

Vegetable Oil Production in Brazil

*Extensive Natural Resources in Oil-bearing Seeds
Offer Opportunities for Commercial Exploitation*

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*Young palm nut trees (*Elaeis guineensis*) in the first year of bearing.*

IN this short article it is only possible to survey the problem of the utilization of Brazilian oils for industrial and commercial purposes. But as I have visited every oil factory in the country from the Amazon to Rio Grande de Sul, and studied them in all their aspects, my personal observations on this problem may be of interest to the industries concerned, and may be compared with the facts collected by independent scientists.

Brazil, with its 8,511,189 square kilometres and possessing the most varied climates, can supply the world with every kind of fatty vegetable substance; but this great wealth is

buried in forests, only a small area being cultivated with cotton, coconut, "mamona," monkey nuts, "gergelim," and flax. The oleaginous nuts are an important and varied group, the first place being occupied by the "babassu," the oil of which is used to greater advantage in the margarine industry than coconut oil.

American Machinery Predominant

THE first Brazilian oil factory was founded in 1875 in Rio de Janeiro. Until the European War British manufacturers were the most important suppliers of machinery for the oil factories, and of the 73 factories existing in Brazil in 1922 some 40 used British ma-

chinery. American, German, French, and Italian presses, as well as those of local manufacture, are found in smaller numbers. But the best factories in the country today have American installations; this applies especially to the extraction of cottonseed oil, which is carried out in the majority of factories by the American process. Of the 43 cottonseed oil factories only 14 use the English process of extraction (oil from undecorticated seeds), but these 14 installations are also used for other oils. The reason for the American hold on the market is simple. While cotton has long been exploited in the country for its fibre, it was only during and after the war that the exploitation of cottonseed oil was greatly developed. At this time British machinery was not available; the Government lent large sums for the installation of modern factories of American type for the extraction of cottonseed oil, and there is no doubt that the best installations are to be found in these factories.

The oil manufactured on the largest scale is summer oil, while winter oil and salad oil (deodorized) are also manufactured at present by three factories in the country. Summer oil is exported on a large scale to Great Britain and other countries, the exporters for certain purposes signing contracts made out in accordance with the rules employed by the Incorporated Oil Seed Association and the London Oil and Tallow Trade Association. On the other hand, the internal trade in seeds, oils, soapstock, cake, or meal is not yet regulated, and no certain basis exists for dealings between manufacturers. Bills are discounted after an investigation of the standing of the manufacturer concerned, and an arrangement is made according to the merits of each.

Of the 43 cottonseed oil factories in Brazil not more than ten are acquainted with the use of Lovibond's tintometer for oil refining, so that the rules of the Inter-State Cotton Seed Crushers' Association are not as yet widely applied in Brazil. But during the International Cotton Congress of 1922, it was proposed, after hearing the views of the most important manufacturers interested in cottonseed oil, and after studying the manufacturing facilities of each factory, that there should be established various standard types in oils and cakes or "farellos", which, being less stringent than the Inter-State rules, could serve to regulate this branch of trade. The large cottonseed oil factories, however, can produce cakes of the same standard as the American.

The possibilities of Brazil as a producer of cotton are incalculable. It possesses fertile land suitable for an abundant cultivation of

cotton, and the tendency of the consumption of cottonseed oil is to increase. Manufacturers do not advertise their salad oil—the manufacture of which from cottonseed oil was started in 1920 with American machinery—but its consumption has increased sufficiently to justify the installation of new factories. However, in spite of the fact that the salad oil prepared in Brazil is as good as the American, Brazil in 1928 imported more than \$4,250,000 worth of this oil. The value of imports of salad oil in 1923 was about \$1,500,000 and in 1927 about \$2,900,000.

At the seventh International Vegetable Oil Congress, held in Seville in 1924, it was said that cotton oil and colza oil were exported to Brazil and other South American countries as olive oil. It will be a task of the laboratory of which I am in charge to investigate this assertion. But the Public Health Department, which analyzes all vegetable oils used in foodstuffs, informs me that in a small number of samples of imported olive oil some cottonseed oil has been found.

Another oil which can be substituted for olive oil is "pataua" oil, derived from the palm nut *Oenocopus Batava Mart*. Its similarity to olive oil is so great that writing on the subject in the "Analyst" of December, 1927, the British scientists E. R. Bolton and Hewer said: "The oil bears a striking resemblance to olive oil, and, save for a distinctly lower refractive index and a hardly appreciably lower iodine value, the analytic constants are strikingly similar, including its specific gravity of 0.9158. Methods of rapidly distinguishing this oil from olive oil are specially needed in view of the fact that it is eminently suitable as a salad oil and would prove an excellent edible generally." Bolton, too, on page 152 of his magnificent work, "Oils, Fats, and Fatty Foods," republished in 1928, says; "'Pataua' oil is like olive oil in many respects, including appearance and chemical characteristics; and it behaves in a similar way when subjected to Bellier's test as modified by Evers." This oil is only manufactured in Para on a small scale and enjoys a great demand in the country.

The Babassu Kernel

THE kernel of the babassu nut, (*Orbignia speciosa Barb*), Rodrigues, is today the most important item in the trade of the State of Maranhao, and its exploitation is increasing rapidly. Germany imports almost two-thirds of the production, and American, Belgian, French, and British companies are also interested in this industry. The difficulty in the way of increasing exportation is the lack of

a machine which can be an economic substitute for hand labor to break the shells without damaging the kernels.*

Bolton, in his examination of the babassu nut on page 174 of the above-mentioned book, writes: "The oil is closely allied to coconut oil and is very similar in appearance and composition, but lower in melting-point as a result of the higher proportion of unsaturated glycerides . . . The refined oil is suitable for margarine and general edible use, and the crude oil for soapmaking, serving in a similar manner to coconut oil." William Clayton, referring to the babassu in his work "Margarine," says, on page 8: "It is anticipated that this fat will figure prominently among vegetable fats intended for margarine manufacture in the near future." For soap manufacture this oil has also been widely used, both in Brazil and other countries. The importance of the babassu nut can therefore be easily appreciated, and there are at present in Brazil 16 factories engaged in extracting the oil from its kernels.

The coconut (*Cocos nucifera*) is exploited in Brazil on a small scale in proportion to the length of the Brazilian coastline and the vast areas suitable for its cultivation. The coconut is still chiefly utilized in Brazil for its coconut water (milk), and hence its substitution by the babassu. The copra nut is produced on a small scale, and not more than eight factories use it for the extraction of oil. Castor seed is cultivated in the country, and 26 factories extract this oil. This seed is exported to the United States and other countries, while the oil is exported to the Argentine.

Flax is cultivated on a small scale in the south of the country for consumption by local factories and factories in other States. Since this trade is not under official inspection, the oil is very much adulterated. As a substitute for flax, oil manufacturers and business men have sought to extract oil from the "oiticica," which has been studied by American and English experts, the opinion of Bolton being that "it is probable that this oil may prove an exceedingly useful one to the varnish-maker, though some difficulties in its commercial extraction are to be expected. Various firms are already experimenting with the oil, and it is likely that larger quantities will soon reach this country." Several factories import flax from the Argentine and extract the oil for sale in the country and for export with the "cakes" to other markets.

Many other seeds and oleaginous nuts are exploited in Brazil, and consumption of them

has increased. In the State of Bahia, for instance, the "pindobassu," "piassava," "uricury" and other nuts which produce a fat less rich in solid fatty acids than the fat of the babassu are also utilized by the oil factories. In this State palm oil is extracted and consumed as a foodstuff, the palm-kernel oil being despised.

The oil manufacturers of Brazil are daily becoming more convinced of the advantages of the employment of capital in this industry, which is thus becoming better developed from the technical point of view. In Sao Paulo there has been installed all the machinery necessary for the extraction and solution of oil existing in oleaginous "tortas" (cakes) left by small factories after the first pressing; good results have been obtained by this process, which is now employed by one factory in the country.

Summary

FROM this short description it may be concluded that in Brazil there already exist good factories for the extraction of cottonseed oil by the American process, good refineries and factories for vegetable butter and similar products, and that it would be in the interests of American capitalists to study the possibilities of this industry in Brazil. In 1928 Brazil exported oleaginous seeds to the value of 71,835 contos, and 733 contos' worth of vegetable oils. However, as the Government of Brazil is keenly interested in the exploitation of the nuts and seeds, the Secretary of Agriculture has been able to obtain from the Federal Congress the necessary means for the installation of a laboratory for the specialized study of oils and their sub-products.

This laboratory forms part of the Escola Superior de Agriculture, a Federal institution, and its equipment, with the exception of the Zeiss material, was purchased in the United States. It possesses all the apparatus necessary for the control of oils, fats, waxes, and resins, and for research work on those products. Besides the departments of analysis and research, it has an industrial department, in which there will be installed within the next two months the most modern equipment of American manufacture for the extraction of cottonseed oil by the American process and of oil from other seeds rich in fat (coconut, babassu, and other nuts), and for the manufacture of soaps and other articles.

The Government has also inaugurated a specialized course in vegetable oils and derivatives; this will be the first post-graduate course es-

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* Note—An American firm has perfected such a machine, several units of which are now in operation.

Vegetable Oils in Brazil

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established in Brazil for chemists and agriculturists who have received their degrees in the agricultural colleges and other university institutions of the country. The material already acquired by the oils laboratory is valued at some \$43,000, but the Government proposes to complete the installation with apparatus for essential oils, the extraction of glycerine, and the manufacture of candles and other articles. There could be no greater evidence of the confidence felt by the Government and people of Brazil in the future of its vegetable oil industry.

Bleaching Loss Coefficients

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retention of any given bleaching material. Having arrived at a successful solution of the problem, we have not fully determined which portions of the procedure are critical and which are not. Nevertheless, since the method as we have used it seems to give satisfactory results, we offer it in the thought that it may be of some use to others, even though some of the details specified may represent useless restrictions.

Summary

DETAILED description has been given of a laboratory method for determining oil retention by bleaching earths and carbons. The method involves determination of the increase in weight resulting when a sample of the bleaching material is treated with oil and the excess oil removed by suction in a stream of hot inert gas under standardized conditions. The oil retention values obtained by this method fall within the range of those observed under practical conditions of plant operation.

Bakery Research Laboratory

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they bake a complete line of pies, pastries, cakes, doughnuts, and icings. These visits are becoming more and more popular and give promise of developing into small baking schools where several bakers will receive instruction at the same time.

The Bakery Research Department has published booklets on the following subjects: Danish Pastry, doughnuts, cookies, icings, pies, and cakes. In addition to this educational material, numerous bulletins on subjects relating to bakery practice have been issued and a good many magazine articles have been prepared. These bulletins and articles have covered a variety of problems. New methods for cake manufacture, nut frying, potato chip frying, eliminating mould from the bakery, reducing the overhead cost, together with articles on the manufacture and proper use of fats, are examples of this type of work. The Bakery Research Department maintains a complete formula service for bakers and the files contain hundreds of formulas for almost every conceivable type of pastry and other baked goods.

The Secretary of The American Oil Chemists' Society desires to call the attention of the members of the Society to the requirement of the use of a clear colorless glass in connection with many color readings of oil under the new rules on color reading. The glass to be used must be a standard one. Standard glasses for this purpose may now be obtained from the Secretary of The American Oil Chemists' Society, 705 Tchoupitoulas St., New Orleans, Louisiana. The charge for such glasses is fifty cents each, plus postage.

Census Report

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EXPORTS OF FOREIGN FATS AND OILS, QUARTER ENDED JUNE 30, 1929

KIND	Pounds		Pounds
Fish oils	7,664	Palm & palm-kernel oil	790,239
Other animal oils & fats, inedible	185,384	Peanut oil	10,948
Olive oil, edible	33,003	Soya-bean oil	1,517
Tung oils	1,568,083	Other expressed oils & fats	70,389
Coconut oil	563,566	Vegetable wax	345,599

EXPORTS OF DOMESTIC FATS AND

KIND	Pounds
Oleo oil	16,470,589
Oleo stock	2,197,038
Tallow	526,833
Lard	190,587,381
Lard, neutral	3,339,235
Lard compounds, containing animal fats	857,152
Oleo & lard stearin	1,398,351
Neat's-foot oil	175,438
Other animal oils, inedible	205,250
Fish oils	166,756
Grease stearin	736,215
Oleic acid, or red oil	1,166,807
Stearic acid	338,109

OILS, QUARTER ENDED JUNE 30, 1929

KIND	Pounds
Other animal greases & fats	16,834,209
Cottonseed oil, crude	2,479,598
Cottonseed oil, refined	1,759,203
Corn oil	96,066
Vegetable oil lard compounds	1,624,887
Other edible vegetable oils and fats	832,172
Coconut oil	7,215,433
Linseed oil	483,695
Soya-bean oil	3,231,953
Vegetable soap stock	1,407,602
Other expressed oils and fats, inedible	2,272,155
Glycerin	321,231