

The potential of sprouted hulless barley grains "Kornelija"

Cereals and grain products are the basis of our diet, because with the carbohydrates and proteins they contain, we take in almost two-thirds of the calories we need per day, and they are an important source of B vitamins and fibre. Sprouted seeds, grains and grain/cereal germs have been used in the diet since ancient times. In year 1782, vitamin C was discovered in soybean sprouts, after which they were started to be used to treat scabies. Sprouted linseed during the First World War was used as a source of vitamin C by British soldiers. Today, in many parts of the world, grain germ and sprouted grains are used as a biologically high-quality food (Nöcker R.-M., 1995).

Results of previous research (Rakcejeva, 2016) show that during germination, the amount of fibre, vitamin B₂, E and niacin amounts in grains increase, and vitamin C is synthesized. As a result of protein hydrolysis, essential amino acids are formed in the grains during their activation. Compared to ungerminated grains, glucosamine content increases most rapidly in sprouted hulless barley in comparison to rye and wheat. It should be noted that glucosamine belongs amongst glycopeptides. In turn, glycopeptides are very important biologically active compounds that prophylactically increase the body's resistance, mainly the phagocytic activity of the immune system, and inactivate pathogenic microorganisms, while secreting immune mediators cytokinins, which cause further development of the body's immune response (Ermolaev J., 2002; Slesarev V. *et al.*, 1998; Yamamoto K. *et al.*, 1998).

In experimental (Rakcejeva, 2016) researches it was determined that after germination/sprouting of grains of up to 36 h, the gluten quality of wheat becomes unsatisfactory, due to intensive disimilation processes, which in turn reduce the protein content. Gluten could not be obtained from rye and hulled barley, so the idea arose to evaluate the gluten content in grains after germination/sprouting, with the aim to obtain grains with reduced gluten content, possibly even a gluten-free product, thus creating solutions to reduce gluten content in grains.



1. Fig. Sprouted grain
(A – 36±1 h drying of sprouted grains, B – 36±1h sprouted and dried grains)

For the experiments, the grains were rinsed and soaked in water in a ratio of 1:2 (grains:water) at a temperature of 22±2°C 24±1h. After soaking, the grains were placed for germination/sprouting in a climatic chamber ICH110 (Memmert, Germany) at a temperature 35±1°C and relative air humidity (RH) 95±5% in darkness for 24±1 h and 36±1 h (Kince *et al.*, 2017). After germination/sprouting, the grains were dried at room temperature +60±2°C for 7±1 h UF160 (Memmert, Germany) (Rakcejeva., 2008) (Fig. 1.).

Table 1 shows the biochemical parameters of ungerminated and germinated, dried grains.

Table 1

Biochemical parameters of ungerminated and germinated grains, %

Parameter	Hulless barley variety "Kornelija",		
	unsprouted	24±1 h sprouted	36±1 h sprouted
Total sugars, g 100 g ⁻¹ :	0.95±0.40	3.00±0.30	3.20±0.30
Incl. glucose, g 100 g ⁻¹	<0.20	0.50±0.10	0.90±0.10
Fructose, g 100 g ⁻¹	<0.20	0.30±0.10	0.40±0.10
Sucrose, g 100 g ⁻¹	0.95±0.40	1.20±0.10	1.90±0.20
Maltose, g 100 g ⁻¹	<0.20	1.00±0.10	<0.20
Total fibre, %:	26.30±0.40	25.80±1.60	24.60±1.20
β-glycan, %	4.38	4.14	3.80
Protein, %	13.53	14.45	14.28
Total essential amino acids, mg 100 g ⁻¹	36.30	----	36.50
Gliadin, ppm	82.00 (>50)	48.40 (<50)	36.90 (<50)
Gluten, ppm	164.10 (>100)	96.90 (<100)	73.70 (<100)

In ungerminated/unsprouted grains of the variety "Kornelija", the amount of fibre is initially 26.3% and the amount of β–glucans – 4.3%. After germination of the grains for 24 and 36 hours, the fibre content decreases by 2.0% and 6.5%, respectively, including β–glucan levels by 5.5% and 13.3%. The protein content of sprouted grains is higher, including a slight increase in the content of essential amino acids. During the germination/sprouting process

It has been experimentally obtained that the gluten content in hulless barley can be reduced by 41% by germinating them for 24 hours, compared to ungerminated/unsprouted grains, and by 55% – by germinating them for 36 hours. Thus, during germination/sprouting it is possible not only to increase the nutritional value of grains, but also to reduce their gluten content almost twice.

Such germinated/sprouted grains can be used both in the production of bakery and confectionery products, and in the composition of muesli, they can be added to yoghurts and desserts, increasing their nutritional value and improving the viscosity.

Literature:

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