

A Study of Lime Beer Formulations

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Abstract

The suitable method to produce low-hopped ale with a lime flavor formulation and the optimum formulation for lime juice beer production was studied in this experimental work. The experiment was divided into three stages. In stage 1, the lime juice concentrations of 0.3, 0.6, 1, 2, and 3% (v/v) were added before and after the primary fermentation, respectively, to determine the optimum lime juice content and time of lime juice addition. In stage 2, hop additions were set to 0.12, 0.14, 0.1% 0.18 and 0.20% to determine the optimum hop addition. In stage 3, the wort boiling temperatures were set to 85-90, 90-95 and 95-100°C to determine the optimum wort boiling temperature. The alcohol content, pH, sugar content, specific gravity, color, total acidity and vitamin C content were tested for each sample and sensory evaluation was held to determine the optimum fermentation factors. Our results showed that the best lime beer in this study was produced by adding 0.3% (v/v) lime juice after primary fermentation. The optimum hop addition was 0.18% w/v and the wort boiling temperature was 95-100°C. The final product of lime juice beer had a bright pale color, with a color of 12 EBC, and it had a pleasant aroma and taste.

Keywords: Lime beer, lemon beer, fruit beer, juice beer, brewing process, beer innovation.

1. Introduction

More and more research is made to study the technology on juice beer. Recently, “Bud Light have just pushed innovation to the next level with its latest offering, a drink that combines the taste of its Bud Light Lime Beer with the classic margarita cocktail to give customers a brand new alcoholic drink” (DBN Editor 2012). Fruit beers are any beers using fruit or fruit extracts as an adjunct and/or flavoring agent in either primary or secondary fermentation, “providing obvious, yet harmonious, fruit qualities” (Protz 2004; GABF 2007). According to The Gourmet Retailer (2007), “Fruits have been used as a beer adjunct or flavoring for centuries, especially with Belgian lambic styles. Cherry, raspberry, and peach are a common addition to this style of beer.” Also, “beers with dash of fruit or spirits become a runaway success as customers seek imaginative alternatives” (Smithers 2012). However, “fruit qualities should not be overpowered by hop character”

(GABF 2007). As stated by Zhang and Zhao (2007), “It was shown that the fruit beer contained more flavors and had better constitution proportions compared with conventional beer. The content of long-chain alcohol is lower in fruit beer, while the contents of organic acids were higher, especially for citric acid. Besides, the content of sucrose was decreased in fruit beer with an increasing in the contents of fructose and glucose.”

There are many kinds of commercial fruit beer in the market. Juice beers mostly popular in the Occident market such as Henninger and Bavaria - St. Pauli mainly have pineapple taste, lemon taste, apple taste, strawberry taste, coke taste, etc. The technologies of sweet potato beer (Hare 1827), fragrant pear juice beer (Magerramov *et al.* 2007), kiwifruit and strawberry mixed fruit beer (Huang 2008) have also been reported.

Lime is a common citrus fruit in Thailand. Limes are usually smaller and contain more Vitamin C than lemons. Also (eHow Contributor 2013), “Lemons are too