

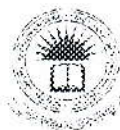
# MINIMAL PROCESSING OF OYSTER MUSHROOM

*(Pleurotus ostreatus)*



BY

M. A. PRATHIBHA MALMI



DEPARTMENT OF AGRICULTURAL CHEMISTRY

FACULTY OF AGRICULTURE

EASTERN UNIVERSITY

SRI LANKA

2019

## ABSTRACT

Mushrooms are important in human nutrition with high protein, minerals, vitamins, low fat content, and low energy levels. They provide an alternative source of protein to people who cannot consume animal foods for different reasons. They are also considered to be a good dietary product with low fat content and energy levels. Mushrooms are consumed for medical purposes as well as for their use as food. Because of its short shelf life and perishability, mushroom cannot be stored longer period. Therefore more attention is required in the postharvest chain. "Minimally processed" products are prepared and handled to maintain their fresh nature. Minimal processing can improve the shelf life of product while providing convenience to the user. Therefore, this study was conducted to increase the shelf life of mushrooms using minimal processing.

Oyster mushroom was selected as mushroom variety and Sodium metabisulfite, Citric acid, Ascorbic acid and Calcium chloride were used as chemical solutions in minimal processing. The treatments are as follows -T1: Oyster mushrooms soaked in water, T2: Oyster Mushrooms soaked in Citric acid solution, T3: Oyster Mushrooms soaked in Ascorbic acid and Calcium chloride solution, T4: Oyster Mushrooms soaked in Sodium metabisulfite solution. Physico-chemical analysis was conducted using AOAC Methods (2002) to determine the moisture content, pH value, fat content, crude fiber content and protein content of freshly made minimally processed oyster mushrooms. Sensory evaluation was conducted to evaluate organoleptic characteristics of curry samples of the freshly made minimally processed mushroom. The colour, taste, texture, aroma and overall acceptability were evaluated using a Seven-point hedonic scale.

Significance differences at 5% level were observed in physico-chemical composition viz crude protein, crude fat, crude fiber, moisture content and pH value of freshly made minimally processed mushrooms. The sensory evaluation revealed that, there were significant differences between the chemically treated mushrooms for colour, taste, texture, aroma and overall acceptability at 5% level of significance. According to Tukey's test, T4: Oyster Mushrooms soaked in Sodium metabisulfite solution had highest score for taste, colour, texture, aroma and overall acceptability. Among four treatments, sodium metabisulfite treated freshly made minimally processed oyster mushroom was the best compared to other treatments based on Physico-chemical and organoleptic qualities.

The above four treatments of freshly prepared minimally processed mushrooms samples were subjected for storage studies. They were stored in refrigerator at 4°C for two weeks period. Physico- chemical analysis of the above samples were done as per the above at 3 days intervals. Sensory evaluation was done as per the above after two weeks. During storage period, the physico-chemical parameters such as pH, fat content, fiber content, protein content seemed to decrease and the physico-chemical parameters such as moisture content seemed to increase in minimally processed mushrooms. In sensory analysis, there were significant ( $p < 0.05$ ) differences for organoleptic characters between the treatments. Organoleptic score of minimally processed mushrooms were decreased gradually with storage period. Because of undesirable biochemical reaction leads to develop off flavor and off colour. According to Tukey's test, the highest overall acceptability was observed in the sodium metabisulfite treated minimally processed oyster mushroom (T4). When consider T2 and T3, ascorbic acid treated oyster mushrooms (T3) better than citric acid treated oyster mushrooms (T2).

Therefore, it can be concluded that the sodium metabisulfite treated minimally processed oyster mushroom is the best for maintaining the physico-chemical and organoleptic qualities with an extended shelf life, which has no any harmful effect for consumers. Minimally processed oyster mushroom is a new product for improving the storage capacity of mushroom. Minimal processing enhanced the shelf life of mushrooms, reduced the post-harvest loses and reduce the perishability & deterioration rate of mushrooms. Because of their fresh nature, minimally processed mushrooms provide convenience to the user.

# TABLE OF CONTENTS

ABSTRACT.....	I
ACKNOWLEDGEMENT .....	IV
TABLE OF CONTENTS.....	VI
LIST OF TABLES .....	IX
LIST OF PLATES .....	X
LIST OF FIGURES .....	XI
LIST OF ABBREVIATIONS.....	XII
CHAPTER 01 .....	1
1.0 INTRODUCTION .....	1
CHAPTER 02 .....	4
2.0 LITERATURE REVIEW .....	4
2.1 Mushrooms .....	4
2.2 Ecological Classification of Mushrooms .....	6
2.3 Morphology of Mushrooms .....	7
2.4 Edible mushrooms .....	8
2.5 Oyster mushroom ( <i>Pleurotus ostreatus</i> ).....	9
2.5.1 Scientific classification of oyster mushroom .....	11
2.5.2 Identification of oyster mushroom .....	11
2.6 Nutritional Value of Mushrooms .....	12
2.7 Health Benefits of Mushrooms .....	13
2.8 Postharvest Handling of Mushrooms .....	17
2.8.1 Mushroom Grading and Quality .....	17
2.8.2 Postharvest Physiology and Storage .....	18
2.9 Minimal Processing of Mushrooms .....	20
2.10 Effect of Packaging on Mushroom Shelf-Life .....	26
2.11 Processing for long-Term Preservation.....	27
2.11.1 Freezing.....	27
2.11.2 Canning.....	28
2.11.3 Drying .....	29
2.12 Value-Added Mushroom Products.....	30
2.12.1 Food Products and Food Additives.....	30
2.12.2 Beverages and Beauty Products.....	32
2.12.3 Dietary Supplements: Nutraceutical Products .....	33

CHAPTER 03 .....	37
3.0 MATERIALS AND METHODS.....	37
3.1. Materials .....	37
3.1.1 Materials Used for the study .....	37
3.1.2 Material Collection .....	37
3.2 Methods.....	38
3.2.1 Preparation Raw Material .....	38
3.2.1.1 Sterilization of Equipment and Materials .....	38
3.2.1.2 Preparation of chemical solutions .....	38
3.3 Experimental Design and Treatment Plan for Minimal Processing of Mushrooms.....	38
3.4 Experiment 1- Nutritional and Organoleptic Qualities Analysis of Freshly Prepared Minimally Processed Mushrooms .....	41
3.4.1 Physico-Chemical Analysis of minimally processed of oyster mushrooms .....	41
3.4.1.1. Determination of Moisture Content .....	41
3.4.1.2 Determination of Ash Content.....	42
3.4.1.3 Determination of pH .....	44
3.4.1.4 Determination of Crude Fat .....	45
3.4.1.5 Determination of Crude Fiber.....	46
3.4.1.6 Determination of Crude Protein.....	48
3.4.2 - Sensory Evaluation for Organoleptic Qualities Analysis .....	50
3.4.2.1 Serving of Mushroom Samples.....	51
3.5 Experiment 2- Storage Study of Minimally Processed Mushrooms.....	51
3.6 Statistical Analysis.....	51
CHAPTER 04 .....	52
4.0 RESULTS AND DISCUSSION .....	52
4.1 Experiment 1- Nutritional and Organoleptic Qualities Analysis of Freshly Prepared Minimally Processed Mushrooms .....	52
4.1.1 Physico-Chemical Qualities of Minimally Processed Oyster Mushrooms .....	52
4.1.1.1 Moisture Content .....	53
4.1.1.2 pH.....	54
4.1.1.3 Fat Content.....	55
4.1.1.4 Fiber Content .....	56
4.1.1.5 Protein Content .....	57
4.1.2 Sensory Qualities of Minimally Processed Oyster Mushrooms.....	58
4.1.2.1 Colour .....	58
4.1.2.2 Taste.....	59
4.1.2.3 Texture .....	59
4.1.2.4 Aroma .....	59

4.1.2.5 Overall Acceptability .....	61
4.2 Experiment 2- Storage Study of Minimally Processed Mushrooms .....	61
4.2.1 Physico-Chemical Qualities of Minimally Processed Oyster Mushrooms during Storage .....	61
4.2.1.1 Moisture Content .....	61
4.2.1.2 pH.....	62
4.2.1.3 Fat Content.....	63
4.2.1.4 Crude Fiber Content.....	64
4.2.1.5 Protein Content .....	65
4.2.2 Organoleptic qualities of minimally processed Oyster mushrooms during Storage .....	66
4.2.2.1 Colour .....	66
4.2.2.2 Taste.....	66
4.2.2.3 Texture.....	67
4.2.2.4 Aroma .....	67
4.2.2.5 Overall Acceptability .....	67
CHAPTER 05 .....	69
5.0 CONCLUSION.....	69
SUGGESTION FOR FUTURE RESERCH .....	72
CHAPTER 06 .....	73
6.0 REFERENCES .....	73
APPENDICES .....	85