

# EVALUATION OF THE QUALITY PARAMETERS OF GERMINATED SPRING GRAIN BREAKFAST CEREALS DURING STORAGE



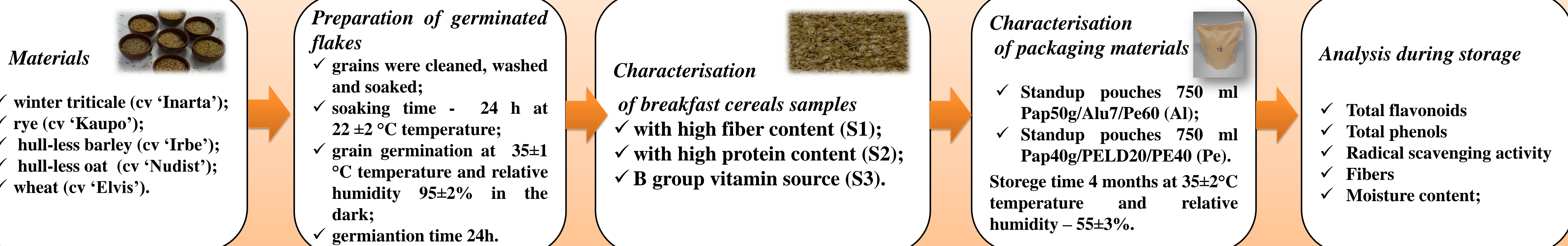
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## INTRODUCTION

- Cereal grains constitute a major source of energy and nutrients in the world. Different kind of cereals, whole grain and hull-less cereals, breakfast cereals and muesli products are dry foods containing protein, fat and saccharides and minor nutritional parameters are minerals and vitamins. Breakfast cereals are increasingly consumed because they are an important source of energy both for adults and children.
  - Triticale, oats and barley belong to the group of crops with high energy and nutritional value arising from a high content of biologically valuable proteins, high portion of lipids compared to other cereals, favorable saccharide composition as well as from significant levels of dietary fiber, vitamins and mineral substances (Demirbas, 2005; Gajdosova et al., 2007).
  - Germination, a complex process causing physical, chemical and structural changes in grains, has been identified as an inexpensive and effective technology for improving cereal quality (de Pinho Ferreira Guine & dos Reis Correia, 2013).
  - Changes of the quality is significantly influenced by packaging materials and technology.
- The aim of current research is to evaluate changes of quality parameters of germinated spring grain breakfast cereals during storage in different packaging materials.

## MATERIALS AND METHODS



## RESULTS and DISCUSSION

Breakfast cereal samples were developed based on chemical composition of cereals and germinated cereal:

- S-1 is more rich in fiber and consists mainly from triticale (raw and germinated)
- S-2 is the source of proteins and the main components are triticale and oats,
- S-3 is rich in B group vitamins consisting of triticale and rye.

Additionally to fibers, proteins and vitamins, breakfast cereals contain biologically active substances as phenolics, flavonoids and substances with radical scavenging activity (Table 1).

Content of flakes in the breakfast cereal samples

Grains	Composition of breakfast muesli S-1			Composition of breakfast muesli S-2			Composition of breakfast muesli S-3		
	Total phenols, mg 100 g <sup>-1</sup>	DPPH, mg 100 g <sup>-1</sup>	ABTS, mg 100 g <sup>-1</sup>	Total phenols, mg 100 g <sup>-1</sup>	DPPH, mg 100 g <sup>-1</sup>	ABTS, mg 100 g <sup>-1</sup>	Total phenols, mg 100 g <sup>-1</sup>	DPPH, mg 100 g <sup>-1</sup>	ABTS, mg 100 g <sup>-1</sup>
Wheat	0.00	0.00	0.00	0.00	0.00	0.00	4.41	0.14	0.62
Oats	0.00	0.00	0.00	15.60	0.69	1.35	0.00	0.00	0.00
Rye	5.59	0.32	0.74	0.00	0.00	0.00	11.17	0.64	1.49
Triticale	19.44	0.71	2.04	15.56	0.57	1.63	7.78	0.29	0.82
Naked oats	0.00	0.00	0.00	0.00	0.00	0.00	5.14	0.28	0.46
Germinated wheat	0.00	0.00	0.00	8.16	0.27	1.12	0.00	0.00	0.00
germinated rye	0.00	0.00	0.00	0.00	0.00	0.00	16.00	1.14	1.79
germinated triticale	17.42	0.66	1.31	8.71	0.33	0.65	0.00	0.00	0.00
Germinated Naked oats	10.57	0.45	1.05	0.00	0.00	0.00	0.00	0.00	0.00
Germinated Naked barley	14.80	0.79	1.85	14.80	0.79	1.85	29.60	1.58	3.69
	67.83	2.94	6.98	62.83	2.65	6.60	74.10	4.07	8.86

Packaging materials and storage duration influence composition of breakfast cereals

Moisture of breakfast cereals is influenced by packaging materials. In the samples stored in PE for five month moisture is significantly lower, but in AL no significant differences were observed (Fig.1.)

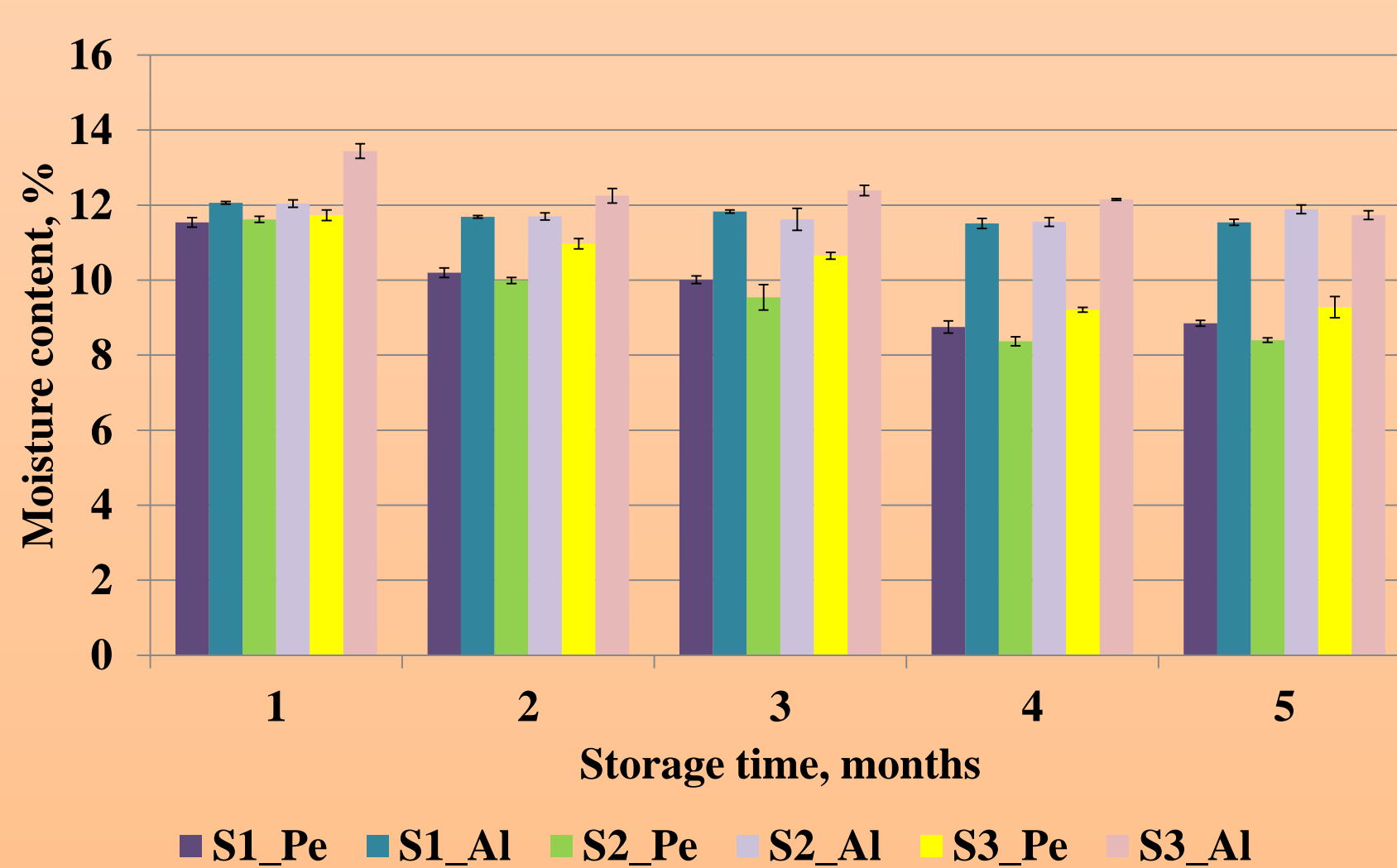


Figure 1. Moisture content of breakfast cereals samples

Changes of fiber content is more influenced by cereal types not packaging materials (Fig.2.).

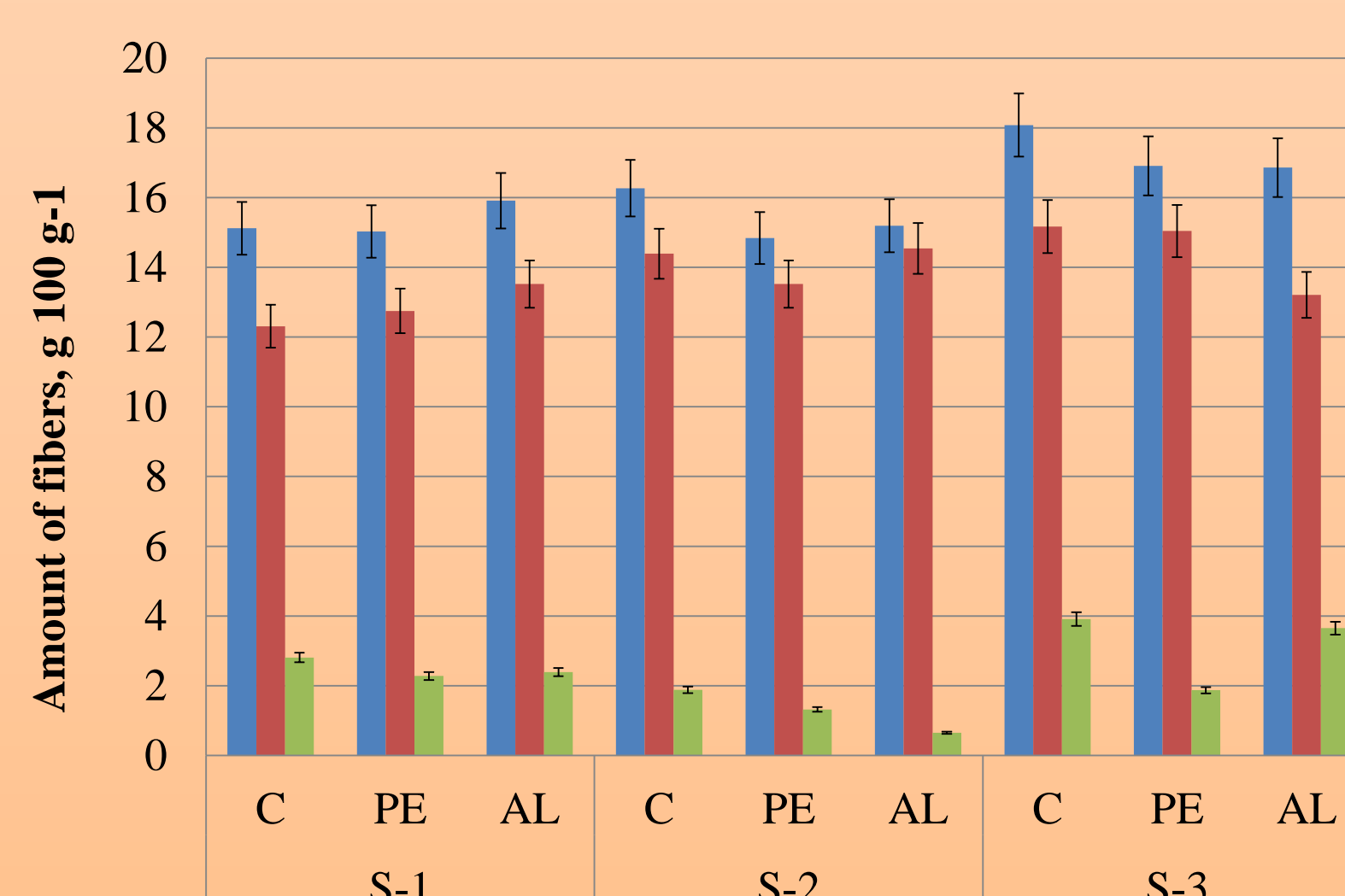


Figure 2. Fiber content of breakfast cereals samples

Total phenols, flavonoids and radical scavenging activity was influenced by packaging materials, and for the samples S1 and S2 PE is more suitable packaging material (Fig.3.).

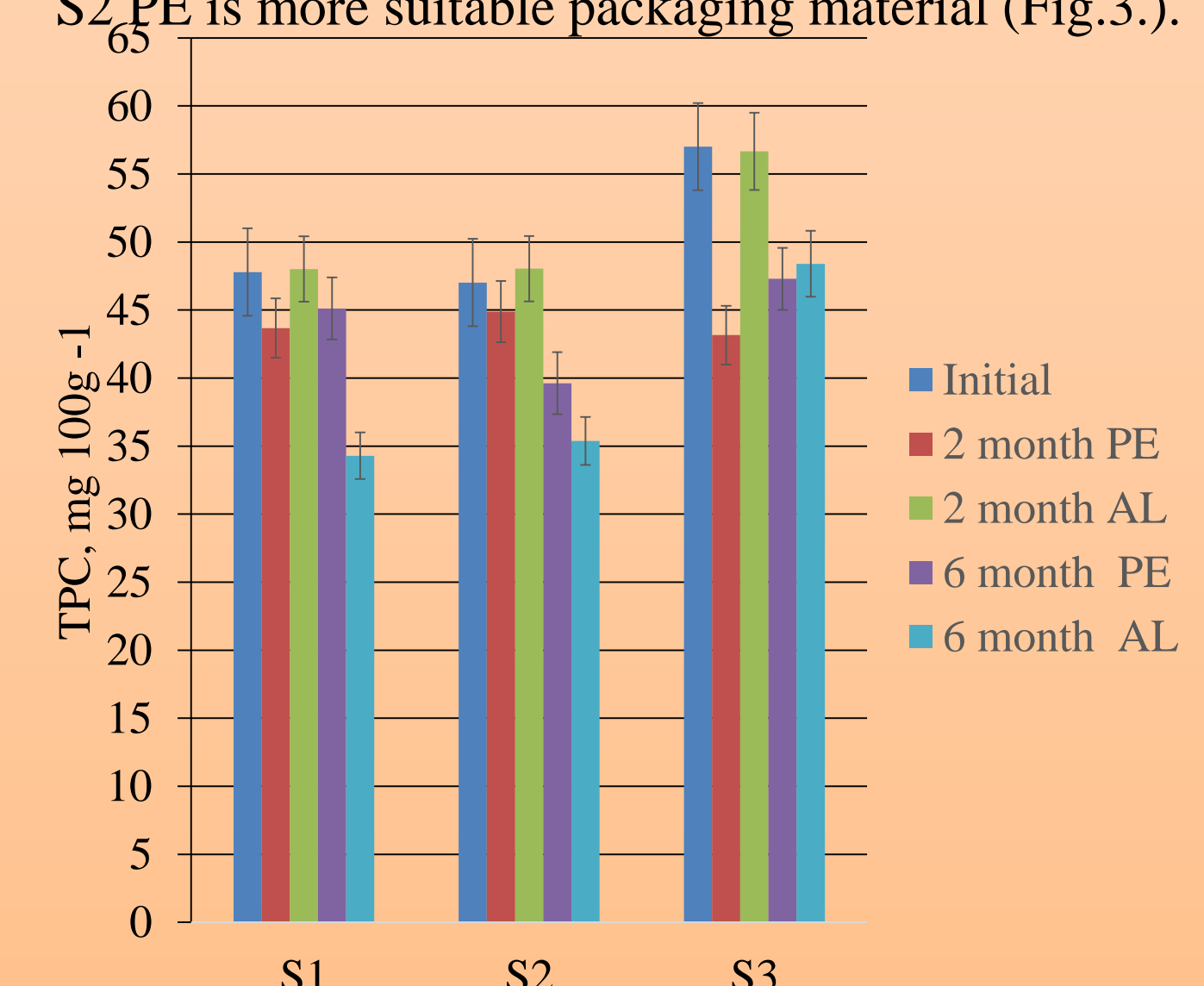


Figure 3. Total phenols of breakfast cereals samples

## CONCLUSIONS

- Breakfast sample S-3 contains the highest amount of phenolic compounds and has the highest antioxidant activity.
- The main source or phenolic compounds and antioxidant activity is germinated barley.
- Packaging material influenced all tested parameters during storage
- Results showed that as the most suitable packaging material Standup pouches 750 ml Pap40g/PELD20/PE40 could be selected.

## REFERENCES

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