

**Title:** Very High Gravity Brewing with sugarcane syrup and corn syrup as adjunct

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**ABSTRACT:**

Very High Gravity Brewing process (VHGB) is a technology that carries energetic, economic and environmental benefits and it can be defined by obtaining worts with original extract concentration above of 18 °P. In the brewing industry traditional adjuncts like corn, rice and wheat are used. Another trend is the research for use of non-traditional adjuncts such as sugarcane juice, black rice and quinoa, which is being developed at EEL - USP. The aim of this project was the use of sugarcane syrup and corn syrup as adjunct of malt in VHGB technology. To develop the project, previously it was elaborated a 2<sup>3</sup> factorial design (8 tests), where they were evaluated the proportion of adjunct (70/30 or 55/45 malt/adjunct), the adjunct type (sugarcane syrup or corn syrup) and fermentation temperature (10 or 14 °C). Were made two experiment repeat, in scale of 3L, to every one of the eight tests. The beginning of process was the elaboration of pure malt wort, with 16 °P of extract concentration, using a novel mashing process. In this stage were added papain, to increase the dilution of free amino nitrogen (FAN), and termamyl, to saccharify part of starch at 95 °C, and thus facilitate the mash separation process at these temperatures. Fermentation process were managed in fed batch regime with the addition of the syrup in pulse, with 65 °P, and was used a yeast with high efficiency of fermentation and tolerating of alcohol high concentrations, denominated as PPB-01. In worts and beers were evaluated different parameters. Was verified that there are significant differences, at the level of 5% of probabilities, regarding the fermentation time, color and pH, of the beers obtained in the different experimental conditions. However, there was no significant difference (p <0.05) between the factors of substrate conversion in alcohol. The beers were submitted to sensory analysis, obtaining good results. In every tests, the original extract concentration was above of 18 °P, complying with the regulation for denominate the process as VHGB. FAN concentration was sufficient for an adequate fermentation process and the efficiency of extract attenuation and alcohol formation were adequate, in all samples.

**Keywords:** Very High Gravity Brewing, sugarcane syrup, corn syrup, papain, termamyl

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