"Beta-One", New Naked-Barley Cultivar with High *β*-glucan Content in Korea

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ABSTRACT

Barley is one of the main cereals for mixed-rice, and it has been introduced as waxy source from 1980s in Korea. *β*-glucan, protein and waxy are very important quality factors and health functional ingredient in barley, respectively. We developed the new barley variety which contained high *β*-glucan. The new variety is about twice of the *β*-glucan content 11.4% compared to the previous varieties of 6.5%, and it has yellow grain, good palatability after cooking, and quality of barley flour as well. In 2007, it was crossed with Glacier AC38 of high amylose content and Shikoku Hadaka 97 of high *β*-glucan content, from Japan. After F_3 generation, we selected one pedigree with excellent agricultural traits such as heading, mature stage and logging. The yield was also tested the adaptation for three years from 2013 to 2015. It was showed a similarity to other barley cultivars with a yield of 3.2 ton ha^{-1} in the paddy field of Korea. Further, as a result of analysis of quality characteristics, the particle size of the powder was smaller than the naked barley, so it was expected to suitable for processing products. The new variety was named "Beta-One", means the best quality and high content of *β*-glucan.

Fig. 1. History of Beta-One crossed and derived from Japan's germplasm

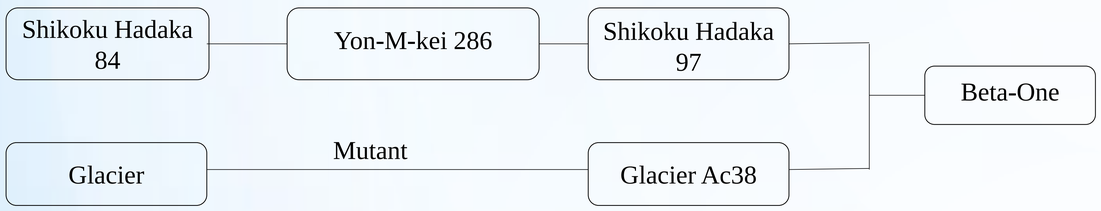


Table 1. Morphological characteristics of 'Beta-One' and Standard variety 'Saechalssal'

(NICS, 2015)

Cultivar	DV*	ET**	UZu/non-uzu	Leaf			Culm		Spike Type		Awn	
				Color	Width	Length	Color	Thick	Rowed	Dense	Color	Length
Beta-One	III	Waxy	non-uzu	Green	mid	Long	Green	mid	Six	mid	green	Long
Standard (Saechalssal)	IV	Waxy	Uzu	Green	mid	Long	Green	mid	Six	mid	green	Short

* Degree of Vernalization; I~V, ** Endosperm Type

Table 2. Heading date of cultivar 'Beta-One' evaluated on paddy field of 4 provinces in Korea from 2013 to 2015

(Jeonju Korea, 2013～2015)

Regions	Beta-One				Standard Variety(Saechalssal)			
	2013	2014	2015	Mean	2013	2014	2015	Mean
Jeonbuk(JB)	May 8	April 24	April 26	April 29	May 2	April 21	April 27	April 27
Jeonnam(JN)	May 15	April 24	April 17	April 29	May 5	April 19	April 18	April 24
Kyeongnam(KN)	May 13	April 24	April 26	May 1	May 3	April 20	April 24	April 26
Kyeongbuk(KB)	May 13	April 25	May 1	May 3	April 30	April 21	April 22	April 24
Mean	May 12	April 24	April 25	May 1	May 3	April 20	April 23	April 25

Table 3. The resistances and tolerances of "Beta-One" to the bio-stress and non bio-stress

(Jeonju Korea, 2013～2015)

Cultivar	Barley yellow mosaic virus, BaYMV (0~9)♪			Powdery Mildew (0~9)	Winter Hardness (0~9)	Lodging (0~9)
	Naju (Type I)	Jinju (Type IV)	Iksan (Type III)			
Beta-One	0	0	2	3	9	0
Standard variety (Saechalssal)	0	0	3	8	9	0

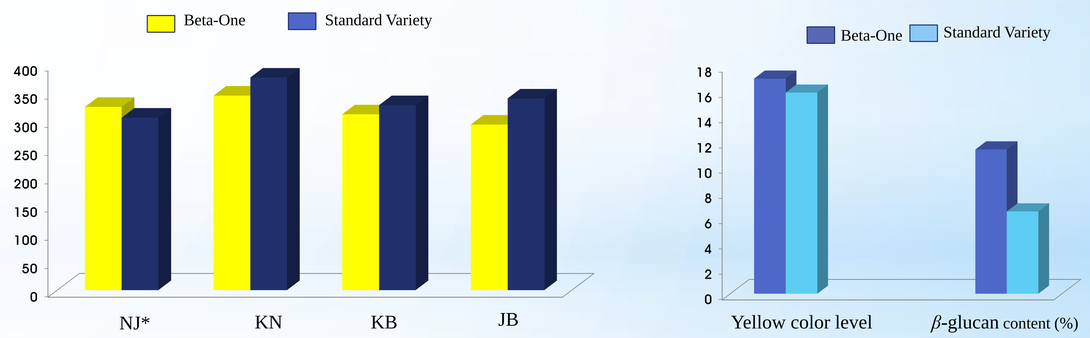
♪Degree, 0 is resistance and strong, 9 is susceptible and weak

Fig. 2. BaYMV screen of Beta-One(left), standard variety(mid) and another one, Saessalbori(right)

Table 4. Agronomic characteristics and yield components of 'Beta-One' and Saechalssalbori

Cultivar	Culm length (cm)	Panicle length (cm)	No. of spike per ㎡	No. of grains per panicle	L(g)	1,000 grains weight
Beta-One	85	6	502	59	766	34
Standard Variety	75	5	522	58	790	30

Table 5. The grain yield of cultivar 'Beta-One' and standard variety evaluated in 4 provinces from 2013 to 2015



NJ*, KN, KB and JB refer to Table 2

Table 6. Photos of plant at maturity time and the color after boiling

Maturity Time of Beta-One(left) and Saechalssalbori(right)

The color after boiling, Beta-One(right) and Saechalssal(left)

Reference

Masays Fujita, Eiji Domon and Yoshinori Doi, 1999. Grain and Starch Characteristics of the Double Recessive Lines for Amylose-free and High Amylose Gene in Barley. Breeding Science 49 : 217-219

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