

***Lactococcus lactis*, an original producer of volatile compounds during the fermentation of mashed cucumber.**

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INTRODUCTION & AIM

- Fermented vegetables are currently getting attention worldwide due to their interest through lactic acid bacteria's (LAB) beneficial effects (1).
- Sensorial challenges linked to fermentation highly depend on LAB species' biochemical capability (1).
- Volatile profiles contributing to flavor and nutrient properties are necessarily important for assessment in green vegetables fermentation (1).

Aim:

- To explore volatile profiles produced by different LAB in mashed cucumber fermentation.

METHOD

LAB Isolation & Identification



ជ្រូកត្រសក់	ជ្រូកស្ពៃ	ត្រសក់ចាវ	ជ្រូកឆែវ	ម៉ាស្នូង	ជ្រូកសណ្តែកបណ្តុះ
<i>“Chrouk Trasak”</i>	<i>“Chrouk Spai”</i>	<i>“Trasak Chav”</i>	<i>“Chrouk Chai Thav”</i>	<i>“Moam Lahong”</i>	<i>“Chrouk Sandaek-bondoh”</i>
Small cucumbers	Mustard cabbages	Mustard cucumbers	Radishes	Papayas	Sprout beans

- Strains isolated from various fermented vegetables collected in **Cambodian markets**
- Genotype identification by **16S rRNA gene sequencing**

LAB fermentation with mashed cucumbers

1	2	3
Cucumber treatment  Pasteurized for 5 min at 80 °C	Single strain inoculation <i>L. plantarum</i> (1 strain) <i>L. pentosus</i> (2 strains) <i>P. pentosaceus</i> (1 strain) <i>L. lactis</i> (1 strain) <i>L. fermentum</i> (1 strain) Inoculation at 10^6 cfu/g in 200 grams of cucumber	Fermentation for 24 hours at 37 °C: - Other species reach 10^8 cfu/g <i>L. lactis</i> reach 10^7 cfu/g

CONCLUSION & PERSPECTIVES

- **LAB affected volatile profiles of cucumber.**
- *L. lactis* produced a wide range of volatile esters.

Perspectives:

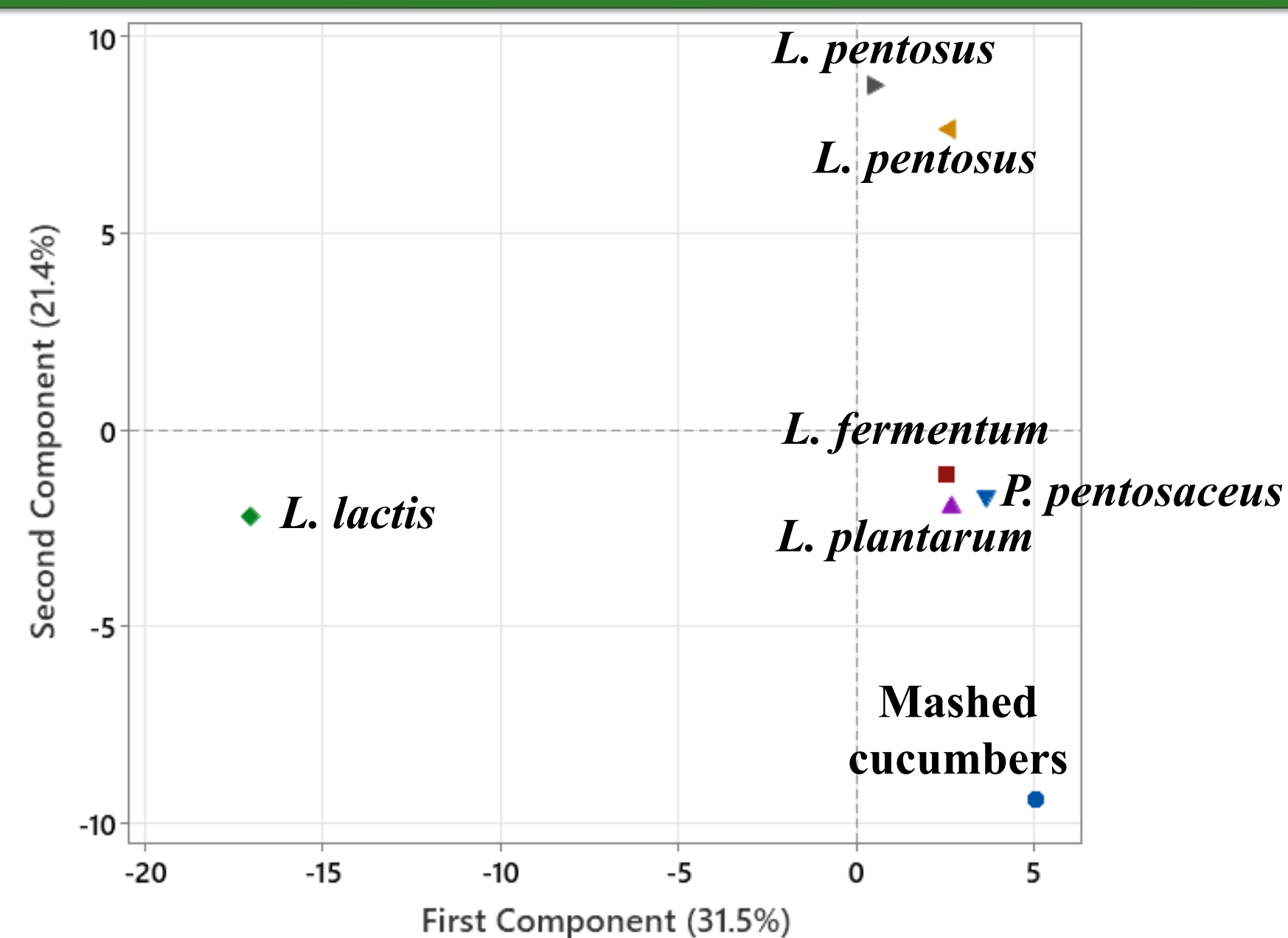
- Volatile esters are known to be fruity and floral scents which is interesting to be found in *L. lactis* fermentation with cucumbers. Using *L. lactis* as a starter in green vegetables fermentation could be further studied about organoleptic properties to observe whether if volatile esters formation enable flavor improvement.
- Biochemical pathway of *L. lactis* forming volatile esters must be further investigated.

REFERENCES

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RESULTS & DISCUSSION

Score plot of volatile compounds found in this study



- This PCA score plot of volatiles found in this study presented half of total variability: **PC1 (31.5%) and PC2 (21.4%) of total variance in data.**
- **After fermentation, volatiles were greatly modified by LAB.**
- Volatiles from cucumber fermented with *L. fermentum*, *L. plantarum*, *P. pentosaceus* resulted in closer relation to each other compared to other LAB species.
- Despite being the same genus, *L. plantarum* and *L. pentosus* resulted in **different volatile profiles.**
- *L. lactis* presented **important differentiation of volatile profiles** in cucumber fermentation by comparing with other LAB species.

L. lactis is the key producer of acetate esters

	Pasteurized cucumbers (µg/kg)	<i>L. fermentum</i> CC22-MRS (µg/kg)	<i>L. plantarum</i> R3 (µg/kg)	<i>L. pentosus</i> R6 (µg/kg)	<i>L. lactis</i> SB1 (µg/kg)	<i>P. pentosaceus</i> Pa12 (µg/kg)
Acetate esters						
Ethyl acetate	0	0	0	0	4.01	0
Hexyl acetate	0	0	0	0.51	6.6	0.09
Pentyl phenylacetate	0	0	0	0	0.99	0
Octyl acetate	0	0	0	0	0.41	0
Isopentyloxyethyl acetate	0.13	0	0	0	0	0.14
3-6-Nonadienyl acetate	0	0	0	0	0.11	0
(Z)-6-Nonenyl acetate	0	0.08	0.19	0.35	0.51	0.2
Nonyl acetate	0	0.11	0.06	0.15	0.13	0.1
3,7,11,Trimethyl-8,10-dodecedienylacetate	0	0.02	0.03	0	0.06	0.04
Total	0.13	0.22	0.28	1.01	12.82	0.58

- ***L. lactis* produced the highest number of volatile esters.**
- Alcohol Acetyltransferase (ATF) potentially involved in the production of acetate esters have not been completely elucidated. ATF genes in yeast are involved in the acetate ester formation from long chain alcohols, but not from shorter chain alcohols (2).
- For *L. lactis*, no homologues of ATF have been identified but hexyl acetate could imply EstA esterase (3).