GENETIC CHARACTERIZATION OF COMMERCIAL SACCHAROMYCES CEREVISIAE ISOLATES RECOVERED FROM VINEYARD ENVIRONMENTS USING COMPARATIVE GENOME HYBRIDIZATION ON ARRAY (aCGH)

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Introduction

S. cerevisiae is one of the most important yeasts of the human ecosystem. Its use in the production of alcoholic beverages started, in most cases, centuries ago, and it is widespread in the environment. In this study, we have analyzed the genetic characteristics of 8 wine strains, after their isolation from various wine environments, and compared them with the strains used in the alcoholic fermentation industry, namely Saccharomyces cerevisiae "mother" strains, in order to evaluate their potential as wine starters. Our results have shown that these strains have undergone numerous genetic changes over time, and that they can be considered natural wine yeast strains.

Materials and Methods

The strains used in this study were isolated from different wine environments: 16 wine strains from wineries located close to vines where the strain has been used for winemaking in consecutive years, and 222 wine strains from vineyards. The strains were characterized using comparative genome hybridization on array (aCGH) to evaluate their potential as wine starters. The results showed that these strains have undergone numerous genetic changes over time, and that they can be considered natural wine yeast strains.

Results

1. Clustering of aCGH profiles

2. Gene copy number alterations – SAM analysis

3. Phenotypic characterization

Phenotypic tests

Phenotypic differences between strains

Conclusions

The commercial “mother” strain was able to grow at 18 °C, but evidenced some growth in the presence of CuSO₄, InBm and SOD-K₁₄₃. Variable growth patterns were found for NaOCl 1.5 M, KNO₃ (100 mg/l), wine + glucose 0.5% and wine + glucose 1%.

Phenotypic differences between the strains were observed for 17 of 20 tests.

Some phenotypic traits distinguish specific strains from the “mother” strain, suggesting that these strains could be used as alternative wine starters.

References


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