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Non-*Saccharomyces* yeast nitrogen consumption and metabolite production during wine fermentation

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Context: toward the diversification of enological yeasts

- Wide diversity of yeast species at the beginning of the fermentation
  → But domination of *S. cerevisiae* at the end of FA

- Use of active dry yeasts to control the process
- Some of the non-*Saccharomyces* yeasts have interesting properties

- Association of a non-*Saccharomyces* strain with *S. cerevisiae*:
  
  **Non-Saccharomyces**
  - Aroma production
  - Do not complete the fermentation

  **S. cerevisiae**
  - Fermentation completion

  Interactions: nutrients competition

- Contribution of *M. pulcherrima* Flavia® for the production of aromas?
- Assessment of nutrient requirements to ensure alcoholic fermentation?
M. pulcherrima Flavia® in sequential inoculation with S. cerevisiae Lalvin QA23®

- Experimental conditions:
  
  In SM with thiol precursors

  **Fermentation progress**

  T=0h : inoculation of M. pulcherrima Flavia®
  T=48h : inoculation of S. cerevisiae Lalvin QA23®

- Results: fermentative aroma compounds

  

  - Characteristic profile of fermentative aromas production, with increased production of acetate esters derived from branched higher alcohols ➔ diversification of aroma profile of wines
**M. pulcherrima Flavia®** in sequential inoculation with *S. cerevisiae* Lalvin QA23®

- Results: thiols

- Strong increase in the production of thiols in seq. inoculation with *M. pulcherrima* Flavia®
- Phenotypic diversity of non-Saccharomyces yeasts for the production of aromas to be exploited

- Management of nitrogen important in sequential inoculation for the alcoholic fermentation process. Co-cultures result in interactions between the yeasts with effect on the quality of the final product, on the production of positive aromas.

Nitrogen sources prematurely consumed

- Limitation for the S. cerevisiae development?

28% of yeast assimilable nitrogen consumed by M. pulcherrima in 48h: mainly Glu, Gln and amino acids branched.

Lower implantation of S. c in sequential inoculation.
Thank you for your attention

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Michel Brulfert
**M. pulcherrima Flavia®**: A high ability to secrete hydrolytic enzymes

- Release of hydrolytic enzymes into the must, such as β-lyase which involved in the cleavage of thiol precursors

![Diagram showing β-lyase and thiol precursors](image)

- **Thiol precursors**: 
  - NH₄, amino acids, or peptides

- **β-lyase**
- **Thiol**

![Graph showing β-lyase activity](image)

- **S. cerevisiae (control)**
- **Sequential inoculation (M.p et S.c)**

- Diversification of aroma profile
Impact of must characteristics on *M. pulcherrima* Flavia® performances

**Thiols**

- 3MH and 4MMP: same shape = same liberation pathway
- 3MHA: different shape, close to acetate esters = similar production pathway

- Quadratic effect of nitrogen on the release of 3MH and 4MMP
- Positive effect of nitrogen on the production of 3MHA

*3MHA production using similar mechanisms than the other acetate esters*