

# STUDY REGARDING THE YEAR OF PRODUCTION'S INFLUENCE FOR THE APPLES MEANT FOR CONCENTRATED APPLE JUICE AT SC AGRANA JUICE SRL VASLUI

## STUDIUL PRIVIND INFLUENȚA ANULUI DE PRODUCȚIE ASUPRA CALITĂȚII MERELOR–MATERIE PRIMĂ PENTRU OBTINEREA SUCULUI DE MERE CONCENTRAT ÎN CADRUL SC AGRANA JUICE SRL VASLUI

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**Abstract.** *Research was carried out in both USAMV Iassy and SC Agrana Juice SRL Vaslui –company specializes in production of concentrated apple juice. This study aims to determine the quality of the raw material used by the firm knowing that for industrialization they used fruits that do not exhibit a quality satisfactory to be delivered in the market for consumption. Qualitative indicators of the raw material- fresh apples for industry, as such as specific values of titrating acidity or dry soluble substance content, are also needed in order to assure the suitability for processing. Climate conditions vary from one year to another and taking into account the technological features of apples at the harvest time, it may have a negative influence upon these qualitative indicators.*

**Key words:** quality, the raw material

**Rezumat.** *Cercetările au fost realizate atât în cadrul SC Agrana Juice SRL Vaslui-firmă specializată în fabricarea sucului concentrat de mere cât și în cadrul USAMV Iași. Prezentul studiu urmărește determinarea calității materiei prime utilizate de firma vasluiană, având în vedere că pentru industrializare se folosesc fructe ce nu prezintă calitate satisfăcătoare pentru a fi livrate pe piață cu destinația consumului proaspăt. Totodată merele proaspete- materie primă pentru industrializare trebuie să corespundă unor parametri calitativi ce presupun anumite valori ale acidității titrabile și a conținutului în substanță uscată solubilă. Condițiile climatice ce variază anual, pot influența în mod nefavorabil acești parametri calitativi, astfel încât fructele recoltate în vederea industrializării nu corespund uneori din punct de vedere tehnologic.*

**Cuvinte cheie:** calitate, materie primă

### INTRODUCTION

Apples represent an important raw material for obtaining the concentrated juices due to the chemical composition and volume of raw-material.

Studies undertaken worldwide have the following aims:

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➤ testing and introduction in the technologies used to processing fruits

- the varieties genetically resistant to frost and disease, which are obtained in intensive plantations, with a small number of phytosanitary treatments (half of the treatments used for the standard varieties) (Körmedy, 1994) ;

- with a low degree of pollution, but high productivity (Snowdon, 1991) ;

➤ reducing the consumption of the raw material during the processing (Jamba, Carabulea , 2002).

In România, in 1999, ICCP Pitești has initiated such a research programme, too. In a first stage, were made observations and data were recorded regarding the the fenologia, yields and suitability for juice obtaining at 20 genotypes of apple.

The analysed parameters were: average weight of fruit (g), the yield in juice (% substance), the dry soluble content (<sup>0</sup>Bx.), total sugar (g/l), total acidity content (g/l), sugar/acidity ratio, the pH of the juice, the color, the taste, the brightness of the juice and the degree of oxidation in air.

Relating the sugar/acidity ratio it was found that Florina, Priam, Liberty, Jonathan varieties and also the Romanian varieties as such as Generos and Romus are most suitable. At the same time, the varieties of French origin as Florina, Priam and the Romanian varieties T119 and 120 T, have been noted due to the large yield of juice and low content of apple pomace.(Budan și colab., 2001)

The production activity at SC Agrana Juice SRL is for seasonal and runs from August-November along with harvesting the apples which represent the raw material. Finished products are concentrated apple juice and flavor of apples (<http://www.agranajuce.ro>). For the past 7 years, these products have been exported to 100%.

According to technical conditions laid down in the technical specification of the firm (ST-1/2008) the raw nmaterial used by the company have to exhibited a good phytosanitary state and balanced from the point of view of content in sugars and acids, too.

## **MATERIAL AND METHOD**

The raw material used by S.C. Agrana Juice SRL are fresh apples for industry, mainly the varieties more encountered such as Golden delicious, Jonathan and Starkrimson, collected mostly from Moldova to the right area, and Moldova Republic.

Qualitative determination for apples meant for apple juice has to be an objective exam and it supposed that a lot of physical-chemical determinations to be done. For this purpose, samples of raw material were taken and analysed during the period of study: 2007-2009. All those samples were taken at random from the raw material on the silo unloading, each sample being built in a trial about 1 kg apples for industry, in accordance with the norms in force.



**Fig.1** - Apple silo belongs to SC Agrana Juice SRL

*Table 1*

**Variants analysed and sampling date**

| <b>YEAR</b> | <b>SAMPLING DATE</b> | <b>VARIANT</b> |
|-------------|----------------------|----------------|
| 2007        | 12.09.2007           | V1             |
|             | 24.10.2007           | V2             |
| 2008        | 14.10.2008           | V1             |
|             | 23.10.2008           | V2             |
| 2009        | 02.10.2009           | V1             |
|             | 09.10.2009           | V2             |
|             | 02.11.2009           | V3             |

Qualitative determination for apples meant for apple juice were carried out at the Technology of horticultural products lab within USAMV Iasi and involved the determination of dry soluble substance content by refractometric method (SR 2213-5:2009); determination of titrating acidity (SR 8613-4:2009) determination of catalase activity through gas-meter method and determination of the pulp firmness through the iodine test.

**RESULTS AND DISCUSSIONS**

The titrating acidity of samples collected during the year-2007, expressed in malic acid g /100 g of product, varied between 0.27 g/100 g malic acid in case of Starkrimson variety and 0.52 g / malic acid /100 g of product by the Jonathan variety, while the Golden Delicious variety was obtained the mean value (average value) of 0.39 g malic acid/100 g of product.

In 2008 the titrating acidity average value for the variants under study was about 0.32 g malic acid /100 g of product with a minimum of 0.23 malic acid /100 g of product for Starkrimson variety and a maximum of 0.41 malic acid /100 g of product in case of the Jonathan variety; the Golden Delicious variety reached a maximum of 0.33 g malic acid /100 g of product, equal to the minimum value of the previous year.

In 2009, in spite of a reduction of the average value of titrating acidity for the analyzed samples compared with 2008, the maximum is reached at 0.41 g malic acid /100 g of product like the previous year 2008 and the Jonathan variety has been also presented the highest values. The lower value of titrating acidity for the variants under study - 0.33 g malic acid /100 g of product, was registered by the very same Starkrimson variety.

*Table 2*

**The titrating acidity average value for the variants under study (g malic acid /100 g of product)**

| SAMPLING DATE | VARIANT | VARIETIES        |             |             |
|---------------|---------|------------------|-------------|-------------|
|               |         | GOLDEN DELICIOUS | STARKRIMSON | JONATHAN    |
| 12.09.2007    | V1      | 0,44             | 0,30        | <b>0,52</b> |
| 24.10.2007    | V2      | 0,33             | 0,27        | 0,42        |
| 14.10.2008    | V1      | 0,33             | 0,27        | 0,41        |
| 23.10.2008    | V2      | 0,27             | 0,23        | 0,33        |
| 02.10.2009    | V1      | 0,27             | 0,20        | 0,41        |
| 09.10.2009    | V2      | 0,21             | 0,19        | 0,33        |
| 02.11.2009    | V3      | 0,19             | <b>0,16</b> | 0,29        |

The smaller quantity of soluble dry matter was registered in the year 2007, by the Golden Delicious variety -11.8 °Bx, while the maximum value - 9.1°Bx, was reached by Starkrimson variety (tab.3).

*Table 3*

**Soluble dry matter content for the variants in the period under study(°Bx)**

| SAMPLING DATE | VARIANT | VARIETIES        |             |          |
|---------------|---------|------------------|-------------|----------|
|               |         | GOLDEN DELICIOUS | STARKRIMSON | JONATHAN |
| 12.09.2007    | V1      | 11,8             | 12,8        | 12,2     |
| 24.10.2007    | V2      | 13,2             | 14,6        | 14,0     |
| 14.10.2008    | V1      | <b>11,2</b>      | 13,4        | 12,6     |
| 23.10.2008    | V2      | 12,6             | 14,8        | 13,4     |
| 02.10.2009    | V1      | 11,6             | 15,8        | 14,6     |
| 09.10.2009    | V2      | 12,2             | 16,4        | 15,2     |
| 02.11.2009    | V3      | 13,6             | <b>16,8</b> | 15,6     |

In 2008 were not recorded significant differences regarding the dry soluble content compared to the previous year. The upper limit of the amount of dry soluble substance has been also recorded for the Starkrimson variety , while the minimum is also Golden Delicious variety.

The year 2009 is the year in which they recorded the highest values of soluble dry substance in the period under study, the average value of the parameter examined being 14.2 °Bx.

The maximum value is also reached by Starkrimson variety-16.8 °Bx, while the bottom limit of dry soluble substance content is noticed in the case of Golden Delicious variety, like previous years. Dry soluble substance content recorded by Jonathan variety varied between 7.2-10.4 °Bx.

Table 4

**Grades given in iodine test (average value in the period under study)**

| SAMPLING DATE | VARIANT | VARIETIES        |             |          |
|---------------|---------|------------------|-------------|----------|
|               |         | GOLDEN DELICIOUS | STARKRIMSON | JONATHAN |
| 12.09.2007    | V1      | 9                | 9           | 9        |
| 24.10.2007    | V2      | 10               | 10          | 10       |
| 14.10.2008    | V1      | 9                | 9           | 9        |
| 23.10.2008    | V2      | 10               | 10          | 10       |
| 02.10.2009    | V1      | 9                | 9           | 9        |
| 09.10.2009    | V2      | 9                | 10          | 10       |
| 02.11.2009    | V3      | 10               | 10          | 10       |

The first samples taken both in 2007 and 2008 respectively 2009, met the same score of 9 for all varieties analyzed, while later samples collected during the campaign reached the maximum 10 mark, for all three varieties which made the variants (tab 4).

Analyzing the samples by using the iodine test, they notice that that apples-raw material, regardless of their variety, were harvested at a high level of starch hydrolysis corresponding to the final stage of ripeness.

The main function of catalase is to decompose hydrogen peroxide, thus protecting the cell from toxic effects of hydrogen peroxide. According to the made determinations (tab.5), the catalasis presents the upper limit of activity with a maximum value - 5.8 cm<sup>3</sup> O<sub>2</sub> /g product recorded for the V2 variant, sampling in 2007 for Starkrimson variety and also presented a minimum value -2.2 cm<sup>3</sup> O<sub>2</sub> /g product ,in 2009, for Golden variety-V1 variant.

Table 5

**The catalasis activity (cm<sup>3</sup> O<sub>2</sub>/g product- determinated average values in the period under study)**

| SAMPLING DATE | VARIANT | VARIETIES        |             |          |
|---------------|---------|------------------|-------------|----------|
|               |         | GOLDEN DELICIOUS | STARKRIMSON | JONATHAN |
| 12.09.2007    | V1      | 3.6              | 4.8         | 4.2      |
| 24.10.2007    | V2      | 4.2              | <b>5.8</b>  | 5.6      |
| 14.10.2008    | V1      | 3.8              | 3.6         | 4.0      |
| 23.10.2008    | V2      | 3.6              | 4.9         | 4.3      |
| 02.10.2009    | V1      | <b>2.2</b>       | 2.8         | 2.6      |
| 09.10.2009    | V2      | 2.6              | 3.2         | 2.8      |
| 02.11.2009    | V3      | 3.6              | 4.9         | 4.3      |

The variants V2-2007 and V1- 2009 are, in fact, the variants which have presented the upper limit and the bottom limit of the analysed parameter.

The Starkrimson variety has recorded more significant catalasis activity compared to the Golden variety, while Jonathan variety presented the intermediate values, with a single exception-V1 in 2008, in which the differences between the three of variants are insignificant

## CONCLUSIONS

1. The titrating acidity of raw material, expressed in malic acid g/100 g of product, has recorded the minimum average value in 2009, less 0,10 g comparing with 2007 and 0,04 g comparing with 2008.

2. In the period under study, the dry soluble content, expressed in °Bx, has registered an average value of 14.2 °Bx. The upper limit of the amount of dry soluble substance has been recorded for all three varieties in 2009.

3. Apples –raw material, regardless of their variety, were harvested at a high level of starch hydrolysis corresponding to the final stage of ripeness.

4. The activity of catalase has been low during the whole period of study, the average values have ranged between 3.5-2.5 cm<sup>3</sup> O<sub>2</sub>/g product, which means that fruits have not reached the phase of physiological decline

5. The raw material used by the company has also degree of uniformity and quality parameters required to confere packet processing into juice.

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