



HAL
open science

Potential of microorganisms to decrease the "beany" off-flavor

Estelle Fischer, Nathalie Cayot, Rémy Cachon

► **To cite this version:**

Estelle Fischer, Nathalie Cayot, Rémy Cachon. Potential of microorganisms to decrease the "beany" off-flavor. 23ème colloque du Club des Bactéries Lactiques, Jun 2022, Rennes, France. hal-03687346

HAL Id: hal-03687346

<https://institut-agro-dijon.hal.science/hal-03687346v1>

Submitted on 3 Jun 2022

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.

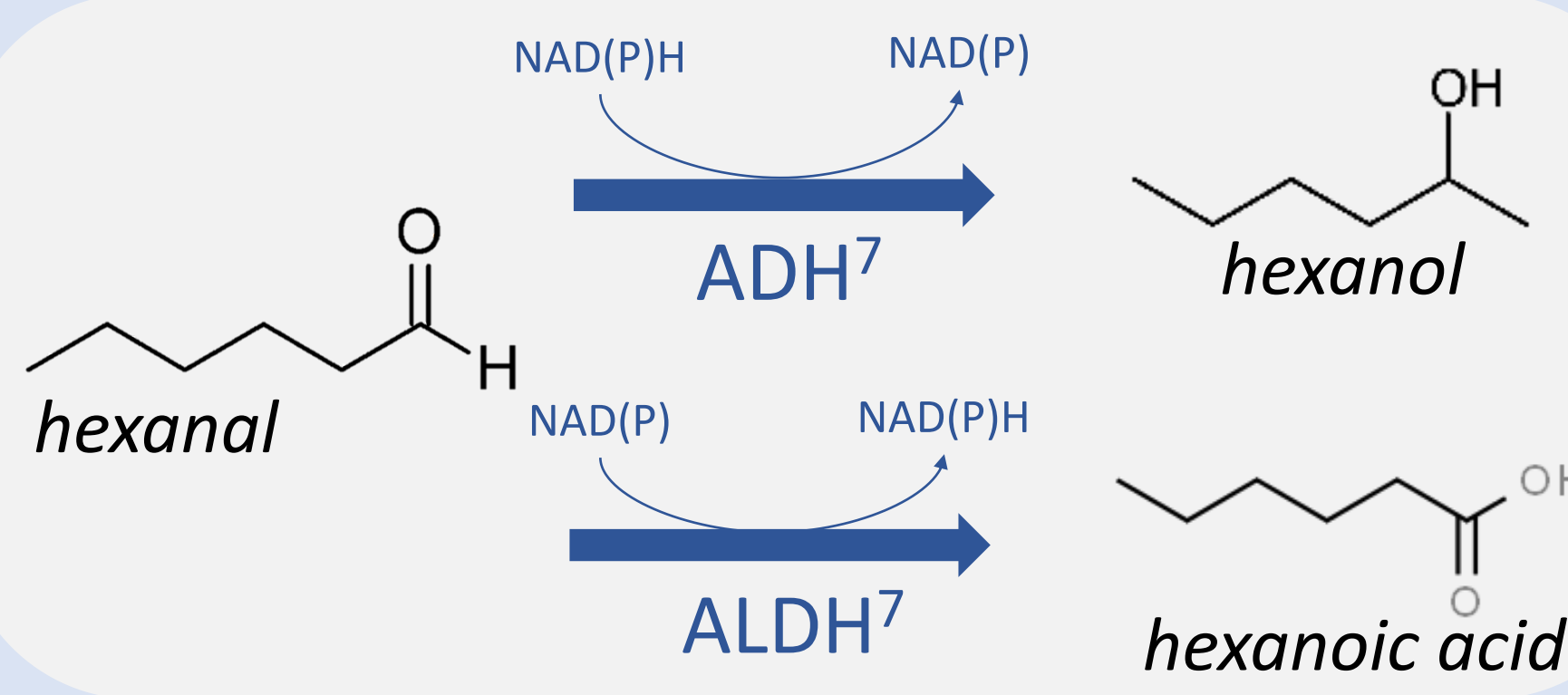
POTENTIAL OF MICROORGANISMS TO DECREASE THE « BEANY » OFF-FLAVOR

Estelle FISCHER, Nathalie CAYOT, Rémy CACHON

UMR PAM ; estelle.fischer@agrosupdijon.fr

Plant-based protein consumption¹ → disadvantages : “beany” off-flavors².
Decrease the off-flavor ? Breeding, harvesting and storage, chemical and physical treatments.

Fermentation - Investigate the potential of mo to decrease the “beany”³⁻⁶



Lactobacillus acidophilus
Limosilactobacillus fermentum
Lactiplantibacillus plantarum
Streptococcus thermophilus
Saccharomyces cerevisiae
Gluconobacter suboxydans

« BEANY » OFF-FLAVOR

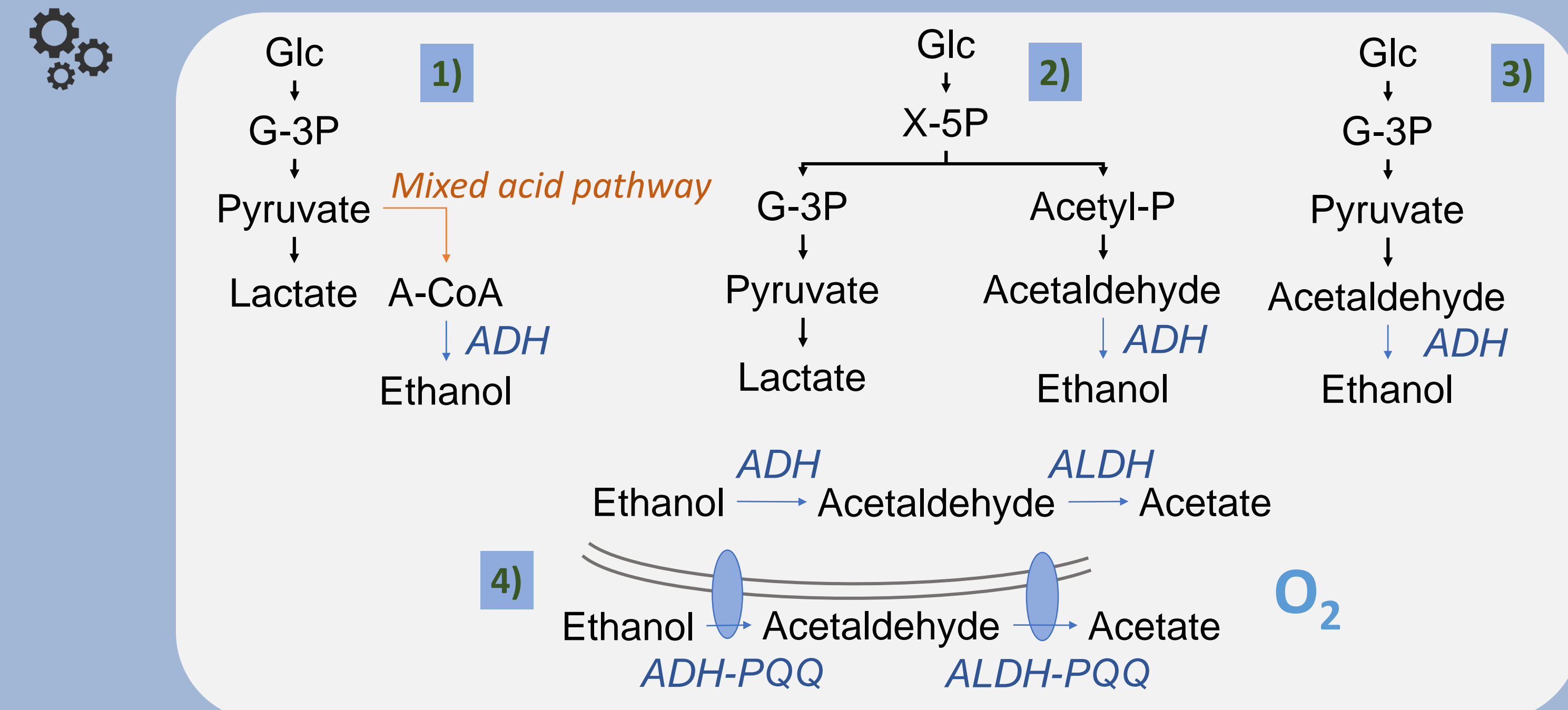
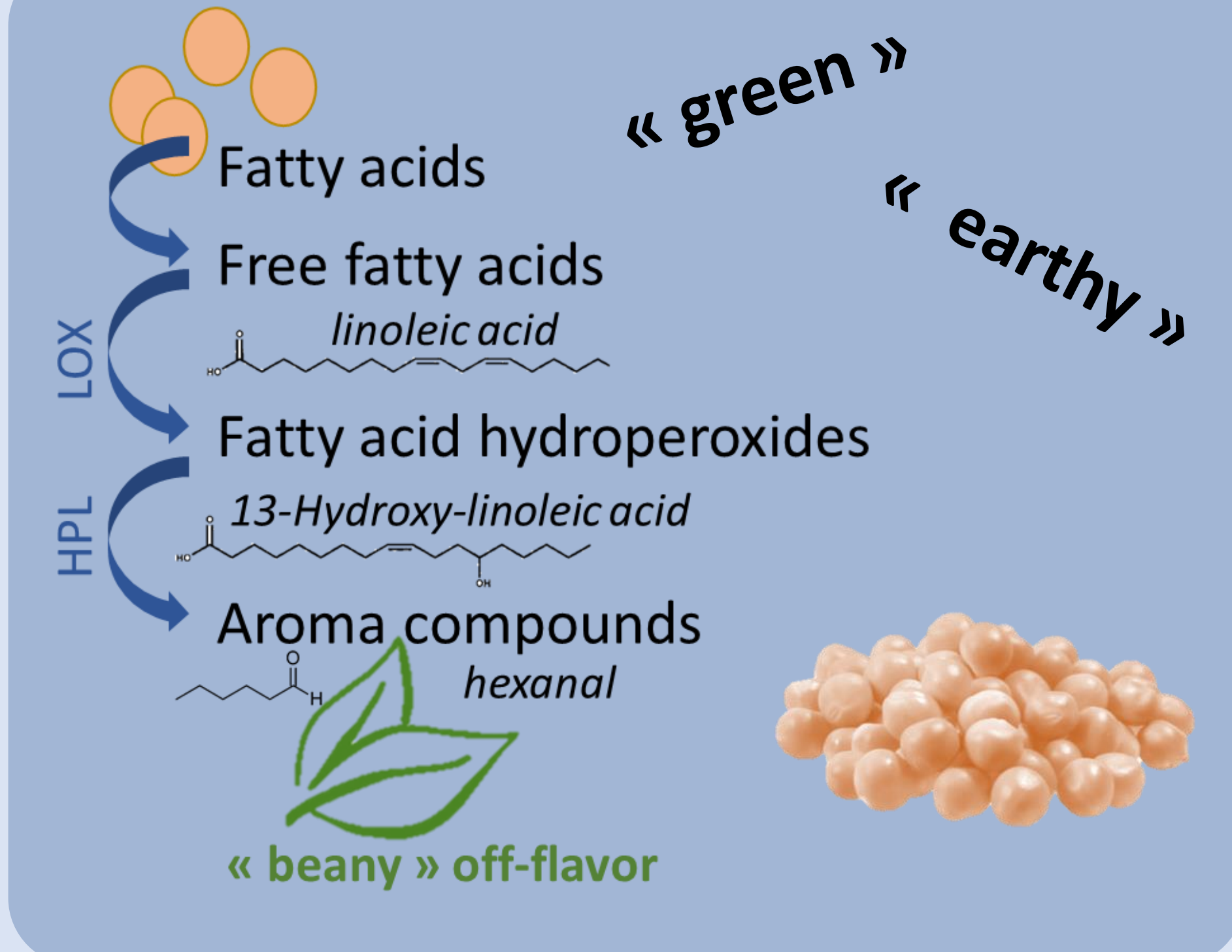


Figure 1: ADH and ALDH in the primary metabolism of 1) homofermentative LAB⁸⁻¹⁰, 2) heterofermentative LAB^{8,10,11}, 3) yeast alcoholic fermentation^{12,13}, 4) acetic acid bacteria¹⁴⁻¹⁶. Carbon dioxide is not represented in metabolic pathways 2) and 3).

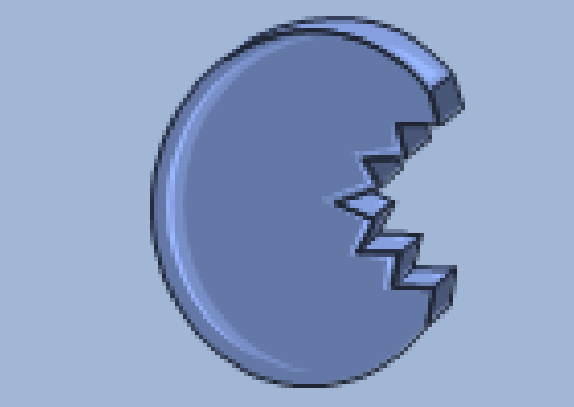
Involved ADH and ALDH in the strains catabolism (Fig. 1.)

Inducible or constitutive enzymes

Homo and HeteF inducible enzymes
HeteO, Y and AAB constitutive enzymes



CATABOLISM STUDY



BIO-INFORMATICS

LINKED WITH

VS Litterature

REDUCED « BEANY » OFF-FLAVOR



SEE MORE

ADH and ALDH diversity, presence in the genome (Fig. 2.) KEGG¹⁷



Table 2: Bioinformatics data on ADH and ALDH

Species	ADH	ALDH
<i>L acidophilus</i>	3	6
<i>L fermentum</i>	4	8
<i>L plantarum</i>	4	11
<i>S thermophilus</i>	2	6
<i>S cerevisiae</i>	5	10
<i>G suboxydans</i>	4	13

Differences in enzyme diversity

≥ 4 ADH in He, Y and AAB
≥ 8 ALDH in He, Y and AAB

Fermentative type, presence of enzyme and diversity leads to ≠ efficiencies (Fig. 2.)^{7,18,19}
+ Correlation between constitutive enzyme, diversity AND efficacy to ↓ “beany”

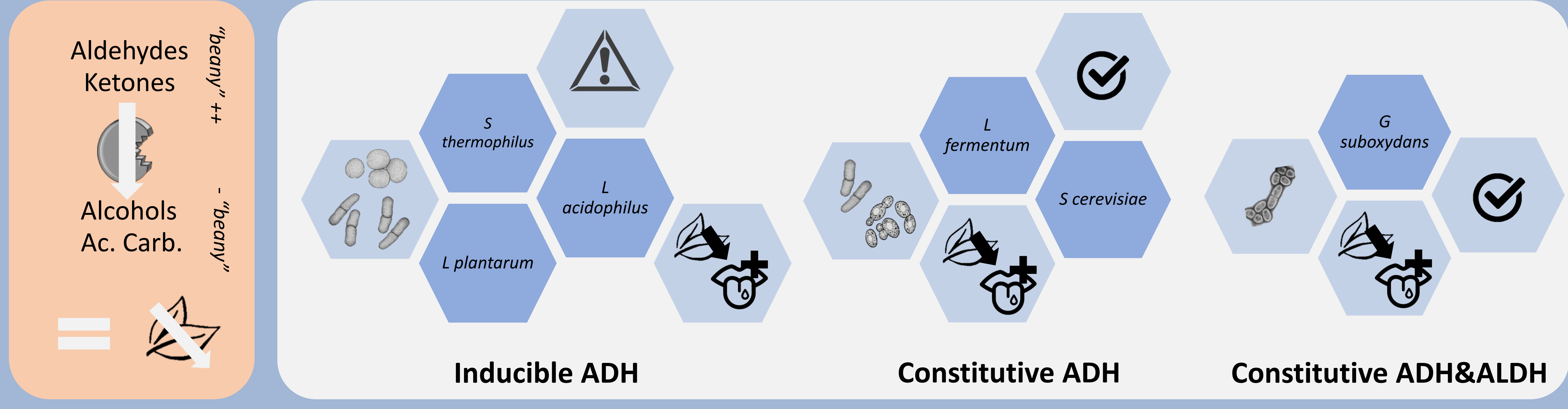


Figure 3: Correlation between ADH and ALDH presence and organoleptical improvement reported in the litterature

Constitutive enzyme = higher efficacy
LAB: ADH predominant, HeteO ++
Y: ADH++ ; AAB: ADH&ALDH++ polyvalent
ADH&ALDH activities correlated with sensory improvement

¹ Rackis, J. J. et al. (1979). *JAOCs*, 56, 262-271.
² Trindler, C. et al. (2022). *Food Chem.*, 376, 131892.
³ Youssef, M. (2017). PhD thesis, Burgundy University.
⁴ Furuguchi, S. et al. (1997). Patent Number JP 1997-205999.
⁵ Garrigues, C. et al. (1997). *J BACTERIOL.*, 179, 6.
⁶ Verce, M. et al. (2020). *Food Microbiol.*, 816 89, 103448.
⁷ Mizuno, A. (2006). *J. Biosci. Bioeng.*, 101 (1), 31-37.
⁸ Hommel, R. K. & Ahnert, P. (1999). *Acad. Press*, 955-961.
⁹ KEGG, Kegg Pathway, accessed 2019.
¹⁰ Minoru, A. et al. (1990). Patent Number 4 975 289.
¹¹ Vara-Ubol, S. et al. (2004). *J. Sens. Stud.*, 19 (1), 15-26.
¹² Marzec, V. et al. (2016). Patent Number 1022936 B1.
¹³ Li, C. et al. (2021). *Food Funct.*, 12 (15), 6950-6963.
¹⁴ Caplice, E. et al. (1999). *Int. J. Food Microbiol.*, 50 (1-2), 131-149.
¹⁵ Reis, J. A. et al. (2012). *Food Eng. Rev.*, 4 (2), 124-140.
¹⁶ Faria-Oliveira, F. (2013). Food Industry, Ed. InTech.
¹⁷ Lynch, K. M. (2019). *Compr. Rev. Food Sci. Food Saf.*, 18 (3), 587-625.
¹⁸ Deppenmeier, U. et al. (2009). *J. Mol. Microbiol. Biotechnol.*, 16 (1-2), 69-80.
¹⁹ Blagden, T. D., et al. (2006). *J. Food. Sci.*, 70 (3), 186-189.

FISCHER E., CAYOT N., CACHON R., (2022). Potential of microorganisms to decrease the « beany » off-flavor: a Review ; *JAFc* XX