Enzymatic diversity among pectinolytic activities in yeast
Mehmet Gazaloğlu, Carole Camarasa, Sylvie Dequin, Elke Nevoigt

To cite this version:
Mehmet Gazaloğlu, Carole Camarasa, Sylvie Dequin, Elke Nevoigt. Enzymatic diversity among pectinolytic activities in yeast. 7. conference on yeast and filamentous fungi, Jun 2019, Milan, Italy. hal-02959424

HAL Id: hal-02959424
https://hal.inrae.fr/hal-02959424
Submitted on 6 Oct 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L’archive ouverte pluridisciplinaire HAL, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d’enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.
Enzymatic diversity among pectinolytic activities in yeast

Mehtem Gazalagolu, Carole Camasara, Sylvie Dequin, and Elke Nevoigt

1 Department of Life Sciences and Chemistry, Jacobs University Bremen, Campus Ring 1, 28759, Bremen, Germany
2 Sciences pour l’Oenologie, INRA, Montpellier SupAgro, 2 Place Pierre Viala, 34090, Montpellier, France

It has been reported that certain yeast species display pectinolytic activities, mainly resulting 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

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

5 µl of 0.2 OD pre-grown cells

Rich medium pH 5.0 2% polygalacturonase acid

Synthetic grape must medium pH 6.5-2% polygalacturonase acid

30°C

Wash with 6 M HCl for 20 min

Measure halo

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

Results

YEAST SPECIES STUDIED

- Candida sp.
- Cryptococcus sp.
- Hanseniaspora sp.
- Kluyveromyces sp.
- Pichia sp.

Yeast strains kindly provided by:
- Jacobs University – AG Nevoigt Yeast Collection, Bremen, Germany
- Yeast Collection Sciences pour l’Oenologie, SupAgro, INRA, Montpellier, France
- Lallemand Inc., Ontario, Canada

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 CAXTines.

Acknowledgements

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 704527

Enzymatic diversity among pectinolytic activities in yeast

Mehtem Gazalagolu, Carole Camasara, Sylvie Dequin, and Elke Nevoigt

1 Department of Life Sciences and Chemistry, Jacobs University Bremen, Campus Ring 1, 28759, Bremen, Germany
2 Sciences pour l’Oenologie, INRA, Montpellier SupAgro, 2 Place Pierre Viala, 34090, Montpellier, France

It has been reported that certain yeast species display pectinolytic activities, mainly resulting 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

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

5 µl of 0.2 OD pre-grown cells

Rich medium pH 5.0 2% polygalacturonase acid

Synthetic grape must medium pH 6.5-2% polygalacturonase acid

30°C

Wash with 6 M HCl for 20 min

Measure halo

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

Results

YEAST SPECIES STUDIED

- Candida sp.
- Cryptococcus sp.
- Hanseniaspora sp.
- Kluyveromyces sp.
- Pichia sp.

Yeast strains kindly provided by:
- Jacobs University – AG Nevoigt Yeast Collection, Bremen, Germany
- Yeast Collection Sciences pour l’Oenologie, SupAgro, INRA, Montpellier, France
- Lallemand Inc., Ontario, Canada

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 CAXTines.

Acknowledgements

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 704527