

Enzymatic diversity among pectinolytic activities in yeast

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It has been reported that certain yeast species display pectinolytic activities, which mainly result from the activity of polygalacturonases.

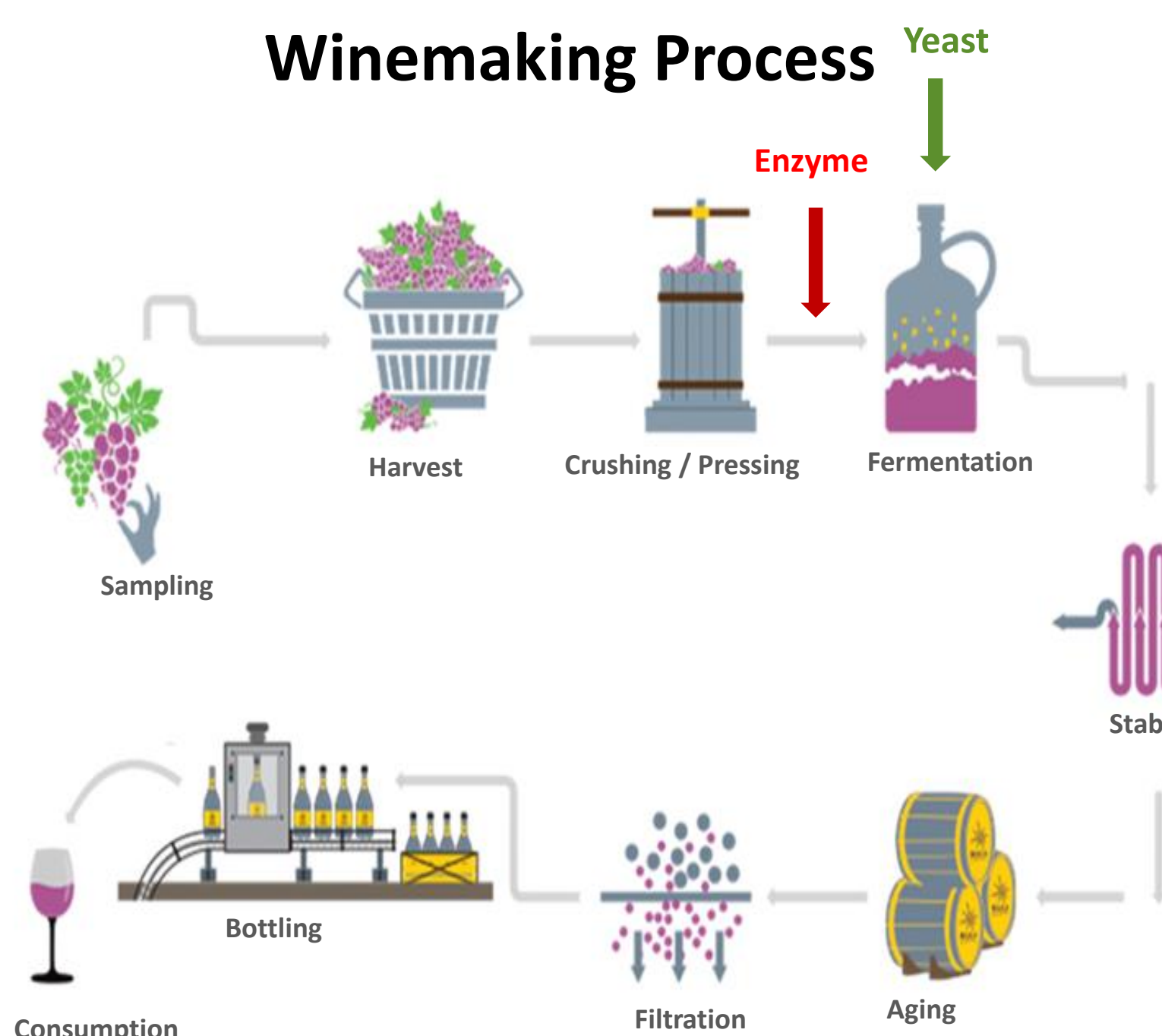
These yeasts have reported positive effects on taste complexity and organoleptic richness in winemaking and cocoa production.

Nevertheless, a detailed understanding of how pectinolytic yeasts contribute to wine and cocoa quality needs further scientific work.

In this work, strains from different wine-associated yeast species will be screened for their native polygalacturonase activities.

Background

Winemaking Process



Yeast in winemaking

❖ Conventional yeast (*S. cerevisiae*)

- Complete fermentation of must sugars to ethanol due to high ethanol tolerance and low pH (3.0-4.0 pH)

❖ Non-conventional yeast (*Non-S. cerevisiae*)

- Produce broad range of secondary metabolites
- Secretion of extracellular enzymes

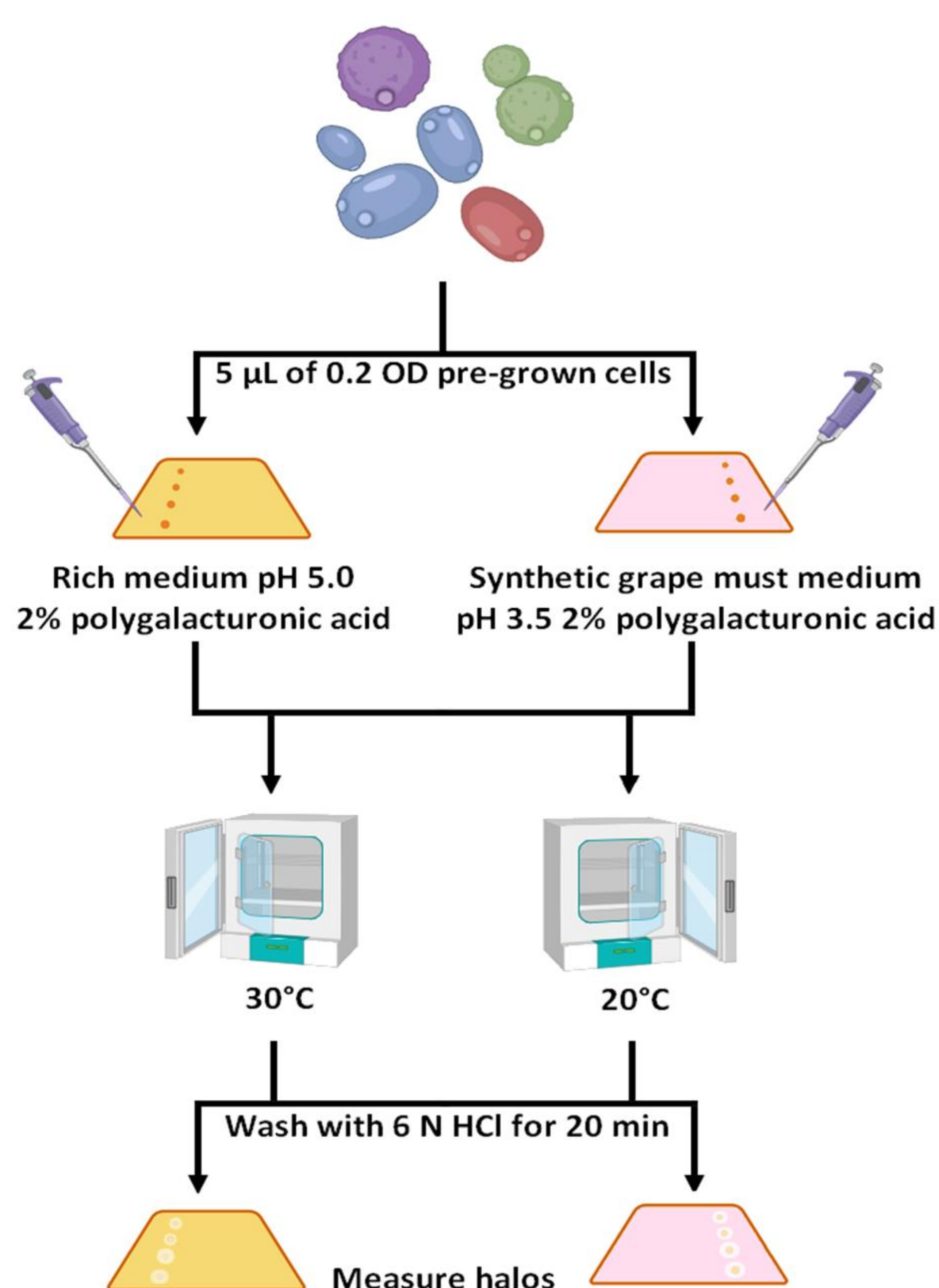
Pectinolytic enzymes in winemaking



- Increase juice yield
- Increase concentration & variety of flavor compounds
- Greater colour stability
- Easy filterability
- Speeds up settling
- Shortens filtration time and stabilization processes
- Color and flavor extraction

Aim: Screen pectinolytic yeasts for improving clarification and organoleptic properties in winemaking

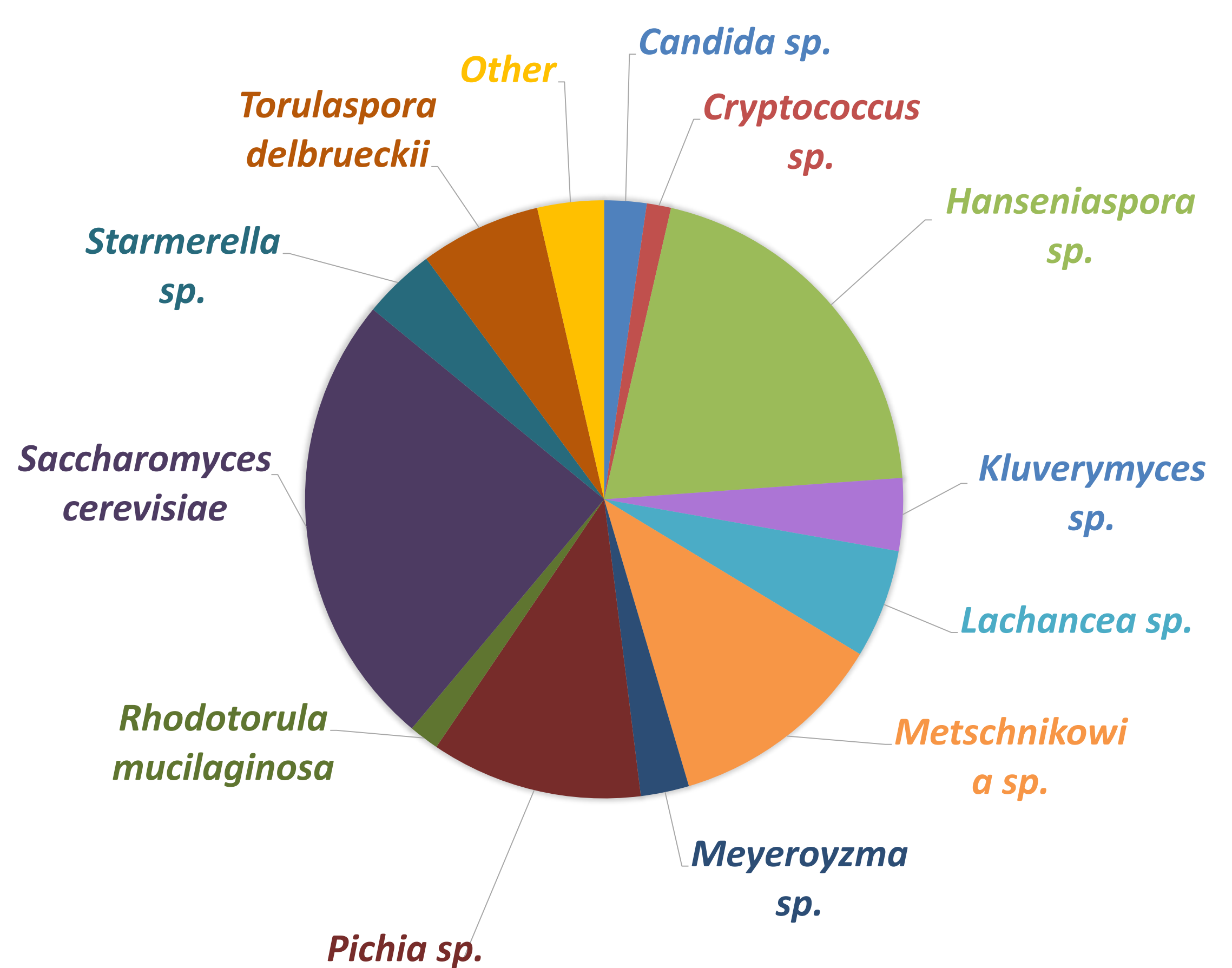
Method



Results

In total, **306** yeast strains from **17** different yeast species have been screened for polygalacturonase activity.

YEAST SPECIES STUDIED



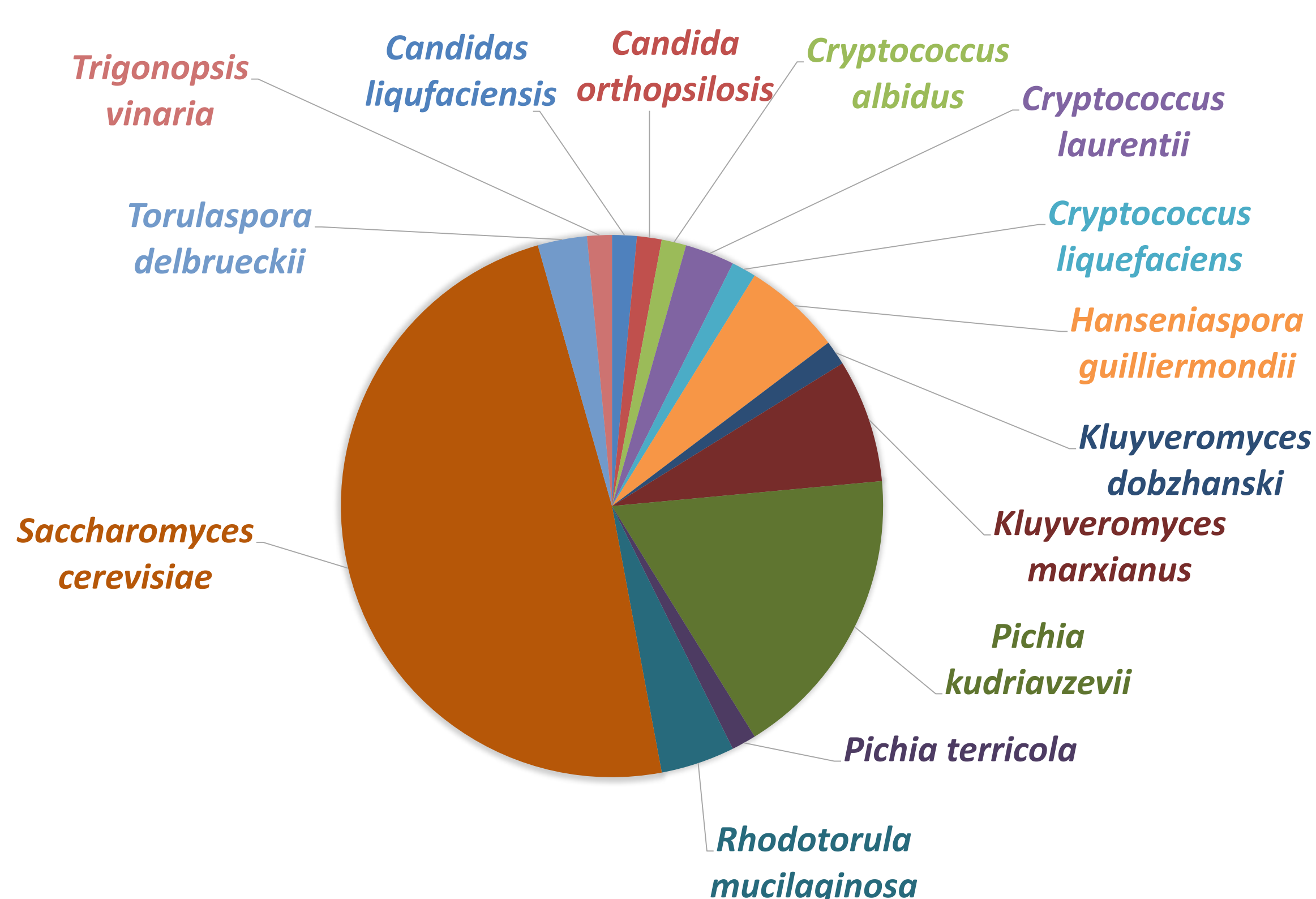
Yeast strains kindly provided by

- Jacobs University – AG Nevoigt Yeast Collection, Bremen, Germany
- Yeast Collection Sciences pour l'Oenologie, SupAgro, INRA, Montpellier, France
- Lallemant Inc., Ontario, Canada

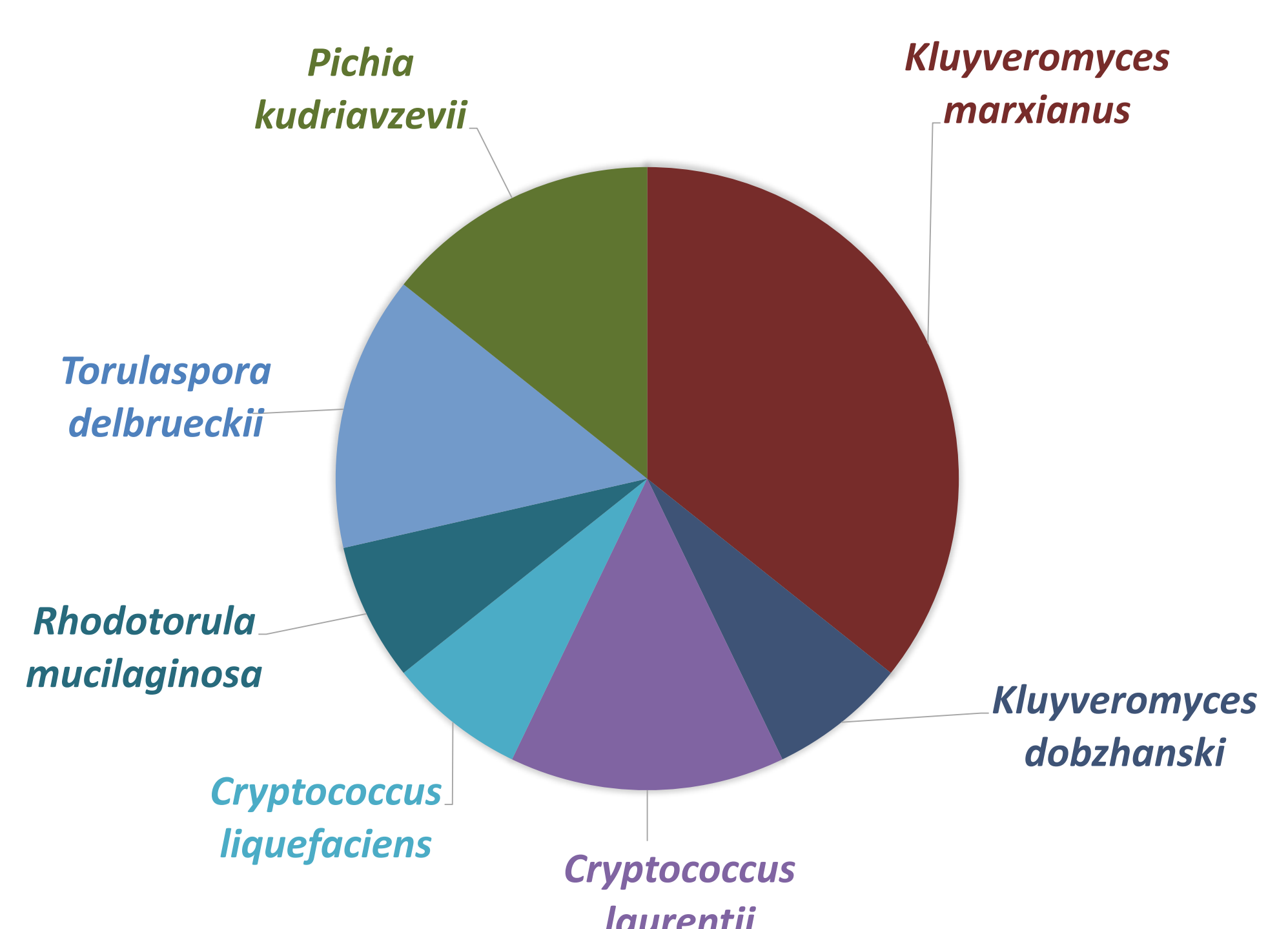
68 of the **306** yeast strains showed polygalacturonase activity in Rich Medium pH 5.0 at 30°C

14 of the **68** yeast strains also showed polygalacturonase activity in Synthetic Grape Must Medium pH 3.5 at 20°C

ALL PG POSITIVE YEAST STRAINS



PG POSITIVE YEASTS ON WINE-MIMICKING MEDIUM



Conclusions and Future Perspectives

- Yeast strains from different species were studied for phenotypic diversity in polygalacturonase enzyme secretion under optimum and winemaking conditions.
- The 14 strains that are PG-positive under winemaking conditions will be characterized for the quantification of their PG activity, their aroma contributions and their impact on winemaking processing such as filtration time, clarity and color for future studies.
- To understand the genetic basis of the enzymatic and metabolic information acquired so far, the genomic DNA of superior strains will be subjected to whole-genome sequencing (WGS), and bioinformatics analysis will be conducted to search also for other potential CAZymes.

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