STUDIES ON SOYBEAN PROTEIN AS A PROTEIN SUPPLEMENT

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Thesis submitted in Partial Fulfilment
of the Requirements for the Degree of
Doctor of Philosophy

To

The Faculty of Agriculture
Ein-Shams University

1972

APPROVAL SHEET

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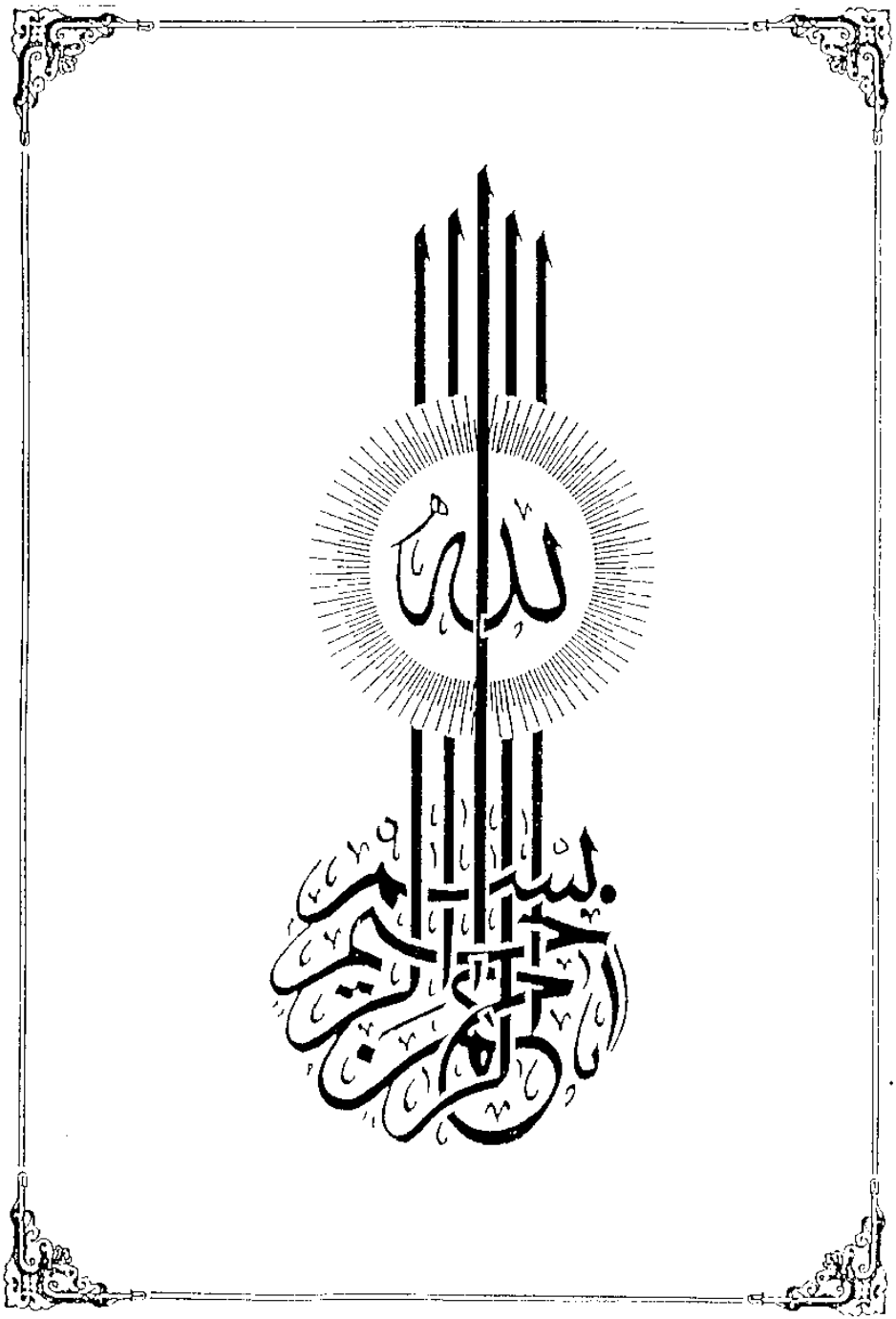
Date : / / 1972



Acknowledgements

The author is indebted to Prof. Dr. [illegible], Professor of Food Sci. and Technology at the Food Sci., Dept., Faculty of Agriculture, Ain Shams University, for his continuous supervision and valuable help as well as his constructive criticism throughout the discussion of this thesis.

Sincere appreciations are expressed to Dr. Laila Hussien, National Research Centre for her helpful suggestions and every possible guidance she kindly offered.

I wish to thank prof. Dr. M. Ashmawy, head of the council board of the Egyptian Organization of Food Industries for his interest and encouragement.

The author greatfully acknowledges the facilities offered by the NAMRC research centre for using the gas liquid chromatography unit for identification of amino acids.

Many thanks is also extended to the dairy research laboratory, N.R.C., for their sincere cooperation.

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ARABIC SUMMARY.

Introduction

[illegible] already said by many writers of the increasing shortage of dietary protein in developing countries, particularly those in the tropics and subtropics, where population is rapidly growing and the possibility for expanding milk production as a protein of first choice for infants and children appear to be inadequate to meet the increasing needs.

Proteins occupy a central position in the architecture and functioning of living cells. Therefore the need for an adequate food protein is of considerable importance for human consumption.

Textured vegetable proteins as soybean proteins represent a fascinating plant food protein capable of being treated through standard food processing without deleterious effect. When vegetable proteins were properly fabricated, whether, spun, extracted, extrusion-puffed or otherwise created, their structural matrix permits its incorporation in various food items of essentially unlimited choice range. The net result, however, is a new capability of manufacturing new foods from many cost only available vegetable sources like soybean which can be designed to fit nearly into any chosen pattern of food preference with any nutritional impact desired.

In the development of new sources of protein intended for the feeding of human beings it is necessary that the resulted food products have the same nutritional quality, safety and acceptability as those of animals origin.

Researches have been established for regulations of such problems since they seemed to vary with the nature of the material as well as the specific methods that are designed for extraction and manufacturing such proteins.

Guide lines for evaluation of the suitability of new protein that can replace animal sources were very necessary and must be stressed.

Soybean protein, however, is considered to be one of the excellent sources of protein that could be added to foods in significant amounts to improve their protein value. For the organolyptic evaluation, the quantity of soya protein that can be incorporated or substituted with animal sources will be under control.

It is well known, however, that soya protein is stated to be a potential food in itself, capable of a variety of textural modifications that could be used

desirably in food processing without detrimental effect to its taste or texture.

Soybean protein, from the other side represents a raw material new to the food industry which participate in processing of many food items as well as replacing to specific degree the protein of animal sources.

However, the solution of the animal protein problem could be found in the increase of the consumption of vegetable proteins as well as provide a firm basis for formulating food in which vegetable protein, as soya, participate with the animal source. The functional and the desired properties of the soybean proteins lead to its uses and incorporation for processing different food items.

Food stuffs such as soybean proteins which used as supplements, can suffer considerable damage during its preparation as well as through out the processing steps unless the procedures are rigidly controlled.

Since, soybean commodities are readily available, great attention has been given to use the soybean protein.

Under (1) [illegible] the soybeans are the world's largest oilseed crop, totaling as much as 35 million metric tons annually, a quantity which is only slightly less than the total production of the next two major oilseeds taken together peanuts and cotton seed.

Table (1) Major Soybean used as food

Botanical Name	Protein content (Av.), %	Oil content (Av.), %	World Production 1000 metric tons	Major producing Countries	Available protein 1000 metric tons
Glycine	36	-	30,000[a]	World total	11000
Max	42	20	3,000[b]	U.S., China	-

a) World total for 1962-1963 (FAO 1963)

b) Estimated for 1965 (FAO 1962)

Soybeans alone accounts for about 40 % of the world's total oilseed crop. In 1963, 2/3 of the world's soybean crop was produced in a single country i.e. the United States. The doubling in the world's soybean resources between the immediate post-World War II period and recently is due primarily to the U.S. crop, which has risen from

[illegible] million bushels (73 million metric tons). China is the second major producer (about [illegible] millions tons) and thus the United States and China together produce 90 % of the world's crop. Other countries producing soybeans in amounts worth mentioning are Japan, Brazil, and Indonesia. Table 2 summarized the annual production of soybean for the year 61-62 and 62-63 for some African countries and other different countries respectively. Unfortunately, this valuable protein resources is virtually unknown in many countries where the need for protein is the greatest.

Table 2: Production of Soybean in the Near East and some regions and selected countries of the World.

Country	Soybean/1000 metric tons per annual	
	1961-1962[a]	1962-1963[b]
World production	31000	30700
Near East	5	4
North America	17700	17400
Far East	11700	11700
Africa	30	40
India	--	--
Nigeria	15	--
Europe(excluding USSR)	--	15
Latin America	--	420

a) No (1962) b) No (1963)

Data concerning the production of soybean in [illegible] is lacking.

Introduction

The work presented in this investigation was divided into two parts with respect to soybean protein.

The first part dealt with the study of its chemistry, the properties of its proteins special interest in its biological activities and their kinetic mechanism towards varying degrees of temperature and pH.

The second part was directed towards the processing of the soybean protein and the potantiality of success of its introduction to the food industry in Egypt. The chemical and amino acid composition of soybean and soybean protein processed were also investigated. Emphasis had been focused towards the establishment of certain food items in which soybean protein had been incorporated with varying degree to satisfy human consumption from the stand point of acceptability, cheapness and its high biological value.

[illegible]

1- Chemical composition of soybean and some soybean products:

The chemical composition of soybean seed is very complex and is governed by the combined forces of heredity of the variety and the environment under which the parent plant is grown. The seed contains all the elements, compounds, enzymes, sytems and genetic factors essential for production and initial nourishment of the new plant, as well as the distinctive characteristics of the parental type with respect to growth habits and seed production.

The soybean is an oleaginous seed consisting principally of lipids, proteins, carbohydrates and mineral constituents.

The variations in composition of hundreds of samples of soybean reported by Bailey *et al.* (1935) are given in Table 3.

Table 5: [illegible] Soybeans

Constituents	Minimum %	Maximum %	Mean %
Moisture	7.02	9.42	[illegible].0
Ash	3.30	6.35	4.6
Fat	13.50	24.20	18.0
Fiber	2.84	5.27	3.5
Protein	29.60	50.30	40.0
Pentosans	3.77	5.45	4.4
Sugars	5.65	9.46	7.0
Starch like substances	4.65	8.37	5.6

Table 4 gives the composition of soybean products (Bacigalupo 1968). Similar data were obtained by other investigators (Haran 1966 and Leger 1966).

Table 4: Chemical Composition of Some Soybean Products

Soya	Percentage						Cost per pound of protein
	Fiber	Protein	Fat	Carbo-hydrate	Ash	Mois-ture	
Seed	4.1	33.2	17.2	30.5	4.7	10	0.140
Meal	5.1	44.8	1.5	32.1	5.7	11	0.037
Flour	3.0	50.0	0.5-1.	30.0	5.0	10	0.108
Full Flour	5.0	40.0	22	15	4.0	5	0.155
Protein concen-trate	5.0	40	2	15	3.0	5	0.214
Isolate	0.5	93.7	0.6	1.2	1.9	2.1	0.305
Texturized Food	13	54.2	22.2	17.1	2.4	2.8	0.635
Beef Analogue	--	15.0	13.5	5.5	2.0	63.0	3.300

- utritive value of soybeans:

a-a) Factors affecting the nutritive value of soybean

The soybean, containing up to 40 % of protein, can be considered as a protein concentrate even without defatting.

In comparison with other plant proteins it is unusually higher in lysine and is therefore useful as a supplement to the cereals.

Table 5 gives the amino acid content of soybeans, texured soyflour and some soybean protein concentrates and isolates respectively, as determined by many research workers from different countries.

It can be shown that the lysine level does not change considerably as a result of processing, since it ranges between 3.7 to 5.3 % in the total protein of the different products.

Compared to the FAO (1965) recommendations for minimum daily requirement of lysine, its level in the different soybean product is much higher as shown from the ratio of essential amino acid lysine/total essential amino acid contents per gram of nitrogen.