PROTEIN CONCENTRATE AND PROTEIN ISOLATE FROM SESAME SEED

By

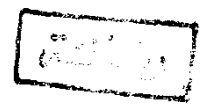
MADIHA FAHMY HASSAN

B. Sc. (Home Economic, Biochemistry and Nutrition)

THESIS

Submitted in Partial Fulfilment of the Requirements
For the Degree of Master in
Nutrition and Food Chemistry

Faculty of Women's
Ein Shams University
Department of Nutrition
and Food Chemistry

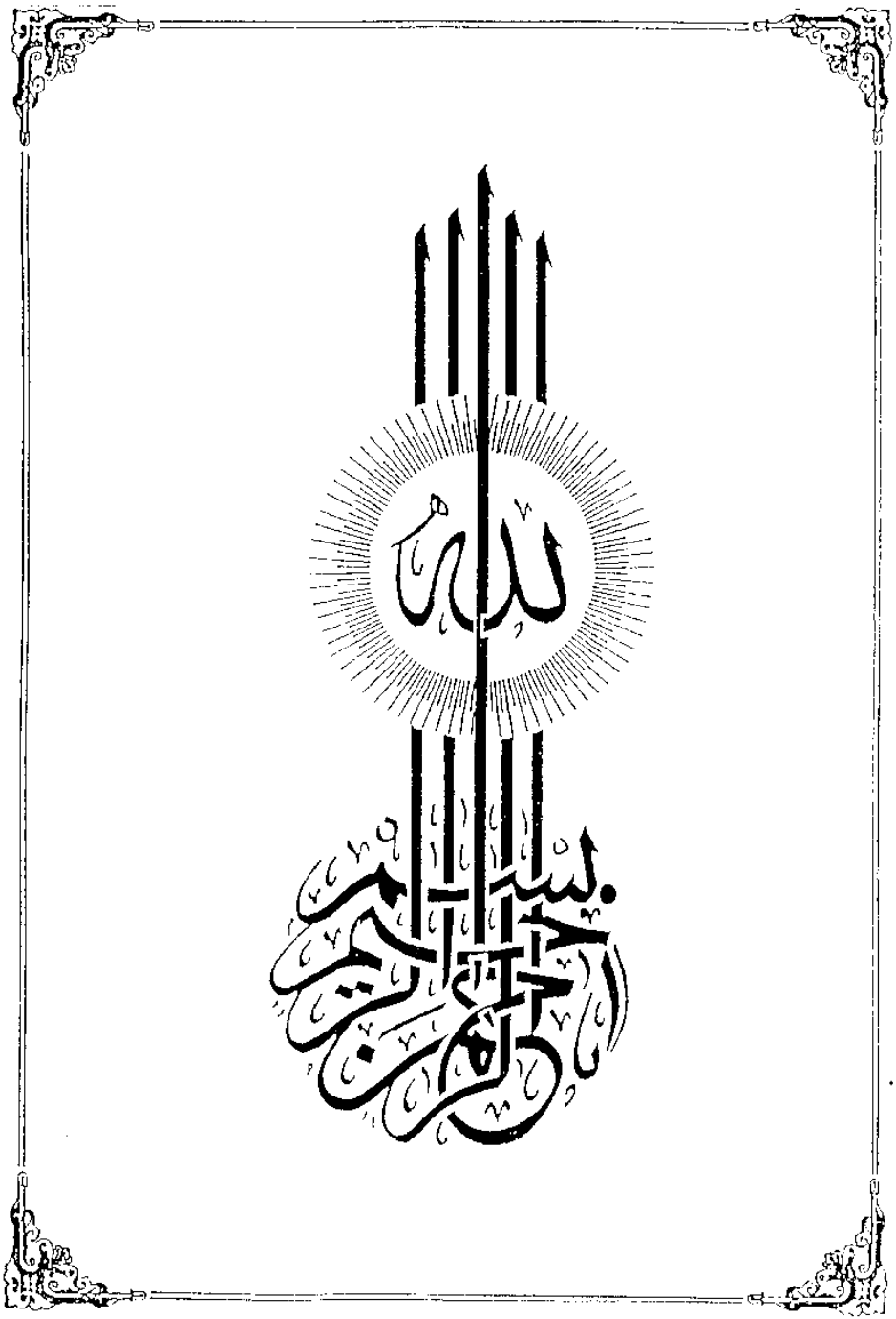


1986

PROTEIN CONCENTRATE AND PROTEIN ISOLATE FROM SESAME SEED

THESIS ADVISORS	THESIS APPROVED
Prof. Dr.	Yahiasen. Abbassy
Prof. Dr.	.....
Prof Dr.	A. S. Sokary
Prof Dr.	.....
Prof Dr.	Mona. A. Sadek

Mahiasen Abbassy



NOTE

Nutrition and Food Chemistry Department women's college for Ein Shams University:-

Thesis presented by the condidate submitted in partial Fulfilment for the Degree of Master in Nutrition and Food Chemistry, had been preceded by her success in the following Courses :-

1- German language.
2- Advanced Nutrition
3- Biochemistry
4- Food Microbiology
5- Statistics.

APPROVAL SHEET

Name : Madiha Fahmy Hassan

Title : Protein Concentrate and Protein isolate from Sesame Seed.

This thesis has been approved by:

Prof. Dr. . . . .

Prof. Dr. . . . .

Prof. Dr. . . . .

Date / /

ACKNOWLEDGEMENT

I would like to express my deepest gratitude and sincere thanks to Prof. Dr. Saad K. Shehab , Professor of Biochemistry and Head of Department of Nutrition and Food chemistry, Women's college , Ein - shams University, Prof. Dr. Ahmed S. El-Nockrashy, Professor of Biochemistry, National Research Center, Prof. Dr. Mahassen H. Abbassy Professor of Biochemistry, and Dr. Tahany. El-Kholeaf Assistant Professor of Biochemistry and Dr. Mona. A. Sadek, lecturer of nutrition and food chemistry, Women's college, Ein-Shams University, for their supervision, continuaus encouragement and critisism throughout the whole work.

I would like to offer my special thanks to Dr. Fakhriya. S. Taha Assistant Professor, National Research center, for suggesting the topic of this work, for her initiative thoughts and constructive discussions she feels greatly indepted to her efforts and kindness throughout the whole work.

CONTENTS

INTRODUCTION

INTRODUCTION

The gap between the nutritional requirements and the actual consumption of protein by the majority of the population in developing countries is widening rapidly. Protein deficiency has already shown its marks on the health and working efficiency of a big sector of the population. Protein - energy malnutrition not only increases succeptability to acute and chronic infections, but also causes a compensatory reduction in the capacity of physical activity and promote mental deficiency.

Food supply and population must be brought into balance, but during the coming years it is unlikely that reduction in birth rates will have much effect on the critical decline of the per capita food supply. The crisis arising from this imbalance can only be met or mitigated through rapid increases in food production. This will require more concentrated national developmental efforts to increase the quantity and quality of food supplies through a) improved yields from conventional agricultural and animal husbandry, b) expansion of the cultivated land if possible, c) better utilization of existing protein sources for human use, and d) exploitation of unconventional and novel sources of food.

The following objectives are strongly recommended in the course of utilization of unconventional protein sources [Bender et al. (1970) - Scrimshaw et al. (1971), Altschul (1974), wolf et al. (1977]:

1- Increase in the direct food use of oilseeds and oilseed protein concentrates and protein isolates.

2- Promotion of the production and use of fish protein concentrates.

3- Increase in the production of synthetic amino acids.

4- Promotion of the development of single - cell protein for both animal feeding and direct human consumption.

It is expected that the use of unconventional proteins will grow gradually, but not necessarily smoothly. Unconventional proteins probably will not replace traditional animal protein foods outright, but will be used as welcomed functional ingredients. It is possible to create compounded foods using mixtures of plant proteins, or plant and animal proteins and possibly synthetic amino acids, which would have equal nutritional value to the best animal sources of protein.

Nutrition can now be engineered by modern science and technology, but the main difficulties in increasing

plant protein acceptance are still flavour, texture and traditional eating patterns. Two aspects of inducing populations to increase the utilization of new protein foods are of primary importance. One is to teach the population, especially the mothers, the nature of protein, its content in the foods which are available to them, and its value to the children and adults. The other is to use psychological approaches to insure that any protein foods offered to the population are not only nutritionally valuable, but also acceptable and desirable.

Food production in Egypt is falling behind the population growth despite all national efforts to expand vertically and horizontally in agriculture Egypt has a total area of about one million square kilometers of which 3.3 % are only cultivated. Egypt with a total population of about 50 millions at present and an increase of about one million every eight months, is expected to adouble its population rapidly.

For many years, the oilseed industry in Egypt was based solely on the cottonseed crop. Total oil production amounts to 110, 000 tons which covers only one quarter of the national demands. Egypt imports about 400,000 tons of edible and nonedible oils and fats. Soybeans cannot cover this gap since ca. 2550,000 hectares

(ca. 6 million Feddans) must be cultivated to yield 780,000 tons of soybean oil(soybeans contain ca. 20 % oil) which is the year 2000 prospected needs. Sesame seeds contain ca. 50 % oil that is highly resistant to oxidation can contribute in bridging the gap between production and consumption.

Sesame seed is not only a rich source of edible oil but also a rich source of protein, containing ca. 25 % protein which is rich in sulphur - amino acids and tryptophan Dehulling of sesame seeds is important for human consumpton of the protein since the hull contains 2 - 3 % oxalic acid. The dehulled, defatted meal contains up to 60 % protein. Sesame meal is bland and white in colour, but contains more than 5 % phytic acid compared to soybean meal 1.5 % Johnson et al (1979) Phytates reduces the biological availability of zinc, calcium, magnesium and perhaps iron and complexes with protein rendering it less soluble. Smith et al (1957).

Sesame seed is used extensively as a garnish on speciallity breads, buns and rolls. Fried sesame seed may be mixed with sugar to form a sweetmeat or soup ingredient. Tahena is made from a paste of roasted sesame seed, and Halawa is a candy made with tahena, sugar, egg albumin, gelatin and panama root juice.

Present production of processed sesame protein ingredients is currently nonexistant in developing countries.

The present work has been designed for better utilization of sesame seed meal. A process for the isolation of highly pure sesame seed protein isolate free of phytate is described. Protein concentrate, low in phytate, has been prepared from sesame seed meal. Chemical and nutritional evaluation of sesame seed meal, sesame seed protein isolate and sesame seed protein concentrate are investigated.

REVIEW OF LITERATURE