



ELABORATION OF DISTILLED BEVERAGE FROM BREWER'S SPENT GRAINS

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Introduction. During the last years, the industry of distillates has demonstrated large interest in producing new products from unusual raw materials that enable acquisition of different flavors, attracting new markets. Brewers' spent grains (BSG) are the most abundant solid by-products generated during the brewing process and they are practically unused (1).

Taking into account that beer is a much appreciated drink for the consumers of alcoholic beverages and that it has a successful market; it was proposed in this study to elaborate a distilled beverage from BSG as an alternative to expand the distillates market, contributing, at the same time, for the valorization of this industrial by-product.

Methods. BSG was submitted to a hydrothermal process at 121 °C during 10 or 90 min. Then, the produced liquors were supplemented with 200 g/L sucrose and 175 mg/L potassium metabisulfite to be used as fermentation medium. Fermentation assays were performed at 30 °C and 150 rpm in a 6.5-L bioreactor containing 3 L of fermentation medium inoculated with an initial cell concentration of 1 g/L. *Saccharomyces cerevisiae* (RL-11) was the yeast strain used in the experiments.

At the end of the fermentations, the cells were separated from the fermented broths, which were then submitted to a distillation process. The produced BSG distillates were submitted to chemical (determination of major and minor volatile compounds) and sensory analyses.

Results. Thirty-eight volatile compounds were identified in the BSG distillates, being 8 major and 30 minor volatile compounds. Alcohols and esters were the most abundant volatile compounds.

For the sensory analysis, an experienced panel using a total of 29 descriptors (2 for color, 19 for aroma and 8 for taste) performed the characterization of the distillates (Table 1). In terms of global value, the distillate A was less appreciated than the distillate B, with a global score of 43.64 %GM (geometric mean), while the spirit B was preferred by judges, with a score of 65.47 %GM.

The spirit A presented a more complex aroma (olfactory analysis) since six descriptors had %GM>20, while only four aroma descriptors defined the profile of the spirit B. In taste (gustatory analysis) most of the highest values of GM were found in the distillate B, but not all of them can be considered positive descriptors. For example bitter, astringent and rough had higher values in spirit B and could be negative aspects for the taste of the distillate.

Conclusions. BSG was successfully used for the production of a novel distilled beverage, which presented

a characteristic aroma from the raw material. The sensory analysis revealed that, independently of the time used for hydrothermal pretreatment of BSG, the distillate produced from this raw material had organoleptic quality acceptable for human consumption. Despite the astringent and bitter taste, due to being a "new spirit", the distillate produced from BSG revealed features of a pleasant beverage, which could be further improved by aging the distillate.

Table 1. Geometric mean (GM) attributed to each descriptor identified in the sensory analysis of the BSG distillates.

Sensory analysis	Descriptors	GM (%)	
		Distillate A	Distillate B
Visual	Clarity	72.37	78.68
	Brilliance	73.46	75.59
Olfactory	Quality	48.09	61.72
	Intensity	60.61	77.66
	Almond	31.94	0.00
	Herbaceous	53.24	0.00
	Yeast	29.74	11.66
	Chamomile	16.50	0.00
	Nuts	34.99	0.00
	Barley	20.20	0.00
	Orange peel	9.52	0.00
	Dry grass	16.50	17.82
	Aniseed	20.20	0.00
	Lactic	20.20	0.00
	Apple	9.52	9.52
	Cabbage	0.00	10.65
	Mushroom	0.00	35.95
Coffee	0.00	19.05	
Metalic	0.00	8.25	
Tropical	0.00	10.65	
Dry fruit	0.00	23.33	
Gustatory	Quality	61.72	59.09
	Intensity	67.85	76.64
	Sweet	61.72	56.34
	Salt	56.34	74.54
	Acid	49.49	69.01
	Bitter	65.47	66.67
	Astringent	57.14	69.01
	Rough	39.84	67.85
Global value		43.64	65.47

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Reference

1. Mussatto SI, Dragone G, Roberto IC. (2006). *J. Cereal Sci.* 43:1-14.