



EUFRUIT – European Fruit Network

**EUFRUIT - WP 4 FRUIT QUALITY;
IMPROVEMENT OF FRUIT HANDLING/STORAGE**

DYNAMICS OF QUALITY PARAMETERS OF FRUITS STORED IN CA

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Research Center for Studies of Food Quality and Agricultural Products

[RESEARCH CENTER FOR STUDIES OF FOOD QUALITY AND AGRICULTURAL PRODUCTS](https://erris.gov.ro/RESEARCH-CENTER-FOR-STUDIES--1)

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centru.mp4

Warsaw, 23.06.2017



University of Agronomic Sciences and Veterinary Medicine of Bucharest, ROMANIA



Research Center for Studies of Food Quality and Agricultural Products



13 Laboratories:

- Laboratory of intergrated fruit growing
- **Laboratory of postharvest technologies**
- Laboratory of diagnosis and plant protection
- Laboratory of senzorial analysis
- Laboratory of plant multiplication
- Laboratory of agrochemistry
- Laboratory of physico-chemical analysis
- Laboratory of plant physiology
- Laboratory of molecular plant physiology
- Laboratory of plant virology
- Laboratory of microscopy and plant anatomy
- Laboratory of IT, logistics and econometry



Warsaw, 23.06.2017

Research greenhouse



University of Agronomic Sciences and Veterinary Medicine of Bucharest, ROMANIA



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Postharvest Technologies Laboratory

2 cold rooms:

- capacity: -14 m²
-21 m²
- parameters: - humidity (30~95%)
- temperature (0~15 °C)





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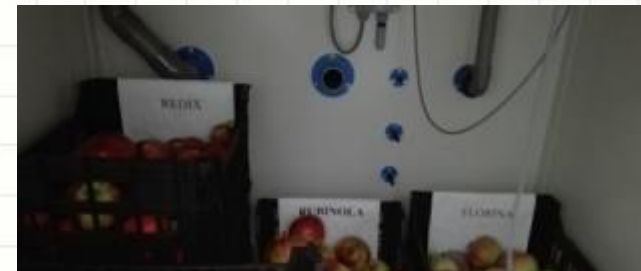


Research Center for Studies of Food Quality and Agricultural Products

Postharvest Technologies Laboratory

12 Controlled atmosphere rooms:

- capacity: -1 m²
- parameters:
 - humidity (0~100 %)
 - temperature (0~15 °C)
 - CO₂ (0~100 %)
 - O₂ (0~100 %)
 - N₂ (0~100 %)
 - ethylene
- soft control: Besseling Group B.V.





DYNAMICS OF QUALITY PARAMETERS OF FRUITS STORED IN CA

A. Fruit quality of 3 apple varieties: Redix, Topaz, Florina*

* Bezdadea-Catuneanu I.L., Naftanaila M., Stan A., Hoza D., Badulescu L., The influence of storage in controlled atmosphere on quality indicators of three apple varieties, Poster la 15th International Symposium: "Prospects for the 3rd Millennium Agriculture", 29th September – 1st October 2016, Cluj-Napoca, Romania

Stored in 2 rooms with different controlled atmosphere, during 7 months of monitoring (2015-2016)

Conditions:

Room1: T= 1°C, humidity: 90%

O₂: 1,5%, CO₂: 3%,

Room2: T= 5°C, humidity: 90%

O₂: 2%, CO₂: 2%,



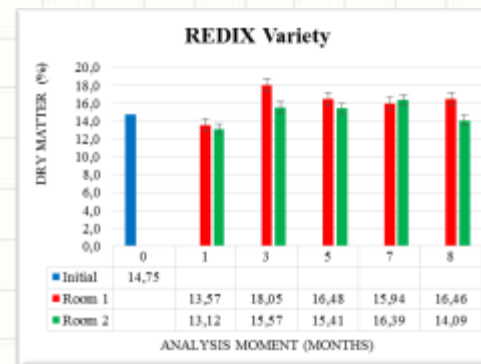
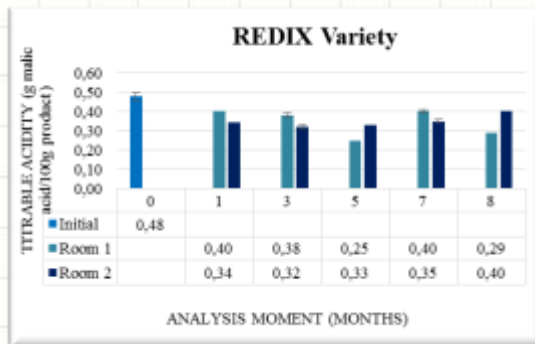
Dynamics of quality parameters of fruits stored in CA

A. Fruit quality of 3 apple varieties: Redix, Topaz, Florina

Parameters: dry matter content, acidity, soluble-solids and firmness



REDIX: initial 1-st month 3-rd month 5-th month 7-th month





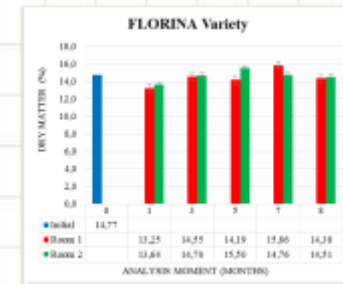
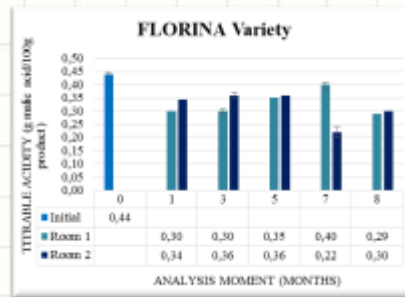
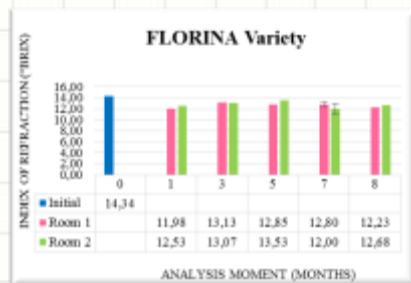
Dynamics of quality parameters of fruits stored in CA

A. Fruit quality of 3 apple varieties: Redix, Topaz, Florina

Parameters: dry matter content, acidity, soluble-solids and firmness



FLORINA: initial 1-st month 3-rd month 5-th month 7-th month





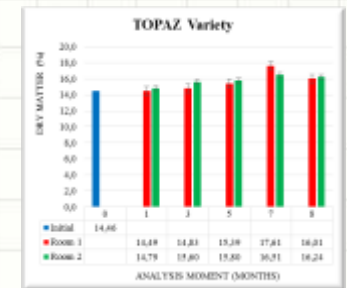
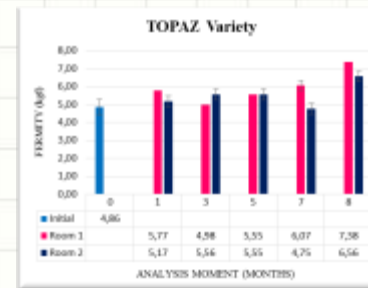
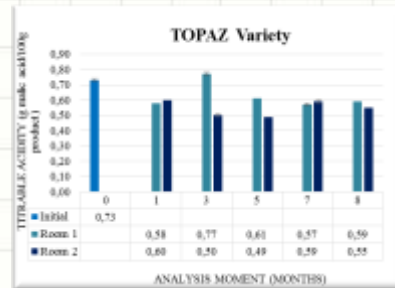
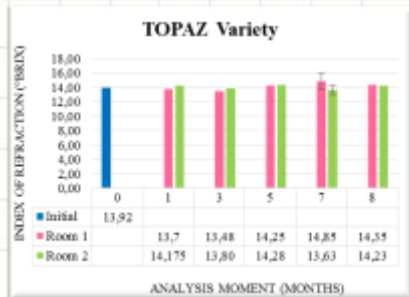
Dynamics of quality parameters of fruits stored in CA

A. Fruit quality of 3 apple varieties: Redix, Topaz, Florina

Parameters: dry matter content, acidity, soluble-solids and firmness



TOPAZ: initial 1-st month 3-rd month 5-th month 7-th month





A. Fruit quality of 3 apple varieties: Redix, Topaz, Florina

Bezdadea-Catuneanu I.L., Naftanaila M., Stan A., Hoza D., Badulescu L., The influence of storage in controlled atmosphere on quality indicators of three apple varieties, Poster la 15th International Symposium: "Prospects for the 3rd Millennium Agriculture", 29th September – 1st October 2016, Cluj-Napoca, Romania

Parameters: dry matter content, acidity, soluble-solids and firmness

Apples from varieties Topaz and Florina have kept the quality indicators better than Redix cultivar, for both storage conditions.

The storage parameters recommended from this experiment for these apple varieties are: $T = 5^{\circ}\text{C}$, humidity: 90%, O_2 : 2%, CO_2 : 2%

Dynamics of quality parameters of fruits stored in CA



DYNAMICS OF QUALITY PARAMETERS OF FRUITS STORED IN CA

B. Fruit quality of 3 blueberry varieties: Coville, Blueray, Chandler*

* BEZDADEA CĂTUNEANU I., BĂDULESCU L., DOBRIN A., STAN A., HOZA D. 2017, THE INFLUENCE OF STORAGE IN CONTROLLED ATMOSPHERE ON QUALITY INDICATORS OF THREE BLUEBERRIES VARIETIES. Scientific Papers. Series B, Horticulture, Volume LXI, Print ISSN 2285-5653, 91-100

Stored in 3 rooms with different controlled atmosphere, during 4 months of monitoring (2016-2017)

Conditions: T: 1°C, humidity: 95%, O₂: 3%

Room1: CO₂: 0%,

Room2: CO₂: 5%,

Room3: CO₂: 10%



Dynamics of quality parameters of fruits stored in CA

B. Fruit quality of 3 blueberry varieties: Coville, Blueray, Chandler

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Quality parameters:


Physico-chemical analysis

Dry matter and water content
Fruit firmness
Soluble solids
Titratable acidity

Biochemical analysis


Total flavonoid (spectrophotometry - 510 nm)
Total polyphenol (spectrophotometry - 750 nm)
Total anthocyanins (spectrophotometry - 540 nm)
Antiradical activity (spectrophotometry - 515 nm)
Ascorbic acid content (HPLC – DAD)

Variation of firmness and content of: dry matter, water, TA and soluble solids during storage period in CA for **Coville** variety



Sample	Time of analysis	Dry matter content (D.M.%)	Water content (%)	Titrateable acidity (g acid citric/100 g)	Soluble solids (% Brix)	Firmness (kg/cm ²)
Coville	Initial moment (0)	14.334	85.666	1.016 ± 0.009	10.420 ± 0.751	0.294 ± 0.032
0% CO₂	After 2 months	13.870	86.130	1.087 ± 0.002	11.670 ± 1.063	0.383 ± 0.103
5% CO₂	After 2 months	14.366	85.634	1.061 ± 0.001	11.160 ± 1.251	0.293 ± 0.071
10% CO₂	After 2 months	14.256	85.744	0.889 ± 0.005	9.920 ± 1.396	0.255 ± 0.042
0% CO₂	After 3 months	15.121	84.879	1.136 ± 0.021	10.820 ± 1.434	0.384 ± 0.062
5% CO₂	After 3 months	13.217	86.783	1.302 ± 0.005	10.660 ± 2.219	0.333 ± 0.063
10% CO₂	After 3 months	13.778	86.222	1.092 ± 0.003	9.440 ± 1.608	0.329 ± 0.092
0% CO₂	After 4 months	14.907	85.093	0.967 ± 0.022	10.470 ± 1.589	0.341 ± 0.074
5% CO₂	After 4 months	14.794	85.206	1.161 ± 0.001	10.570 ± 1.455	0.257 ± 0.044
10% CO₂	After 4 months	13.829	86.171	1.105 ± 0.001	10.280 ± 1.605	0.268 ± 0.090

Variation of firmness and content of: dry matter, water, TA and soluble solids during storage period in CA for **Blueray** variety



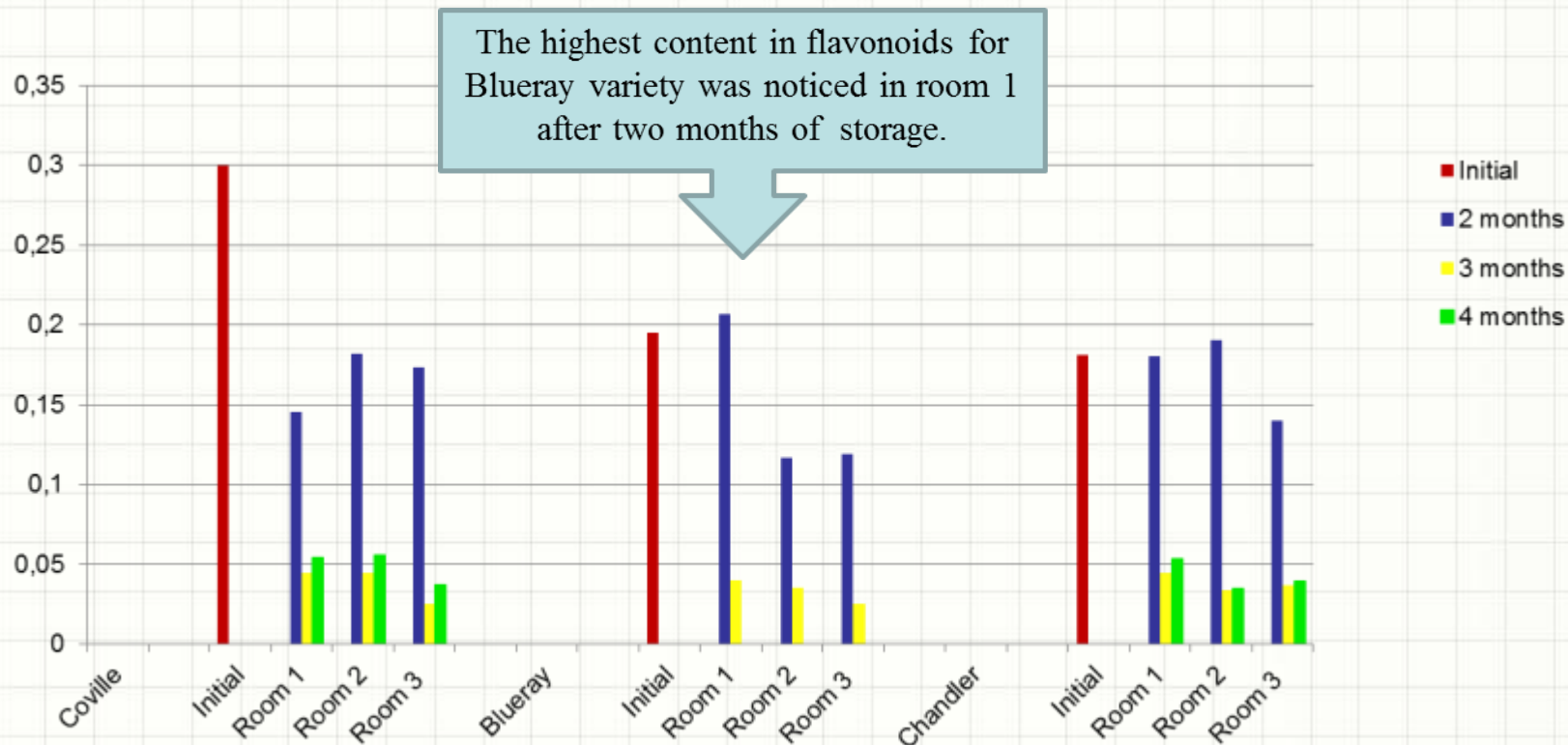
Sample	Time of analysis	Dry matter content (D.M.%)	Water content (%)	Titrateable acidity (g acid citric/100 g)	Soluble solids (% Brix)	Firmness (kg/cm ²)
Blueray	Initial moment (0)	11.458	88.542	0.620 ± 0.009	8.400 ± 1.339	0.243± 0.063
0% CO2	After 2 months	12.251	87.749	0.780 ± 0.001	9.370 ± 1.434	0.303 ± 0.069
5% CO2	After 2 months	11.042	88.958	0.751 ± 0.003	8.430 ± 1.318	0.268± 0.063
10% CO2	After 2 months	11.265	88.735	0.792 ± 0.008	9.120 ± 1.989	0.259± 0.049
0% CO2	After 3 months	13.956	86.044	0.856 ± 0.001	8.688 ± 1.698	0.256± 0.069
5% CO2	After 3 months	13.909	86.091	0.818 ± 0.003	9.040 ± 0.873	0.338 ± 0.075
10% CO2	After 3 months	11.879	88.121	0.705 ± 0.005	10.400 ± 1.268	0.283 ± 0.124
0% CO2	After 4 months	11.458	88.542	0.620 ± 0.009	8.400 ± 1.339	0.243± 0.063
5% CO2	After 4 months	12.251	87.749	0.780 ± 0.001	9.370 ± 1.434	0.303 ± 0.069
10% CO2	After 4 months	11.042	88.958	0.751 ± 0.003	8.430 ± 1.318	0.268± 0.063

Variation of firmness and content of: dry matter, water, TA and soluble solids during storage period in CA for **Chandler** variety



Sample	Time of analysis	Dry matter content (D.M.%)	Water content (%)	Titrateable acidity (g acid citric/100 g)	Soluble solids (% Brix)	Firmness (kg/cm ²)
Blueray	Initial moment (0)	12.693	87.307	0.851± 0.009	7.390±1.480	0.079 ± 0.047
0% CO2	After 2 months	13.297	86.703	0.836 ± 0.002	10.050±1.706	0.322 ± 0.037
5% CO2	After 2 months	11.604	88.396	0.909 ± 0.002	10.370±1.113	0.272 ± 0.049
10% CO2	After 2 months	12.413	87.587	0.889 ± 0.005	10.170±1.501	0.274 ± 0.064
0% CO2	After 3 months	13.381	86.619	0.863 ± 0.014	9.560±1.692	0.280 ± 0.035
5% CO2	After 3 months	12.626	87.374	0.833 ± 0.001	10.725±1.320	0.340 ± 0.062
10% CO2	After 3 months	11.352	88.648	0.858 ± 0.003	9.440±1.665	0.315 ± 0.036
0% CO2	After 4 months	11.216	88.784	0.820 ± 0.003	8.750±1.925	0.320 ± 0.049
5% CO2	After 4 months	13.554	86.446	0.857 ± 0.001	9.830±0.953	0.333 ± 0.053
10% CO2	After 4 months	12.686	87.314	0.759 ± 0.001	9.750±0.977	0.278 ± 0.049

Variation of **total flavonoid** content (mg/100g) during storage period in CA for Coville, Blueray and Chandler varieties

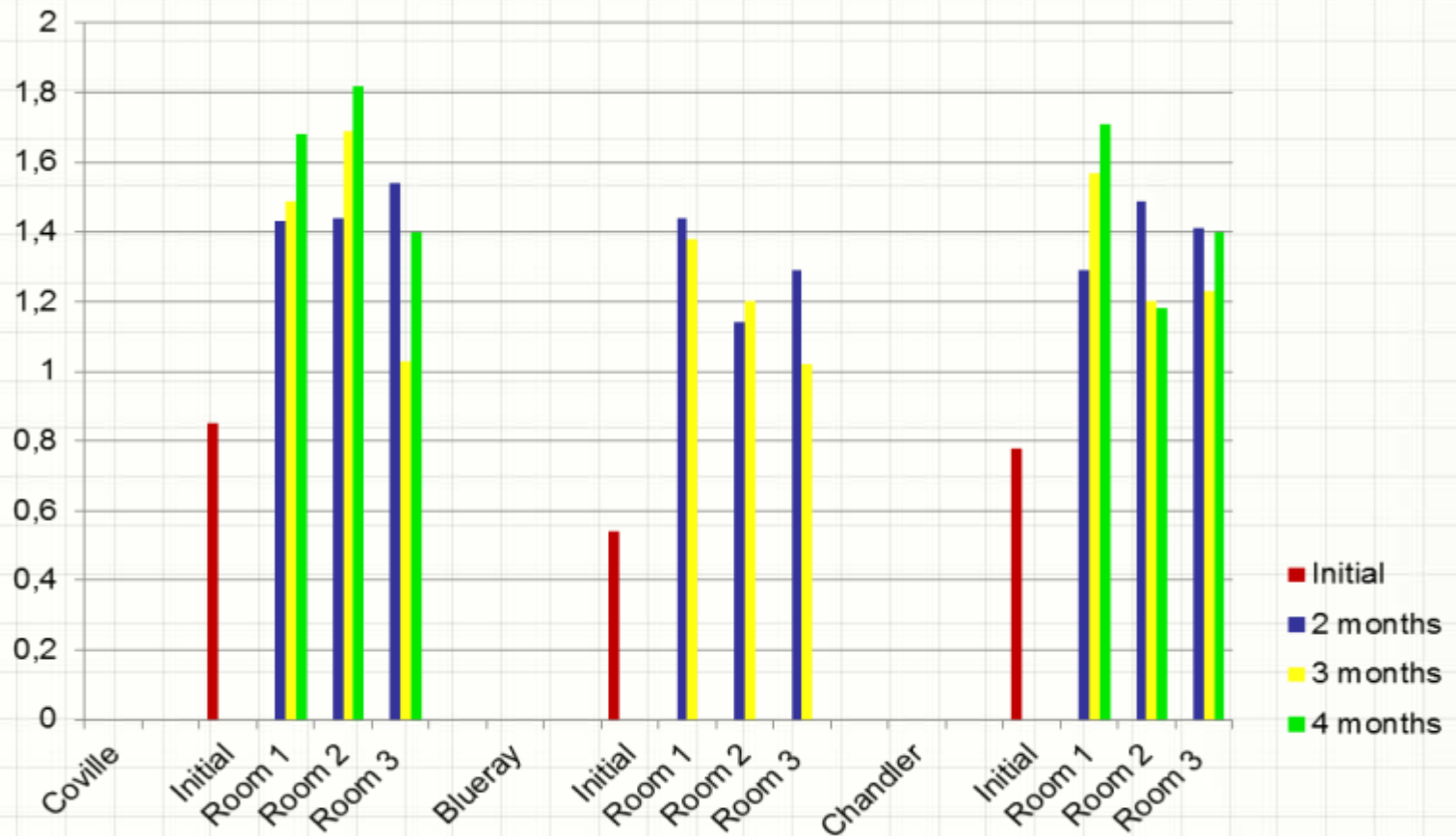


The highest content in flavonoids for Blueray variety was noticed in room 1 after two months of storage.

The total flavonoid content of Coville variety has recorded lower values for all three rooms in 2 and 3 months compared with the value from the initial moment.

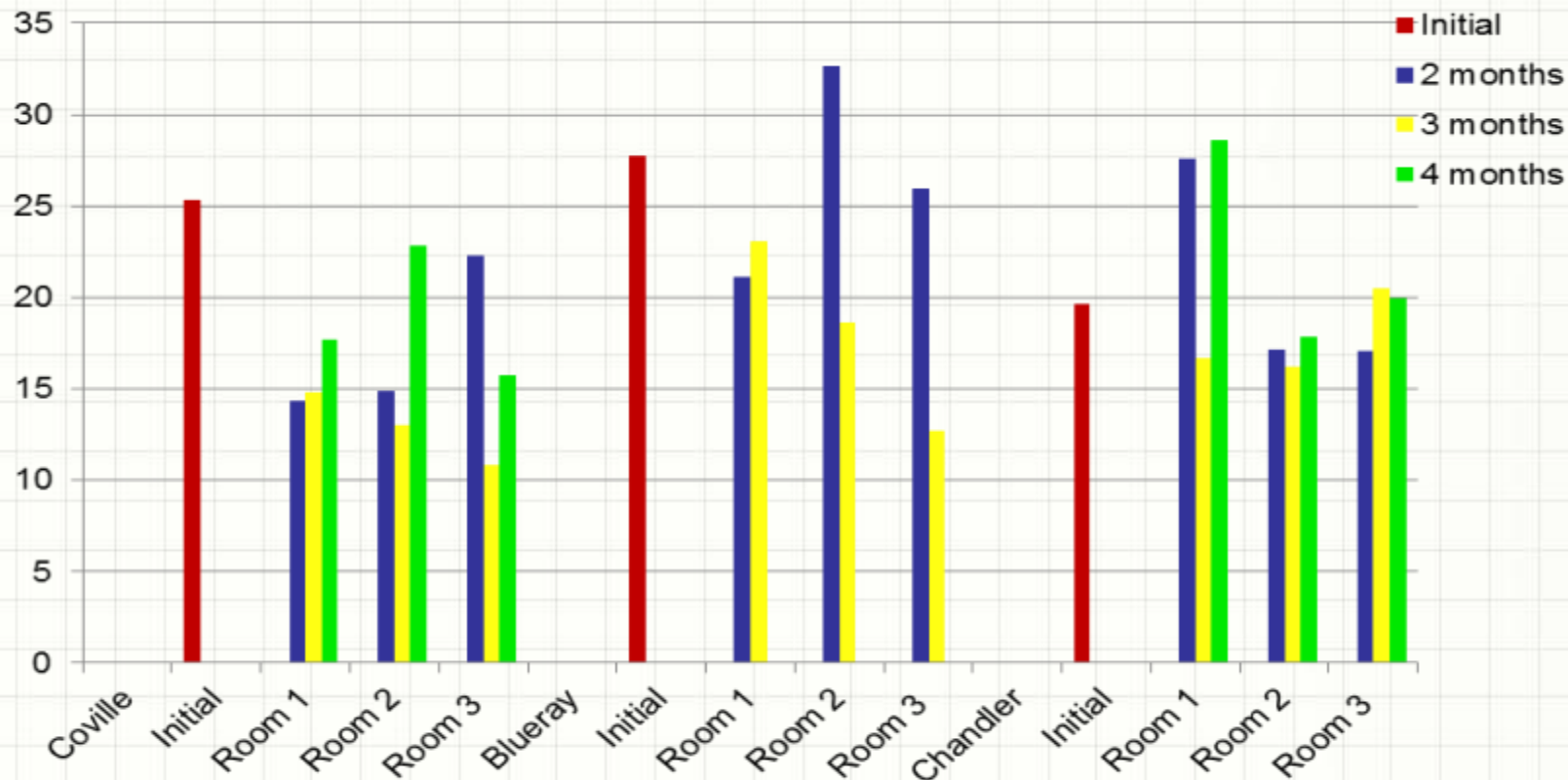
The Chandler variety maintained the flavonoids content after two months of storage in room 1 and 2.

Variation of **total polyphenol** content (mg/100g) during storage period in CA for Coville, Blueray and Chandler varieties



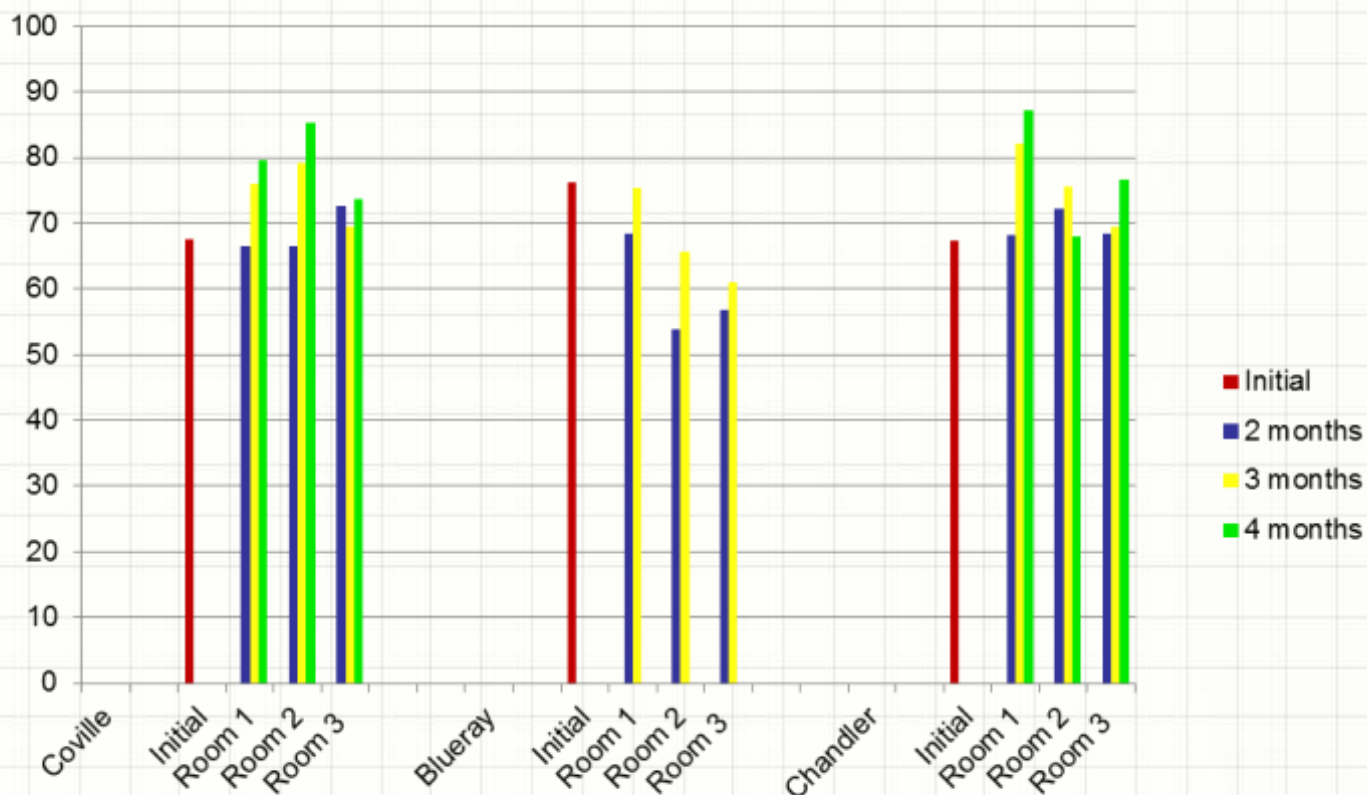
The content of total polyphenols of all 3 varieties studied, increased gradually towards the initial moment throughout storage.

Variation of **total anthocyanin** content (mg/100g) during storage period in CA for Coville, Blueray and Chandler varieties



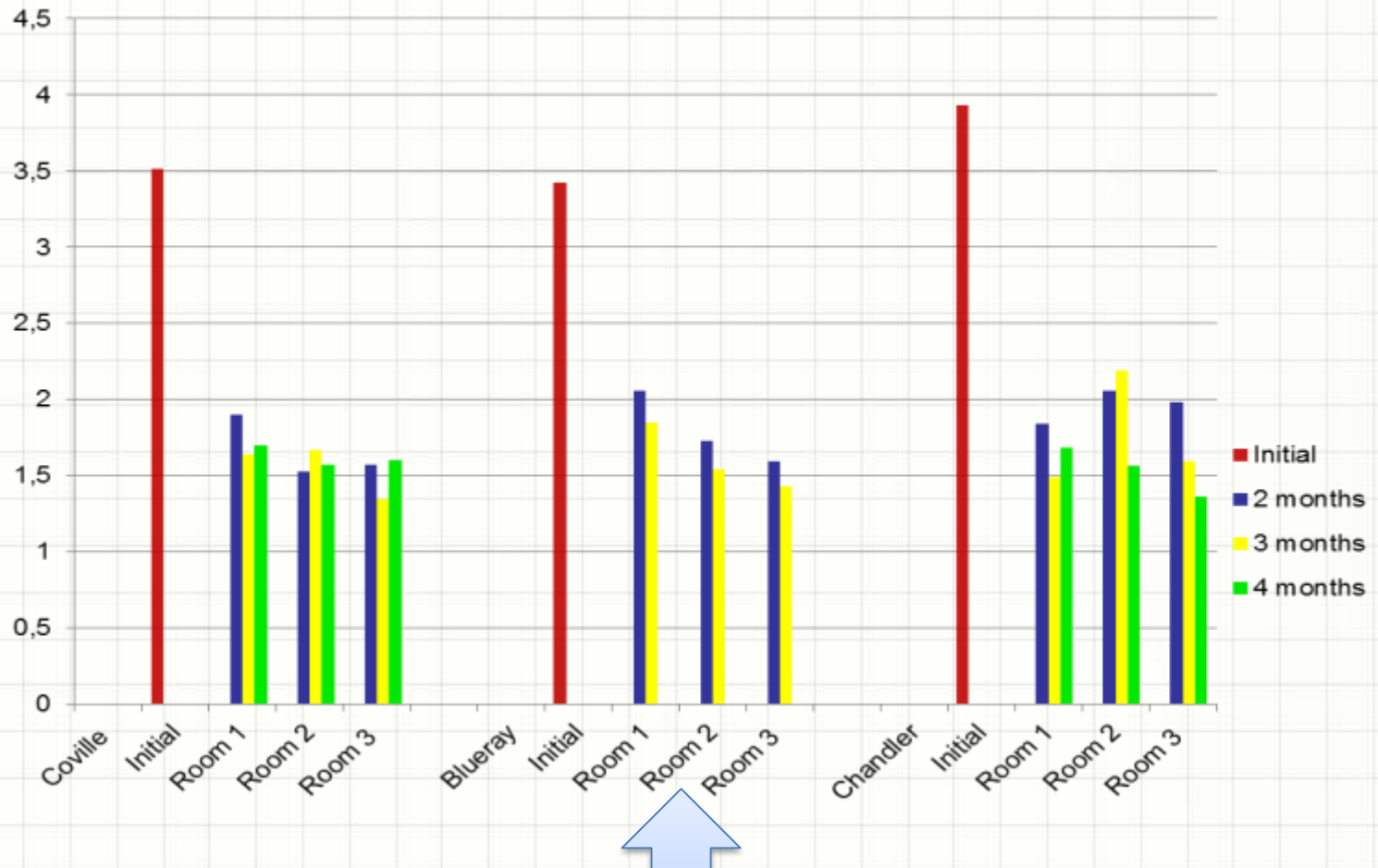
The Chandler variety maintain the total anthocyanins content during 4 months of storage.

Variation of **antioxidant activity** (%) during storage period in CA for Coville, Blueray and Chandler varieties



The Chandler and Coville varieties maintain the highest antioxidant activity during 4 months of storage.

Variation of **ascorbic acid** content (mg/100g) during storage period in CA for Coville, Blueray and Chandler varieties



After the initial decrease of vitamin C, during the 4-th months of storage, the content of ascorbic acid is slowly influenced by the CO₂ concentration



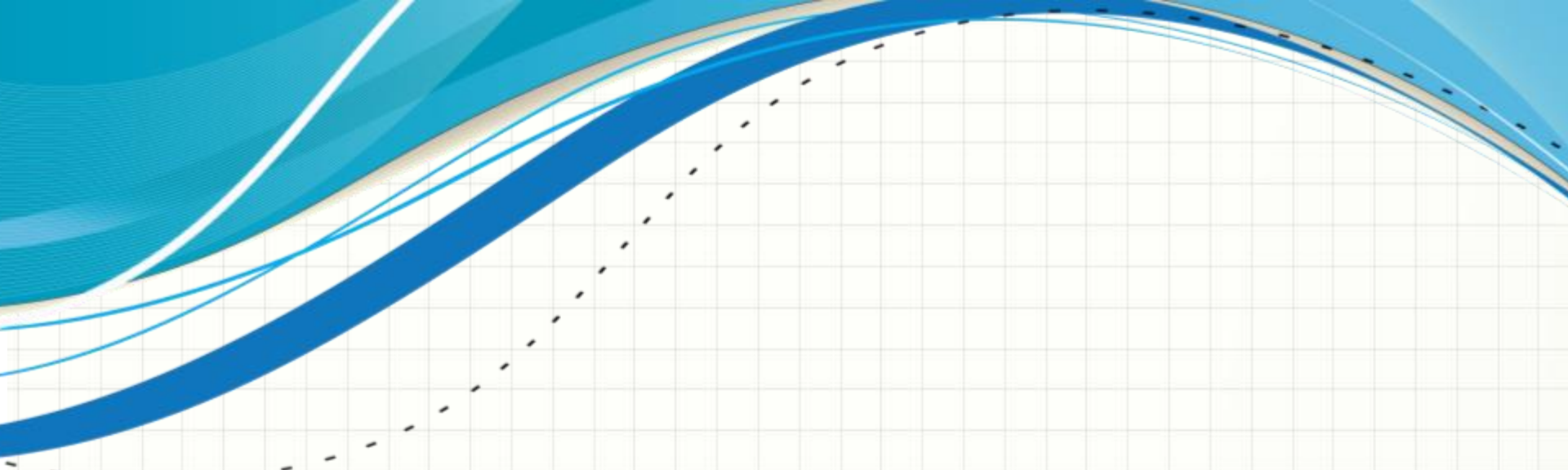
B. Fruit quality of 3 blueberry varieties: Coville, Blueray, Chandler*

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- ✓ **Chandler variety** behaved much better during the four months of storage compared to the other two varieties
- ✓ The antioxidant capacity of **Coville** and **Chandler** varieties in room 3 (CO₂ - 10%) had a slight increase towards the end of the storage period suggesting that metabolic processes in fruit were slowed down due to higher CO₂ content.

The storage parameters should be recommended for each variety of blueberry

Dynamics of quality parameters of fruits stored in CA



**Thank you for your
attention!**