

Table S1 Chemical, physical and enzymatic characterisation of barley malt (variety Planet, harvesting year 2019). Means and standard errors were calculated based on in triplicate measurements. The **starch content** was determined by using the Total Starch Kit (K-TSTA, Megazyme, Bray, Ireland). The **free sugar content**, defined as the sum of glucose, fructose, sucrose, maltose and maltotriose, was expressed on a dry matter barley malt base, and was determined according to the procedure as applied by Langenaeken et al. (2020). The **protein content** was calculated by multiplying the total nitrogen content in barley and barley malt, determined by the use of an elemental analyzer (EA 1108 CHNS–O elemental analyzer, CE-Instruments/Thermo Scientific, Waltham, MA, USA) and the Dumas method, with a factor 6.25. The **total arabinoxylan content** was determined by converting arabinose and xylose after an acid hydrolysis into alditol acetates, followed by the analysis using a GC-FID as described by Gebruers et al (2005). The arabinoxylan content was calculated based on the sum of arabinose and xylose corrected for arabinose as part of the arabinogalactan peptide by the formula as provided by Courtin et al (2009). The **β-glucan content** of barley malt was analysed according to EBC Method 3.10.1 by using the mixed linkage β-glucan assay kit (K-BGLU, Megazyme, Bray, Ireland). The **α-amylase and beta-amylase activity** (free and total) were analysed according to the procedures outlined by De Schepper et al (2021). The **total and free limit-dextrinase activity** was determined based on the PullG6 Method using the Pullulanase/Limit-Dextrinase Assay Kit (Megazyme, Bray, Ireland). The addition of 25 mM dithiothreitol to the extraction buffer allowed the quantification of the total limit-dextrinase activity, while without the addition, the free limit-dextrinase activity was quantified.

Chemical composition

Starch content (% db)	53.77 ± 1.41
Fermentable sugar content (% db)	9.03 ± 0.16
Glucose (% db)	2.06 ± 0.05
Fructose (% db)	0.19 ± 0.00
Sucrose (% db)	4.56 ± 0.08
Maltose (% db)	1.99 ± 0.05
Maltotriose (% db)	0.23 ± 0.02
Protein content (% db)	9.20 ± 0.33
Arabinoxylan content (% db)	5.82 ± 0.19
β-glucan content (% db)	0.22 ± 0.01

Physical parameters

Moisture content (%)	6.81 ± 0.01
Thousand kernel weight (g dm)	42.7 ± 0.26

Enzyme activity

α-amylase activity (total) (CU/g dm)	240 ± 10
Beta-amylase activity (total) (BU/g dm)	12.2 ± 0.5
Beta-amylase activity (free) (BU/g dm)	10.1 ± 0.2
Limit-dextrinase activity (total) (PU/ g dm)	80.8 ± 2.5
Limit-dextrinase activity (free) (PU/ g dm)	40.2 ± 0.2

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