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Development of health ingredients from chicory by-products fermentation : first step strains selection

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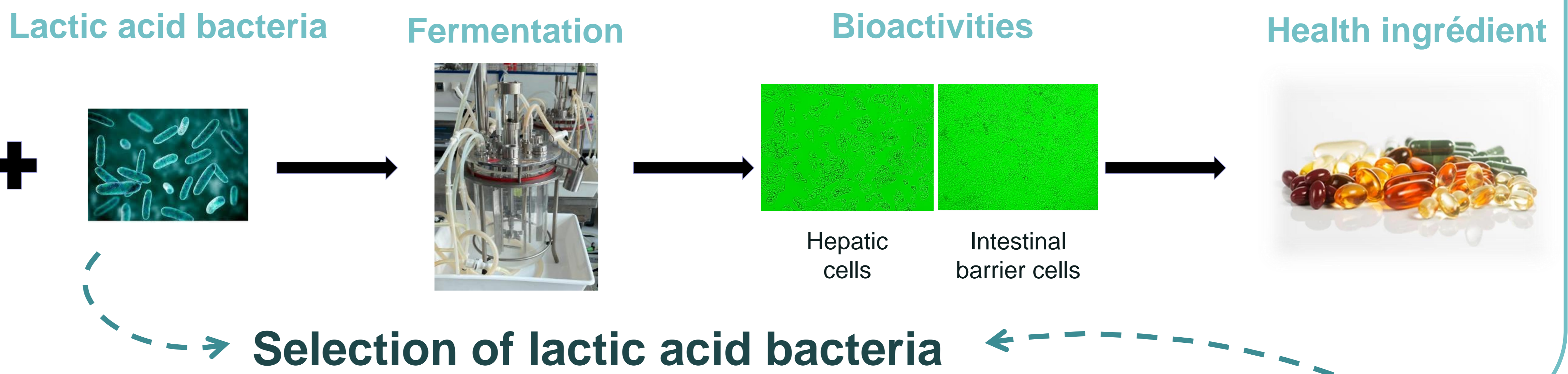
Introduction

The chicory production generates many by-products, particularly in Hauts-de-France, the leader region. It is necessary to valorize these by-products, which can exert bioactivities. Chicory is known to possess molecules such as polyphenols responsible for multiple anti-oxidant, anti-microbial, or hepatoprotective activities. Lactic acid bacteria possess different enzymes which can transform polyphenols. **Fermentation of chicory by-products by different species of lactic acid bacteria could release bioactive molecules with activities related to human health.** In order to select the lactic acid bacteria that will be used in fermentation, an isolation of the total endive flora has been performed.

Chicory by-products



Workflow of thesis



Methods : isolation of endive flora



External flora
Endophyte flora
Maceration in MRS media

Isolation and freezing of pure colonies



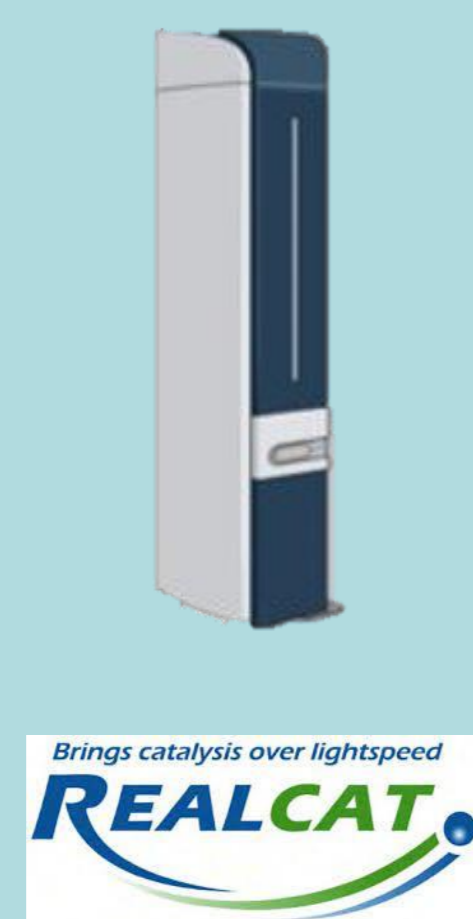
Medium:
M17 and MRS → Lactic acid bacteria
GN → non-fastidious bacteria
PDA → Fungi

MALDI-TOF

Strain identification have been realized on the Realcat platform, by MALDI-TOF method. Some strains which seemed to be promising have been sent to Genoscreen for 16S sequencing.

GenoScreen

16S sequencing



Results

Roots in fields



External flora	Endophyte flora	Maceration
18 strains including 3 fungi		
<i>Rahnella aqualitis</i>	<i>Citrobacter</i>	3 <i>Lactobacillus reuteri</i>
<i>Pseudomonas koreensis</i>	<i>Enterobacter</i>	<i>Weissela</i>
<i>Pantoea agglomerans</i>	<i>Bacillus</i>	
<i>Pseudomonas</i>		
<i>Bacillus mycoides</i>		
<i>Bacillus</i>		

External flora

Endophyte flora

11 strains including 3 fungi

<i>Pantoea agglomerans</i>	<i>Bacillus licheniformis</i>
<i>Lelliottia amnigena</i>	<i>Bacillus magetarium</i>
<i>Citrobacter gillenii</i>	<i>Bacillus</i>
<i>Pectobacterium carotovorum</i>	
<i>Pseudomonas</i>	

Roots after endive forcing



Endive



External flora

7 strains including 2 fungi

<i>Raoultella terrigena</i>
<i>Streptococcus mitis</i>
<i>Staphylococcus horminis</i>
2 <i>Pantoea agglomerans</i>

Legend

green : good identification of type and species,
orange : identification of type but uncertain for species

Conclusion and perspective

This study aims to find lactic acid bacteria from chicory leaves and roots to be used in fermentation. This study highlighted 36 strains. Most of the strains were isolated from roots and belong to external flora. Most strains come from soil and waters like *Bacillus*, *Citrobacter*, or *Pseudomonas*. Other species are commonly found in plants like *Pantoea agglomerans*, *Pseudomonas koreensis*, *Bacillus mycoides* or *Pectobacterium carotovorum*. Only *Rahnella aqualitis* as already been found in chicory. Most of the strains isolated in this study were possibly not present in the chicory itself but in the soil. However, some strains look promising for the continuation of the project. It is, therefore, necessary to identify the fungi. **Notably, three Lactobacillus strains are promising for the continuation of this project. These strains will be used to ferment chicory by-products.**