EVALUATION OF QUALITY AND SAFETY FOR SOME PROCESSED FOODS IN RELATION TO ENZYME ACTIVITY

By

EMAN KAMAL NABIH HANAFI

B.Sc. Agric. Sci. (Food Technology), Ain Shams University, 2008

A thesis submitted in partial fulfillment
of
the requirements for the degree of

MASTER OF SCIENCE

in

Agricultural Science
(Food Science and Technology)

Department of Food Science
Faculty of Agriculture
Ain Shams University

2014

Approval Sheet

EVALUATION OF QUALITY AND SAFETY FOR SOME PROCESSED FOODS IN RELATION TO ENZYME ACTIVITY

By

EMAN KAMAL NABIH HANAFI

B.Sc. Agric. Sci. (Food Technology), Ain Shams University, 2008

This thesis for M.Sc. degree has been approved by:

Dr. Aly Abd El-Aal Bakr .....
Prof. of Hotel Studies, Faculty of Tourism and Hotels, University of Sadat City.

Dr. Gamal Abd El-Twab El-Shatanovi .....
Prof. of Food Science and Technology, Faculty of Agriculture, Ain Shams University.

Dr. Nessrien Mohamed Nabih Yassin .....
Prof. of Food Science and Technology, Faculty of Agriculture, Ain Shams University.

Dr. Magdy Gomaha El-Shemy .....
Prof. of Food Science and Technology, Faculty of Agriculture, Ain Shams University.

Date of Examination: 14 / 6 / 2014

EVALUATION OF QUALITY AND SAFETY FOR SOME PROCESSED FOODS IN RELATION TO ENZYME ACTIVITY

By

EMAN KAMAL NABIH HANAFI

B.Sc. Agric. Sci. (Food Technology), Ain Shams University, 2008

Under the supervision of:

Dr. Magdy Gomaha El-Shemy
Prof. of Food Science and Technology, Food Science Department, Faculty of Agriculture, Ain Shams University. (Principal Supervisor).

Dr. Nessrien Mohamed Nabih Yassin
Prof. of Food Science and Technology, Food Science Department, Faculty of Agriculture, Ain Shams University.

Dr. Mohamed Gadallah El–Sayed Gadallah
Associate Prof. of Food Science and Technology, Food Science Department, Faculty of Agriculture, Ain Shams University.

ABSTRACT

Eman Kamal Nabih Hanafi : Evaluation of Quality and Safety for some Processed Foods in Relation to Enzyme Activity. Unpublished M.Sc. Thesis, Department of Food Science , Faculty of Agriculture, Ain Shams University, 2014.

The main objective of this work was to follow the quality and safety parameters for frozen blanched green beans during 6 months of frozen storage at -18±2°C, refrigerated pasteurized orange juice during 60 days of refrigeration at 4±1°C and bolti fish under refrigeration at 4±1°C through 12 days. The changes in physicochemical properties, microbiological assessment and assay of activity for some enzymes were studied. Also, the sensory evaluation for all selected food items were undertaken.

Data revealed that, an increasing of ash contents was noticed in blanched green beans presoaked in solution of mixed chemicals before blanching. The green beans samples blanched by microwave had the highest retention of ascorbic acid followed by steam and boiling water, respectively. The loss of total chlorophylls was increased by increasing the blanching time. Also, the blanching of green beans in boiling water gave the best color parameters than other blanching methods used in this investigation. However, the presoaking of green beans in solution of mixed chemicals contained 0.5% potassium metabisulphite, 0.1% magnesium oxide and 0.1% sodium bicarbonate caused to obtain the bright green color as magnesium oxide and sodium bicarbonate present in the blanching media. Consequently, results illustrated that, the blanching in boiling water was more effective than other blanching methods for reduction of total viable bacterial counts, psychrophilic population, yeasts and molds, and coliform group during 6 months of frozen storage at -18±2°C, particularly when chemical media is used. While, the

blanching by microwave had the lowest reduction effect on microbial counts. On the other hand, the activity of selected enzymes under investigation were reduced by increasing the time of blanching and the frozen storage period up to 6 months. The blanching in boiling water was the best treatment to inactivate peroxidase, catalase and ascorbic acid oxidase followed by microwave blanched samples for 60 sec. which presoaked in solution of mixed chemicals. Meanwhile, the reactivation of peroxidase was noticed after 4 months of storage at -18±2°C in some samples. Frozen blanched green beans in boiling water with the mixed chemicals for 2 min. recorded the highest scores of sensory parameters for organoleptic test among other frozen blanched green beans.

Results also showed that, the pasteurization of orange juice led to decrease the moisture and ash contents and, total soluble solids by extending the refrigeration storage at 4±1°C. However, the loss of ascorbic acid was increased by increasing the refrigeration storage period. Also, the highest retention of ascorbic acid was noticed for orange juices pasteurized by microwave. Moreover, the browning rate was higher for juice pasteurized by heating than that of both the control and pasteurized by microwave, at zero time. Furthermore, pasteurization by heating for 4 min. had the highest reduction of total viable bacterial counts, psychrophilic population and, yeasts and molds counts followed by juice pasteurized with microwave for 60 sec. However, an incremental patterns in microbial populations were observed by increasing the time of refrigeration storage up to 60 days. On the other hand, the pasteurization by heat for 4 min. and microwave for 60 sec. was more effective for inhibiting the activity of pectin-methyl esterase and ascorbic acid oxidase. Also, a gradual loss of enzyme activity was recorded for pasteurized orange juices by extending the shelf-life of orange juices by refrigeration up to 60 days. The highest scores of sensory evaluation was observed for orange juice pasteurized by microwave for 60 sec.

ABSTRACT

Consequently, the Nile bolti fish were stored under refrigeration at 4±1°C after immersing in aqueous solutions of acetic acid (AA, 1%), citric acid (CA, 3%) and mixing between (1% AA+ 3% CA) for 5 minutes. Results indicated that, the suggested used aqueous solutions for immersing of fish were significantly ($P \leq 0.05$) affected on the chemical composition, particularly for the lipid and protein contents. However, significant ($P \leq 0.05$) reduction in thiobarbituric acid concentration and total volatile nitrogen were assessed for the fish samples that were immersed in the aqueous solutions when compared with the control. Moreover, the aqueous solutions of used acids caused to reduce various categories of spoilage microorganisms. On the other hand, by increasing the storage period of fresh bolti fish at 4±1°C, the microbial counts and both of catalase and protease activity were gradually increased. Whereas, the combination of the aqueous solution of AA and CA could be the most effective for reducing catalase and protease activity during storage period up to 12 days. A gradual decrease ($P \leq 0.05$) in sensory attributes was observed by extending the shelf-life of refrigerated bolti fish up to 12 days at 4±1°C. Whereas, the fish that have been immersed in 3% CA solution were more acceptable than other used treatments after 12 days of storage.

Key words: Green beans, Orange juice, Bolti fish, Blanching, Physicochemical, Browning index, Microbiological assessment, Enzymes assay, Peroxidase, Catalase, Ascorbic acid oxidase, Pectin methyl-esterase, Protease, Sensory evaluation.

ACKNOWLEDGEMENT

All praises are due to Allah, who blessed me with kind professors and colleagues, and gave me the support to finish this thesis.

I wish to extend my deepest appreciation and sincere gratitude to **Prof. Dr. Magdy Gomaha El-Shemy,** Professor of Food Science and Technology, Food Science Department, Faculty of Agriculture, Ain Shams University, for the kind attention and greater help provided for the accomplishment of this work and for his efforts, supervising the research, writing the manuscript and encouraging me through this work. It is difficult to express in words my deep respect to him.

Thanks and gratefulness will not be enough to **Prof. Dr. Nessrien Mohamed Nabih,** Professor of Food Science and Technology, Food Science Department, Faculty of Agriculture, Ain Shams University, for supervising this work, plentiful advice and endless efforts provided for me to complete this work.

Deepest thanks to **Dr. Mohamed Gadallah El–Sayed,** Associate Professor of Food Science and Technology, Food Science Department, Faculty of Agriculture, Ain Shams University, for his true efforts throughout the lab work and writing the manuscript.

Also, I would like to extend my thanks to all the stuff members of Food Science and Technology Department, Faculty of Agriculture, Ain Shams University.

Thanks will not be enough to my family for their continuous help and sincere support.

LIST OF CONTENTS

LIST OF TABLES