







THE UNIMORE MICROBIAL CULTURE COLLECTION: FROM STRAINS STORAGE TO INDUSTRIAL STARTER CULTURES DESIGN

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UNIMORE Location





- University of Modena and Reggio Emilia UMCC (www.umcc.bio-aware.com)
- University of Turin TUCC
- University of Perugia DBVPG
- University Hospital San Martino Genoa- USMI
- National Research Council CNR

- A starter culture is a microbial culture added to the raw material to start and guide the fermentation process.
- The application of starter cultures to the fermentation processes lets to exploit specific characteristics of the strains, allowing the diversification of the final products for the consumer market.
- The selection of suitable starter cultures always starts from the isolation and characterization of a large number of strains from the original matrix (clonal selection).

UMCC holds about 2900 strains, including Yeasts, Acetic Acid Bacteria (AAB) and Lactic Acid Bacteria (LAB) isolated from food and beverages.

These strains are exploited for fermentation process and other biotechnological application.

Provides critical insights into yeasts and bacteria physiology and metabolism

Integrates sequence data with transcriptional and functional studies

UMCC performs design, technological screening and development of selected strains with desired features

Builds up appropriate starters for different industrial needs

Selected starter cultures



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ECCO 2019 – Turin, 12-14 June

Yeast starter cultures for winemaking

UMCC holds more then 1.000 strains with oenological features



- isolated from fermented must or wine of different regions
- characterized with polyphasic approaches
- screened for specific traits
- improved by non-GM techniques such as breeding or adaptive evolution

THE UNIMORE MICROBIAL CULTURE COLLECTION: FROM STRAINS STORAGE TO INDUSTRIAL STARTER CULTURES DESIGN ECCO 2019 –Turin, 12-14 June Adaptive evolution strategies are particularly valuable to improve strains used in food and beverage technologies, where the application of genetically modified organisms (GMO) is prohibited or limited by legal restrictions.

Since they have not undergone artificial genomic modifications, the use of yeast strains obtained by adaptive evolution approaches has a high degree of acceptance by the consumers, even in winemaking.

Yeasts with low production of sulfites and hydrogen sulfide or enhanced GSH production

These phenotypes are attractive for the winemaking field, as they reduce allergenic risks and off-flavour compounds as well as limit must and wine oxidation, respectively.



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NOTE TO THE EDITOR

Evolution-based strategy to generate non-genetically modified organisms *Saccharomyces cerevisiae* strains impaired in sulfate assimilation pathway

L. De Vero, L. Solieri and P. Giudici

Department of Agricultural and Food Sciences (DipSAA), University of Modena and Reggio Emilia, Reggio Emilia, Italy

Letters in Applied Microbiology (2011), 53: 572–575

Adaptive evolution strategies from the wild type strain to the selected evolved strain



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De Vero et al. 2017. AIMS Microbiology, 3(2): 155-170.

Heavy metal tolerance in yeast as indirect selectable phenotype



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De Vero et al. 2017. AIMS Microbiology, 3(2): 155-170.

GSH content in wine



FEMS Yeast Res 14 (2014) 977-987.



RESEARCH ARTICLE

Evolved Saccharomyces cerevisiae wine strains with enhanced glutathione production obtained by an evolution-based strategy

Francesco Mezzetti, Luciana De Vero & Paolo Giudici

Department of Life Sciences, University of Moderna and Reggio Emilia, Reggio Emilia, taly



Appl Microbiol Biotechnol. 2018 Mar;102(5):2269-2278. doi: 10.1007/s00253-018-8773-3. Epub 2018 Jan 22.

A multi-phase approach to select new wine yeast strains with enhanced fermentative fitness and glutathione production.

Bonciani T¹, De Vero L², Mezzetti F¹, Fay JC³, Giudici P¹.

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UMCC wine strains on the market



Fermol[®] Elegance

(S. cerevisiae)

Packaging: 500 g vacuum pack

FERMOL ELEGANCE is a strain selected with a strategy that killed the cells that are assimilating sulphur. It is in-fact indicated in all those situations where production of H2S is promoted by a natural presence of sulphur in the must. Fermol Elegance is a strain obtained by natural hybridization. It stands out for the excellent fermentation kinetics and for the broad spectrum of aromatics that is able to highlight. It has a positive action toward the release of glycosylated terpenes and increases the synthesis of ß-phenylethyl.



Glutaferm® One (S. cerevisiae)

Packaging: 500 g vacuum pack

Yeast selected in function of the high glutathione production. Glutathione is a strong natural antioxidant and is used also in human diet to protect from free radicals. Yeast produce it naturally to protect themselves from oxidizing activities that can affect their organs. Wines higher in glutathione like the one fermented with Glutaferm One have a longer shelf life and require less SO2. It has high ethanol tolerance, and low YAN requirements. Indicated for reds, whites and roses.

AAB in UMCC



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AAB starter cultures



UMCC AAB strains are exploited for food and no food applications:

- production of different kind of vinegars,

- production of functional acetic beverages,
- production of bacterial cellulose.

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Vinegars

Paolo Giudici*, Luciana De Vero, Maria Gullo

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Cross

Salvatore La China · Gabriele Zanichelli · Luciana De Vero · Maria Gullo 🗈

- ✓ Within Europe, Italy is the leading market for vinegar as well as its major exporter.
- ✓ Italy also exports twice the quantity of vinegar when compared to Germany, Spain and France.
- ✓ In particular the "Aceto Balsamico di Modena" is the leader for exports, with 80% of it being sold across 120 different countries.





The development of AAB starter cultures requires selective screening according to the characteristics of the raw material and the final use:

- small-scale production of artisanal foods,
- industrial scale production.









Methods of AAB starter cultures production















SUBMERGED METHOD

STATIC METHOD

- In the last century, the consumption of fermented products has greatly increased, boosted by the growing demand of the global market.
- The design of new commercial starter cultures is extremely important for maximizing product quality and safety.
- Microbial Culture Collections specialises in starter cultures are the best place to find the right candidate for specific needs.
- They are also fundamental tools for maintaining strains genetic and phenotypic stability which are crucial for both research and industrial production of selective starter cultures.







UMCC STAFF AND DELEGATES IN MIRRI-IT



- Prof Paolo Giudici. Founder of UMCC
- Dr Maria Gullo, UMCC Scientific Coordinator. Acetic Acid Bacteria Specialist
- > Dr Stefano Cassanelli, Molecular Biology Specialist
- Prof Andrea Pulvirenti, Food Safety Specialist
- Salvatore la China, PhD student

Thank you for your kind attention!



A culture of bacteria