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43  
63  
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**THE AMAZON BASIN  
BRAZIL NUT INDUSTRY**

*by*



W. R. SCHREIBER

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# C O N T E N T S

	Page
DESCRIPTION OF THE NUT AND TREE.....	1
CLIMATIC CONDITIONS IN PRODUCING AREAS.....	12
LOCATION OF PRODUCING AREAS.....	12
RESEARCH PROJECTS ON BRAZIL NUTS.....	17
DEPENDENCE ON RIVERS FOR TRANSPORTATION.....	18
Railroad Transportation Not Important.....	18
Highway Transportation Almost Nonexistent.....	19
GATHERING AND ASSEMBLING NUTS IN THE INTERIOR.....	20
Harvesting Season.....	20
Laborers and Their Mode of Life.....	20
Methods of Harvesting.....	22
THE TRADING POST.....	24
Locations and Methods of Trading.....	24
Role of Traders in the Industry.....	25
COST OF NUTS AT EXPORT CENTERS.....	28
CLASSIFICATION OF NUTS.....	31
EXPORTATION OF NUTS.....	32
Brokers and Exporters.....	32
Exports of Unshelled Nuts.....	35
Exports of Shelled Nuts.....	39
Shelling industry.....	39
Operation of shelling plants and cost of shelling...	42
Quality and quantity of shelled nuts exported.....	45
UNITED STATES LANDED COSTS OF UNSHELLED AND SHELLED NUTS.	48
Landed Cost of Unshelled Nuts in the United States.....	50
Landed Cost of Shelled Nuts in the United States.....	51
BRAZIL NUT EXPORTS IN THE FUTURE.....	52



FIGURE 1.- Brazil nut producing area.



shortly after 1850 when Para became a State and the Amazon was opened to foreign navigation.

The Brazil nut is also known by such Indian names as nha, nia, invia, tacary, and tucary. It is called touka in French Guiana - although very few grow there - and juvia in southern Venezuela. In Peru it is called castana (chestnut) or almendra silvestre (forest almond). In foreign countries it is known as the Brazil, Para, or cream nut to English-speaking people; as noix du Bresil in French; and as Paranesse in German. In the United States it is called the Brazil nut in the trade, but many Americans refer to it as the "Nigger toe."

Another nut that grows wild in the Amazon Basin in the same regions as the Brazil nut has occasionally been confused with it or even taken to be the same nut. This nut is called sapucaia (fig. 2) in Brazil and like the Brazil nut is known by a number of names. In English-speaking countries it is frequently called the Paradise nut or Monkey Pot. The name "Monkey Pot" comes from the peculiar shape and characteristics of the pod in which the nuts are produced. The pod is roughly heart-shaped and contains a segment at stem end about 2 inches in diameter. When the fruit is ripe this segment separates from the pod and the pod drops generally spilling the contents on the ground. The empty pods are occasionally used for crude household utensils. Rodents, monkeys, and other wild life appear to be very fond of these nuts and carry them off almost as soon as they hit the ground. The monkeys' fondness for these nuts may be the reason it is sometimes called "Monkey Pot."

The tree itself is related to the Brazil nut, being classified as *L. ollaria* a member of the natural order of *Lecythidaceae*. There are several species of this tree such as *L. zabucajo*, *L. lanceolata*, and *L. amara*. The trees observed, while large, do not attain the height or circumference of the Brazil nut tree.

The sapucaia appears to have first come to the attention of the white man about 1648 when William Piso included a short section on it in his books of natural history on medicinal and other plants of Brazil, published in Leyden. Every generation or two since then, someone "rediscovers" a new nut and tells the story of its wonderful food value, flavor, and use by Indians. These "rediscoveries" usually forecast for the sapucaia a wonderful commercial future, which in 300 years has failed to materialize. The nut itself is about 2 inches long, brown, and wrinkled like a dried prune. It is not as plentiful as the Brazil nut and fails to interest American consumers. A relatively small quantity is imported into the United States from time to time



FIGURE 2.- The sapucaia, also known as Monkey Pot--a nut that grows wild in the Amazon Basin--is often mistaken for the Brazil nut.

generally as curios rather than for human consumption. The nuts, highly perfumed, are frequently sold as "Indian Nuts" to tourists at beach and other resorts.

The kernel of the Brazil nut contains from 65 to 70 percent oil, which is of a pale yellow color. In normal times production of oil is limited, as it is extracted only as a byproduct from spoiled, surplus, and sometimes broken or low-grade nuts. During World War II when exports were curtailed, surplus nuts on hand were crushed for oil; however, the venture was not profitable. The oil is generally used for soap and other industrial purposes.

The relatively high cost of producing oil from Brazil nuts compared with oils from other oilseeds will probably prevent a major industrial development in this commodity.

Although for several centuries the nut was known to have a high oil content very little in the way of analysis was done until 1930. In view of the frequent requests for information on Brazil nut oil, it is deemed advisable to repeat here pertinent parts of an article appearing in the *American Chemical Journal* of October 6, 1930. The analysis and method employed by H. S. Schuette, R. W. Thomas, and Mabel Duthey are given below.

The oil in the kernels from 26.5 pounds of Brazil nuts was expressed in a small manual press rather than one of the hydraulic type because it had been demonstrated by experimental trials that a cleaner product and a one better adopted for chemical analysis without a preliminary refining process is obtainable by using this method of recovery. The residual meat pulp was then extracted in percolators with low-boiling petroleum ether. Then the final portions were in turn removed from the oil in the presence of carbon dioxide - a dark-brown oil in distinction to that obtained by expression was recovered with no separated glycerides when stored in the refrigerator (5-10° F.). After filtration the expressed oil possessed a pale yellow color and a taste suggestive of the nut itself.

## II Analysis of Oils

(a) Chemical and Physical Characteristics. - The more important chemical and physical characteristics (Table below) of both the expressed oil and that recovered from the residual meat pulp were determined by recognized procedures<sup>4</sup>. Separation of the saturated from the unsaturated acids was effected by the lead

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<sup>4</sup> Association of Official Agricultural Chemists, "Methods of Analysis," Washington, D.C. 1925, 2d. ed., pp. 281-285.



Chemical and Physical Characteristics of Brazil nut Oil

	Expressed oil	Residual oil
Specific gravity 25°/25°	0.9150	0.9143
Index of refraction 20°	1.4678	1.4683
Titer test	...	33.3 a
Iodine number (Wijs)	99.92	95.21
Saponification number	194.0	198.00
Ester number	193.9	193.8
Reichert-Meissl number	0.0	0.31
Polenske number	0.0	0.32
Free fatty acids (per cent oleic)	0.006	0.02
Acetyl number	12.3	12.3
Soluble acids (per cent as butyric)	0.87 a	0.56
Insoluble acids (percent)	94.16 a	93.88
Unsaturated acids (per cent) corrected	73.00	70.10
Saturated acids (per cent) corrected	20.29	21.36
Iodine number of unsaturated acids	129.18	127.92
Saponification no. of unsaturated acids	199.6	201.2
Unsaponifiable matter	0.64	0.68

<sup>a</sup> Grateful acknowledgement is made to G.A. Tarnutzer and W. W. F. Enz who determined the titer test of the residual oil and the soluble and the insoluble acids of the expressed oils, respectively.

salt-ether method<sup>5</sup> after which corrections were made<sup>6</sup> for the small amount of unsaturated acids contaminating them when this procedure is used, and for the unsaponifiable matter accompanying the insoluble acids.

Glycerides of fatty acids of low molecular weight are absent, or at least present in very small amount, a situation pertinent also to sterols and hydroxylated compounds. The low acidity suggests the probable absence of any very active fat-splitting enzymes in the nut. Its iodine number assigns this oil to the semi-drying group.

(b) Unsaturated Acids. - Bromination<sup>7</sup> of the unsaturated acids led to the formation of no hexabromide, the derivative of linolemic acid. Appreciable quantities of the tetrabromide (m. p. 14.5° F.; Br. 53.58%) of linoleic acid were obtained. The bromine content (39.73%) of the dibromide fraction showed that the

<sup>5</sup> Gusserow, Arch. Apoth.-Vereins nord Teutschland, 27, 153 (1828); Varrentrapp. Ann., 25, 197 (1840).

<sup>6</sup> Jamieson, J. Assoc. Official Agrl. Chem., 11, 303 (1928).

<sup>7</sup> Eibener and Muggenthaler, Farben-Ztg., 18, 131 (1912).

latter was contaminated with a small amount of the linoleic derivative. Using the former value and the theoretical iodine numbers of oleic and linoleic acids, the percentage composition of the whole was then calculated<sup>8</sup> with the following results. The same acids were qualitatively identified, both by bromine content and melting point, in the unsaturated fraction of the expressed oil.

Composition of the Unsaturated Acid Fraction of the Residual Oil

Acid	In Oil, %	Glycerides in oil, %	Total, a%
Oleic	51.26	53.57	55.64
Linoleic	18.84	19.69	21.65

<sup>a</sup> This column includes the unsaturated acids present with the saturated.

(c) Saturated Acids. - Separation of the methyl esters<sup>8</sup> of the saturated acids into five fractions whose boiling range was 145 to 175° (3 mm.) (Part III) was followed by the calculation of the mean molecular weight of each from saponification and iodine numbers, the latter serving as a measure of the degree of contamination by unsaturated acids. These values lay between 259.3 and 289.6 indicating the presence of

Results of Analysis of Methyl Esters of the Saturated Fatty Acids

Fraction	Boiling range, 3 mm.	Wt., g.	Iodine no.	Sapon. no.	Mean mol. wt.
1	145-150	3.52	11.87	213.9	259.34
2	150-157	25.56	12.42	208.8	266.20
3	157-165	12.51	19.74	205.6	269.35
4	165-168	10.58	35.63	197.0	281.55
5	168-175	8.28	30.66	193.2	289.62
Res.	.....	2.30	59.68	167.2	390.50
Total		...	---	...	....
	Unsatd. acids, g.	Myristic acid, g.	Palmitic acid, g.	Stearic acid, g.	
1	0.33	1.18	1.84	..	
2	2.48	3.21	18.60	..	
3	1.93	0.36	9.63	..	
4	2.95	..	4.28	2.85	
5	1.99	..	1.85	4.07	
Res.	1.18	..	..	..	
Total	....	4.75	36.20	6.92	

<sup>8</sup> Baughman and Jamieson, This Journal, 42,157 (1920).

esters in the C12 to C18 group. Myristic, palmitic and stearic acids were subsequently identified by their melting points. These data lead to the following statement of the percentage composition of the saturated acid fraction.

Composition of the Saturated Fraction of the Residual Oil

Acid	%	Percentage in oil	Glycerides in oil
Myristic	7.94	1.70	1.79
Palmitic	60.48	12.92	13.55
Stearic	11.57	2.47	2.58

The same fatty acids were qualitatively identified by means of their melting points in this corresponding fraction of the expressed oil.

#### SUMMARY

The chemical and physical characteristics of the expressed and the residual portions of a specimen of Brazil nut oil have been determined. The statement<sup>1</sup> that this oil contains stearin, palmitin and olein has been confirmed. To this list have been added myristin and linolein.

The percentage composition of the residual oil was found to be as follows: Myristin, 1.79; palmitin, 13.55; stearin, 2.58; olein, 55.64; linolein, 21.65; unsaponifiable matter, 0.68; residues and undetermined, 4.11.

<sup>1</sup> Andes, "Vegetable Fats and Oils" (translated by Salter), Scott, Greenwood and Co., London, 1902, p. 187.

Although little use has been made in the past of Brazil nuts for the production of edible oil, someone decides periodically to explore the possibilities. In the postwar period at least four such investigations have been projected. It is reported that one firm considers establishing such a plant in northern Bolivia for the purpose of supplying edible and soap oil to the Bolivian market. The venture is faced with difficult transportation problems from jungle to mill site or to consumption centers and with competition from relatively cheap vegetable oils from other oil-seeds. It is also reported that two additional firms are interested in constructing small plants in the same general area.

The food value of Brazil nuts is high compared with that of fruits and other nuts. Table 1 shows that 1 ounce of Brazil nuts contain 197 calories. This figure is higher than that for all other nuts except pecans and walnuts. It is said that two Brazil nut kernels have the same caloric food value as an average-sized egg.

TABLE 1.- Food value of specified nuts and fruits

NUTS	CALORIES PER OUNCE	FRUITS	CALORIES PER OUNCE
Almonds.....	181	Apples.....	18
Brazil nuts.....	197	Apricots.....	16
Cashews.....	172	Bananas.....	28
Chestnuts.....	107	Cherries.....	19
Filberts.....	190	Olives.....	41 to 54
Pecans.....	212	Oranges.....	14
Pistachio.....	179	Peaches.....	14
Walnuts.....	199	Pears.....	20

Source: U.S. Dept. Agr., PROXIMATE COMPOSITION OF AMERICAN FOOD MATERIALS, cir. 549, June 1940.

An analysis of Brazil nuts by the Commercial Museum in Belem made some years ago showed the following composition:

<u>Percent</u>	
Protein.....	17
Fats.....	67
Salts.....	4
Carbohydrates.....	7
Water.....	5

The Brazil nut tree is one of the largest in the Amazon Basin, being from 75 to 150 feet high, and usually reaches well above the surrounding jungle (fig. 3). The height of the tree depends on its age, the soil, and other growing factors.

The trunk of the Brazil nut tree is generally smooth and is covered with a brown or ash-colored bark. It is very straight and devoid of lower branches. The crown of the tree spreads out like that of the American white oak and is often as much as 100 feet in diameter. It is covered with large oblong-shaped leaves that are dark green and deeply ribbed. The base of the tree is usually well buttressed, and at maturity the trunk is from 4 to 6 feet in diameter. A few trees were observed with a trunk as much as 10 feet in diameter.

The wood is clear-grained and gray in color. The long, straight, thick trunk makes good saw timber, though relatively few trees are felled for lumber because the trees are more valuable for nut production. The bark of the Brazil nut is used in the manufacture of oakum and a coarse cloth used by natives. The bark is also pounded into flexibility for use as sleeping mats by the nut gatherers (castanheiros) and as containers for other jungle products.

The fruit of the tree is a sort of large, woody-shelled capsule, closely resembling a coconut without its husk. The pod is dark brown and from 3 to 8 inches in diameter. It is known as an ourico, which in Portuguese means "rough prickly shell of chestnut covered with bristles



or bristle-like attachments." This description is not altogether accurate because the pod's outer covering is rough but is not covered with bristles (fig. 4). The outer covering of the pod is composed of a brown vegetable substance about one-fourth of an inch thick. This covering in some respects resembles the outer covering of the Persian (English) Walnut. Unlike that of the walnut, however, it becomes very hard, though somewhat brittle. After the pod falls to the ground the outer covering begins to break, the splits becoming larger the longer the pod remains on the ground. In the Spanish-speaking countries the pod is referred to as a coco.

Inside the outer shell is a very hard, fibrous, rough pod about one-fourth of an inch thick. This pod resembles a huge black walnut after the husk has been removed and contains from 12 to 20 nuts. The pod, when cut and polished, in some respects resembles the grain of bird's-eye



FIGURE 3.- Brazil nut tree towering over other jungle vegetation. Compare the size of the man standing at the base with that of the tree.



FIGURE 4.- Pods, or ouricos. Note the strong leaves and thick outer layers of the pods protecting the kernels.





FIGURE 5.- Brazil nut tree about 1 year old.

into small pieces and loosens the nuts within the pod. If a pod is turned upside down and shaken, the small bits of broken fiber drop out of the stem end. The opening at the stem end of an average pod is about as large as a dime.

The tree grows wild and is propagated by the small nuts in the pods. A notion was prevalent in the Amazon Basin and elsewhere for many years that only the nuts in the pods would germinate, but nuts have been germinated at experiment stations after they were removed from the pod. It usually requires 3 months or more for the nuts to sprout. In prewar years the experimental plantation at Kuala Lumpur in the Malay Peninsula found that approximately 50 percent of the nuts planted germinated. Germination would require from 3 to 12 months after planting of the seed. The results obtained in Malaya may be due in part to conditions prevailing in that area. Experiment station records for Brazil are not available. Under natural conditions, however, it was observed that the germination rate was high and the length of time was shorter than that reported for Malaya. Some nuts were found that were alleged to have germinated in about a month. The young tree reaches a height of about a foot the first year (fig. 5) and thereafter grows with fair rapidity, reaching a height of 15 to 20

maple. There appears to be no uniformity as to the number of nuts per pod on any given tree. Several pods from the same tree were cut open and found to contain different numbers of nuts. The experiment was repeated in several different areas with the same result. This divergence is probably due to incomplete pollinization, which results in the development of only a part of the nuts.

The nuts are arranged in the pod similar to the segments of an orange and are held in place by a fibrous growth. This fibrous substance dries as the fruit matures. When the pod falls from the tree to the ground, the impact breaks the fiber



FIGURE 6.- A grove of Brazil nut trees on the Acara River. Note the height and size as compared with other vegetation.

feet in a period of 5 years. The tree fights its way above the surrounding jungle but grows at a somewhat slower rate after the fifth or sixth year.

The Brazil nut tree is usually found growing on well-drained ground and seldom within the reach of high water. The tree prefers a clay or clay-loam soil, from 50 to 100 feet from streams or swamps. The trees are usually found in groups of six or more, often forming fair-sized groves (fig. 6). They also are found so far inland that the difficulty in transporting the nuts to the waterways precludes their being harvested.

The tree begins to flower in its fifth or sixth year but little fruit is produced until the twelfth to fifteenth year. Flowering takes place from October to March in most of the producing areas, though in some sections, such as Acre and Rio Negro, blossoming takes place slightly earlier. The flowers grow in cream or white clusters and resemble in some respects the ornamental hydrangea of the United States.

The flowers are borne on the small outer branches. There are generally several clusters of flowers on the same branch, but as a rule only two or three produce fruit. Pollinization appears to be effected by insects flying from one tree to another.

It is usually at least a year from the blossom state to the time when the pods mature and drop to the ground. A point of particular interest is that blossoms and mature, or nearly mature, fruit are found on the Brazil nut tree at the same time. The quantity of blossoms on the tree in a current year, therefore, gives a preliminary indication of the potential yield a year hence. Such a preliminary indication on a commercial plantation of fruits or nuts would normally be of considerable help in forecasting production. In the case of Brazil nuts, however, it is only a partial indication as to what the harvested crop will be because of a great many unpredictable factors. These are chiefly the availability of labor, the amount of water in streams, the occurrence or not of severe windstorms and rainstorms before fruit is mature causing it to fall prematurely, and the prices offered by trading posts to natives.

There is comparatively little loss from disease or insect pests, according to the information available. There is a loss when pods crack and air and rain are admitted, causing the nuts to mold. This cracking may be brought about by disease or insects; however, since it is physically impossible to examine the pods in the tree, because of their great height from the ground, the cause must remain unknown, for the time being at least. Another source of loss is a small jungle rodent, similar in some respects to a squirrel or wood rat, which carries off many nuts for food.

The trees bear about the same quantity of nuts each year, provided growing conditions are satisfactory. The effect of a heavy yield one year on that of the following year is considerably less noticeable than in the case of such cultivated nuts as almonds. Severe storms during the blossoming and pollination period, however, cause a light set for the following year. Since the Amazon Basin is in the Tropics, no frost damage ever occurs. The vast area in which these trees are found natural-

ly makes losses due to the weather inevitable in some parts of the region each year. The total harvest is therefore not materially affected by weather losses, and the economic factors mentioned are far more important in determining production.

### CLIMATIC CONDITIONS IN PRODUCING AREAS

The temperature in the Amazon Basin along and near the banks of rivers is relatively uniform and the humidity is high. Temperatures during the year vary from 101° to 64° F. The monthly variations between the average maximum and minimum temperatures registered are from 9° to 18°. In the upper regions of the Amazon Valley the variations are somewhat greater, and in Acre Territory they are greater still (table 2). The greatest variation in temperature generally occurs during the comparatively dry season, which extends from June through November.

The rainfall in the Amazon Basin is heavy and typical of the Tropics in this part of the world. The data in table 3 show the monthly distribution of rainfall in 1945 according to the records at the meteorological stations at Sena Madureira, Manaus, and Belem.

### LOCATION OF PRODUCING AREAS

The Brazil nut tree is found scattered throughout the entire Amazon Basin. Its northern limit is southern Venezuela and British Guiana, or about 5° north latitude, while its southern limit is the Beni Highland in northeastern Bolivia and northwestern Mato Grosso in Brazil, about 14° south latitude. Its western limit is eastern Colombia and Peru near the Brazilian and Bolivian borders.

This report deals primarily with those varieties found in Acre, Amapa, Amazonas, Guapore, Para, and Rio Branco, or, roughly speaking, in the Brazilian States and territories of the Amazon Basin. This area extends over about 1,378,998 square miles, or approximately 42 percent of the area of Brazil (table 4). Production in Bolivia, British Guiana, Colombia, Peru, Venezuela, and Mato Grosso is relatively unimportant. Exports from these areas generally move to market via the Brazilian States of Amazonas or Para.

Belem, the Capital of Para, is located near the mouth of the Amazon River. It is the largest city in the area and in 1948 was credited with a population of 240,077. Manaus, the capital of Amazonas, with a population of 123,801 is the next largest city, while Rio Branco, the capital of Acre Territory, has a population of 18,661. In addition to these capital cities there are a number of other fairly important towns, such as Itacoatiara and Santarem, located up the river from Belem.

The people living in these cities are in general typically Brazilian, a mixture of whites, mulattoes, mestizos, Negroes, and Indians. The back country and interior is somewhat different in that the percentage of whites is lower and that of the colored and mixed bloods is higher.



TABLE 2.- Temperature of specified weather stations in Acre, Amazonas, and Para, by months, 1945

ACRE - SENA MADUREIRA

MONTH	TEMPERATURE			
	AVERAGE MAXIMUM	AVERAGE MINIMUM	ABSOLUTE MAXIMUM	ABSOLUTE MINIMUM
	° F.	° F.	° F.	° F.
January.....	88	71	92	66
February.....	87	71	94	67
March.....	88	71	93	68
April.....	89	70	93	58
May.....	87	59	93	46
June.....	86	62	92	54
July.....	88	63	94	52
August.....	95	64	98	55
September.....	93	67	98	61
October.....	89	66	95	58
November.....	87	70	82	67
December.....	88	70	83	64
Annual.....	89	67	98	46

AMAZONAS - MANAUS

January.....	88	75	93	72
February.....	85	74	90	69
March.....	85	75	90	72
April.....	86	75	91	73
May.....	86	74	91	72
June.....	87	75	91	72
July.....	89	75	93	71
August.....	93	76	96	73
September.....	92	76	96	71
October.....	90	75	97	71
November.....	88	76	99	70
December.....	90	75	102	69
Annual.....	88	75	102	69

PARA - BELEM

January.....	87	73	91	72
February.....	85	73	90	69
March.....	86	74	91	67
April.....	85	74	90	71
May.....	87	74	90	72
June.....	89	73	91	71
July.....	89	72	91	71
August.....	90	73	91	70
September.....	88	72	90	70
October.....	89	72	91	69
November.....	90	72	91	70
December.....	89	73	90	71
Annual	88	73	91	67

TABLE 3.- *Precipitation and relative humidity of specified weather stations in Acre, Amazonas, and Para, by months, 1945*

ACRE - SENA MADUREIRA

MONTH	PRECIPITATION		RELATIVE HUMIDITY
	MAXIMUM IN 24 HOURS	TOTAL AMOUNT	
	<i>Inches</i>	<i>Inches</i>	<i>Percent</i>
January.....	2.9	12.6	92
February.....	1.4	7.9	92
March.....	2.6	11.1	92
April.....	1.9	7.7	91
May.....	1.4	2.5	89
June.....	.7	1.6	88
July.....	.8	2.1	88
August.....	.5	.6	82
September.....	2.5	5.8	83
October.....	1.4	5.1	90
November.....	.6	4.2	91
December.....	1.7	11.8	92
Annual.....	2.9	73.0	89

AMAZONAS - MANAUS

January.....	1.9	8.0	86
February.....	3.5	16.6	89
March.....	2.2	15.8	90
April.....	3.1	13.4	89
May.....	1.8	12.1	86
June.....	1.7	3.7	83
July.....	1.2	3.6	80
August.....	.2	.9	74
September.....	2.1	3.3	80
October.....	2.1	9.1	78
November.....	1.6	6.4	-
December.....	1.1	7.4	-
Annual.....	3.5	100.3	-

PARA - BELEM

January.....	1.7	14.6	88
February.....	3.8	23.1	91
March.....	2.4	20.4	91
April.....	2.2	17.9	90
May.....	2.4	10.4	86
June.....	1.4	6.4	83
July.....	.7	5.3	82
August.....	1.3	3.2	80
September.....	2.5	7.5	84
October.....	.8	3.1	81
November.....	.8	2.1	80
December.....	1.2	5.2	85
Annual.....	3.8	119.2	85



In pre-World War II years a number of Japanese had settled in the Amazon Basin and established plantations of jute and various other tropical crops. During the war the Japanese were removed as a security measure.

The inhabitants of the Amazon Basin are known as caboclos, meaning "copper colored ones." The term originally referred to Indians but now includes the whites, mestizos, mulattoes, Indians, and Negroes who live in the interior. It is from the ranks of these caboclos that the castanheiro, or nut gatherers, are drawn.

There are two types of caboclos - the year around residents of the Amazon Basin and the migratory workers who come into the area from other parts of Brazil. Whenever drought or other adverse weather or economic conditions prevail in northeastern Brazil, large numbers of laborers migrate to the Amazon Basin to work for a season or longer. The migratory worker generally does not like conditions in the Amazon Basin, since he is used to a dryer climate and usually is very anxious to return to his home. The manner in which the migratory worker lives and collects Brazil nuts and other jungle produce differs little from that of the permanent resident.

The Amazon Basin is larger than the combined area of the 11 Western States of the United States (table 5), or more than eight times the size of California. It is nearly a hundred times as large as the Netherlands, whose citizens were said to have been the first foreigners to recognize the value of the Brazil nut. The wooded area alone is seven times the size of the State of California.

In contrast with the figure of 1.3 for the population density of the Amazon Basin, the preliminary 1948 United States census for the 11 Western States shows a density of 15.8 persons per square mile. In this group, California is credited with 64.0, while Nevada, the most sparsely settled, has only 1.3 per square mile. The Netherlands, whose area is

TABLE 4.- Area and population of nut-producing states and territories, Brazil, 1948

STATE OR TERRITORY	AREA		POPULATION <sup>1</sup>	
	IN SQUARE KILOMETERS	IN SQUARE MILES	TOTAL	DENSITY PER SQUARE MILE
Acre.....	153,170	59,139	92,814	1.6
Amapa.....	137,419	53,057	(2)	(2)
Amazonas.....	1,595,818	616,145	492,908	.8
Guapore.....	254,163	98,132	(2)	(2)
Para.....	1,216,726	469,778	1,074,062	2.3
Rio Branco.....	214,316	82,747	(2)	(2)
Total.....	3,571,612	1,378,998	1,659,784	1.2

<sup>1</sup> Estimated.

<sup>2</sup> Population included in original states of Amazonas, Mato Grosso, and Para.

Source: Anuario Estatístico do Brazil, 1947.

only one one-hundredth that of the Amazon Basin, had a density of 735.9 persons per square mile in 1948.

The comparisons presented in the preceding paragraphs and tables give some idea of the vast expanse and sparse population in the region in which the Brazil nut is found. The region is unbelievably rich in natural jungle resources, which 400 years after discovery have hardly been tapped.

The wooded area of more than a million square miles is, for the most part, dense tropical jungle. There are as many as 150 species of trees to an acre, and it is said that there are more than 2,500 species in the territory. The nature of the region makes understandable the fact that the number of bearing castanha trees in Brazil is unknown. A mathematical approach to the solution of this question might be made by dividing total average annual production by the estimated yield per tree. The average annual production for the 10 years 1933 to 1942 was 41,100 short tons, and the average yield per tree is said to be from 500 to 800 pounds of nuts, not including the weight of the outer shell. If the lower figure of 500 pounds is used, it is indicated that some 165,000 trees are harvested during an average year. The yield, however, may average considerably less, and there are hundreds of thousands of trees from which the fruit is never harvested.

There are only 3 commercial plantings of Brazil nuts in the Brazilian portion of the Amazon Basin. The largest plantation is located near Boa Vista in the Federal Territory of Rio Branco in the north of

TABLE 5.- Area and population of the Amazon Basin, with comparisons, 1948

AREA	POPULATION	AREA	DENSITY OF POPULATION PER SQUARE MILE
	<i>Number</i>	<i>Square miles</i>	<i>Number</i>
Amazon Basin.....	1,659,784	1,378,998	1.2
Netherlands.....	<sup>1</sup> 9,715,890	13,202	735.9
Arizona.....	664,000	113,580	5.8
California <sup>2</sup> .....	10,031,000	156,803	64.0
Colorado.....	1,165,000	103,967	11.2
Idaho.....	530,000	82,808	6.4
Montana.....	511,000	146,316	3.5
Nevada.....	142,000	109,802	1.3
New Mexico.....	571,000	121,511	4.7
Oregon <sup>2</sup> .....	1,626,000	96,350	16.9
Utah.....	655,000	82,346	8.0
Washington.....	2,487,000	66,977	37.1
Wyoming.....	275,000	97,506	2.8
Total 11 Western States.....	18,657,000	1,177,966	15.8
Georgia <sup>2</sup> .....	3,128,000	58,518	53.5
Oklahoma <sup>2</sup> .....	2,362,000	69,283	34.1
Texas <sup>2</sup> .....	7,230,000	263,644	27.4

<sup>1</sup> 1947.

<sup>2</sup> Principal United States nut-producing States: California, Georgia, Oklahoma, Oregon, and Texas.

Brazilian official sources.

the State of Amazonas. It is said to contain about 14,000 trees, which are about 30 years old. The trees in the plantation are spaced 20 meters apart (about 66 feet). This plantation produces from 1,500 to 2,000 hectoliters (84 to 112 U. S. tons) of unshelled nuts per year.

The second largest plantation is located near Parintins in Amazonas. This plantation contains an estimated 12,000 trees from 10 to 12 years old. It was planted by a Japanese agricultural firm but has since passed into the hands of a Brazil nut exporting firm in Manaus. The production from this plantation is still very limited as the trees are still young.

The third plantation is located near Manaus and contains about 4,000 trees between 19 and 22 years old. This planting was made in conjunction with an attempt to start a rubber plantation. The rubber trees for various reasons died and the plantation was for some years abandoned. It has since been revived as a Brazil nut plantation and is producing on a commercial scale.

These three plantations are relatively young as far as Brazil nut trees go and do not supply an accurate guide as to the economic feasibility of plantations. The abundance of wild trees and the length of time and cost involved to bring a plantation into profitable bearing makes the venture somewhat doubtful from a profit point of view. There are a number of advantages to having such plantations but there are also disadvantages. A well-planned plantation would permit the use of wagons or other means of transportation of the ourico from the base of the trees to some central point where they might be cut open with power saws or other type of equipment. Such a plantation also offers the owner an opportunity to estimate the probable tonnage he will harvest and thus permit him to sell at better advantage. It would also reduce the number of laborers required to harvest the nuts. The probable returns from such a plantation would generally not justify the expenditure during the lifetime of the person planting them. However, 30 years or more after planting, such a venture may be profitable. The planting of Brazil nuts in conjunction with other short-term jungle crops may be feasible economically.

## RESEARCH PROJECTS ON BRAZIL NUTS

There had been no research work of any importance done on Brazil nuts prior to 1941; however, about that time planning was begun and with the characteristic energy and foresight of the Brazilians, projects were started.

At present the experiment station at Belem, Instituto Agronomico do Norte and Fomento Agricola Federal, is testing seed germination and raising from 2,000 to 3,000 young trees in the nursery each year. The young trees are reported doing very well under nursery conditions. To date, however, no one has planted them on a commercial scale.

At Fordlandia, site of one of a United States Company's experimental rubber plantations (fig.7) some trees have been planted for study purposes in connection with tropical lumbering. This venture was started in 1948 and is to be continued. Bel Terra, the company's other former





FIGURE 7.- Brazil nut plantation. Area in foreground was cleared for a rubber plantation, which was abandoned.

site, is reported to be planting Brazil nut trees for the purpose of establishing a commercial plantation. These more or less experimental plantings and research projects could in the future lead to regular and large-scale plantations, which would change the nature of the present industry.

#### DEPENDENCE ON RIVERS FOR TRANSPORTATION

The Amazon Basin, comprising the mighty Amazon River and its innumerable tributaries, extends over an area of more than a million and a quarter square miles. This vast region depends almost entirely on water transportation for freight movements (fig. 8). There is frequent airplane service from Belem to Manaus and Porto Velho, but Brazil nuts are not carried by air.

The Amazon River is more than 150 miles wide at its mouth and is navigable by large oceangoing vessels as far as the city of Manaus, 1,000 miles from the Atlantic. By the use of shallow draft ships the Amazon is navigable all the way to Iquitos, Peru, some 2,300 miles from the mouth. Many tributaries are good-sized rivers and can be used most of the year by smaller ships for transportation far into the interior. The Madeira, for example, is able to accommodate oceangoing vessels of 6,000 tons. Some of the other important tributary rivers are the Tocantins, Xingu, Tapajoz, Purus, Jurua, Acre, Solimoes, Trombetas, Negro, Branco, Paru, Cajary, and Maraca. All of these rivers figure prominently in the production and transportation of Brazil nuts. In addition to the many tributary rivers, there are hundreds of small creeks (called igarape, meaning "canoe path"), which are used by the natives.

#### Railroad Transportation Not Important

There are only three railways in the Amazon Basin, all of relatively short length and of little importance to the Brazil nut industry. In

Amazonas the Madeira-Mamore Railroad starts at Porto Velho on the bank of the Madeira River and terminates at Guajara-Mirim on the bank of the Mamore River. This railroad was built, at great cost in lives and money, at the beginning of this century to carry freight around the 19 rapids in the Madeira River. The urge to build the railroad stemmed from the rubber boom prior to and during World War I. The first section of the line was opened to traffic May 31, 1910, and ran between Porto Velho and Jaci Parana, a distance of about 51 miles. The entire road now has about 210 miles of rail.

According to the railroad administration at Porto Velho, this railroad carried the following tonnages of Brazil nuts in 1944-48: 19 short tons in 1944; none in 1945; 788 tons in 1946; 448 in 1947; 271 tons in 1948. The freight rates on this railroad are said to be the highest in Brazil if not in the world. They are reported to exceed 10 percent of the value of the merchandise.

The State of Para has two railroads neither of them of much importance to the Brazil nut industry. The first of these, known as the Belem-Braganca railroad, starts at Belem and runs a distance of about 142 miles to Braganca. The railroad has a number of short branch lines totaling some 41 miles in length. It was opened to traffic on June 24, 1884, from Belem to Benevides, a distance of about 21 miles. The other railroad in the State of Para is along the banks of the Tocantins River starting at Alcobaca. The first section was completed and opened to traffic December 4, 1908. This railroad has never been completed in accordance with the original plans and serves only to carry freight around the rapids in the river. There is no commercial production of Brazil nuts in the territory served by this railroad.

It is doubtful whether railroads will ever be built as extensively in the Amazon Basin as in other parts of the world due to the very difficult terrain and the scarcity of population, which in turn is limited by climatic and health conditions. In addition, water transportation is so much more economical in an area that has such an abundance of usable streams, big and small.

#### Highway Transportation Almost Nonexistent

The highways and roads in the Amazon Basin are found only around such places as Belem, Manaus, and other towns and cities. They are usually of short length and serve only to carry produce into the city.



FIGURE 8.- Small schooner loaded with jungle produce headed for Belem markets.



In 1939-40 there was no highway in Acre territory. According to the Brazilian statistical yearbook of 1939-40, there were 115 miles of "improved roads" in Amazonas and 2 miles in the State of Para. There were in addition about 148 miles of "unimproved roads" in Amazonas and 1,180 miles in Para. There are a number of short stretches of roads either under construction or projected. The total mileage of improved roads in this vast area of 1,378,998 square miles is only 117 miles and there are only 1,328 miles of unimproved roads. These figures clearly demonstrate the almost complete lack of highway transportation. The same difficulties experienced in railroads are found in highway construction.

In 1939 according to the same Brazilian statistics, there were 272 passenger motor vehicles including motorcycles in the State of Amazonas and 768 in Para. Acre territory had only 2 trucks, the State of Amazonas 142, and Para 417.

## GATHERING AND ASSEMBLING NUTS IN THE INTERIOR

### Harvesting Season

The pods, or ouricos, that contain the commercial Brazil nut begin to drop from the trees in late November and continue into early June. There is a slight variation in the season according to the section of the country. Those in Acre and Rio Negro are usually the first to ripen. Because of the immense size of the tree and the pod, the pods are never gathered by ascending the tree.

The action of the winds breaks the heavy pods loose and they drop to the ground. Laborers make it a point not to be under the trees on windy or rainy days, and even on calm days they are constantly on guard against falling ouricos. The pods weigh from 2 to 4 pounds and fall at the rate of from 800 to 1,000 feet per minute. If a laborer is unfortunate enough to be hit by a falling pod he may suffer serious injury, if not death.

### Laborers and Their Mode of Life

The laborer, or caboclo, when employed in collecting Brazil nuts is referred to as a castanheiro. He is frequently a migratory worker who follows the Brazil nut and rubber harvests.

The nonmigratory caboclo usually has a hut of some sort, built at the edge of a river or creek (figs. 9 and 10), and from a half to 3 acres or more of land around the shack. The more prosperous caboclos have a few animals, such as pigs, goats, or even cows, provided there is sufficient pasturage for them. They also have a few chickens as a rule, and practically every family has at least one dog.

Wild animals and snakes are a constant menace to the caboclos' livestock and probably account in part for the few domestic animals found in these areas. Climatic and health conditions are not satisfactory



FIGURE 9.- Close-up of caboclo's hut, showing its construction and the family of the castanheiro. The house is built on piling because of dampness.

estrada open.

The migratory workers usually occupy abandoned shacks or set up their own temporary dwelling. The abundance of palms and other trees makes the latter a comparatively simple task. A few pots and pans, a little bedding or hammocks, a tercado (large knife) or two, and a few other small items make up the necessary possessions of both the migratory and the resident caboclo. Moving is a relatively simple matter when everything, including family and dog, can be easily loaded into a canoe.

The migratory worker usually goes into the jungle to collect Brazil nuts only when other more profitable work is not available. He stays only as long as he feels that collecting Brazil nuts is the best source of income available,

for most domestic animals. The caboclo plants mandioca, rice, bananas, and other food plants, if he has the cleared land and the inclination, and also gathers wild edible plants and fruits (fig. 11). The river or creek in front of his place is an ever-ready source of fish, while an occasional wild animal or bird is added to his supply of food.

Starting from the edge of the clearing and running into the jungle fanwise are numbers of paths, or estradas (fig. 12). They consist of trails cut into the jungle by the caboclo and lead from one nut tree to another. A typical estrada may have located on its course Brazil nut, rubber, tonka bean, and other trees that produce commercial crops, and it may be from a few hundred feet to several miles in length. It winds through the jungle from one worthwhile tree to another, across small streams, swamps, and fallen logs, depending on the particular terrain. There is an almost constant struggle between the jungle and the caboclo in his attempt to keep the



FIGURE 10.- A typical caboclo or castanheiro's home. A canoe like that in the foreground is often the only means of getting from one home to another. The clearing here is less than half an acre in size, and paths lead fanwise into the jungle from this hut.





FIGURE 11.- The author and a native eating wild fruit.

a level where returns to labor are no longer attractive, gathering stops or is greatly reduced. This was clearly demonstrated during the 1940 season when prices at Belem for a short period reached a very low level. On the other hand, since the vast bulk of the annual production must be transported by water, a cessation of gathering operations during the rainy or high-water period makes it difficult to bring additional supplies to tidewater even should prices strengthen appreciably.

The dampness and heat of the region make it impossible to store one year's production of Brazil nuts in the jungle for disposal the following year. The nuts are almost certain to spoil, and, therefore, there can be no carry-over. When nuts are said to be "abandoned" in the jungle, the word is used literally.

#### Methods of Harvesting

The gathering or harvesting operations are comparatively simple. The caboclo and possibly the members of his family follow the estrada to the tree or trees.

or during the 4 to 6 months' rainy season when he cannot work at rubber gathering and other occupations. The resident caboclo, on the other hand, continues to gather nuts as long as they are available and at the same time collects every other salable product of the jungle. When work slackens on his estradas he may clear more land around his hut or cut a new estrada.

The harvesting period in general is from November to June (fig. 13), and its activity is dependent upon the availability of labor, which in turn is more or less determined by prices received for the nuts at the barracao, or trading post. When prices of unshelled nuts go down to



FIGURE 12.- A typical estrada on the Tapajoz River in Para. To the right of the path is a Brazil nut tree.

They collect the pods in baskets or throw them out from under the trees and collect them later. The pods are then carried to the camp (fig. 14) where they are cut open (fig. 15) with a *tercado*, a long knife similar to a sugarcane knife and one of the prized possessions of all *caboclos*. *Tercados* are obtained from the local trading post at from 50 to 90 cents, depending on size, quality of steel, and type of handle. Formerly these knives were manufactured in the United States and other foreign countries and exported to Brazil, but now they are manufactured in southern Brazil.



FIGURE 13.- *Caboclos* gathering Brazil nut pods. Note the size of the tree trunk.

The task of cutting open the pods is usually reserved for days on which it is dangerous to be under the trees because of the wind or rain. Sometimes, however, the other members of the *castanheiro's* family do this part of the work. The pod, which is extremely hard and requires considerable effort to open, contains from 12 to 20 nuts. The nuts are put into a basket or on mats on the ground until a sufficient quantity has been collected to deliver to the local trading post.

The nuts are washed by the *castanheiro* and then sold in lots of approximately 1 hectoliter (about 112 pounds). The empty pods are used for fuel in the *caboclo's* camp or are discarded, though a few are used for cups and other household utensils. They could probably be used profitably in the manufacture of some byproduct, such as charcoal. Little thought has been given to the possible commercial uses of the empty pod.

In the interior and at the trading post, Brazil nuts are stored in the open (fig. 16).



FIGURE 14.- A pile of pods in front of a *caboclo's* hut ready to be opened. A jaguar skin is stretched in the background.

Whether the land on which the trees are found is publicly or privately owned makes little difference to the *caboclo*. Where the land is privately owned, he is compelled by law to deliver the produce to the owner, who either runs the *barracao* (trading post) or has someone else run it for him. If the land is publicly owned, the *caboclo* may collect nuts and other products without payment of taxes and may sell wherever he chooses. There is no control exercised by the State over harvesting on publicly owned land. During the past 30 years, however, most of the suitable Brazil nut areas have passed into private hands in one way or another.



## THE TRADING POST

### Locations and Methods of Trading



FIGURE 15.- opening Brazil nut pods with machetes.

Trading posts (figs. 17, 18) are usually located a few miles apart on the banks of the larger streams in the Brazil nut area. There is little incentive for the caboclo to carry his produce any farther than the nearest post. He exchanges his produce, which in addition to Brazil nuts may include rubber, hides, cacao, tonka beans, and other commodities, for such items as hardware, matches, cotton cloth, beans, mandioca, flour,

dried beef, and sugar. He delivers his produce frequently, even though he does not require supplies, and is given credit against future purchases. The season's purchases usually just about use up all he has earned. If not, he receives cash or additional merchandise to settle the account. He usually handles very little actual cash during the year because he receives his pay in merchandise.

The price received by the caboclo for his nuts is indirectly affected by the f.o.b. price in Belem or Manaus; that is, the more difficult the transportation to the export centers, the higher the freight and consequently, the smaller the amount paid the caboclo. In prewar years it ranged from 15 cruzeiros a hectoliter to 40 cruzeiros (from about 75 cents to \$2 a hundred pounds). Occasionally, however, the price dropped to as low as 10 cruzeiros per hectoliter (about 50 U. S. cents a hundred pounds). In the postwar years, prices in the Amazon Basin as a whole have been somewhat higher and more in line with the wartime inflation. During the last season, prices have had a declining tendency and may eventually return to prewar levels if the cost of items purchased by the natives decline and the foreign demand for Brazil nuts is weak. The price paid the caboclo is not based on the size of the nuts, for he brings in his produce ungraded and receives no more for large nuts than for small ones. The hectoliter basket used in interior trading contains from 112 to 130 pounds; thus the trader apparently makes a small profit on the weight. However, the nuts are damp when delivered to the barraçao and lose some weight in storage.



### Role of Traders in the Industry

Each trader has from a few to perhaps as many as 200 or more caboclo customers - fregues - in his trading area. He collects the various commodities received in trade until he has enough to ship to Belem or Manaus (figs. 19, 20), where he disposes of them through brokers or exporters. He sells his wares to the caboclo at a mark-up of seldom less than 100 percent and, it is said, occasionally even as much as 300 percent.

Such an advance in price seems excessive, but the trader's cost of doing business is high. He must pay the cost of sending the produce to the export centers and of getting his trade goods back to his place of business. Some traders have their own small schooners that carry from 8 to 10 tons and before World War II cost from \$4,000 to \$6,000. If a trader owns a schooner he merely hires a crew to take it loaded with his goods to Belem or Manaus and to bring back his purchases. On occasion he may also carry goods for other traders if space is available on his schooner. A trader may contract with owners of schooners, barges, river boats, etc., to carry his freight both ways. In any event, there is a freight bill both ways to be considered, and the distance from export centers increases or decreases this expense. The cost of such inland freight has increased somewhat since the outbreak of World War II.

In addition, the trader must stand the risk of a fluctuating market for the goods he has taken in trade. He may find that the nuts he has taken in trade



FIGURE 16.- In the interior (above) and near trading posts along the river banks, Brazil nuts piled in the open awaiting shipment.



FIGURE 17.- A typical trading post (barracão) on the Acara. The small schooner in the foreground is used to carry Brazil nuts and other jungle produce to Belem and to bring goods back for trade. A Brazil nut tree towers above the building and other vegetation in the background. A pile of hardwood lumber lies in the foreground. The building is built on piling because of the dampness and frequent high water. Note also the very small amount of cleared land surrounding the building.

percent commission and the buyer pays 1 percent to the broker.

The combined collection of Brazil nuts by these traders runs into a substantial tonnage each year, and this tonnage, rather than the total yield of all the trees in the Amazon Basin, is the "production" given in Brazil nut statistics (table 6).

The production of nuts depends not so much on the yield of the trees as it does on foreign demand. If there were sufficient foreign demand at remunerative levels, production would be greatly expanded. Strong foreign demand would result in higher prices, which in turn would cause traders in the interior to make more effort to tap areas normally not harvested. As it is, only the most readily accessible stands are now being worked.

In 1940 when the original survey was made, a leading Brazilian exporter summed up the situation as follows: "If the f.o.b. prices in Brazil were doubled or trebled, production could be almost unlimited; but with the quotations of recent years, it is doubtful if much more than the average of the past 10 years will ever be exported."

The statement would have been entirely correct were it

at 120 cruzeiros have dropped to 90 at Belem. He must also figure shrinkage, spoilage, interest on his investment, and losses in hazardous river transportation (fig. 21). The profits of the trade, therefore, are not as large as might be thought from the mark-up.

There are hundreds of trading posts in the Amazon Basin, all sending their collections of Brazil nuts and other commodities to the export centers, Belem and Manaus. Upon arrival in these centers the nuts are almost entirely sold through brokers to exporters or shellers, the proceeds being credited to the trader's account at firms supplying him with trade goods, or credited to his account at the bank. The seller pays 1



FIGURE 18.- A typical trading post on the Moju River and the trader's schooner.



FIGURE 19.- A load of nuts being transported along a small tributary of the Amazon River. This load represents the collection of a great many natives who have sold or traded them to a trading post.

not for the inflation that occurred as a result of the World War II demand for rubber and other items produced in the jungle and the substantial increase in the cost of trade goods. The prices received in the immediate postwar period for Brazil nuts were from three to four times those at the time the statement was made; yet collection of Brazil nuts was considerably less than the 10-year average (1931-40). This is the result of the higher prices paid the natives for other products and of other factors not normally applicable to this trade. During the 1949 season, prices have been lower and are only about twice those of the prewar period; yet the collection of nuts was about twice that of 1948. The 1949 situation reflects, in part, a gradual return to normal economic conditions in the Amazon Basin brought about by a gradual drop in prices of trade goods and other factors. As pointed out elsewhere in this



FIGURE 20.- Brazil nuts being loaded in bulk onto a launch on the Tocantins River for shipment to Belem.





FIGURE 21.- A wrecked power launch, on the Tocantins River, used for hauling Brazil nuts and other jungle produce to export centers.

report the total collection of nuts depends on economic factors rather than on the yield of the trees. The native usually works only long enough to supply his meager wants. He has no interest in money as such. If it is necessary to work 7 days a week to supply his needs, he will work 7 days; if he can accomplish this end in 3 days of work, he works 3 days. The relationship between what he receives for his jungle produce and the cost of what he needs therefore determines the quantity of any item he produces that will come out of the jungle.

Thus, if the price of trade goods remains fairly high, more Brazil nuts and other products must be brought to the trading post to pay for the trade goods. If the prices paid natives for other products, such as rubber, drop to low levels, more effort may be expended collecting Brazil nuts and, in turn, cause a drop in Brazil nut prices still resulting in a large collection. This situation may occur in the not-too-distant future.

#### COST OF NUTS AT EXPORT CENTERS

The delivered cost of unshelled nuts at Belem and Manaus varies with the price of goods at the point of origin and the cost of transportation. Freight costs were relatively high in the area before the outbreak of World War II. Since then, transportation costs (table 7) in all parts of the area have increased somewhat, especially on the Acre and the upper Madeira, Solimoes, and Tocantins Rivers.

Between the time they leave the jungle and arrive alongside the oceangoing ship, the nuts are handled four or five times, all of which increases their cost to the exporter (table 8) and, consequently, to the United States importer. Most Brazil nuts are now washed before they are



TABLE 6.- Estimated production of Brazil nuts, Brazil and Bolivia, 1911-49

YEAR	BOLIVIA	BRAZIL			BOLIVIA AND BRAZIL
		AMAZONAS	PARA	TOTAL <sup>1</sup>	
	Short tons	Short tons	Short tons	Short tons	Short tons
1911.....	(2)	5,400	3,200	8,600	8,600
1912.....	(2)	13,200	4,300	17,500	17,500
1913.....	(2)	3,800	800	4,600	4,600
1914.....	(2)	11,900	5,000	16,900	16,900
1915.....	(2)	4,500	3,600	8,100	8,100
1916.....	(2)	7,300	3,900	11,200	11,200
1917.....	(2)	9,400	8,600	18,000	18,000
1918.....	(2)	2,600	5,500	8,100	8,100
1919.....	(2)	13,900	8,900	22,800	22,800
1920.....	(2)	6,100	4,900	11,000	11,000
1921.....	500	16,700	10,800	27,500	28,000
1922.....	(3)	20,000	18,000	38,000	38,000
1923.....	200	11,700	14,100	25,800	26,000
1924.....	100	21,700	18,600	40,300	40,400
1925.....	200	8,200	10,100	18,300	18,500
1826.....	(3)	14,500	24,700	39,200	39,200
1927.....	400	11,600	8,200	19,800	20,200
1928.....	300	11,000	13,300	24,300	24,600
1929.....	600	19,500	20,000	39,500	40,100
1930.....	300	10,200	8,600	18,800	19,100
1931.....	600	18,100	24,600	42,700	43,300
1932.....	2,000	22,900	13,900	36,800	38,800
1933.....	2,500	18,400	26,000	44,400	46,900
1934.....	2,800	22,700	17,000	39,700	42,500
1935.....	2,700	21,300	26,600	47,900	50,600
1936.....	2,900	19,200	20,900	40,100	43,000
1937.....	3,100	11,000	14,900	25,900	29,000
1938.....	5,300	21,900	19,600	41,500	46,800
1939.....	4,600	14,600	26,200	40,800	45,400
1940.....	3,400	23,000	21,200	44,200	47,600
1941.....	7,700	13,900	13,300	27,200	34,900
1942.....	1,700	11,700	11,300	23,000	24,700
1943.....	0	1,800	1,600	3,400	3,400
1944.....	0	1,700	1,600	3,300	3,300
1945.....	100	3,500	3,300	6,800	6,900
1946.....	100	17,400	10,100	27,500	27,600
1947.....	100	15,500	14,900	30,400	30,500
1948.....	100	6,400	12,500	18,900	19,000
1949.....	200	17,300	17,900	35,200	35,400
Average:					
1911-20.....	(2)	7,800	4,900	12,700	12,700
1921-30.....	300	14,500	14,600	29,100	29,400
1931-40.....	3,000	19,300	21,100	40,400	43,400
1941-49.....	1,100	9,900	9,600	19,500	20,600

<sup>1</sup> States and territories not listed are included in Amazonas and Para.

<sup>2</sup> Not available.

<sup>3</sup> Less than 50 tons.

Prepared or estimated on the basis of official statistics of foreign governments, reports of U.S. Foreign Service Officers, results of office research or other information.

TABLE 7.- River freight rates for transporting Brazil nuts from Amazon interior points to exporting centers of Belem and Manaus

BELEM <sup>1</sup>		
POINT OF ORIGIN	FREIGHT RATE PER TON OF 2,200 POUNDS	
	BRAZILIAN CRUZEIROS	UNITED STATES DOLLARS
Boca do Acre, Acre.....	577,38	30.83
Porto Velho, Guapore.....	414,99	22.16
Manaus and intermediate ports to Belem.....	175,63	9.38
Tucuruí, Tocantins River, Para.....	173,71	9.28
MANAUS <sup>2</sup>		
Boca do Acre, Purus River.....	323,00	17.25
Porto Velho, Madeira River.....	182,00	9.72
Sao Paulo de Olivenca, Solimoes River.....	200,00	10.63
Tapurucuara, Negro River.....	130,00	6.94
Parintins, Medium Amazon River.....	151,00	8.06

<sup>1</sup> Data obtained by the American Consulate, Belem, Para, Brazil, from the head office of the Servicos de Navegacao da Amazonia e de Administracao do Porto do Para (SNAPP), Belem, Para, Brazil.

<sup>2</sup> Data obtained by the American Consular Agency, Manaus, Amazonas, Brazil, from the local Agency of Servicos de Navegacao da Amazonia e de Administracao do Porto do Para (SNAPP), Manaus, Amazonas, Brazil.

Note: Each hectoliter of unshelled Brazil nuts entering the Manaus market involves an average of about Cr \$46,00 of total expenses, including freight, insurance, dispatching, and all Government taxes.

placed on board ship for export, which also increases the cost but improves the appearance and the quality since all foreign matter and many of the spoiled nuts are removed. The washing of nuts is generally done in Belem and Manaus. Nobody knows when the practice of washing these nuts began, but it is thought that it was started about 1895 by Lourenco Nicolau de Melo, one of the most progressive operators in Brazil nuts of that period.

The total landed cost at export centers is difficult to ascertain. On the basis of estimates made on several occasions by the Brazilian Ministry of Agriculture (1928) and others, however, it appears that in prewar years about 30 to 35 percent was added to the original cost in the jungle. These estimates of cost included 14 items of expense, such as commissions, customhouse examinations, duties, baskets, contributions, boatmen, and lighterage. The exporter added to the landed cost in Belem or Manaus his profit and incidental expenses before the nuts were actually loaded aboard ship. For a short period in 1940 the f.o.b. price for unshelled nuts fell to 1.3 cents per pound. Obviously, these prices were at distress levels and the exporters lost money on the transactions.

Under postwar conditions and as long as inflation continues in the Amazon Basin, there appears little prospect of prices similar to those prevailing in the years just prior to the outbreak of World War II.

There has been a lowering of f.o.b. prices in the past two seasons but for the most part prices were still considerably above those of the pre-war years.

### CLASSIFICATION OF NUTS

Unshelled Brazil nuts are classified as large, large medium, good medium, medium, and small. The three largest sizes are generally shipped to the United States. The areas usually producing the various sizes are shown below:

	Sizes
Para regions and rivers:	
Lower Amazon, south:	
Guana, Capin, Acara, Moju.....	Small
Tocantins.....	Small and medium
Oeiras, Jacunda.....	Small
Camaraipy, Anapu, Pacaja, Xingu.....	Small and medium
Curua de Santarem, Tapajoz.....	Small
Lower Amazon, north:	
Araguary.....	Small
Maraca.....	Medium
Cajary, Jary, Paru.....	Small and medium
Maicuru, Curua de Alemquer, Rio Branco (Obidos district), Curucamba.....	Small
Trombetas and affluents:	
Lago do Sapucna.....	Small
Jamunda (left bank).....	Medium and large
Juruty.....	Small
Amazonas regions and rivers:	
Upper Amazon, south:	
Uicurapa, Andira, Macary.....	Medium and large
Maues, Apucuhytawa, Abacaxis, Canuma, Autaz,..... and lakes.....	Medium and large
Purus and tributaries, chiefly Ayapua.....	Large
All affluents of the Solimoes from the south between the Madeira and the Jutahy, chiefly Madeira and tributaries (Aripuana, Mariapaua, Matura, Atininga, Jatuarana, Capana, Marmellos, Uruapiara, Acara, Baetas, Tres Casas, Cunhian, Maicy, Jamary, Machado, Jacy-Parana, and Abuna)	
Manacapuru, Amana, Badjoz, Caicara, and Teffe.....	Medium and large
Upper Amazon, north:	
Jamunda (right bank).....	Medium and large
Urubu, Uatuman.....	Small and medium
Negro, Branco, all affluents of the Solimoes from the north between Negro and Japura.....	Medium and extra large
Acre Territory:	
Acre and tributaries.....	Small
Bolivia:	
Guapore, Beni.....	Medium

TABLE 8.- Estimated exporter's costs for 1,000 hectoliters<sup>1</sup> of Brazil nuts

ITEM	BRAZILIAN CRUZEIROS	UNITED STATES DOLLARS
Purchase price.....	120,000,00	6,480
Labor to receive the nuts.....	2,500,00	135
Brokers's commission 1 percent.....	1,200,00	65
Total.....	123,700,00	6,680
Duty.....	14,600,00	788
Customhouse charge.....	960,00	52
Baskets.....	250,00	14
Boatman (8 days).....	320,00	17
Lighterage (8 days).....	1,600,00	86
Interest at bank.....	-	-
Stamps for documents.....	150,00	9
Labor.....	1,000,00	54
Telegrams.....	120,00	6
Miscellaneous.....	4,500,00	243
Total exporter's cost.....	147,200,00	7,949
Selling agent's commission.....	3,200,00	173
Exporter's commission (6 percent).....	9,600,00	518
F.o.b. value at export center (Belem) <sup>2</sup>	160,000,00	8,640

<sup>1</sup> About 112,000 U. S. pounds.

<sup>2</sup> F.o.b. value at export center (Belem) U. S. cents per lb. 7.71.  
Brazilian official sources.

The nuts are frequently further classified locally by the areas from which they come. For example, those from the southern bank of the Amazon are Tocantins, Xingu, Tapajoz, Madeira, Purus, Jurua, Acre, and Solimoes, while those from the northern bank are Rio Negro, Trombetas, Alemquer, Paru, Jary, Cajary, and Maraca. These names, it will be noted, cover the chief tributary rivers in the basin from whose banks and affluents the major supply of Brazil nuts comes. When nuts are distinguished as Tapajoz or Acre they are usually small, and when they are Brancos or Negros they are extra large or medium, etc. There appears to be little difference in the quality of the nuts other than size and thickness of shell.

## EXPORTATION OF NUTS

### Brokers and Exporters

Brazil nuts are sold to exporters through brokers by private negotiation, and the auction market, as such, no longer exists. Sales through brokers are much the same as auction sales, for brokers offer the merchandise to several exporters, the highest bidder receiving the nuts. The number of exporting firms, however, is relatively small, and the prices offered or asked are generally only a fraction apart. At times the prices offered by all the exporters and quoted by the brokers on a given day are identical.

The broker bases his offers to sell to exporters on what he thinks the New York and other foreign markets will pay. If there is a strong



demand from abroad, he advances his prices to exporters. Conversely, if there is little demand, prices go down. Table 9 shows annual maximum and minimum f.o.b. prices for unshelled Brazil nuts at Belem, 1911-40.

Before World War II the British buyers entered the market early and generally set the pattern of the market for the season. They usually entered in late December, made fairly heavy purchases until February, and then reduced their takings. The heavy British buying early in the season had a tendency to raise prices. After the heavy British demand was over, prices weakened until the American demand began to make itself felt in March. American interests contract for the bulk of their requirements of unshelled nuts from March to June, after which their buying tapers off.

The selling and buying procedure for Brazil nuts varies somewhat, but, in general, follows the usual pattern of international trade. The Brazilian exporter usually is represented by a broker in New York, and in other American markets, who attempts to sell importers there and who cables offers to buy or requests firm offers for prospective customers.

TABLE 9.- Annual maximum and minimum f.o.b. prices for unshelled Brazil nuts at Belem<sup>1</sup>

YEAR	PRICES PER POUND IN UNITED STATES CURRENCY	
	MAXIMUM	MINIMUM
	<i>Cents</i>	<i>Cents</i>
1911.....	10.25	9.71
1912.....	11.56	4.33
1913.....	13.38	4.60
1914.....	6.29	0.79
1915.....	5.95	1.10
1916.....	7.55	3.36
1917.....	8.04	2.68
1918.....	6.11	2.26
1919.....	12.18	3.34
1920.....	15.32	10.05
1921.....	6.68	2.58
1922.....	6.36	2.08
1923.....	9.22	1.52
1924.....	7.81	1.96
1925.....	16.88	3.92
1926.....	7.48	1.42
1927.....	12.69	5.29
1928.....	11.97	5.24
1929.....	17.71	2.11
1930.....	8.61	2.01
1931.....	4.39	1.82
1932.....	3.81	1.27
1933.....	3.55	1.13
1934.....	3.98	1.80
1935.....	7.77	2.88
1936.....	5.29	3.56
1937.....	8.26	5.37
1938.....	5.13	3.37
1939.....	5.31	3.53
1940.....	5.33	1.78

<sup>1</sup> Not available after 1940. Compiled from trade sources at Belem.

If offers from New York are not high enough, only sufficient nuts are sold to keep the American importers interested.

As a general rule, Brazilian exporters buy only against orders from abroad, though there is some speculative buying. Brazil nuts are generally sold for shipment (fig. 22) on the first available ship to New York, which in prewar years was about every 7 to 14 days.

Some foreign buyers ask for quotations from several New York or London brokers at the same time. These brokers, in turn, cable Brazilian firms for quotation. The buyer believes he is thereby assuring himself the best deal. In some markets and with some commodities he might be right; however, with Brazil nuts such a procedure usually defeats its own purpose. Several exporters enter the market in Brazil at the same time, creating an artificial demand that often results in an increase in f.o.b. prices.

During the 1940 season, chaos prevailed in the market, in Brazil as well as in New York, and many firms in both places must have ended the season with unprofitable business in unshelled nuts. British buyers



FIGURE 22.- Loading unshelled Brazil nuts in bulk onto an oceangoing vessel.

were caught with good-sized commitments on their hands when the Ministry of Food revoked import licenses on May 2, 1940. This action was followed by selling pressure, which forced the prices at one time to as low as 1.3 cents, f.o.b. Belem. The word of these low prices quickly traveled to the interior, and gathering practically stopped. After a few weeks, prices gradually began to return to more normal levels. In the meantime, many New York brokers and importers had offered Brazil nuts in the United States at the lowest prices in many years. About the time they attempted to fill their commitments they found prices in Brazil had firmed considerably. In Brazil, on the other hand, exporters were unable to secure additional supplies from the interior. Then followed a period in which prices reached high levels in Brazil, and it was said that some exporters were attempting to buy back their contracts from United States importers. In New York it is alleged importers, in some cases, were buying goods from competitors at prices higher than they had quoted to their customers.

Rumors were circulated in the United States during the season that large quantities of nuts had been abandoned in Brazil and that prices, ex dock New York, were as low as 5 cents, and even lower. There were also reports that huge quantities of nuts would be dumped in the United States. The volume that actually moved at 1.3 cents, f.o.b. Belem, was extremely small, and these sales were of distressed lots only.

The export market for Brazil nuts from May 2, 1940, until the United States entry into World War II was almost entirely confined to the United States. When the United States entered the war an agreement was made between the United Kingdom, the United States, and Brazil whereby the former countries would prohibit the importation of Brazil nuts. The United States agreed to purchase harvested nuts on hand at the time the agreement was made and make some disposal of them in Brazil. This applied only to the 1942 harvest of Brazil nuts. The purpose of the agreement was to save shipping space for materials considered essential to the war effort and to divert labor from collecting Brazil nuts to rubber and other scarce or essential items. The program was a costly one and the over-all success of it is still debatable. The domestic economy of the Amazon Basin was definitely affected by the agreement.

The agreement came to an end in September 1945 and the United States started to import Brazil nuts again on September 24, 1945. The British, however, did not actively re-enter the market until 1948 when wartime restrictions were lifted. The 1949 export season is the first since 1940 in which British interest in these nuts has begun to approach prewar levels. The German buyers have been out of the market in Brazil since 1939 and may continue to be out for an indefinite time. Other countries such as Argentina and the Union of South Africa are again buying limited quantities of Brazil nuts.

#### Exports of Unshelled Nuts

Apparently the first white people to become commercially interested in Brazil nuts were the Dutch. As early as 1633 the Dutch traded with



the natives and sent "wild oil fruits" back to the Netherlands. These "wild oil fruits" are now thought to have been Brazil nuts.

Exports by the Dutch, shipped via ports in Maranhao, were very small and remained so under Portuguese control until after 1800. By 1818 the nuts were moving out of Para and had become known as Para nuts. The exportation from Para practically stopped between 1823 and 1836. From 1836 to 1866 the volume rose gradually when, as a result of the opening of the Amazon Basin to foreign trade, the nuts became one of the major export items of the region. Brazilian export records prior to 1890 are not available, and from 1890 to 1929, countries of destination were not given (table 10). The available data starting with 1929 show only the United States, Europe, and "South" as destinations. The "South" refers to southern Brazil and an occasional small lot to Argentina.

The history of United States imports of Brazil nuts can be traced back to 1810, although actual tonnage figures from customs records are available only as far back as 1873. On June 13, 1810, the American schooner Asenath, arrived at New York from Para with rubber, cacao, caju nuts, and, it is said, a small lot of Brazil nuts. Since caju nuts are not found in the Amazon Basin, it seems likely the schooner had also called at Maranhao or other northeast Brazilian ports. The earliest

TABLE 10.- Exports of unshelled Brazil nuts from Amazon Basin, 1890-1948

YEAR	TOTAL <sup>1</sup>	YEAR	TOTAL <sup>1 2</sup>	YEAR	UNITED STATES	EUROPE	OTHERS <sup>3</sup>	TOTAL <sup>2</sup>
	Short tons		Short tons		Short tons	Short tons	Short tons	Short tons
				AVERAGE:				
1890...	220	1910...	3,844	1890-1899	(1)	(1)	(1)	3,662
1891...	6,034	1911...	3,179	1900-1909	(1)	(1)	(1)	2,995
1892...	3,344	1912...	4,262	1910-1919	(1)	(1)	(1)	4,687
1893...	2,200	1913...	786	1920-1929	(1)	(1)	(1)	19,194
1894...	6,242	1914...	4,922	1930-1939	8,953	17,701	(4)	26,654
1895...	2,453	1915...	3,536	1930.....	5,358	11,416	(4)	16,774
1896...	2,612	1916...	3,773	1931.....	11,965	21,596	(4)	33,561
1897...	3,592	1917...	8,426	1932.....	9,108	18,061	(4)	27,169
1898...	3,586	1918...	5,412	1933.....	8,580	26,468	(4)	35,048
1899...	6,336	1919...	8,728	1934.....	6,907	22,310	(4)	29,217
1900...	1,144	1920...	4,785	1935.....	11,074	20,954	(4)	32,028
1901...	974	1921...	11,082	1936.....	8,818	17,710	226	26,754
1902...	3,658	1922...	17,682	1937.....	6,250	8,097	113	14,460
1903...	4,840	1923...	14,020	1938.....	10,443	15,392	522	26,357
1904...	1,342	1924...	18,332	1939.....	11,028	13,676	472	25,176
1905...	4,350	1925...	10,108	1940.....	16,073	5,331	886	22,290
1906...	2,150	1926...	37,730	1941.....	9,684	-	164	9,848
1907...	2,832	1927...	17,793	1942.....	5,680	-	534	6,314
1908...	4,510	1928...	23,036	1943.....	-	-	874	874
1909...	4,147	1929...	37,375	1944.....	-	-	1,306	1,306
				1945.....	401	-	464	865
				1946.....	12,782	-	1,064	13,846
				1947.....	14,182	1,820	1,028	17,030
				1948.....	11,085	1,021	322	12,428

<sup>1</sup> Breakdown by country of destination not available.

<sup>2</sup> Includes Bolivian sent via Brazilian ports.

<sup>3</sup> Includes shipments to south Brazil.

<sup>4</sup> Others, if any, included in Europe.

Brazilian trade and official sources.



available records indicate that Brazil nuts were not moving from Para until about 1818, so the nuts were probably acquired in Maranhao.

Another historical entry of Brazil nuts into the United States took place in 1832. The brig *Isabella*, of 133 gross tons, sailed from Para for New York where it arrived on May 20, 1832. This vessel carried Brazil nuts and other jungle products consigned to *E. and L. Corning*. The actual tonnage is not known, but, in view of the small size of the vessel, it could not have been very large. This vessel seems to have been one of the few to carry Brazil nuts from Para during the period. There is a record of 26,621 alquire (1,490,776 U. S. pounds) of Brazil nuts exported from Para to the United States between October 1, 1858, and September 30, 1859.

The first official United States entry of record available today shows that 3,690,908 pounds of unshelled nuts valued at \$170,628.00 were admitted between July 1, 1872, and June 30, 1873. These nuts probably were from the harvest of 1873. Their value was slightly more than 4.62 U. S. cents per pound, which is well within the price range of years prior to World War II. United States imports between 1873 and 1883 averaged 3,521,220 pounds per fiscal year, with an average value of 4.57 U.S. cents per pound. The tonnage of imports is not available between 1884 and 1897; however, the average annual value of imports was \$267,-055.64.

In 1897-98 the import of unshelled Brazil nuts totaled 7,024,724 pounds, valued at \$192,783, or an average of 2.74 U.S. cents per pound. United States importers, the next year, set a record of 18,440,722 pounds, valued at \$364,958.00. This record stood until 1908 when 19,011,494 pounds, valued at \$742,364.00, were imported. The imports for 1909 were still larger, totaling 24,993,998 pounds; and in 1910 a record of 27,784,-184 pounds, valued at \$1,210,091.00 was reached. After 1910 the imports fell off, until 1918 when a new high record of 29,663,497 pounds, valued at \$1,416,602.00, was reached. The increase for 1918 was probably due to the fact that the German buyers were out of the market and thus left a larger supply available for United States importers and also because of the wartime demand for items of this type in the United States. Importation of other nuts from the Mediterranean Basin had been greatly restricted by World War I. The largest tonnage of unshelled Brazil nuts ever to be imported into the United States was 44,553,692 pounds, in 1924. They were valued at \$2,450,501, which averaged about 5.5 U. S. cents per pound. The nearest to this all-time high was a record in 1926-27 when 42,185,037 pounds were imported. The figures in the foregoing paragraphs give testimony of the importance of this industry to the Amazon Basin.

The export trade in unshelled Brazil nuts up to the war of 1914-18 was largely in the hands of British, Germans, Dutch, and other Europeans. Unshelled nuts were shipped to Europe, shelled there, and some of them were then sent to the United States and elsewhere. German traders sometimes even bought them in Para, shelled them in Hamburg, and then shipped them back to Rio de Janeiro and other points in southern Brazil and

South America. World War I, however, interfered with this trade to a considerable extent and resulted in many foreign interests going out of business. The period between World War I and World War II saw additional foreign firms withdrawing from the field.

A comparison of the list of exporters prior to 1914 and the early 20's with the current list shows that only a few of the old-time exporters remain. At present the export trade in Brazil nuts is largely in the hands of native Brazilians. Another change brought about by World War I is that the trade is now directly with the United States and other countries instead of passing through European hands. It is interesting to mention here that very few unshelled Brazil nuts are to be found in stores in southern Brazil and that a great many of the south Brazilians do not know the Brazil nut.

Following is a list of exporters of shelled and unshelled Brazil nuts in the Amazon Valley.

*Manaus, Amazonas, Brazil:*

Abraham, Irmao & Cia., Rua dos Bares 80. Unshelled.  
Compania do Importacao e Exportacao S. A., Praca Tenreiro Aranha 125.  
Shelled and unshelled.  
Expresso Mercantil Ltda., Rua Marechal Deodoro 40. Unshelled.  
Ezagui, Irmao & Cia., Ltda., Rua Guilherme Moreira 296. Unshelled.  
Higson & Co. (Manaus) Ltd., Rua Tamandare 100. Shelled and unshelled.  
I.B. Sabba & Cia., Ltda., Rua Guilherme Moreira 235. Shelled and unshelled.  
J.G. Araujo & Cia., Ltda., Rua Marechal Deodoro 156. Unshelled.  
Jacob & Cia., Rua Guilherme Moreira 195. Shelled and unshelled.  
L. Honorio & Cia., Rua Teodoreto Souto 189. Unshelled.  
T. J. Dunn & Cia., Rua Marechal Deodoro 229. Unshelled.

*Belem, Para, Brazil:*

Arthur Vieira & Cia., Avenida Castilhos Franca 46. Shelled.  
Benchimol & Irmao, Rua 15 do Novembro 165. Shelled and unshelled.  
Companhia Industrial do Brazil, Rua da Municipalidade 398. Shelled  
and unshelled.  
Empreza Exportadora Paraense Ltda., Rua 15 de Novembro 157. Shelled  
and unshelled.  
Jayme Benchimol & Cia., Travessa Padre Eutiquio 17/21. Shelled and unshelled.  
Marcos Athias & Cia., Rua 15 do Novembro 106. Shelled and unshelled.  
M. E. Serfaty & Cia., Avenida Castilhos Franca 68. Shelled and unshelled.  
M. S. Cardoso & Cia., Travessa Marquez do Pombal 24. Shelled and unshelled.  
M. Santos & Filhos, Rua da Municipalidade 629. Shelled and unshelled.  
Oscar Santos & Cia., Ltda., Travessa Quintino Bocaiuva 395. Unshelled.  
Tacito & Cia., Ltda., Avenida Padre Eutiquio 558. Shelled.

## Exports of Shelled Nuts

### Shelling Industry

Shelling operations in Brazil prior to 1914 were on a very small scale. The maladjustments in the export movement of unshelled Brazil nuts to Europe brought about by the war of 1914-18 and the good demand from the United States caused the shelling industry to receive a great deal of attention in the late 20's. A number of enterprising and energetic Brazilians started the domestic shelling industry in 1925. The industry like all new ventures had its difficult problems in the early years.

The principal difficulties were in the cracking and drying operations. United States importers reported that during the period 1925 through 1927 the quality of Brazilian shelled nuts was very poor compared with those shelled elsewhere. The quantities imported during the 1925-27 period were very small and generally thought of more as experimental imports than as an established item. The energy and perseverance of the Brazilian shellers finally solved the problems and by the 1928 season quality was greatly improved. As a further proof of the business acumen of our Brazilian friends, by 1930 practically all shelled Brazil nuts imported into the United States were shelled in Brazil.

Most of the shelled Brazil nuts used in the United States prior to 1930 were shelled in the United States. In 1930, this practice was discontinued since it was cheaper to import nuts shelled in Brazil. By 1928, successful shelling operations in Brazil had already made an inroad into the United States operation. The cheaper shelling costs in England had resulted in substantial quantities of shelled Brazil nuts coming into the United States as early as 1927 and hastened the day when our own industry went out of existence. During the period when shelling was done in the United States very few nuts were blanched. There was little market for this type of nut prior to 1926. In 1926 and 1927, a sizable tonnage of blanched Brazil nuts was imported from England. These blanched nuts found a ready sale and have since been an important part of the business. The shelling industry in England lasted until 1939 when the outbreak of World War II made it necessary to divert all possible labor to the war effort. It is not known whether the industry will be revived in England now that import restrictions have been removed.

The largest of the shelling plants in Belem has an annual production capacity in excess of 1,300 short tons of shelled Brazil nuts. It employs more than 1,000 workers during the peak season and prepares both shelled and blanched nuts. The plant is one of the most modern and hygienic in Brazil. Great care is given to grade, quality, and sanitation. The industry is justly proud of this shelling plant and its efforts toward bettering foreign demand by constantly striving to improve the quality of its product. This plant has inspired other shellers to modernize their plants and operations (fig. 23).

According to the latest available information there are 9 shelling plants in Belem, 6 in Manaus, and 4 in Bolivia. These plants give employment to an estimated 6,000 workers, mostly women, for much of the year.



Following is a list of the Brazil nut shelling plants in the Brazilian Amazon Valley.

*Belem, Para, Brazil:*

*Usina Brasil*, Travessa Quintino Bocaiuva 361

Estimated annual capacity: 8,000 to 10,000 cases of shelled nuts

Number of workers at plant when operating at capacity: 500

Established: 1937; out of operations since 1946

*Usina Chamie*, Rua da Municipalidade 398

Estimated annual capacity: 40,000 cases of shelled nuts

Number of workers at plant when operating at capacity: 1,000

Established: 1927

*Usina Conceicao*, Estrada de Rodagem de Icoraci

Estimated daily capacity: 5,000 kilos unshelled nuts

Number of workers at plant when operating at capacity: 100

Established: 1934; out of operations since 1936

*Usina Gloria*, Rua 28 do Setembro 537

Estimated annual capacity: 20,000 cases of shelled nuts

Number of workers at plant when operating at capacity: 300

Established: 1932

*Usina Progresso*, Rua Gaspar Viana 335

Estimated daily capacity: 3,500 kilos of shelled nuts

Number of workers at plant when operating at capacity: 300

Established: 1930

*Usina Santo Amaro*, Avenida Padre Eutiquio 558

Estimated annual capacity: 20,000 cases of shelled nuts

Number of workers at plant when operating at capacity: 400

Established: 1928

*Usina Sao Vicente*, Rua da Municipalidade 629

Estimated annual capacity: 8,000 cases of shelled nuts

Number of workers at plant when operating at capacity: 200

Established: 1929

*Usina Tupi*, Travessa Benjamin Constant 47

Estimated annual capacity: 25,000 cases of shelled nuts

Number of workers at plant when operating at capacity: 350

Established: 1947

*Usina Vila Nova*, Travessa D. Pedro I

Estimated daily capacity: 10,000 kilos of unshelled nuts

Number of workers at plant when operating at capacity: 260

Established: 1931



*Manaus, Amazonas, Brazil:*

*Usina Alegria*, Avenida Joaquim Nabuco, 1469

*Usina Americana*, Bairro do Flores

*Usina Esperanca*, Bairro da Cachoeirinha

*Usina Estrela*, Rua Wilkens de Matos 431

*Usina Labor*, Bairro dos Educandos

*Usina Vitoria*, Avenida Borba 758

Estimated annual capacity; 12,000 cases of shelled nuts

Number of workers at plant when operating at capacity: 350

Established: in 1936

According to information obtained in Belem from local firms dealing with Bolivian companies, there are about four Brazil nut shelling plants operating in the Bolivian section of the Amazon Valley. Three of them are owned and operated by the firm Seiler & Compania of Riberalta, and the other one is owned and operated by Soares Hermanos S.R.L. of Cachuela Esperanza, Bolivia. The latter has been out of business since about 1942, but it is expected to reinitiate operations during 1950. No data on estimated annual capacity and number of workers at these Bolivian shelling plants when operating at capacity could be obtained.

The trend of the Brazil nut industry is toward encouraging the exportation of shelled rather than unshelled nuts. The shelling industry gives employment in Brazil and, furthermore, shelled nuts bring more foreign exchange than the unshelled. The profits derived by the trade in Brazil from shelled nuts tend to be a little larger than on unshelled exports, and there is less worry about spoilage, shrinkage, and outturn weights at destination. Furthermore, shelling costs in Brazil are considerably lower than they are in the United States and other Northern Hemisphere countries. The demand for shelled nuts from abroad, especially from the United States, was increasing each year before World War II. During the war years the shelling business was stopped. Since the end of World War II when shelling was resumed, exports have been considerably below prewar levels. United States imports have been small in the postwar period because of the below-average harvests in Brazil and the high prices of the shelled product. There is reason to believe that when the prices of shelled Brazil nuts return to more normal levels in relation to other shelled nuts and harvests increase to average, the importation will again reach levels comparable to the late 1930's.

Prior to the entry of the United States into World War II, some sections of the American confectionery trade using nuts found it advantageous to shift from the more expensive types of shelled nuts to Brazil nuts. Brazil nut importers have carried on an intensive advertising campaign since 1934 through their Brazil Nut Advertising Fund (fig. 24)



FIGURE 23.- Shelling Brazil nuts in one of Brazil's largest plants. Cracking machines on the benches are hand operated. Note the general cleanliness of the plant and employees.

to acquaint the American confectionery trade, retailers, housewives, and school children with the Brazil nut, both shelled and unshelled, and thereby increase its consumption in the United States. This advertising program was suspended during the war but has since been resumed with considerable success. The program, though operating with limited funds, has been a valuable aid in the merchandising of this product. It could well serve as a pattern for advertising programs for other types of nuts and merchandise.

#### Operation of Shelling Plants and Cost of Shelling

Shelling plants buy their unshelled nuts through brokers much the same as do exporters of unshelled nuts. Many shellers, in fact, are also exporters of unshelled nuts. The sheller, however, is in a slightly better position on purchases than is the exporter of unshelled nuts. He can buy odd and distressed lots and store them until needed. Many shelling-plant operators buy for future delivery, although this sometimes works out to their disadvantage. The sheller can buy at times

when foreign demand is slack and he need not worry about the grading of the unshelled nuts as to size. His average cost of unshelled, therefore, is usually slightly below that of the exporter of unshelled nuts. The shelling plant usually manages to keep sufficient unshelled nuts on hand to keep the plant running steadily all season.

The nuts to be shelled are placed in large cement vats and covered with water. They are permitted to soak about 24 hours and then are placed in boiling water for from 3 to 5 minutes to soften the shell. After the nuts are removed from the boiling water, they are taken into the cracking room and placed on the benches of the workers.

The cracking machines are hand operated and in many respects resemble a home bottle capper, such as is used in the United States (fig. 25). They cost from 300 to 350 cruzeiros (\$15.00 to \$17.50) each and are made locally. The nuts are placed endwise in a small cup, and the handle of the machine is pressed down until the shell breaks. Care must be taken in this work not to exert too much pressure on the shell and so damage the kernel. In a few of the smaller plants a small piece of iron or a wooden club is used instead of a machine. Also, in a few of the smaller plants the unshelled nuts are not soaked before they are cracked.

Several pounds of nuts are cracked and the kernels and shells are thrown to one side of the bench. The worker then sorts out the sound kernels and pieces and places them in a small wooden box. The shells and spoiled kernels are used as fuel in the furnaces to supply heat for the dryers and power for the shelling plant.

The speed with which some of the girls do the cracking and shelling is amazing. They are paid by the quantity shelled per day, the usual rate per kilogram (2.2 pounds) being 0.70 cruzeiro (about 3.5 U. S. cents), with the output per girl varying between 15 and 30 kilograms per day (33 to 66 pounds). The average output per girl per 8-hour day is



FIGURE 24.- Brazil nut Advertising Fund exhibit at the National Confectioners' Convention.





FIGURE 25.- Girl operating a hand-shelling machine in a small Brazil nut plant.

about 22 kilograms (about 28.4 pounds). In small plants employing from 50 to 200 girls, the average output seems to be somewhat higher than in the larger plants employing more than 400. This is probably explained by the fact that as the number of workers increases it becomes more difficult to obtain fast workers and that perhaps there is more lost time. At one time the Brazilian Government enforced a minimum rate of 6 cruzeiro per 8-hour day (about 32.4 U.S. cents), but this was unsatisfactory because many workers began to do less work. The minimum was finally lowered to 4 cruzeiros (about 21.6 U.S. cents).

After the worker has a box full of kernels she receives a metal check, which is later exchanged for money. The poor pieces and foreign matter of the newly shelled nuts are sorted out by other workers, and any bad

spots found on the kernels are removed. The nuts are then placed on wire screens and taken to a steam dryer, where they are left just long enough to remove the surface moisture. Drying is necessary because the nuts would spoil quickly if any moisture were to remain on them.

The dried nuts are passed to graders for sizing. For blanched nuts the brown skin is removed before the nuts go to the dryers. The girls doing the grading work receive about 1.50 cruzeiros (about 8.1 U. S. cents) per 2.2 pounds. The average output per girl per 8-hour day

is about 10 cases of 66 pounds each. The girls doing the blanching receive from 81 U. S. cents to \$1.08 per 8-hour day.

The ratio of unshelled to shelled nuts varies somewhat. At the beginning of the season a loss of at least 1 percent must be figured for bad nuts and foreign matter, such as dirt, pebbles, and sticks. This percentage increases as the season advances, sometimes reaching more than 5 percent. The average shellout from a hectoliter of 112 pounds of good-quality unshelled nuts is about 18 kilograms (40 pounds) of kernels, though it varies from 16 to 20 kilograms (35 to 44 pounds). In actual practice a hectoliter of Brazil nuts at export centers may weigh as much as 120 pounds and as little as 105. The weight depends on the moisture content and size of the nuts and on the variation of thickness of the shell, as well as on the spoilage, shrinkage, etc.

It should be noted that the estimated shelling ratio is somewhat higher than is normally used for these nuts in the United States. The unshelled nuts received in the United States have been cleaned of the foreign matter and most of the spoiled nuts, commonly found in the shipments from the interior, have also lost some of their moisture.

The actual cost of producing shelled nuts is not available, but it is known to vary considerably with the different plants and with the quality and cost of the unshelled nuts. Table 11 gives some estimated factory costs in 1949 involved in producing shelled nuts for a given selling price of unshelled nuts. The total shown in the last two columns does not include exporter's commission, insurance, factory profit, and other expenses necessary to preparing the goods for loading on board ship. The charges to be added to the factory costs also vary greatly. Shellers deal largely in futures, and shelled quotations may therefore not always closely follow the market for unshelled.

#### Quality and Quantity of Shelled Nuts Exported

Shelled nuts purchased in the United States or elsewhere at much below the prevailing price are generally of inferior quality. Some

TABLE 11.- *Estimated cost of producing one case (66 lbs.) of shelled Brazil nuts*

	BRAZILIAN CRUZEIROS	UNITED STATES DOLLARS
Sheller's purchase price for unshelled nuts required for one case (80 kilograms).....	214,30	11.57
Shelling.....	30,00	1.62
Packing, grading, etc.....	39,00	2.11
Two tin cans.....	33,00	1.78
One wooden case.....	12,00	.65
Overhead costs.....	15,00	.81
Total.....	343,30	18.54

Brazilian official sources.

exporters of shelled nuts who consistently underbid the market price ship nuts of the lowest possible quality that will be accepted. The whole industry is injured by such trading, and every effort should be made to prevent it.

The rapid expansion in domestic shelling from 1926 to 1940 is indicated by the increased exports of shelled nuts (table 12). From an initial exportation of 104 tons in 1926, exports gradually increased until they reached 736 in 1930. By 1935 they had jumped to 6,282 short tons of shelled nuts, 60 times the 1926 figure.

In 1926 United States imports of shelled Brazil nuts totaled 865 short tons of which, according to Brazilian export data, only 104 short tons were direct shipments. By 1931 United States imports reached 3,039 tons and Brazilian exports destined for this country were recorded at 3,186 short tons. The difference in these figures is partially explained by the fact that December exports from Brazil do not enter United States import figures until January and consequently show up in the following calendar year's imports. Also, imports into the United States are sometimes held in bonded warehouses until needed and are therefore not entered in import-for-consumption statistics for some months after they leave Brazil.

The volume of United States imports increased gradually and by 1941 had reached 7,054 short tons almost all of which were from Brazil and

TABLE 12.- Exports of shelled Brazil nuts from Amazon Basin, 1926-48

YEAR	UNITED STATES	EUROPE	OTHERS <sup>1</sup>	TOTAL <sup>2</sup>
	<i>Short tons</i>	<i>Short tons</i>	<i>Short tons</i>	<i>Short tons</i>
1926.....	104	-	-	104
1927.....	274	28	4	306
1928.....	410	10	1	421
1929.....	644	64	2	710
1930.....	682	53	1	736
1931.....	3,186	59	17	3,262
1932.....	3,159	153	18	3,330
1933.....	2,997	377	36	3,410
1934.....	3,840	405	38	4,283
1935.....	5,992	206	84	6,282
1936.....	4,517	144	39	4,700
1937.....	3,076	119	357	3,552
1938.....	3,416	265	635	4,316
1939.....	4,364	714	400	5,478
1940.....	5,111	27	425	5,563
1941.....	5,860	-	220	6,080
1942.....	2,505	-	277	2,782
1943.....	36	-	660	696
1944.....	-	-	208	208
1945.....	1,557	-	141	1,698
1946.....	3,703	-	149	3,852
1947.....	3,393	277	134	3,804
1948.....	1,691	-	205	1,896

<sup>1</sup> Includes shipments to south Brazil.  
<sup>2</sup> Bolivian nuts included.  
Brazilian trade and official sources.



TABLE 13.- United States imports of specified nuts, annual 1929-49, 5-year averages, 1929-33/1944-48

YEAR <sup>1</sup>	ALMONDS <sup>2</sup>		BRAZIL NUTS		CASHEWS		FILBERTS		WALNUTS		TOTAL	
	SHELLED	UNSHELLED	SHELLED	UNSHELLED	SHELLED	UNSHELLED	SHELLED	UNSHELLED	SHELLED	UNSHELLED	SHELLED	UNSHELLED
	Short tons	Short tons	Short tons	Short tons	Short tons	Short tons	Short tons	Short tons	Short tons	Short tons	Short tons	Short tons
Annual:												
1929.....	9,503	9,540	34,400	2,420	8,425	2,420	8,425	3,490	26,486	15,450		
1930.....	6,238	11,365	4,302	2,358	8,168	2,997	8,168	1,775	22,653	16,137		
1931.....	3,966	8,243	5,960	3,253	5,479	3,040	5,479	3,013	20,417	14,296		
1932.....	2,317	8,731	4,290	1,554	2,780	3,051	2,780	905	13,589	12,687		
1933.....	1,413	8,397	7,118	1,002	2,774	1,300	2,774	14	15,817	9,711		
1934.....	1,635	8,460	9,918	1,035	1,825	1,208	1,825	16	19,289	9,684		
1935.....	5,507	12,301	10,239	1,077	1,736	1,736	1,736	157	23,775	14,194		
1936.....	5,175	9,762	13,374	1,131	2,707	2,821	2,707	37	26,461	12,620		
1937.....	1,290	6,951	13,063	1,024	1,997	115	1,997	126	20,627	7,192		
1938.....	1,765	9,516	813	333	2,202	753	2,202	67	22,798	9,916		
1939.....	652	11,603	13,303	1,358	2,172	753	2,172	19	23,206	12,375		
1940.....	1,290	13,705	18,462	561	2,320	34	2,320	0	30,781	13,739		
1941.....	1,543	8,501	12,068	27	946	(4)	946	0	18,952	8,501		
1942.....	616	3,583	3,806	27	82	0	82	0	6,276	3,583		
1943.....	8,254	0	4,038	576	6	6	6	0	12,874	6		
1944.....	9,325	(4)	10,817	4,180	6	16	6	(4)	24,328	16		
1945.....	9,437	3,959	14,487	4,595	214	589	214	24	32,692	6,502		
1946.....	3,301	3,272	16,015	5,060	459	1,669	459	118	28,107	13,526		
1947.....	6,135	2,925	15,585	2,448	257	3	257	3	27,350	14,342		
1948.....	4,878	3,000	18,693	3,696	1,387	44	1,387	34	31,654	12,540		
1949.....	476	2,399	10,604	2,306	1,140	15	1,140	2	16,925	6,817		
Average:												
1929-33.....	4,687	9,255	5,214	1,656	5,525	2,562	5,525	1,839	19,792	13,656		
1934-38.....	2,874	9,398	12,221	1,016	2,287	1,243	2,287	81	22,589	10,722		
1939-43.....	2,471	7,478	10,355	510	1,105	159	1,105	4	18,417	7,641		
1944-48.....	6,615	8,885	15,119	3,996	465	464	465	36	28,926	9,385		

<sup>1</sup> September-August crop year basis with the following exceptions: cashews 1930 through 1940 - July-June and walnuts 1930-1943 - October-September.

<sup>2</sup> U. S. imports of unshelled almonds have been insignificant for many years.

<sup>3</sup> Estimated.

<sup>4</sup> Less than ½ ton.

<sup>5</sup> 7 months, September through March.

Note: United States also imports small quantities of shelled pecans (mostly from Mexico), pistachios, and other minor nuts. Compiled from official records of the Bureau of the Census.

Bolivia. The 1941 import is the largest on record to date. The Brazilian shelling industry has taken full control of the trade with the exception of the relatively small quantity produced in Bolivia.

The shelling industry in Bolivia did not get started until 1931, in which year 20 tons of nuts were sent via Brazilian ports to the United States. The following year, such exports jumped to 317 tons and have not increased much above that level. Bolivian shelled and unshelled nuts are handled through Brazilian ports and frequently are included in Brazilian export statistics. Unfortunately, from available records it is not possible to segregate them from nuts produced in Brazil.

### UNITED STATES LANDED COSTS OF UNSHELLED AND SHELLED NUTS

Before World War II, there were 10 steamship lines regularly calling at Belem and occasionally at Manaus. In addition, occasional tramp or

TABLE 14.- United States imports of Brazil nuts (for consumption) compared with domestic nut production, annual 1929-49, 5-year averages, 1929-48

YEAR	IMPORTS BRAZIL NUTS	UNITED STATES ESTIMATED PRODUCTION					PERCENT IMPORT OF U. S. PRODUCTION
		ALMONDS	FILBERTS	PECANS	WALNUTS	TOTAL	
	Short tons	Short tons	Short tons	Short tons	Short tons	Short tons	
Annual:							
1929.....	13,630	4,700	200	26,670	43,400	74,970	18.18
1930.....	14,539	13,500	300	28,570	30,300	72,670	20.00
1931.....	15,761	14,800	420	44,230	34,200	93,650	16.82
1932.....	14,027	14,000	490	34,120	49,100	97,710	14.35
1933.....	15,417	12,900	1,070	39,400	34,000	87,370	17.64
1934.....	16,454	10,900	1,210	28,090	47,100	87,300	18.84
1935.....	22,555	9,300	1,240	62,240	57,400	130,180	17.32
1936.....	17,910	7,600	2,100	29,890	45,800	85,390	20.97
1937.....	13,457	20,000	2,570	53,600	62,400	138,570	9.71
1938.....	18,528	15,000	2,440	37,160	55,300	109,900	16.85
1939.....	23,045	21,600	3,890	48,530	62,500	136,520	16.89
1940.....	30,001	12,000	3,210	61,440	50,800	127,450	23.53
1941.....	17,237	6,000	5,750	60,890	70,000	142,640	12.08
1942.....	7,073	23,800	4,270	38,690	61,200	127,960	5.52
1943.....	(2)	17,500	7,030	66,520	63,800	154,850	-
1944.....	(2)	24,000	6,520	71,610	71,800	173,930	-
1945.....	13,807	27,200	5,320	70,590	70,900	174,010	7.93
1946.....	18,283	37,800	8,450	38,350	71,900	156,500	11.68
1947.....	20,186	29,200	8,800	59,320	64,600	161,920	12.46
1948.....	18,462	34,000	6,440	88,830	71,100	200,370	9.21
1949.....	<sup>3</sup> 11,598	39,000	11,240	56,850	85,500	192,590	6.02
Averages:							
1929-33...	14,675	12,000	500	34,600	38,200	85,300	17.20
1934-38...	17,781	12,600	1,900	42,200	53,600	110,300	16.12
1939-43...	15,471	16,200	4,800	55,200	61,700	137,900	11.21
1944-48...	14,148	30,400	7,100	65,700	70,100	173,300	8.16

<sup>1</sup> Imports for consumption beginning 1933; prior to 1933, general imports. Beginning 1935 on September-August crop-year basis. Prior to 1935 on July-June basis. Unshelled basis.

<sup>2</sup> Less than  $\frac{1}{2}$  ton.

<sup>3</sup> 7 months, September through March.

Imports compiled from official sources of the Bureau of the Census. Production data estimated by Crop Reporting Board BAE.

chartered ships also called for freight at these ports, so that shipping space was almost always available.

After the outbreak of World War II, practically all ships of European registry were withdrawn for use elsewhere, and only two American lines and one Brazilian line regularly called at Belem. Occasional vessels from Japan and other countries were in the port, but the service was greatly reduced. The ships still in the service naturally carried the best paying freight, and Brazil nuts were not in that class. The freight rate was raised, but even so space was hard to get. With the United States entry into the war, service was stopped for a short period but finally resumed under wartime regulations. The exportation of Brazil nuts was suspended entirely in 1942 to permit the few remaining vessels to carry more essential cargoes. At present there is ample shipping space to handle all cargoes offered in the Amazon basin for shipment to the United States.

The Conference that serves the Amazon is the North Brazil/United States-Canada Freight Conference and includes the following lines:

The Booth Steamship Company, Ltd.<sup>1</sup>  
Lampport and Holt Line, Ltd.<sup>1</sup>  
Moore-McCormack Lines, Inc.<sup>1</sup>  
The Northern Pan-America Line, A/S<sup>1</sup>  
Mississippi Shipping Company, Inc.<sup>2</sup>  
Lloyd Brasileiro (Patrimonio Nacional)  
Dampskibsselskabet Torm (Torm Line)  
Cia. Argentina de Navegacion Dodero, S. A.

<sup>1</sup> Serves Belem and/or Manaus at the present time.

<sup>2</sup> Serves Gulf Coast ports, principally New Orleans.

The Pacific Coast River Plate Brazil Conference includes the following lines:

Pacific Argentine Brazil Line<sup>1</sup>  
Pacific Republics Line<sup>1</sup>  
Silver Line<sup>1</sup>  
Dodero Lines  
Java Pacific Line  
Westfal-Larsen Compnay Line

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<sup>1</sup> Carried Brazil nuts during 1949.

Tables 13 and 14 show the quantity of Brazil nuts imported into the United States and table 15 shows the freight rates for shipping them from certain Brazilian ports to United States Atlantic ports.

The United States import duty on shelled nuts is 1-1/8 cents a pound and on unshelled 3/8 cent a pound. The duty was cut in half on July 31, 1948, as a result of the General Agreement on Tariffs and Trade at Geneva, Switzerland.



TABLE 15.- Freight rates for transporting Brazil nuts from specified Brazilian ports to United States Atlantic and Pacific ports and to European Atlantic ports

TO UNITED STATES ATLANTIC PORTS		
PORT OF SHIPMENT AND PACKAGE	FREIGHT RATE	BASIS
<i>U. S. dollars</i>		
BELEM:		
Unshelled nuts in bulk or bags.....	2.75	100 lb.
Shelled in cases of 66 lbs. net.....	2.30	case
PARINTINS, ITACOATIARA AND MANAUS:		
Unshelled nuts in bulk or bags.....	3.11	100 lb.
Shelled nuts in cases of 66 lbs. net.	2.70	case
TO UNITED STATES PACIFIC PORTS <sup>1</sup>		
BELEM:		
Unshelled nuts in bulk or bags.....	3.35	100 lb.
Shelled nuts in cases of 66 lbs. net.	2.85	case
TO EUROPEAN ATLANTIC PORTS		
	<i>Shillings<sup>2</sup> - Dollars</i>	
BELEM:		
Unshelled nuts in bulk or bags.....	220	30.80
Shelled in cases of 66 lbs. net.....	200	28.00
PARINTINS, ITACOATIARA, AND MANAUS:		
Unshelled nuts in bulk or bags.....	260	36.40
Shelled in cases of 66 lbs. net.....	240	33.60

<sup>1</sup>There are no direct shipping lines from Manaus, Itacoatiara, and Parintins to the United States Pacific ports. <sup>2</sup> United Kingdom currency.

Note: These rates are the basic rate for freight. Additional charges of one type or another are generally added to obtain the total cost of landing the nuts in the United States.

Brazilian official sources.

The rate of shrinkage varies, running as low as 10 and as high as 18 percent, but averages about 15 percent for imports into the United States. The importer must also pay the various agency, carrying, letter-of-credit, cartage, storage, handling, and insurance charges. Most of the charges, especially insurance, have shown an upward tendency in recent years.

#### Landed Cost of Unshelled Nuts in the United States

The landed cost of unshelled nuts estimated in table 16 does not take into account export taxes at Belem and other shipping points. It represents the f.o.b. price quoted in Brazilian cruzeiro and converted to United States cents per pound. The quotations are based on hectoliters of 112 pounds on outturn weights in American ports, and it frequently happens that the hectoliters shipped in Brazil weigh from 112 to 130 pounds. The ocean freight rates used in table 15 are the present contract rates from Amazon River ports to United States Atlantic and Pacific ports and to Europe's Atlantic ports.

The cost of shrinkage has been figured at 15 percent on the f.o.b. quotations, plus ocean freight; however, some allowance should be made for insurance and other incidental costs. The cost of insurance, commission, storage, cartage, etc., varies considerably.

The total estimated landed cost at New York or other North Atlantic or Gulf ports, duty paid, does not include the importer's profit. Assuming it to be 5 percent, which is hardly a large margin for commodities of this type, it is apparent that, unless the f.o.b. Brazil price for unshelled nuts is less than 2 cents, the ex-dock price in the United States cannot be as low as 5 cents. There occasionally were distressed sales for 5 cents in prewar years, but these accounted for only a very small percentage of the tonnage during any given season. The landed cost for the Pacific coast works out higher, as the comparable freight rate is higher. In addition, the longer haul increased some of the other costs, and wharfage and handling at Pacific coast ports must be added.

Landed Cost of Shelled Nuts in the United States

The landed cost of shelled Brazil nuts at North Atlantic and Gulf points is estimated in table 17. There is no shrinkage in shelled nuts

TABLE 16.- Estimated minimum landed cost per pound of unshelled Brazil nuts in United States North Atlantic ports at given f.o.b. Brazil prices, 1950

F. O. B. BRAZIL PER POUND	FREIGHT CONTRACT RATES	ALLOWANCE FOR SHRINKAGE AND MISCELLANEOUS CHARGES	DUTY	ESTIMATED TOTAL LANDED COST
<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>	<i>Cents</i>
2.00	2.75	0.825	0.375	5.95
2.50	2.75	.915	.375	6.54
3.00	2.75	.995	.375	7.12
3.50	2.75	1.085	.375	7.71
4.00	2.75	1.165	.375	8.29
4.50	2.75	1.255	.375	8.88
5.00	2.75	1.335	.375	9.46
5.50	2.75	1.425	.375	10.05
6.00	2.75	1.505	.375	10.63
6.50	2.75	1.595	.375	11.22
7.00	2.75	1.675	.375	11.80
7.50	2.75	1.765	.375	12.39
8.00	2.75	1.845	.375	12.97
8.50	2.75	1.935	.375	13.56
9.00	2.75	2.015	.375	14.14
9.50	2.75	2.105	.375	14.73
10.00	2.75	2.185	.375	15.31
10.50	2.75	2.275	.375	15.90
11.00	2.75	2.355	.375	16.48
11.50	2.75	2.445	.375	17.07
12.00	2.75	2.525	.375	17.65
12.50	2.75	2.615	.375	18.24
13.00	2.75	2.695	.375	18.82
13.50	2.75	2.785	.375	19.41
14.00	2.75	2.865	.375	19.99
14.50	2.75	2.955	.375	20.58
15.00	2.75	3.035	.375	21.16
15.50	2.75	3.125	.375	21.75
16.00	2.75	3.205	.375	22.33

Brazilian official sources.



FIGURE 26.- Unshelled Brazil nuts in storage on New York docks.

though occasionally some loss is incurred from breakage or spoilage, part of which may be covered by insurance.

#### BRAZIL NUT EXPORTS IN THE FUTURE

There appears to be little information to indicate any material change in the pattern and volume of Brazilian exports of this nut to the United States. There will, of course, be seasonal fluctuations resulting from the size of the harvest and the level of consumer demand. Any nut regardless of its high food value is generally considered a luxury or semiluxury item. It follows that when the consuming public is well supplied with funds consumption goes up and when funds are short consumption declines.



The ever-increasing yield of nuts in the United States, which during the 1949-50 season reached an all-time high and a burdensome surplus, will make competition in the nut industry very keen. This may result in a gradual decline of imports of Brazil nuts. A partial offset to this intensified competition is the very much lower duty, on Brazil nuts over the pre World War II rates and the anticipated lowering of prices in the Amazon Basin as the economy of that area returns to more normal levels. Ocean freights and insurance rates are still up from prewar levels but are eventually expected to decline although not to prewar rates.

The postwar period has turned out about as anticipated as far as exports of Brazil nuts are concerned. Most European nations are still out of the market although the United Kingdom has again become a factor. It seems probable barring another war and economic disasters that as Europe and other sections of the world return to more normal economic conditions exports will increase. The export to European nations other than the United Kingdom are expected to be on a limited scale because of the competition from other nuts produced in the Mediterranean area and India. In conclusion, it appears that unless considerable promotional energies are expended, the exportation of this nut will not exceed the prewar level and probably will be below this level for some years.

TABLE 17.- Estimated minimum landed cost of shelled Brazil nuts per pound in United States North Atlantic and Gulf ports at given f.o.b. Brazil prices, 1950

F. O. B. PRICE BRAZIL <sup>1</sup>	FREIGHT <sup>2</sup>	DUTY	ESTIMATED MISCELLANEOUS CHARGES <sup>3</sup>	TOTAL <sup>4</sup>
Cents	Cents	Cents	Cents	Cents
10.00	3.48	1.125	0.275	14.88
11.00	3.48	1.125	.295	15.90
12.00	3.48	1.125	.315	16.92
13.00	3.48	1.125	.335	17.94
14.00	3.48	1.125	.355	18.96
15.00	3.48	1.125	.375	19.98
16.00	3.48	1.125	.395	21.00
17.00	3.48	1.125	.415	22.02
18.00	3.48	1.125	.435	23.04
19.00	3.48	1.125	.455	24.06
20.00	3.48	1.125	.475	25.08
21.00	3.48	1.125	.495	26.10
22.00	3.48	1.125	.515	27.12
23.00	3.48	1.125	.535	28.14
24.00	3.48	1.125	.555	29.16
25.00	3.48	1.125	.575	30.18
26.00	3.48	1.125	.595	31.20
27.00	3.48	1.125	.615	32.22
28.00	3.48	1.125	.635	33.24
29.00	3.48	1.125	.655	34.26
30.00	3.48	1.125	.675	35.28

<sup>1</sup> Brazilian taxes if any not included.  
<sup>2</sup> Lowest conference rates.  
<sup>3</sup> Includes letter of credit, insurance, cartage, etc.  
<sup>4</sup> Does not include importers and wholesalers profit.  
Brazilian official sources.

