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Brewing with 100% unmalted grains

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Beer is traditionally produced from malted barley, however, with commercial enzymes great beers could be made from 100% unmalted barley. Avoiding malting can save ca. 8g CO₂ emission per 33cl beer and reduce 7% land use, leading to reduced industrial cost, optimised raw material utilisation and improved productivity. Whilst brewing with 100% unmalted barley has been well-established, brewing performance using other raw materials remains mostly unknown. The purpose of this study was to investigate the potential of brewing with 100% unmalted oat, wheat and rye, and to compare their brewing performances to 100% barley and malt. To address this, five different ingredients (oat, wheat, rye, barley and malt) were processed to mimic industrial brewing process, including milling, mashing (a 13L DTU-patented mashing system), boiling, fermentation and maturation. Full comparisons were made between raw ingredients, wort attributes and beer qualities; in particular, flavour profiles of the five beers were analysed using headspace GC-MS. It is anticipated that this study will provide a greater understanding of brewing performance using 100% unmalted grains, potentially leading to process optimisation and new products in future.



100% unmalted grains



DTU-patented mashing system

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