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Effect of Processing Methods on Quality of Soymilk

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Abstract: Soymilk is one of the easiest ways to add soyprotein, a high quality protein, to the human diet because it doesn't alter the taste of food. It is a highly nutritious drink and must be prepared in such an easy way that the quality is maintained. Soymilk was processed using 5 methods including delayed filtration, hot extraction, cold extraction, soaking and blanching, potash and sodium bicarbonate processing methods. The highest protein content was between 3.05% for delayed filtration and 2.23% for soaking in potash. The sensory properties of the soymilk increased with decrease in nutritional quality indicating that methods which increase sensory properties of soymilk by reducing its beany flavour have lower nutritional qualities.

Key words: Soymilk, process method, sensory quality

INTRODUCTION

Soymilk is the 'magic crop' which occupies a unique position among leguminous crops in having 40% protein and 20% oil in mature seeds, hence occupying an intermediate position between legumes and oilseeds having more protein than most of the concentrate (IITA, 1990). Products from soybean in developing countries include tofu, soymilk, soyflour, soybean oil.

Soybean protein is a high quality protein and it is obtained at a cheaper cost compared to other high quality protein sources e.g. meat and fish in the tropics. As a result of this, the potentials of soybean can be used to solve the protein gap problem among the low-income earners in the country. Soybean is also rich in minerals especially calcium, potassium, magnesium, iron, zinc and copper (FAO, 1971). It is also an excellent source of vitamins, thiamine, riboflavin and niacin (Singh *et al*., 1989).

Soymilk is the rich creamy liquid extract of soybean and it is the easiest way of adding soy protein to the Nigerian diet because of the beany taste. Soymilk is a popular nutritious alternative to cow milk and is even cheaper and can be processed in a fairly simple way (www.Soyfoods.com). The method of preparation that will yield the highest nutritive quality and that can be processed especially by the low-income earners is necessary. Ogundipe and Osho (1990b) carried out a study on the yield obtained from five methods of production including the use of potash and sodium bicarbonate (two substances reported as making soybeans tenderer and easier to cook). Thus this paper evaluates the five methods of production and the nutritional composition of the soymilk produced from the processing methods.

MATERIALS AND METHODS

Soybean seeds used were obtained from Sabo market in Ogbomoso and the methods of production of the different samples are as indicated in Fig. 1. After production the moisture content, protein, fat and ash content of the soymilk samples were determined using the methods of the Association of Official Analytical Chemists (1990). The sensory properties of the soymilk were determined by a panel of judges who were familiar with the product using the hedonic scale where 1-9 represents dislike extremely to like extremely. The panelists analyzed the samples for colour, smell, texture, taste, appearance and mouth feel. The values obtained were analyzed using a t-test to determine the degree of difference between the samples. Each sample was replicated thrice.

RESULTS AND DISCUSSION

The proximate composition of the soymilk samples are shown in Table 1 while the sensory properties are in Table 2. The protein content of the soymilk samples ranged from 3.05 to 2.23% for the delayed filtration and soaking in potash respectively. The high protein value for the delayed filtration is probably due to the fact that blanching had increased the breaking down of the secondary bonds holding down the molecules of the amino acid thus making the protein more soluble in the filtrate and hence increasing availability of the amino acids. The delay in filtration also helps to increase the solubility of the denatured protein in the filtrate such that the protein content of the soymilk produced is high. The low value for the potash method is because potash reacts with protein and forms a complex, which reduces the protein availability and thus decreases the protein content of produced soymilk. The value for sodium bicarbonate, which is also low, is due to the same reason as that of potash. Soaking as well as blanching gave a higher protein content of soymilk because soaking gives a tender product, which results in a finer slurry and thus more filtrate will filter through the filter cloth thereby increasing yield and subsequently the protein content of soymilk.

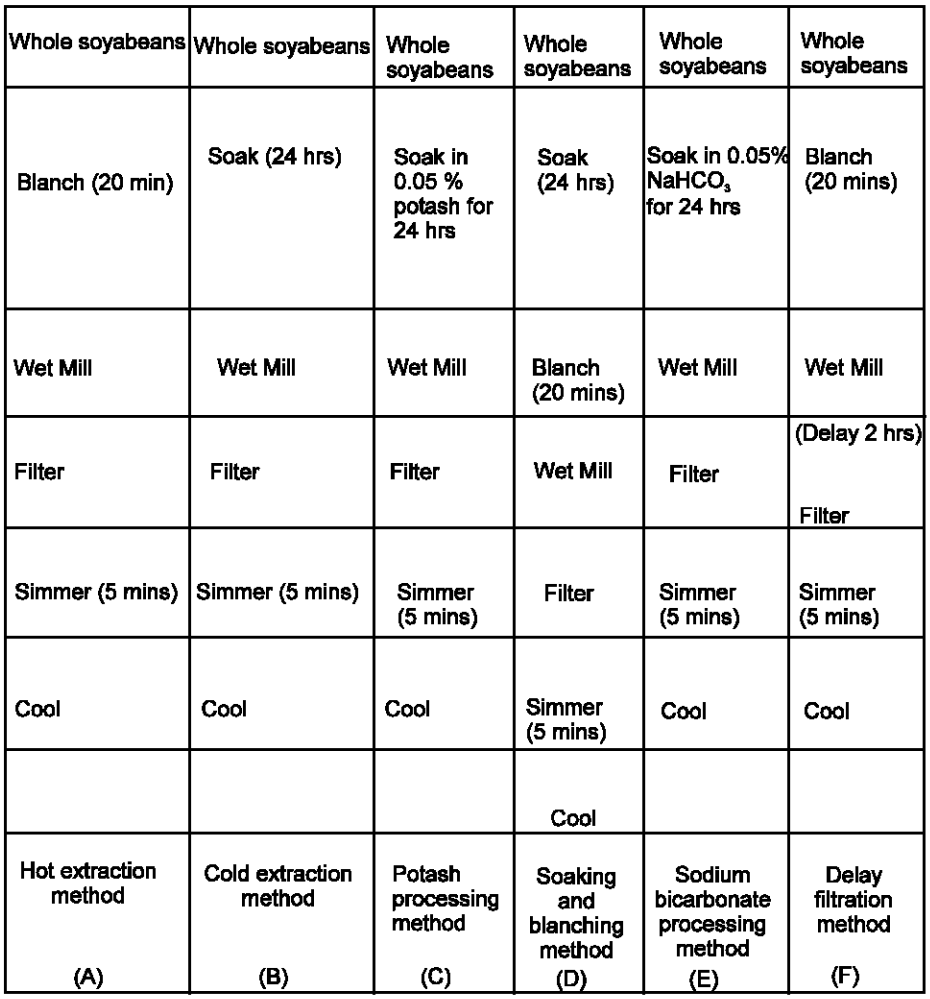

Fig. 1: Flowchart for methods of soymilk production

Table 1: Proximate Composition of Soymilk

Proximate Composition	A	B	C	D	E	F
Protein (%)	2.93^{b}*	2.72^{b}	2.23^{c}	2.81^{b}	2.67^{b}	3.05^{a}
Ash (%)	0.32^{b}	0.29^{c}	0.36^{a}	0.29^{c}	0.24^{c}	0.25^{c}
Fat (%)	1.94^{a}	1.90^{a}	1.60^{c}	1.93^{a}	1.81^{b}	1.86^{b}
Carbohydrate (%)	2.78^{a}	2.44^{b}	2.77^{a}	2.22^{b}	1.99^{c}	2.10^{c}
Moisture (%)	92.02^{a}	92.65^{a}	93.04^{a}	92.75^{a}	93.29^{a}	92.74^{a}

*Numbers with same letters are not significantly different; A-hot extraction technique, B-cold extraction technique, C-soaking with potash technique, D-soaking and blanching technique, E-soaking with sodium bicarbonate technique, F-delayed filtration technique

Table 2: Sensory Tests Panel Scores of Soymilk Processing Techniques

Quality attribute	A	B	C	D	E	F
Color	7.75^{a}*	7.88^{a}	7.38^{c}	7.50^{b}	7.50^{b}	7.25^{c}
Smell	5.50^{b}	5.25^{b}	6.88^{a}	5.38^{b}	5.88^{b}	7.13^{a}
Taste	6.38^{b}	6.63^{a}	7.13^{a}	6.25^{b}	6.25^{b}	7.50^{a}
Texture	6.90^{ab}	7.00^{ab}	7.50^{ab}	7.38^{ab}	6.63^{b}	7.63^{a}
Mouth-feel	7.00^{bc}	7.14^{ab}	6.88^{c}	6.38^{d}	6.25^{d}	7.25^{a}
Appearance	7.88^{ab}	8.00^{a}	7.13^{ab}	7.63^{ab}	7.00^{b}	7.75^{ab}

*Numbers with same letters are not significantly different; A-hot extraction technique, B-cold extraction, C-soaking with potash, D-soaking and blanching, E-soaking with sodium bicarbonate technique, F-delayed filtration

The fat content of hot extraction, soaking and blanching; soaking and delayed filtration were significantly different and higher than those with the use of sodium bicarbonate and potash. The high values for methods in which the soybean seeds are cooked is because the preheating treatment reduces viscosity of the oil and allows for easy breakdown of oil cells and release of oil. The lower value for the delayed filtration is that the delay gives time for the formation of a complex between the fat and starch/carbohydrate which is not soluble in ether which is the normal method used for fat analysis, thus giving a low fat content (Ogundipe and Osho, 1990b).

The sensory evaluation shown in Table 2 shows that samples produced using potash and sodium bicarbonate have a higher preference for smell, texture and taste because the methods reduced the beany flavour to a bearable extent as reported by Liu (1997). However these samples have the lowest preference in terms of colour. It is observed that these samples had the lowest nutritional composition while soymilk samples with high nutritional compositions had the lowest sensory quality in terms of smell, texture and taste. This shows that the beany taste of soymilk is still a problem that can hinder soymilk utilization in the country since processing methods that eliminated the beany taste had a higher preference though they had a lower nutritional value. Also the different methods of production have different nutritional compositions and therefore the methods chosen should be determined by the important nutritional component that is needed.

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