PHYSIOLOGICAL PARAMETERS OF SOME POMOLOGICAL SPECIES FOR THE INITIAL MOMENT BEFORE STORAGE PERIOD- PRELIMINARY DATA

PARAMETRII FIZIOLOGICI A UNOR SPECII POMICOLE PENTRU MOMENTUL INTRODUCERII ACESTORA ÎN SPAȚIU DE DEPOZITARE – DATE PARȚIALE

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The aim of this study was to establish the values of the physiological parameters of organic fruits in view of subsequent correlations with the parameters determined during storage.

INTRODUCTION

- Fruits and vegetables are living organism
- The physiological processes are continued from harvest to consumption
- One of the most important parameter is the respiration rate => measuring the CO_2 production with a closed system
- The modifications of the cell walls produced by mass loss, is determined by transpiration rate

MATERIAL AND METHOD

For this study there were chosen climacteric and non-climacteric organic fruits like:

- strawberries (‘Regina’ variety),
- blueberries (‘Legacy’ and ‘Blue Gold ’ varieties),
- chokeberries (‘Nero’ variety),
- plums (‘Centenar’, ‘Tita’, ‘Stanley’ and ‘Jojo’ varieties)
- apples (‘Rubinola’, ‘Topaz’, ‘Gemini’ and ‘Renoir’ varieties,.

For these samples the analyses like:

- Respiratory intensity
- Transpiration rate
- Water content
- Soluble solids content.

made in triplicate, at room’s temperature

All analyses were performed in the Postharvest Technologies laboratory from the Research Center for Studies of Food Quality and Agricultural Products - University of Agronomic Sciences and Veterinary Medicine of Bucharest.

The respiratory intensity was measured in containers with hermetic closure with a volume of:

- 280 ml (for berries)
- 1180 ml (for plums and apples).

was measured with Lambda T NDIR Monitor, ADC BioScientific LTd.

The transpiration rate was measured by gravimetric measurement after:

- 10 minutes for strawberries,
- 20 minutes for blueberries and
- 30 minutes for chokeberries, plums and apples

- The water content of the samples were determined by oven drying for 24 hours at 105°C using a UN110 Memmert oven.

- Soluble solids were determined from 5 to 10 fruits, with refractive device Kruss (% Brix).

RESULTS AND DISCUSSIONS

For strawberries, water content was estimated at 86-92% by Chira (2008).

Gherghi (2001) estimated values between 6.4-15.3% for strawberries soluble solids content.

	Sample	Water content (%)		Soluble Solids (Brix %)	
		Mean	± St.Dev.	Mean	± St.Dev.
Strawberries	Regina	**90.943**	0.102	**9.492**	1.885
Blueberries	Legacy	**84.822**	0.308	**13.233**	1.021
	Blue Gold	**86.256**	0.609	**12.733**	0.058
Chokeberries	Nero	74.775	2.105	17.850	1.098

For chokeberries, similar values for water content (74 to 82.1%) and soluble solids content (12.4-18.3 %Brix) were found by Tolić (2015) for juices from different varieties .

Skupień (2006) estimated values between 10-19% for blueberries soluble solids content.

For blueberries, water content was estimated at 80.1-87.7% by Skupień (2006) and by Gherghi (2001) at 79-86%.

Stefanova (2010) registered values between 15.5-25.5% for soluble solids content for ‚Jojo'

For plums, water content was estimated at 72-88% by Gherghi (2001).

For soluble solids content, Gherghi (2001) estimated values between 7.2-14.9%

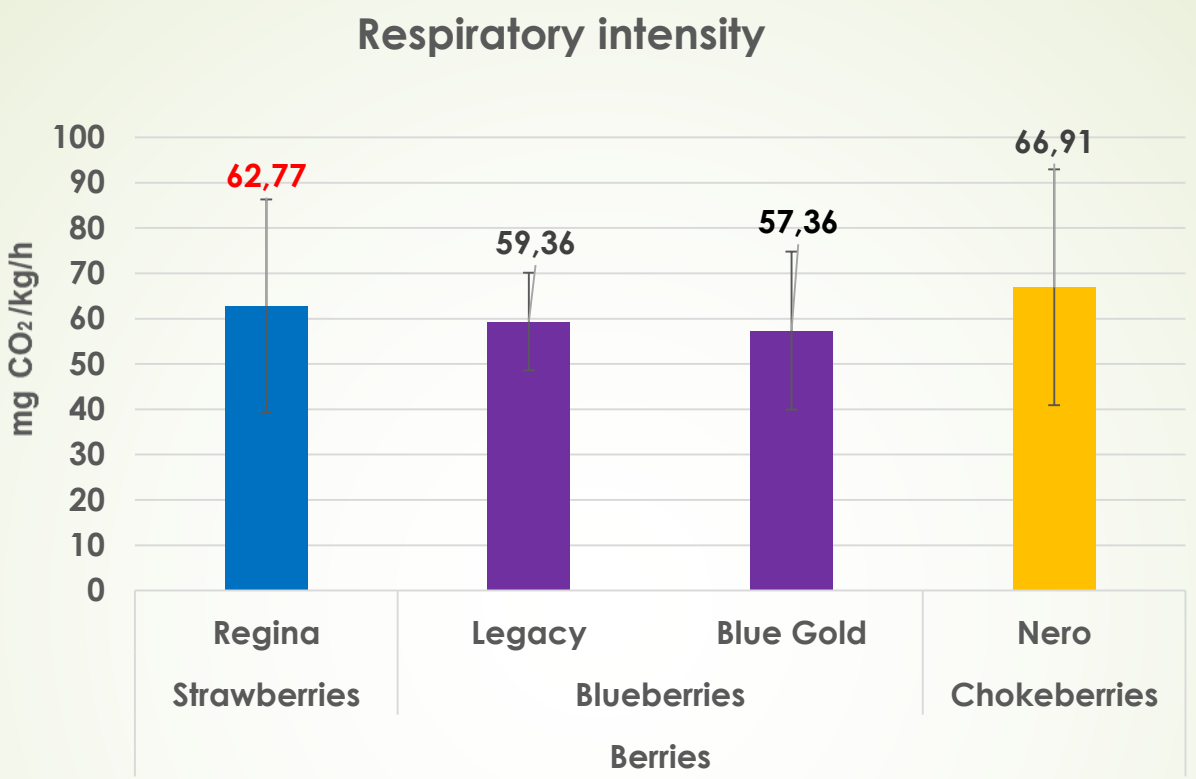
Also, Gherghi (2001) and Leis (2013) estimated values between 6.0-16.7% for apples soluble solids content.

	Sample	Water content (%)		Soluble Solids (Brix %)	
		Mean	± St.Dev.	Mean	± St.Dev.
Plums	Centenar	90.522	4.008	**14.220**	0.904
	Tita	91.871	1.466	**13.680**	1.385
	Stanley	**83.707**	0.62	**14.680**	0.816
	Jojo	**83.170**	0.425	**17.567**	1.303
Apples	Rubinola	**83.977**	0.846	**14.410**	1.174
	Topaz	**84.618**	0.900	**13.230**	1.503
	Gemini	**87.245**	0.947	**11.960**	0.938
	Renoir	79.520	1.724	17.490	1.600

Leis (2013) estimated a value about 15.5 °Brix for soluble solids content, at picking time, for Renoir variety, a value lower than that obtained in the present experiment (17.49 % Brix).

For apples, water content was estimated at 83-89% by Chira (2008).

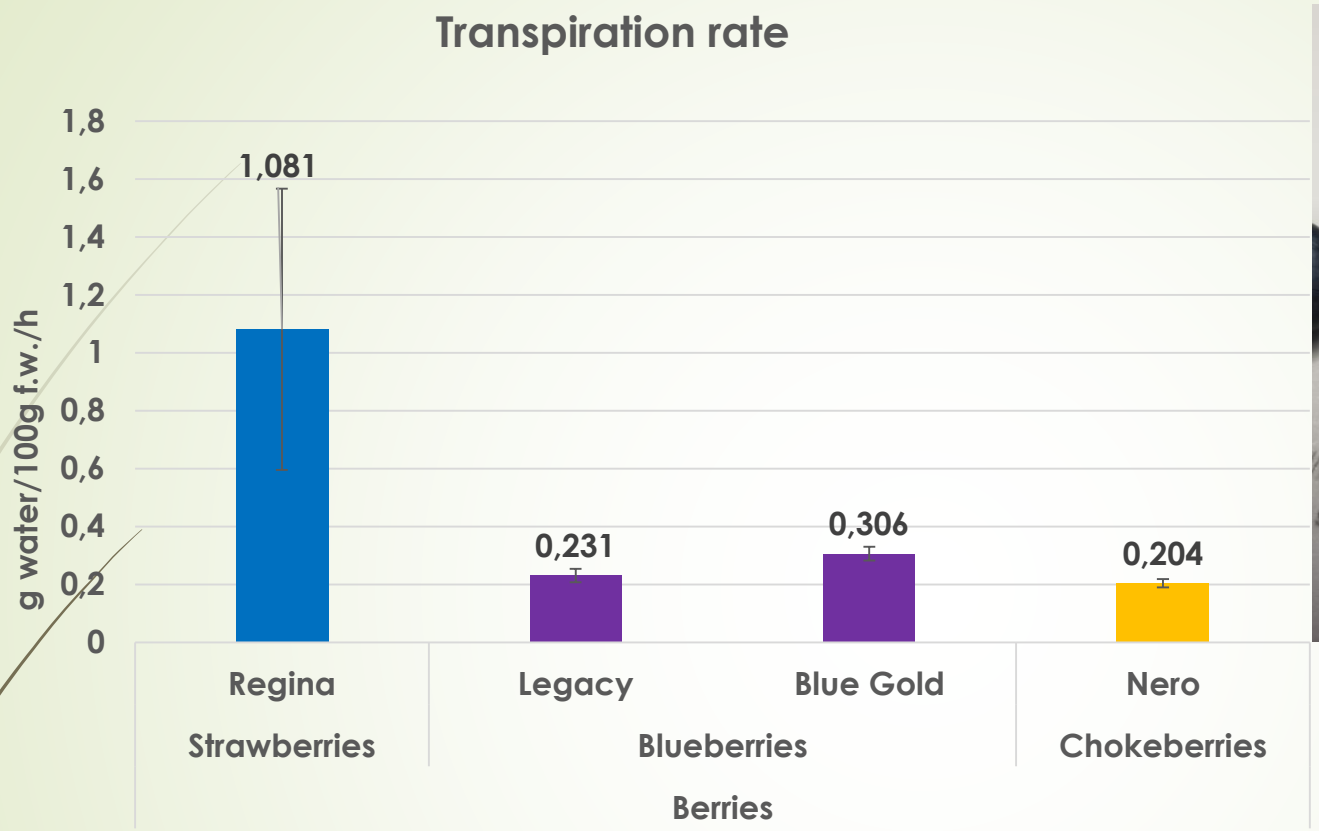
Respiratory intensity for strawberries was estimated by Gherghi (2001) at 50.2-100 mg/ CO_2/kg/h.

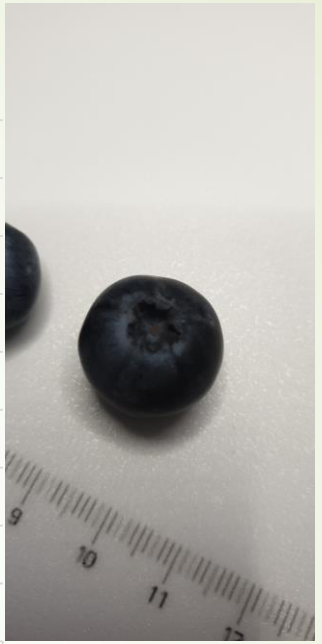


The respiratory intensity values:

- 57,36 mg CO_2/kg/h (‚Blue Gold' variety) and
- 66, 91 mg CO_2/kg/h (‚Nero' variety).

For blueberries and chokeberries, between respiratory intensity and soluble solids content, it has been registered a very strong significant positive correlation.



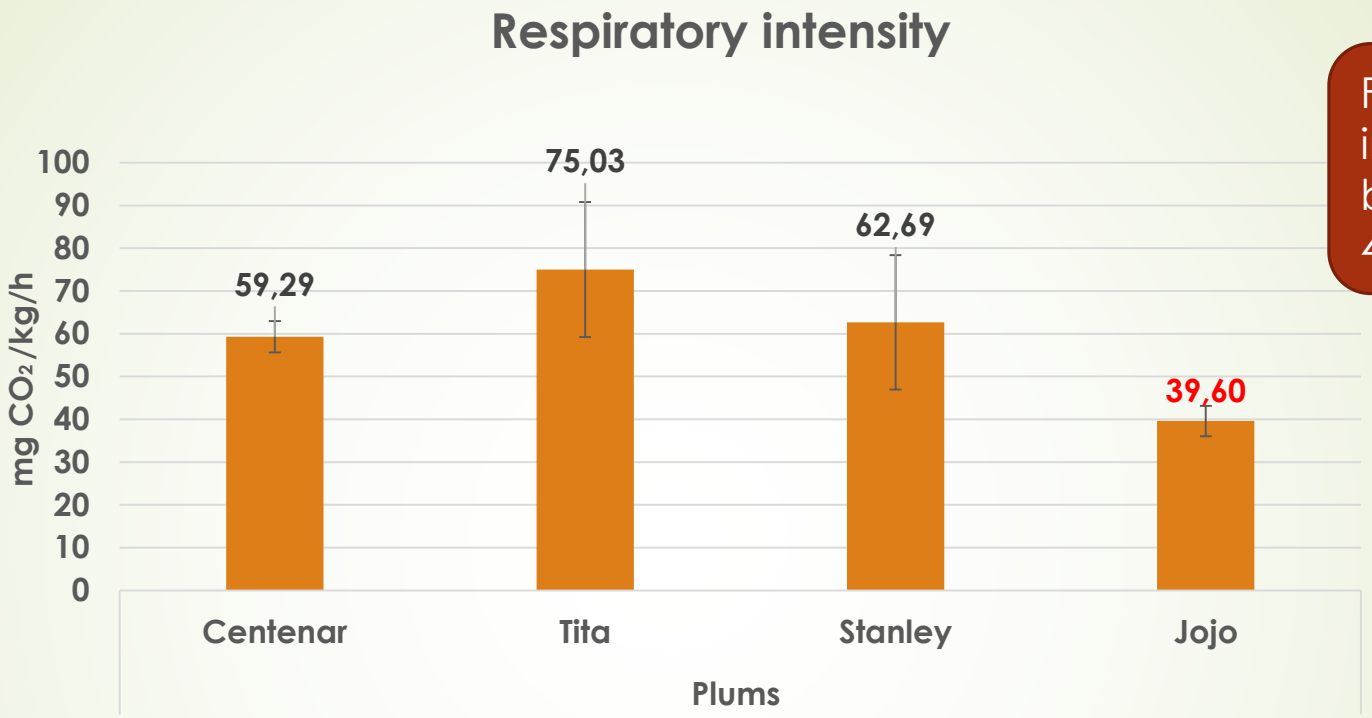


For strawberries, between transpiration and water content, it has been registered a negative correlation R= -0.8826.

The values of transpiration rate were:

- 0,231 and 0,306 g water/100g f.w./h (blueberries)
- 0,204 g water/100g f.w./h (chokeberries)

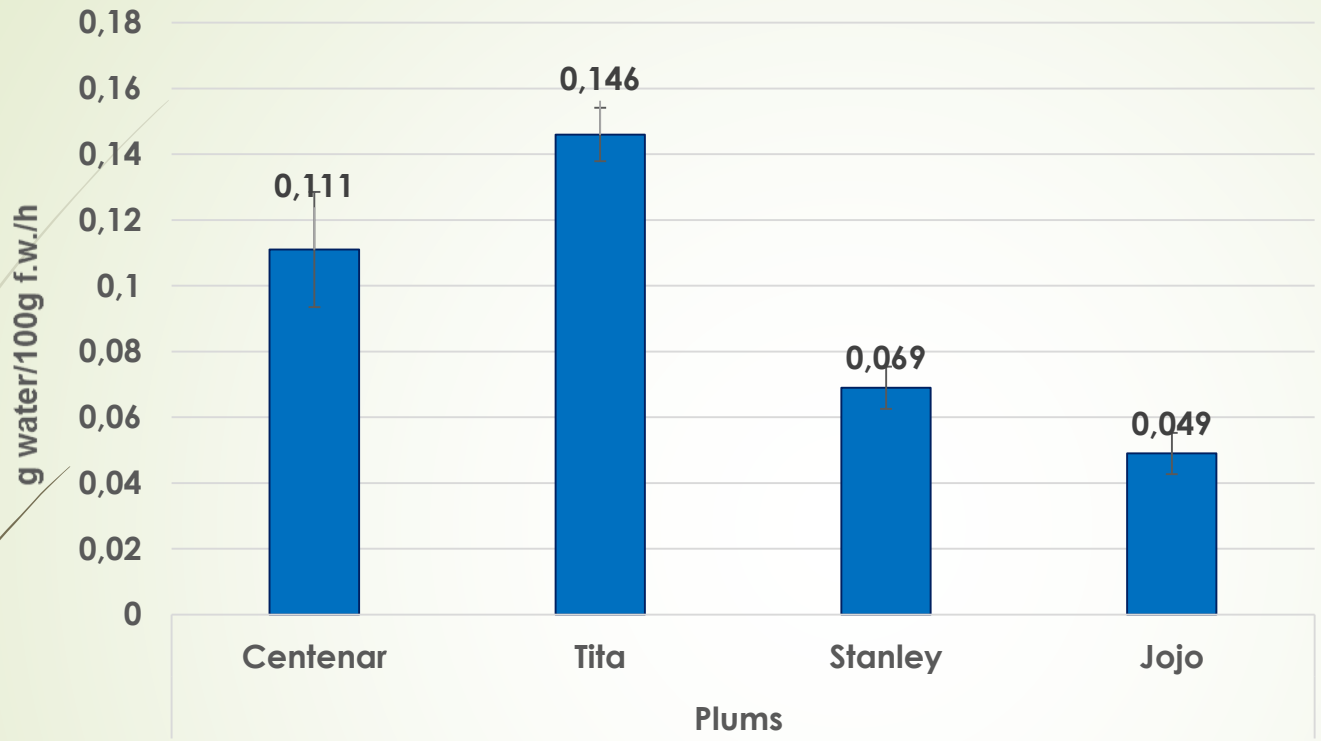
For plums, between respiratory intensity and soluble solids content it has been registered very strong significant negative correlation



For plums respiratory intensity was estimated by Gherghi (2001) at 26.8-40.2 mg/ CO_2/kg/hour.

The values for respiratory intensity of plums are between 39,60 mg CO_2/kg/hour (for ‚Jojo' variety) and 75,03 mg CO_2/kg/hour (for ‚Tita' variety).

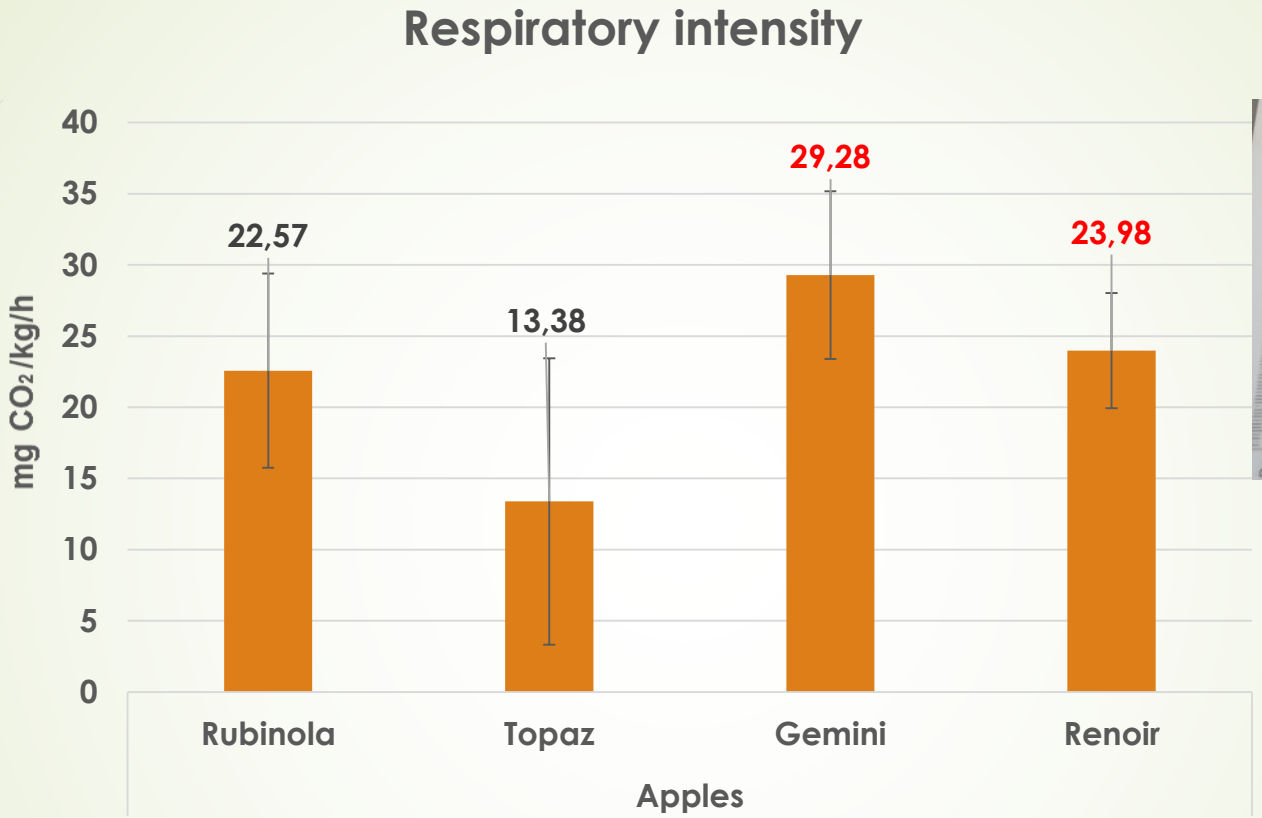
Transpiration rate



Also the values of transpiration rate have positive correlations with there respiratory intensity R=0.8475.

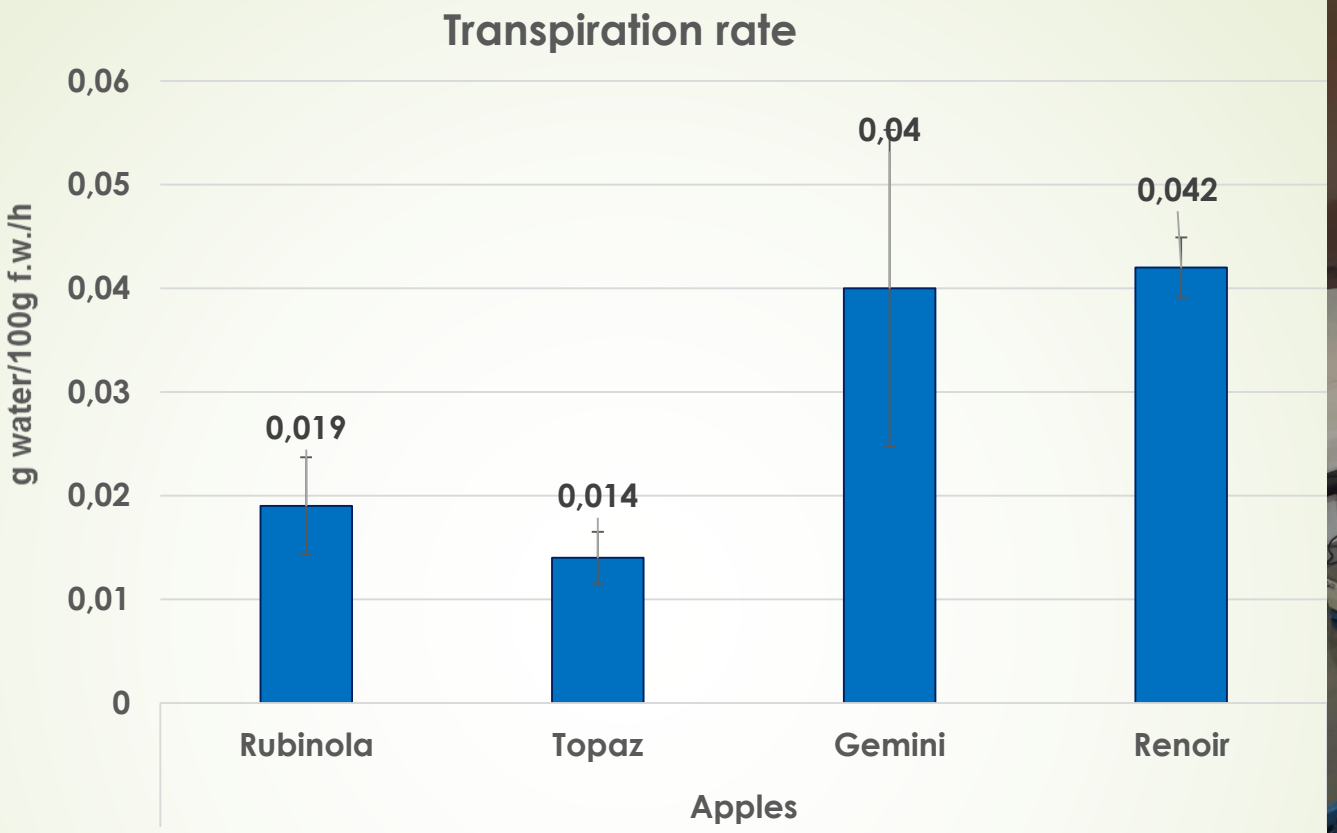
The values of plums transpiration rate were between 0,049 g water/100g fresh weight/hour (‚Jojo' variety) and 0,146 g water/100g fresh weight/hour (‚Tita' variety) have very strong significant positive correlations with water content R=0.9665.

The respiratory intensity of the apples registered values between 13,38 mg CO_2/kg/hour (for ‚Topaz' variety) and 29,28 mg CO_2/kg/hour (for ‚Gemini' variety).



For apples respiratory intensity was estimated by Gherghi (2001) at 24.2-42.3 mg/CO_2/kg/hour

For apples, between transpiration rate and water content, it has been registered a negative correlation R=-0.2304.



The values of apples transpiration rate were between 0,014 g water/100g fresh weight/hour (for ‚Topaz' variety) and 0,042 g water/100g fresh weight/hour (for ‚Renoir' variety), with there respiration rate have positive correlations R=8088.

CONCLUSIONS

The differences obtained are explained by the different levels of maturation process and the fruit's large variability (for plums and apples).

The differences between the climacteric and non-climacteric fruits were pointed out in order to choose the best storage conditions for these.

The difference between strawberries and the others berries, in respiration and transpiration rate, shows the importance of cuticular wax on blueberries and chokeberries, which slow down the metabolic processes.

Future research is required in order to understand the physiological processes in fruits such as: strawberries, blueberries, chokeberries, plums, and apples.

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Thank you for your attention!