New aroma hop varieties in the Czech Republic

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Abstract

Four new aroma hop varieties – Saaz Brilliant, Saaz Comfort, Saaz Shine and Mimosa – were registered in the Czech Republic in 2019. All of the new hop varieties have significantly higher yields than the traditional Saaz aroma variety. Saaz Comfort has the significantly highest content of alpha acids (5.59 %) whereas Mimosa has the significantly lowest content of alpha acids (1.90 %). The Saaz Comfort and Saaz Brilliant varieties show a variability of alpha acid content below 20 %. The other hop varieties, Saaz Shine and Mimosa, as well as Saaz, have a variability of alpha acid content above 25 %. Mimosa has the significantly highest content of beta acids (6.07 %). Mimosa shows the highest average cohumulone content (29.29 % rel.) whereas Saaz Comfort has the lowest cohumulone content (18.04 % rel.). Saaz Comfort and Saaz Shine have the highest average contents of hop oils (0.84 % w. and 0.75 % w., respectively). The Saaz, Saaz Shine and Saaz Brilliant varieties show the significantly highest farnesene contents (13.47 % rel., 12.50 % rel. and 12.38 % rel., respectively), which are higher than those of Saaz Comfort and Mimosa.

Key words: *hops, humulus lupulus L., yield, hop oils and resins, variability*

Chart 1 shows average contents of alpha and beta acids of the hop varieties under review compared to the standard variety Saaz. With a probability of 99%, the Saaz Comfort variety has a higher content of alpha acids (5.59 % w.) than the other varieties. In contrast, with a probability of 99%, the Mimosa variety has a significantly lower content of alpha acids (1.90 % w.). No statistical difference could be determined between the Saaz Brilliant, Saaz Shine and Saaz varieties. The Mimosa variety has a significantly higher content of beta acids compared to the Saaz Comfort variety with a 90 % probability and compared to the Saaz, Saaz Shine and Saaz Brilliant varieties with a 99% probability. The Saaz Comfort variety has a significantly higher content of beta acids than Saaz, Saaz Shine and Saaz Brilliant with a 99 % probability. Saaz has a significantly higher content of beta acids than Saaz Shine and Saaz Brilliant with a 99% probability. No statistically significant difference in the content of beta acids was determined between Saaz Shine and Saaz Briliant. Average alpha/beta ratios of Saaz Brilliant (1.39), Saaz Shine (1.23), Saaz Comfort (1.02), Saaz (0.84) and Mimosa (0.31) are significantly different with a 99% probability. A variability of the alpha acid content below 20 % was found with respect to the Saaz Comfort and Saaz Brilliant varieties. The other varieties – Saaz Shine, Mimosa and Saaz – have a variability of the content of alpha acids above 25 % (Chart 2). The variability of the content of beta acids is the lowest in Mimosa (17.76 %) and the highest in Saaz Shine (24.65 %).

Chart 3 shows that Mimosa has the highest average content of cohumolone (29.29 % rel.) and Saaz Comfort the lowest content of cohumulone (18.04 % rel.). For all of the varieties, except for Saaz Brilliant and Saaz Shine, a significant difference in cohumulone was determined compared to Saaz with a 99% probability. The lowest variability of the cohumulone content was determined in Saaz Shine (6.84 %), Mimosa (7.15 %) and Saaz (7.25 %). Only Saaz Comfort has a variability of the cohumulone content above 10 %.

The Saaz Brilliant variety has the significantly lowest content of xanthohumol compared to the other varieties (Chart 4) with a 99 % probability. Saaz has a significantly lower xanthohumol content with respect to Saaz Shine with a 99% probability and with respect to Saaz Comfort and Mimosa with a 98 % probability. No statistical significance of the difference in the xanthohumol content was determined between the Saaz Shine, Saaz Comfort and Mimosa varieties. With a probability of 99%, Saaz Comfort has the significantly highest DMX content compared to the other varieties. No significant difference in the DMX content was established between Saaz and Mimosa. However, both varieties have a significantly higher DMX content than Saaz Brilliant and Saaz Shine with a probability of 99 %. No significant difference was established between Saaz Brilliant and Saaz Shine. The xanthohumol/alpha ratio is very interesting. The ratio of xanthohumol and alpha acid content is also crucial. It states how many grams of xanthohumol are contained in 100 g of alpha acids. Breweries hop beer according to the content of alpha acids. Mimosa has the highest xanthohumol/alpha ratio, namely 19.6 (Chart 5). When 100 g of alpha acids are used per 1000 l of beer for hopping, this variety contains 12 g of xanthohumol. Almost identical xanthohumol/alpha ratios were found in Saaz Shine (10.2) and Saaz (9.2). The lowest xanthohumol/alpha ratios were determined in Saaz Comfort (6.1) and Saaz Brilliant (5.7).

Chart 6 shows that the highest average content of hop oils was determined in Saaz Comfort (0.84 % w.) and Saaz Shine (0.75 % w.). No significant difference in the content of hop oils was found between these two varieties. With a probability of 99%, Mimosa has a lower content of hop oils than Saaz Comfort. No statistical significance of the difference in hop oil content was determined for Saaz Shine. With a probability of 99%, the significantly lowest content of hop oils was determined for Saaz Brilliant (0.52 % w.) and Saaz (0.51 % w.) compared to the other varieties. There is no significant difference in the content of hop oils between Saaz Brilliant and Saaz.

The highest myrcene content (Chart 7) was found in Mimosa (30.46 % rel.). It shows a significant difference compared to Saaz Shine and Saaz Brilliant with a probability of 90% and compared to Saaz with a probability of 99%. Saaz Comfort has an average myrcene content of 28.05 % rel. However, only compared to Saaz, there is a significant difference in the myrcene content with a probability of 99%. The lowest contents were found in Saaz (22.04 % rel.), Saaz Brilliant (24.99 % rel.) and Saaz Shine (25.11 % rel.). No significant difference was determined between the varieties. The significantly highest caryophyllene content was found in Saaz Shine (10.30 % rel.), compared to Saaz, Saaz Comfort and Mimosa with a 99% probability. In contrast, the lowest caryophyllene content was determined in Mimosa (6.05 % rel.) with a probability of 99 %. There is no statistical difference in the average contents of Saaz Brilliant (9.07 % rel.), Saaz (8.40 % rel.) and Saaz Comfort (8.23 % rel.). With a 99% probability, the significantly highest average content of farnesene was found in Saaz (13.47 % rel.), Saaz Shine (12.50 % rel.) and Saaz Brilliant (12.38 % rel.), compared to Saaz Comfort and Mimosa. With a 99 % probability, Saaz Comfort has a significantly higher farnesene content (4.70 % rel.) than Mimosa (0.84 % rel.). The average content of humulene in Saaz Shine (28.81% rel.) is significantly higher compared to Saaz with a 95 % probability and compared to Saaz Brilliant, Saaz Comfort and Mimosa with a 99 % probability. There is no statistical difference in the average content of humulene between Saaz (25.00 % rel.) and Saaz Brilliant (23.98 % rel.). In Saaz Comfort the average content of humulene (16.68 % rel.) is significantly lower than that in Saaz Shine, Saaz and Saaz Brilliant with a 99 % probability. In Mimosa the average content of humulene (3.39 % rel.) is significantly lower than that in other varieties under review with a 99% probability. The average content of selinenes in Mimosa (32.98 % rel.) is significantly higher than that of the other varieties with a 99% probability. Saaz Comfort has a significantly higher content of selinenes (16.91 % rel.) than Saaz Brilliant, Saaz and Saaz Shine with a probability of 99 %. Saaz Brilliant has a significantly higher content of selinenes (4.06 % rel.) than Saaz and Saaz Shine with a 98% probability. There is no statistical difference in the average contents of selinenes in Saaz (2.34 % rel.) and Saaz Shine (2.13 % rel.).

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Chart 1: Average contents of alpha and beta acids in the new aroma varieties and the benchmark variety Saaz

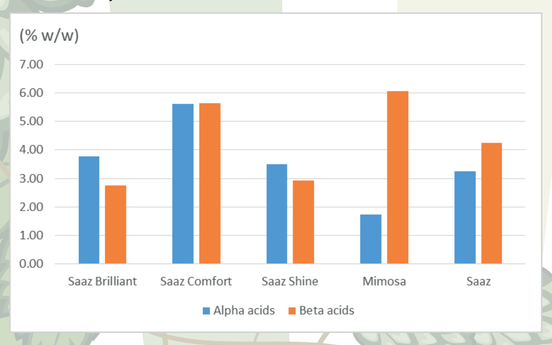

Chart 2: Average variability of the content of alpha and beta acids in the new aroma varieties and the benchmark variety Saaz

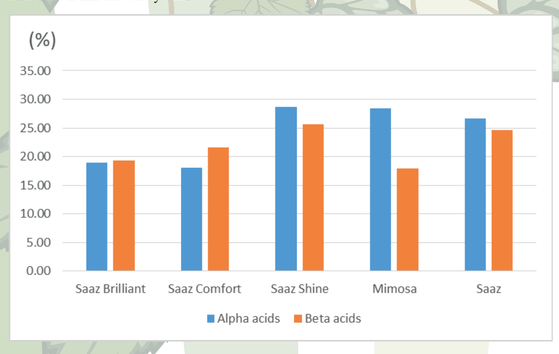

Chart 3: Average content of cohumulone and its variability in the new aroma varieties and the benchmark variety Saaz

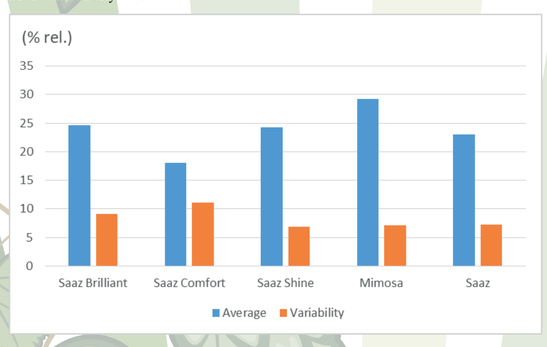

Chart 4: Average content of xanthohumol and DMX in the new aroma varieties and the benchmark variety Saaz

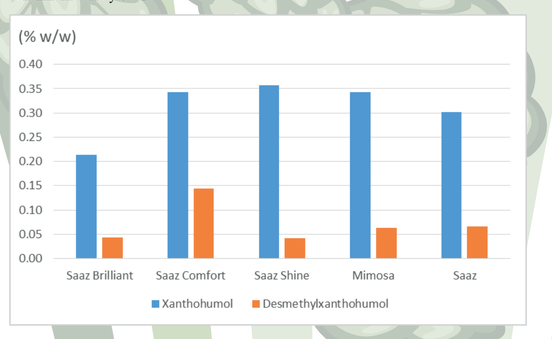

Chart 5: Average ratios of xanthohumol/alpha acids in the new aroma varieties and the benchmark variety Saaz

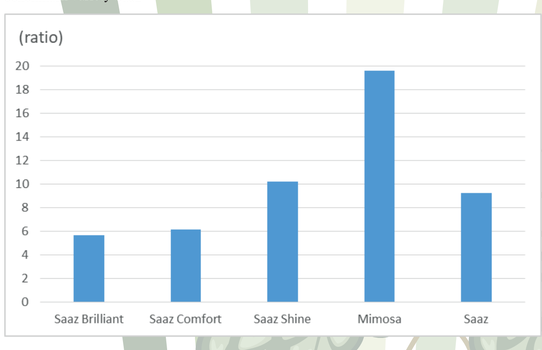

Chart 6: Average content of hop oils in the new aroma varieties and the benchmark variety Saaz

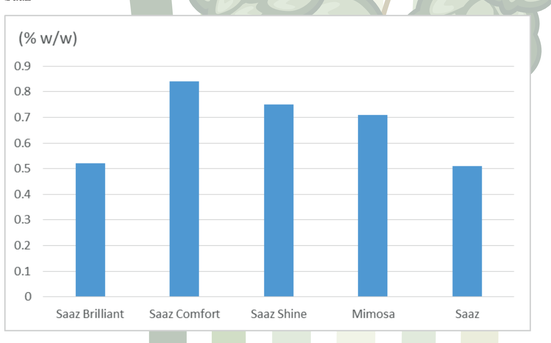

Chart 7: Composition of hop oils in the new aroma hop varieties and the benchmark variety Saaz