

RETENTION OF VITAMIN A, IRON AND IODINE IN FORTIFIED SOY SAUCE

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ABSTRACT

The retention of vitamin A, iron and iodine in fortified soy sauce prepared in the laboratory and stored using different packaging materials and storage conditions for a period of one (1) year was determined. The soy sauce was fortified with vitamin A, iron and iodine and the changes in the physico-chemical, microbiological and sensory properties of the fortified soy sauce stored using transparent glass and plastic bottles exposed under fluorescent light and sunlight were investigated for a period of one (1) year. After one (1) year of storage, iodine content changed from 456 µg to 438 µg (glass bottle) and to 431 µg (plastic bottle) per 100g for samples exposed to fluorescent light and from 405 µg to 426 µg (glass bottle) and to 422.4 µg (plastic bottle) per 100g for samples exposed to sunlight. Iron content changed from 31.6 mg to 27.0 mg (glass bottle) and to 26.3 mg (plastic bottle) per 100g for samples under fluorescent light and from 28.8 mg to 25.1 mg (glass bottle) and to 25.2 mg (plastic bottle) per 100g for samples under sunlight. The vitamin A content changed from 1,319 µg to 726 µg (glass bottle) and to 558 µg (plastic bottle) per 100g for samples under fluorescent light and from 1,816 µg to 481 µg (glass bottle) and to 441 µg (plastic bottle) per 100g for samples exposed to sunlight condition. Fortified soy sauce was rated like moderately (6) to like very much (7), using 7-point hedonic rating scale by trained laboratory panelists in terms of color, flavor, odor and general acceptability even after the 12 month storage study. The fortified soy sauce was also found microbiologically safe. Iron and Iodine were substantially retained in fortified soy sauce after one (1) year of storage in glass and plastic bottles exposed under fluorescent light and sunlight meeting the 1/3 recommended dietary allowance for the particular nutrient. Significant reduction in vitamin A content was noted in soy sauce kept in plastic and glass bottle and stored under fluorescent light and sunlight. Pilot and commercial scale trials are needed to validate results obtained in the laboratory before a large scale production can be implemented.

INTRODUCTION

Significance of the Study

- Approximately 20 % of the world's population are at risk of micronutrient malnutrition, particularly vitamin A, iron, and iodine.
- Food fortification is one of the three strategies adopted by the Philippine Government to address this micronutrient malnutrition.
- Soy sauce is an Asian seasoning and condiment made from fermented soybeans, wheat, salt and water. It is widely consumed by the Filipinos.

- Improving the nutrient content of soy sauce through food fortification will benefit majority of the soy sauce consuming Filipinos.

OBJECTIVES

General: To determine the retention of vitamin A, iron and iodine in fortified soy sauce prepared in the laboratory using different packaging materials and storage conditions.

Specific Objectives:

- To conduct laboratory fortification trials of soy sauce with vitamin A, iron, and iodine.
- To standardize the method/technique of fortifying soy sauce.
- To determine the changes in the vitamin A, iron, iodine, color and sensory properties of fortified soy sauce during storage.
- To determine the effect of storage condition on the retention of vitamin A, iron and iodine of the fortified soy sauce.
- to determine the effect of packaging materials on the retention of vitamin A, iron and iodine of the fortified soy sauce.

METHODS



HIGHLIGHTS AND RESULTS

- Iron and iodine levels of fortified soy sauce after one (1) year of storage are within acceptable levels meeting the 1/3 recommended dietary allowance for iron and iodine.
- Vitamin A of fortified soy sauce are within acceptable levels under fluorescent light for eight (8) months and two (2) months when exposed to sunlight.
- Color of fortified soy sauce was not affected during storage.
- Fortified soy sauce was found acceptable during storage by trained laboratory panelists.

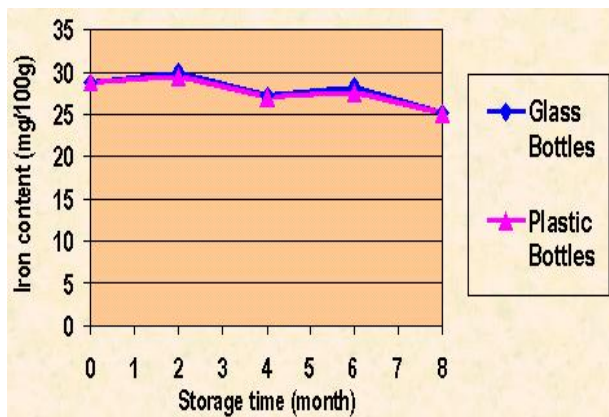


Figure 1. Changes in the iron content of triple fortified soy sauce exposed to sunlight

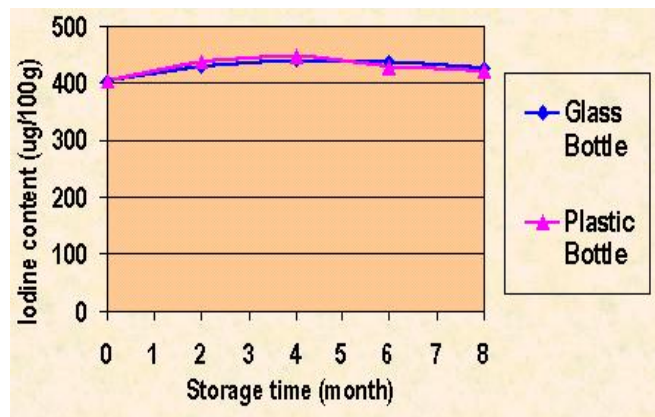


Figure 2. Changes in the iodine content of triple fortified soy sauce exposed to sunlight

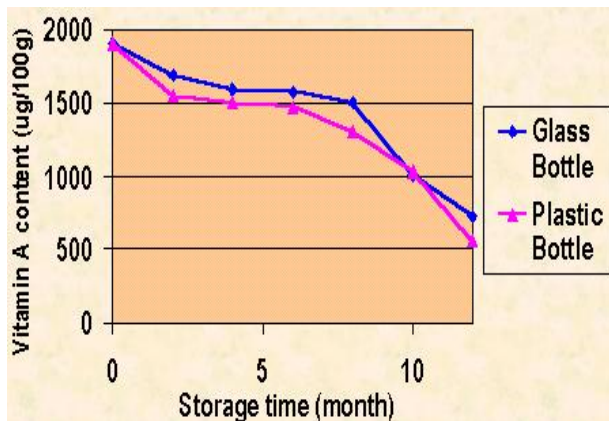


Figure 3. Changes in the vitamin A content of triple fortified soy sauce under fluorescent light

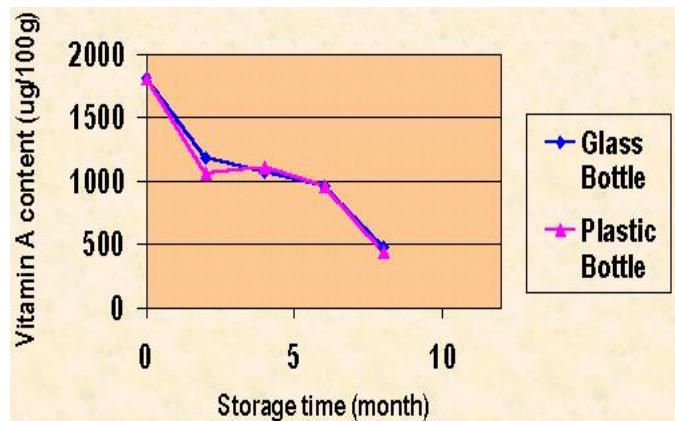
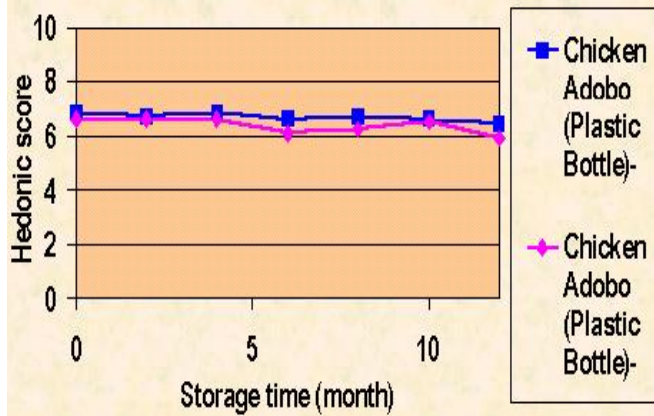
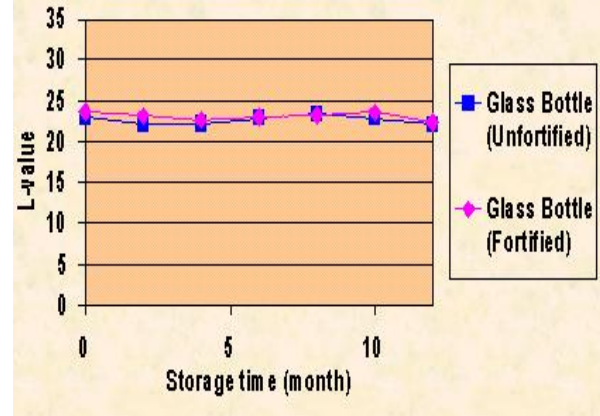


Figure 4. Changes in the vitamin A content of triple fortified soy sauce exposed to sunlight



Legend: 7 = Like very much =, 1 = Dislike very much



Legend: L = 100 white, L = 0 black

Figure 5. Acceptability level of chicken adobo using fortified soy sauce exposed under fluorescent light

Figure 6. Color evaluation of triple fortified soy sauce under fluorescent light

Color Acceptability of Cooked Fortified Soy Sauce



CONCLUSION AND RECOMMENDATION

- Iron and iodine were retained for one (1) year in different packaging materials and storage conditions.
- Vitamin A was stable only for eight (8) and two (2) months when exposed to fluorescent light and sunlight respectively.
- Raw fortified soy sauce stored using different packaging materials and storage conditions was acceptable by trained panelists.
- Fortified soy sauce was acceptable when used in chicken *adobo*, beef steak, and *pancit bihon* by trained panelists.
- Soy sauce can be successfully fortified with iron and iodine.
- The results of the study will serve as basis for large-scale production of fortified soy sauce and eventually for transfer to food industry.

ACKNOWLEDGEMENT

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