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

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

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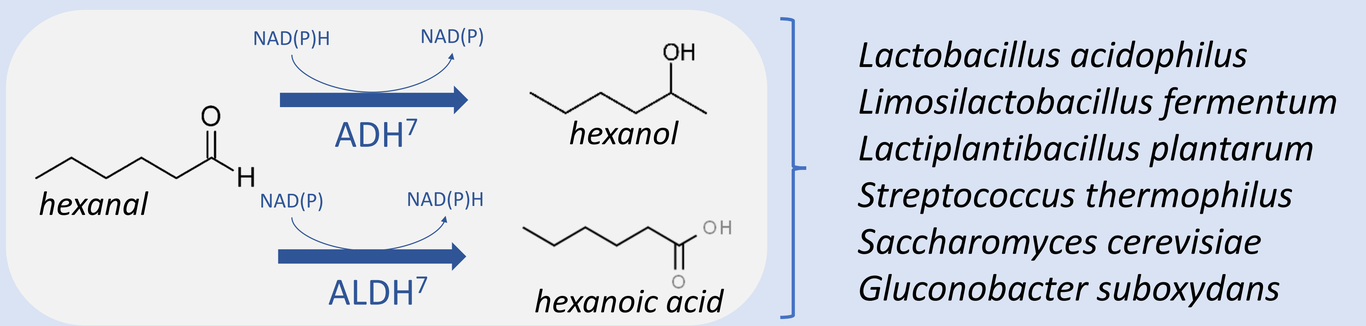
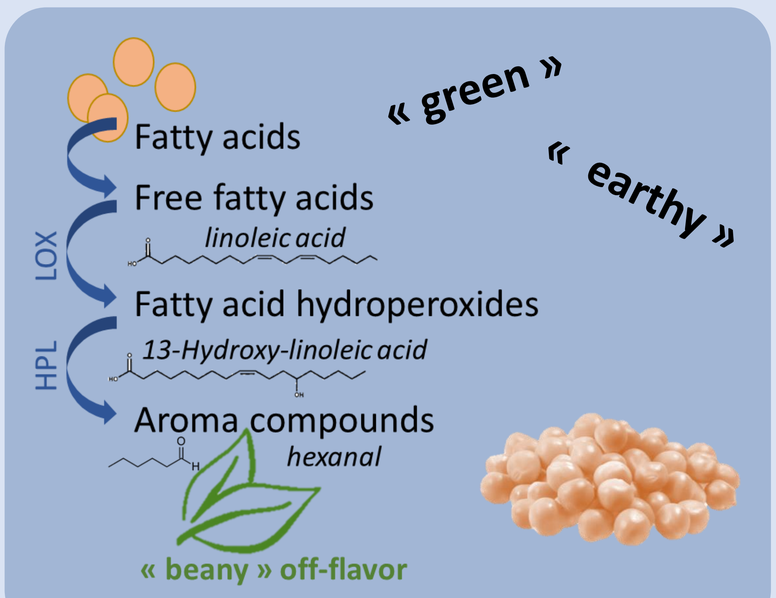
Plant-based protein consumption[1] → disadvantages : “beany” off-flavors[2].
Decrease the off-flavor ? Breeding, harvesting and storage, chemical and physical treatments.
Fermentation - Investigate the potential of mo to decrease the “beany” [3-6]



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

« BEANY » OFF-FLAVOR



CATABOLISM STUDY

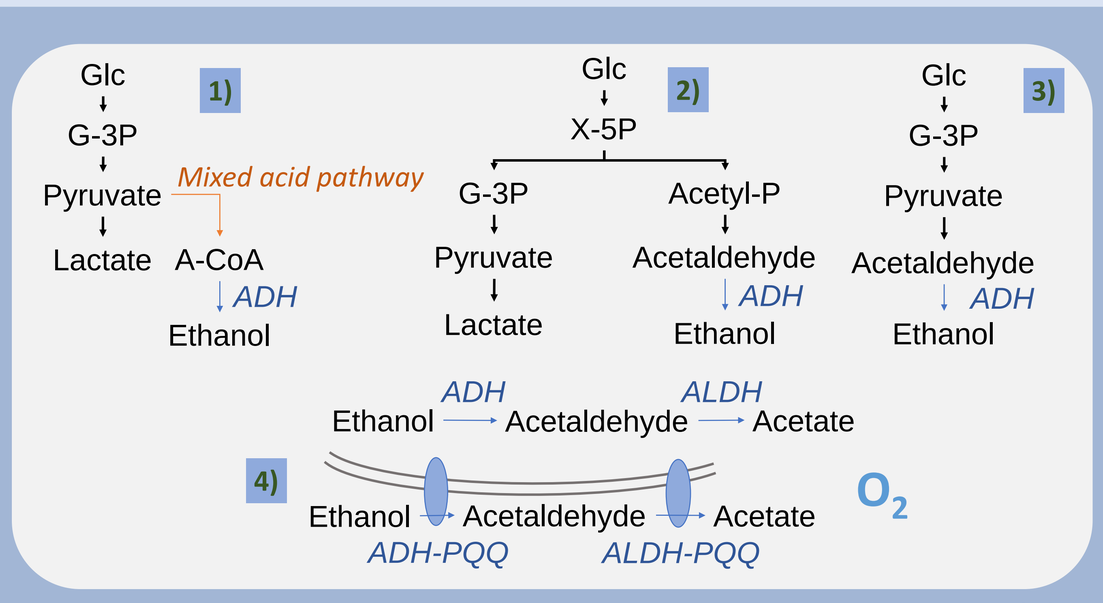


Figure 1: *ADH and ALDH in the primary metabolism of 1) homofermentative LAB[8-10], 2) heterofermentative LAB[8,10,11], 3) yeast alcoholic fermentation[12,13], 4) acetic acid bacteria[14-16]. Carbon dioxide is not represented in metabolic pathways 2) and 3).*

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

Inductible or constitutive enzymes

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

BIO-INFORMATICS

ADH and ALDH diversity, presence in the genome (**Fig. 2.**) KEGG[17]

Table 2: *Bioinformatics data on ADH and ALDH*

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

Differences in enzyme diversity

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

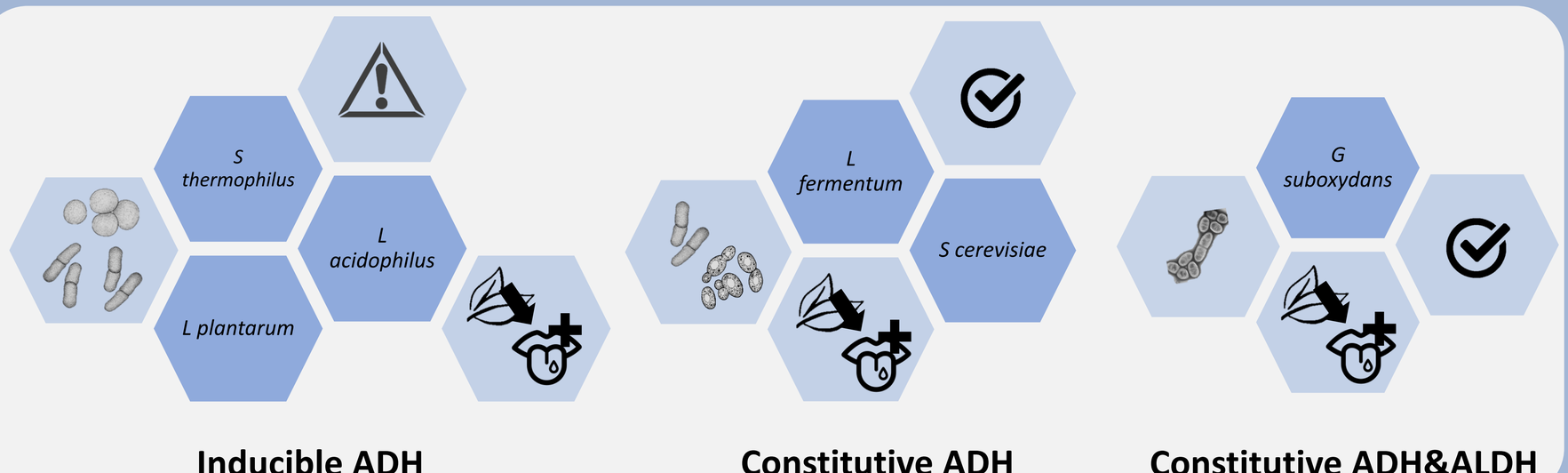
LINKED WITH

VS Litterature

REDUCED « BEANY » OFF-FLAVOR

Fermentative type, presence of enzyme and diversity leads to ≠ efficiencies (**Fig. 2.**)[7,18,19]
+ Correlation between constitutive enzyme, diversity AND efficacy to ↘ “beany”

Aldehydes
Ketones
“beany” ++
Alcohols
Ac. Carb.
- “beany”
=



Inducible ADH **Constitutive ADH** **Constitutive ADH&ALDH**

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

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

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

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