



LONG-TERM STORAGE, QUALITY AND FLAVOR OF PEARS

Bujancă Gabriel, David Ioan, Ștef Ducu, Cazacu Mihaela, Jianu Călin, Rinovetz Alexandru, Rădulescu Laura, Megyesi Corina

affiliation *Corresponding author: gabrielbujanca@usvt.ro

Abstract: The metabolism of horticultural products is largely influenced by the applied preservation method. One of the most effective and widely used methods of fruit storage is controlled atmosphere. Regarding the optimal O₂ and CO₂ content in the experimental boxes, the Napoca, Doina and Adria hair fruit varieties significantly inhibited biochemical processes compared to their storage under ordinary atmospheric conditions, while providing higher quality and greater taste.

• Introduction

Pear fruits have an increased storage capacity. To provide the population with pears for a longer period of the year, it is necessary to study the peculiarities of regulating their ripening processes. The continuous performance of existing storage methods depends on the development of new storage procedures and remedies, which allow storing pears for a period of 7–8 months with a guarantee of increased fruit quality. In the current study, the quality of pears and the extent to which they can satisfy consumption requirements, depending on the storage method applied, was determined.

• Material and method

The use of controlled atmosphere in fruit storage increases the ability of cold to reduce their vital activity, to avoid some physiological disorders and induces an advanced quality of the fruit upon discharge. To inhibit metabolism, in order to maintain the quality of pear fruits, the controlled atmosphere storage (CA) procedure was used, in relation to their storage in the usual atmosphere (AO) – the control variant. This aimed to achieve optimal temperature and relative humidity conditions in the storage spaces, as well as a well-established proportion of CO₂ and O₂ in the atmosphere of the cold room for the fruits of each studied variety, using organoleptic analysis (taste appreciation) in conjunction with the chemical one (content in carbohydrates and organic acids) and the technological one (quantity of standard fruits, recorded at the end of long-term storage), using the methods proposed by. The pears of the Napoca, Doina, Adria varieties were taken as the object of study.

• Results and discussions

Our research has demonstrated the direct dependence between the occurrence of the maturation-senescence period in the fruits of the new hair varieties studied, the consumption of plastic substances, involved in metabolic processes, depending on the gas composition of the controlled atmosphere, in which these fruits were stored. The optimal composition of the atmosphere and the storage temperature manifest inhibitory effects on the activity of some enzymes in the respiratory cycle, which contributes to maintaining the acidity and sugar content in the fruits, respectively their organoleptic quality, a situation also confirmed by our study. The optimal gas composition of the controlled atmosphere (2% CO₂/4% O₂), established following research conducted over a two-year study period, for the fruits of the new hair varieties mentioned, determined the registration of the slowest rate of biodegradation of organic acids and total carbohydrates in relation to the control variant, regardless of the hair variety studied. For example, in Napoca pears, stored for 180 days in the atmosphere with the optimal gas content of 2% CO₂/4% O₂, the quantitative losses of organic acids amounted to 25.6%, while in the control they reached 55.8%, the content of total carbohydrates reached 15.21%, which is 1.18% higher than in the control variant.

Under conditions of balanced storage, at low temperature, the intensity of the oxidation process of organic acids is higher than that of carbohydrates, and as a result the ratio of soluble carbohydrates/titratable acidity increases (starting from values of the Z/A ratio of 17-24% at the beginning of storage), contributing to the achievement of the taste, characteristic of mature fruits (28-52%). In our research, the optimal gas ratio of the controlled atmosphere determined lower values of the glucose/acid index compared to the values recorded at the end of storage in the usual atmosphere (on average by about 29.0%) (table 1). This fact indicates a slower rate of biodegradation of organic compounds, respectively, a more advanced quality and vitality index.

Tabel 1. Determining the degree of influence of the storage method on the modification of some quality indices in plums, after 180 days of storage

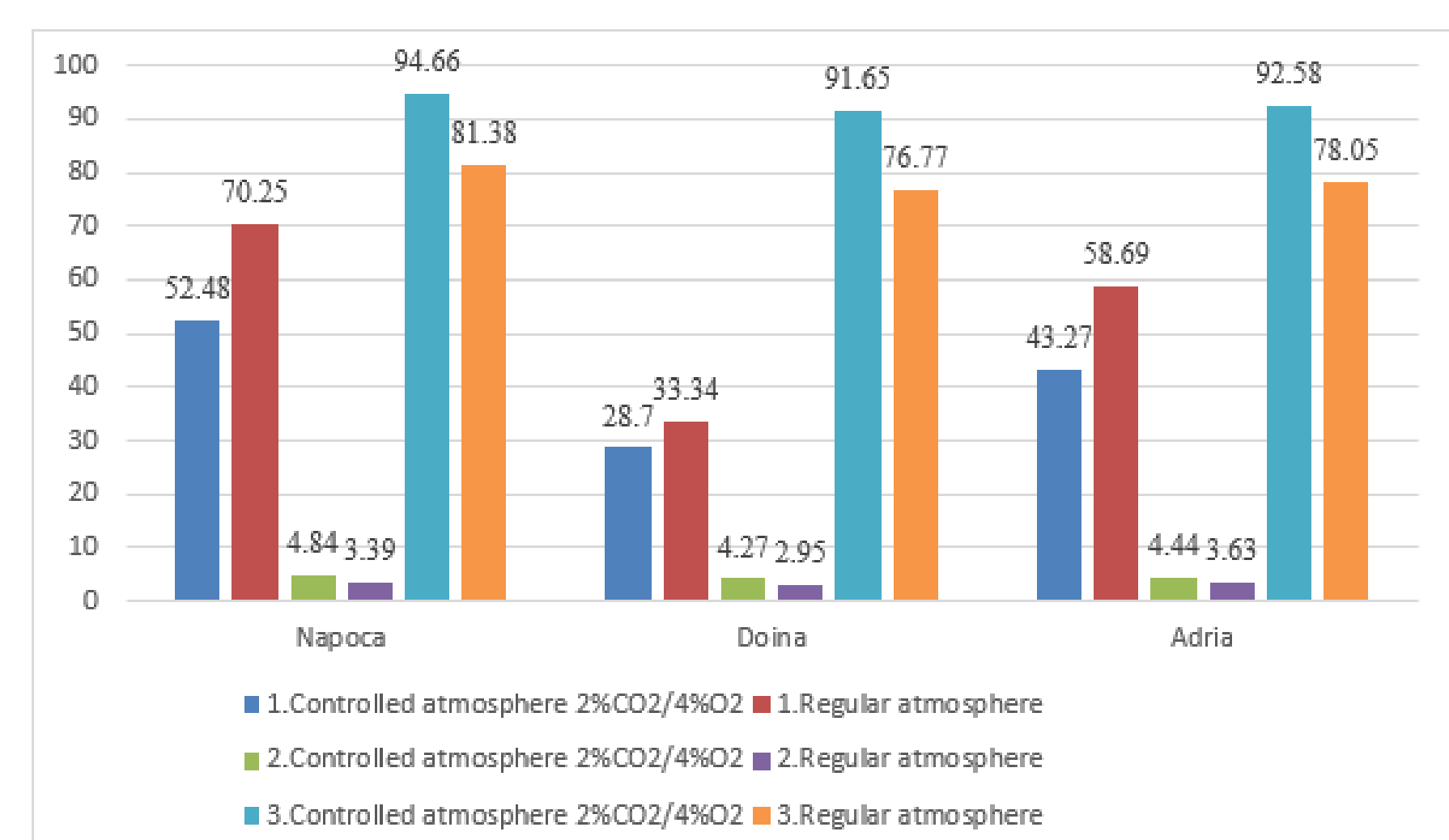
| Pear fruit variety | Glucose/acid index value, G/A | | Organoleptic examination, bal | | Standard fruit quantity, % | |
|--------------------|--|--------------------|--|--------------------|--|--------------------|
| | Controlled atmosphere 2%CO ₂ /4% O ₂ | Regular atmosphere | Controlled atmosphere 2%CO ₂ /4% O ₂ | Regular atmosphere | Controlled atmosphere 2%CO ₂ /4% O ₂ | Regular atmosphere |
| Napoca | 52.48±0.01 | 70.25±0.03 | 4.84±0.16 | 3.39±0.10 | 94.66±0.06 | 81.38±0.07 |
| Doina | 28.70±0.03 | 33.34±0.02 | 4.27±0.11 | 2.95±0.18 | 91.65±0.04 | 76.77±0.04 |
| Adria | 43.27±0.01 | 58.69±0.02 | 4.44±0.19 | 3.63±0.09 | 92.58±0.06 | 78.05±0.04 |

Conclusions

The direct dependence between the quality, the taste aroma of the fruits of the new researched pear varieties Napoca, Doina and Adria, the applied preservation method and the gas composition of the controlled atmosphere in which the preservation of these fruits took place was demonstrated;

The biochemical study conducted confirmed that at the end of storage, under conditions of an optimal proportion of O₂ and CO₂ in the experimental boxes (2%CO₂/4%O₂), the amount of total carbohydrates and organic acids, respectively the Z/A ratio, are preserved much better than under conditions of the usual atmosphere - the control variant, which denotes an increased vitality of the fruits and an advantage of the nominated storage process;

The technological results show that the degree of resistance of the fruits of the new varieties of hair investigated, to qualitative and quantitative depreciation during the 180 days of storage, is maintained in direct dependence on the gas ratio in the AC, the biological particularities of the variety, the degree of maturation and the biochemical content of the fruits.



Both the organoleptic examination, through the score given in the analysis report, completed in the tasting process, and the assessment of fruit quality, carried out through the technological analysis of the standard production upon discharge from long-term storage, highlighted the same trend in the quality assessment during storage, also demonstrating superior results for pears stored in controlled atmosphere conditions. After 180 days of pear storage under the optimal gas ratio of the controlled atmosphere, the quantity of quality fruit exceeded by about 15% that of fruit stored in the usual atmosphere. This fact indicates that the degree of resistance of the fruits of the investigated pear varieties to qualitative depreciation (functional disorders, fungal diseases and tissue dehydration), which determine quantitative losses, is maintained in direct dependence on the gas ratio in the AC.