EVALUATION OF THE FUNCTIONAL PROPERTIES OF AQUAFABA IN VEGAN FOOD FORMULATIONS

Alina BOISTEAN, ORCID ID: 0000-0002-5374-5853
Technical University of Moldova, Department Food and Nutrition, Chisinau, Republic of Moldova

Aurica CHIRSANOVA, ORCID ID: 0000-0002-1172-9900
Technical University of Moldova, Department Food and Nutrition, Chisinau, Republic of Moldova

Aliona GHENDOV-MOSANU, ORCID ID: 0000-0001-5214-3562
Technical University of Moldova, Department Food Technology, Chisinau, Republic of Moldova

*Corresponding author: Alina Boistean, e-mail: alina.boistean@toap.utm.md

Introduction and Background

Aquafaba, the residual liquid derived from canned or cooked legumes, has recently emerged as a valuable functional ingredient due to its natural emulsifying and stabilizing properties [1]. According to previous research conducted at the Technical University of Moldova, aquafaba represents a significant food-processing residue—constituting up to 40% of the total mass of canned legumes—and has proven functional potential as a plant-based foaming and structuring agent, successfully replacing egg whites in various vegetable food products [2]. This study aimed to investigate how residual aquafaba collected from three different legume sources—chickpeas, white beans, and green peas—affects the physicochemical, rheological, sensory, and microbiological quality of vegan mayonnaise-type sauces.

Methodology

Aquafaba samples were collected directly as residual brine from commercial legume cans readily available on the Moldovan market. Vegan mayonnaise formulations were prepared according to a standardized recipe, and the resulting products were analyzed for dry matter, titratable acidity, pH, viscosity, sensory attributes, and microbial load using established analytical and instrumental methods.

Results

White bean aquafaba showed the highest dry matter content, while green pea aquafaba exhibited the highest moisture percentage among the three samples. All vegan sauces prepared from these aquafaba types met the required acidity specifications, and pH measurements indicated values below 4.6, confirming microbiological safety; the chickpea-based sauce presented the lowest pH, thus offering the most favorable acidic profile. Rheological analysis showed that the sauce formulated with chickpea aquafaba reached the highest viscosity, reflecting a thicker and more stable emulsion compared to the white bean and green pea variants. Sensory evaluation revealed that the chickpea and white-bean sauces received the highest scores for appearance, taste, and texture, aligning closely with consumer expectations for mayonnaise-type products. Microbiological assessment demonstrated acceptable colony counts across all samples, with the chickpea-based sauce again showing the lowest microbial load, confirming its superior hygienic quality.

Conclusions and Implications

The study demonstrates that the type of aquafaba—collected as a residual by-product from canned legumes—significantly influences the quality of vegan mayonnaise-type sauces. Chickpea aquafaba provided the most advantageous functional, sensory, and microbiological characteristics, highlighting its potential as an effective clean-label emulsifier for plant-based formulations. Moreover, these findings offer practical value for public catering enterprises that prepare vegan dishes, as the use of residual aquafaba can contribute to waste reduction and cost optimization in the production of vegan sauces. This approach supports both sustainable resource management and the affordability of plant-based menu items.

Keywords: *aquafaba, emulsification, sensory quality, vegan mayonnaise, viscosity*

Acknowledgments. The research was supported by the Institutional Project 020405 *"Optimization of food processing technologies in the context of circular bioeconomy and climate change", Bio-OpTehPAS,* running within the Technical University of Moldova.

References

1. BULGARU, Viorica et al. The influence of additives on the aquafaba quality. In: Insights of Future Foods - From concepts and challenges to technological innovations: 11th internat. symposium EURO-ALIMENT 2023, Galaţi, Romania, 19-20 October 2023, p. 49. ISSN 1843-5114. http://repository.utm.md/handle/5014/27056

2. MAZUR, Mihail, SANDULACHI, Elisaveta, PATRAS, Antoanela, GHENDOV-MOSANU, Aliona. Use of chickpeas aquafaba in the technology of manufacturing vegetal sponge cake. In: Intelligent Valorisation of Agro-Food Industrial Wastes. Book of abstracts. International Conference, Chișinău, 7-8 October 2021, p. 48. ISBN 978-9975-3464-2-9. http://repository.utm.md/handle/5014/17732