

# Unimore Microbial Culture Collection as a bioresource for the industrial exploitation of Acetic Acid Bacteria

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**UMCC** is the Microbial Culture Collection of the University of Modena and Reggio Emilia ([www.umcc.unimore.it](http://www.umcc.unimore.it))

✓ Internationally recognized collection specialised in: selection of microorganisms for both academic and industrial purposes

✓ Organisms: yeasts, acetic acid bacteria and lactic acid bacteria

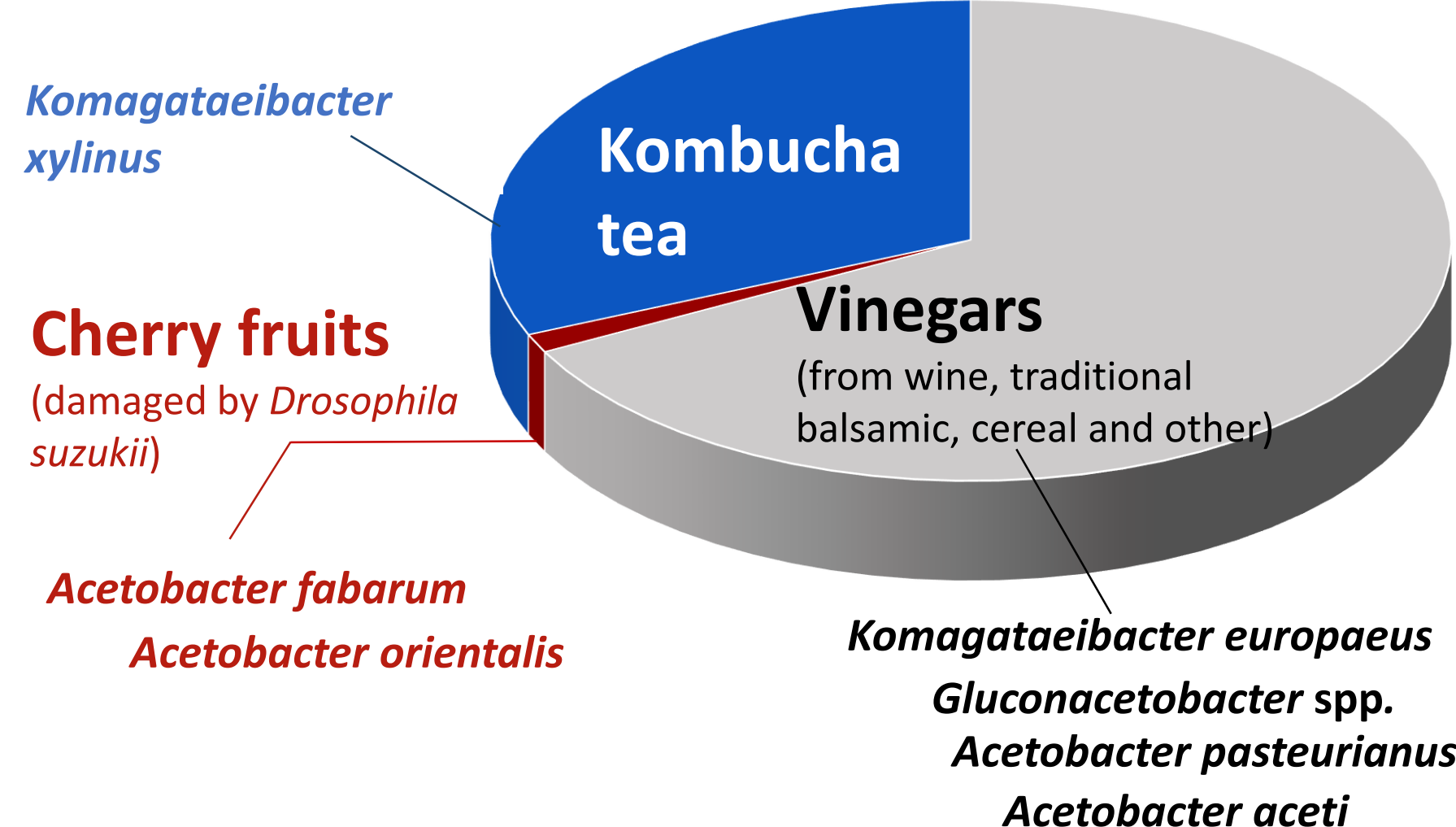
✓ Partner of the Italian network of microbial resources collections (Joint Research Unit MIRRI-IT; [www.mirri-it.it](http://www.mirri-it.it))

## Main compounds produced by acetic acid bacteria and their application \*

Chemical compound	Key enzyme - Precursor compound	Biotechnological application	Organism
Acetic acid (C <sub>2</sub> H <sub>4</sub> O <sub>2</sub> )	-ALDH [EC 1.2.1.-] -Acetaldehyde	Food, chemical	<i>Acetobacter</i> spp., <i>Gluconacetobacter</i> spp., <i>Komagataeibacter</i> spp.
Glucono-δ-lactone (C <sub>6</sub> H <sub>10</sub> O <sub>6</sub> )	-PQQ-GDH [EC 1.1.5.2] -Glucose	Food, pharmaceutical, chemical	<i>Gluconobacter</i> spp., <i>Acetobacter</i> spp.
2-keto-D-gluconate (C <sub>6</sub> H <sub>10</sub> O <sub>7</sub> )	-FAD-GADH [EC 1.1.99.3] -Gluconic acid	Food, pharmaceutical, chemical	<i>Gluconobacter</i> spp., <i>Acetobacter</i> spp.
5-keto-D-gluconate (C <sub>6</sub> H <sub>10</sub> O <sub>7</sub> )	-PQQ-GLDH [EC 1.1.99.22] -Gluconic acid	Food, pharmaceutical, chemical	<i>Gluconobacter</i> spp., <i>Acetobacter</i> spp.
2,5-diketo-D-gluconate (C <sub>6</sub> H <sub>8</sub> O <sub>7</sub> )	-2KGADH [EC 1.1.99.4] -2-keto-gluconate	Food, pharmaceutical, chemical	<i>Gluconobacter</i> spp., <i>Acetobacter</i> spp.
L-sorbose (C <sub>6</sub> H <sub>12</sub> O <sub>6</sub> )	-PQQ-GLDH [EC 1.1.99.22] -D-sorbitol	Pharmaceutical, cosmetic, food	<i>Gluconobacter</i> spp., <i>Acetobacter</i> spp.
L-Sorbose (C <sub>6</sub> H <sub>10</sub> O <sub>6</sub> )	-FAD-SDH [EC 1.1.99.12] -L-Sorbose	Pharmaceutical, cosmetic, food	<i>Gluconobacter</i> spp., <i>Acetobacter</i> spp.
2-keto-L-gulonate (C <sub>6</sub> H <sub>10</sub> O <sub>7</sub> )	-SNDH [EC:1.1.1.-] -L-sorbose	Pharmaceutical, cosmetic, food	<i>G. oxydans</i>
Dihydroxyacetone (C <sub>3</sub> H <sub>6</sub> O <sub>3</sub> )	-PQQ-GLDH [EC 1.1.99.22] -Glycerol and other polyols	Pharmaceutical, chemical, cosmetic	<i>G. oxydans</i>
Cellulose (C <sub>6</sub> H <sub>10</sub> O <sub>5</sub> ) <sub>n</sub>	-CS [EC 2.4.1.12] -UDP-glucose	Food, biomedical, cosmetic, engineering	<i>Komagataeibacter</i> spp., <i>Gluconacetobacter</i> spp.
Levan (C <sub>18</sub> H <sub>32</sub> O <sub>16</sub> )	-LS [EC 2.4.1.10] -Fructose	Food, medical, pharmaceutical	<i>Gluconobacter</i> spp., <i>Neosassa</i> spp., <i>Kozakia</i> spp., <i>Gluconacetobacter</i> spp.

\* Adapted from La China et al 2018; De Vero et al 2010

## AAB in UMCC



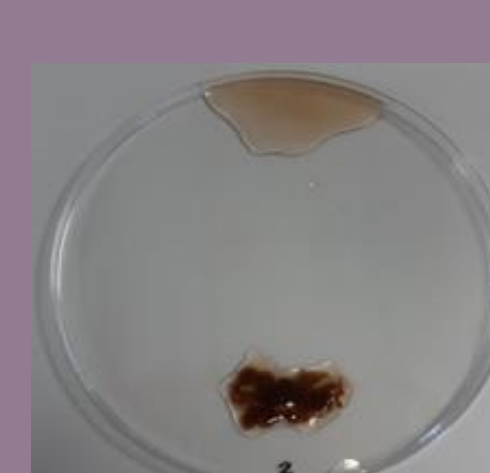
## UMCC

- ✓ Combines phenotypic and molecular traits with industrial strain performance
- ✓ Assesses the technological stability of industrially useful strains
- ✓ Offers innovative research and scientific services to customers and stakeholders for novel and functional starter cultures

Suitable preservation techniques and quality control are performed in **UMCC** in order to avoid genetic drift and phenotypic changes



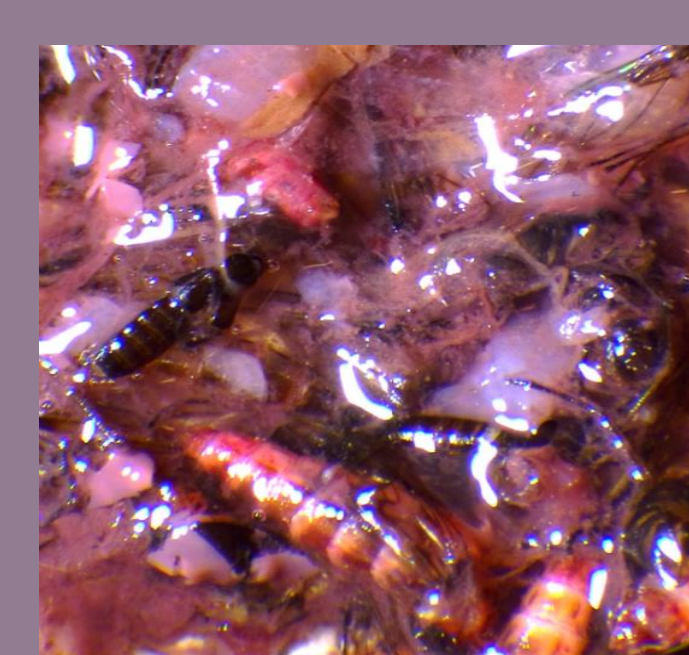
## UMCC – Current applied research



Conventional and innovative fermentations by static and submerged systems



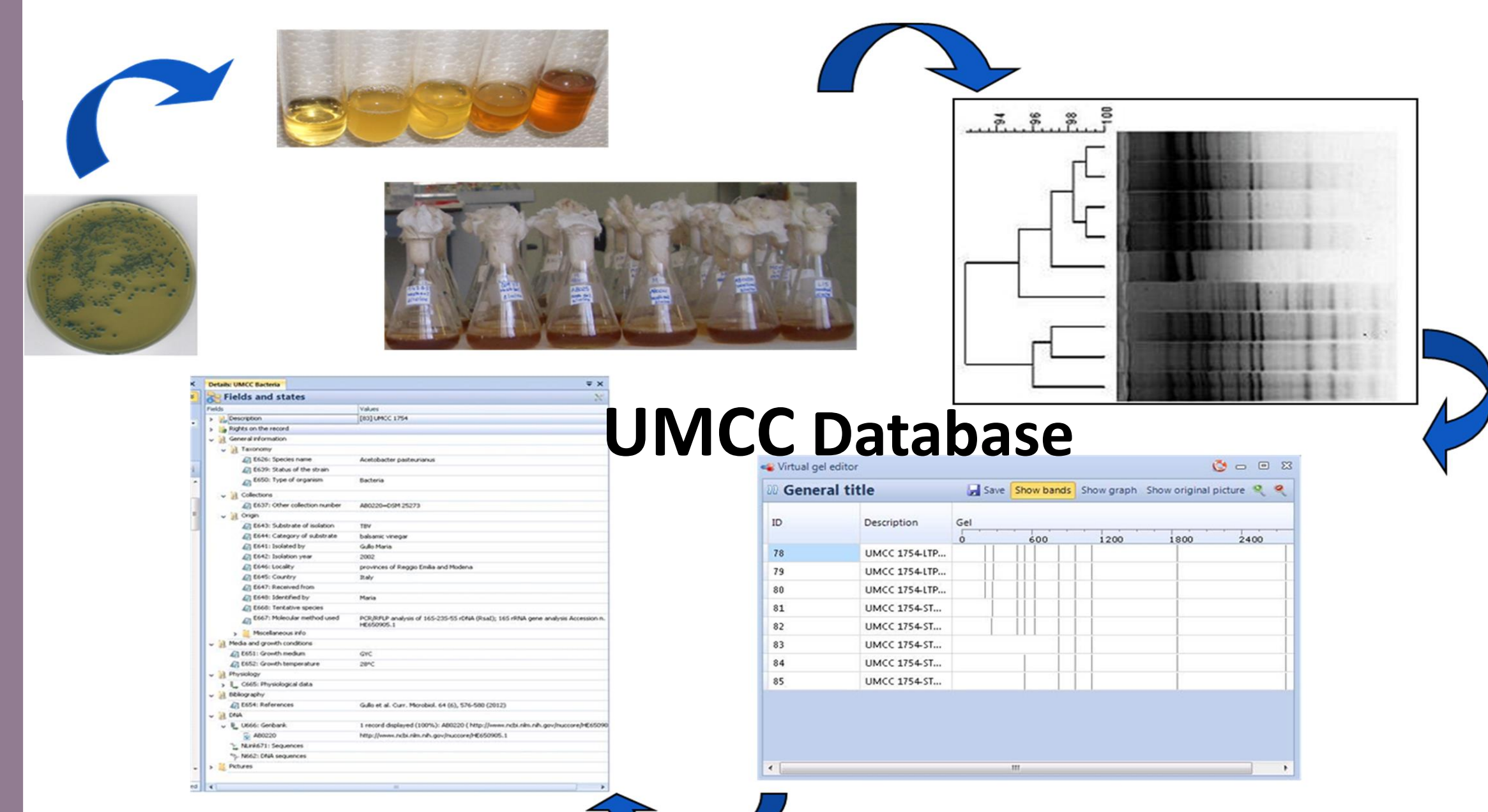
Bacterial cellulose synthesis towards applications (Gullo et al 2017; 2018)



Source: Consorzio Fitosanitario Provinciale di Modena

Control of *Drosophila suzukii* - an emerging pest of small fruits

Standardized and integrated information on the AAB are recorded in the **UMCC** Database available on line at: <http://umcc.bio-aware.com/>



## REFERENCES:

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- Gullo M, Sola A, Zanichelli G, Montorsi M, Messori M, Giudici P (2017). Increased production of bacterial cellulose as starting point for scaled-up applications. *Appl Microbiol Biotechnol* 101: 8115-8127.
- La China S, Zanichelli G, De Vero L, Gullo M (2018). Oxidative fermentations and exopolysaccharides production by acetic acid bacteria: a mini review. *Biotechnol Lett*. <https://doi.org/10.1007/s10529-018-2591-7>.