



HUMULUS LUPULUS

AND OTHER BITTER TRUTHS

Expect fluctuations

In Hallertau, Tettngang, Spalt and Elbe-Saale, the hop harvest has largely been completed – producing a crop of average volume. For although it was not as hot during the growing period in 2020 as in previous years, it was once again too dry. Precipitation remained below the long-term average. The rainfall in June did do the plants a lot of good, but night-time temperatures were relatively low and, in some cases, held back plant growth, particularly among the aroma varieties, meaning that these plants tend to look rather frail. The visual quality of the hop cones is satisfactory – thanks to the efforts of the growers, who succeeded in keeping pests and diseases well under control. According to status reports at the time of going to press, at the beginning of the harvest in early August, there have only been a few cases of quality impairment due to powdery mildew infestation. In the absence of any extreme weather conditions, little will have changed by the time this issue appears. As for the compositional quality of the hops, nothing can be said until analysis begins in October/November, but the present overall situation offers hope of at least average results.

However, crop fluctuations are always to be expected – in two respects. First, the alpha acid content, which determines a hop's bittering potential, varies from year to year. This is well-known – not least because it dictates the world market prices. What is less well-known, but increasingly important, is that the oil content, which serves as an indicator of a hop's aroma intensity, is never the same either. In crop year 2019, for example, the Czech variety Saaz was more than 50 per cent up year-on-year on both counts (oil content 2018: 0.51 ml/100g, 2019: **0,80 ml/100g**; alpha acid 2018: 3.3 % w/w, 2019: **5.2 % w/w**). As a result, annual fluctuations may have enormous effects on a beer's taste and aroma. Brewers can compensate for this by doing the maths: in other words, by recalculating the dosage quantities – in terms not only of bitterness addition on the hot side of the brewing process, but also of aroma addition on the hot and cold side – on the basis of the given values. The hop service providers' technical teams can provide sup-

port here. And brewers can use their sense of smell, too. Major brewers come to the Hallertau region to select specific hop batches based on both visual and sensory assessment.

As shown in a study conducted by Oregon State University in conjunction with John I. Haas, Nyseos and Asahi in 2019, an additional factor influencing the overall intensity of the hop aroma is the time of harvest. The researchers examined the influence of harvest maturity on the aroma attributes and chemical composition of Cascade hops from crop years 2014, 2015, 2016 in dry hopping. According to their findings, the intensity of the citrus aroma grows as harvest maturity increases. When used for dry hopping, Cascade hops harvested at a later stage tended to produce beers with a more intense hop aroma and pronounced citrus notes. All in all, the analytical data for the three crop years showed that the hops harvested at a later stage displayed a higher oil content, a higher geraniol concentration, a lower thiol precursor content and a higher concentration of free thiols and imparted a more intense hop aroma to the beers through dry hopping than hops harvested early.

Any brewers who now think they can get a more intense dry-hopping aroma by using more mature hops from German growers will be disappointed, however. Because the harvest window is so short and labour-intensive, German producers grow a mix of early, medium and late varieties that enable them to coordinate the utilisation of their picking and processing equipment. This means that there is simply no room for individual demands regarding time of harvest. The farmer's logistical processes simply do not allow it. In the USA, on the other hand, fluctuations due to the time of harvest are a fact of life. Both the hop farms and the acreage per variety there are huge. Citra alone, which



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has been the number-one variety since 2017, accounts for more than 15 per cent of American hop acreage. It is impossible for US producers to harvest areas of such size all at one time.

In order to offer the breweries consistent quality, hop processors compensate for maturity fluctuations within one variety by means of targeted blending – be that of cones for pelletisation, extracts or hop oils. In fact, the choice of the right hop product is a reliable means of achieving consistency of both quality and flavour (taste, aroma and mouthfeel). Reliability of this kind is offered by LUPOMAX™ hop pellets, for example, which were developed by John I. Haas in the USA. These are lupulin-enriched pellets produced from variety-typical batches that are selected using the Sensory Plus™ selection scheme and are tailored to a consistent lupulin concentration. The program comprises the application of a proprietary production process, and, next to chemical analysis, also a sensory evaluation to ensure that the hops are true-to-type from a varietal perspective. LUPOMAX™ imparts consistent, optimized flavour intensity in standardised brewing processes while at the same time introducing less vegetative matter and thus minimising beer losses.

Overall, we can await the sensory and chemical analysis of the new crop with the reassurance that thorough calculations, technical support from hop service providers and the right products will help brewers through all their ups and downs.