Hochschule Niederrhein
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Sustainable and natural product innovations –
Development of a low-alcohol craft beer with carrot peel sidestreams

INTERREG VA-Program: Project SUN – sustainable and natural sidestreams

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Introduction

The craft beer movement originated in the U.S. and developed from the desire for tastier and more diverse beers, which until then had not been fulfilled by the large U.S. breweries. This gave rise to numerous microbreweries, which also made use of other ingredients and thus went beyond the German purity law.[1] Craft beers have also been experiencing a positive trend in Germany for several years, while consumption of conventional beer has been declining. [2][3] At the same time, the demand for low to non-alcoholic beverages is increasing along with the trend towards healthier lifestyles.[4] The aim of this study is to develop a low-alcohol craft beer that is expanded to include the ingredient carrot peel as a by-product.

Material and Method

The brewing process was carried out in the 12-L Braumeister of the company Speidel. A malt blend of Pilsner malt and Caramuench Type I was taken as the basis. Carrot peels were provided by the Bauer Funken family business and replaced 50% of the malt blend used in the novel craft beer ("MS"). As a reference ("R"), a low-alcohol craft beer was brewed with 100% malt blend.

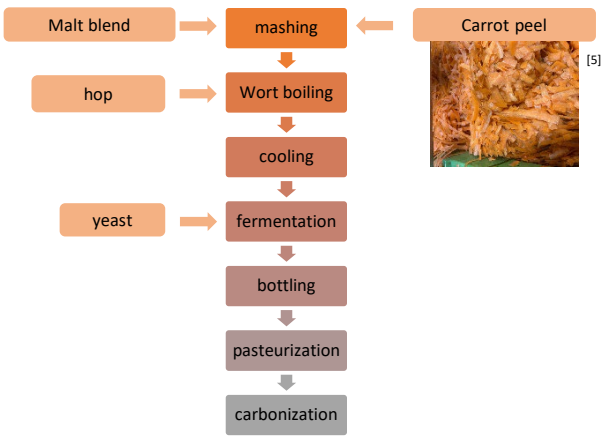

Fig. 1: manufacturing process of the carrot peel craft beer

Fermentation time was limited to < 72 h as recommended and the beverage was pasteurized to inactivate fermentation. For tasting, the beverages were carbonated shortly beforehand.

Results and discussion

Due to the maltase negativity of the yeast, only sucrose, glucose and fructose are available for fermentation. Their low content led to the desired low alcohol content (< 1 vol.%). Sensory tasting with an untrained panel of 29 showed significant differences between the two samples in the frequency of some attributes of the characteristics appearance, odor and mouthfeel. Consequently, R is clearer in appearance (Fig. 2) and more effervescent and is thus evaluated more positively, while MS appears duller and is evaluated more negatively.

Fig. 2: left: reference craft beer (uncarbonized); right: carrot peel craft beer (uncarbonized)

In mouthfeel, the intensity "tingling" is perceived more intensively in R and is thus rated more positively. In terms of odor, there are significant differences in the frequency with which the attributes "musty/earthy" and "sour" are rated (Fig. 3), which do not show any significant differences in intensity on further evaluation and have no effect on odor liking.

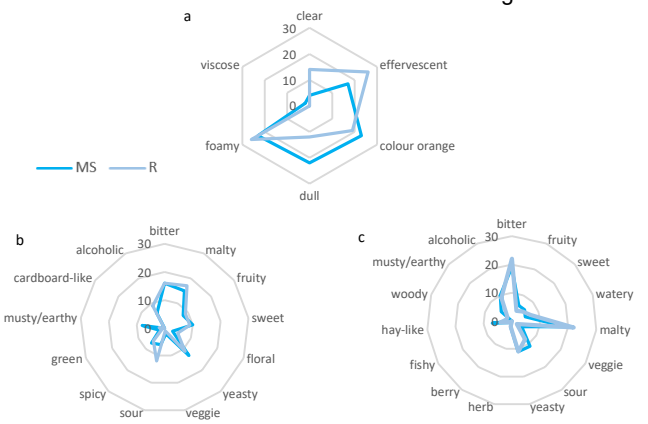

Fig. 3: Comparison between the frequency of the attributes of the characteristics appearance (a), odor (b) and taste (c)

In terms of overall liking, the dislike range is larger for MS (approx. 28%) than for R (14%). More than 60% of the panel liked the novel carrot peel craft beer (Fig. 4).

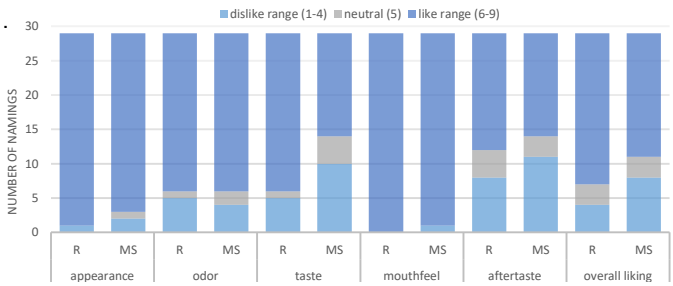

Fig. 4: Number of mentions in the dislike, neutral, and like sections of individual characteristics.

Conclusion

Substituting 50% of the malt with carrot peel results in non-significant differences from the reference craft beer, so further development or recipe changes can be guided to highlight the flavor of carrot peel.

Literature
[1] https://brauer-bund.de/biervielfalt/craftbier/
[2] https://brauer-bund.de/wp-content/uploads/2021/05/210321-European-beer-trends-2020.pdf
[3] https://de.statista.com/statistik/daten/studie/788357/umfrage/haeufigkeit-konsum-von-craft-beer/
[4] https://brauer-bund.de/pressemitteilungen/alkoholfreie-biere-in-deutschland-immer-beliebter/; [5] Aufnahme von Bauer Funken, 2020

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