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

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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.**

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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

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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±2 ºC ***(2K-PL)*** ,
  - PP boxes with holes as a control placed at temperature +4±1 ºC ***(1K-PL)***
  - carton boxes as a control placed at temperature +20±2 ºC ***(4K-PAP)***;
  - carton boxes as a control placed at temperature +4±1 ºC ***(3K-PAP)***;
- The samples were stored in “Commercial Freezer/Cooler ELCOLD” at +4 ±1 º C temperatures under fluorescent lighting.

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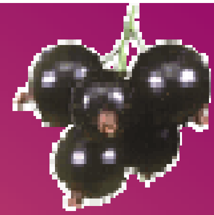
Analyses



- 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.

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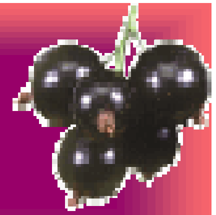

Results and Discussion

Changes of oxygen composition

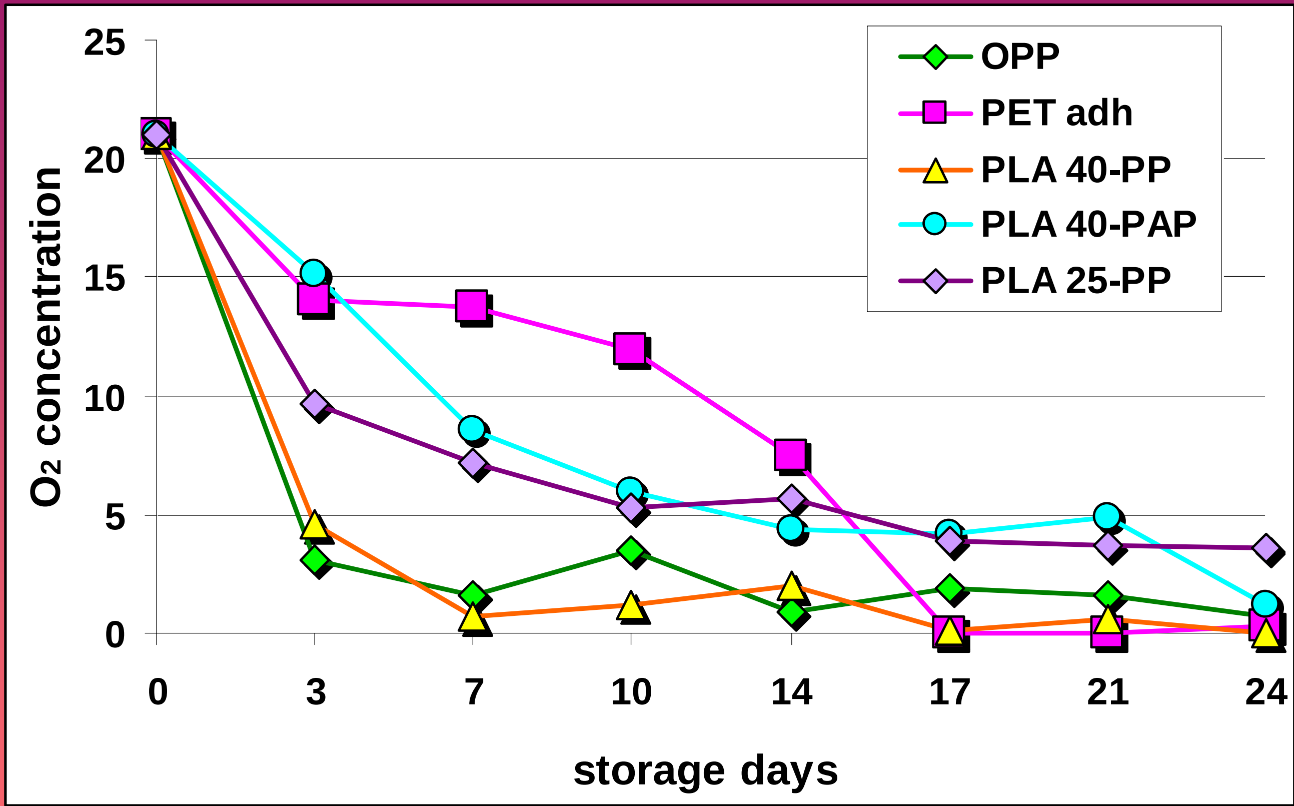

Fig. 1 The dynamics of oxygen (O_2) in the Blackcurrants at the storage time in different packaging materials.

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Changes of carbon dioxide composition

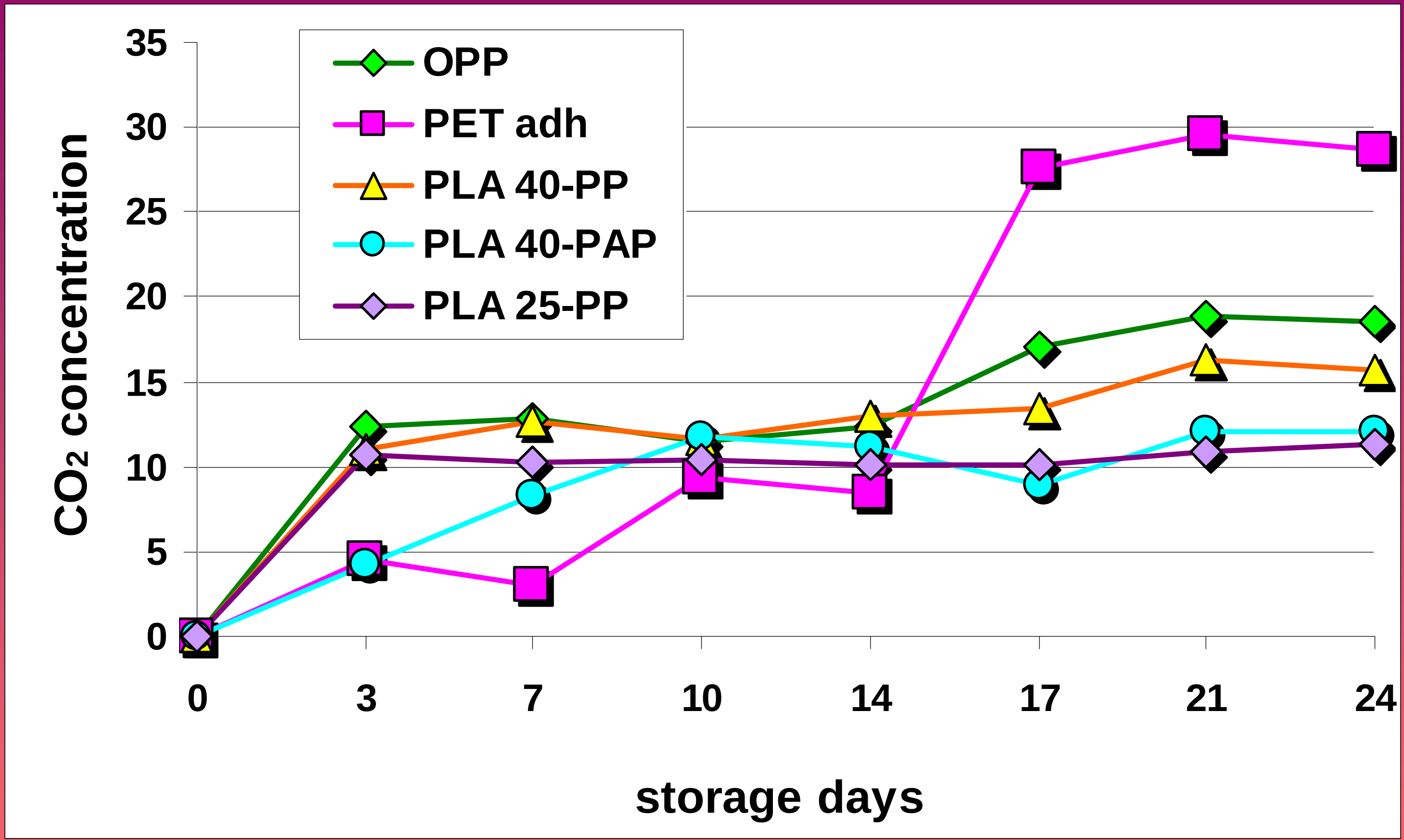

Fig. 2 The dynamics of carbon dioxide (CO_2) in the Blackcurrants at the storage time in different packaging materials.

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Changes of Anthocyanin content

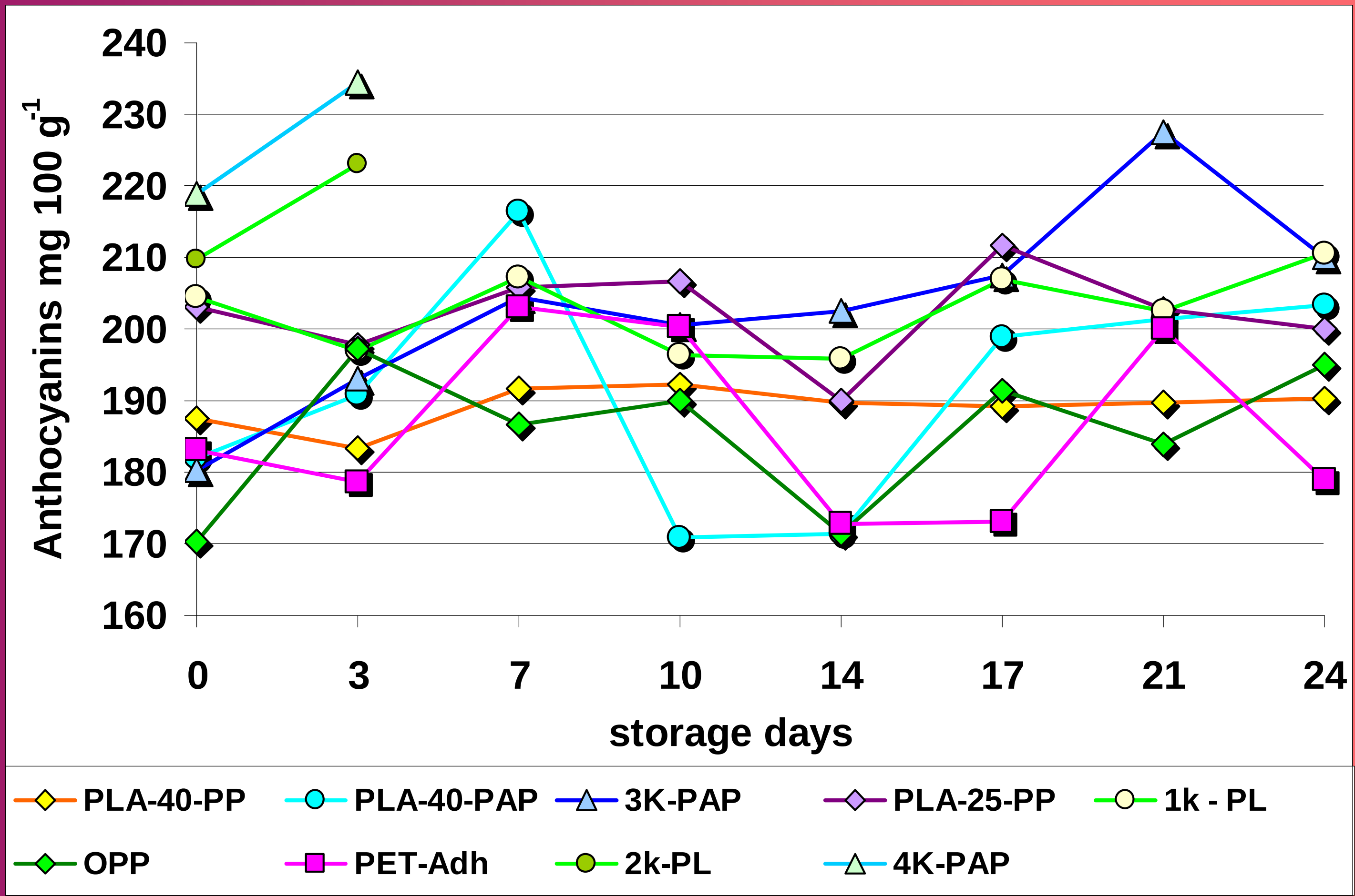

Fig. 3 The changes of anthocyanin content in Blackcurrants at the storage time in different packaging materials.

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Changes of Ascorbic acid content

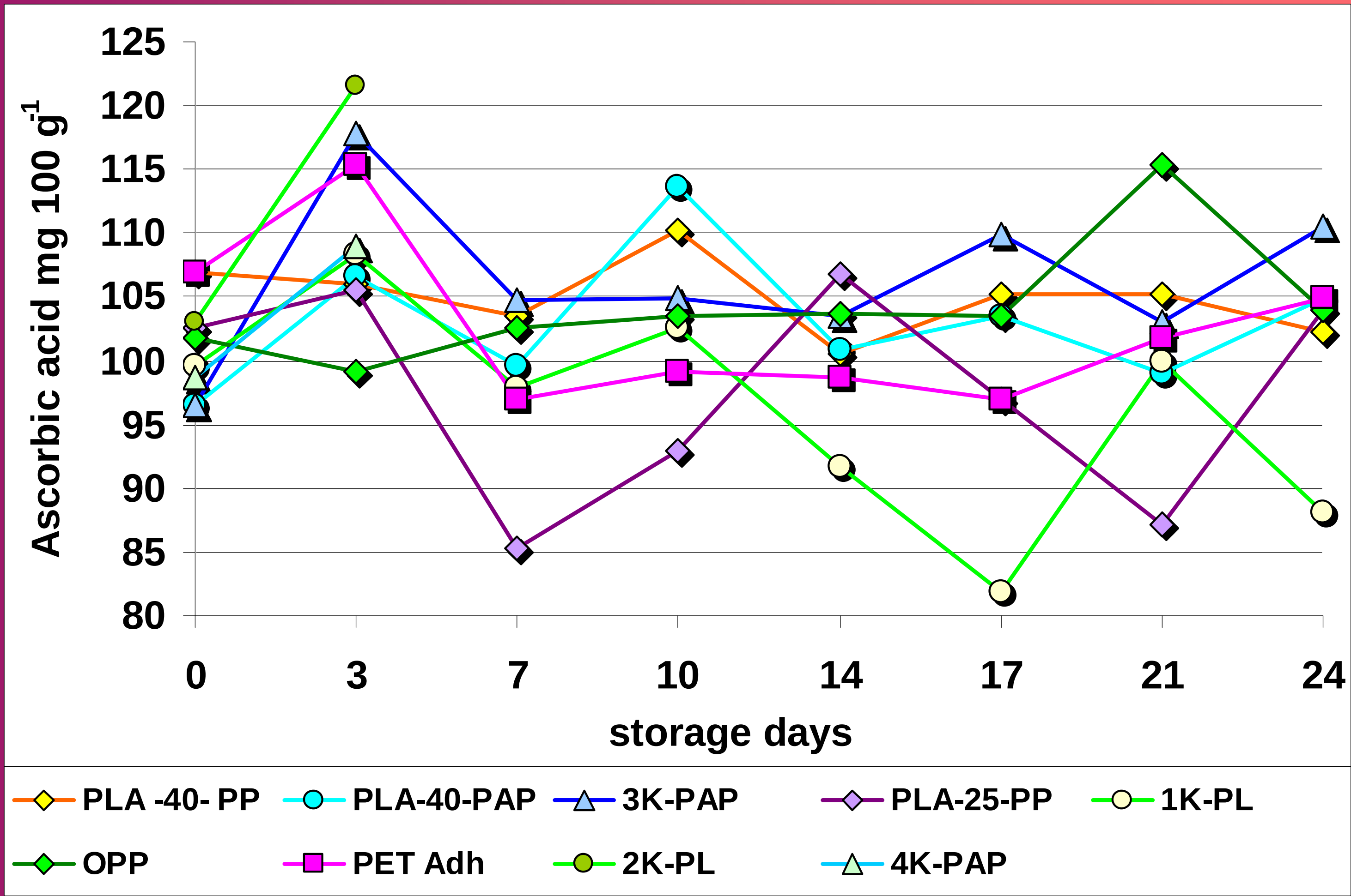

Fig. 4 The changes of ascorbic acid content in Blackcurrants at the storage time in different packaging materials.

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Weight losses

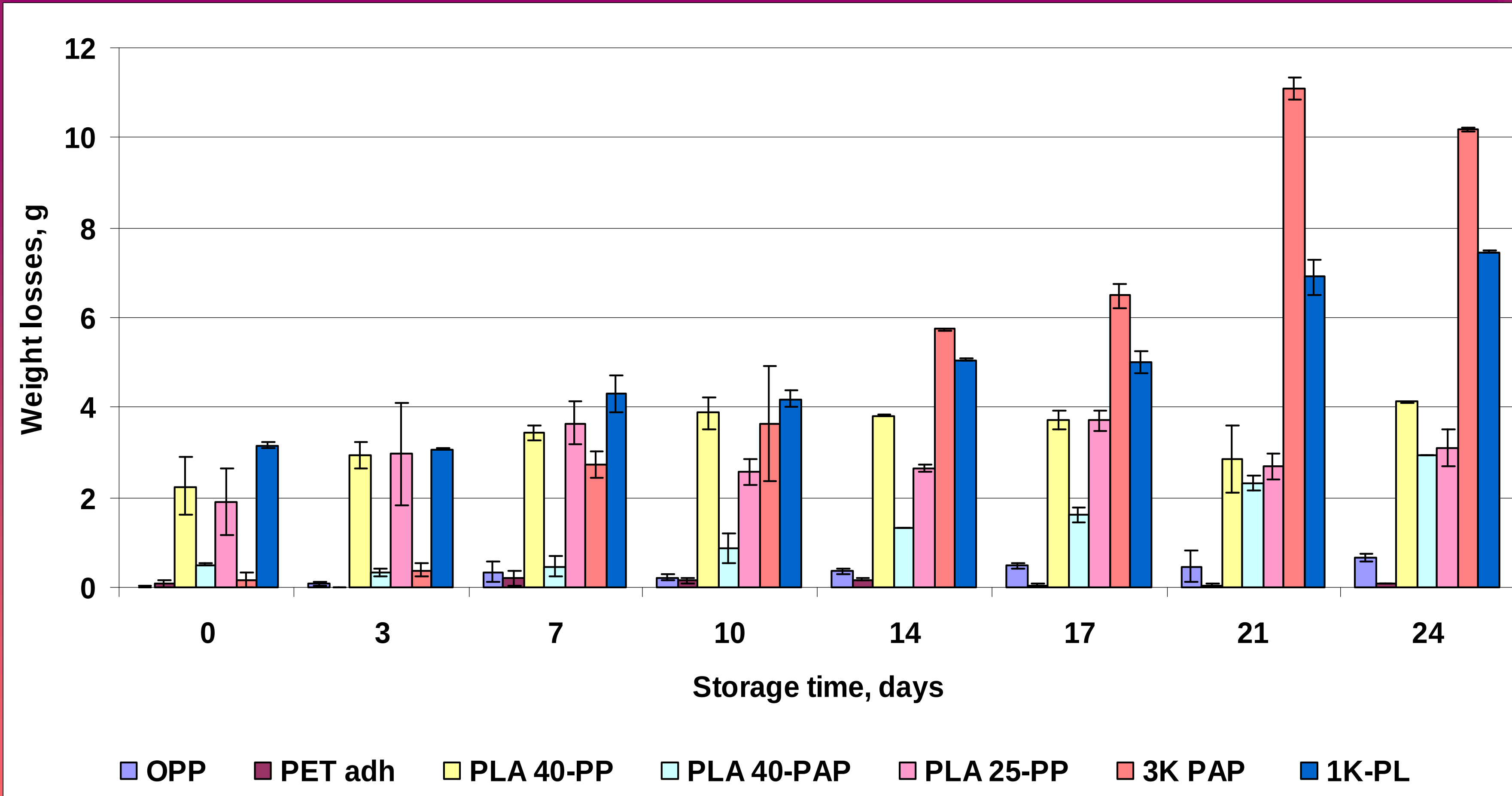

Fig. 5 The dynamics of weight losses in blackcurrants at the storage time in different packaging materials.

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The quality changes

storage time, days	1K PL	2K PL	3K PAP	4 K PAP	OPP	PET Adh	PLA 25 PP	PLA 40 PAP	PLA 40 PP
0	green	green	green	green	green	green	green	green	green
3	green	red	green	yellow	cyan	green	green	green	green
7	cyan		cyan		cyan	cyan	cyan	green	cyan
10	cyan		cyan		cyan	cyan	cyan	green	cyan
14	yellow		cyan		orange	yellow	yellow	cyan	orange
17	yellow		cyan		red	yellow	yellow	cyan	yellow
21	red		yellow		red	orange	orange	orange	orange
24	red		yellow		red	orange	red	orange	red

- green: good quality
- cyan: acceptable quality
- yellow: some berries started to mould
- orange: 20-50% of berries started to mould
- red: more than 60% of berries are spoiled

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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 signifficant 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

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Thank you for the atention!