

The chemical composition of new barley varieties and breeding lines created in Latvia

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Introduction

The increased interest in barley as a human food ingredient results from studies which have shown barley to be an excellent source of dietary fibre and, in particular, β -glucans. Incorporation of barley as a part of a balanced diet can help reduce the risk of coronary heart diseases, diabetes and certain cancers.

Generally, the barley protein content is highly dependent on the cultivar [Qi *et al.*, 2006] and differs in growth conditions. The higher crude protein content in barley was usually accompanied by lower contents of the starch and dietary fibre [Biel & Jacyno, 2013].

The preferred barley for human food is hull-less barley with caryopses that is thresh free from the pales [Baik & Ullrich, 2008]. In contrast to the wide diversity of naked barley in Asia, very few naked barley cultivars have been developed for modern UK or European agricultural systems. In food industry, naked barley has been recognized as being more valuable and economic than covered barley, as the interest of consumers in health strengthening and promoting food products is increasing [Newman and Newman, 2005]. The first naked varieties registered in Latvia were 'Irbe' (2011) and 'Kornelija' (2014). Naked barley research and development is now receiving more emphasis with a potential for various end uses.

For developing new products and further breeding of barley, it is necessary to increase knowledge on variation in content of fibre and bioactive components in barley and their mutual relations.

The aim of investigation was to analyze the grain composition of perspective barley varieties, including content of protein, starch and β -glucans, and compare barley varieties bred in Latvia.

Materials and Methods

The research was conducted at the Institute of Agricultural Resources and Economics, including Stende and Priekuli research centres at the organic (O) and conventional (C) conditions.



The material consisted of 5 barley genotypes.

Hulled varieties	Hull-less varieties
RUBIOLA TYRA	IRBE KORNELIJA Breeding line GN03386

Mean samples from all (4) replications (0.5 kg) were taken for laboratory testing. Covered grains dehulled mechanically. Test weight, protein, starch and β -glucans were determined by using automatic grain analyzer Infratec Analyser 1241.

Results and discussion

The results of analyzed protein, lipids, starch and β -glucans in hulled and hull-less barley varieties and breeding lines grain are summarized in Table 1.

Table 1. THE CHEMICAL COMPOSITION OF HULLED AND HULL-LESS BARLEY GRAINS

Genotypes/lines	Place	Protein, %		Starch, %		β -glucans, %	
		C	O	C	O	C	O
Hulled varieties							
RUBIOLA	Stende	10.7	10.5	62.4	62.2	4.1	3.8
	Priekuli	11.3	11.2	55.3	55.3	3.6	3.5
TYRA	Stende	10.9	10.9	62.6	62.8	4.2	4.0
	Priekuli	11.7	10.9	55.2	56.2	3.8	3.7
Hull-less varieties							
IRBE	Stende	12.9	10.4	62.3	63.8	5.1	4.6
	Priekuli	10.9	10.0	59.2	59.9	4.2	3.8
KORNELIJA	Stende	15.9	12.9	60.1	62.2	5.2	5.1
	Priekuli	13.4	12.9	56.2	56.7	4.4	4.0
GN03386	Stende	12.6	11.9	62.2	62.4	4.8	4.9
	Priekuli	12.7	13.0	56.7	56.4	4.0	3.8

The data demonstrates notable variation in protein among the barley breeding lines - the difference between minimum and maximum values of crude protein was 5.4%.

The richest in protein was the grain of naked barley variety 'Kornelija' - on average 13.9%.

Usually, higher crude protein content in barley was accompanied by lower contents of the starch and dietary fibre [Biel & Jacyno, 2013]. Results of our investigation showed that the variety 'Kornelija' had the highest protein content, but it did not have the smallest β -glucans (3.61%),

Correlation between protein content and β -glucans content was calculated in grains of hulled and hull-less barley varieties and shown in Figure 1.

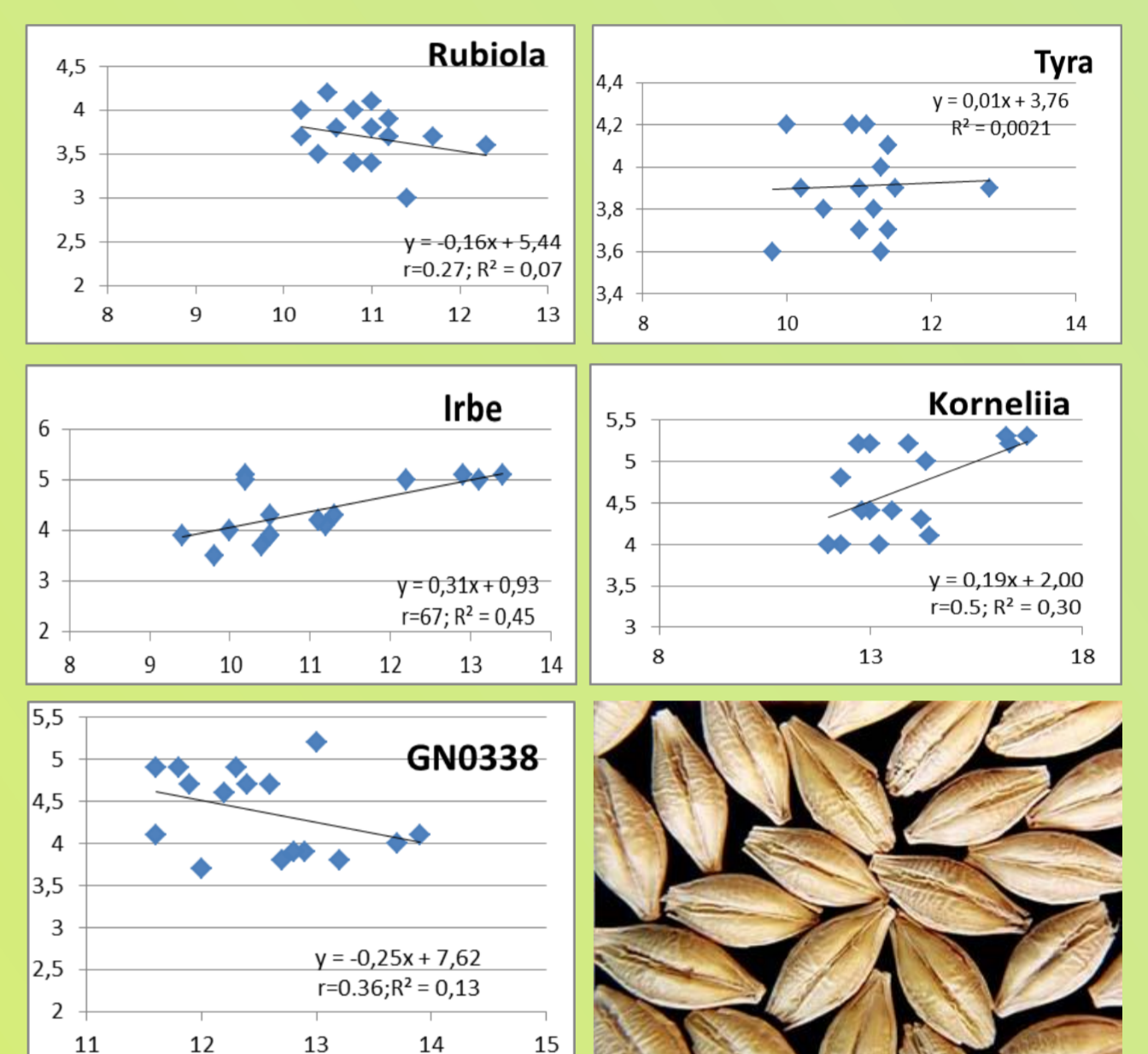


Figure 1. Comparison of correlations between protein and β -glucans content.

Results of investigation shown in Figure 1. confirm that hulled barley grain 'RUBIOLA' negatively correlated with β -glucans ($r=0.264$). Hull-less barley varieties 'IRBE' and 'KORNELIJA' increase in protein content positively correlated ($r=0.671$ and $r=0.547$, respectively), with β -glucans

Conclusion

Comparison of barley varieties bred in Latvia suggests, that variety 'Kornelija' outperforms other in protein and β -glucans. Current research into barley composition and its functional ingredients suggests that barley grain could be wider used for healthy food products production.

References

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