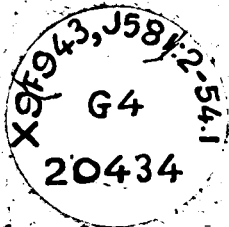


SURVEY OF OILSEEDS AND
VEGETABLE OILS.

Vol. 3.

Ground Nut Products.



2043

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SURVEY OF OILSEEDS AND VEGETABLE OILS

VOLUME III

GROUND NUT PRODUCTS

A SUMMARY OF PRODUCTION AND TRADE IN
BRITISH EMPIRE AND FOREIGN COUNTRIES

Prepared by the Intelligence Branch of the
Imperial Economic Committee



OCTOBER, 1934

LONDON

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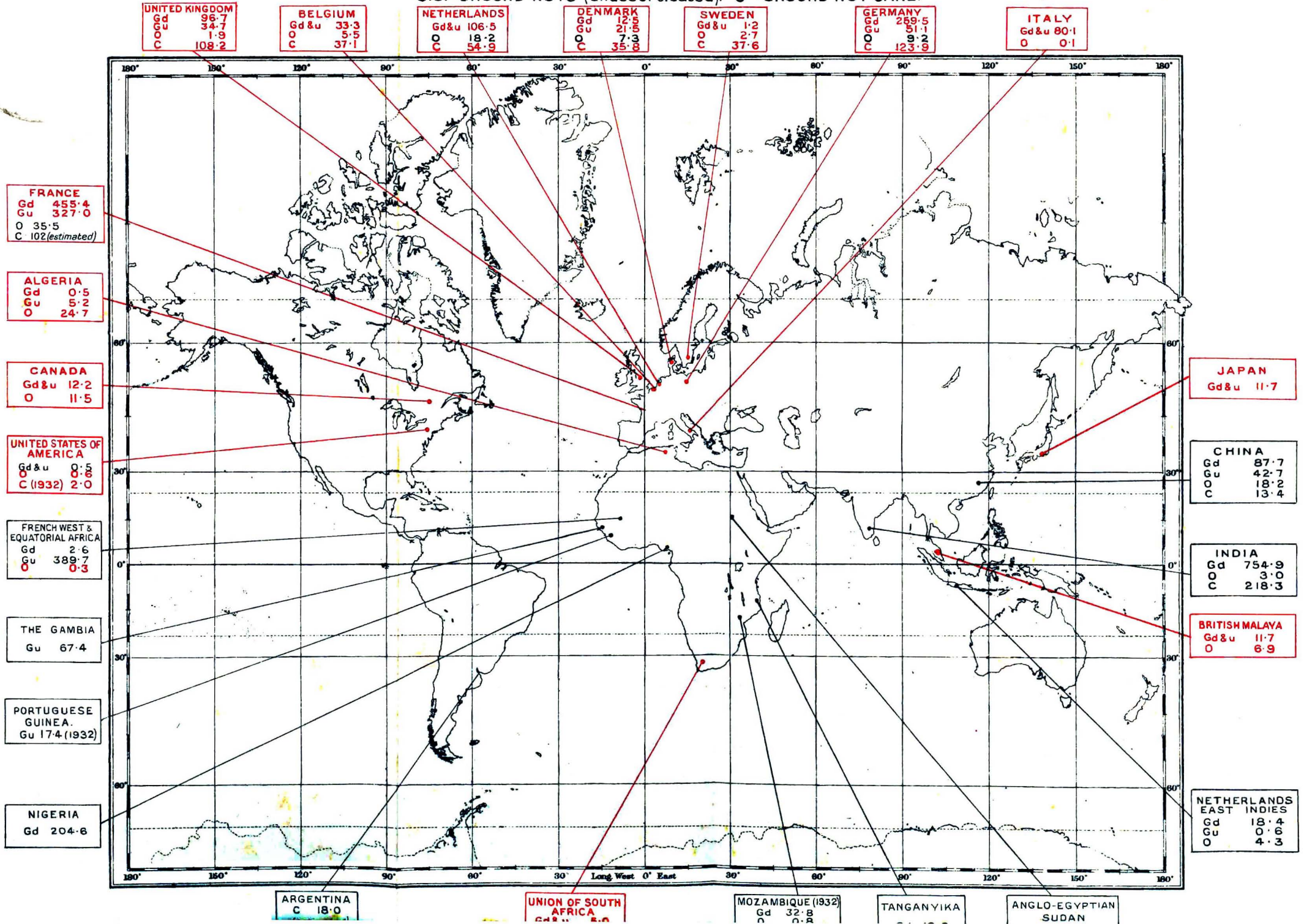
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DIAGRAM I - WORLD TRADE IN GROUND NUT PRODUCTS, 1933.

EXPORT BALANCE — IMPORT BALANCE — .

(IN THOUSANDS OF TONS).

G.d. = GROUND NUTS (decorticated), O = GROUND NUT OIL.
G.u. = GROUND NUTS (undecorticated), C = GROUND NUT CAKE.





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64

20434

TABLE OF CONTENTS

	<i>Page</i>		<i>Page</i>
Foreword	5	PART II.—Import.	
Introduction	8	British Empire Countries :—	
PART I.—Production and Export.		Chapter 18.—United King-	
British Empire Countries :—		dom	115
Chapter 1.—India ..	21	„ 19.—Canada ..	134
„ 2.—British West		„ 20.—British Malaya	139
Africa	35	Foreign Countries :—	
„ 3.—Tanganyika ..	46	Chapter 21.—France ..	142
„ 4.—Union of South		„ 22.—Germany ..	156
Africa	48	„ 23.—Netherlands ..	169
„ 5.—Australia ..	51	„ 24.—Italy	179
„ 6.—Other British		„ 25.—Belgium ..	183
Countries	54	„ 26.—Denmark ..	190
„ 7.—Anglo-Egyptian		„ 27.—Sweden ..	197
Sudan	55	„ 28.—Algeria ..	201
Foreign Countries :—		„ 29.—Other Foreign	
Chapter 8.—China ..	58	Countries	203
„ 9.—French West		PART III.—Prices.	
and Equatorial		Chapter 30.—The course of	
Africa	70	prices of ground nut products	207
„ 10.—Mozambique ..	78	PART IV.—Summary and Con-	
„ 11.—Portuguese		clusions.	
Guinea	80	Chapter 31.—Summary ..	215
„ 12.—Netherlands		„ 32.—Conclusions ..	240
East Indies	82		
„ 13.—United States			
of America	88		
„ 14.—Spain	102		
„ 15.—Japan	105		
„ 16.—Argentina ..	108		
„ 17.—Other Foreign			
Countries	112		

LIST OF DIAGRAMS AND ILLUSTRATION

Diagram I : World Trade in Ground Nut Products, 1933	..	Frontispiece
Illustration : Erect and Trailing Types of Ground Nut Plants	..	Facing page
Diagram II : Prices of Coromandel Ground Nuts and Crude Ground Nut Oil and the General Commodity Index, 1911-33	" " 20
Diagram III : Exports of Ground Nuts and Ground Nut Oil from the Principal Producing Areas (in oil equivalent)	..	" " 22
Diagram IV : Estimated Amount of Ground Nut Oil, Palm Oil, Palm Kernel Oil and Coconut Oil available for con- sumption in the four chief consuming areas	..	" " 23

FOREWORD

THIS, the third volume of a Survey of Oilseeds and Vegetable Oils, like the two preceding volumes, was undertaken by the Empire Marketing Board. Following the adoption by all the Governments of the Empire of the Report of the Imperial Committee on Economic Consultation and Co-operation, 1933,* set up by a resolution of the Imperial Economic Conference held at Ottawa in 1932, the Empire Marketing Board ceased to function on 30th September, 1933. The Board's Statistics and Intelligence Services, under the terms of the Report, were taken over by the Imperial Economic Committee on 1st October, 1933, and the present Volume, then in course of preparation, was accordingly completed by the Intelligence Branch of the Imperial Economic Committee.

The Empire Marketing Board had from time to time received applications from a number of the Colonies for information upon the vegetable oil industry, particularly as regards its future and the extent of substitution between one vegetable oil and another and between vegetable oils and marine oils. The Board's Agricultural Economics Committee accordingly suggested that the Statistics and Intelligence Branch of the Board should undertake a statistical survey of world production and consumption of oilseeds and nuts for the information of producers, traders and utilisers of these commodities. A preliminary survey, entitled "Copra and Competitive Products," very brief and covering only the most easily accessible figures, was compiled early in the year 1931 and circulated among the Government Departments of the Empire countries concerned, and it was intended to follow this by a more detailed analysis on the lines of the surveys already issued relating to Oranges (E.M.B. 15) and Cocoa (E.M.B. 27).

During the work of preparation, it soon became apparent that the subject was too wide to be confined to one volume and it was decided

* Cmd. 4335.

to issue a series of volumes, each dealing with a convenient group of these commodities. The first of these, dealing with oil palm products, appeared in June, 1932 (E.M.B. 54) and the second, dealing with coconut palm products, in December, 1932 (E.M.B. 61).

The present volume covers the products of the ground nut plant—ground nuts, ground nut oil, ground nut cake and meal—and follows much the same lines as the previous surveys referred to above. It is essentially a statistical record of the trade in these products in recent years with some indication of the general trend of production and consumption. Where possible, an attempt has been made to indicate the effect of the competition of substitutable oils, vegetable, animal and marine. In this connection, difficulty has been experienced in estimating the degree of substitution that is being effected in some countries, on account of the absence of statistics of the oils and fats utilised by the more important industries concerned, namely the edible oil, margarine and soap industries.

Certain minor difficulties have also been encountered in connection with the trade statistics, which frequently do not separate decorticated (shelled) from undecorticated ground nuts and in some cases do not separate ground nuts and ground nut oil from other oilseeds and oils. The figures of acreage, production and trade published in this Survey represent the latest statistics available. Where official figures of acreage or production are lacking the most authoritative estimate, whether official or otherwise, has been adopted in order that the data presented may be as complete as possible. Aggregates for the world, and for the British Empire, and in some instances individual figures, may accordingly differ from those given in other publications of the Empire Marketing Board or of other bodies publishing similar statistics.

In the compilation of this Survey, the Statistics and Intelligence Branch of the Empire Marketing Board and the Intelligence Branch of the Imperial Economic Committee have had the skilled and ungrudging assistance of many official, statistical and trade bodies in all the important countries of the world interested in the production of and foreign trade in ground nut products both within and without the Empire, and the Imperial Economic Committee desire to take this opportunity of expressing their keen appreciation of this valuable co-operation.

The proofs of this Survey have been scrutinised by :—

Sir Arthur Hill, K.C.M.G., D.Sc., F.R.S., Director, Royal Botanic Gardens, Kew ;
F. A. Stockdale, Esq., C.M.G., C.B.E., M.A., F.L.S., Agricultural Adviser to the Secretary of State for the Colonies ;
The Imperial Institute ;
F. D'Arcy Cooper, Esq., Joint Chairman of Messrs. Unilever, Ltd. ;
F. M. Dyke, Esq., of Messrs. Lever Bros. ;
F. E. Fehr, Esq., C.B.E., of Messrs. Frank Fehr and Company ;
J. W. Pearson, Esq., of the British Oil and Cake Mills, Ltd. ;
E. Steiner, Esq., of Messrs. Volkart Bros. ; and
The International Institute of Agriculture, Rome.

In addition, the proofs of those chapters of the Survey, on which they are specially competent to advise, have been scrutinised by :—

Sir Robert Cahill, C.M.G., Commercial Counsellor, His Britannic Majesty's Embassy, Paris ;
The late J. W. F. Thelwall, Esq., C.M.G., M.C., Commercial Counsellor, His Britannic Majesty's Embassy, Berlin ;
G. Janson, Esq., Compagnie du Congo pour le Commerce et l'Industrie, Brussels ; and
S. Sørensen, Esq., Agricultural Counsellor to the Danish Government, London.

The Committee desire to take this opportunity of expressing their sincere appreciation of the valuable help thus furnished.

Intelligence Branch,
Imperial Economic Committee.

October, 1934.

INTRODUCTION

Ground nuts, the fruit of a tropical to sub-tropical annual plant, *Arachis hypogaea*, are so called because the nuts mature in the ground ; they are also known as earth nuts, peanuts—the kernels growing inside pods like peas—and monkey nuts. The nuts are used for human food, as food for live stock—chiefly pigs which are turned into the field to do the harvesting—or crushed for oil and oilcake. All but a small proportion of the ground nuts entering world trade are destined for the production of oil. The following chapters deal mainly with the part of the crop that is exported and the relatively small amounts of ground nut oil and cake leaving the ground nut producing areas.

THE GROUND NUT PLANT

Arachis hypogaea is of South American origin, but was introduced into Africa and Asia in the sixteenth century*. India, China and West Africa, with the addition of the United States of America, remain the principal sources of supply. The ground nut plant thrives best on a well-drained, rich, sandy loam well supplied with lime, in areas free from frost during the period of growth which lasts about five months, and having an annual rainfall of 30 to 50 inches so distributed as to provide dry weather during the ripening and harvesting of the crop when adequate sunshine is needed. The absence of frost and the avoidance of heavy or stiff soils are essential to successful cultivation, but ground nuts can be produced under a variety of conditions of soil and climate, and in addition to the areas already mentioned they are grown in other parts of Africa—notably in Mozambique, Tanganyika, the Anglo-Egyptian Sudan and the Union of South Africa—in North Australia, British Malaya, Spain, Japan, the Netherlands East Indies, the West Indies, and South America. Where the soil is inclined to be heavy, as in some parts of Nigeria, greater cultivation is needed to keep it sufficiently friable to enable the flower stalks to bury their ovaries. Where the soil is dark and discolours the shells, as in some parts of South Africa, the shells are often bleached to improve the marketing prospects of the nuts. An insufficient rainfall during the earlier months of growth can be counteracted by irrigation, as is done for the summer crop in Madras.

* See Kew Bulletin, 1901, pp. 175, 182.

To face page 9.



ERECT AND TRAILING TYPES OF GROUND NUT PLANTS
(Reproduced by courtesy of the High Commissioner for India)

After the soil has been pulverised to a depth of 4 to 5 inches, the nuts are sown, sometimes in their shells, about 1 to 2 inches deep and 3 to 4 inches apart with 24 to 36 inches between the rows. Usually nuts from the previous crop are used, but a periodic renewal of the seed stock is desirable to maintain the yield and strengthen resistance to attacks by insects and disease. The habit of growth depends upon the variety of seed planted. The many varieties of ground nuts fall into two main divisions—the erect or bunch, and the trailing types. Plants of the erect varieties have a bushy growth and reach a height of 12 to 18 inches, the pods clustering round the “bunched” stems. Plants of the trailing varieties creep along the ground and soon cover it, the pods forming all along the “running” stems. Whatever the variety, the flower withers after fertilization, its stalk elongates and turns earthward burying its point about 3 inches in the soil where the ovary develops into a pod or shell $\frac{3}{4}$ to $1\frac{1}{2}$ inches long, greyish white or light buff in colour and containing one to five, but usually two or three, ovoid kernels each of which is covered with a thin skin varying in colour according to its variety from cinnamon shade to blood red. The sizes and weights of the shells and kernels differ in each variety, but on the average the shells are about one-third of the weight of the kernels and the number of kernels to the ounce varies between 30 and 40 in the varieties bearing the larger nuts, and between 60 and 80 in the varieties bearing the smaller nuts. The average yield per acre is about 900 lb. of nuts in the shell, but a good yield may reach 1,500 or 2,000 lb. of nuts in the shell and 1 to 2 tons of haulms, which may be used for feeding stock.

The ground nut is a hardy plant and easy to grow; it needs little cultivation beyond weeding—two or three hoeings before the nuts form usually suffice—and it requires little manure except when grown for several consecutive years on comparatively heavy soil. It is often grown in a three-year rotation with a cereal and cotton, or in a two-year rotation with one of these.

Ground nut plants are attacked by locusts, rosette disease, leaf spot, and wilts (*Fusarium* and bacterial). The locust problem is receiving the active attention of the authorities in those areas where losses are serious.

Rosette disease is transmitted by a sucking insect (an *Aphis*, *A. Laburni*, sometimes called *A. leguminosae*), and it has been found that its incidence is increased by drought, wide and late plantings,

and by clean cultivation. In certain areas it has been found that closer and early planting gives an effective practical control of this disease.

Rosette disease and leaf spot, both of which seriously reduce the yield of the plants affected, are being overcome by selecting varieties of seed showing the greatest resistance to the disease.

No satisfactory method other than adequate rotation is known for controlling wilts, the bacterial form of which (due to the well-known *Bacterium solanacearum*) causes considerable losses in the Netherlands East Indies and elsewhere.

Ground nuts of the erect varieties, being easier to harvest, are more suited to heavier soils, whilst the trailing varieties give the highest yields on light soils, but the problem facing the producers and their advisers is to determine which of the many varieties in each type is best suited to the conditions of a particular area. The Virginia Bunch, Spanish Bunch, Valencia, Natal, Small Japan and Philippine Pink are examples of the erect type, and Bombay Bold, Coromandel, West African, Virginia Runner, Philippine White and Mauritius are examples of the trailing type. Ground nuts of the Virginia Bunch variety are preferred by the confectionery and barrow trades because of their large size and flavour, but there is little difference in the commercial value of the different varieties of ground nuts where the nuts are intended for the manufacture of oil.

Harvesting is the most costly operation in the production of ground nuts, and in the United States of America about one-quarter of the crop is left in the ground to be "hogged off" by pigs. In most areas outside the United States of America the bulk of the crop is harvested without the aid of machinery, although in some countries the authorities are encouraging the increased use of ploughs. In the United States of America machinery is used for digging, picking, cleaning and decorticating the nuts. The world's ground nut crop is almost entirely produced on small holdings and harvesting employs the whole family; the availability of cheap labour accounts in part for the increased production that has accompanied low prices, a further factor being the alternative use of ground nuts as a food crop or cash crop.

The foliage of the ground nut plants from which the nuts have been harvested is sometimes dug in as a fertiliser and sometimes dried and stored as "hay," but is often wasted.

GROUND NUTS

The proportion of the crop which is consumed as nuts is not known. In the United States of America almost all the ground nuts harvested are eaten either as raw or roasted nuts, in confectionery or after manufacture into peanut butter ; but this is exceptional and in the other producing areas, although actual figures are not available, it is known that substantial proportions of the production are crushed locally or exported to Europe for the manufacture of oil. On the average over 40 per cent. of the weight of ground nut kernels consists of oil, but the proportion varies slightly according to the variety of the nut and the area where it is produced.

Table 1 shows the results of tests made to ascertain approximately the number and weight of the kernels of the principal varieties entering world trade, together with the oil content of the kernels and the free fatty acid content of their oil, which vary both from year to year and according to the time of shipment.

It is important that the nuts should be thoroughly dried before being stored. Artificial drying is sometimes used for this purpose, but the method usually adopted is to stack the harvested plants in the field until they are dry or to spread out the unshelled nuts in the sun for about a week, protecting them at night. If the nuts are not properly dried they become discoloured and develop an unpleasant smell, and, if shipped or stored in a damp condition, damage through heating may render the oil produced from them fit only for the manufacture of soap and the cake unfit for cattle food. The nuts are exported both in the decorticated and undecorticated state ; if decorticated, the shelling process is not undertaken until the nuts are ready to be marketed. As a rule, producing areas that are relatively near their export markets, ship their ground nuts in the undecorticated state, while producing areas far removed from their export markets decorticate their ground nuts before shipment. The heavier cost of transport over greater distances is offset by the reduction of 25 per cent. in weight and about 50 per cent. in space effected by decortication. The nuts are exported undecorticated notably from the Gambia and French West Africa. When not wasted, the shells are used as manure, as fuel—for example in cotton ginneries and oilseed mills, for polishing in the tin-plate industry, as bait in the sardine-fishing industry of France, or ground and mixed with molasses for use as a cattle food.

TABLE 1.—*The Principal Varieties of Ground Nuts Entering World Trade*

	Indian (a).				Nigerian (b).	Gambian (b).	Rufisque (b).	Chinese (c) (excluding Spanish type).
	Bombay Bold.	Coro-mandel.	Khan-deish.	Red Natal (Small Japan).				
Kernels (in per cent.) :—								} Generally two kernels.
3 kernels or more	40	8	—	5	1	3	—	
2 kernels	50	80	90	85	78	87	76	
1 kernel	10	12	10	10	21	10	24	
Number of kernels per ounce.	44-53	62-66	78-85	65-75	58-68	79-90	66 (average).	26-42
Oil content of kernel (in per cent.) (d).	46.0-47.2	48.3-49.6	47.9-49.6	46.1-47.9	47.0-49.2	47.0-49.0	50.0 (average).	42.0-43.7
Free fatty acids in the oil (in per cent.).	1.3-4.8	2.7-5.4	2.4-6.7	1.0-9.1	0.5-8.3	2.0 (average).	1.0-5.0	1.2-3.3

(a) Based on "A few notes on Indian Ground Nuts" by E. Lieberherr, of Messrs. Volkart Bros., Bombay, and information published by the Incorporated Oil Seed Association, London.

(b) Based on information supplied through the Seed, Oil, Cake and General Produce Association (Incorporated) of Liverpool.

(c) The number of kernels per ounce is the range of standard sizes for decorticated nuts when graded. Oil content and free fatty acids based on information published by the Incorporated Oil Seed Association, London.

(d) This represents the oil content and not the percentage of oil extracted from the kernels. In practice about 5 per cent. of the oil content of the kernel is left in the residual cake when the oil is obtained by expression, which is the usual method.

Allowing for the weight of the shells, there is no marked difference in the prices paid by importers for decorticated and undecorticated ground nuts for the manufacture of oil, but Rufisque (French West Africa) ground nuts command a small premium and Chinese ground nuts fetch less than the average price. The quality of India's exports has been considerably improved by substituting machine shelling of dry nuts for decortication by hand after wetting the nuts, and screening combined with official inspections of exports from the Gambia have reduced the percentage of sand and sticks in the consignments to less than the trade allowance of 2 per cent.

The export balances of decorticated and undecorticated ground nuts from the principal ground nut producing areas rose from an annual average of 600,000 tons (decorticated basis) in the pre-war quinquennium to about 1,500,000 tons between 1928 and 1931, but fell to about 1,200,000 tons in 1932 and 1933. The British Empire—principally India—supplied over 60 per cent. of these exports; France, Germany and the United Kingdom were the principal markets.

GROUND NUT OIL

The ground nut oil produced in the ground nut producing areas is obtained for the most part by primitive methods, but modern plants have been set up in India, China and other areas which manufacture ground nut oil for export. The largest export of ground nut oil in any year from the ground nut producing areas was little more than 50,000 tons, and is thus of small importance as compared with the exports of ground nuts.

The best grades of oil are produced from undecorticated nuts, but oil of very good quality is produced from decorticated nuts including those exported in that state. Decorticated ground nuts suffer some fermentation in transit which is increased by the presence of broken kernels, the free fatty acid content of which increases during storage and transport to a greater extent than is the case with whole nuts.

A good ground nut oil is clear, thin, amber coloured and slightly nutty in flavour. Two grades, differing in quality and use, are usually produced in the crushing of the nuts. The first pressing, after heating, gives an oil which is used for edible purposes and the manufacture of margarine; the second pressing produces an oil slightly inferior but used for the manufacture of margarine and soap. In France, a preliminary pressing, cold-drawn, yields an edible oil which is refined for table or culinary use. Ground nut oil is also obtained

by the use of solvents, a method which secures higher yields of oil than are obtained by crushing the nuts and hence is of value in treating low grade nuts or in cases where the maximum oil recovery is essential. It is reported that experiments are being made in India to ascertain the possibilities of extracting the oil by a bacterial process.*

The use of ground nut oil as a salad and cooking oil has increased in recent years at the expense of olive oil, but its use in margarine and soap has declined in favour of cheaper oils such as whale oil and soya bean oil. Ground nut oil is also used as a minor constituent in compound lubricants, as a preserving oil in the canning of fish, and to a small extent in the wool textile industry. The aggregate amounts available for consumption in the principal consuming centres of Europe rose from about 230,000 tons in 1924 to over 590,000 tons in 1929, but declined to about 425,000 tons in 1932 and 1933. France, Germany and the United Kingdom are the largest European consumers.

Prior to the War the oilseed and nut crushing industry had shown a more rapid development on the Continent than in the United Kingdom. In the seventeenth century linseed and rapeseed oil production was an established industry, and at the beginning of the nineteenth century about 500 windmills, situated for the most part in the Netherlands, were crushing these seeds.† The industry grew up around the principal oilseed importing ports, such as Hull and Liverpool in the United Kingdom, Hamburg and Bremen in Germany and the Rhine towns supplied by the ports of Antwerp and Rotterdam. These centres of production were also convenient centres of distribution for the oil and oil cake extracted by the crushing mills.

The crushing of ground nuts for ground nut oil was to a large extent a French development, as regards the European aspect of the industry, although ground nut oil had been produced and utilised in the ground nut areas a long time prior to the first shipments of ground nuts to Europe. For a considerable period prior to the War Marseilles was the seat of an important vegetable oil industry, and France consumed about 70 per cent. of the ground nuts exported during the pre-war quinquennium. Other countries which participated in this trade were Germany and the Netherlands, but imports into the United Kingdom were then unimportant.

* Madras Agricultural Department Report, 1932-33 (page 40).

† See "Organisation and Business Methods of the Oilseed Trade," by G. N. Chapman, Secretary of the International Association of Seed-Crushers.

The principal object of the crushing industry in the United Kingdom before the War was the production of oil cake for cattle-feed, whilst on the Continent, and especially in some parts of France and Germany, the principal demand was for oils and more particularly edible oils for table use, culinary purposes or the manufacture of margarine; at that time, oils for these purposes were in less demand in the United Kingdom than on the Continent and there was little demand for any other oilseed cakes than linseed and cottonseed. During and since the War the margarine industry and the consumption of vegetable oils for culinary and edible purposes have made great strides in the United Kingdom with the result that the crushing of oilseeds and nuts for the production of edible oils has considerably increased.

In regard to the crushing methods adopted, little change has occurred since the introduction of the so-called Anglo-American system about 1872. Modern practice usually involves two operations: the first being generally a preliminary treatment in a unit of the Anderson Expeller type, and the second, a treatment of the residue from the expeller in an hydraulic press. The general development of the oil crushing industry has been in the direction of increasing the capacity of the mills, as the larger mills have proved to be more economical. The extraction of oil from the seed by means of solvents, as opposed to the crushing of the seed, was introduced about the beginning of the present century and has since been widely adopted for low grade nuts or where maximum oil recovery is essential, on account of the higher yield of oil obtained by this method.

GROUND NUT CAKE

The residue from the crushing of the nuts is known as ground nut cake, whilst the residue from extraction by solvents is known as ground nut meal. Both cake and meal are valuable as fertilisers or as cattle feed, but the latter is the only important use outside the ground nut producing areas. Ground nut cake contains a higher percentage of oil than ground nut meal and is of greater nutritive value. The cake left from the crushing of decorticated ground nuts is somewhat similar in composition to decorticated cotton cake and possesses a feeding value not surpassed by any other oilcake, though the choice of oilcake is considerably determined by local preferences. The feeding value of undecorticated ground nut cake is rather lower, but both varieties are valuable feeding stuffs suitable for milch cows and cattle generally and for sheep. It has been

suggested that ground nut cake might be used in the manufacture of patent foods for human consumption, but enquiries have failed to provide any evidence that it is so used.

In recent years over 1 million tons of ground nut cake and meal have been consumed annually in the principal consuming centres of Europe, of which Germany, France and the United Kingdom are the most important. Ground nut cake is not separated from ground nut meal in any trade returns and the references to ground nut cake that follow should be interpreted to include ground nut meal.

GENERAL

The following chapters indicate the recent development of the production and export of ground nut products from the principal producing areas, and their distribution to the principal centres of consumption. British Empire countries have been treated apart, and in this group have been included the mandated territory of Tanganyika and the Anglo-Egyptian Sudan. The order in which the various countries in this and the foreign countries group have been treated was determined by their importance as exporters or importers.

Precise agreement between corresponding tables is not to be expected owing to variations in the method of classification of exports and imports, and particularly owing to the different ways of recording their origin and destination.

The unit of weight used throughout the Survey is the long ton of 2,240 lb. and except where otherwise stated the conversion factors used are as follows :—

100 tons of undecorticated ground nuts	= 75 tons of kernels
	= 30 tons of ground nut oil
	= 70 tons of undecorticated ground nut cake
100 tons of decorticated ground nuts	= 40 tons of ground nut oil
	= 60 tons of decorticated ground nut cake
243 gallons of ground nut oil	= 1 ton

The estimates made of the available supplies of ground nut cake in the ground nut importing countries include the weight of shells where the ground nuts are imported undecorticated.

The trade figures relate to the total foreign trade of the country in question except where the tables are headed "Special Trade," in which case the imports relate only to those quantities intended for domestic consumption and the exports to domestic produce together with such part of the imports intended for domestic consumption as were subsequently re-exported.

Except where otherwise stated, annual figures relate to calendar years.