

## **Barley, malting and brewing research**

### **Publications**

#### **2010**

Holopainen, U., Wilhelmson, A., Home, S., Rajala, A., Poutanen, K., Peltonen-Sainio, P., Shewry, P. 2010. Water uptake and endosperm modification during malting - links to the total protein content and hordein localisation in the barley kernels. International Symposium for Young Scientist and Technologists in Malting, Brewing and Distilling. Freising-Weihenstephan, Germany, 19-21 May 2010.

Kaukovirta-Norja, A., Sibakov, J., Jaskari, J. & Lilja, E.-L. 2010. Uusi palvelu elintarviketutkimustiedon hakuun ja välitykseen. *Mallas ja Olut* 2:2010, 62-63.

Laitila, A., Juvonen, R., Sarlin, T., Kotaviita, E., Huttunen, T. & Wilhelmson, A. 2010. *Pichia anomala* in malting. First International *Pichia anomala* mini-Symposium. Uppsala, Sweden, 10-12 Feb. 2010, 17.

Laitila, A., Wilhelmson, A., Kokkonen, M., Jestoi, M., Rautio, J. 2010. Prediction of *Fusarium* activities in malting using transcriptional profiling. *Bioforsk FOKUS*, vol. 5, 7, ss. 28. Nordic Baltic *Fusarium* Seminar (NBFS). Ski, Norway, 23-25 Nov. 2010

Laitila, A., Sarlin, T., Raulio, M., Wilhelmson, A., Kotaviita, E., Huttunen, T., Juvonen, R. 2010. Yeasts in malting, with special emphasis on *Wickerhamomyces anomalus* (synonym *Pichia anomala*). *Antonie van Leeuwenhoek* - online first. doi:10.1007/s10482-010-9511-8

Nevanen, T., Siitari, H. & Laitila, A. 2010. Miniatyrisoidun pikadiagnostiikan mahdollisuudet oluen valmistusprosessissa. *Mallas ja Olut* 2:2010, 55-57.

Niemi, P., Sibakov, J., Myllymäki, O., Wilhelmson, A., Heiniö, R.-L., Lehtinen, P. & Buchert, J. 2010. Milling as a pre-treatment in the food uses and fractionation of brewer's spent grain. 9th Trends in Brewing. Ghent, Belgium, 13-16 April 2010.

Pihlava, J.-M., Reinikainen, P., Hietaniemi, V. & Kaukovirta-Norja, A. 2010. Flavonoid content in barley, oat, rye and wheat cultivars. Final HEALTHGRAIN Conference Enhancing Health Benefits of Cereal Foods - Results, Perspectives and Challenges. Lund, Sweden, 5-7 May 2010. VTT Technical Research Centre of Finland, Espoo, 75. <http://lund2010.healthgrain.org/>

Pitkänen, J.-P. 2010. Bioprosessien automaattinen monitorointi. *Mallas ja Olut* 2:2010, 58-61.

Sibakov, J. & Kaukovirta-Norja, A. 2010. Uusi palvelu elintarviketutkimustiedon hakuun ja välitykseen. *Ruoka-Suomi* 2/2010, 16.

Storgårds, E. 2010. Tutkimus tarvitsee korkeatasoista mikrobikeskusta. *Kemia-Kemi* 2/2010, 10.

Sweins, H. 2010. Mikrobit tallessa jo 50 vuotta VTT:n mikrobipankissa. *Mallas ja Olut* 1:2010, 18-20.

Wilhelmson, A., Niemi, P., Lehtinen, P., Sibakov, J., Flander, L., Heiniö, R.-L., Viljanen, K., Heiskanen, V.-P., von Weymarn, N., Buchert, J. 2010. Ingredients and energy from brewers' spent grain. ASBC Proceedings. Rhode Island, USA, 14-18 June 2010

#### **2009**

Laitila, A., Raulio, M., Wilhelmson, A. & Salkinoja-Salonen, M. 2009. Barley-associated microbial biofilms in malting. 32nd EBC Congress. Hamburg, Germany, 10-14 May 2009. European Brewery Convention.

Laitila, A., Raulio, M., Wilhelmson, A. & Salkinoja-Salonen, M. 2009. Mikrobiofilmit ohran mallastuksessa. *Mallas ja Olut* No: 3:2009, 87-88.

Lyly, M., Liukkonen, K.-H., Salmenkallio-Marttila, M., Karhunen, L., Poutanen, K. & Lähteenmäki, L. 2009. Fibre in beverages can enhance perceived satiety. *Eur. J. Nutr.* 48, 251-258. [10.1007/s00394-009-0009-y](https://doi.org/10.1007/s00394-009-0009-y)

Raulio, M., Wilhelmson, A., Salkinoja-Salonen, M., Laitila, A. 2009. Ultrastructure of biofilms formed on barley kernels during malting with and without starter culture. *Food Microbiol.* 26, 4, 437-443. [10.1016/j.fm.2009.02.004](https://doi.org/10.1016/j.fm.2009.02.004)

Sarlin, T., Linder, M., Nakari-Setälä, T., Home, S. & Laitila, A. 2009. Fungal hydrophobins as a beer gushing factor - current knowledge and future aspects. 32nd EBC Congress. Hamburg, Germany, 10-14 May 2009. European Brewery Convention.

Sarlin, T., Linder, M., Nakari-Setälä, T., Home, S. & Laitila, A. 2009. Hydrofobiinit oluen ylikuuhuntatekijöinä - nykytietämys ja tulevaisuuden haasteet. *Mallas ja Olut* No: 3:2009, 92-93.

Sibakov, J., Holopainen, U., Myllymäki, O., Suortti, T., Kaukovirta-Norja, A., Wilhelmson, A. & Lehtinen, P. 2009. Barley as an ingredient for functional food products. The 14th Australian Barley Technical Symposium. Sunshine Coast, Australia, 13-16 Sept. 2009.

Treimo, J., Westereng, B., Horn, S.J., Forssell, P., Robertson, J.A., Faulds, C.B., Waldron, K.W., Buchert, J. & Eijsink, V.G.H. 2009. Enzymatic solubilization of brewers' spent grain by combined action of carbohydrases and peptidases. *J. Agric. Food Chem.* 57, 3316-3324. [10.1021/jf803310f](https://doi.org/10.1021/jf803310f)

Wilhelmson, A., Lehtinen, P., von Weymarn, N., Itävaara, M., Sibakov, J., Heiniö, R.-L., Forssell, P. & Buchert, J. 2009. Future applications for brewers' spent grain. *New Food* 12 (3), 59-61.

Wilhelmson, A., Rautio, J.J., Kokkonen, M., Jestoi, M. & Laitila, A. 2009. Prediction of barley and *Fusarium* activities during malting using transcriptional profiling. 32nd EBC Congress. Hamburg, Germany, 10-14 May 2009. European Brewery Convention

Wilhelmson, A., Rautio, J.J., Kokkonen, M., Jestoi, M. & Laitila, A. 2009. Ohran ja *Fusarium*-homeen aktiivisuuksien ennustaminen transkriptioprofiloinnilla mallastuksessa. *Mallas ja Olut* No: 3:2009, 89-91.

## 2008

Forssell, P., Kontkanen, H., Schols, H.A., Hinz, S., Eijsink, V.G.H., Treimo, J., Robertson, J.A., Waldron, K.W., Faulds, C.B. & Buchert, J. 2008. Hydrolysis of brewer's spent grain by carbohydrate degrading enzymes. *J. Inst. Brew.* 114, 306-314. <http://www.scientificsocieties.org/jib/abstracts/2008/G-2009-0109-574.htm>

Wilhelmson, A., Vilpola, A., Räsänen, E., Peltola, P., Kotaviita, E., Home, S. & Laitila, A. 2008. The use of modified atmosphere to control malt quality. *MBAA Techn. Quart.* 45, 245-252. [10.1094/TQ-45-3-0245](https://doi.org/10.1094/TQ-45-3-0245)

Yli-Mattila, T., Paavanen-Huhtala, S., Jestoi, M., Parikka, P., Hietaniemi, V., Gagkaeva, T., Sarlin, T., Haikara, A., Laaksonen, S. & Rizzo, A. 2008. Real-time PCR detection and quantification of *Fusarium poae*, *F. graminearum*, *F. sporotrichioides* and *F. langsethiae* in cereal grains in Finland and Russia. *Arch. Phytopathol. Plant Protect.* 41, 243-260. [10.1080/03235400600680659](https://doi.org/10.1080/03235400600680659)

## 2007

Holopainen, U., Dundrova, D., Virtanen, H., Wilhelmson, A., Fiala, J., Pöyri, S., Kotaviita, E., Reinikainen, P., Hartwall, P., Hortling, P., Home, S. & Kaukovirta-Norja, A. 2007. New strategies for protein and proteolysis research in barley to beer chain. Proceedings of the 31st European Brewery Convention Congress. Venice, Italy, 6-10 May 2007. Fachverlag Hans Carl, Nürnberg, 118: 1055-1059.

Kaukovirta-Norja, A., Venäläinen, J., Jantunen, A., Wilhelmson, A., Pöyri, S., Männistö, P. & Home, S. 2007. Development of proline-specific peptidase activities during malting of cereals. Proceedings of the 31st European Brewery Convention Congress. Venice, Italy, 6-10 May 2007. Fachverlag Hans Carl, Nürnberg, 18: 170-174.

- Laitila, Arja. 2007. Microbes in the tailoring of barley malt properties. VTT, Espoo. 107 p. + app. 79 p. VTT Publications 645. <http://www.vtt.fi/inf/pdf/publications/2007/P645.pdf> 2007.
- Laitila, A., Kotaviita, E., Peltola, P., Home, S. & Wilhelmson, A. 2007. Indigenous microbial community of barley greatly influences grain germination and malt quality. J. Inst. Brew. 113, 9-20.
- Laitila, A., Sarlin, T., Kotaviita, E., Huttunen, T., Home, S. & Wilhelmson, A. 2007. Antifungal potential of yeasts derived from the industrial malting ecosystem. Proceedings of the 31st European Brewery Convention Congress. Venice, Italy, 6-10 May 2007. Fachverlag Hans Carl, Nürnberg, 17: 164-169.
- Laitila, A., Sarlin, T., Kotaviita, E., Huttunen, T., Home, S. & Wilhelmson, A. 2007. Yeasts isolated from industrial maltings can suppress *Fusarium* growth and formation of gushing factors. J. Ind. Microbiol. Biotechnol. 34, 701-713. [10.1007/s10295-007-0241-5](https://doi.org/10.1007/s10295-007-0241-5)
- Rajala, A., Peltonen-Sainio, P., Kauppila, R., Wilhelmson, A., Reinikainen, P. & Kleemola, J. 2007. Within-field variation in grain yield, yield components and quality traits of two-row barley. J. Agric. Sci. 145, 445-454. [10.1017/S002185960700723X](https://doi.org/10.1017/S002185960700723X)
- Rautio, J., Laitila, A., Wilhelmson, A., Kokkonen, M., Jestoi, M. & Satokari, R. 2007. Detection of *Fusarium trichothecene* biosynthesis using a novel transcript analysis method TRAC. Proceedings of the 31st European Brewery Convention Congress. Venice, Italy, 6-10 May 2007. Fachverlag Hans Carl, Nürnberg, 149: 1318-1322.
- Sarlin, T., Vilpola, A., Kotaviita, E., Olkku, J. & Haikara, A. 2007. Fungal hydrophobins in the barley-to-beer chain. J. Inst. Brew. 113, 147-153.
- Wilhelmson, A. 2007. The importance of oxygen availability in two plant-based bioprocesses: hairy root cultivation and malting. VTT Publications 652. VTT, Espoo. 66 p. + app. 56 p. <http://www.vtt.fi/inf/pdf/publications/2007/P652.pdf>
- Wilhelmson, A., Kallio, P.T., Oksman-Caldentey, K.-M. & Nuutila, A.M. 2007. Heterologous expression of *Vitreoscilla haemoglobin* in barley (*Hordeum vulgare*). Plant Cell Rep. 26, 1773-1783. [10.1007/s00299-007-0393-9](https://doi.org/10.1007/s00299-007-0393-9)
- Wilhelmson, A., Laitila, A., Vilpola, A., Huttunen, T., Räsänen, E., Kotaviita, E. & Home, S. 2007. The effects of modified atmosphere in malting. Proceedings of the 31st European Brewery Convention Congress. Venice, Italy, 6-10 May 2007. Fachverlag Hans Carl, Nürnberg, 16: 158-163.
- 2006**
- Laitila, A., Sweins, H., Vilpola, A., Kotaviita, E., Olkku, J., Home, S. & Haikara, A. 2006. *Lactobacillus plantarum* and *Pediococcus pentosaceus* starter cultures as a tool for microflora management in malting and for enhancement of malt processability. J. Agric. Food. Chem. 54, 3840-3851. [10.1021/jf052979j](https://doi.org/10.1021/jf052979j)
- Laitila, A., Wilhelmson, A., Kotaviita, E., Olkku, J., Home, S. & Juvonen, R. 2006. Yeasts in an industrial malting ecosystem. J. Ind. Microbiol. Biotechnol. 33, 953-966. [10.1007/s10295-006-0150-z](https://doi.org/10.1007/s10295-006-0150-z)
- Rautio, J., Satokari, R., Kataja, K., Huuskonen, A., Vuokko, H., Laitila, A., Wilhelmson, A., Home, S., Söderlund, H. & Londesborough, J. 2006. Analysing barley to beer chain. New Food 9(2), 15-17.
- Sarlin, T., Yli-Mattila, T., Jestoi, M., Rizzo, A., Paavanen-Huhtala, S. & Haikara, A. 2006. Real-time PCR for quantification of toxigenic *Fusarium* species in barley and malt. Eur. J. Plant. Pathol. 114, 371-380. [10.1007/s10658-006-0001-9](https://doi.org/10.1007/s10658-006-0001-9)
- Schmitt, M. & Home, S. 2006. Sieving test for malt - Determination of accuracy, repeatability and reproducibility. Monatsschr. Brauwiss. Yearbook 2006, 38-40.

Wilhelmson, A., Laitila, A., Vilpola, A., Olkku, J., Kotaviita, E., Fagerstedt, K. & Home, S. 2006. Oxygen deficiency in barley (*Hordeum vulgare*) grain during malting. J. Agric. Food Chem. 54, 409-416. [10.1021/jf0521505](https://doi.org/10.1021/jf0521505)

Yli-Mattila, T., Paavanen-Huhtala, S., Sarlin, T., Jestoi, M., Parikka, P., Rizzo, A., Haikara, A., Gagkaeva, T. & Klemsdal, S. 2006. Kvantitatiivinen PCR-pikamääritysmenetelmä viljojen *Fusarium*-homeille. Maataloustieteen Päivät 2006 [verkkojulkaisu]. Suomen Maataloustieteellisen Seuran julkaisuja no 21. Hopponen, A. (toim.). Helsinki. 7 s. <http://www.smts.fi/pos06/0906.pdf>

## 2005

Evans, E., Collins, H., Eglinton, J. & Wilhelmson, A. 2005. Assessing the impact of the level of diastatic power enzymes and their thermostability on the hydrolysis of starch during wort production to predict malt fermentability. J. Am. Soc. Brew. Chem. 63, 185-198.

Holopainen, U.R.M., Wilhelmson, A., Salmenkallio-Marttila, M., Peltonen-Sainio, P., Rajala, A., Reinikainen, P., Kotaviita, E., Simolin, H. & Home, S. 2005. Endosperm structure affects the malting quality of barley (*Hordeum vulgare* L.). J. Agric. Food Chem. 53, 7279-7287. [10.1021/jf050349b](https://doi.org/10.1021/jf050349b)

Kaukovirta-Norja, A., Virtanen, H., Pöyri, S., Lehtinen, P., Nurmi, T., Hartwall, P., Reinikainen, P., Siirilä, J. & Home, S. 2005. The increase of antioxidativity during mashing – does it improve beer flavour stability? Proceedings of the 30<sup>th</sup> European Brewery Convention Congress. Prague, 14-19 May 2005. Nürnberg: Fachverlag Hans Carl, 2005. CD, 79: 709-720.

Laitila, A., Wilhelmson, A., Sarlin, T., Juvonen, R. & Storgårds, E. 2005. Novel strategies for studying the complex microbial community in barley and in malting. Proceedings of the 30<sup>th</sup> European Brewery Convention Congress. Prague, 14-19 May 2005. Nürnberg: Fachverlag Hans Carl, 2005. CD, 141: 1168-1174.

Lehtinen, P., Kaukovirta-Norja, A., Virtanen, H., Selin, P., Hartwall, P., Reinikainen, P., Siirilä, J. & Home, S. 2005. Oxygen consumption during mashing in. Proceedings of the 30<sup>th</sup> European Brewery Convention Congress. Prague, 14-19 May 2005. Nürnberg: Fachverlag Hans Carl, 2005. CD, 84: 757-763.

Olkku, J., Kotaviita, E., Salmenkallio-Marttila, M., Sweins, H. & Home, S. 2005. Connection between structure and quality of barley husk. J. Am. Soc. Brew. Chem. 63, 17-22. [10.1094/ASBCJ-63-0017](https://doi.org/10.1094/ASBCJ-63-0017)

Robinson, L.H., Home, S., Kaukovirta-Norja, A., Vilpola, A., Aldred, P., Ford, C.M., Healy, P., Gibson, C.E. & Evans, D.E. 2005. Improving beer haze stability by investigating the interaction between malt protein quality and brewing conditions. Proceedings of the 30<sup>th</sup> European Brewery Convention Congress. Prague, 14-19 May 2005. Nürnberg: Fachverlag Hans Carl, 2005. CD, 64: 580-590.

Sarlin, T., Laitila, A., Kotaviita, E., Olkku, J. & Haikara, A. 2005. Novel gushing factors, hydrophobins, in the barley-malt-beer chain. Proceedings of the 30<sup>th</sup> European Brewery Convention Congress. Prague, 14-19 May 2005. Nürnberg: Fachverlag Hans Carl, 2005. CD, 6: 66-71.

Sarlin, T., Laitila, A., Pekkarinen, A. & Haikara, A. 2005. Effects of three *Fusarium* species on the quality of barley and malt. J. Am. Soc. Brew. Chem. 63, 43-49. [10.1094/ASBCJ-63-0043](https://doi.org/10.1094/ASBCJ-63-0043)

Sarlin, T., Nakari-Setälä, T., Linder, M., Penttilä, M. & Haikara, A. 2005. Fungal hydrophobins as predictors of the gushing activity of malt. J. Inst. Brew. 111, 105-111.

Satokari, R., Kataja, K., Rautio, J., Saloheimo, M. & Söderlund, H. 2005. TRAC for gene expression analysis – applications and perspectives. Proceedings of the 30<sup>th</sup> European Brewery Convention Congress. Prague, 14-19 May 2005. Nürnberg: Fachverlag Hans Carl, 2005. CD, 121: 1045-1049.

Wilhelmson, A., Laitila, A., Olkku, J., Kotaviita, E., Vilpola, A., Fagerstedt, K. & Home, S. 2005. Oxygen deficiency in germinating barley. Proceedings of the 30<sup>th</sup> European Brewery Convention Congress. Prague, 14-19 May 2005. Nürnberg: Fachverlag Hans Carl, 2005. CD, 5: 62-65.

## 2004

Laitila, A., Saarela, M., Kirk, L., Siika-aho, M., Haikara, A., Mattila-Sandholm, T. & Virkajärvi, I. 2004. Malt sprout extract medium for cultivation of *Lactobacillus plantarum* protective cultures. Lett. Appl. Microbiol. 39, 336-340. [10.1111/j.1472-765X.2004.01579.x](https://doi.org/10.1111/j.1472-765X.2004.01579.x)

Marttila, S., Pekkarinen, A., Liljeroth, E., Jones, B.L. & Niku-Paavola, M.-L. 2004. Proteinases secreted by *Fusarium* and their inhibitors in barley grains. Proc. 9<sup>th</sup> Int. Barley Genetics Symp. Brno, 20-26 June 2004. Spunar, J. & Janikova, J. (Eds). CD-ROM, 842-847.

Ritala, A., Teeri, T.H., Marttila, S., Wilhelmson, A., Kaur, S., Rasmussen, S. & Nuutila, A.M. 2004. Transgenic barley in brewing – detection of transgene and heterologous protein levels. Proc. 9<sup>th</sup> Int. Barley Genetics Symp. Brno, 20-26 June 2004. Spunar, J. & Janikova, J. (Eds). CD-ROM, 487-492.

Robinson, L.H., Evans, D.E., Kaukovirta-Norja, A., Vilpola, A., Aldred, P. & Home, S. 2004. The interaction between malt protein quality and brewing conditions and their impact on beer colloidal stability. Tech. Quart. Master Brew. Assoc. Am. 41, 353-362.

Wilhelmson, A., Kallio, P.T., Oksman-Caldentey, K.-M. & Nuutila, A.M. 2004. Expression of heterologous *Vitreoscilla* hemoglobin in barley. Proc. 9<sup>th</sup> Int. Barley Genetics Symp. Brno, 20-26 June 2004. Spunar, J. & Janikova, J. (Eds). CD-ROM, 394-398.

## 2003

Kaukovirta-Norja, A., Raitio, R., Lehtinen, P., Hartwall, P., Reinikainen, P., Siirilä, J. & Home, S. 2003. Influence of different raw materials on lipid distribution during mashing and wort boiling. Proc. 29th Congr. Eur. Brew. Conv., Dublin, 2003. Nürnberg: Fachverlag Hans Carl. ISBN 90-70143-22-4. CD-ROM, 83: 858–866.

Laitila, A., Wilhelmson, A., Mikkola, H., Kauppila, R., Kotaviita, E., Olkku, J., Haikara, A. & Home, S. 2003. Importance of drying and sound storage conditions on the microbiological safety and viability of malting barley. Proc. 29th Congr. Eur. Brew. Conv., Dublin, 2003. Nürnberg: Fachverlag Hans Carl. ISBN 90-70143-22-4. CD-ROM, 124: 1235-1245.

Mattila, I., Virkajärvi, I. & Londesborough, J. 2003. On-line measurement of beer production by membrane inlet mass spectrometry. Proc. 29th Congr. Eur. Brew. Conv., Dublin, 2003. Nürnberg: Fachverlag Hans Carl. ISBN 90-70143-22-4. CD-ROM, 96: 986-992.

Olkku, J., Kotaviita, E., Salmenkallio-Marttila, M., Sweins, H. & Home, S. 2003. Husk damage, a new quality problem of barley and malt? Proc. 29th Congr. Eur. Brew. Conv., Dublin, 2003. Nürnberg: Fachverlag Hans Carl. ISBN 90-70143-22-4. CD-ROM, 3: 68–78.

Olsen, M., Jonsson, N., Magan, N., Banks, J., Fanelli, C., Rizzo, A., Haikara, A., Dobson, A., Frisvad, J., Holmes, S., Olkku, J., Persson, S.-J. & Börjeson, T. 2003. Prevention strategies for ochratoxins in grain. Mycotoxins in Food Production Systems. Bath, 25-27 June 2003. Aspects of Applied Biology 68: Mycotoxins in Food Production Systems. Warwick, UK: The Association of Applied Biologists, 29–33.

Pekkarinen, A.I. & Jones, B.L. 2003. Purification and identification of barley (*Hordeum vulgare* L.) proteins that inhibit the alkaline serine proteinases of *Fusarium culmorum*. J. Agric. Food Chem. 51, 1710–1717. [10.1021/jf026035v](https://doi.org/10.1021/jf026035v)

Pekkarinen, A.I., Sarlin, T.H., Laitila, A.T., Haikara, A.I. & Jones, B.L. 2003. *Fusarium* species synthesize alkaline proteinases in infested barley. J. Cereal Sci. 37, 349–356. [10.1006/jcrs.2002.0512](https://doi.org/10.1006/jcrs.2002.0512)

Pekkarinen, A. 2003. The serine proteinases of *Fusarium* grown on cereal proteins and in barley grain and their inhibition by barley proteins. VTT Biotechnology, Espoo. VTT Publications: 487. 90 p. + app. 74 p. ISBN 951-38-6027-2. <http://www.vtt.fi/inf/pdf/publications/2003/P487.pdf>

Rautio, J. & Londesborough, J. 2003. Maltose transport by brewer's yeasts in brewer's wort. J. Inst. Brew. 109, 251–261.

Sweins, H., Kleemola, J., Kauppila, R., Wilhelmson, A., Olkku, J., Kotaviita, E., Reinikainen, P. & Home, S. 2003. Improvement of malting barley homogeneity by precision farming. Proc. 29th Congr. Eur. Brew. Conv., Dublin, 2003. Nürnberg: Fachverlag Hans Carl. ISBN 90-70143-22-4. CD-ROM, 15: 197-204.

Wilhelmson, A., Laitila, A., Heikkilä, J., Räsänen, J., Kotaviita, E., Olkku, J. & Home, S. 2003. Changes in the gas atmosphere during industrial scale malting. Proc. 29th Congr. Eur. Brew. Conv., Dublin, 2003. Nürnberg: Fachverlag Hans Carl. ISBN 90-70143-22-4. CD-ROM, 18: 226-233.

## 2002

Kaukovirta-Norja, A., Lehtinen, P., Reinikainen, P. & Stenholm, K. 2002. Oxygen consumption of malt - can it be used to predict antioxidative and pro-oxidative characteristics of malt? Eur. Brew. Conv. Symp. Flavour and Flavour Stability. Nancy, Oct. 2001. EBC Monograph 31. Fachverlag Hans Carl. CD Rom. 13 p.

Laitila, A., Alakomi, H.-L., Raaska, L., Mattila-Sandholm, T. & Haikara, A. 2002. Antifungal activities of two *Lactobacillus plantarum* strains against *Fusarium* moulds *in vitro* and in malting of barley. J. Appl. Microbiol. 93, 566–576. [10.1046/j.1365-2672.2002.01731.x](https://doi.org/10.1046/j.1365-2672.2002.01731.x)

Nuutila, A.M., Ritala, A., Salmenkallio-Marttila, M., Aspegren, K., Aikasalo, R., Kurten, U., Tammissola, J., Teeri, T., Mannonen, L. & Kauppinen, V. 2002. Improvement of malting quality of barley by complementing the malt enzyme spectrum. Phytochem. Rev. 1, 135-140. <http://www.kluweronline.com/issn/1568-7767/contents>

Pekkarinen, A. & Jones, B.L. 2002. Trypsin-like proteinase produced by *Fusarium culmorum* grown on grain proteins. J. Agric. Food Chem. 50, 3849-3855. [10.1021/jf020027x](https://doi.org/10.1021/jf020027x)

Pekkarinen, A.I., Jones, B.L. & Niku-Paavola, M.-L. 2002. Purification and properties of an alkaline proteinase of *Fusarium culmorum*. Eur. J. Biochem. 269, 798-807. [10.1046/j.0014-2956.2001.02697.x](https://doi.org/10.1046/j.0014-2956.2001.02697.x)

Pöyri, S., Mikola, M., Sontag-Strohm, T., Kaukovirta-Norja, A. & Home, S. 2002. The formation and hydrolysis of barley malt gel-protein under different mashing conditions. J. Inst. Brew. 108, 261–267.

Ritala, A., Nuutila, A.M., Aikasalo, R., Kauppinen, V. & Tammissola, J. 2002. Measuring gene flow in the cultivation of transgenic barley. Crop Sci. 42, 278-285.

## 2001

Haikara, A. & Laitila, A. 2001. The use of lactic acid bacteria cultures in malting improvement. Conf. Plant microbial interactions: Positive interactions in relation to crop production and utilisation. Sunderland 2-3 July 2001. Aspects on Applied Biology 63, 229-238.

Kleemola, T., Nakari-Setälä, T., Linder, M., Penttilä, M., Kotaviita, E., Olkku, J. & Haikara, A. 2001. Characterisation and detection of the gushing factors produced by fungi. Proc. 28th Congr. Eur. Brew. Conv., Budapest 2001. CD-ROM, 129-138.

Ritala, A., Mannonen, L. & Oksman-Caldentey, K.-M. 2001. Factors affecting the regeneration capacity of isolated barley microspores (*Hordeum vulgare* L.). Plant Cell Reports 20, 403-407. [10.1007/s002990100345](https://doi.org/10.1007/s002990100345)

Vanne, L. & Haikara, A. 2001. Mycotoxins in the total chain from barley to beer. Proc. 28th Congr. Eur. Brew. Conv., Budapest 2001. CD-ROM, 839-848.

**2000**

Haikara, A., Laitila, A. & Kleemola, T. 2000. Effect of different *Fusarium* species and climatic conditions on the quality of barley and malt. 6th European *Fusarium* Seminar & 3rd COST 835 Workshop Agriculturally important toxigenic fungi. Berlin, 11-16 Sept. 2000, 68-69.

Laitila, A. & Haikara, A. 2000. Surveillance of malting barley quality. Int. Congr. Innovation in the barley-malt-beer chain. Nancy, 16-17 Oct. 2000, 151-156.

Pekkarinen, A., Mannonen, L., Jones, B.L. & Niku-Paavola, M.-L. 2000. Production of proteases by *Fusarium* species grown on barley grains and in media containing cereal proteins. J. Cereal Sci. 31, 253-261. [10.1006/jcrs.2000.0305](https://doi.org/10.1006/jcrs.2000.0305)

Pekkarinen, A.I., Niku-Paavola, M.-L. & Jones, B.L. 2000. Using biochemistry to protect barley from *Fusarium*. 8th Int. Barley Genetics Symp. Adelaide, 22-27 Oct. 2000. Barley Genetics VIII. Logue, S. (Ed.). Vol. II, 154-156.