ANNALS OF THE
UNIVERSITY OF CRAIOVA

Series: ✓ *Biology*
✓ *Horticulture*
✓ *Food products processing technology*
✓ *Environmental engineering*

Vol. XXVII (LXIII) - 2022

FRUIT JUICES CLARIFICATION WITH α AMYLASES

Giurgiulescu Liviu[2*], Chiver Olivian[1], Hendre Cristian[2]
[1]Department of Engineering and Technologic Management, Faculty of Engineering, Technical University of Cluj Napoca, Victor Babes 62A, 430083, Baia Mare, Romania.
[2]Department of Chemistry-Biology, Faculty of Science, Technical University of Cluj Napoca, Victoriei Street 76, Baia Mare Romania
**Correspondence author. E-mail giurgiulescu@gmail.com*

Keywords: *Fruit juices*; *α amylases, total acidity, total sugar content*

ABSTRACT

On the market consumers prefer clear fruits juice. The clarification process can be improved by utilization of pectolytic enzymes with major influence in juice chemical composition. This study follows the possibility to use in apple, pear and orange juice clarification process with untypical enzymes for industrial processes – amylases.

INTRODUCTION

According to (CODEX STAN 247-2005) fruit juice is the unfermented but fermentable liquid obtained from the edible part of sound, appropriately mature and fresh fruit or of fruit maintained in sound condition by suitable means including post harvest surface treatments applied in accordance with the applicable provisions of the Codex Alimentarius Commission. The juice is prepared by suitable processes, which maintain the essential physical, chemical, sensory and nutritional characteristics of the juices of the fruit from which it comes. The juice may be cloudy or clear and may have restored aromatic substances and volatile flavor components, all of which must be obtained by suitable physical means, and all of which must be recovered from the same kind of fruit. Pulp and cells obtained by suitable physical means from the same kind of fruit may be added. (CODEX STAN 247-2005).

Some fruit types (e.g. pome fruits, such as apples and pears) require mechanical treatment (milling), coupled with a biochemical process (involving enzymes) to break down the cellular structure and obtain the best yields. It is possible to achieve almost total liquefaction by means of an appropriate enzyme cocktail. (Industrial practice involved pectolytic enzymes in order to destroy the pectic structure and disintegrate the vegetable cells. If a clear juice is required in special in production of apple or pear juices, enzymes can be added to accelerate the natural process. (Ashurst 2001; Vagelas & Șugar 2020; Șugar & Bănică, 2020).

This study follow the possibility to use in apple, pear and orange juice clarification process with untypical enzymes for industrial processes like as amylases and glucoamylases and the influence over total acidity and sugar total content.

MATERIAL AND METHODS

Fruits was procured from local market. Fresh fruits were washed, cleaned and squeezing with a blender to prepare the juice (Fig. 1). Experimental part consists in 3 categories of samples: apple juice; pear juice and orange juice. Each sample of juice contain 10 ml of juice and from 0.1 to 1 ml α amylases. Other experimental variants content 10 ml of juice and from 0.1 to 1ml glucoamylases followed the experimental table.(Fig. 2).

Table 1.

Experimental model

Juice (10 ml) [a,b,c]	α Amylases (ml)
V1	0.1
V2	0.2
V3	0.3
V4	0.4
V5	0.5
V6	0.6
V7	0.7
V8	0.8
V9	0.9
V10	1

a. apple juice; b. pear juice; c. orange juice

For each variant it was determinate total acidity by titrimetric method and total content of sugar by refractometric method. Determination was made it at the T_0 after juice preparation; at T_1 7 days after juice preparation and T_2 30 days after juice preparation.

RESULTS AND DISCUSSIONS

Figure 1. Fruit juices at T_0

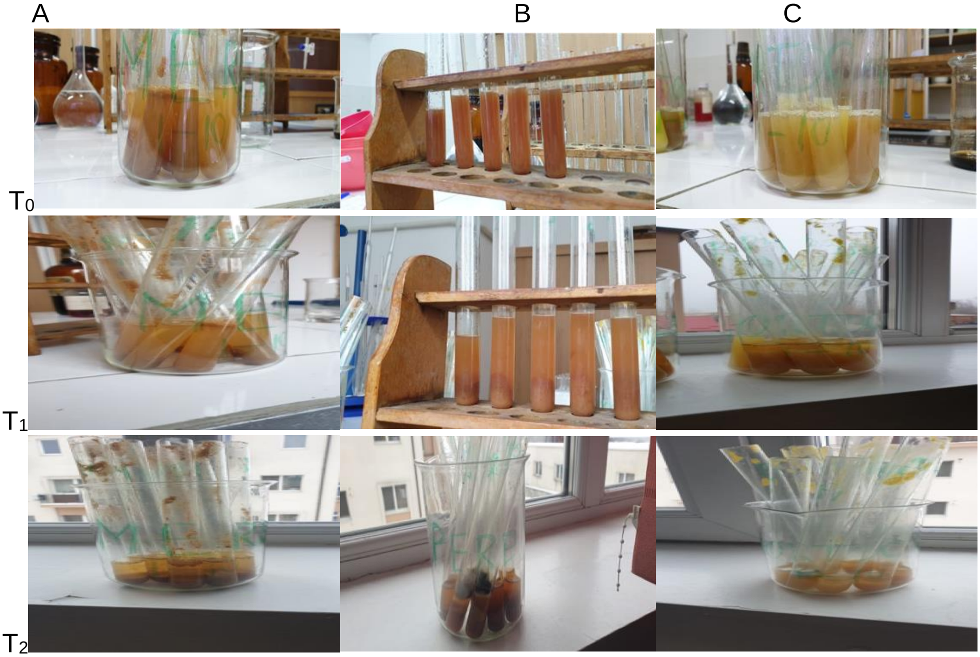

Figure 2. Juice fruits treated with α amylases at the moment T_0; T_1(7 days); T_2(30 days); A. apple juice; B. pear juice; C. orange juice

At the moment T_0 total sugar content in apple juice starts from 1.356 refractometric degrees at the sample without enzymes and record variation depends the quantity of α amylases added (Fig. 3).The low concentration in sugar content record at the variant V8 where was added 0.8 ml of α amylases and the high concentration at the variant V_{10} with 1 ml α amylases. After 7 days at moment T_1 high total sugar content reported at the control sample was recorded at the sample V_9 and the low content at sample V_3. During the storage period enzymes release substances with reductive character and influence the total content of refractometric sugar. On the other hand, inside the samples start the microbiological activity, par of reduced sugars was consumed by molds.

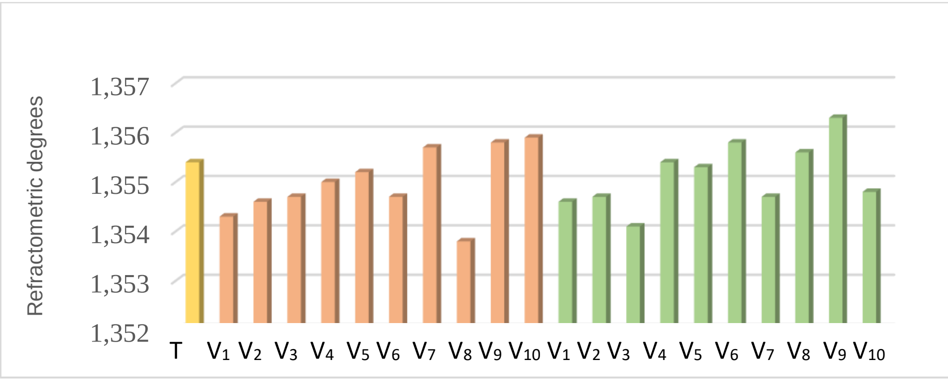

Figure 3. Total sugar content in apple juice with α amylases at T_0; T_1 (7 days)

At T_2 after 30 days, total sugar content in most of the samples record a half degree report to control sample. Microbiological activity started from 7th preservation day led to transformation of sugars from chemical composition of apple juice samples. Samples V_9; V_8 and V_6 present high sugar content compared with control sample (Fig. 4). Mold activity from samples treated with α amylases determinate accumulation of substances in apple juice chemical composition with high reducing potential.

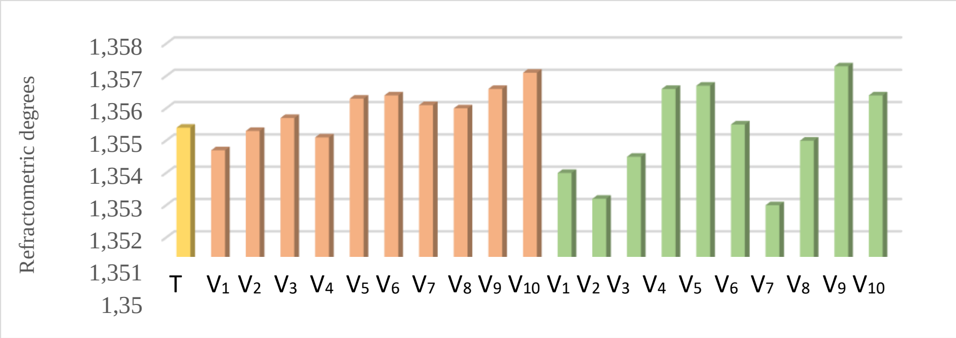

Figure 4. Total sugar content in apple juice with α amylases at T_0; T_2 (30 days)

Regarding total acidity in all the samples where α amylases was added acidity content degrees with 60% compared with control samples. Enzymes added in apple juice determinate an increase of volatile acidity, volatile compounds eliminate from apple juice chemical composition and as result the total acidity decreased. Compared total acidity from apple juice samples at T_1 and T_2 moment, total acidity continues the degreased process, part of total acidity was consumed in microbiological processes produced by molds.

CONCLUSIONS

α Amylases added in juice fruits can be used to increase the clarification yield. A major consequence is determined by the microbiological activity. Total sugar content and total acidity records variable values during the preservation process. We recommend the treatments with α amylases to be follow by preservation methods (chemical or physical methods) to maintain juice fruit chemical composition.

REFERENCES

Ashurst P.R. 2016, *Chemistry and Technology of Soft Drinks and Fruit Juices*, Third Edition. John Wiley & Sons, Ltd. ISBN: 9781444333817

Şugar I.R., Banica, M., 2020, Experimental study on noise reductionand performance enhancement for internal combustion engines, *MATEC Web of Conferences*, Volume 318.

Vagelas I., Sugar, I. R. 2020. Potential Use of Olive Oil Mill Waste Water to Control Plant and Post Harvest Diseases, *Carpathian Journal of Food Science and Technology*, 12(4), pp. 140-144.

***2005. CODEX STAN 247-2005, General standard for fruit juices and nectars.