Creating 'Designer' Yeast Hybrids for Brewing and More

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WARF: P160107US03

Inventors: Christopher Hittinger, David Peris Navarro, William Alexander

The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a new method for synthesizing tetraploid (or higher ploidy) yeast strains for beverage production and potentially other commercial fermentation processes.

The simple and efficient new method called HyPr (Hybrid Production) has been used to create novel lager, Belgian ale and cider *Saccharomyces* strains.

Overview

Interspecies yeast hybrids are critical for producing commercially important fermentation products such as Belgian ale, certain ciders and cold-fermented wines. As one major example, lager beer, the most common fermented beverage in the world, is produced using *S. cerevisiae x S. eubayanus* hybrids.

Given the importance of interspecies yeast hybrids in industry, there is interest in developing new synthetic hybrids that may possess novel properties and enable strain improvement. However, current methods are cumbersome and/or require genomic modification. Some strategies yield strains with persistent drug markers, raising concerns about safety that would need to be addressed prior to introducing them into the food and beverage industry.

Needed is a 'scarless' new method for creating synthetic yeast strains for commercial fermentations.

The Invention

UW–Madison researchers have developed HyPr, a simple and efficient method for generating synthetic *Saccharomyces* hybrids without sporulation or modification of the nuclear genome.

Specifically, using the new method, induction of HO endonuclease expression by a promoter in two diploid cultures, followed by co-culture and subsequent double-drug selection, will produce hybrids at a rate approaching 1 out of 1,000 cells plated. Plasmids can then be easily cured or spontaneously lost to produce strains without genome modifications.

The resulting strains can be rapidly screened for plasmid loss, opening an efficient route towards meeting the Generally Recognized as Safe (GRAS) standards of the U.S. Department of Agriculture and FDA.

Applications

- Creation of novel synthetic yeast hybrids for beverage and biofuel production
- Basic and applied research tool

Key Benefits

- New method is simple, more robust and efficient than known techniques.
- Broadly applicable to strains of industrial interest
- Plasmids used to facilitate the process are easily lost and the hybrid genome remains unmodified.

Stage of Development

HyPr has been used to efficiently produce allotetraploid and autotetraploid strains of *Saccharomyces*, as well as new *Saccharomyces* strains with more than four sets of chromosomes.

S. cerevisiae x S. eubayanus, *S. cerevisiae x S. kudriavzevii* and *S. cerevisiae x S. uvarum* designer hybrids were created as synthetic lager, Belgian and cider strains respectively. The ploidy and hybrid nature of the strains were confirmed using flow cytometry and PCR-RFLP analysis.

Additional Information

For More Information About the Inventors

- Christopher Hittinger

Related Technologies

- See WARF reference number P140088US01 for information about recently discovered Wisconsin-sourced lager yeast.
- See WARF reference number P150032US01 for information about wild strains of yeast recently isolated from the Chicago area, potentially of interest to the craft brewing industry.

Tech Fields

- Animals, Agriculture & Food : Food ingredients & additives
- Animals, Agriculture & Food : Food processing
- Animals, Agriculture & Food : Food safety & quality
- Research Tools : Microbial technologies

For current licensing status, please contact Jennifer Gottwald at jennifer@warf.org or 608-960-9854