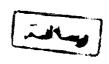
BIOCHEMICAL STUDIES ON RICE BRAN

BY



KHALED MOHAMED AMIN FAUZY

B. Sc. Agric., (Biochem.), Ain Shams Univ. 1994

A thesis submitted in Partial Fulfillment

of the requirement for the degree of

MASTER OF SCIENCE

In

57681

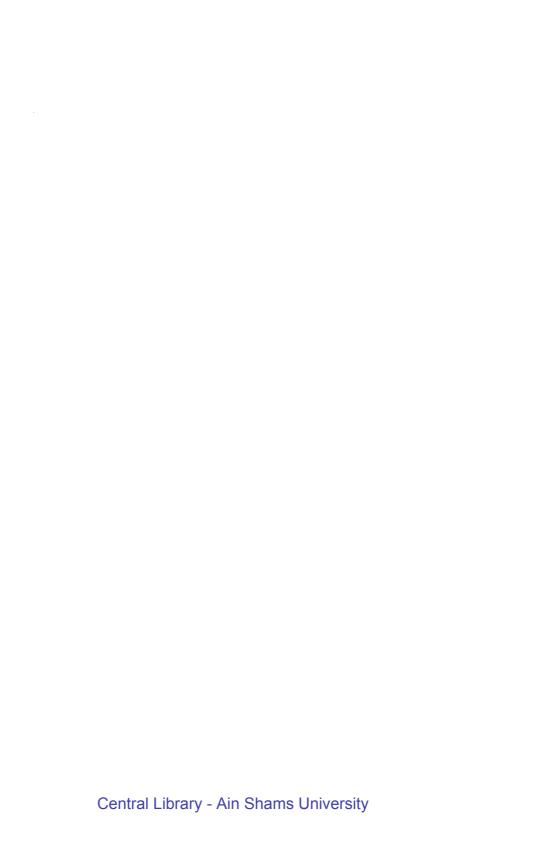
Agriculture

(Agricultural Biochemistry)

Biochemistry Department **Faculty of Agriculture** Ain Shams University



1999





APPROVAL SHEET

BIOCHEMICAL STUDIES ON RICE BRAN

BY

KHALED MOHAMED AMIN FAUZY

B. Sc. Agric., (Biochem.), Ain Shams Univ. 1994

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

Prof. Dr. S.M.E. Mansour S. M. Mansour

Prof. of Biochemistry, Institute of Food Technology.

Agric. Research Center.

Prof. Dr. Z.A. El-Hadidy El-Hadidy, 2. A.

Prof. of Biochemistry, Faculty of Agric. Ain Shams

Prof. Dr. K.R.F. Hussein K. R. F. HASSQIN

Prof. of Biochemistry, Faculty of Agric., Ain Shams University.

Date of examination 17/7/1999.

BIOCHEMICAL STUDIES ON RICE BRAN

BY

KHALED MOHAMED AMIN FAUZY

B. Sc. Agric., (Biochem.), Ain Shams Univ. 1994

Under the supervision of:

Prof. Dr. KAMAL, R.F. HUSSEIN

Prof. of Biochemistry Fac. of Agric., Ain Shams University.

Prof. Dr. REFAT, E. EL-GHOBASHY

Prof. of Biochemistry Fac. of Agric., Ain Shams University.

Prof. Dr. NAGAH, E. ALI

Prof. of Biochemistry Fac. of Agric., Ain Shams University.



ABSTRACT

Khaled Mohamed Amin Fauzy. Biochemical studies on Rice Bran. Unpublished Master of Science, University of Ain Shams, Faculty of Agriculture, Department of Biochemistry (1999).

autoclaving, cold storage and stabilization, Dry heat parboiling were investigated as a method of stabilization of rice bran, extraction of oil immediately after milling showed to be preventing its deterioration, parboiled bran, cold stabilized, heat stabilized at 110°C for 30 min, autoclaving and heating for 20 min also found to be retarded oil deterioration during storage. Heating rice bran for 10 min at 110°C seems to be not effective for destroying lipase enzyme. Effect of stabilization and storage on fatty acid composition of oil were investigated by GLC technique. Palmitic, oleic and lenoleic are the predominant fatty acids in rice bran oil. Crude proteins, crude fat, carbohydrates, fibers, ash and free amino acids were determined. These components were only affected by parboiling. Hypocholesterolemic activity was subjected on full fat rice bran and rice bran oil in two biological experiments on rats, rice bran and rice bran oil lowered serum total cholesterol and total lipids, LDL, triglycesides in normal and hyperlipemic rats. HDL were significantly increased, and GOT and GPT were lowered. Full fat rice bran were mixed with wheat flour at 20% level, rheological properties were determined, water absorption, arrival time and dough development were increased while dough stability and mixing tolerance index were reduced (Farinograph test), from data of extensograph test, elasticity and proportional number were increased, while extensability and energy were Maximum viscosity was increased when viscodecreased.

amylgraph test carried out. Baking test were also made to determine the quality of panned bread which containing full fat stabilized rice bran. The volume was reduced and the crust and cramp colour were increased.

Key Words:

Rice bran, Rice bran oil, stabilization, parboiling, storage fatty acid, chemical analysis, hypocholesterolemic activity cholesterol, HDL, LDL, transaminase, Rheological, Baking.

ACKNOWLEDGMENT

The student wishes to express his deepest gratitude and sincere thanks to **Prof. Dr. K.R.F. Hussein,** professor of Biochemistry Faculty of Agriculture, Ain Shams University for his supervision sincere guidance, continuous encouragement and valuable helps in accomplishing this study.

My deepest gratitude is extended to **Prof. Dr. R.E.El-Gobashy**, professor of Biochemistry Faculty of Agriculture, Ain Shams University and **Prof. Dr. N.E.Ali**, professor of Biochemistry Faculty of Agriculture, Ain Shams University for their guidance and advice, for their valuable discussions, useful helps and cooperation during this study.

Due thanks are also presented to all members of Biochemistry Department, faculty of Agriculture, Ain Shams University for their help and encouragement.



CONTENT	Pag.
I. INTRODUCTION.	1
II. REVIEW OF LITERATURE.	3
1. Stabilization of rice bran	3
1.1. Lipase activity and fundamentals of rice bran	
stabilization	3
1.2. Effect of stabilization on the chemical composition	
and nutritional characteristics of rice bran.	6
1.3. Rice bran oil	7
2. Effect of stabilized rice bran and rice bran oil on serum	
and liver lipids.	13
3. Food uses and backing quality of stabilized rice	
bran	21
III. MATERIALS AND METHODS.	24
1. Stabilization of rice bran	24
1.1. Materials.	24
1.2. Stabilization process	24
1.3. Storage conditions	25
1.4 Methods of analysis	26
1.4.1. Moisture	26
1.4.2. Ash	26
1.4.3. Crude fiber	26
1.4.4. Fiber fraction	27
1.4.5.Extraction of sugar and free amino acid	28
1.4.6. Protein analysis	30
1.4.7.Lipid analysis	
2. Biological experiments	
2.1. Animals	
2.2. The experiment design	

2.3.Diets and blood sampling	2.5
2.4.Blood analysis	35
2.4.1. Total lipids.	42
2.4.2.Total cholesterol.	42
2.4.3 HDL cholesterol.	42
2.4.4. LDL cholesterol.	43
2.4.5. Triglycerids	44
2.4.6. Transaminas activity (GOT and GPT)	45
3. Rheological properties of dough which containing full	46
fat rice bran	40
3.1. Samples	48
3.2. Brabender farinograph	48
3.3.Extensograph test	48
3.4. Visco amylograph test	49 50
3.5. Baking test	51
IV. RESULTS AND DISCUSSION	51 52
Part one:1. Stabilization of rice bran	
1.1.Chemical composition and nutritional	52
characteristics of rice bran	50
1.2. Fiber fractionation .	52 54
1.3. Effect of stabilization on chemical composition	54
of rice bran	5.1
1.4. Rice bran oil	54 69
1.4.1. Physicochemical properties of extracted oil	09
from row rice bran and parboiled rice bran	60
1.4.2. Fatty acid composition of raw rice bran oil	69
and parboiled rice bran oil	71
1.4.3. Changes in acid value and percentage of free	/ 1
fatty acid during storage	73
J	/ 1

1.4.4. Changes in peroxide value during storage.	82
1.4.5. Changes in iodine value during storage	87
1.4.6. Changes in fatty acid composition of oil	
during storage.	91
Part two: 2. Effect of feeding the full fat rice bran and rice	
bran oil on the serum lipids and serum	
transaminase enzymes activity in rats	97
2.1. Effect of feeding the full fat rice bran and	
rice bran oil on the serum total cholesterol	97
2.2. Effect of feeding the full fat rice bran and rice	
bran oil on the serum LDL and HDL	
cholesterol.	103
2.3. Effect of feeding the full fat rice bran and rice	
bran oil on the serum triglycerides and total	
lipids	118
2.4. Effect of feeding the full fat rice bran and rice	
bran oil on the activity of serum	
transaminase enzymes GOT and GPT	127
Part three:3. Effect of addition stabilized full fat rice bran	
properties of dough and baking test	136
3.1. Rheological properties of dough	136
3.1.1. Farinograph test	136
3.1.2. Extensograph test	140
	143
3.1.3. Amylograph test	
3.2. The baking properties of wheat flour mixed with full-fat rice bran	143
	149
V. SUMMARY.	152
VI. REFERENCES.	
VII. ARABIC SUMMARY.	

