

## Popular Science Summary

As a cold sauce originated from France, mayonnaise is nowadays one of the most famous sauces worldwide normally made from egg yolks, vegetable oil, salt, vinegar, and mustard. The magic of mixing immiscible liquids into a semi-solid sauce is the formation of an emulsion. The science behind mayonnaise or similar food emulsions is the dispersion of oil in the form of small droplets in the continuous aqueous phase. No specific equipment or technique is needed to make it; by slowly adding the oil while beating the egg yolk and continuously incorporating the other ingredients until thoroughly combined, you will have a light and shiny sauce with a smooth, creamy and thick texture.

You won't be surprised to find a full-fat mayonnaise contains more than 70% of vegetable oil. Although all emulsions are unstable and will eventually break down during prolonged storage, the high amount of oil in mayonnaise contributes to not only its attractive appearance, but a perfect physical stability. However, the concern on the health and the calls for sustainability have put the food producers in the race for alternatives. You might notice that more and more "light mayonnaise" (with reduced fat) and "vegan mayonnaise" have been popping up on the shelves, where egg yolk is usually replaced by modified potato starch, pea protein or soy protein. But, in most cases, the quality of those products is not competitive to the real mayonnaise.

You don't want to see a layer of separate oil on the top of your sauce. Also, you don't too much calories or a long list of additives. Is it possible to have a healthy vegan sauce without compromising to the physical stability?

When looking for an ingredient out of this purpose, baobab (*Adansonia digitata L.*) is listed as a potential candidate which has been approved as a novel ingredient by the EU in 2008. As you might know, the baobab tree is a signature of Africa. The fruit is included in the traditional meals in African, and it has numerous cosmetic and medical applications. It is rich in vitamin C, antioxidant compounds, and dietary fibres, especially pectin, a suggested food emulsifier. Baobab pulp is suitable for extended storage and is convenient for industrial applications as it is naturally dried in shells and light in weight.

Regarding the flavour, nutrition and processing properties, a savoury sauce named Baonaise made from baobab pulp and rapeseed oil was created by Arwa FoodTech AB. However, the very original version of this sauce had a problem of creaming during storage. This thesis is to help to solve this problem. In the preliminary study, a comparison between Baonaise sauce base (BSB) and the commercial references confirmed the need of improving emulsion stability. Then, the investigations into the effect of ingredients and processing parameters were conducted. The stability of the emulsions was evaluated by the centrifugal method, where unstable sauce would be separated into layers while the stable part was still homogenous. At the same time, particle size and rheological behaviours were determined to understand the variations in stability under different treatments. The results show that oil content, mixing speed and time play vital roles in the quality of baobab emulsions, especially the physical stability; baobab emulsions have similar flow behaviours as mayonnaise. Baonaise comes up with three different flavours.

The outcome of this thesis highlighted the needed parameters to produce stable Baonaise, a healthy and plant-based savoury sauce that is promising to satisfy the urgent need from the market.