

THE EFFECT OF PACKAGING MATERIALS AND TECHNOLOGIES TO THE STORABILITY OF FRESH



BLACK CURRANTS



**Solvita Kampuse^{1*}, Dalija Seglina², Inta Krasnova²,
Gunta Heidemane², Lija Dukalska¹**

¹ Department of Food Technology, Faculty of Food Technology, Latvia University of Agriculture (LLU), Jelgava, Latvia, skampuse@inbox.lv

² Latvia State Institute of Fruit Growing, Dobele, Latvia



Introduction

- Black currants have been classified as a non-climacteric fruit, exhibiting no increase in respiration rate or ethylene production during ripening.
- As a typical soft fruit they have a high physiological post-harvest activity, short ripening and a senescence period.
- For prolongation of fresh strawberry storage time different packaging materials and technologies can be used.
- Packaging is an integral and determinant part of the industrial and commercial food supply chain. Packaging protects goods from damage, against secondary contamination, allows efficient transportation and distribution, offers convenience, prolongs shelf life, provides easy use, informs consumers, and promotes goods in a competitive market place.

An objective of the research was to determine the possibility of prolonging black currant storage time, reducing moisture loss and changes of bioactive compounds by packaging in different materials



Materials and Methods

- Experiments were carried out at the Latvia University of Agriculture Department of Food Technology and in Latvia State Institute of Fruit Growing, Dobele during the year 2007.
- The effect of packaging material for prolongation of storage time were determined by using following packaging types:
 - PET/adhesive/PP containers (**PET Adh**);
 - PP (polypropylene) trays coated with biodegradable PLA films with thickness 25 μm (**PLA 25 PP**);
 - PP (polypropylene) trays coated with biodegradable PLA films with thickness 40 μm (**PLA 40 PP**);
 - carton boxes placed in PLA films, with thickness 40 μm (**PLA 40 PAP**),
 - oriented polypropylene material with film thickness 40 μm (**OPP**);
 - PP boxes with holes as a control placed at temperature $+20\pm 2$ °C (**2K-PL**),
 - PP boxes with holes as a control placed at temperature $+4\pm 1$ °C (**1K-PL**)
 - carton boxes as a control placed at temperature $+20\pm 2$ °C (**4K-PAP**);
 - carton boxes as a control placed at temperature $+4\pm 1$ °C (**3K-PAP**);
- The samples were stored in “Commercial Freezer/Cooler ELCOLD” at $+4 \pm 1$ °C temperatures under fluorescent lighting.

Analyses



- The composition of oxygen and carbon dioxide (measured by gas analyzer “OXYBABY” ECO).
- The firmness of blackcurrants (analyzed by Texture analyzer TA-XTPlus (Stable Micro Systems, U.K.)
- The moisture dynamics in the blackcurrants (by sample mass change weighting)
- Content of ascorbic acid (determined by titration with 0.05-M iodine solution);
- Content of anthocyanins (with spectrafotometer);
- colour in L*a*b measuring system
- pH value changes (detected by pH-meter)
- The blackcurrant damage by moulds were detected visually.

Results and Discussion



Changes of oxygen composition

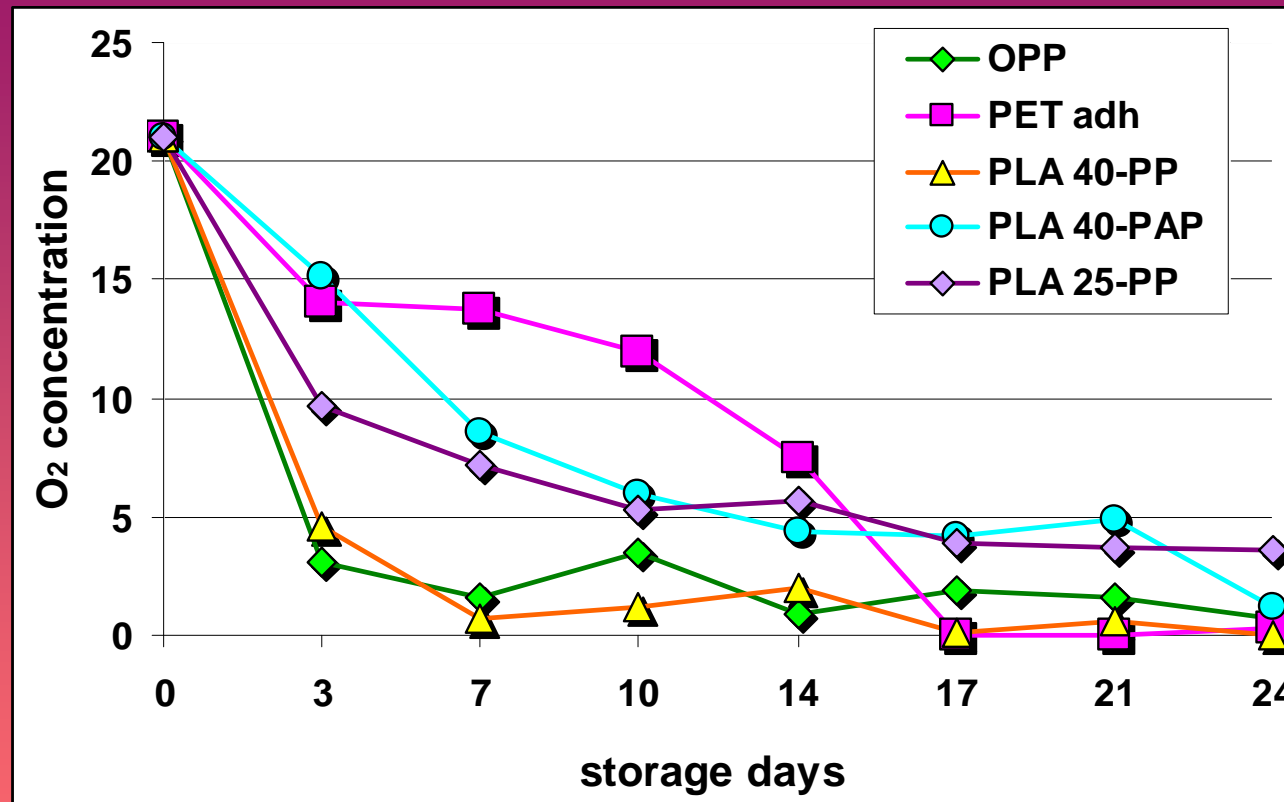


Fig. 1 The dynamics of oxygen (O₂) in the Blackcurrants at the storage time in different packaging materials.

Changes of carbon dioxide composition

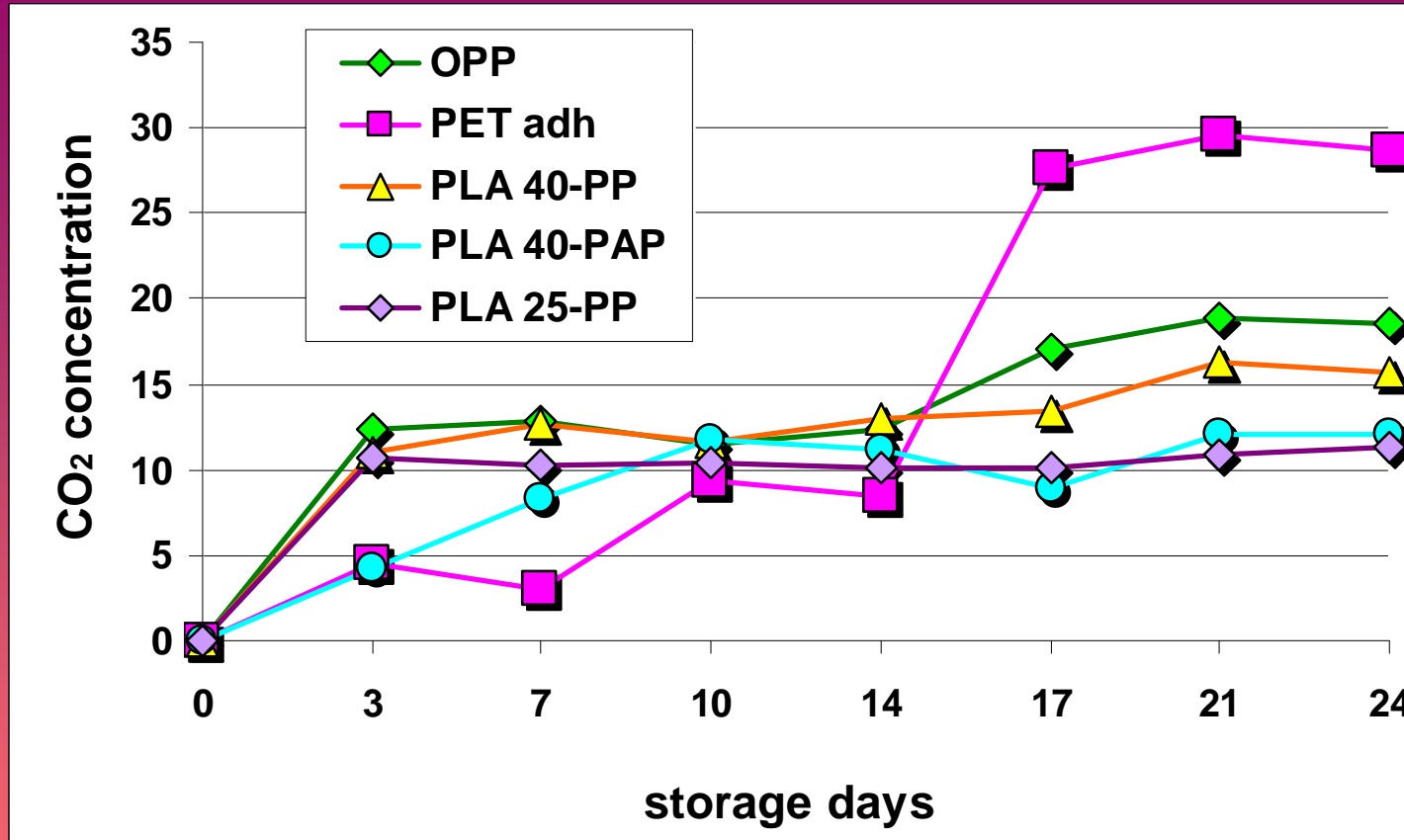


Fig. 2 The dynamics of carbon dioxide (CO₂) in the Blackcurrants at the storage time in different packaging materials.

Changes of Anthocyanin content

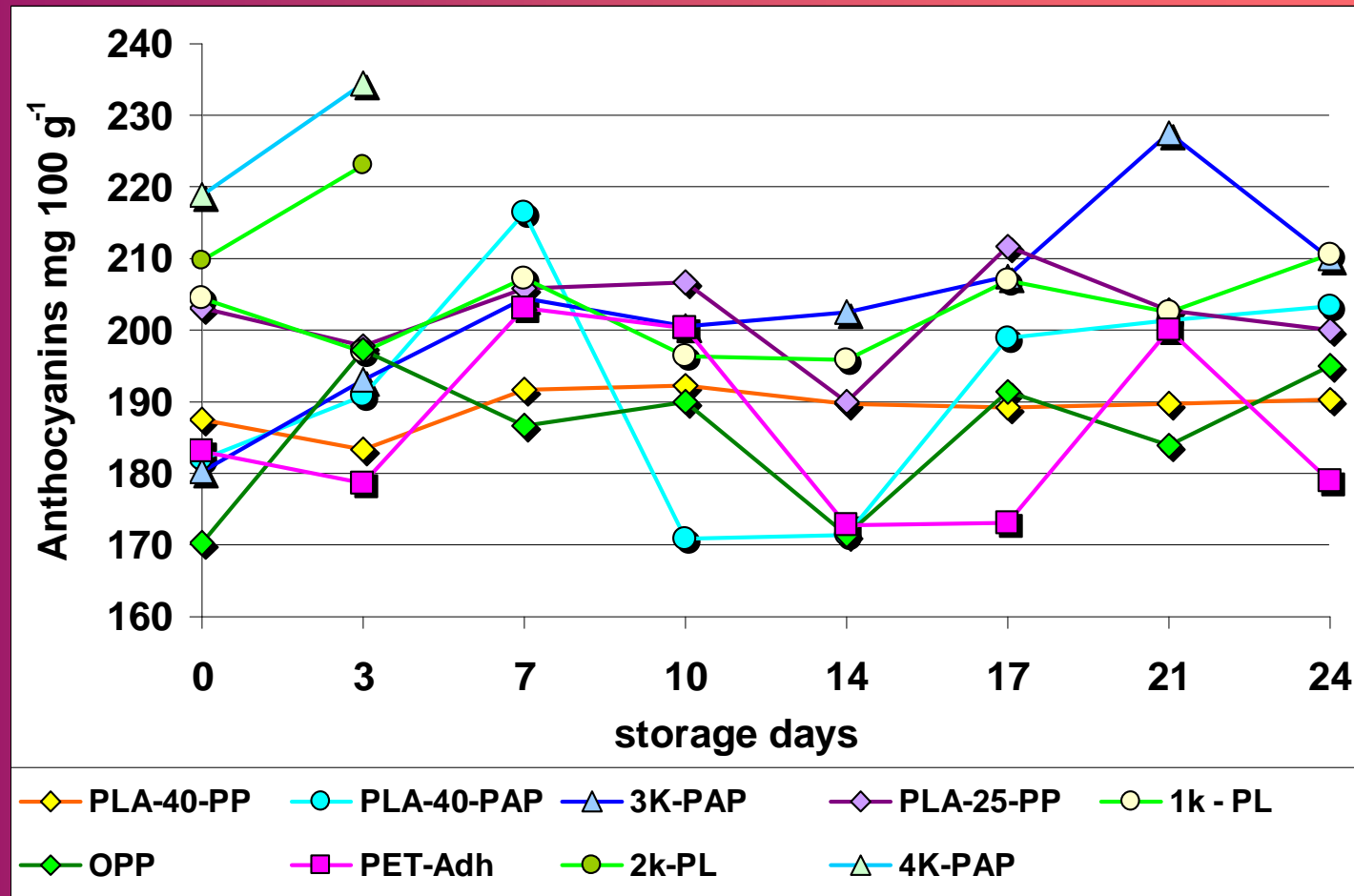


Fig. 3 The changes of anthocyanin content in Blackcurrants at the storage time in different packaging materials.

Changes of Ascorbic acid content

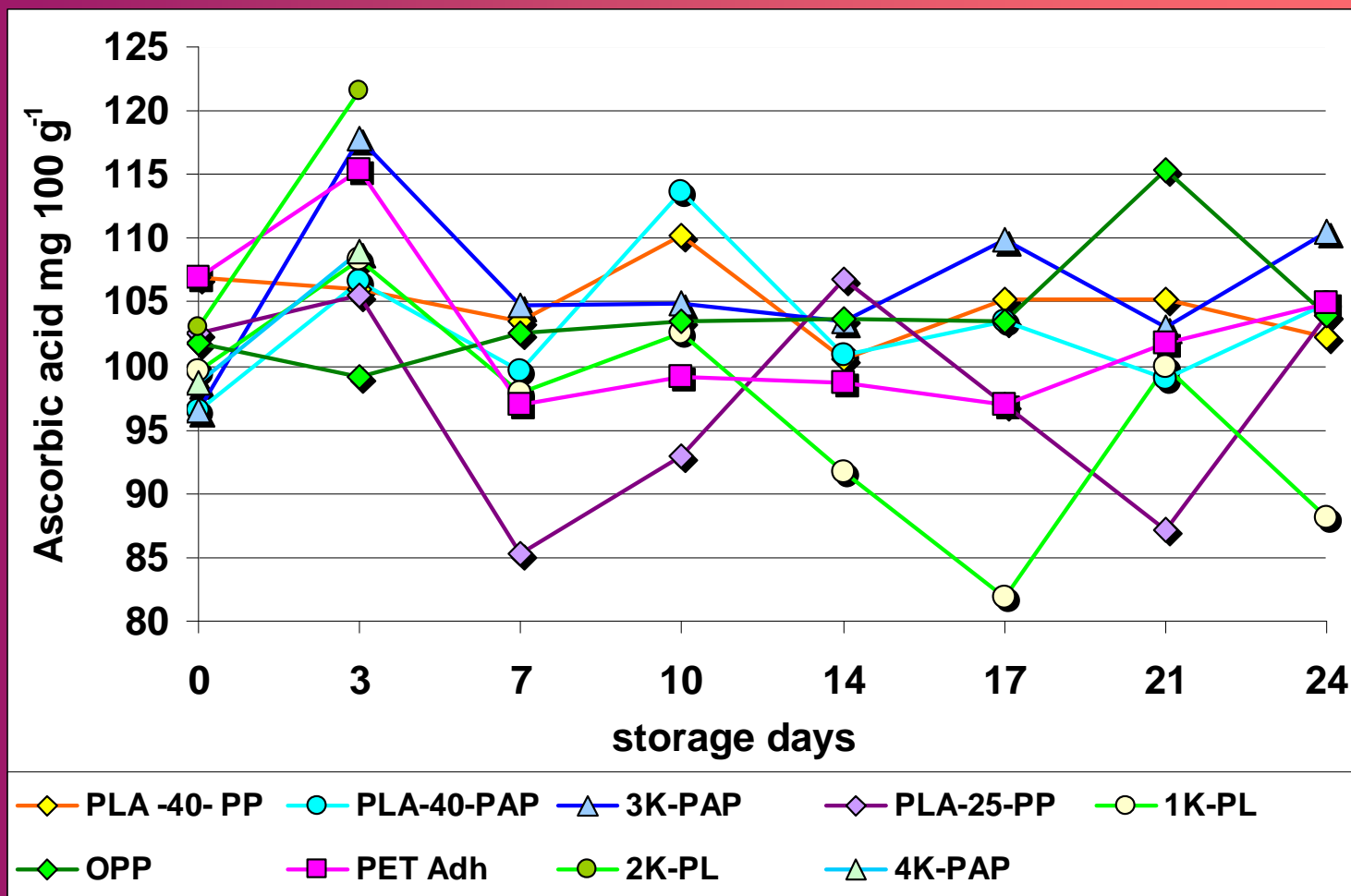


Fig. 4 The changes of ascorbic acid content in Blackcurrants at the storage time in different packaging materials.

Weight losses

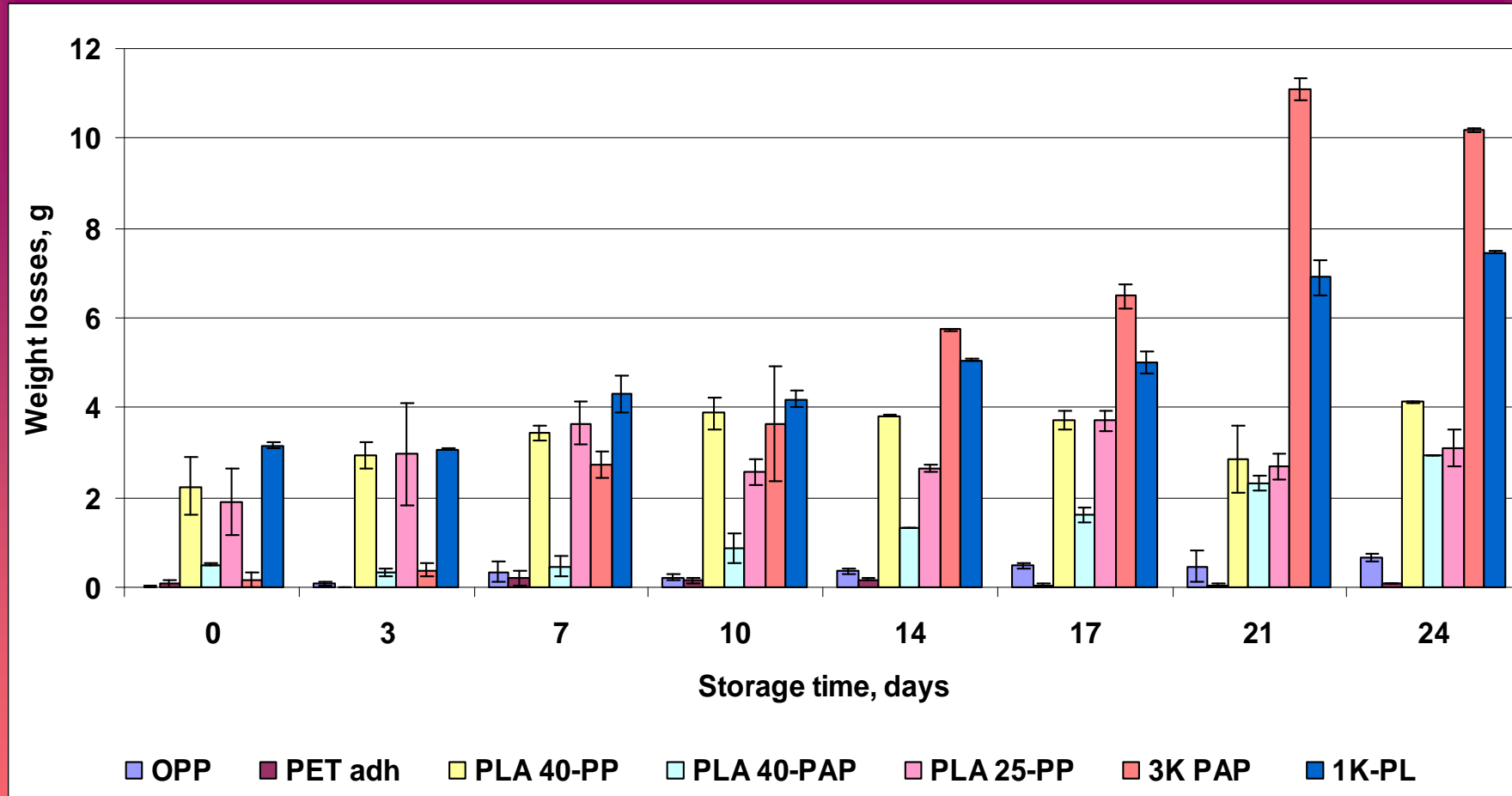


Fig. 5 The dynamics of weight losses in blackcurrants at the storage time in different packaging materials.

The quality changes

storage time, days	1K PL	2K PL	3K P PAP	4 K PAP	OPP	PET Adh	PLA 25 PP	PLA 40 PAP	PLA 40 PP
0	good	good	good	good	good	good	good	good	good
3	good	spoiled	good	some mould	acceptable	good	good	good	good
7	acceptable	spoiled	acceptable	spoiled	acceptable	acceptable	good	acceptable	acceptable
10	acceptable	spoiled	acceptable	spoiled	acceptable	acceptable	good	acceptable	acceptable
14	some mould	spoiled	acceptable	spoiled	20-50% mould	some mould	some mould	acceptable	20-50% mould
17	some mould	spoiled	acceptable	spoiled	spoiled	some mould	some mould	acceptable	some mould
21	spoiled	spoiled	some mould	spoiled	spoiled	20-50% mould	20-50% mould	20-50% mould	20-50% mould
24	spoiled	spoiled	some mould	spoiled	spoiled	20-50% mould	spoiled	20-50% mould	spoiled

	good quality
	acceptable quality
	some berries started to mould
	20-50% of berries started to mould
	more than 60% of berries are spoiled

Conclusions



1. The oxygen concentration after 10-day storage in samples with PET Adh were the highest but after 24 day storage this sample had the highest CO₂ concentration.
2. There were no significant influence of storage time and packaging material to ascorbic acid and anthocyanin content in samples
3. The least weight losses was observed in samples, packaged in PET Adh and OPP.
4. The best results were obtained, when blackcurrants were packaged in paper boxes, and in paper boxes, covered with PLA 40



Thank you for the attention!

