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Impact of ageing on pea protein volatile compounds and correlation with odor

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OBJECTIVE

Plant-based protein consumption → positive effects. Disadvantages: beany off-flavors[1]. Evolution of off-flavor during ageing not well-known[2].

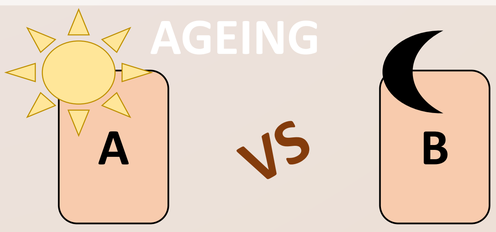
Investigate the evolution of volatile compounds and odor during two ageing processes.

Identify mechanisms involved and the most important factor.

Is it possible to predict the evolution of odor during ageing using data on volatile compounds ?

MATERIAL & METHODS

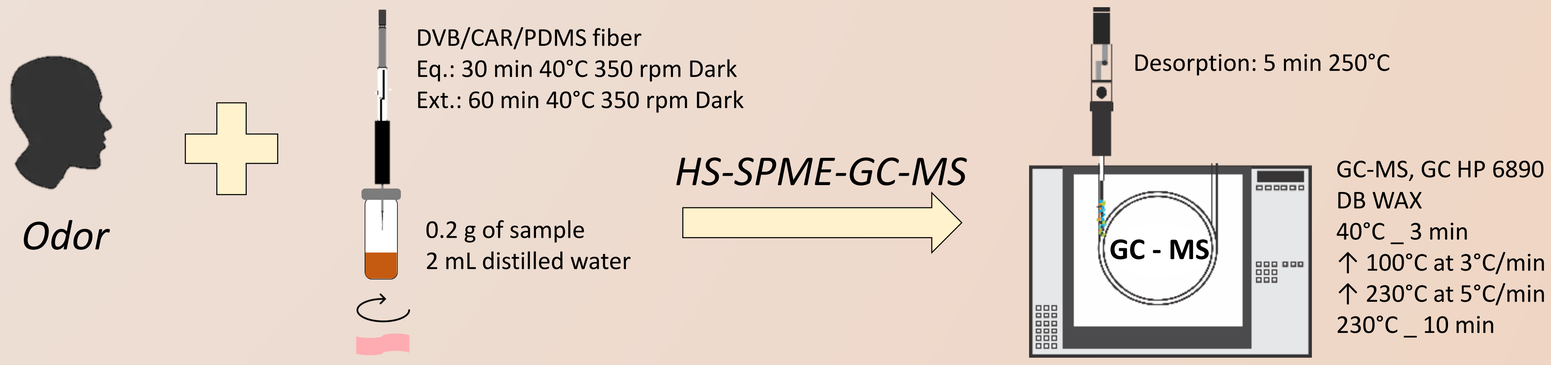
AGEING



Pea protein isolate, flat in plastic bags

Sampling: 0, 3, 6, 9, 12 months

MEASUREMENTS



RESULTS

IMPACTS OF THE AGEING

Tab. 1: Odor evolution during the ageing

	0	3	6	9	12 months
A	Beany	Beany, sharp, earthy	Beany+, sharp, earthy	Beany+, sharp, earthy, rancid	Beany+, sharp, earthy+, rancid
B		Light beany, roasted	Light beany, roasted	Light beany, roasted, earthy	Beany, earthy

Impact of ageing on odor (**Tab. 1**) and volatile compounds (**Fig. 1**). Reactions involved presented **Fig 2**.

A: strong impact (high increase, decrease, equilibrium). Photo-oxidation added to other phenomena, ↑ aldehydes, ↑ alcohols, ↑ ketones ; newly formed.

B: slight impact (slight increase up to 12 months)[2]. ↑ aldehydes, ↑benzaldehyde, ↑ furans.

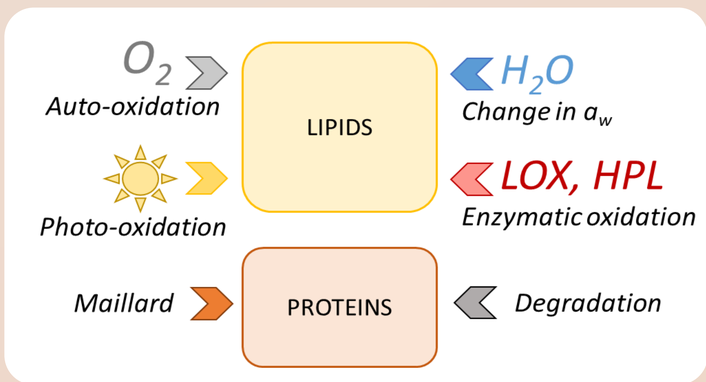


Fig. 2: Reactions involved during the ageing[3,4,5,6]

IMPACT

Light >> T°C

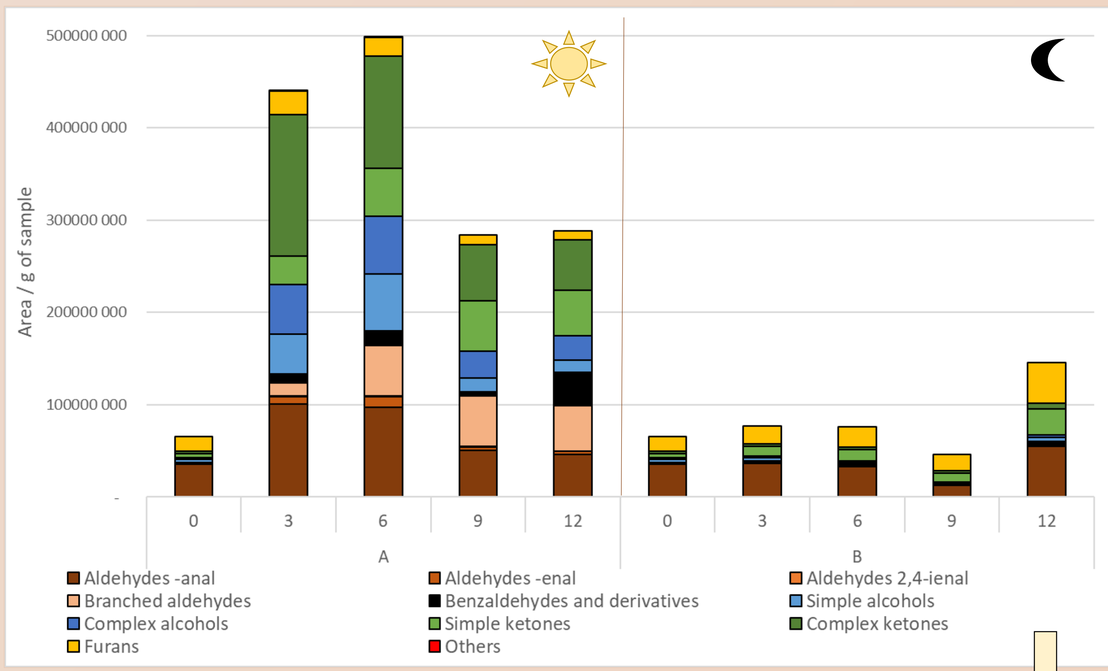


Fig. 1: Profile of volatile compounds by chemical family during the ageing

Evolution of odor linked to increase in volatiles.
Possible to predict the odor ?

CORRELATIONS

Possible correlation if specific presentation of the results (**Fig. 3**). *Examples :*

- A-3 months, earthy off-flavor (**Tab. 1**), ↑ proportion of volatile responsible for earthy notes (**Fig. 3**).
- B-3-6 months, slight change in odor, no big changes in ratios of compounds responsible for off-flavor.

Odor change	⟺	**Change in ratios of compounds**
Perception of new off-flavor	⟺	**↑ in ratio of compounds responsible for that attribute**

⚠ Not sufficient to describe the global sensory profile
Not working with all attributes

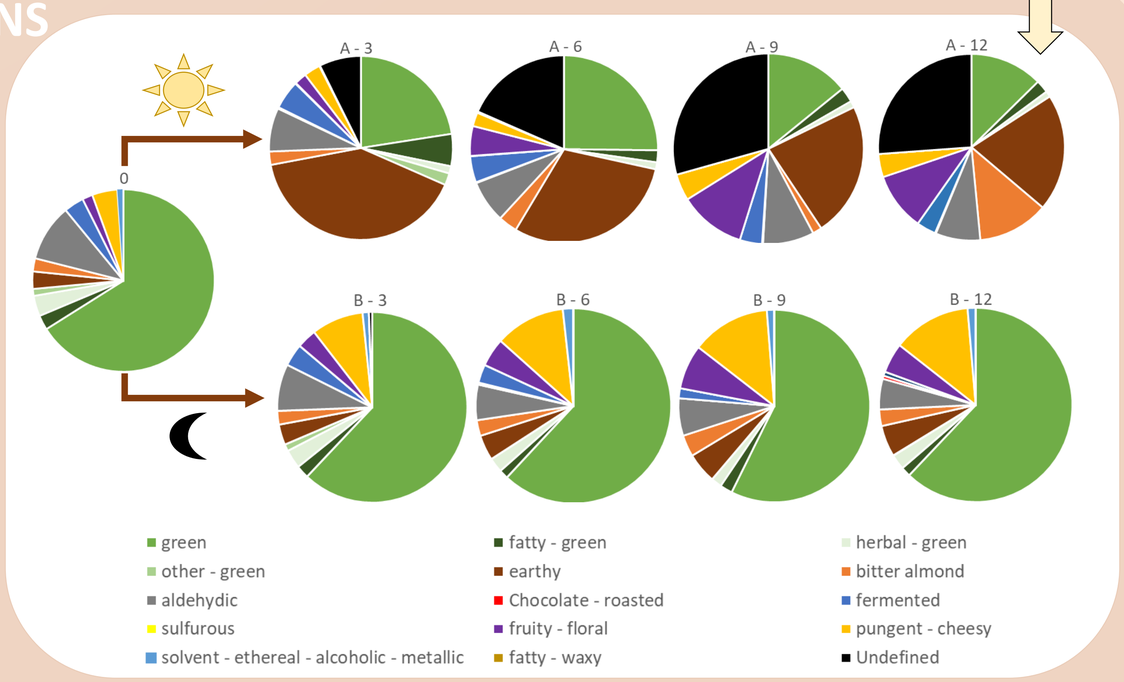


Fig. 3: Profile of volatile compounds by sensory descriptors during the ageing (in ratios)

CONCLUSIONS

Storage conditions = strong impact on volatile compounds and odor. Evolution and deterioration of odor during time. Light has the biggest impact.

Data, presented by sensory descriptors, enable to predict how compounds responsible for the different attributes are evolving. ⚠ Different from the overall odor perception.

Need to choose/trace compounds that are correlated with off-flavor/attribute of interest.

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