Editorial

Brewing and Craft Beer

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Beer is a beverage with more than 8000 years of history, and the process of brewing has not changed much over the centuries. However, important technical advances have allowed us to produce beer in a more sophisticated and efficient way. The proliferation of specialty hop varieties has been behind the popularity of craft beers seen in the past few years around the world. Craft brewers interpret historic beer with unique styles. Craft beers are undergoing an unprecedented period of growth, and more than 150 beer styles are currently recognized. While many studies have suggested the beer value chain might be a vehicle for economic growth, few have estimated the economic impacts of craft beer to a geographical region. *Craft Beer as a Means of Economic Development: An Economic Impact Analysis of the Michigan Value Chain* is a very interesting study in this Special Issue suggesting that state governments might generate economic growth by creating a business climate that is conducive to the growth of the instate beer value chain [1].

This Special Issue, *Brewing and Craft Beer*, comprises nine different works by researchers from five continents (North America, South America, Europe, Africa, and Oceania). This Special Issue reflects thus a broad perspective on the most important questions that concern the researchers in different parts of the world. One such problem is the difficulty to cultivate barley on the African continent. Barley is a temperate cereal, and the African climate is unsuitable for its cultivation. The process of brewing lager beer with cereals other than barley is growing to be a common practice, especially in non-barley-producing countries. Mbeh Harry et al. demonstrate how sorghum can be well and efficiently utilized industrially in Cameroon for producing beer [2].

Hops are a very important component for the success of craft beer. The aroma and flavor of hops in strongly hopped and often in dry hopped beers are particularly responsible for the character of such beers. The work of da Costa Jardim et al. [3] advances the understanding and complexity of the sensory profile of different styles of craft beers from Southern Brazil. They report that the beer with the lowest bitterness had a higher preference among consumers, showing bitterness as a key factor that influences beer preference and leads to a decline in consumer preference. Also from Brazil, a comparative study of dry and wet milling of barley is presented by Pereira de Moura et al. [4]. Their results indicate the best milling conditions to obtain a good mashing yield in order to increase competitiveness of the microbreweries sector, as well as to improve product quality and to promote the reduction of production costs.

The main quality characteristics of beer are appearance, aroma, flavor, and mouthfeel. Computer vision is a non-destructive technique which has been applied in automated inspection and measurement. Lukinac et al. present an overview of the applications and the latest achievements of computer vision methods in determining the quality attributes of beer [5]. The use of machine learning algorithms, especially artificial neural networks (ANN), has become more popular in recent years, as they aid in increasing accuracy and reducing time and cost through analytical and sensory methods to assess the quality and acceptability of beverages. These models may be used as a cost-effective method for the fast-screening of beers during processing to assess the acceptability more efficiently, as reported by Gonzalez Viejo et al. [6]. The same team uses a machine learning modelling approach to study the

effect of soundwaves on foamability properties and sensory of beers [7]. They show that the use of soundwaves is a potential treatment in brewing to improve beer quality by increasing the number of small bubbles and the foamability without disrupting yeast or modifying the aroma and flavor profile.

In the brewing process, the efficiency of fermentation and the character and quality of the final product are intimately linked. Two papers are published in this Special Issue addressing the fermentation step. Firstly, Kumar et al. showed that the use of water obtained from the soaking of corn germ resulted in a shortening of the fermentation time [8]. The addition of germ water, rich in micronutrients and soluble proteins, increased the free amino nitrogen levels and Zn concentration in the wort, enhancing its economic value. Then, last but certainly not least, Silva Ferreira et al. answer the question why craft brewers should be advised to use bottle refermentation to improve late-hopped beer stability [9]. As bottle refermentation is widely used in Belgian craft beers, the aim of their work is to assess how this practice might impact their flavor.

It was with great pleasure that I carried out the coordination of this Special Issue of *Beverages* on the topic *Brewing and Craft Beer*. I firmly believe that this research field will hold a very important place in the strategy of *Beverages*. I am especially thankful to all authors who have generously shared their scientific knowledge and experience with others through their contribution to this Special Issue. I wish to extend my thanks to the Editorial Office of *Beverages*, in particular to Ms. Tina Tian.

Conflicts of Interest: The author declares no conflict of interest.

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