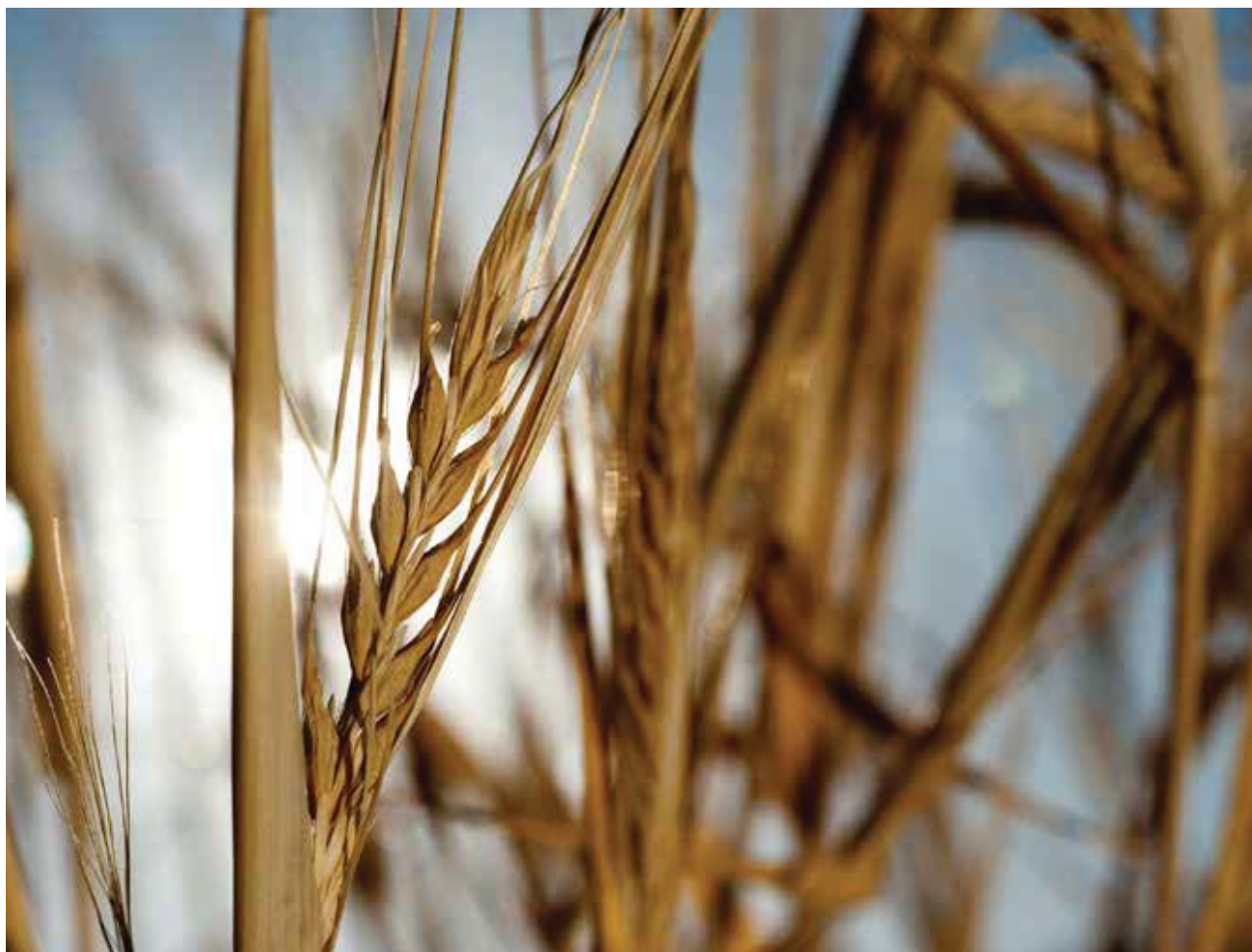




# CHASING FLAVOUR AT THE WORLD'S NORTHERNMOST MALT HOUSE

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As all devoted readers of the SBR will be aware, your technical editor has one passion that overshadows all the rest – the passion for the creation of a New Nordic Beer culture. During the years of hard work within the informal organization promoting this concept and philosophy, one of the challenges has been the availability – or rather the lack thereof – of truly local malt for local craft brewing. Not just because “local” is trendy and sustainable, but even more so because local craft malting based on “non-traditional” barley and other cereal varieties opens up for creating new flavours in the beers derived from such unique malts. Thus, bringing you this article by Dr. Tyson Weaver of Bonsak Gårdsmalteri in Norway, where precisely these objectives guide the work and development, is a true pleasure.





In 2014, a US Brewers Association member survey uncovered the #1 thing brewers felt was missing in the malt supply chain was flavour. Whilst the global pace of innovation in new hop and yeast varieties has been rapid, there has been arguably less innovation happening in the malting supply chain. To fill this void in the US, a craft malt revolution has taken off. In 2008, there were only a handful of craft malt houses, now there are over 70 bringing new innovation and flavour diversity to the marketplace. There are only a small handful of European craft malt houses, most of them operational for generations, a couple new. The European malting supply chain is characterized by large industrial producers with plant capacities to the magnitude of 50,000 – 200,000 tons per annum.

An hour north from Trondheim at 63.7N, Bonsak Gårdsmalteri started producing craft malt in 2018. The couple Bodil Oust and Tyson Weaver run an estate malting operation, where all grain is grown and malted on-site. They have full control of the malting process from two-row barley varietal selection, to field management practices, to final kilning regime in the malt house.

The last commercial malt house closed in Norway in 1986. Of all the grain production in Norway, only 20% goes towards human consumption, the other 80% ending up as animal feed. Therefore 100% of brewers' malt is imported. Rather than just selling their grain as animal feed, Bodil and Tyson sought to create a higher value out of their barley on-site and have a closer connection to the end product. With the rise of craft breweries and an increased focus on quality and flavour, they recognized there could be an opportunity to produce local malts for craft brewers. However, the challenges to bring a simple idea to fruition proved to test their perseverance in a three-year pursuit to first batch. To bring quality and diversity to the marketplace, they focused on the four main attributes that drive flavour in brewers' malt.

## BARLEY VARIETAL SELECTION

In the UK, 60% of the brewing malting grain is sourced from a single variety - Concerto (Maris Otter only accounts for 4%). In Northern European countries, malting grain has similarly little varietal differentiation (such as Planet, Propino, Irina, etc.). Recent scientific research published by the ASBC (American Society of Brewing Chemists) found that barley variety has a noticeable impact on the flavour of the malt, which carries over into the final beer.

Motivated to bring diversity to the market, Bonsak sought after lesser known varieties to grow and malt. They needed to find

varieties that have an early maturity date when growing so far north in a mild maritime climate, similar to Scotland (cold and wet during harvest). To find out which varieties would produce the best malting quality grain, they grew 4 varieties in full-scale trials in their first year. In year two, they cut 2 out and added 3 more. In 2019, a total of 6 varieties have filled the fields. R&D in the barley production game takes years. They landed on two varieties that meet and/or exceed malting barley quality requirements. Salome is a slightly older German two-row variety that lends itself to a more raw grainy flavour with plump kernels and protein levels of 10.5-11.1%. Fairytale is a Finnish variety with fat kernels and 9.5-9.9% protein levels, producing a more robust flavour package in the darker base malt range. In order to discover the flavour and aroma potential each variety is producing, all grain needs to be harvested, stored and malted separately by variety. Truly a farmer's logistical nightmare!

## TERROIR OF GRAIN

Recent scientific research\* published in the ASBC Journal confirms something brewers have suspected for a long time: that soil and climatic conditions where grain is grown have a noticeable impact on the flavour of the malt. The wine industry has preached the terroir gospel since the 1980s, yet the terroir of malting barley has not been part of the brewers' malt discussion until recently. Bonsak's grain grows in medium heavy clay soils during long summer nights under the midnight sun, with cool and moist harvest conditions.

## GERMINATION PROCESSES

Floor malting is deeply rooted in malting history. Brewers that still use Bohemian style pilsner malts strongly proclaim that the floor malting process gives the malt a depth and complexity in flavour and aromas they cannot find in modern day pneumatic malting. Clearly, floor malted Maris Otter is still a thing for a reason. Dave Thomas wrote\* that the lack of forced oxygen through the grain bed causes a localized blanket of CO<sub>2</sub> around every kernel of grain, which slows respiration and modification, giving the malt a rich aroma and flavour that is difficult to duplicate in modern pneumatic malt house operations. The industrialization and size upscaling of the malting industry pushed the industry to pneumatic malting to maximize throughput and reduce areas needed for germination. Many brewers in the US felt that the push for economies of scale has come at the cost of more flavourful malt. The time-honoured floor malting tradition of mild sweltering of respiring grain bathing in its own breath is seeing a renaissance across the pond to fill the gap of flavour complexity many brewers are missing.





## KILNING PROCESSES

Maltsters have kilning recipes just like brewers have beer recipes. Process orientation and control in the kiln has a profound effect on the style of malt being created. It is recognized that a continental pale malt does not produce the same flavours as a British style pale ale malt, and a British lager malt has a different flavour profile than that of a Belgian pilsner. Often, these malts have similar specifications, but many brewers recognize their diverging sensory performance.

## MALT HOUSE DESIGN

Craft malting is quite new, and consequently there are only a handful of equipment suppliers globally. European malting equipment suppliers are geared towards 200-600 ton batch sizes. Therefore, Bonsak had to spend a year designing and engineering their three-story tower malting facility themselves. Tyson spent the following year carrying out construction works to see the vision come to life. The malt house was built by retrofitting an existing structure 11.7 metres in working height. The things a guy does to build a craft malt house!

The 3rd floor contains two 3000L stainless vessels; one for steeping, the other as water buffer storage. The steep tank is equipped for aeration in wet cycles (barley bubble bath), and CO2 evacuation in dry cycles. The 3rd floor also contains the 7000L stainless vessel for kilning, along with the entire requisite malt house infrastructure. The lower two 28m2 circular floors are germination rooms, allowing a gravity feed steep out from the top floor to the lower two floors for germination. In the pursuit of flavour, Bonsak built a hybrid floor/pneumatic system that allows the floor malting CO2 bath flavour effect to transpire, yet allows free airflow when necessary for managing and optimizing the germination process. To consistently produce high-quality malts, Bonsak invested in automation systems that enable full process control. All the energy needs in the malt house are sourced from renewable energy. In the indirectly fired kiln where most energy is used, 87% of total energy needs are provided from an on-site wood chip boiler housed in a separate building. A water-to-air heat exchanger is used as a transfer medium on the kiln, and electric elements allow them to boost up final kiln temperatures to style different products. Having stand-alone steep and kiln vessels along with two germination floors allows for production of four simultaneous batches at any given time. Batch sizes are 1.5 tons finished malt, giving an annual production capacity of around 120 tons.

## PRODUCTS

To date, Bonsak Gårdsmalteri produces six floor malted products: An Old World Belgian-style farmhouse malt delivers aromas of fresh cut grass, hay, and raw grain as if one were two hundred years back in time harvesting by hand in the fields. The Salome Pale malt is light and frothy in colour, and brewers have noted it especially highlights hop citrusy notes. The British-style Salome Lager malt puts the terroir and barley variety flavours and aromas in focus, giving mild grainy, malty and fresh spring floral-like flavours. Fairytale Ale malt brings sweet aromatics (caramel, toffee, honey, waffle batter) and super bread-like attributes along with 83+% extract. On the darker end, they also produce a medium Munich, and a single specialty called Special N (75EBC with diastatic power) with complex multi-layered dimensions of marzipan, toffee, figs, prunes, marshmallows, and chock-full of melanoidins. Whether it is the barley variety, terroir effect, floor-malting germination or kilning processes that can be credited, Norwegian brewers are tasting the difference.

*The author of this article has a complete list of references for the background statements and results referred to in this article (these are marked by an asterisk \*). The list of references can be obtained by contacting Tyson Weaver (bonsakmalt@gmail.com).*

## ABOUT THE AUTHOR

Tyson Weaver is the Norway correspondent for SBR and recently appointed as the election committee chairman for the Norsk Bryggelaug (Norwegian Brewers Guild). Daily, he runs Bonsak Gårdsmalteri as production and sales manager. He holds a PhD in Industrial Economics and Technology Management from the Norwegian University of Science and Technology, a MSc in Renewable Energy from the University of Jyväskylä (Finland), and a BSc in Finance from Northern Arizona University. Before entering the malting business, he ran several start-ups in real estate development, project finance consulting, and events management back in the USA.