**The development of vegan meringue-based icings: a comparative evaluation of the foaming properties of egg albumen and plant proteins.**

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**Abstract**

The study evaluated the foaming properties of plant proteins and considered their suitability as alternatives to egg albumen in the production of vegan meringue-based icings. Merigue-based icings are traditionally made from egg albumen, sugar and butter. Their distinct aerated structure rely solely on the foaming, emulsifying and binding properties of the egg albumen. Vegan icings exclude animal-derived ingredients, plant-based proteins and fats are used instead. Icings contribute primarily to the sensory properties but also act as a moisture-barrier, a protective coating that can help extend the shelf life of bakery products. Veganism has been identified as a major food industry trend in recent times, but the history dates back to 1944, with the establishment of ‘The Vegan Society’ in England. The necessity for vegan icings derives from the health threat posed by egg as an allergen and purveyor of the food pathogen, *Salmonella.* Veganism may als*o* provide a means of combating potential food crisis by offering safe and nutritious diets with low impact on the environment. This has directed research into the exploration of plant-based alternative proteins as replacements for egg albumen in bakery products. However, mimicking the unique role of egg albumen in the formulation of meringue-based icing, presents a huge challenge as foaming is vital for the distinct structural characteristics of certain bakery products. Thus, the foam properties of egg albumen and the plant proteins from potato and pea were evaluated. The foams were produced from 100 mls of water, 2-6% of each plant protein and 1-5% stabilisers (corn and potato starch), cream of tartar, vinegar and lemon juice. A handheld mixer, Bosch ErgoMixx 400 W, was used to whisk the ingredients for 4 minutes at speed 5. 100 mls of egg white was whisked, similarly. The volumes of the samples were examined after whisking to determine foam capacity and the increase in volume. All analyses were carried out in quintuples and at a temperature of 20˚C. Early indications showed that the plant proteins can mimic the foaming properties of egg albumen to a significant extent and hence can be used successfully as alternatives.

**Keywords**: *Egg albumen, Foaming properties, Plant-based proteins, Vegan meringue-based icings, Veganism*

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**References**

Akharume, F. U., Aluko, R. E. and Adedeji, A. A. (2021) Modification of plant proteins for improved functionality: A review, *Comprehensive Reviews in Food Science and Food Safety*, 20 (1), pp. 198–224. DOI:10.1111/1541-4337.12688. [Accessed 3 October 2022].

Alavi, F., Emam-Djomeh, Z., Mohammadian, M., Salami, M. and Moosavi-Movahedi, A. A. (2020) Physico-chemical and foaming properties of nano-fibrillated egg white protein and its functionality in meringue batter, *Food Hydrocolloids*, 101, pp. 105-554. DOI:10.1016/j.foodhyd.2019.105554. [Accessed 18 October 2022].