COMMERCIAL TETRA PACK JUICE - EVALUATION OF QUALITY PARAMETERS

SUCURI COMERCIALE LA TETRA PACK - EVALUAREA PARAMETRILOR DE CALITATE

PRISACARU Ancuța Elena[1]*, APOSTOL Laura-Carmen[1], ROPCIUC Sorina[1], ALBU Eufrozina[1], URSACHI F.V.[1]

*Corresponding author e-mail: ancuta.prisacaru@fia.usv.ro

Abstract. *The present study was conducted to investigate the physico-chemical parameters (titratable acidity, total soluble solids, antioxidant capacity and total phenolic compounds) of six different types of commercial Tetra Pack juices. The total phenolic content was measured by Folin-Ciocalteu reagent assay. Antioxidant activity determination was performed by the spectrophotometric method with the DPPH reagent (2,2- diphenyl-1-picrylhydrazyl). Results of the physico-chemical properties obtained show the following range of values for acidity (1.46-2.76 g/L malic acid), total solids (9.17-12.00 °Bx). The highest total phenolic content was 1.138 mg GAE/100g and the lowest 0.003 mg GAE/100g. It was shown that the content of total antioxidant activity in juices varied between 0.639 and 1.554.*

Key words: Tetra pack juice, quality, physico-chemical parameters

Rezumat. *Prezentul studiu a fost realizat pentru a analiza parametrii fizico-chimici (aciditate titrabilă, substanțe solubile totale, capacitate antioxidantă şi conținut total în compuți fenolici) a şase probe diferite de sucuri comerciale la Tetra Pack. Conținutul total de polifenoli a fost analizat prin metoda Folin-Ciocalteau. Determinarea activității antioxidante a fost realizată prin metoda spectrofotometrică utilizând reactivul DPPH (2,2-difenil-1-picril hidrazil). Rezultatele obținute cu privire la proprietăție fizico-chimice au indicat următoarele limite de variație pentru aciditate (1,46-2,76 g/L acid malic) şi conținutul total în substanțe solubile (9,17-12,00 °Bx). Conținutul total cel mai ridicat în compuşi fenolici a fost de 1,138 mg GAE/100g iar cel mai scăzut 0,003 mg GAE/100g. S-a observat că activitatea antioxidantă a sucurilor a variat între 0,639 şi 1,554.*

Cuvinte cheie: suc Tetra Pack, calitate, parametrii fizico-chimici

INTRODUCTION

Fruits are processed for different reasons into a variety of products, like fruit juices, fruit salads, wine, jam etc. Juice, the naturally liquid contained in fruits and vegetable tissues, is usually consumed as a beverage or used as an ingredient in foods (Makanjuola *et al.,* 2008). From these products fruit juices are most frequent produced due to the fact that they are easily consumed by all categories of age, infants, children and adults (Twohig *et al.,* 2011). Fruit juices

[1] Stefan cel Mare University of Suceava, Faculty of Food Engineering, Romania

meet their nutrient requirement in vitamins, minerals, antioxidant, fiber and electrolyte (Dasenaki and Thomaidis, 2019; Jan *et al.,* 2016). Apple juice contains natural phenols and procyanidins with beneficial long-term health effects, such as decreasing the risk of cancer and heart disease (Rosnah *et al.,* 2012, Damian *et al.,* 2015). The present study was conducted to investigate the physico-chemical parameters of six different types of commercial Tetra Pack juices.

MATERIAL AND METHOD

Sample collection

Six samples of commercial Tetra Pack juices [F1 (apple and white grapes), F2 (apple), F3 (carrot, apple and peaches), F4 (apple and cherry), F5 (peaches and apple), F6 (apple and kiwi)] were purchased from a local market of Suceava (Romania) in order to study the physico-chemical characteristics immediately after opening packet of samples.

Physicochemical test method

Total titratable acidity was determined by acid base titration with a standardized solution of 0.1 N sodium hydroxide in the presence of phenolphthalein as indicator and the results were expressed in acetic acid content (AOAC, 1990).

Total soluble solids were measured as degrees Brix with a portable refractometer. Brix were reported as "degrees Brix" and is equivalent to a percentage.

Antioxidant activity was analyzed based on the scavenging activity of 2,2-Di (4-tert-octylphenyl)-1-pycrilhydrazyl (DPPH) radicals. The absorbance was measured at 515 nm using a spectrophotometer and inhibition percent of free radicals (I%) was computed with the relation (3):

$$I\% = (A_{standard}-A_{sample})/A_{standard} \times 100 \quad (1)$$

where, I% - inhibition percentage of radicals; $A_{standard}$ - absorbance of the standard sample; A_{sample} - absorbance of the analyzed sample.

Folin-Ciocalteu method was used to assay the total polyphenol content (TP). The results were expressed as mg of gallic acid equivalents (mg GAE).The correlation coefficient (r2) for the calibration curve was 0.9964.

Statistics: samples were analyzed in triplicate and the results are expressed as averages ± standard deviation. Statistical analysis of the variables was determined by the correlation matrix Person, depending on the intensity of the correlative links (in the range-1, 1) using XLSTAT 2013 software.

RESULTS AND DISCUSSIONS

Total acidity of analyzed fruit juices is determined by the presence of different organic acids, whose composition varies depending on the fruit nature, maturity of the pulp and other ingredients used. Organic acids confer originality among sensorial characteristics of natural beverages. Acidity (as malic acid) of analyzed samples showed the lowest value of 1.46 g/L malic acid at F3 juice and the maximum was 2.76 g/L malic acid in the case of F6 (fig. 1). The obtained values on acidity are in agreement with Leahu *et al.* (2013), who evaluated the physico-chemical parameters of natural fresh juices.

Total soluble solids is influenced by the content in solids materials (apple, white grapes, carrot, peaches, cherry and kiwi pulp and other ingredients) dissolved in water in the juice. The highest total soluble content was determined in apple and white grapes juice samples (12.00° Brix) followed by peaches and apple juice (11.43° Brix), and the lowest in apple and cherry sample (9.17° Brix) (fig. 1). These results are different from those obtained by Mosotho and Moiloa (2015) who analyzed the total soluble solids in home-made and commercial juice samples. Total soluble solids are influenced in general by sugars and fruit acids (Harrill R., 1998). These are mostly influenced by combined effects of stages of maturity and ripening conditions.

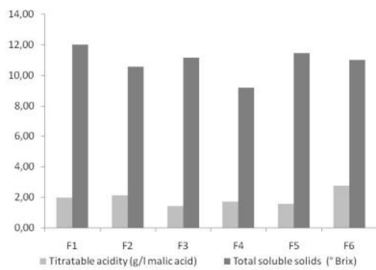

Fig. 1 Total acidity and soluble solids of juices

The six samples of juices present amounts of TP that did not have significant variations, except for sample F1 that registered he highest amount (1.138 mg GAE/100g). Based on the DPPH method, antioxidant capacity, was in order: apple and cherry juice> peaches and apple juice> apple and kiwi juice> carrot, apple and peaches juice> apple juice > apple and white grapes juice (fig. 2).

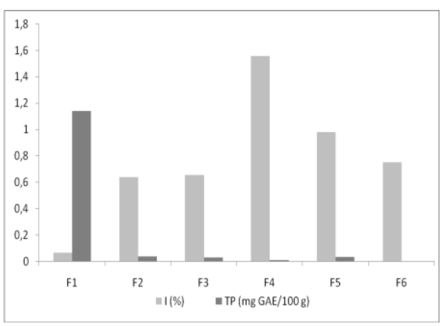

Fig. 2 Total polyphenols and antioxidant capacity of juices

Links correlative matrix determined by Pearson in analyzed juices, shows the highest significant negatively correlation (r = -0.854) between the total soluble solids and antioxidant activity. The correlation value for the parameters total soluble content and total poliphenol content in the selected juices is 0.576, showing that there is a strong correlation between these two parameters (tab. 1).

Table 1

Correlation matrix for the variables measured in juice samples

Variables	Titratable acidity	Total soluble solids	I	TP
Titratable acidity	1	0.053	-0.226	0.033
Total soluble solids	0.053	1	-0.854	0.576
I	-0.226	-0.854	1	-0.720
TP	0.033	0.576	-0.720	1
Values in bold are different from 0 with a significance level alpha=0.05				

CONCLUSIONS

1. This work has shown that the chemical characteristics of commercial Tetra Pack juices have a variance among assortment.

2. Regarding quality parameters total acidity and total soluble content haven't showed significantly differences between the analyzed samples.

3. The properties of these juices that bring major difference are total polyphenol content and antioxidant activity and this was expected since juice is to have all nutritional value from their fruits.

REFERENCES

1. **Damian C., Leahu A., Oroian M., Ropciuc S., 2015** - *Analytical characterization of some pasteurized apple juices during storage.* Ovidius University Annals of Chemistry, 26(1), p. 7-11.
2. **Dasenaki M. E., Thomaidis N. S., 2019** - *Quality and Authenticity Control of Fruit Juices-A Review.* Molecules, 24(6), 1014.
3. **Harrill R., 1998** - *Using a refractometer to test the quality of fruits and vegetables*. P. Publishing, Éd., 20.
4. **Jan A., Gull A., Haq R. U., Parray A., Tabasum S., Safapuri T. A., 2016** - *Physico-Chemical Analysis of Apple Juice Concentrates from Kashmir Valley*. American Journal of Food Science and Nutrition Research, 3(3), p. 42-45.
5. **Leahu A., Damian C., Carpiuc N., Oroian M., Avramiuc M., 2013** - *Change in colour and physicochemical quality of carrot juice mixed with other fruits*. Journal of Agroalimentary processes and technologies, 19(2), p. 241-246.
6. **Makanjuola O. M., Adepegba A. O., Ajayi A., Makanjuola J. O., 2013** - *Effect of Different Preservation Methods on the Quality Attributes of Some Tropical Fruit Juices.* Advances in Bioresearch, 4(4), p. 74-78.
7. **Rosnah S., Wong W. K., Noraziah M., Osman H., 2012** - *Chemical composition changes of two water apple (Syzygium samaragense).* International Food Research Journal, 2012, 19(1), p.167-174
8. **Twohig M., Krueger D.A., Gledhill A., Yang J., Burgess J., 2011**- *Super fruit juice authenticity using multivariate data analysis, high resolution chromatography, UV and Time of Flight MS detection.* Agro Food Ind. Hi Tech, 22, p. 23–26.