



## Studies on standardization and preparation of flavoured mayonnaise

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### Abstract

Mayonnaise is an oil in water emulsion and egg components are its emulsifier. Study of preparation of Flavoured mayonnaise was done by using soya milk, oil and other ingredients. In this research application of soya milk to stabilize mayonnaise was studied. Egg was replaced with soya milk and microstructure, stability, colour, viscosity and sensory analysis were performed. Firstly, the flavoured mayonnaise was prepared using soya milk, aloe vera gel, oil and other ingredients. Physio-chemical analysis were carried were the results showed that mayonnaise prepared was slightly yellow/white in colour with smooth/shiny texture and it consists of moisture content with 47.37g, Ash content 0.70g, protein content 1.12g, fat 46.69g and carbohydrate content was found to be 4.11g. Energy values was found to be 291.54 Kcal and dietary fibre 0.07g respectively. Sensory evaluation of Flavoured Mayonnaise was carried out & score recorded was T3 sample observed higher score of colour, texture, appearance and taste. Sample T3 like very much having more good taste and texture content was selected for further study. Sample T3 was observed higher score followed by T1 and T2 samples. The sample was stored in a plastic bottle for 30 days in Refrigerator.

**Keywords:** Mayonnaise, aloe vera, soya milk, proximate analysis, flavoured mayonnaise, storage etc

### Introduction

The word mayonnaise was not used for a dressing before the start of the 19 century. Mayonnaise belongs to the food products widely consumed in Europe. It has been in existence origin France. It is first produced commercially in early 1900s, becoming popular in America from 1917 to 1927 and recently in Japan where sales increased by 21% in the years from 1987 to 1990. Because of its low pH and high fat content, mayonnaise resistance to microbial spoilage (Depree and Savage, 2001).

Mayonnaise is an oil-in-water emulsion despite containing between 70 80% fat. Oil in water emulsions consist of finely dispersed droplets of oil in a continuous phase of water or a dilute aqueous solution. Droplet size range is from less than 1µm to 20µm or more. This emulsion is formed by mixing the eggs, vinegar and spices, and then slowly feeding the oil, resulting in a closed packed form of oil droplets or coarse emulsion. Dissimilarly, if the aqueous and oil phases are mixed at once the result is a water-in-oil emulsion, whose viscosity is similar to the oil from which it was made (Depreeand Savage2001). Vegetable oils, the main ingredient in mayonnaise, have an important function in an emulsion; they contribute to the taste, the appearance. The texture and the oxidative stability of the emulsion in a very specific way (Moslavac *et al.*, 2012).

Iranian national standard has specified three types of mayonnaise regarding the fat content 1) ordinary mayonnaise with min. 66% fat, 2) reduced fat mayonnaise with min. 25% fat reductions compared to the ordinary one, 3) low-fat mayonnaise with 50% fat reduction as compared to the ordinary counterpart. Among the most evident examples are dressing for which well-known variants “reduced – fat”, “light low fat” and “fat-free” have been developed (Sabaghianet *al.*, 2014).

Mayonnaise is an oil-in-water (O/W) emulsion and is widely consumed as a traditional seasoning due to its creamy mouthfeel and special flavour. The conventional mayonnaise contains 65%–80% fat, which contributes to its texture, appearance, flavour, and shelf life (Sun *et al.*, 2018; Worrasinchai, Suphantharika, Pinjai, & Jamnong, 2006). Mayonnaise is presumed to have originated from Port Mahon, France, in 1756. It was produced for celebrating the conquering the Port Mahon by forces under the command of Louis Francois Armand de Vignerot du Plessis, duc de Richelieu (1696–1788), a marshal of France, and it was called Maho´nnaise. The word was later changed to mayonnaise, probably because of the old French words for egg yolk and to stir, moyen and manier (Morley, 2016).

Mayonnaise was produced commercially in the early 1900s for the first time and then became popular in America from 1917 to 1927 (Harrison & Cunningham, 1985). Later in Japan, the mayonnaise price was incremented by 21% from 1987 to 1990 (Le, 1992). This emulsion includes an aqueous solution as a constant phase and oil as a dispersed phase (Aganovic *et al.*, 2018). It is produced using vegetable oil, emulsifier (egg lecithin), acidic components (acetic acid, citric acid, and maleic acid), flavouring agents (sweetener, salt, mustard, or garlic), texture enhancers, stabilizers, and an inhibitor for unwanted crystals (Yildirim, Sumnu, & Sahin, 2016).

An oil in water emulsion is a system in which oil droplets are distributed in a water phase called aqueous phase. Emulsifier molecules possess surface activity because they are amphiphilic, meaning both polar and non-polar regions exist within their molecular structure. This structure helps the emulsifier to interact with both phases, forming a protective layer at interface in which dispersed phase droplets are prevented from coalescence.

Most food emulsifiers are amphiphilic molecules, such as lipid-based emulsifiers (small molecule surfactants and phospholipids) and biopolymers (proteins and polysaccharides). In addition, some types of solid particles are also surface active and can act as emulsifiers in foods like granules from egg or mustard (McClements 2009).

Mayonnaise is an oil in water emulsion and egg components are its emulsifier. Egg contributes to the emulsification, stabilization, flavour and color of mayonnaise. Egg possesses high nutritional value and is comprised of 75 % water, 12.5 % protein, 12 % fat, and a small proportion of carbohydrate (Maghsoudi 2004). Both egg yolk and egg white contain several components, each of which possesses emulsifying activity (Mine 1998; Drakos and Kiosseoglou 2006; Drakos and Kiosseoglou 2008). Although egg possesses excellent emulsifying ability, concerns about high blood cholesterol are developing. Realizing they can contribute to their health, people eat much more knowledgeably. So there have been done several studies on removing egg in mayonnaise. Aluko and McClintosh (2005) have studied canola proteins in native and hydrolyzed forms in mayonnaise, wheat protein functionality in mayonnaise was studied by Ghoush *et al.* (2008); Goankar *et al.* (2010) have done a research on milk proteins emulsifying performance in mayonnaise and used both native and hydrolyzed milk proteins to stabilize mayonnaise.

Soya beans have been an integral part of the diet of people in the Far East for more than 5,000 years. However the history of soy protein products is relatively short. In early years soy protein products were mainly used to meet nutritional needs, but more recently they have been used primarily for their unique functionality. With steadily improving production technology and intensive training in applications, full fat soy flours are finding wide application as a food or food ingredient. Full fat soy flours are primarily produced in Europe and Asia for the baking industry and production of soy milks (Choon Rhee 2004).

Water extractable soybean proteins can be divided in whey proteins (10 %), and globulins (90 %). Soybean globulins consist of four fractions, 2S (15 %), 7S (34 %), 11S (41.9 %) and 15S (9.1 %) (Fukushima 1991). Several trypsin inhibitors and cytochrome c exist in the 2S fraction; other minor proteins may also be present. The 7 s fraction comprises at least four different proteins: hemagglutinin, lipoxigenase,  $\beta$ -amylase, and a component designated 7 s globulin. The 7 s globulin ( $\beta$ -Conglycinin) represents more than one-half of the total 7 s fraction (Wolf and Sly 1967). In the 11 s fraction, a single protein called 11 s globulin (Glycinin), accounts for most of this fraction. The remaining of the protein constitutes the 15 s fraction, which has not been isolated and characterized (Wolf 1970). Functional properties of soy proteins such as emulsification, gel formation, etc. Have been widely investigated by several researchers (Ahmad *et al.* 2010; Arjun Kulthe *et al.* 2011; Fukushima 1991; Poongodi Vijayakumar and Boopathy 2012; Vasu Pallavi *et al.* 2011)

Although soy proteins emulsifying properties have been studied by different authors, there is no scientific research on investigating soy proteins emulsification when full soy flour is used. As a result, this study aimed at removing egg, partially or totally, and developing an egg- reduced product without any financial disadvantage for industry. Therefore, our objectives in this study were to investigate soy milk prepared with full soy flour emulsifying property and the

characteristics of the mayonnaise when soy milk is employed to stabilize it.

Soya milk has the same amount of protein as cow's milk, though the amino acid profile differs. Unlike cow's milk, it has little saturated fat and no cholesterol. Soy is naturally high in essential fatty acids, proteins, fiber, vitamins and minerals. These nutrients provide energy and keep the body functioning at its optimum level.

Aloes are perennial succulents or xero-phytes; they can adapt to habitats with low or erratic water availability, are characterized by the capacity to store large volumes of water in their tissue, and are able to use crassulacean acid metabolism, an adaptation to the photosynthetic pathway that involves the formation of malic acid (Boudreau *et al.*, 2013). Aloe plants, such as Aloe vera, all have green fleshy leaves covered by a thick cuticle or rind, under which is a thin vascular layer covering an inner clear pulp (Boudreau *et al.*, 2013) The leaves are 30–50 cm in length and 10 cm in width at the base, pea-green in colour (when young spotted with white), and with bright yellow tubular flowers 25–35 cm in length arranged in a slender loose spike (WHO, 1999).

Aloe vera, sometimes referred as a “miraculous” plant, has been used by mankind during centuries, for the treatment of mainly skin conditions but also for different disorders like constipation, stomach disease, hair loss, kidney disease and more (Park & Lee, 2006). From the ecological nature of the plant, Aloe originated from Africa and the history of its use dates back to almost 6000 years

Formerly alternatively placed in the Liliaceae and Cloaceae Families, Aloe genus is nowadays counted between the members of the Xanthorrhoeaceae (Upton 2012), subfamily Asphodeloideae. The Aloe genus counts over 400 species in the world. Among them, A. Vera (L.) Burm. F. (= A. Barbadosensis Mill., = A. Chinensis Bak., = A. Vulgaris Lam. = A. Elongata Murray, = A. Officinalis Forsk; Curaçao aloe, the true Aloe); A. Arborescens Mill. Var. Natalensis (Japan), A. Perryi Bak. (India), A. Ferox Mill. (Cape Aloe, Cape), A. Africana Mill. (Africa), A. Saponaria Haw. (Africa and Middle East) are the most popular ones. Aloe species are perennial succulent xerophytes with thick fleshy leaves which permits the water storage in the form of the famous gel. Aloe species prefer semi-desert regions with warm climates and grow best on dry, sandy and calcareous terrain. Aloe however, is not a cactus. The homeland of Aloe is Africa, the Arabian Peninsula, Madagascar and Indian Ocean Islands.

Aloe species are also distributed to the Mediterranean region, Canary Islands, Mexico, India, and the Caribes. In the USA, A. Vera is cultivated in South Texas (Rio Grande), Florida and Southern California. The etymology of Aloe comes from “alloeh (k)” (Arabic) or “allal” (Hebrew) or “alsos” (Greek); which means bitter (Park & Lee, 2006; Shrestha *et al.*, 2015); “vera” means, true veritable. The Arabic name of the plant “saber” (sword) is due to the shape of the enlarged leaves in the form of a sword. The Turkish name of the plant “sarısabır” is derived from the Arabic name probably combined to the color of its yellow flowers. The name “sabir” in Persian was attributed to the fact that this plant relaxes Man and sofort that Aloe is planted on the graves to relax the family of the deceased (Sharrif Moghadassi, 2010).

**Material and methods**

**Procurement of materials for Flavoured Mayonnaise**

Raw materials required during present investigation were procured from local market of Saralgaon such as, Vinegar or lemon, soy milk, salt, sugar, edible oil, Aloe vera. Aloe vera, lemon etc. the raw material were cleaned and made free foreign matters.

**Physical Properties of Flavoured Mayonnaise**

The physical properties such as appearance and colour were studied. The colour of the flavoured mayonnaise observed is slightly yellow/white and the appearance of the product is smooth and shiny.

**Chemical Properties of Flavoured Mayonnaise**

Different chemical properties of samples were analysed for moisture content, ash, fat, protein and total carbohydrate. All the determinations were done in triplicate and the results were expressed as the average value. For moisture determination samples were dried in oven at 130°C for 60 minutes. For ash determination samples were placed in muffled furnace at 550°C to burn out all carbon compounds leaving in organic part (ash). Fat was determined by fat extraction unit by using n. Hexane.

**Sensory Evaluation**

Prepared product was evaluated for sensory characteristics in terms of appearance, color, flavour, aftertaste, texture and overall acceptability by 10 semi-trained panel members comprised of academic staff members using 9- point Hedonic scale. Judgments were made through rating the product on a 9 point Hedonic scale with corresponding descriptive terms ranging from 9 ‘like extremely’ to 1 ‘dislike extremely’. The obtained results were recorded in sensory score card.

**Storage of Flavoured Mayonnaise**

Storage effect on product was good on up to 20 days at ambient temperature and 30 days at Refrigerator Temperature was carried out & score recorded was T3 sample. The significant changes were noticed in colour, consistency, appearance and taste during 200 days of storage.

**Statistical analysis**

The analysis of variance of the data obtained was done by using Completely Randomized Design (CRD) for different treatments as per the method given by Panse and Sukhatme (1967). The analysis of variance revealed at significance of P<0.05 level S.E. and C.D. at 5 per cent level is mentioned wherever required.

**Preparation of Flavoured Mayonnaise**

**Flowsheet for Preparation of Flavoured Mayonnaise**

Selection of raw materials (Soyabean oil, milk, sugar, salt, vinegar/lemon, other ingredients) → Addition of milk in a flask → Addition of sugar to the flask→ Premixing all ingredients with the blender →Addition of vinegar with salt → Addition of Aloe Vera Gel → Homogenization → Mayonnaise→ Filling into jar→ Packaging → Storage

**Result**

**Physical and Chemical Properties of Raw Materials**

**Table 1:** Chemical Properties of Soya Milk

Parameter	Units
Water	228.5
Total Solids	10.4
Ash	1.75
pH	6.74
Acidity	0.24

Chemical properties of soya milk such as water, total solids, Ash, pH, Acidity were carried out and the results obtained are shown in table. It was evident from table that the water content of soy milk is found to be 228.51%, total solids as 10.4%, Ash 1.75%, pH 6.74%, and Acidity was found to be 0.24%.

**Table 2:** Physical and chemical Properties of Aloe Vera Gel

Parameter	Units	Parameter	Units
Appearance	Clear Yellowish/Green liquid	Moisture	98.93
-		Ash	0.16
		Protein	0.12
		Fat	0.01
		Crude Fibre	0.12

(Dr. Vallabh Chandegara *et al*) The physical parameters of Aloe vera Gel states that its appearance is clear yellow/green liquid in color. (K.Scala *et al.*) The chemical parameters such as moisture, protein, Fat, Crude fibre, Ash are studied. Moisture is 98.93 % while protein is 0.12 %and fat is 0.01%, crude fibre 0.12% and Ash 0.16% respectively.

**Physical and Chemical Properties of Flavoured Mayonnaise**

**Table 3:** Physical Properties of Flavoured Mayonnaise

Physical Properties	Mayonnaise
Appearance	Smooth
Colour	Slightly yellow/white
Texture	Semi-liquid

The physical properties such as appearance, texture, color were studied. The color of the flavoured mayonnaise observed is slightly yellow/white and the appearance of the product is smooth and shiny whereas the texture of the product is semi-liquid.

**Table 4:** Chemical Properties of Flavoured Mayonnaise

Chemical Parameter	Selected sample
Ash	0.70g
Moisture	47.37g
Fat	46.69g
Protein	1.12g
Carbohydrate	4.11g
Energy	441.2kcal
Dietary Fibre	0.07g

It was evident from above tabulated that the chemical properties of flavoured mayonnaise moisture content was found to be 47.37g, Ash content 0.70g, protein content 1.12g, fat 46.69g and carbohydrate content was found to be 4.11g. Energy values was found to be 291.54 Kcal and dietary fibre 0.07g respectively.

**Table 5:** Organoleptic Evaluation of Flavoured Mayonnaise

Parameter	T1	T2	T3
Colour	07	07	8.5
Flavour	08	08	09
Taste	07	7.5	08
Texture	7.5	08	08
Appearance	07	07	09
Overall Acceptance	7.8	7.5	8.5

The sample T3 has highest score as compare to the other samples. The colour of T3 sample as per graph is 8.5 point while samples T1 (07), T2 (07). The flavour of sample T3 was acceptable with 09 while samples T1 (08), T2 (08). The texture of sample T3 was selected by 8 points while other samples points are T1 (7.5), T2 (8). The appearance of sample T3 was selected by 09 while other samples points are T1 (7), T2 (7). The taste of sample T3 was selected by 8 points while other sample are T1 (07), T2 (7.5). The overall acceptability of sample T3 was selected by 8.5 points while other samples points are T1 (7.8), T2 (7.5). According to sensory evaluation sample T3 preferred good score and selected for further study.

### Conclusion

Conclusively, it emerges that the Studies on Development and Quality Evaluation of Flavoured Mayonnaise was carried out successfully prepared by using soy milk, oil and other ingredients. The health benefit of Flavoured Mayonnaise is well known so the product is having nutritional values and without egg This type of value addition by way of nutrient enrichment does certainly help to provide good source of energy. After consuming the product it can satisfy the nutritional needs of the consumer.

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