



TECHNICAL CHANGES OF SOTOL PRODUCTION

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Introduction. The Sotol is a liquor which is obtained from a plant that is known with the same name, its scientific name is *Dasyliirion spp.*, and is similar to the maguey, but now has been separated from the Agaváceas for inclusion in the family of Nolinaceas. The drink is produced in the semi desert of Mexico, in the states of Chihuahua, Durango and Coahuila, which has an Origin Designation. Production is usually done on a small scale, mainly based on the experience, and rarely some advances from biotechnology had been incorporated. Production process may be was took of from the mezcal technology, with some modifications by the characteristics of the raw material. The process involves cutting the leaf to remove their stems ("piñas"), that are transported to the "vinata", where they are sewn in stone ovens for 3 to 5 days until the hydrolysis of polysaccharides (fructans) occurs. Then the "piñas" are "carbed" and placed in tanks, where water is added (twice its weight) and fermented spontaneously for subsequent distillation to obtain a liquor with 50% alcohol. The aim of this study was to present a proposal to produce Sotol according to the criteria of modern biotechnology.

Methodology. "Cedars of Zacatecas" was chosen as a model for studying the process of craft production from the "vinata". Sotol plant samples were taken in situ, the raw "piñas" were crushed and then cooked and juice was transferred to fermentation tubs to determine the composition of reducing and total sugars. The biochemical identification of yeasts was performed using automated equipment (AutoScan Microscan, Dade Behring 4). Of all the microorganisms that were found *in situ* in the plants and during the spontaneous fermentation, only native Sotol yeasts were evaluated to determine their ability to produce alcohol. A completely randomized 3x3 experimental design was used to determine the best conditions of an alcoholic fermentation with yeast. The design variables were temperature, with 3 levels: 20, 25 and 30 °C, and concentration of sugars, with 3 levels: 12, 16 and 20 °Bx. Experiments were sampled every 12 hours.

Technological changes were tested to improve the cooking stool "piñas" in an autoclave; the extraction of juice from cooked "piñas" was carried out in a helical mill and roller; and enzyme additions to increase sugar content in the cocked "piñas".

Results and discussion. The results of the present study permit to propose the following technological changes, that will facilitate Sotol production and will improve their quality: a project to allow the planting of sotol (seed or tissue culture); the design of rural factories; the use of windmills to tear the "piñas"; cooking in autoclaves; enzymatic treatment to enhance conversion inulinases to fermentable sugars (fructose and glucose); increase consumption of fructose for yeast or transforming the fructose to glucose; the mechanical extraction juice; the improvement in inocula development with native yeasts stool; and the optimization of the distillation process to enable proper heads and tails of it. We propose that applying these technological changes will allow to bring a spirit of a better quality, more consistent and ultimately with greater market acceptance.

Conclusions. It is possible to transform a traditional process of Sotol production in a modern biotechnology company making changes along the production chain to ensure the delivery of a quality brandy.

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