


## Actividades divulgación Proyecto AGROALNEXT\_2023/24

<b>Lugar</b>	Palacio de Congresos.
<b>Localidad</b>	Valencia
<b>Provincia</b>	Valencia
<b>Fecha</b>	06/11/2023 a 08/11/2023
<b>Proyecto:</b>	LEGUMAX
<b>Código proyecto</b>	AGROALNEXT_2022/030
<b>Grupo de investigación</b>	<p>Grupo de investigación Food&amp;Health del Instituto Universitario de Ingeniería de Alimentos-FoodUPV de la Universitat Politècnica de València.</p> <div style="display: flex; justify-content: space-around; align-items: center;">  <div style="text-align: center;"> <p>UNIVERSITAT POLITÈCNICA DE VALÈNCIA</p> </div>  </div>

### INFORME DE LA ACTIVIDAD:

En el contexto del Congreso “EFFoST International Conference 2023” celebrado en Valencia del 6 al 8 de noviembre de 2023 y organizado por la Federación Europea de Ciencia y Tecnología de los Alimentos (EFFoST) al objeto de facilitar el intercambio de conocimientos y crear oportunidades entre todos los actores del ámbito alimentario se presentó el poster “Sensorial evaluation of fermented fava beans based bars”.

La investigación realizada, vinculada al proyecto AGROALNEXT\_2022/030: “Desarrollo de nuevos productos saludables y sostenibles basados en legumbres fermentadas para la prevención del sobrepeso infantil (LEGUMAX)” tenía como objetivo el desarrollo de nuevos snacks basados en fuentes alternativas de proteínas (habas) así como su análisis sensorial para de esta forma poder evaluar su posible incorporación con éxito en la dieta del colectivo infantil.

FOTOS DE LA ACTIVIDAD:

UNIVERSITAT POLITÈCNICA DE VALÈNCIA Food UPV EFFOST 6-8 November Valencia, Spain 2023 INTERNATIONAL CONFERENCE

**SENSORIAL EVALUATION OF FERMENTED FAVA BEANS-BASED BARS**

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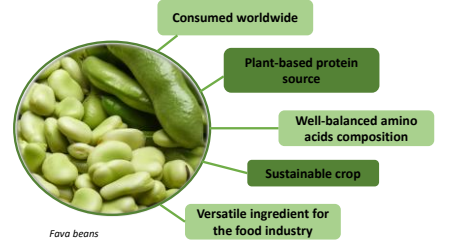
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INTRODUCTION RESULTS

Nowadays, the prevalence of kids obesity and overweight is one of the major concerns for modern society. Numerous studies have revealed that kids and adolescent obesity is connected with adult excess weight problems and can lead to physical and mental health issues. In this case, developing food products enriched with plant protein ingredients is seen as a perspective strategy for achieving healthy patterns in their diet and preventing obesity.

Based on the presented studies [1], fava beans might be considered a valuable fortifying agent for increasing plant protein consumption and nutritional value improvement among other protein-rich ingredients. Considering that snack consumption is regular for the youngest generations (kids and teens) diet, such product improvement can be an effective solution to the mentioned problem. Despite the wide range of studies about beneficial plant-based ingredients and snacks that can be included in kids' diets, there is still a challenge to successfully implement these products on the market and attract young consumers. Thus, this study aims to develop snacks based on alternative sources of protein (fava beans) that can be successfully included in kids' diets.



MATERIALS AND METHODS

All ingredients were purchased from local shops in Valencia, Spain. For the solid-state fermentation process of fava beans, the *Pleurotus ostreatus* strain was used following the methodology used in [2].

To develop protein-rich bars, oat flakes (OF), puffed spelt (PS), and puffed quinoa (PQ) were used. Production of bars followed the factory's process. The optimal ingredients were chosen by sensory evaluation of prepared samples. Developed snacks were offered to consumers for organoleptic test using a 9-point hedonic scale on appearance, color, aroma, texture, stickiness, taste, and overall liking.

The spectro-colorimeter (Minolta, CM-3600D) was used to evaluate the color of the bars. The chromameter was employed to measure the degree of redness (+a) or greenness (-a), brightness (L), and yellowing (+b) or blue (-b) of fava bean-based bars.

After that, according to the D-optimal mixture design approach [3], the rational mixture for fava beans-based bars was chosen. Each analysis of the bars was evaluated based on data determined from three replicates. The data were calculated as means ± standard deviation (SD), and statistically evaluated by analysis of variance (ANOVA).

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ACKNOWLEDGEMENTS

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RESULTS

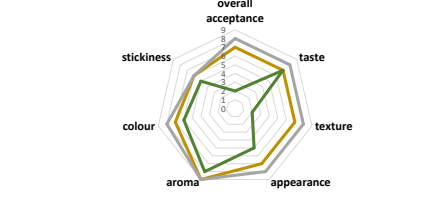


Figure 1. Sensory evaluation of fava beans-based bars

Figure 1 shows the sensory evaluation results, considering all characteristics based on the panelists' responses. The newly developed snack based on the mixture of fermented fava beans + puffed quinoa exhibited the highest organoleptic acceptance scores compared with other samples.

**Table 1. Color of bars**

Sample	L*	a*	b*	C*	h
OF	32.54±0.2 <sup>ab</sup>	6.77±0.05 <sup>a</sup>	17.52±0.2 <sup>ab</sup>	18.84±0.6 <sup>ab</sup>	68.55±0.4 <sup>a</sup>
PQ	33.99±0.6 <sup>b</sup>	6.94±0.08 <sup>b</sup>	19.55±0.25 <sup>b</sup>	20.79±0.8 <sup>b</sup>	70.21±0.4 <sup>a</sup>
PS	27.59±0.35 <sup>a</sup>	8.57±0.04 <sup>a</sup>	14.70±0.5 <sup>a</sup>	17.13±0.5 <sup>a</sup>	59.31±0.6 <sup>a</sup>

The different letter in the same column stated the statistical different at 95% confidence level (p < 0.05)

The color of the bar is affected by the different components, resulting in a heterogeneous surface so measured parameter has a large variation (Table 1). Based on the experimental results it is shown that PS sample is characterised with reduction of L\*, b\* and C\* parameters compared with other bars, indicating the darkening of the product enriched with spelt. This tendency could be explained by the increase in protein content. Similar results were found by Jozinović A. et al. [4] for extruded products with spelt flour.

Design-Expert software generates 7 formulations to produce optimized bars with acceptable sensory characteristics (Tab. 2).

Table 2. D-optimal mixture design of ingredients and sensory responses of protein-rich bars

Formulas	Fermented fava beans, %	Puffed quinoa, %	Pumpkin seeds, %	Actual overall acceptability	Predicted overall acceptability
1	63.10	23.75	13.15	7.9±0.65	8.0
2	69.10	19.40	11.50	8.2±0.5	8.1
3	65.70	20.50	13.80	8.4±0.55	8.4
4	63.10	23.75	13.15	7.9±0.65	8.0
5	69.10	19.40	11.50	8.2±0.5	8.1
6	69.10	19.40	11.50	8.2±0.5	8.1
7	62.20	20.00	17.80	8.9±0.6	8.9

Means ± standard deviation (n = 3).

The optimum ratio between protein-rich ingredients (fermented fava beans, puffed quinoa: pumpkin seeds) was 62 %, 20 %, and 18 %. This indicates that the usage of the suggested mixture can provide high consumer product acceptance and can be used to develop a bar with high plant-protein content for kids.

CONCLUSIONS

- the potential of fermented fava beans usage for the production of the bars was shown;
- sensory analysis showed a greater appreciation for the developed samples by the panelists;
- the basic recipe of bars enriched with plant protein-rich ingredients was developed.

Figura 1. Poster presentado: "Sensorial evaluation of fermented fava beans based bars".

Y para que conste a los efectos oportunos

Firma del IP1.