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Research note: Yeast flora of Haitian rum distilleries

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Introduction

In the French West-Indies the adoption of the seeding practice with baker's yeast has results in a preponderance of *Saccharomyces cerevisiae* over *Schizosaccharomyces* which was dominant in the media of rum manufacture at the turn of the century. Indeed, few modifications have been carried out on the practice in the small distilleries of Haiti over several centuries. We have now however entered upon a taxonomic study of the 'spontaneous' *Schizosaccharomyces* flora of Haitian distilleries.

Materials and methods

Yeasts, isolated from unseeded media in Haitian rum manufacture, were maintained at 4°C in the collection of the Laboratoire de Technologie INRA, Guadeloupe. The isolations were performed on Wickerham yeast nitrogen base with added sucrose. The strains were identified according to Kreger van Rij (1984).

Results and discussion

Yeast reproducing by fission are dominant in the flora of fermentation media in Haitian distilleries. They were abundant in all fermentations of producing 'grand arôme' rum in Jamaica (Allan 1906). The preponderance of *Schizosaccharomyces* strains in rum distilleries has been reported by Greg (1895), Ashby (1909) and Kayser (1916). Now in the French West-Indies, *Schizosaccharomyces* strains can still be found in a plant making 'grand arôme' rum. Soils of cane-sugar plantations and around distilleries contained *Saccharomyces* as well as *Schizosaccharomyces*. The natural seeding of the fermentation media thus brings together the two genera of yeast. It appears that the medium composition determines the proliferation in the distilleries tanks of either *Saccharomyces* or *Schizosaccharomyces*.

Generally, *Schizosaccharomyces* spp. are osmotolerant like almost all the haploid

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yeast species (Tilbury 1980). They proliferate in traditional molasses fermentation media. Molasse is a raw material richer than cane juice in ash (7 to 15% of the dry matter) and in organic acids metabolized by yeast. *Schizosaccharomyces* spp. are quite active in high sugar concentrations (50% w/w glucose) (Tilbury 1980) and also at low pH values (2.5) (Yang 1973).

In some traditional fermentations, slops (still residue) are added to raw materials during wash preparation. These slops are acidic (100 mEq/litre), rich in dry matter (40 g/litre) and ash (4 g/litre). They increase the osmotic pressure of the medium, favouring *Schizosaccharomyces* and spore-forming bacteria: *Clostridium* spp. and *Bacillus* spp. These bacteria proliferate along with slow growing yeast; consequently there is an abundant formation of fatty acids ('grand arôme' rum). The fermentation time is 7 to 12 days; with *Saccharomyces* strains, fermentations of 24 to 72 hours has been reported.

In Haitian small distilleries fermentation liquors are made up with cane juice or syrup (obtained by evaporating water from cane juice) and slops for dilution of the raw material.

Sixty samples of fermented unseeded media were examined. *Schizosaccharomyces* strains were active in all cases. A few cells of other yeasts were observed in some samples, which grew well only on the isolation medium.

Of 60 *Schizosaccharomyces* strains isolated and studied, all were *Schizosaccharomyces pombe* except, one strain of *Schizosaccharomyces japonicus* and four strains of *Schizosaccharomyces malidevorans*.

In the French West-Indies, fermentations are now performed mainly with fresh cane juice without slops addition. This juice has a low content of ash (3% of dry matter), a relatively high pH (5.5), a low acidity (8 to 25 mEq of total acidity per litre). These new conditions are favourable to *Saccharomyces* strains, so faster fermentations occur.

Schizosaccharomyces strains in pure culture produced few secondary products of alcoholic fermentation (Peynaud & Sudraud 1964; Haraldson & Rosen 1984; Fahrasmane *et al.* 1986). This last feature and the osmotolerance are interesting for light rum production (distillate with low non-alcohol content) for which there is a great demand. These two characteristics of the yeast cannot be used without risk of bacterial contamination (Parfait & Jouret 1980) if the medium is not protected.

Unseeded fermentation media of Haitian small distilleries are favourable habitats for *Schizosaccharomyces* yeasts. Their utilization in alcoholic fermentation in concentrated substrates (Haraldson & Björling 1981) is full of promise.

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Summary

In Haitian rum distilleries, fermentation conditions for some time. *Schizosaccharomyces* yeasts were observed in such distilleries. In the distilleries, the presence of *Saccharomyces* yeasts. *Schizosaccharomyces* yeasts are used in rum which is in great demand.

Résumé

Flore levurienne des distilleries de rhum. Il y a déjà un certain temps que le travail dans les distilleries Haïtiennes de rhum. Une levure qui existe dans ces distilleries est la *Schizosaccharomyces*. La prédominance des levures *Saccharomyces* est observée dans la production de rhum de variété claire.

Resumen

Levaduras de las destilerías de ron de Haití. En las destilerías de ron de Haití, se ha observado una levadura que existe desde hace tiempo. En las destilerías, se observa la predominancia del género *Saccharomyces* en la producción de ron claro para exportación.

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Summary

In Haitian rum distilleries, few modifications have been carried out on the working conditions for some time. *Schizosaccharomyces* is the main yeast genus which exists in such distilleries. In the distilleries of the French West-Indies, there is a predominance of *Saccharomyces* yeasts. *Schizosaccharomyces* strains allow the production of a light rum which is in great demand.

Résumé

Flore levurienne des distilleries Haïtiennes de rhum

Il y a déjà un certain temps que l'on n'effectue que peu de modifications aux conditions de travail dans les distilleries Haïtiennes de rhum. *Schizosaccharomyces* est le genre principal de levure qui existe dans ces distilleries. Dans les distilleries des Antilles françaises, il y a prédominance des levures *Saccharomyces*. Les souches de *Schizosaccharomyces* permettent la production de rhum de variété 'light' qui est fort demandé.

Resumen

Levaduras de las destilerías de ron de Haití

En las destilerías de ron de Haití los métodos de producción se han mantenido prácticamente invariables desde hace tiempo. El género de levaduras más abundante en dichas destilerías es *Schizosaccharomyces*. En las destilerías de la Guayana francesa las levaduras predominantes son del género *Saccharomyces*. Las cepas de *Schizosaccharomyces* son las que permiten la producción de ron claro para el que existe una gran demanda.