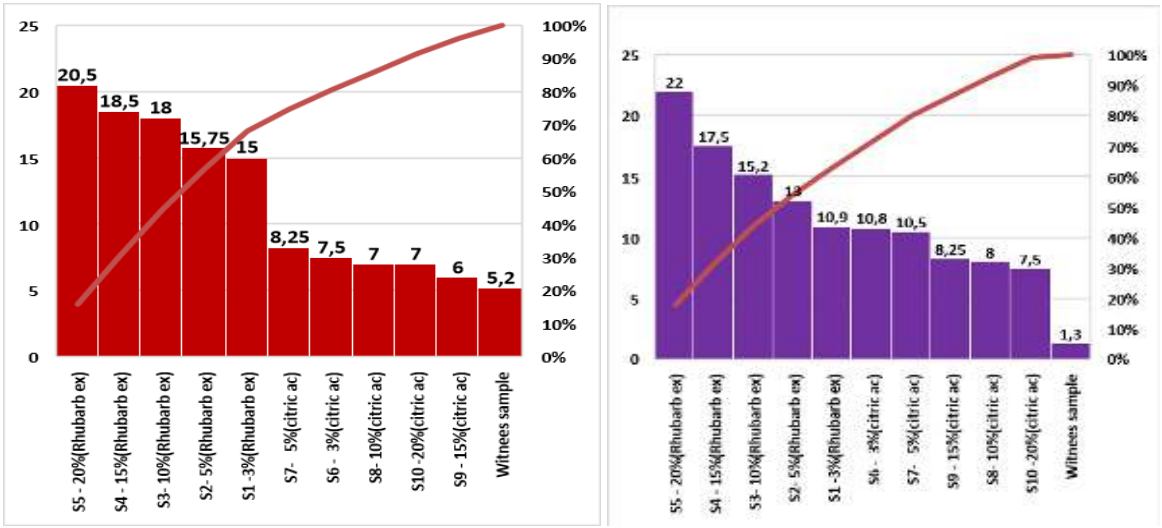
Source: output graph by own contribution

The dynamic of the acidity of the innovated fruit jellies indicates that the addition of rhubarb extract and concentration increased the acidity of the nectarine jellies from 5.2 g/ 100g acidity to 15-20.5 g / 100 g acidity in the case of samples 11, 12, 13, 14, 15 in which the natural extract was used in different concentrations increasing by 3%, 5%, 10%, 15%, 20% (figure no.5).

The evolution of the acidity of the innovated fruit jellies indicates that by adding rhubarb extract and by concentration the acidity of the peach jelly increased from 1.3 g/100g acidity to 10.9-22 g/100 g acidity in the case of the samples 16, 17, 18, 19, 20 in which the natural extract was used in different concentrations increasing by 3%, 5%, 10%, 15%, 20% (figure no.6).

Figure no. 5. Dynamics of the nectarines jelly acidity with rhubarb extract/citric acid

Figure no. 6. Dynamics of the peaches jelly acidity with rhubarb extract/citric acid



Source: output graph by own contribution

The dynamic of the pH in the fruit jellies innovate indicates small variations of the pH indicator between the limits of 3.43-3.72, range that is tangential to the reference pH from the witness sample that recorded values of 3.54 (figure no.7). Regarding the glucose content, it is kept within constant limits both for the addition of rhubarb extract and for the addition of citric acid. The highest glucose content was recorded in sample 5 to which it was added 20% rhubarb extract (figure no 8).

Figure no. 7. PH dynamics in Innovative fruit jellies

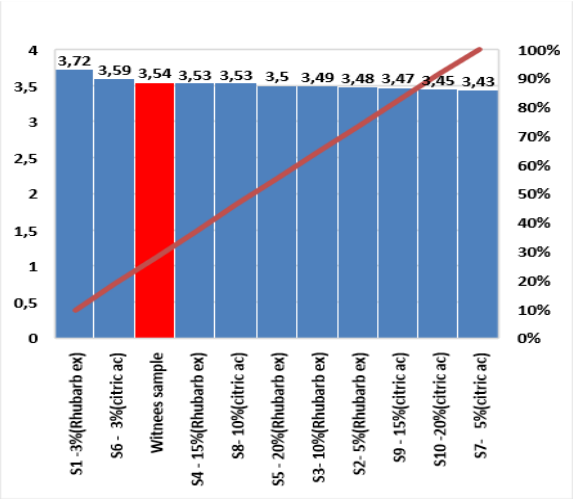
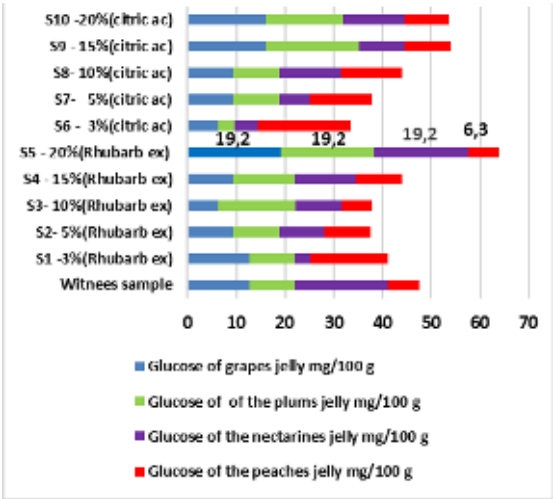


Figure no. 8. Glucose dynamics of fruit jellies innovated with the addition of rhubarb extract



Source: output graph by own contribution

This means that in addition to the natural sugars from the fruits used as raw material (grapes, plums, nectarines, peaches) in the experimental obtaining of the jellies where rhubarb extract was used, the glucose content was enriched by the use of the extract.

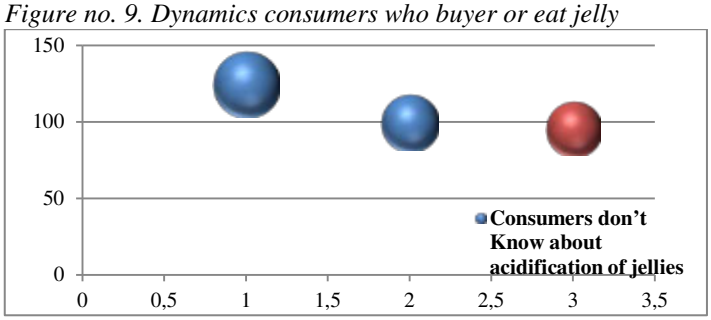
As a result, the use of rhubarb extract has a multiple effect, on the one hand it prevents sugar inversion, on the other hand it also increases the glucose content of the finished product, and thirdly it determines the taste of the finished product by increasing the acidity which it was demonstrated. experimental. This is a novelty aspect because in the manufacture of fruit jellies, citric acid is commonly used which produces their acidification, also having the effect of preventing the inversion of the sucrose, favoring the stability of the finished products. (Prevents the crystallization of the sucrose).

The idea of making jellies for children with rhubarb extract without adding citric acid for acidity correction, has aroused the interest of a large number of consumers.

In a sociological survey conducted on isondaje.ro it was found that 80% of the consumers - parents do not know that the jellies they buy for their children contain as a food additive the citric acid of synthesis (figure no. 9), used mainly to stabilize the product finite.

75% of consumers are not aware of the effects of acidification substances on digestion, as well as the impact of these substances on the digestive tract.

Figure no. 9. Dynamics consumers who buyer or eat jelly



Source: output graph by own contribution

Through technological explanations we managed to inform all the respondents that using a natural product such as rhubarb extract for acidification would be much healthier for obtaining jellies.

4. Conclusions

We can conclude the following:

- By choising raw materials of fruit grapes, plums, nectarines and peaches we obtained from experimental research decreasing values from 16.8% soluble dry substances to grape juice Augusta, 15% at Moldova plums, 10.2% at peaches and 9% nectarine juice.
- The level of glucose in the fruit juices studied indicates an increasing trend from 6.3 mg/100g in peaches, 9.4 mg/100g in plums, 12.6 mg/100g in grapes and 19.2 mg/100g to nectarines.
- The acidity has been studied as the most important factor because the use of rhubarb extract to obtain innovative fruit jellies can generates a major impact in the modification of the classical technology of obtaining jellies. Thus, the fruit juices registered values from 1.3 g/100 g in peach juice to 5.4 g/100 g in plums. However, acidity corrections made when processing fruit juices as well as jellies are a very practical operation in the production process.
- An important novelty aspect encountered in the manufacture of innovative fruit jellies is related to use of rhubarb extract which have produced their acidification, also having the effect of preventing the invert of sucrose, favoring the stability of the finished products (prevents the crystallization of sucrose).
- We recomand fruit jellies, which used 3% and 5% rhubarb extract, these being the most balanced in taste.

5. References

- Mogos, V.T., 1999. *Food in Nutrition and Metabolism*, Vol. II. p.106;
- Radu. S., 2008. *Vegetables food Processing Technologies*. Iasi: Pim Publishig House ISBN: 978-606-520-042-5;
- Radu. S., 2010. *Practical papers-Techniques and methods of food conservation*. Iasi: Pim Publishig House ISBN:606-520-762-9;
- www.sciencedirect.com