



# III JORNADAS DE LÚPULO E CERVEJA

## LIVRO DE RESUMOS BOOK OF ABSTRACTS

**Editores:** João Paulo Miranda de Castro, Jorge Sá Morais,  
Manuel Ângelo Rodrigues, Maria João Sousa, Sérgio Deusdado

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## Programa Científico das III Jornadas de Lúpulo e Cerveja – Scientific Programme

20 e 21 de julho de 2023, Escola Superior Agrária de Bragança, Auditório Dionísio Gonçalves

### Dia 20 de julho

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#### 9h30 Sessão de abertura

Instituto Politécnico de Bragança  
Câmara Municipal de Bragança  
Direção Regional de Agricultura e Pescas do Norte  
Bralúpulo  
Comissão Organizadora

#### 10h00 Desenvolvimento de novas variedades de lúpulo

Moderação: Tiago Brandão (*SUPER BOCK Group*)

- The development of new hop varieties and hop research at the Carlsberg Research  
Ilka Braumann (*Carlsberg Research Laboratory*)

Debate

#### Pausa para café

#### 11h30 Aspetos da agronomia da cultura

Moderação: M. Ângelo Rodrigues (*CIMO/SusTEC – IPB*)

- **Manejo del riego del lúpulo en base a sensores de contenido de agua en el suelo**  
María Fandiño<sup>1</sup>, Marta Rodríguez-Febreiro<sup>1</sup>, Emilio Corral<sup>2</sup>, María Jesús Meira-Rodríguez<sup>1</sup>,  
Benjamín J. Rey<sup>1</sup>, Javier J. Cancela<sup>1</sup> (<sup>1</sup>*EPSE – USC*, <sup>2</sup>*LU.TE.GA.*)

- **Condição dos solos e produtividade dos campos de lúpulo no Nordeste de Portugal em resposta a vários fatores agroambientais**

Sandra Afonso<sup>1</sup>, Margarida Arrobas<sup>2</sup>, Ermelinda Pereira<sup>2</sup>, Jorge Sá Morais<sup>3</sup>, António Rodrigues<sup>4</sup>, M. Ângelo Rodrigues<sup>2</sup> (<sup>1</sup>*CFE – CITEUC*, <sup>2</sup>*CIMO/SusTEC – IPB*, <sup>3</sup>*UNIQA – IPB*, <sup>4</sup>*Bralupulo*)

Debate

## **Pausa para almoço**

Cantina do IPB

## **14h00 Do lúpulo à cerveja**

Moderação: João Paulo Castro (*CIMO/SusTEC – IPB*)

- **Amargor, um desafio cervejeiro**

Teresa Sampaio (*Sociedade Central de Cervejas e Bebidas*)

- **Fatores que influenciam a transferência de compostos do lúpulo para cerveja durante o processo de *dry-hopping***

Júlio C. Machado Jr., Miguel A. Faria, Isabel M.P.L.V.O. Ferreira (*LAQV/REQUIMTE*)

- **Análise de variedades de lúpulo e produção de limonadas gaseificadas: NIR e ETongue para avaliação de similaridades**

Luís G. Dias<sup>1</sup>, M. Letícia Estevinho<sup>2</sup>, J. Sá Morais<sup>2</sup> (<sup>1</sup>*CIMO/SusTEC – IPB*, <sup>2</sup>*UNIQA – IPB*)

- **Linguistic and cultural analysis of slogans and advertising spots of Czech and Polish beer brands**

Janusz Karpeta (*Business Faculty, Czech Republic*)

Debate

## **Pausa para café**

## 15h30 Aplicações diversas da planta de lúpulo

Moderação: Olívia Pereira (CIMO/SusTEC – IPB)

- **Volatiloma de las principales variedades de lúpulo del Norte de España**

M. Vilanova<sup>1,2</sup>, B. Costa<sup>1</sup>, J. Fraile<sup>3</sup>, R. Pérez-Parmo<sup>4</sup>, E. Corral<sup>5</sup>, J. Valladares<sup>6</sup>, M. Rodríguez-Febreiro<sup>7</sup>, M. Fandiño<sup>7</sup>, M. J. Sáiz-Abajo<sup>8</sup>, A. Moreno-Ruíz<sup>8</sup>, J. J. Cancela<sup>2,7</sup>  
(<sup>1</sup>ICVV – CSIC, <sup>2</sup>USC, <sup>3</sup>ICVV – CSIC, <sup>4</sup>SAT Lúpulos de León, <sup>5</sup>NEIKER – BRTA, <sup>6</sup>LU.TE.GA, <sup>7</sup>CIAM – AGACAL, <sup>8</sup>EPSE – USC, <sup>8</sup>CNTA)

- **Potential use of *Humulus lupulus* extract as a cosmetic ingredient for atopic dermatitis**

Ana Rita Gama<sup>1</sup>, José Martínez-de-Oliveira<sup>1</sup>, Carmen Lisboa<sup>3</sup>, Ana Palmeira-de-Oliveira<sup>1,3</sup>, Rita Palmeira-de-Oliveira<sup>1,3</sup> (<sup>1</sup>FCS, CICS – UBI; <sup>2</sup>FMUP, CHUSJ, CINTESIS/RISE; <sup>3</sup>Labfit – HPRD)

- **Comparison of hop bioactive compounds in Nugget and by-product**

Briolanja dos Santos<sup>1</sup>, Vanessa Paula<sup>1</sup>, Luís Pedro<sup>2</sup>, Olívia R. Pereira<sup>1</sup>, Hugo Goes<sup>1</sup>, Susana M. Cardoso<sup>3</sup>, Maria João Sousa<sup>1</sup> (<sup>1</sup>CIMO/SusTEC – IPB, <sup>2</sup>CBV/CESAM – FCUL, <sup>3</sup>LAQV/REQUIMTE)

- **Upcycling *Humulus lupulus* residues: from beer waste to special cosmetic applications**

Ana Rita Gama<sup>1</sup>, José Martínez-de-Oliveira<sup>1</sup>, Carmen Lisboa<sup>3</sup>, Ana Palmeira-de-Oliveira<sup>1,3</sup>, Rita Palmeira-de-Oliveira<sup>1,3</sup> (<sup>1</sup>FCS, CICS – UBI; <sup>2</sup>FMUP, CHUSJ, CINTESIS/RISE; <sup>3</sup>Labfit – HPRD)

Debate

## 18:00 Programa Sociocultural e Provas Comentadas de Cerveja

Centro da Cidade (Rua Alexandre Herculano)

## **Programas dos WORKSHOPS – Workshops Programme**

### **Workshop I: Como fazer cerveja artesanal**

Data: 21 de Julho

Duração do Workshop: 2h30 a 3h

Local: Laboratório de Biologia da ESA

#### **Objetivo:**

Produção de cerveja artesanal

#### **Programa geral:**

9h30- (Início): Apresentação do formador (Arsénio Martins – cervejeiro artesanal)

9h40- Breve introdução teórica sobre a cerveja

9h45- Receita de cerveja a elaborar

## **Workshop II: Lúpulo e Cerveja em Dermofarmácia**

Data: 21 de Julho

Duração do Workshop: 2h30 minutos

Local: Laboratório de Botânica da ESA

Notas: Necessário trazer bata

### **Objetivo:**

Desenvolvimento de formulações de Dermofarmácia com inclusão de extratos de Lúpulo e de Cerveja

### **Programa geral:**

9h30- (Início): Apresentação dos formadores (M<sup>a</sup> João Sousa & Olivia Pereira) e convidados (Professor André da Politécnico da Guarda, & Mestra Fernanda Possamai da empresa Unibio-Lisboa)

9h40- Breve introdução teórica sobre a pele (Professora Olivia)

9h50- Breve introdução sobre o lúpulo e a cerveja: características e potencialidades na cosmética (Professora M<sup>a</sup> João Sousa)

10h – Determinação das condições da pele com recurso a equipamento específico.

10h10- Início das preparações das seguintes formulações:

- 1) Sabonete medicinal enriquecido com cerveja
- 2) Pasta de proteção e regeneração da pele com extrato de Lúpulo
- 3) Creme gordo com extrato de lúpulo
- 4) Champoo sólido com extrato de lúpulo

11h45-12h Testes pós-hidratação da pele.



## **Workshop III: Lúpulo e Cerveja na Gastronomia**

Data e hora: dia 21 de julho às 14h30.

Local: Laboratório de Biologia da ESA

### **Objetivo:**

Desenvolvimento de algumas receitas com a utilização de cerveja ou plantas de Lúpulo

### **Programa geral:**

9h30h - Apresentação do workshop, dos formadores (chef António do Rosário e chef Óscar “Geadas”) e dos formandos

9h45 – Desenvolvimento de um prato salgado com plantas lúpulo

10h30 – Desenvolvimento de receita de molho de carne com Lúpulo

11h15 – Desenvolvimento de uma sobremesa com cerveja

12h00 – Provas das receitas

## **Workshop IV: Instalação da cultura, técnicas de cultivo, variedades, colheita e pós-colheita**

Data e hora: dia 21 de julho às 09h30.

Local: auditório pequeno da ESA

### **Objetivo:**

Apresentação dos aspetos relevantes do cultivo de lúpulo, desde a instalação à colheita e pós-colheita

### **Programa geral:**

9h30h - Apresentação do workshop, dos formadores e dos formandos

9h45 - Projeto de instalação da cultura e mecanização das operações culturais (António Rodrigues, BRALÚPULO)

10h30 - Gestão do solo, da fertilização e da rega (M. Ângelo Rodrigues, CIMO-IPB)

11h15 – Proteção sanitária, variedades, colheita e pós-colheita (Jorge Sá Morais, UNIQA-IPB)

12h00 – Debate

## **RESUMOS DAS CONTRIBUIÇÕES**

## **CONTRIBUTIONS' ABSTRACTS**

## Carlsberg Research Laboratory: Hop research and the development of new hop varieties

Louise de Bang<sup>1</sup>, Oliver Kemp<sup>1</sup>, Sandip Kale<sup>1</sup>, Nadia Kamal<sup>2</sup>, Nicholas Price<sup>3</sup>, Georg Haberer<sup>2</sup>, Heidrun Gundlach<sup>2</sup>, Nicholi Pitra<sup>3</sup>, Katherine Easterling<sup>3</sup>, Kasper Nielsen<sup>1</sup>, Oliver Gericke<sup>1</sup>, Aldo Ricardo Almeida Robles<sup>1</sup>, Sudharsan Padmarasu<sup>4</sup>, Axel Himmelbach<sup>4</sup>, Mark Timothy Rabanus-Wallace<sup>4</sup>, Paul Matthews<sup>3</sup>, Nils Stein<sup>4,5</sup>, Martin Mascher<sup>4</sup>, Birgitte Skadhauge<sup>1</sup>, Manuel Spannagl<sup>2</sup>, Alexander Feiner<sup>6</sup>, Tiago M. Brandão<sup>7</sup>, Ilka Braumann<sup>1</sup>

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### Abstract

*Humulus lupulus* L., commonly known as hop, is grown for its cones: tightly packed bracts and bracteoles of the female inflorescence. In the lupulin glands, located at the base of these bracts and bracteoles, bioactive compounds that are used to flavor beer with bitter and aromatic flavor are produced. Today the brewing industry uses as much as 98% of the produced hop crop worldwide.

As for many crops, the beginning of modern hop breeding dates to the 1920s, when European breeders initiated the first modern hop breeding programs. They crossed imported North American hop lines with European material. Therefore, most of the modern hop cultivars are or originate from crossings of European and North American hop, while traditional European landraces are still cultivated due to their distinct and traditional aromas.

Common goals of current hop breeding include the improvement of yield, resistance to diseases and pests, aroma quality, bittering content, and climate tolerance. This applies as much to the large main growing areas in central Europe and US as to smaller growing areas such as Portugal.

During the presentation an overview over the breeding processes and techniques as well as the selection process for new varieties at Carlsberg Laboratory will be given. Further emphasis will be on the building of a reference genome that will enable breeding for desired traits faster and more efficiently in the future.

Reference genomes are useful tools in plant breeding because they provide an important foundation for identifying agronomically relevant variation. With the availability of the full genome sequence information, more efficient breeding strategies can be developed. While today most crops have a completed reference genome and many are even entering the “pan-genome era”, a reference assembly for hop is still missing.

To fill this gap, we combined PacBio HiFi and HiC reads to generate a chromosome-scale and haplotype resolved genome assembly of Apollo, a high-alpha bittering variety which also lends grapefruit, citrus, and resinous notes. The 2.61 and 2.47 Gb haplotype sizes match with the estimated haploid genome size of 2.5 Gb. Higher BUSCO scores (98.4%: HAP1; 97.46%: HAP2) and very low (<2%) switch errors confirm assembly completeness. Comparative analyses revealed higher divergence (~3%) and identified large structural variations such as an ~80 Mb inversion, between the haplotypes. To study the effect of the high divergence on recombination, a linkage map was constructed using F1 progeny (c.v. Apollo x male) applying a pseudo-test-cross strategy. We identified limited recombination. As a conclusion of this genetic assessment and based on the new genomic resources, the breeding strategy in hop needs to be redefined.

## **Manejo del riego del lúpulo en base a sensores de contenido de agua en el suelo**

María Fandiño<sup>1</sup>, Marta Rodríguez-Febereiro<sup>1</sup>, Emilio Corral<sup>2</sup>, María Jesús Meira-Rodríguez<sup>1</sup>, Benjamín J. Rey<sup>1</sup>, Javier J. Cancela<sup>1</sup>

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<sup>2</sup>Lúpulo Tecnología de Galicia, Sociedad Cooperativa Gallega (LU.TE.GA.), Betanzos, Spain

### **Resumen**

Las necesidades de riego del lúpulo son elevadas en el período de máximo crecimiento de la planta. El manejo del riego de forma adecuada está alineado con la gestión de los recursos hídricos, de cara a la obtención de un producto final en cantidad y calidad adecuada. En el presente trabajo se definieron dos tratamientos de riego deficitario, 100 % y 75 %, en los que se evaluó la dinámica del agua en el suelo, contrastando los resultados con mediciones directas en campo, empleando sensores TDR-100, frente al manejo de sensores de medición en continuo (Teros 10). La variedad estudiada es Nugget instalada en el ayuntamiento de Abegondo en la parcela de Presedo. La plantación se instaló en 2008, con un marco de plantación de 3 por 1,5 m (2,222 plantas por hectárea), y cuenta con un sistema de riego por goteo en la línea de cultivo con goteros de 2 L h<sup>-1</sup>, separados 0,75 m. Los resultados obtenidos muestran que los sensores Teros 10, instalados a 0,45 m de profundidad recogen las variaciones en el contenido de agua en el suelo, tras recibir un riego. Como resultado principal se ha obtenido un límite inferior de contenido de agua en el suelo, por debajo del cual no debería de encontrarse el cultivo, especialmente en los meses de junio a agosto. En el tratamiento 100 %, a pesar de recibir una mayor cantidad de agua, y debido a la variabilidad espacial existente en la parcela, ha mostrado valores de contenido de agua en el suelo, inferiores al 20 %, lo que ha supuesto una merma productiva del 12 %. El uso de sensores de medición en continuo requiere de una calibración/adaptación a las condiciones de suelo

locales, si bien se presentan como una herramienta clave para manejar el agua de forma eficiente.

**Palabras clave:** sensores; calendario de riego; dosis de riego

## **Condição dos solos e produtividade dos campos de lúpulo no Nordeste de Portugal em resposta a vários fatores de influência**

Sandra Afonso<sup>1</sup>, Margarida Arrobas<sup>2,3</sup>, Ermelinda Pereira<sup>2,3</sup>, Jorge Sá Morais<sup>4</sup>, António Rodrigues<sup>5</sup>, M Ângelo Rodrigues<sup>2,3</sup>

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<sup>2</sup>Centro de Investigação de Montanha (CIMO), Instituto Politécnico de Bragança, Portugal

<sup>3</sup>Laboratório Associado para a Sustentabilidade e Tecnologia em Regiões de Montanha (SusTEC), Instituto Politécnico de Bragança, Campus de Santa Apolónia, 5300-253 Bragança, Portugal

<sup>4</sup>Unidade de Química Analítica – Instituto Politécnico de Bragança

<sup>5</sup>BRALUPULO - Produtores de Lúpulo de Bragança e Braga, C.R.L.

### **Resumo**

A produção de lúpulo em Portugal está localizada sobretudo no nordeste de Portugal, com duas principais explorações localizadas em Vinhas e Pinela, ambas produtoras da cultivar de amargo Nugget. As atuais explorações apresentam desafios e oportunidades em termos agronómicos que podem servir para estabelecer práticas de gestão da produtividade da cultura e dos recursos das explorações. Nesse contexto, foram explorados diversos temas, com ênfase na condição dos solos, na produtividade das plantas, e nos fatores que podem influenciar ambos. Os fatores de influência estudados incluíram a rega por alagamento, a aplicação de calcário, a aplicação de sprays foliares (rico em algas vs. rico em nutrientes; rico em potássio; rico em aminoácidos), a compostagem dos resíduos gerados na colheita, e o desempenho agronómico de cultivares de aroma (Columbus, Cascade e Comet) em comparação com a cultivar de amargo em produção. O deficiente arejamento do solo associado a níveis excessivos de manganês e ferro, contribuíram para a redução da produtividade nas parcelas com fraco vigor vegetativo. A rega por alagamento afetou negativamente a condição do solo, mas não gerou gradiente ao longo da linha de rega. A



calagem elevou ligeiramente o pH do solo, mas não teve um efeito relevante no solo ou plantas. Os sprays foliares ricos em algas ou nutrientes apenas aumentaram significativamente a produção de biomassa nas parcelas com fraco vigor vegetativo. O spray foliar rico em potássio não aumentou a produção de biomassa ou o teor de ácidos amargos. O spray foliar rico em aminoácidos manteve a produtividade nos níveis do tratamento controle e aumentou o teor de ácidos alfa. A compostagem das folhas de lúpulo com palha ou estrume em proporções adequadas resultou em compostos com elevado teor de azoto. A cultivar de aroma Comet destacou-se como a mais produtiva (biomassa total e de cones).

**Palavras-chave:** *Humulus lupulus*; fertilidade do solo; performance produtiva

**Agradecimentos:** Fundação para a Ciência e Tecnologia pelo financiamento através de uma Bolsa de Doutoramento (BD/116593/2016).

## **Amargor, um desafio cervejeiro**

Teresa Sampaio

Sociedade Central de Cervejas e Bebidas

### **Resumo**

Desde que se começou a usar lúpulo na produção de cerveja que o processo da sua adição é profundamente estudado no sentido de uma otimização que assegure o atingimento dos níveis de amargor e o perfil aromático de lúpulo desejados na cerveja. Trata-se de um processo complexo, que pode ocorrer em diferentes fases de produção desde a fervura do mosto, fermentação, guarda ou até na etapa final de diferenciação antes de envio para o enchimento. São assim diversos os compostos e atividades que contribuem para um crescente de interações com as substâncias amargas e aromáticas do lúpulo, que para além de contribuírem para uma maior ou menor quebra de amargor, igualmente influenciam o carácter sensorial da cerveja através da sua influência em outras características de extrema relevância, tais como a estabilidade de espuma. Se bem que todo o estudo realizado ao longo dos anos tenha contribuído para um extenso conhecimento da complexidade da perceção do amargor por parte dos apreciadores de cerveja e de como este parâmetro varia nas diferentes fases do processo, muitos enigmas ainda desafiam permanentemente o cervejeiro. Por este motivo, o cervejeiro recorre aos métodos analíticos existentes para o acompanhamento deste parâmetro, tornando-se por vezes este próprio acompanhamento analítico um segundo desafio tendo em conta a sua complexidade e cuidados necessários nas etapas de análise. É assim importante encontrar a melhor estratégia analítica e de controlo de qualidade, avaliando qual o melhor método de análise (extração por isoctana, HPLC, sensorial, outros) assim como qual a amostragem mais correta que permita decifrar este complexo processo.

**Palavras-chave:** Lúpulo; Amargor; Aroma; Controlo de Qualidade; Métodos de Análise

## **Fatores que influenciam a transferência de compostos do lúpulo para cerveja durante o processo de dry-hopping**

Julio Cesar Machado Junior, Miguel A. Faria, Isabel M.P.L.V.O. Ferreira

REQUIMTE/ FFUP

### **Resumo**

O dry-hopping é a adição de lúpulo nas fases frias da produção de cerveja, ou seja, durante ou após a fermentação. É uma tendência mundial que está a tornar-se cada vez mais popular para conferir intensidade e diversidade de aromas de lúpulo às cervejas. Entretanto, o sucesso da técnica está associado à extração de diversos compostos do lúpulo para a matriz da cerveja. O objetivo desta apresentação é elucidar os principais fatores que influenciam a extração dos compostos durante o processo de dry-hopping e o impacto na composição química e percepção sensorial das cervejas. A composição aromática das diferentes variedades, a utilização de cones e pellets, a quantidade de lúpulo, o momento e o número de adições, o tempo de contato, comprovadamente influenciam a transferência de compostos voláteis do lúpulo para a cerveja, e conseqüentemente, as características sensoriais do produto. A transferência de compostos não voláteis, como os polifenóis também tem impacto porque estes influenciam características como o amargor e a adstringência. Adicionalmente, o fenômeno de Hop Creep, processo de fermentação adicional que pode acontecer durante a aplicação do dry-hopping e promove a formação de novos compostos na cerveja. Desenvolver novas receitas ou manter a consistência de um produto com aceitabilidade no mercado é um desafio constante. Uma vez que a composição volátil dos lúpulos difere de acordo com a variedade, mas também com a região onde são plantadas e com o clima durante sua fase de desenvolvimento, é necessário estar atento às informações dadas, anualmente, pelos produtores sobre as características das variedades. Saber interpretar essas informações, assim como compreender a influência das alternativas metodológicas, é ponto crucial para os cervejeiros que procuram aproveitar ao máximo o potencial do lúpulo na produção de cerveja.

**Palavras-chave:** Compostos voláteis; Polifenóis; Cromatografia Gasosa; Análise Sensorial

## **Análise de variedades de lúpulo e produção de limonadas gaseificadas: NIR e ETongue para avaliação de similaridades**

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### **Resumo**

O lúpulo (*Humulus lupulus*) é uma planta amplamente utilizada na indústria de bebidas devido às suas propriedades aromáticas e amargas, sendo empregue tanto na produção de cervejas como na elaboração de limonadas gaseificadas. Neste estudo, é realizada uma análise das diferentes variedades de lúpulo e exploradas as suas aplicações nestas bebidas, recorrendo à técnica de espectroscopia no infravermelho próximo (NIR) e à língua eletrónica (ETongue) para comparar e determinar as semelhanças entre as amostras. O NIR é uma técnica analítica não destrutiva e de rápida execução que apresenta vantagens significativas na caracterização e autenticação de produtos alimentares. Neste estudo, o NIR é utilizado para analisar e identificar as características químicas dos lúpulos utilizados nas limonadas de lúpulo gaseificadas (Hop Water), permitindo avaliar a qualidade e autenticidade das diferentes variedades selecionadas. Paralelamente, a língua eletrónica é também um sistema analítico rápido e não destrutivo, baseado em multisensores químicos de sensibilidade cruzada que imita o sentido do paladar humano, e é empregue para avaliar as propriedades “gustativas” das limonadas gaseificadas. Esta abordagem permite uma análise objetiva das diferenças entre as amostras (relacionada com a matriz global) obtidas das diferentes variedades de lúpulo. Ao combinar os resultados provenientes das técnicas NIR e ETongue, é possível obter uma avaliação mais abrangente e confiável das características químicas e

gustativas dos produtos, permitindo uma comparação e determinação das semelhanças entre as amostras. Esta abordagem pode contribuir para o controlo de qualidade das limonadas gaseificadas, garantindo a consistência e excelência na produção, além de auxiliar na seleção das variedades de lúpulo mais adequadas para a obtenção dos sabores desejados.

**Palavras-chave:** lúpulo; limonada; infravermelho próximo; língua eletrónica

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## **Linguistic and cultural analysis of slogans and advertising spots of Czech and Polish beer brands**

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### **Introduction**

Beer is a timeless cultural and social phenomenon that has been common in the Czech Republic and Poland for centuries. This phenomenon is part of the current cultural traditions of both countries. If we refer to the work of the influential Polish-British sociologist Zygmunt Bauman, a side effect of globalization is the growing attraction of what is considered native. For Polish and Czech society in recent times, the valorization of national traditions is characteristic - regardless of how much they are confirmed in the past and how much they are reinvented on an ongoing basis. In both societies, everything that is considered a tradition, a custom, an indigenous way of preparing food or making drinks, and much more, is gaining importance. In a world of cultural commodification, all real and imaginary indigenous cultural values are continually instrumentalized for marketing, be it political or the sale of various products for consumption. The label of familiarity sells anything well, as it inscribes the product with the need for collective belonging.

### **Objective**

The objective of the study, entitled Linguistic and Cultural Analysis of Slogans and Advertising Spots of Czech and Polish Beer Brands, was to investigate which stereotypes and related circulating meaning structures are referred to in advertising spots and the slogans they contain, and to answer the question of how they are used for brand promotion. The study is primarily based on the concept of myth as conceived by the influential semiotician Roland Barthes, who understands by this concept a vague density of connotations, i.e. images accompanying denotative meanings. This study thus situates itself on the borderline between

linguistic and cultural studies, as it focuses on the linguistic and cultural aspects of advertising.

## Methods

Advertising spots of Polish and Czech beer brands were subjected to a multimodal analysis. The multimodal approach takes into account not only the verbal level but also the sphere of cultural semiotics, taking into account modern aspects of communication based on pictorial means of communication. Within advertising communication, the iconic and the spectacular are becoming increasingly important in the communication between company and consumer. Visual media dominate the modern world and greatly influence the behaviour and expectations of the modern viewer of advertising spots and slogans.

The first step was to present the current state of research and the basic theoretical and methodological starting points. The most recent literature covering advertising and slogan issues was used here. One of the key tools for conducting a linguistic and cultural analysis of slogans and advertising spots of Czech and Polish beer brands is the multimodal approach, which was used in combination with semiotics, with the tools of research on the linguistic image of the world, connotation, and stereotype. Specifically, the idea is that the meaning of an advertising slogan is made up of the context of its use, i.e. the play of accompanying meanings set in motion by images and sound. Even if the reading of a multimedia message may be to some extent individual, it is always made possible by a code shared by the totality of the bearers of one or another linguistic and cultural order. Since the reading of an advertising message is always affected by the specifics of individual experience and collectively shared knowledge, its analysis can never be exhaustive.

The second step was to collect a sample on which research focused on the linguistic-cultural analysis of the advertising spots of interest was conducted. The analysis proposed here was aimed at eyewitness identification and demonstration of the most typical linguistic and cultural means used in the construction of commercially effective advertising messages of beer producers in the Polish and Czech sales markets in the period from 2015 to 2018. The choice of the given period was dictated by the need to report on a fairly up-to-date state of affairs, if one accepts that the linguistic and cultural system may undergo more or less changes under the influence of various factors of social life. The period chosen is long enough



to identify recurring references that fit into the dominant life models and value systems of the target groups of beer brand advertisements in both countries. At the same time, it is not too long, which, due to the vastness of the material, would prevent a systematic analysis of the multimodal advertising messages of all beer brands that dominate the Polish and Czech markets.

Here, I have sought to identify and present relevant linguistic and cultural phenomena in the context of communication between the sender (the beer producer) and the recipient (the potential consumer), taking into account the most important postulates guiding rhetorically effective advertising communication. We are talking about a communication game based on the principles of marketing, persuasive, and audio-visual communication, using spots and advertising slogans of beer brands. In an increasingly competitive environment, producers are forced to use the most modern means and channels of communication to reach the widest possible masses or target groups, usually using the Internet or social media. The building blocks of rhetorically effective messages are not only linguistic and stylistic devices but also cultural signs, which bring to the mind of the recipient the meanings desired by the sender based on conventions established in ways of seeing and interpreting the world and in communication practices. In this respect, the analysis of advertising messages is situated on the borderline between the study of language and culture. In addition to dictionary definitions and the metaphors built on them, a similar analysis must take into account the sphere of connotations and the closely related stereotypes that translate into action and cognitive habits. The need to acquire a proper workshop for the analysis of advertising messages was subordinated to the argument of the theoretical part of the work, which was focused, among other things, on the proposals of Lublin's cognitive ethnolinguistics, which provides us with effective tools for the analysis of semantic, semiotic and pragmatic aspects of advertising messages. A multimodal analysis of the advertising message cannot be satisfied with strictly linguistic tools and must sufficiently draw on theories of communication built outside the confines of linguistics itself. The research formula proposed here is based on tried and tested models, where the pragmatic and ideological dimensions of communication come to the fore.

In further proceedings, I have attempted to find out to what extent the studied aspects of Polish and Czech advertising slogans addressed to potential beer consumers are similar, and in what aspects they must take into account the specificity of the two orders of language and

culture being compared. Based on parallel comparisons and analyses of source material consisting of advertising slogans of Polish and Czech beer brands, I attempt to answer the key research question. For if the material of an advertisement is the meanings contained in the linguistic and cultural system, in what respects do Czech and Polish beer advertisements differ, and in what respects are they similar? In the search for an answer to a similar question, research into the suggested (already existing) and projected (constructed) image of the world in advertising spots in both cultural settings, further into the characteristics of the language used in advertising communication by broadcasters and other extra-linguistic persuasive and advertising methods used by them, plays a significant role.

A prerequisite for the effectiveness of an advertising message is its ability to draw attention to itself and, through this, to the advertised product, which must become recognizable and function as a substitute for everything the potential consumer desires and dreams of. This cannot be achieved without the ability to recreate a linguistic and cultural system that projects the experienced world of the potential advertising recipient. If a message is to be effective, it must be comprehensible to its addressee, it must find its way directly into his or her consciousness and settle there. Its effectiveness is therefore conditioned by the knowledge of the behavioural patterns and social roles of potential customers, their value systems, orders of connotation, and stereotypes, i.e. everything that makes up ideology, understood as the invisible prism of the everyday, colloquial view of the world. The research topic I have undertaken is partly part of the current research on the linguistic image of the world (JOS), as well as the theory of marketing and advertising communication including the theory of persuasion. The research work has resulted in conclusions concerning Polish and Czech advertising of beer brands.

The study is accompanied by appendices containing source materials from which examples have been selected to provide a linguistic and cultural analysis of slogans and advertising spots of Czech and Polish beer brands. The appendices contain 37 examples from the Polish cultural environment and 23 examples from the Czech one. The similar quantitative difference is because the Polish market is correspondingly larger.

## **Results and conclusions**

At this point, it is worth answering the question of to what extent the general initial assumptions about the stereotypes of drinking shown in the advertising spots of the two cultural backgrounds have been confirmed and to what extent a common denominator of the different images can be identified after all.

In the case of the Czech cultural environment, references to the idealised, stereotypical image of the Czech tavern (as a place of social gathering), ritual (beer is drunk after work), beer drinking culture (beer is always frothy, served on a saucer), the tradition of spending time over a mug of beer (in the company of colleagues, etc.) are confirmed. In addition, an idealised, idyllic image of the Czech countryside (a place of peace, harmony, order, and government) is used here. The advertisements considered here prey – based on wishful thinking - on the imagined characteristics of the "typical Czech". All Czech pub-goers drink exclusively Czech-made beer. The promoted brands are supposed to be associated with the vision of a strong, supportive, determined Czech who never gives up in various life situations or during difficult historical periods of his or her own nation, always willing to fight and defend Czech values. A Czech, according to the examples shown, is patriotic (he or she supports Czech teams playing ice hockey), is easy-going, and enjoys parties, events, and informal social gatherings.

In the Polish cultural environment, images of a Pole drinking beer standing up, from a bottle, after working hours are more common. The imagined Pole is easy-going, helps, protects the weak, is determined, travels, marks himself with creativity, copes with different conditions and difficult times, and fights for freedom and democracy. He is a patriot, especially in the sense that he supports Polish teams playing football (not hockey), and believes in victory and success. He is a great businessman. He knows his business. He is the embodiment of male dominance in social, professional, political, and private life. The images used in the adverts imply what happiness in the life of a Pole is supposed to be about. It is here associated with winning, i.e. with the accumulation of financial resources (resulting from good fortune), which will bring him freedom of action, freedom to make his own decisions, and joy in life. The adverts also feature an idealised image of the Polish countryside, characterised by idyllic beauty, peace, and closeness to nature. Its inhabitants are characterised by their unspoiled nature, solidarity, willingness to cooperate and nurture

excellent interpersonal relations, and a high standard of living because it is in harmony with nature and the resulting ethical principles.

As can be seen from the examples analysed in the study, the Czech and Polish communities make almost identical use of the wishful image of the patriot, metaphorically shown in the situation of cheering and supporting the national ice hockey team in the Czech Republic and football in Poland.

The concordance between Czech and Polish advertisements for beer also relates to the wishful, idealised image of the countryside, which refers to supposedly homely - because not alien - traditions (cultivation of grain, hops, and other natural goods, making traditional crafts, etc.), including customs, folk culture and moral and ethical values (solidarity, cooperation, collegiality, equality, excellent neighbourly and interpersonal relations, sense of national dignity).

Consistency also applies to the wishful image of the Czech, or Polish, man, i.e. a strong (physically and mentally), bold, determined man who is not afraid of any obstacles and challenges in his social, political, and private life. He likes adventure, he is heading in the right direction, he is determined to achieve the goal he has set for himself, and the road to it is challenging. He succeeds and wins.

Also, in terms of the wishful lifestyle image, one can notice a relative correspondence between the visions created in Polish and Czech advertising for beer. In both cases, the potential beer consumer is offered an image of an active, spirited man who likes to spend his free time in a group, have fun and enjoy life. In both cultural environments, this role is played exclusively by men, as women are only visible in the background - more often in Polish advertisements. Advertisements operating in both environments promote a not-very-happy division of social roles, seemingly traditional, as references to imagined traditions are also most important here. The question remains whether the target group is only men or also women, who can, after all, confront male domination by reaching for the promoted beer brand.

In addition, the most noticeable semantic element occurring most frequently in the advertising spots of Polish beer brands is the image of success, which runs through almost all Polish advertising spots (Lech, Warka, Żywiec, Harnaś). Success is usually associated with the victory of the Polish team in a football championship, thus being transferred from

the players to the fans and from the fans to the nation. The source of success here is nevertheless individuals, e.g. Leszek who is the personification of the Lech brand. Interestingly, success can result both from personality traits and from fate - winning the lottery.

In Czech beer advertising spots, egalitarianism and a sense of community - rural, but also urban (Smíchov) - come to the fore. The play with tradition and idyll appears here in more or less the same intensity as it does in Polish advertising. In addition to machismo, the common denominator of Polish and Czech beer advertising is also nationalism - understood in a neutral sense - even if in Polish advertising it is more strongly associated with the sport.

In Czech pubs, guests are most likely to be seated; in Polish pubs, they can also stand; moreover, the beer here appears more often in the open air. If the Polish pub is just for fun, the Czech pub is also presented as a place for serious discussions and activities concerning the whole community - a kind of substitute for the agora, where collective decisions are made, including political ones. The space of the advertising inn or the adjoining terrace has a rather common character. It is not the right place for any kind of showdown. Community is built here based on equality.

In Polish advertising for beer, on the other hand, we encounter an image of a pub (bar) that is slightly different from an inn. The space here breathes modernity, and pulsates with fun, partying. It's a place to relax, not to deal with more serious matters. Beer here can be drunk from the bottle, and if it's poured, it can be without foam. A pub is unlikely to be a place for tradition.

Let us recall in three points the most important conclusions from the comparison of Polish and Czech beer commercials:

1. While in advertisements broadcast in Poland, beer is mostly accompanied by those who stand out above the average, in the sense of social advancement, in Czech advertisements egalitarianism, i.e. levelling out of social differences during communal feasting, is more often seen as a value accompanying beer consumption. To put it differently, in Polish advertising we more often encounter the vision of an individual who has succeeded not only in the sense of a job well done but also in the sense of social mobility.

2. Even though the community is seen as a value in both Czech and Polish beer advertising, two different types (idealised models) of the community can be identified. While

in Polish advertising we mostly deal with a community that is formed within the same social class, in Czech advertising the community is most often formed across social divides.

3. The third conclusion is related to the observations made earlier: while in Poland domestic beer brands face more competition from foreign brands, the Czech consumer is used to trusting domestic brands more. (We leave aside here the issues related to the share of foreign capital in the production of Polish and Czech beer brands). This fact is also reflected in the differences between Polish and Czech advertisements for beer: Polish advertisements more often feature an image of a foreigner who likes Polish beer. The need for "foreigners" to confirm the quality of domestic brands is evident here. In Czech advertising, the demand for such an image is rather absent. The quality of domestic beer here does not need to be checked or confirmed externally.

### Keywords

Advertising slogan, advertising spot, language, linguistic image of the world, communication, connotation, multimodality, semiotics, stereotype

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## **Volatiloma de las principales variedades de lúpulo del Norte de España**

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### **Resumen**

La composición volátil de las diferentes variedades de lúpulo es un parámetro clave para la elaboración de cervezas, a pesar de que hasta el momento los estudios se han limitado al estudio del contenido en alfa y beta ácidos, así como el rendimiento, según la zona de estudio. Anteriormente se han llevado a cabo estudios limitados en cuanto al número de compuestos analizados en las principales variedades de Castilla-León, Galicia y País Vasco, por lo que

en el presente trabajo se ha realizado la detección del total de compuestos volátiles presentes en las variedades: Nugget, Columbus, Cascade, Admiral, Magnum, Perle, Saaz y Spalt. Las muestras fueron tomadas en la campaña 2021 en las tres regiones mencionadas, posteriormente extraído el aceite por parte del CNTA, y finalmente la determinación del volatilo realizado con GC-MS con una columna capilar polar, en el ICVV. Se han determinado un total de noventa y un compuestos agrupados bajo diferentes familias: esteroides, monoterpenos, monoterpenoides, sesquiterpenos, sesquiterpenoides entre otros), los cuales contribuyen con notas aromáticas específicas, según la variedad y la zona de cultivo. En términos generales el comportamiento de las variedades en el País Vasco, mostró una mayor composición aromática total, seguido de Galicia y Castilla-León. El estudio ha permitido mostrar la relevancia de la procedencia de la variedad a emplear, con cambios significativos en diferentes compuestos, según la variedad y su origen. Este trabajo innovador es la base de futuros estudios con los que dar respuesta a posibles cambios en la elaboración de cervezas, considerando el origen del lúpulo empleado.

**Palabras clave:** terroir, volatile composition, GC-MS

## Potential use of *Humulus lupulus* extract as a cosmetic ingredient for Atopic Dermatitis

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### Abstract

Atopic Dermatitis (AD) is the most common chronic inflammatory skin disease having a profound impact on patients' quality of life. *Humulus lupulus* (hops) are widely used by the brewing industry for beer production. Alongside, their use in traditional medicine, for various purposes, has led to an increase in hop research for skin applications (both for therapeutic and cosmetic purposes). Through a literature review, this work intends to prove the potential use of hop extract, obtained by supercritical CO<sub>2</sub> extraction, as a cosmetic ingredient for AD. AD is characterized by abnormal Th<sub>2</sub> cell immunity, compromised skin barrier, and pruritus. AD patients have decreased filaggrin expression (usually due to FLG gene mutation) and have decreased water and ceramide content in the stratum corneum. Also, tight junctions are dysfunctional in AD. Together these factors allow skin penetration of allergens or pathogens that induce sensitization. The microbiome also plays an important role in the

pathophysiology of AD, as there is a reduction in microbial diversity and an increased expression of pathogenic *Staphylococcus aureus*. AD therapy aims to control symptoms, which includes the use of adjuvant cosmetic products that promote skin hydration and improve its protective barrier function. The active molecules found in hops present several bioactivities described in the literature, including antioxidant and anti-inflammatory activities (particularly Xanthohumol, Humulone, and Isoxanthomul), antimicrobial and antifungal activity (alfa-acids, beta-acids, xanthohumol, humulone, and lupulone) and estrogenic activity (mainly by 8-prenylnaringenin). There is also a reference in the literature to the beneficial use of hops in Atopic Dermatitis. Since the scientific reports of anti-inflammatory and antioxidant properties of hops meet the needs found in AD, it arises a promising target for the development of new cosmetic products.

**Keywords:** Atopic Dermatitis; *Humulus lupulus*

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## Comparison of hop bioactive compounds in nugget and by-product

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### Abstract

A hop has the scientific name *Humulus lupulus* L., is a plant species of the Cannabaceae family, with climbing, perennial and dioecious characteristics of great importance due to its compounds of interest such as polyphenols and acids. The female inflorescences have glands that secrete mainly lupulin. Hops are known worldwide as an essential raw material and flavouring agent in beer production. Phytochemical compounds, such as xanthohumol, humulone and lupulone, have also been used in pharmaceuticals and cosmetics. In addition, the plant has beneficial properties such as anti-inflammatory, antimicrobial, antioxidant. The Bragança area (Trás-os-Montes) is rich in hops, where samples were collected and were analyzed and compared with the Nugget cultivar (vegetative and cones) with the by-product material not used in the brewing industry (seeds, bracts, bracts, leaf and stems). We determined the content of total phenolic compounds by the Folin Ciocalteu method, the total flavonoids and the profile of phenols was analyzed by UHPLC-DAD-ESI-MSn, the antioxidant activity by the DPPH methodology, the lipids, ashes, volatiles of essential oils in Likens-Nickerson apparatus and  $\alpha$  and  $\beta$  acids analysed in HPLC. Cultivar Nugget flowers and its respective by-product showed similarities regarding the monoterpene component, with  $\beta$ -myrcene being the main compound. As for the HPLC analyses, it showed values of around 5% of  $\alpha$ -acids and 3% of  $\beta$ -acids (by-product). The highest content of total phenolic

compounds was by-product ( $0.129 \pm 0.005 \mu\text{g GA eq./mg}$ ) and of total flavonoids was Nugget vegetative ( $0.133 \pm 0.003 \mu\text{g K eq./mg}$ ). Nugget cones with a value of 14.0% were the highest value of lipids and for analysis of ash the highest value was Nugget vegetative has 17.72%. Therefore, it can be concluded that the by-product of hops has significant levels, to be use in cosmetical industry since that much of it is discarded after the hop cones are harvested.

**Keywords:** Hop, by-product, bioactive compounds, chemistry,  $\alpha$ -acids and  $\beta$ -acids; phenolic compounds.

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## Upcycling *Humulus lupulus* residues: from beer waste to special cosmetic applications

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### Abstract

Hops (*Humulus lupulus*) is a main ingredient of beer and its medicinal properties have been traditionally explored. Residues from beer production are wasted, despite presenting high content of bioactive molecules from *H. lupulus* that could be used for skin applications. The growing demand for “green” and sustainable cosmetic products is rising the interest in plant extracts and upcycled processes. Our focus is to qualify “waste” from the brewing industry as active cosmetic ingredients for sensitive skin, particularly for atopic dermatitis (AD). The extract obtained from these residues will be characterized regarding chemical composition and in vitro bioactivity (both for safety and efficacy, using cell models and reconstructed human epidermis to encompass the multifactorial and particularities of atopic skin). Applications of this ingredient will be developed as solid cosmetic products for cleansing



and hydrating atopic skin. Final products will then be studied in vitro and in vivo for safety and efficacy.

**Keywords:** *Humulus lupulus*; Sustainability; Circular economy; Green Cosmetics; Atopic Dermatitis

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