



IMPACT OF MICROALGAE INCORPORATION ON THE SENSORY PROFILE AND CONSUMER'S EXPECTATIONS OF BREAD AND CHEESE

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INTRODUCTION

Microalgae are a promising future food source with their rich nutrient content and potential to contribute to a carbon-neutral economy. However, incorporating microalgae into food formulations presents sensory challenges, particularly regarding colour and distinct fish-like aromas. Within the YUM ALGAE project, this study aimed to evaluate the impact of microalgae incorporation in two distinct food matrices – bread and camembert-like cheese.

METHODS

Consumer Evaluation

Phase I: Products' Expectation

- Four loaf bread samples and four cheeses were assessed, incorporating either chlorella (*Chlorella vulgaris*) or spirulina (*Arthrospira platensis*), both raw and with enzymatic treatment.

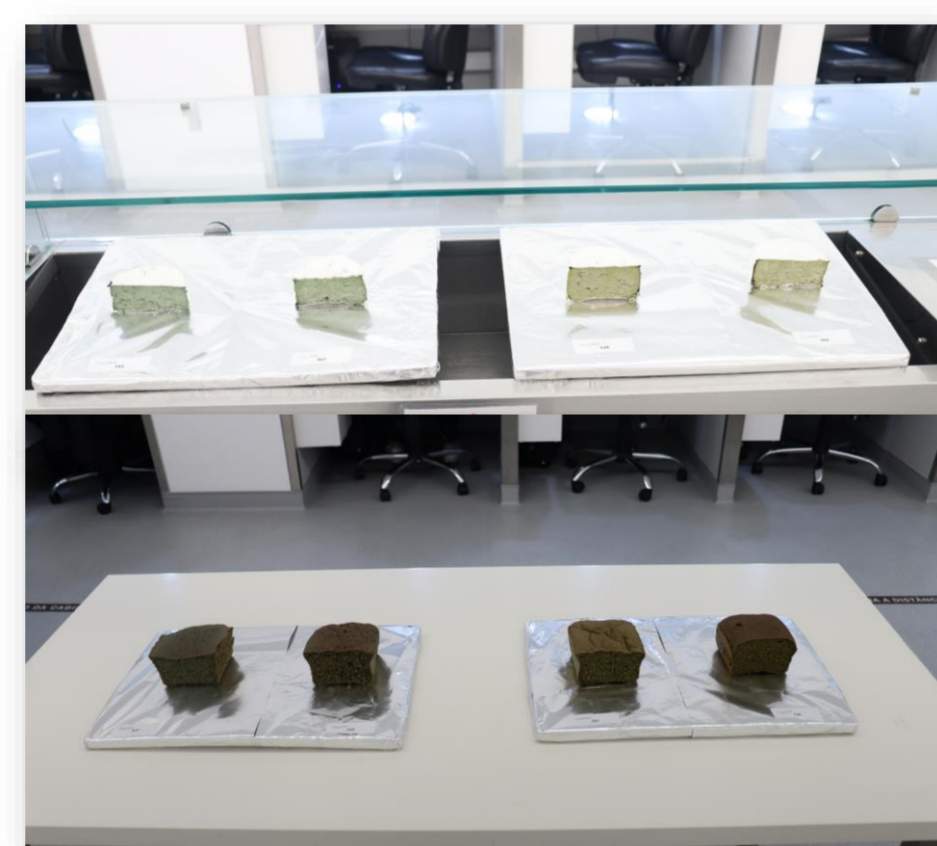


Figure 1: Simulated store shelf exposition

- A panel of 65 naïve tasters was invited to evaluate all the products' expectations, on a 9-point hedonic scale, visualising half-loafs and half-cheeses on a simulated store shelf.

Phase II: Appearance & Odour Evaluation

- At the sensory booth, participants were instructed to evaluate the samples' appearance and odour, rating their overall liking (1- Dislike extremely to 9 – Like extremely) and indicating the aspects they valued most and least when presented sequentially with a slice of each product (Figure 2).

Trained Panel Evaluation

- Using a Rate-All-That-Apply (RATA) (Ares et al., 2014) ballot for appearance (no. of attributes: bread-11 and cheeses-8) and odour (no. of attributes: bread-10 and cheeses-8), a trained panel (n=10) evaluated each of the samples.
- For bread, the trained panel evaluated first the external appearance and then all the attributes related to the internal appearance and odour. For cheese, only a piece was provided for internal evaluation.
- The samples were evaluated in duplicate, within each session.

CONCLUSIONS

This research highlights the success of sensory research in the development of new alternative proteins, instilling confidence in the potential to overcome the associated sensory barriers.



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Figure 2: Samples of cheese and bread evaluated by consumers and trained panel

Bread Evaluation

Based on the naïve tasters' evaluation, all the samples had a high mean acceptance score (>6.0). No significant differences were found between samples with raw microalgae incorporation and those treated with enzymes, except for bread with chlorella, where the sample with raw chlorella had a higher value (p=0.02).

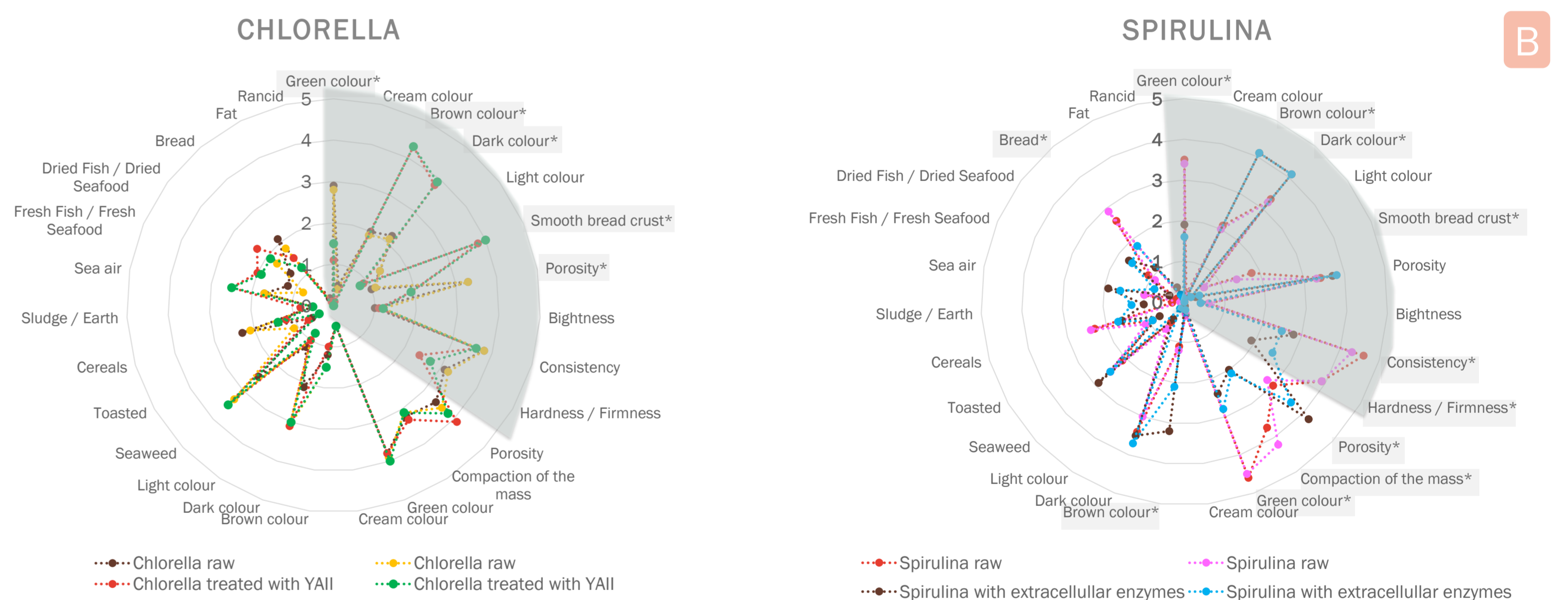


Figure 3: Bread evaluation: (A) Graphical representation of acceptance value vs. liking. (B) Representation of the number of mentions associated with each attribute, with identification of the attributes with significant differences (*). The shaded area refers to the external appearance of half a loaf of bread.

Cheese Evaluation

Regarding the sensory profile, the sea-like odour intensifies, and the cheese odour decreases for the samples with enzymatic treatment.

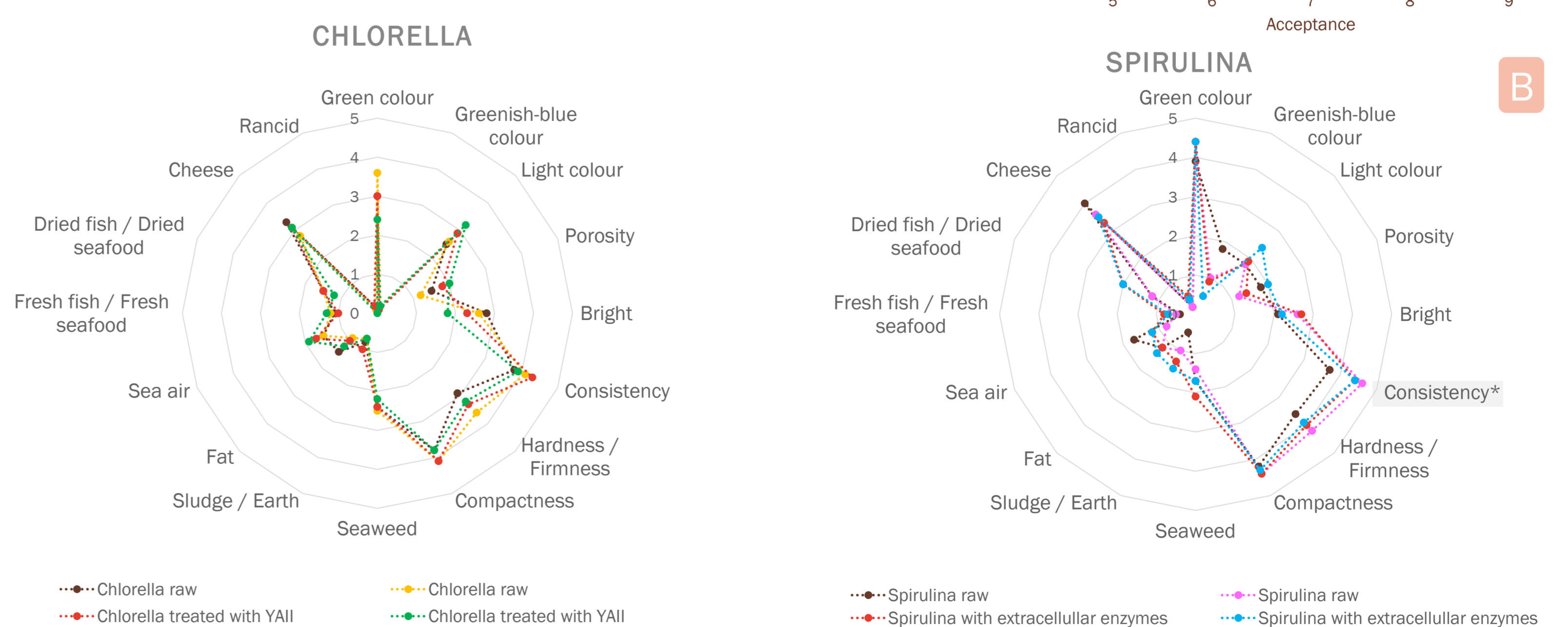


Figure 4: Cheese evaluation: (A) Graphical representation of acceptance value vs. liking. (B) Representation of the number of mentions associated with each attribute, with identification of the attributes with significant differences (*).