

THE CONTENT IN ALPHA BITTER ACIDS OF HOP CULTIVARS CULTIVATED IN ROMANIA DURING 2008-2011

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Abstract. The objectives of the present study are integrated in the last research direction, namely the assessment of alpha bitter acids content of several hop varieties grown in Romanian hop farms. The researches in this area were carried on at the Food Products Engineering Department, more precisely in the Center and Research laboratory on Food Quality and Safety. The results are expressed as conductometric value (CV%) of hop cones and pellets, and are reported as such and as in dry weight. Also, the mean and standard deviation value of hop bitter acids for each hop variety and year were calculated.

Introduction

The researches regarding the biological active compounds from hops are in close relation with the development of Agro-food Biotechnologies doctoral school from UASVM Cluj-Napoca. The researches in this area were carried on at the Food Products Engineering Department, more precisely in the Center and Research laboratory on Food Quality and Safety.

The objectives and the topics on hop studies can be attributed to several distinct research directions:

- Determination of bitter acids from hop cones and pellets and validation of methods (Tofana et al., 2008 and 2009); comparative evaluation of the two methods (Salanta et al., 2011) as well as evaluation of losses in hop bitter substances during storage (Tofana et al., 2006; Mudura et al., 2009; Salanta et al. 2011);
- Evaluation of the degree of hop usage in brewing (Mudura et al., 2008 and 2009);
- Evaluation of hop and beer aroma and identification of some markers for the hop cultivars authentication (Socaci, 2009);
- Determination of polyphenols content, antioxidant and antimicrobial activity of hop, hop products and beer (Mudura, 2009);
- Monitoring the content in alpha acids of hop varieties grown in Romania, for marketing (Salanta et al. 2011).

The objectives of the present study are integrated in the last research direction, namely the assessment of alpha bitter acids content of several hop varieties grown in Romanian hop farms.

Materials and methods

The content in alpha bitter acids of hop cones and pellets from five hop varieties were determined during four years (2008-2011) period. The method used for hop bitter acids analysis was the one described in Analytica EBC 7.5: Determination of

conductometric value of hop, hop powders and hop pellets. The water content was determined according to SR 13842:2003 and Analytica EBC 7.2 methods.

Equipemts used for analyses:

- Analytical balance, Shimadzu, model AX 120, series D440300121, IU-07
- Agitator GFL Germania, model 3005, series 10370205B, IU-11
- Automated titrator and conductometer, Schott, model TA 20 PLUS, series 99430098/0545, IU-08
- Oven, Memmert, model UNB 400, series C4051358, IU-03

The results are expressed as conductometric value (CV%) of hop cones and pellets, and are reported as such and as in dry weight. Also, the mean and standard deviation value of hop bitter acids for each hop variety and year were calculated.

Results and discussion

In the figures 1 to 5 are presented the mean values obtained for bitter acids content for the five hop cultivars taken into study, during 2008-2011.

For Hallertau Magnum variety the content in alpha bitter acids during years 2008-2011 varied between 10.7-14.9% for hop cones and between 11.6-16 for hop pellets, the highest values being detected for both cones and pellets samples in year 2011.

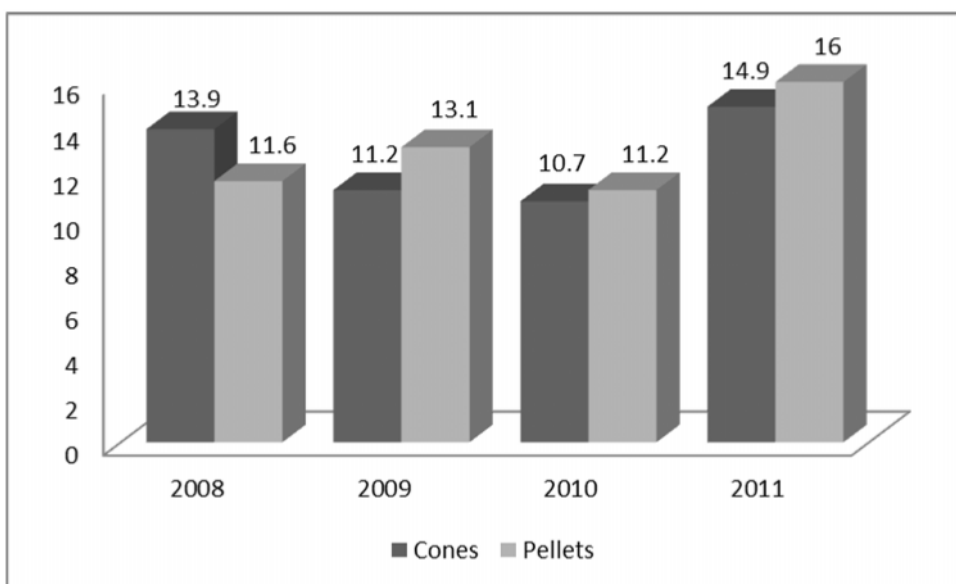


Fig 1. The mean content of Hallertau Magnum alpha acids in cones and pellets (% of d.w.)

In the case of Brewers Gold cultivar, the content in alpha acids is rather constant during the mentioned period of time. For Brewers Gold cones a maximum of 2% variation of bitter acids content (9-10.9%) was observed, while for the hop pellets samples the variation was even smaller, namely 1.1%. So, it seems that the content of bitter acids of Brewers Gold cultivar is the least influenced by the pedo-climatic conditions of the geographical region.

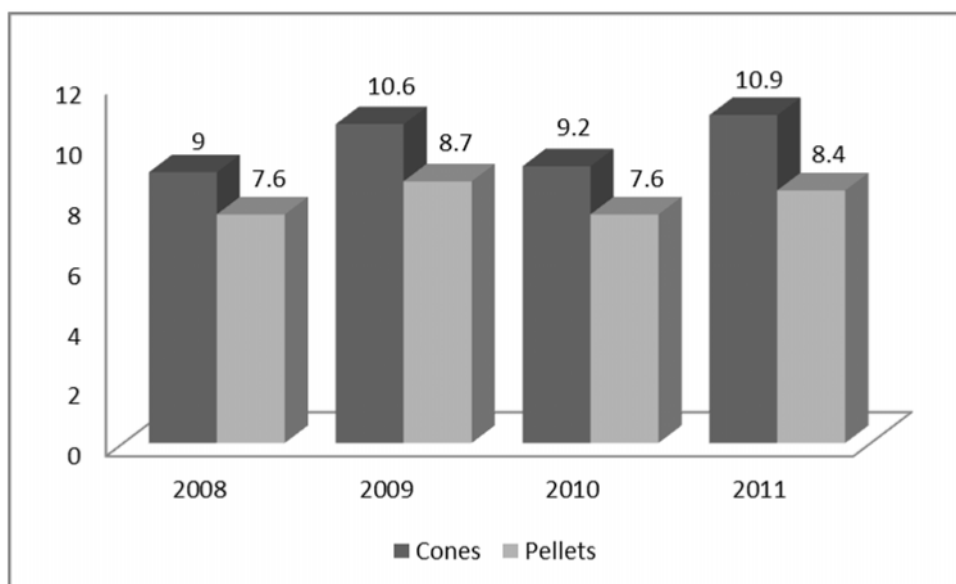


Fig 2. The mean content of Brewers Gold alpha acids in cones and pellets (% of d.w.)

The mean content in alpha acids for Perle cultivar varied between 8.5-11.8% for hop cones samples and between 6.7-9.2% for hop pellets samples. The pelletization process and/or storage conditions greatly influenced the content in bitter acids for year 2010 hop pellets samples. A difference of 3.3% was noticed between hop cones samples and hop pellets samples.

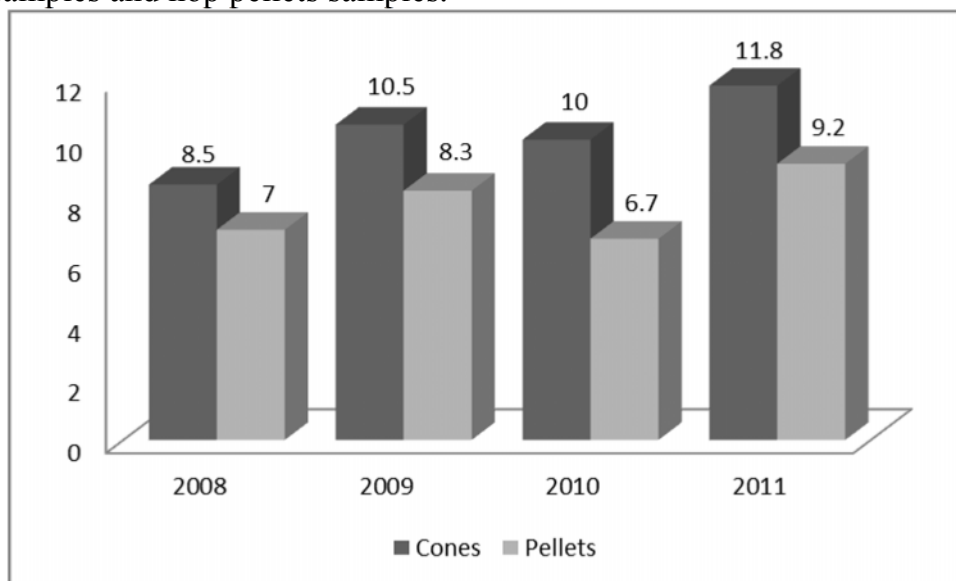


Fig 3. The mean content of Perle alpha acids in cones and pellets (% of d.w.)

Excepting Huller Bitterer variety, for all other hop cones samples, the highest values for bitter acids content were determined for year 2011 crop. Instead, for this cultivar, from the hop cones samples analyzed, the ones with the highest content in alpha acids were those from year 2010. Although, it has to be mentioned that after pelletization process a significant decrease (3.3%) in alpha acids content was observed (from 10.3% in cones to 6.8 % in pellets).

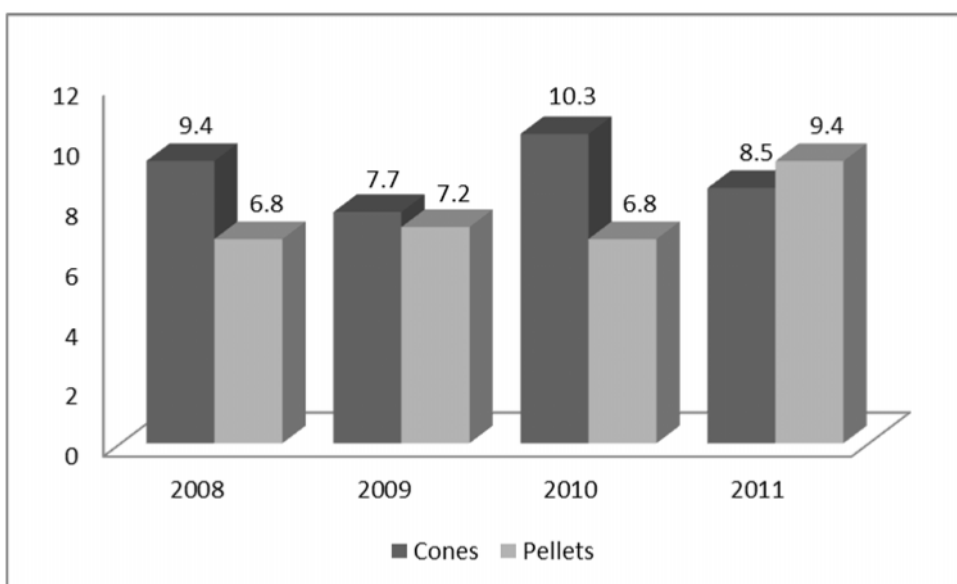


Fig 4. The mean content of Huller Bitterer alpha acids in cones and pellets (% of d.w.)

Merkur hop cultivar had the largest quantity of bitter acids from all hop cones samples analyzed from year 2011 (figure 5).

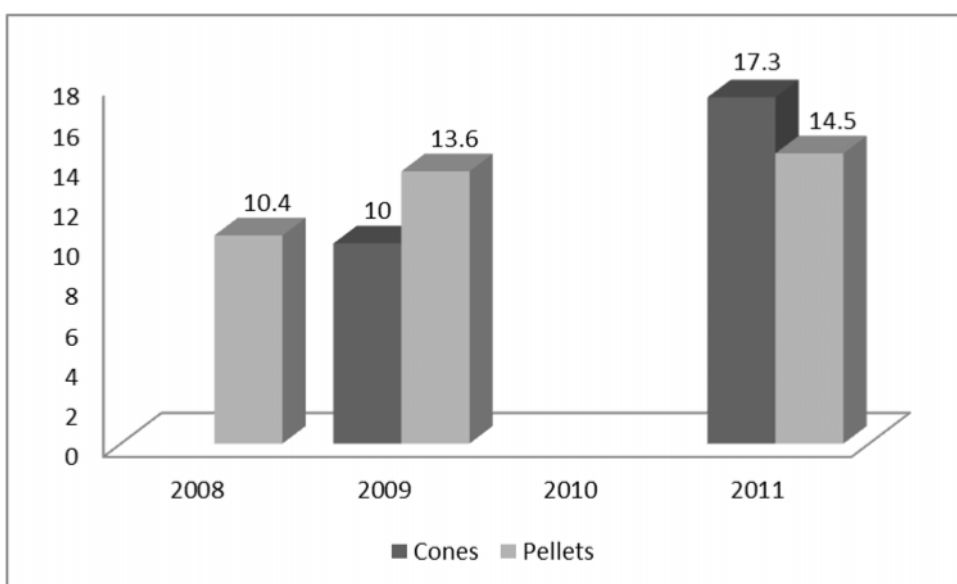


Fig 5. The mean content of Merkur alpha acids in cones and pellets (% of d.w.)

A comparative evolution of bitter acids content, for each hop cultivar taken into study during a four year period is presented in figure 6. As it can be observed, for all samples, the lowest content in bitter acids was for years 2008 and 2010 crops. The crops from years 2009 and 2011 registered higher values for alpha acid content for both bitter hop cultivars and aroma hop cultivars.

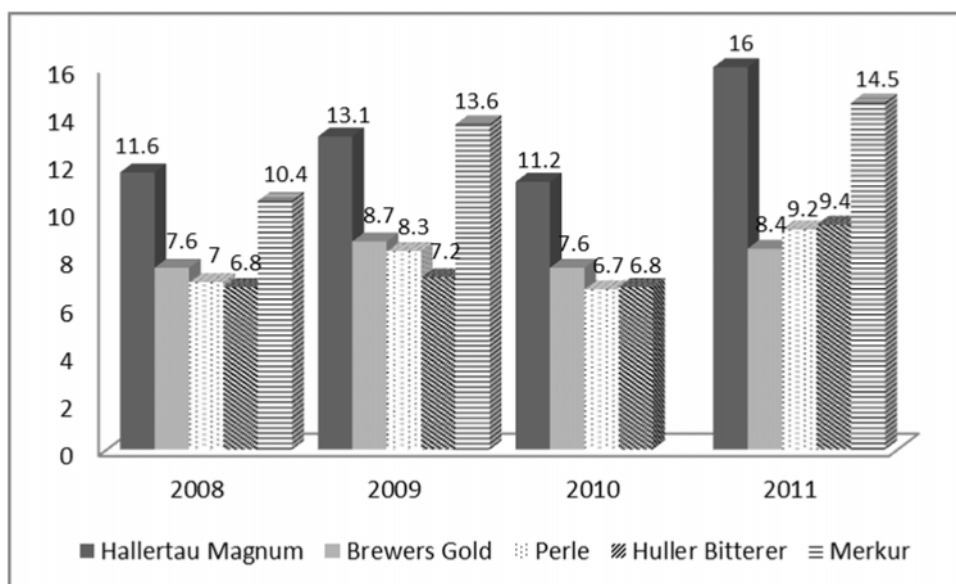


Fig.6. The mean content of the alpha acids in the different hop varieties pellets(% of d.w.)

Conclusions

- The content of bitter acids of Brewers Gold cultivar is the least influenced by the pedo-climatic conditions of the geographical region;
- The mean content in alpha acids for Perle cultivar varied between 8.5-11.8% for hop cones samples and between 6.7-9.2% for hop pellets samples;
- From the Huller Bitterer cultivar hop cones, the ones with the highest content in alpha acids were those from year 2010;
- The crops from years 2009 and 2011 registered higher values for alpha acid content for both bitter hop cultivars and aroma hop cultivars.

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