NEW METHODS OF USING ROSEHIPS IN THE PROCESSING OF TOMATOES

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ABSTRACT

In this paper there have been carried out researches about new methods of using rosehips in food industry in combination with tomato juice.

Rosehips have been added in order to improve the consistency, the taste, lycopene, vitamins and minerals contents.

In function of the proposed objectives (juice or tomato paste), by modifying the ratio between rosehips and tomatoes there can be obtained products with different consistency by the effect of dry matter from rosehips.

The time of exposure with heat treatment has influenced the properties of the final product.

There was emphasized the treatment 3 as regard the balanced taste, consistency and vitamin C content.

INTRODUCTION

Rosehip is a scrub met in spontaneous flora, with a height wich range between 1 and 5 meters. The strain is covered with little, sharp thorns looking like hook. The leaves are pinnate, with 5-7 folioles. The flowers are usually pale pink, but there are also white or dark pink flowers. They have a diameter of 4-6 cm. and they are made of five petals. The fruit, named rosehip, has ellipsoidal shape and it's red or dark orange. In the last years, it was taken in civility in order to increase of productivity and quality indexes (Mladin G. and colab, 1995).

Rosehips are used not only in food industry, but also in the pharmaceutical one due to the multiple properties they have, but especially due to the great content of vitamin C. As Henchen says (1980), there are numerous species that contain up to 1000 mg to 100 g of fresh substance. *Rosa haematodes* contains even 2900 mg vitamin C/100 g (Krussman, 1974).

Even if part of vitamin C is destroyed by oxidation during boiling, in the obtained preparations remain though considerable amounts. It is important for fruits not to come in contact with air and metals during the preparation (Wagner, 2002).

Besides the very great contain of vitamin C, rosehips also contain: 4,1g% total protein; 24,6% carbohydrates; mineral substances 3,25%; carotene 5-7 mg% and lycopene 12,9 – 35,2 mg/100 g (Volker Bohm and colab. 2013; Brasovan Andreea at all, 2011; Barros Lillian, 2011; Sezai Ercisli, 2007; Demarchi M. and colab. 2013).

Rosehips have a high antioxidant potential (Ozturk Yilmaz S., 2011; Orhan, N., at all, 2009).

In food industry are recommended the species *Rosa serica f. pteracantha* and *Rosa rugosa* , wich have thick pulp unlike *Rosa canina,* wich has thiner pulp (St. Wagner, 2002).

For culinary preparations they are used simple or in combination with other fruits (apples, underbrush, tomatoes, etc).

Through this study, we aimed to identify ways of processing rosehips, directly in tomato juice, reducing processing time.

Normally, getting different products from simple tomatoes is achieved by smashing and panning them, followed by the concentrating of tomato juice up to getting the

consistency of juice or paste. Thanks to the dry substance brought by rosehips, we estimate a significant reduction in the time required for boiling, necessary for the tomato juice concentration. This keeps a greater quantity of vitamin C, but it also reduces the energy consumption necessary for processing. Also, the content of the tomato lycopene of 2,8-4,3 mg/100g, is increased by the addition of rosehips wich, after Bohm and colab (2003) have a superior net content (12,9 – 35,2 mg/100 g).

MATERIAL AND METHODS

For the accomplishment of assays were used rosehips from the spontaneous flora (*Rosa sp.)* existent on the area of the Teaching and Researching Place Banu Maracine, and tomatoes come from experimental parcels of the truck farming discipline, also set at Banu Maracine, Plumty F1 variety.

There were completed 5 variants in three iterations, consisting of different proportions of tomatoes/rosehips. The experienced variants were: V1- ratio tomatoes/rosehips 5:1, V2- ratio tomatoes/rosehips 5:2, V3- ratio tomatoes/rosehips 5:3, V4-ratio tomatoes/rosehips 5:4, V5-ratio tomatoes/rosehips 5:5 (table 1).

For the first variant were tested five boiling times: $V_{1(1)}$-25 minutes; $V_{1(2)}$-30 minutes; $V_{1(3)}$-40 minutes; $V_{1(4)}$-45 minutes; $V_{1(5)}$-50 minutes(table 2).

The purpose of the research was to identify ways of processing rosehips, directly from the tomato juice and to determine the optimal proportion of tomatoes and rosehips needed to obtain a product with superior, nutritional and organoleptic qualities. By the dry substance intake brought by rosehips, the boiling time necessary for the concentration of the tomato juice reduces. Also, this way it keeps a higher amount of vitamin C.

The assays were set up in quantities up to one kilo, respecting the proportions of variants. The boiling was effectuated in open ware with diameter of 30 cm. After boiling, rosehips were smashed and passed through thick sieve for withholding seeds. On the finished product were effectuated the following determinations: instant, dry substance content, vitamin C and the consistency of the finished product.

The instant dry substance was examined with the help of the 2WAJ refractometer.

Vitamin C was quantitative determined by the iodine method. Due to the fact that the method is exact just when in the analyzed solution can be found only one product with reducing attribute (Mladin G. and colab.1995), the presented data are indicative.

To determine the consistency of the evidence was used the Bostwick consistometer (the consistency being expressed in cm., the stretch distance in 30 seconds at 20^oC).

Consistency is a physical characteristic of great importance in the case of food products such as creams, jellies, marmalades, juices, gelatine, syrups, concentrated tomatoes etc. Measuring the quality of this factor gives a value index with wich one can appreciate the finished product by setting the right proportions of added ingredients. Also, the viscosity provides tips and upon the flow of materials through the installations and pipes, wich represents the importance of design of machinery and anticipate conclusions upon the duration of heat treatments.

The data obtained were statistically processed in order to clarify the differences between variants and there were also effectuated correlations between the different characters. Also for the purpose of emphasizing good combinations of tomatoes and rosehips, was established the coefficient of correlation and linear regression.

RESULTS AND DISCUSSIONS

Combined processing of rosehips with tomatoes in different proportions and with different boiling, shutter speeds resulted in getting some finished products with new characteristics and substantially improved biochemical characteristics.

Thus, from the obtained data (first and second tables) we observe that the experienced variants recorded different content from the dry, soluble substance, the

values between 6,5 and 22,4%. The increasing of dry, soluble substance was directly proportional with the boiling time and the added rosehips quantity.

Regarding to vitamin C, the content ranged between 68,4 mg/l and 197,53 mg/100g, depending on the boiling time and the added rosehips quantity. The quantity of vitamin C has grown directly proportional with the rosehips quantity and has dropped inversely proportional with the boiling time.

The consistency has grown along with the increase of the boiling time and the rosehips quantity, having values between 14,30 and 2,90 cm.

The process has proved to be feasible because rosehips could be passed through a sieve and crushed after only half an hour of boiling. The short boiling time has resulted in the conservation of a big amount of vitamin C.

The variation of the content of vitamin C, SUS and the consistency depending on the added rosehips quantity

Table 1

Variant	Ratio Tomatoes/Rosehips	Quantity of tomatoes and rosehip added	Vitamin C mg/100g	SUS %	Consistency (cm)
V1	5 : 1	500/100	$82,72^{000}$	$9,8^{000}$	$14,30^{***}$
V_2	5 : 2	500/200	$112,61^{00}$	$13,4^{000}$	$8,50^{**}$
V_3	5 : 3	500/300	139,40	$17,2^{0}$	$5,90^{0}$
V_4	5 : 4	500/400	$168,53^{**}$	$19,6^{***}$	$3,10^{000}$
V_5	5 : 5	500/500	$197,53^{***}$	$22,4^{***}$	$2,90^{000}$
Average -Mt	-	-	140,15	6,94	6,94
DL 5%			16,75	0,50	0,85
DL 1%			24,32	0,74	1,24
DL 0,1%			36,48	1,10	1,86

As a result of the meaning analysis of differences between variants with different content of rosehips and their average(first table) stood out variants 4 and 5 with the help of distinctly significant differences and very significantly positive, in terms of the content of vitamin C and the content of dry substance. The differences were significant negative recorded at the consistency are due to the expression in centimeters, distance being inversely proportional to the flow consistence. The negative differences recorded signify an increased consistency.

The variation of the content of vitamin C, of SUS and the consistency depending on the boiling time(first variant: ratio tomatoes/rosehips 5:1)

Table 2

Variant	The time boiling (min.)	Vitamin C mg/100g	SUS %	Consistency (cm)
$V_{1(1)}$	25	$91,30^{*}$	$6,5^{000}$	$14,20^{***}$
$V_{1(2)}$	30	82,72	$8,9^{000}$	$11,50^{**}$
$V_{1(3}$	35	76,20	11,3	8,83
$V_{1(4)}$	40	70,35	$13,7^{***}$	$6,16^{00}$
$V_{1(5)}$	45	68,40	$16,1^{***}$	$3,20^{000}$
$V_{1(1)}$	25	$91,30^{*}$	$6,5^{000}$	$14,20^{***}$
Average- Mt	-	77,79	11,3	8,77
DL 5%		9,95	0,36	1,73
DL 1%		14,48	0,53	2,52
DL 0,1%		21,72	0,80	3,78

Speaking about the boiling time (second table), the variant analysis revealed very positive significantly differences for the content in dry substance at variants $V_{1(4)}$ and $V_{1(5)}$.

The consistency registered very negative significantly differences due to expression in centimeters.

The study of the studied characteristics correlation confirm the influence of the rosehips addition, presenting strong, positive links between quantity of the added rosehips and vitamin C (+0,999**). Between the dry, soluble substance and vitamin C was also a positive correlation (+o,995**). The correlation of the consistency with the added rosehips quantity, registered negative values (-0,946^{00}), due to its expression in centimeters. The characteristic itself has registered a positive correlation, consistency rising the same time with the amount of rosehips and the boiling time (third table).

The values fo the correlation coefficients for the studies characteristics, depending on the added rosehips quantity

Table 3

Characteristics	Quantity of rosehips added	Vitamin C mg/100g	SUS %	Consistency (cm)
Quantity of rosehips added	-	+0,999**	+0.995**	-0,946^{00}
Vitamin C	-	-	+0.995**	-0,947^{00}
SUS	-	-	-	-0,965^{00}
Consistency	-	-	-	-

p5% =0.88, p1% = 0,96

The study of the correlations between the studied characteristics show positive, strong links between the boiling time and S.U.S. (+1**) and vitamin C and consistency (+0,975**). For the rest of the studied characteristics were registered negative correlations (table 4).

The values of the correlation coefficients between studied characteristics depending on the boiling time (first variant: tomatoes/rosehips ratio 5:1)

Table 4

Characteristics	Boiling time	Vitamin C mg/100g	SUS (%)	Consistency (cm)
Boiling time	-	-0.979^{00}	+1**	-0.999^{00}
Vitamin C mg/100g		-	-0.979^{00}	+0.975**
SUS (%)	-	-	-	-0.999^{00}
Consistency (cm)	-	-	-	-

p5% =0.88, p1% = 0,96

For a more precisely examination of the correlations found between the studied characteristics and the two variables of the experiment (the boiling time and the amount of added rosehips) it was proceeded to analyze the regressions.

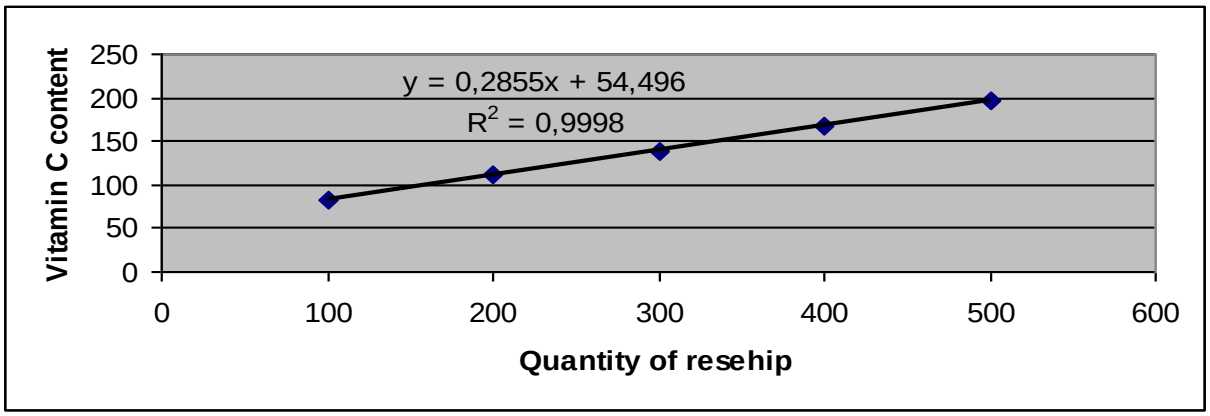

Figure 1: The relation between the amount of added rosehips and vitamin C content

In the first figure is presented the relation between the quantity of rosehips and the quantity of vitamin C. The relation is described by a regression line with positive slope (b=0,285). The determination coefficient (R^2=0,999) indicates the fact that from the total variation of the content of vitamin C, 99% is determined by the variation of the content of rosehips.

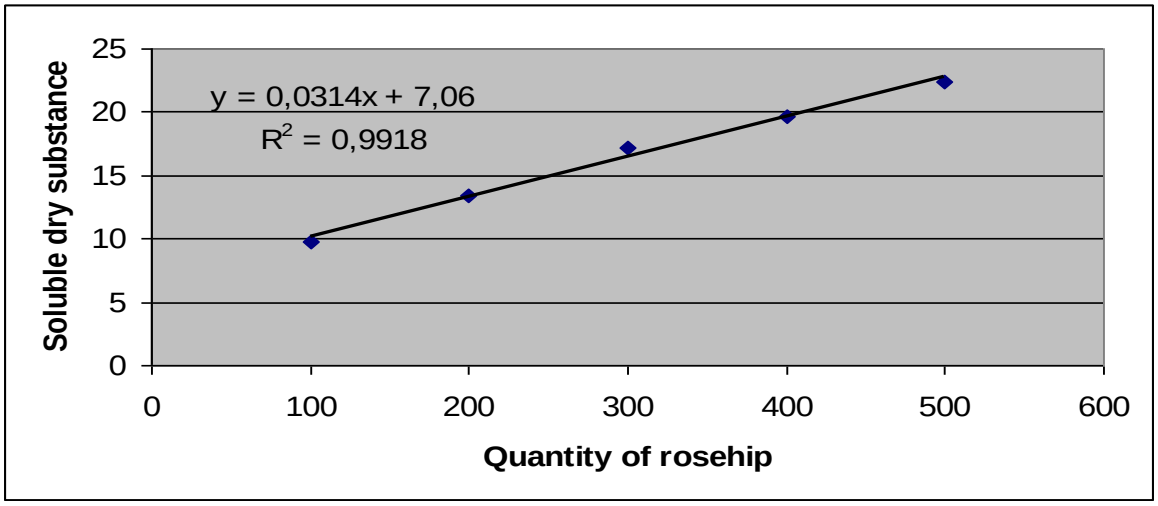

Figure 2: The relation between the amount of added rosehips and the SUS content

The relation between the rosehips quantity and the S.U.S. quantity is described by a regression line with positive slope (b=0,031). The determination coefficient (R^2=0,991) indicates the fact that from the total variation of the content of dry soluble substance, 99% is determined by the variation of the rosehips content (figure 2).

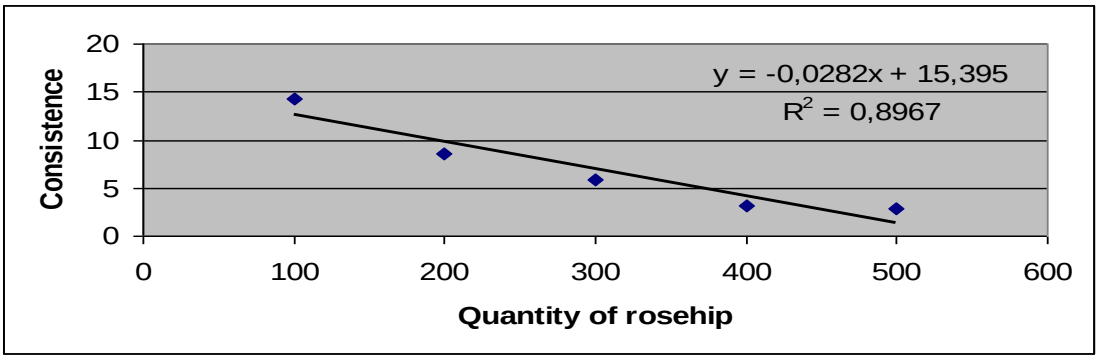

Figure 3: The relation between the amount of added rosehips and consistency

The relation between the rosehips quantity and the consistency of the variants is described by a regression line with negative slope (b=-0,028). The determination coefficient (R^2=0,897) indicates the fact that from the total variation of the content of vitamin C, 89% is assigned to the rosehips addition (figure 3).

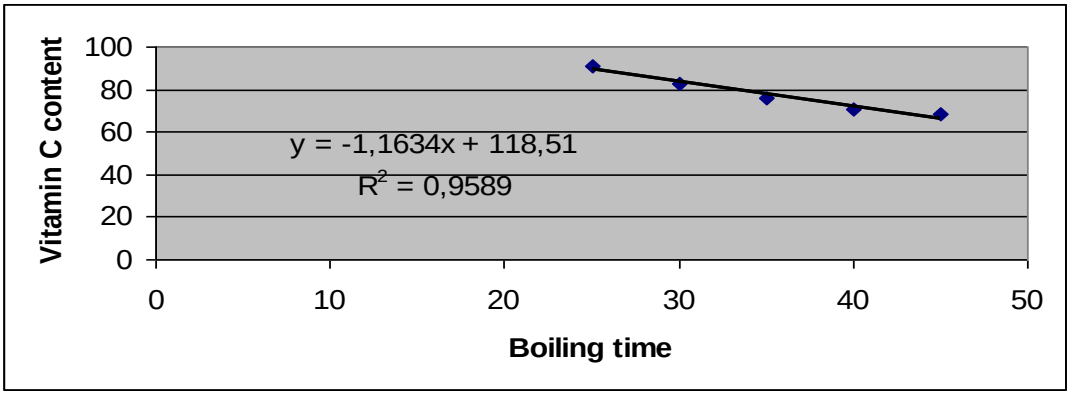

Figure 4: The relation between boiling time and vitamin C content

The relation between boiling time and vitamin C content is described by a regression line with negative slope (b=-1,163). The determination coefficient (R^2=0,958) indicates the fact that from the total variation of the vitamin C content, 95% is determined by the variation of the boiling time.

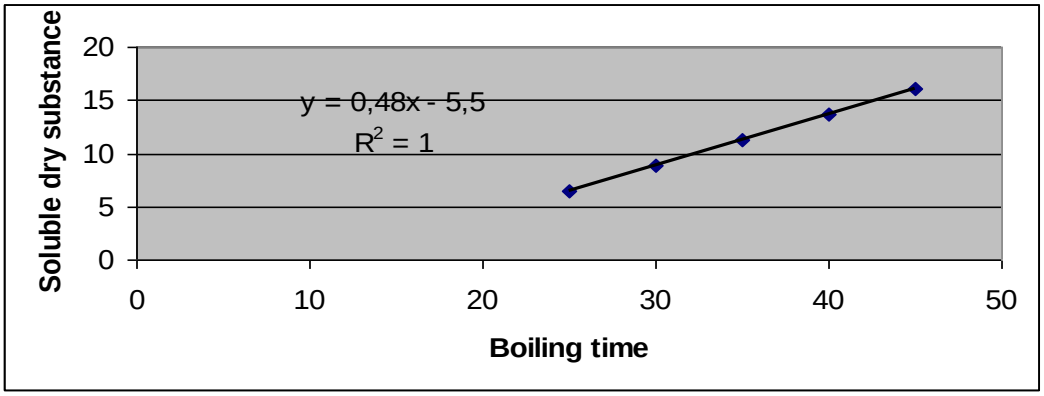

Figure 5: The relation between boiling time and SUS

The relation between boiling time and dry soluble substance content is described by a regression line with negative slope (b=0,48). The determination coefficient (R^2=1) indicates the fact that from the total variation of the dry soluble substance content, 100% is determined by the variation of the boiling time (figure 5).

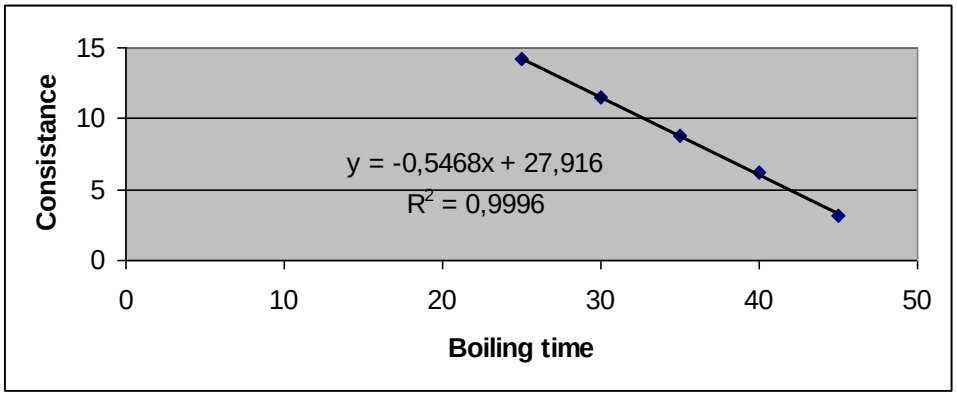

Figure 6: The relation between boiling time and consistency

The relation between boiling time and consistency is described by a regression line with negative slope (b=-0,546). The determination coefficient (R^2=0,999) indicates the fact that from the total variation of the consistency, 95% can be assigned to the increasing of the boiling time (figure 6).

CONCLUSIONS

1. The results obtained bring a character of novelty in diversifying ways of using rosehips in food industry.

2. The added rosehips contribute to reducing the boiling time for tomato juice, by the intake of dry substance.

3. The gross product obtained from processing tomatoes with addition of rosehips can be used as base in different prescriptions, by addition of salt, sugar or spicery.

4. The chemical composition of rosehips, full of vitamins, antioxidants and minerals justify the opportunity of using them in diverse food.

5. It was noticed the third variant, thanks to the balanced taste, good consistency (5.90) and high content of vitamin C (139,40).

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