Indian J. Plant Genet. Resour. 28(3): 345-346 (2015)
DOI 10.5958/0976-1926.2015.00046.7

SHORT COMMUNICATION

Barley Lines with Higher Grain Beta Glucan Content Identified

Dinesh Kumar*, RPS Verma, S Narwal, AS Kharub, R Malik, R Selvakumar, J Singh, V Kumar and Indu Sharma

ICAR-Indian Institute of Wheat and Barley Research (formerly DWR), Karnal-132001, Haryana, India

(Received: 19 March 2014; Revised: 25 August 2015; Accepted: 27 August 2015)

In recent years, there has been renewed interest in food barley due to it's health benefitting properties. Barley grain contains a polysaccharide, beta glucan, which has been shown to reduce blood cholesterol and glucose level. The varieties and some of the germplasm lines were screened for beta glucan content and promising lines were identified. Two lines namely BCU 554 and BK 306 had higher beta glucan and reasonably good protein content also.

Key Words: Barley, Beta glucan, Bold grains, Protein content

With the changing lifestyles and increasing urbanization, coronary heart disease, diabetes *etc*. are on the rise in India. One of the ways, suggested to control these diseases, is changes in the dietary habits. In the past few years, it has been shown that inclusion of nutraceuticals such as soluble dietary fibres can help in controlling the blood cholesterol and glucose levels besides providing benefits to gut health. Cereals, specifically, the barley and oats, possess higher amounts (3-7%) of one such dietary fibre called beta (β) glucan. The mixed linkage (1-3; 1-4) β-glucans have been shown to lower postprandial blood glucose and LDL cholesterol, and is recommended in many countries as health benefitting soluble fibre (Baik and Ullrich, 2008). With the identification of potential health benefits associated with barley grain due to the higher β-glucans, it will be appropriate to develop barley varieties and products meant for human food consumption. Flour from barley grains with higher β-glucans can be a part of regular *chapatti* in the form of multigrain *atta* to provide health benefits as part of a regular diet. Therefore, efforts are being made to identify barley lines with higher β-glucans for further use in barley improvement programme in the country.

In the initial stage, 75 varieties and around 250 germplasm lines/advance stage material from All India Coordinated Wheat and Barley Improvement Programme (AICW&BIP) trials screened for β-glucan concentration were grown at Directorate of Wheat Research, Karnal (29.68° N, 76.98° E), Haryana, India (Kumar *et al.*, 2012; Anonymous 2013). A total of five germplasm lines with higher β-glucan percentage were identified and grown along with seven varieties (as control) subsequently at seven locations (Karnal, Hisar and Ludhiana in North Western Plain Zone, Kanpur, Faizabad and Rewa in North Eastern Plain Zone, and in Bajaura in northern hill zone) during 2012-13 to confirm the trait. The β-glucan content was determined through an enzymatic method and Megazyme β-glucan estimation kit was used (Megazyme International, Ireland) following McCleary Enzymic Method for barley (McCleary and Codd, 1991). Crude protein content was predicted using NIR. The physical parameters like hectoliter weight, 1000 grain weight and bold grain percentage were determined as per standard procedures. There was one pooled sample from each location, which was treated as one replication, and data was analyzed using the statistical software *CropStat*.

It is clear from Table 1 that the lines BCU 554, DWR 30 and DWRUB 76 have higher β-glucan content (>6.0 % dwb) as compared to all the controls except BHS 352 and HBL 276. However the identified lines had higher 1000 grain weight (>45.0) and bold grain (>2.5 mm) percentage (>60%) as compared to the controls. Plump, uniform and round grains are preferred for milling and pearling purposes (Baik and Ullrich, 2008 and references therein).

There is renewed interest in the barley grain since last few years due to its health benefits and it is expected that in coming years, the consumption of food barley may increase. Therefore, the genotypes of barley

*Author for Correspondence: E-mail: dkbiochem69@gmail.com

Table 1. Physico-chemical traits of promising barley germplasm lines

S.No.	Genotype	β-Glucan (% dwb)	Protein (% dwb)	1000-grain wt (g)	Bold grain (>2.5 mm) (%)	Test wt (kg/hl)
1	BCU 554	7.1	13.4	50.9	74.6	62.2
2	BK 306	6.0	15.1	53.3	95.6	58.1
3	DWR 30	6.9	12.1	49.3	74.2	62.9
4	DWRUB 76	6.6	11.8	50.1	88.8	59.6
5	20th I BON 3	6.2	12.6	46.7	67.7	63.2
6	BHS 352 (c)	6.5	12.8	29.7	14.2	70.5
7	DWRUB 73 (c)	5.8	13.0	49.5	74.8	60.9
8	Dolma (c)	5.5	13.5	33.8	12.5	69.0
9	HBL 276 (c)	6.0	14.0	29.4	20.7	67.5
10	NB 2 (c)	5.4	11.2	35.3	53.3	58.3
11	NB 3 (c)	5.3	11.1	37.1	47.0	59.3
12	RD 2668 (c)	5.7	11.9	40.5	62.2	61.6
	SE	0.2	0.4	1.9	4.7	1.0
	LSD (5%)	0.7	1.0	5.5	13.2	2.7

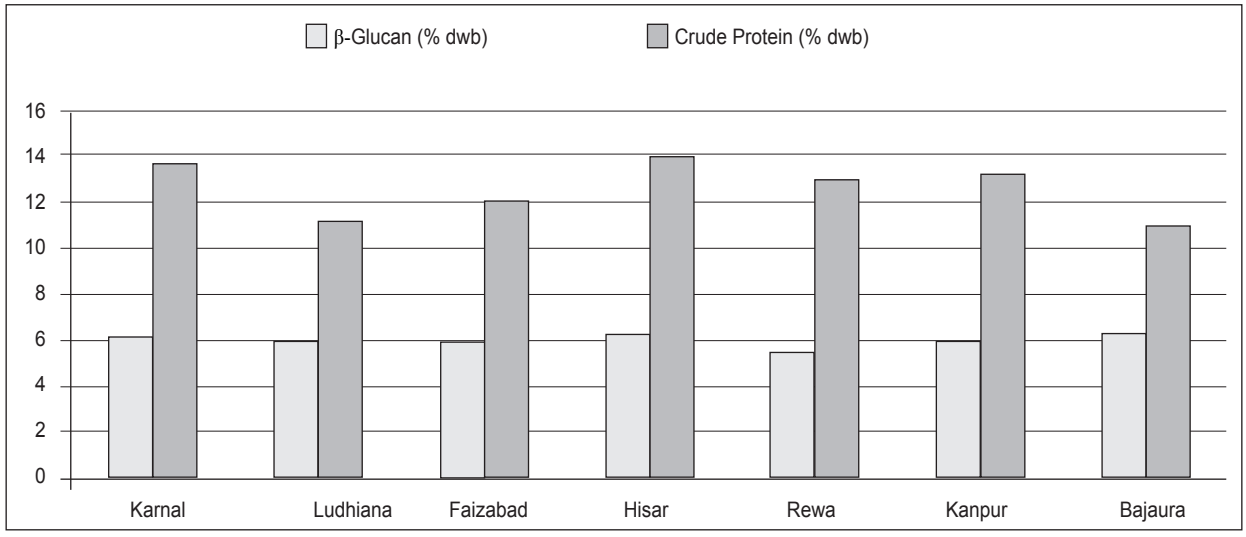

Fig. 1. Mean grain β-glucan content and protein content of BK 306 at different locations

were also screened for higher protein content without compromising the grain boldness. Germplasm line BK 306 was identified with higher protein content, higher bold grain percentage and reasonably good β-glucan percentage (6.0%), which is even higher or comparable with the naked barley cultivars developed in country (Fig. 1).

References

Anonymous (2012-13) *Annual Report*, Directorate of Wheat Research, Karnal, India, pp 76.

Baik B and Ullrich SE (2008) Barley for food: Characteristics, improvement, and renewed interest. *J. Cereal Sci.* **48**: 233–242.

Kumar D, S Narwal, RPS Verma, AS Kharub, V Kumar and I Sharma (2012) Genotypic variability in β-glucan and crude protein contents in barley genotypes. *J. Wheat Res.* **4:** 61-68.

McCleary BV and Codd R (1991) Measurement of (1-3)(1-4)-β-D-glucan in barley and oats: A streamlined enzymic procedure. *J. Food Sci. Agri.* **55**: 303-312.