

SHELF LIFE AND ACCEPTABILITY OF DIFFERENT FRUITY FLAVORED SOYMILK UNDER TWO TYPES OF STORAGE METHOD

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ABSTRACT

Soy milk or Soya milk is liquid obtained by suspending soybean flour in water, used as a fat-free substitute for milk, particularly by vegans and by those unable to tolerate milk products. Soy milk is a good substitute for cow's milk on many levels. It acts as a good source of protein, lactose-free, an interesting alternative for consumers who are lactose intolerant and allergic to cow's milk. Nowadays, many food products are enhanced, engineered, modified and fortified for health and economic reasons. The aimed of this study was to evaluate the sensory aspects and shelf life of fruit flavored soy milk using two different storage method and consumers' acceptability. To this goal, there were five different powdered fruits were added in appropriate amount to the plain soy milk like mango, soursop, melon, strawberry and banana. The shelf life of the products was tested between two storage methods. The results interestingly manifested that in average shelf life under refrigerated condition, the melon flavored soymilk had the longest shelf life of 24 days, soursop flavored with 21 days, banana had 20 days, strawberry had 15 days and mango flavored was the shortest shelf life of 10 days. Unrefrigerated samples majority revealed that it only lasts for 10 hours. For sensory evaluation and acceptability, there were 105 trained and consumer typed of panelists involved in actual food testing based on Hedonic Scale Acceptability Test. The overall acceptability revealed that strawberry flavor soymilk was ranked as like moderately by the consumers as well as banana and melon. Unflavored soymilk, mango and soursop are slightly acceptable. The overall result of product acceptability constituted as good. The interpretation of the findings signified that adding fruit flavor to pure soya milk enhance its palatability factor and mask the beany-off flavor and consequently offer more variance of soya milk product to choose from and also it is economically feasible.

KEYWORDS: *Flavored Soy Milk, Shelf Life, Storage Method, Acceptability, Profitability*

Article History

Received: 23 Jan 2018 | Revised: 30 Jan 2019 | Accepted: 13 Feb 2019

INTRODUCTION

Through the years, there has been a gap between population growth and food production. This gap continues to increase to the extent that malnourishment has become prevalent in the country. It is because population growth is known to be faster than the speed of food production. Although efforts are expended towards increasing agricultural productivity, all these may simply go to waste if agricultural yield will not be harnessed fully (Gatchalian, 1986). Thus, there is an imperative to provide the means to increase food availability. One of the answers to this need is proper practice of food processing such as milk alternative both at the farm site, and in the food manufacturing sectors.

In many developing countries where malnutrition is a major problem, legumes and nuts have been tapped as alternative protein sources. The most common of these protein sources are soybeans, peanuts and mungbeans. (De Leon Sonia Y., Claudio, Virginia S. et. al., 1999). Soybean (*Glycine max* L.) is an important plant protein source, a potential source of bioactive peptides and contains high level of mineral and amino-acids (Hayta et. al; 2003). In the Philippines, soybean is called “utaw” by some. The Filipino people have long known some important soybean preparations such as soy sauce or “toyo”, bean curd or “tokwa” and fermented bean curd “tausi” (Ancheta, 1987).

Among the many soy products, soymilk is one of the popular traditional products in China and other Asian countries (Shun-Tang et. al., 1997) consumed as a nutritious and economical protein food (Matsuura et al., 1989). Consumers in western countries consume soymilk mainly as an important replacer of cow milk due to lactose intolerance or allergic reaction to cow’s milk, and as a low cost source of good quality protein and energy (Rosenthal et. al. 2003; Lui, 1997; Kwok and Niranjana, 1995; Kanthamani et. al., 1978).

Soymilk is one of the most popular soybean products, with plain and vanilla being most common flavors, although these beverages are being developed in a wide variety of other flavors (Chambers et. al., 2006). Soymilk and soymilk beverages consumption provides well-known health benefits (Hasler, C.M. 1998) and can also be an interesting alternative for consumers who are lactose intolerant, allergic to milk, avoid milk for any other reason (Reilly et. al., 2006).

Processing of soybeans into products are simple; farming families in soybean producing barangays could easily learn the simple technologies of soybean utilization. If this is achieved, then nutritious soybean products or food stuffs could be made available for the farm families as part of their daily food source. With all these important food substances present in the soybean, it is highly recommended as one of the best economical food crops of our farm families who are working hard daily and need nutritious food.

Meanwhile, soybean milk has a natural beany-off flavor, which is not popular for some consumers. The fruity flavored soymilk is made to provide greater varieties of soybean milk, and more nutritional and acceptable values for consumers. Fruit flavored soymilk is an upgraded product using soybean as main ingredient. This is low-cost but healthy food and has great benefit to human health. Besides, this strives to provide decent job for future effort to develop innovative processing strategies for producing and processing soybean product for food industry. This will help alleviate the malnutrition situation, being a good source of family income.

It is observed that one of the serious problems facing the country today particularly in some rural community is malnutrition due to poverty condition, specifically known as rural poor. The malnourished condition is a result of lack of income in that they cannot provide the basic nutrients stated in the three basic food groups and in the food pyramid, namely carbohydrates, protein, fats, vitamins and minerals. The most common deficiency in the diet is protein wherein good sources are meat and leguminous products.

The shelf life of soymilk is of great consideration to make the product acceptable and safe for human consumption. Shelf life is influenced by many factors, such as heating and preparation method, its packaging and how the milk alternatives are being stored to lengthen the storability factor and to reach the final consumers with utmost quality.

To help provide good source of protein among the growing children in the rural families, this study was conducted to develop a soybean-based beverage. Specifically, this aims to evaluate the sensory aspects and the acceptability attributes

of soymilk beverage with different fruit flavors such as mango, soursop, melon, strawberry and banana to enhance its sensory characteristic and to establish the desirable storability or shelf life with different storage methods. Also the study assesses the economic feasibility of the product and promotes soymilk as the best milk alternative and excellent source of protein from plants for rural families.

Experimental Design

A two-factorial experiment using Completely Randomized Design (CRD) was employed in the study in a controlled laboratory environment with two factors and replicated three times.

Soybean Variety and Fruit Flavors Used

Soybean variety IPB-Sy 96-27-23 was used. It has light yellow color, starchy, food grade soybean, ideal for soymilk processing. Powdered fruits are manufactured by MJ Commodity Flavors and Spices Inc. S.M.R. DFAD LTO # RDII-RIV-F-2977.

Treatment Used

Treatment are as follows:

Factor A- Storage methods

- A1- Room Temperature or unrefrigerated, and
- A2- Refrigerated

Factor B-Fruity flavored soymilk

- B1-Unflavored soymilk
- B2-Soymilk +Mango
- B3-Soymilk +Soursop
- B4- Soymilk +Melon
- B5-Soymilk +Strawberry
- B6- Soymilk +Banana

The Ingredients of Flavored Soymilk

- 1 kilogram soybean seed
- .667 kilogram refined sugar
- 20 grams rock salt
- 80 grams fruit flavorings
- 12 liters drinking water

The Procedures in Making Flavored Soymilk

- All necessary materials were prepared;
- The soybean seeds were cleaned and sorted out, the defected seeds, pebbles and other foreign materials were removed;
- The soybean seeds were washed with clean tap water;
- The soybeans were soaked overnight for 8 hours, after soaking, the water was drained;
- The cleaned soybean seeds were quickly steamed for easier removal of its seed coat;
- The soybean seed coat was eliminated by rubbing using hands with flowing tap water. The beans were ready for milk extraction;
- Cleaned soybean seeds were blended for five minutes or until smooth. One kilogram of soybean seeds, twelve liters of drinking water was added. The soymilk was strained into a casserole through a very fine sieve and re-strain using double-layered cheesecloth to ensure the separation of the okara from the milk;
- The soymilk was boiled to 90 °C centigrade for 15 minutes, stirred occasionally to prevent scorching;
- The soymilk was removed from heat and cooled with running water, when the temperature dropped to 50 °C, melted powdered fruits were gradually added;
- Cooled flavored soya milk was packed in the transparent bottle and sealed tightly;
- Packed soymilk was stored under two storage methods as used in the study.

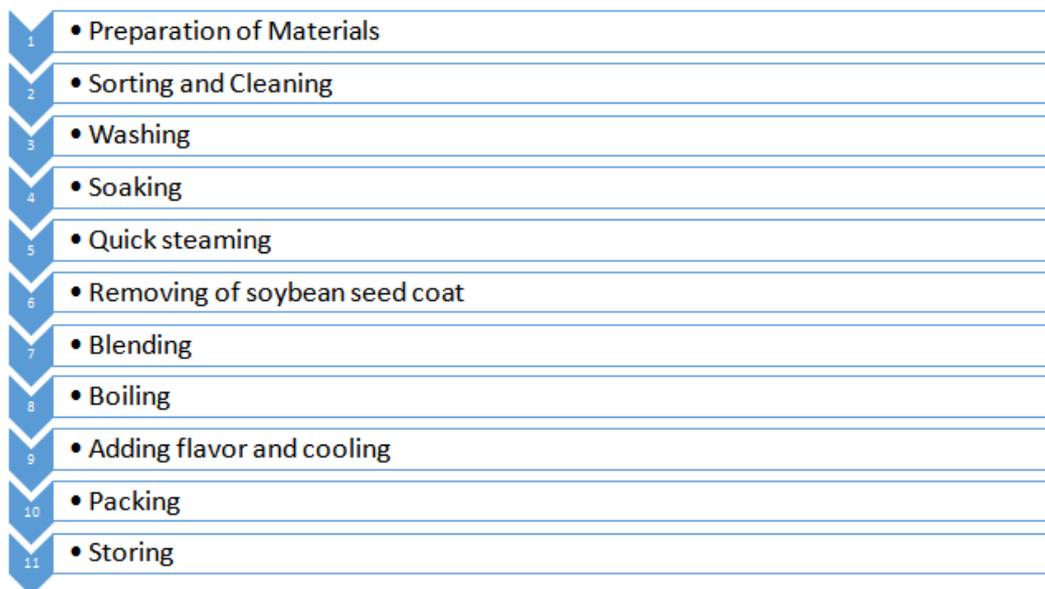


Figure 1

Experimental Procedure

Soymilk was developed into another product by adding flavors in a desirable amount and right procedures to achieve the acceptable sensory characteristics. A total of ten kilograms was processed for the purpose of sensory evaluation and acceptability test as well as shelf life testing. Five kilograms of soybean was processed for sensory evaluation and acceptability test and another five kilograms was processed separately for shelf life testing. Mango flavored soymilk contained light yellow color; soursop flavor had a whitish color; melon flavored soymilk possessed light orange color; strawberry flavored soymilk was pinkish; and banana flavored soymilk contained off-white color.

Shelf life testing was conducted inside the laboratory room. Five kilogram of soybean was processed and it yielded 60 liters of soymilk. However, little amount of soymilk was lost through evaporation during boiling process. Six treatments were prepared: treatment (1) was unflavored soymilk; treatment (2) was soymilk with mango; treatment (3) was soymilk with soursop; treatment (4) was soymilk with melon; treatment (6) was soymilk with banana flavored. The six treatments were replicated thrice and each replication had ten samples and each sample bottle was filled with 320 ml. a total of 180 bottles were prepared for shelf life studies; 18 bottles were randomly arranged under refrigerated or ambient room condition while 162 bottles were randomly arranged inside the refrigerator with -4°C temperature.

Data Gathering Procedure

A hundred and five trained and consumer-type panelists or judges carried out sensory evaluation and acceptability test of the six treatments of soymilk beverages. They were chosen based on their specific age range, allergy-free, sugar or fructose, and available for complete evaluation of all six samples at one time. The respondents comprised of purposely-selected male and female college faculty members aged between 35 to 55; staff aged between 25 to 45; farm workers aged 35 to 40 years old; and the college students aged 16 to 21, of the college of Agriculture, Mindanao State University, Marawi City. Each tester was given six coded randomized samples of the unflavored and five different flavored soymilk. A cup of drinking water was offered to cleanse their palate in between sample evaluation in order to minimize sensory carryover/and or fatigue effects. The evaluators provided a nine-point Hedonic scale rating form where 9 was the highest score and 1 was the least score. This was used to test for flavor, texture, and color acceptability. The degree to which a product was liked was expressed as: like extremely much (9), like very much (8), like moderately (7), like slightly (6), neither like nor dislike (5) dislike slightly (4), dislike moderately (3), dislike very much (2), dislike extremely (1). Like extremely to like slightly constituted good, while dislike slightly to dislike extremely constituted poor. Neither like nor dislike shows that the product was neither good nor bad.

Shelf life of flavored soymilk was methodically and closely monitored using the organoleptic or sensory test. The proponent conducted a precarious visual monitoring, organoleptic testing and evaluation of samples, and recording of data of the storage methods both refrigerated and unrefrigerated samples. Refrigerated samples were monitored in 24-hour interval while unrefrigerated samples were monitored in 5-hour interval until samples were no longer fit for drinking. This procedure was done to measure the products' suitability for human consumption. At least three (3) samples from every treatment or (1) representative from every replication was subjected to the said test each day. Spoiled samples were removed from the shelves.

Statistical Analysis

The following statistical tools were utilized in this study: Analysis of Variance (ANOVA), T Test for Independent Samples, Duncan Multiple Range Test (DMRT), and Return on Investment (ROI).

Discussion and Findings

From the data gathered, findings revealed that different treatments of the flavored soymilk have significant differences among one another. The products' overall acceptability revealed that strawberry, banana and melon flavored soymilk ranked moderately acceptable while the unflavored, the mango and soursop flavored soymilk were slightly acceptable. Generally, the product was acceptable and rated as good.

In terms of shelf life stability, the study revealed that among flavored soymilk in refrigerated sample, melon flavored soya obtained the longest averages shelf life of 586 hours or 24 days, while mango flavored soymilk achieved the shortest average shelf life of 248 hours or 10 days. For unrefrigerated soymilk under room temperature, unflavored soymilk has an average shelf life of 10 hours and the flavored soymilk such as soursop and banana had an average shelf life of ten hours, while mango flavor has the lowest average shelf life of 8 hours. Also, study shows that the test of difference and interaction between the storage methods and flavored soymilk revealed no significance. Lastly, the average Return on Investment (ROI) of the soymilk production is highly feasible since in every 100 pesos invested, there is an average return of 35.79 pesos.

CONCLUSIONS

Based on the findings of the study, soymilk sensory attribute is greatly related to the method of preparation and storage, right choice of soybean variety, and the accurate measurement of ingredients. Acceptability depends largely on the flavor, texture and color characteristics of the products. Furthermore, the product's shelf life is traceable on the specific storage method using appropriate packaging material and hygienically, scientifically and aesthetically prepared. Thus, to prolong the shelf life of flavored soymilk, it is recommended that the product should be refrigerated. Soybean-based products like soymilk provides profit, specifically refrigerated flavored soymilk; it demonstrates marketable and feasible acceptance in the market.

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