

The Fruit and Kernel Oil of the Plumy Coconut (*Arecastrum Romanzoffianum*)¹

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The production of fats and oils in this country to meet new defense needs has become of increasing importance. The present investigation was therefore undertaken to obtain information regarding a possible new source of vegetable oil, the fruit of the plumy coconut.

The plumy coconut (*Arecastrum Romanzoffianum*), sometimes referred to as *Cocos Plumosa*,² is a tall-growing palm (Fig. 1) with arching pinnate leaves

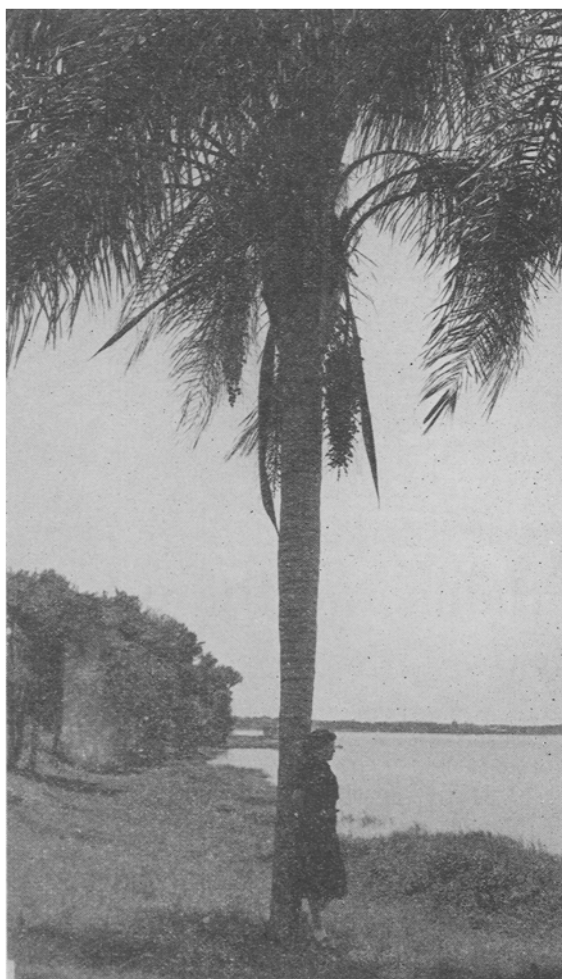


FIG. 1. *Arecastrum Romanzoffianum*
Showing Fruit.

and a smooth trunk which has the bases of old leaf-stalks remaining near the top. This species is quite widely planted in Florida as a substitute for the royal palm (*Roystonea Regia*), since *Arecastrum* is much more cold-resistant and has a far greater range of adaptability than the royal palm. Plantings of the plumy coconut are, however, confined to yards

and along highways and lake shores as a means of beautification. Thus, production is rather scattered. For this reason, commercial production of oil from the fruit would entail some difficulty of collection and probably would be economically feasible only in case of a grave shortage of this type of oil.

The fruits of *Arecastrum Romanzoffianum* are borne in racemes which hang down; when mature, the fruits are yellow or orange. They vary in size according to the maturity of the tree, but on a well-developed palm are about 1¾ in. long and when dry weigh about 6 gms. The outer fleshy portion of the fruit contains fibers in longitudinal strands, and has a sweet, fruity taste not unlike that of fresh dates. Beneath the fibrous outer coating is the hard shell of the fruit at whose apex are three "eyes." Inside the shell is the oil kernel, light grey in color

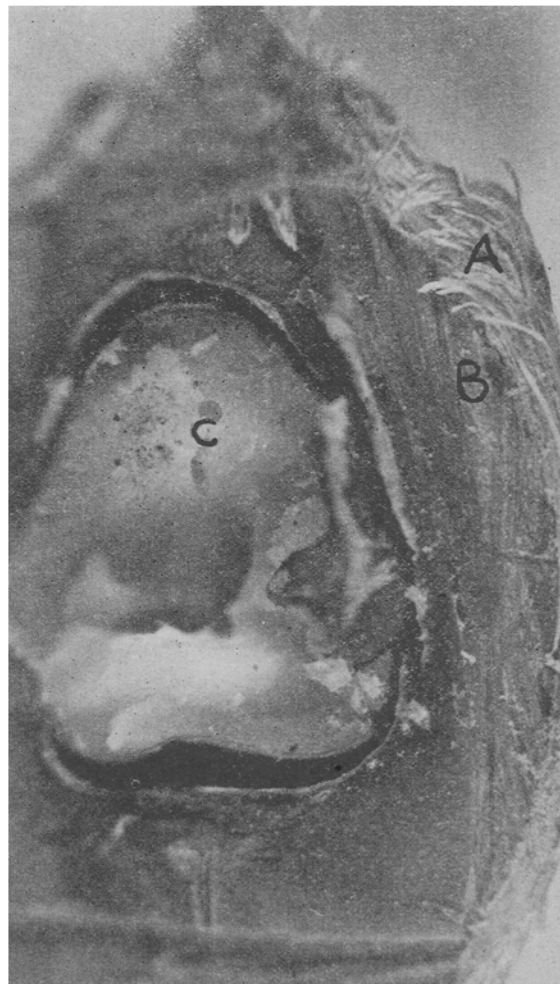


FIG. 2. Longitudinal Section of Fruit of *Arecastrum Romanzoffianum*.

Mag. x5. (A) fibrous husk; (B) shell; (C) oily kernel. From a mature tree.

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² Mowry (1) states that the variety *Australe* is the one commonly referred to as *Cocos Plumosa*.

and possessing the odor and taste of copra (Fig. 2). On a dry basis, the outer fibrous portion consists of about 23 per cent, the shell about 69 per cent and the kernel about 8 per cent of the weight of the fruit. Analyses of these three portions are given in Table I.

TABLE I
Composition of the Fruit of *Arecastrum Romanzoffianum*
(On a Moisture-Free Basis)

| | Husk | Shell | Kernel |
|--|--------|--------|--------|
| Crude Fat (ether extract), per cent.. | 0.65 | 0.50 | 52.20 |
| Ash, per cent..... | 4.63 | 2.40 | 1.97 |
| Protein (N x 6.25), per cent..... | 4.37 | 2.73 | 10.37 |
| Total Sugars (as invert), per cent.... | 28.35 | 4.27 | 4.87 |
| Crude Fiber, per cent..... | 19.85 | 45.29 | 17.97 |
| Undetermined, per cent..... | 42.15 | 44.81 | 12.62 |
| Total..... | 100.00 | 100.00 | 100.00 |

Preparation of the Kernel Oil. The fruit, after falling from the tree, was placed on screened trays and allowed to dry in the sun. The air-dried material was cracked with a hammer and the kernel removed by hand. The kernels thus obtained were then pressed in a Carver press to remove the oil which was subsequently heated for a short time at 100° C. and filtered, using a filtering aid. The filtered oil contained 0.08 per cent volatile constituents (2).

Characteristics of the Oil. The cold-pressed oil was light amber in color and possessed an odor and taste similar to coconut oil. It melted at 18° C. (uncorr.). The chemical and physical characteristics of the oil were determined by the usual procedures (2), with the results given in Table II.

Discussion of Results. Due to the presence of saturated acids of lower molecular weight than myristic, the saturated and unsaturated acids were calculated, using the formulae given by Jamieson (3).

The oil is non-drying and similar to palm kernel oil in physical properties.

TABLE II
Chemical and Physical Characteristics of the Kernel Oil From
Arecastrum Romanzoffianum.

| | |
|--|--------|
| Specific Gravity 25°/25°..... | 0.9194 |
| Refractive Index n_D 20° C..... | 1.4580 |
| Free Fatty Acids (as oleic), per cent..... | 0.19 |
| Saponification Value..... | 239.5 |
| Iodine No. (Hanus)..... | 28.4 |
| Unsaponifiable Matter, per cent..... | 0.41 |
| Unsaturated Acids,* per cent..... | 27.20 |
| Saturated Acids,* per cent..... | 68.10 |
| Polenske No..... | 0.85 |
| Acetyl Value (A.O.A.C.)..... | 3.5 |
| Hehner Value..... | 88.4 |
| Thiocyanogen No..... | 24.5 |
| Reichert-Meißl Value..... | 0.72 |

* Calculated from thiocyanogen and iodine numbers.

Summary

The nuts and oil from *Arecastrum Romanzoffianum* have been examined. Full-grown dried nuts from a mature tree average 23 per cent of fibrous husk, 69 per cent of shell and 8 per cent of oily kernel. The dried kernel contains about 52 per cent of oil of a non-drying character, and somewhat similar to palm kernel oil in physical properties. The chemical and physical characteristics of the kernel oil are: Sp. G. 25°/25°—0.9194; Refrac. Index n_D 20° C.—1.4580; Free Fatty Acids (as oleic)—0.19 per cent; Saponification Value—239.5; Iodine No. (Hanus) 28.4; Unsaponifiable Matter—0.41 per cent; Pol. Value—0.85; Acetyl Value—3.5; Hehner Value—88.4; Thiocyanogen No.—24.5; R-M Value—0.72.

BIBLIOGRAPHY

1. Mowry. Native and Exotic Palms of Florida. Univ. Fla. Agri. Expt. Sta. Bul. 228 (May, 1931).
2. Association of Official Agricultural Chemists. "Methods of Analysis." Washington, D. C. Fifth ed., 1940.
3. Jamieson. Vegetable Fats and Oils. Chemical Catalog Co., Inc., New York, N. Y. (1932) p. 347.

Report of the Uniform Methods and Planning Committee

The Uniform Methods and Planning committee has received only one report and that was from the Soap Analysis committee.

This committee has been doing some work on the determination of tetrasodium pyrophosphate in soap. The procedure reported in brief is as follows:

1. Obtain alcohol insoluble in usual manner.
2. Dissolve alcohol insoluble in water and adjust to pH of 3.8, using glass electrode.
3. Add a measured excess of zinc sulphate solution and
4. Titrate liberated sulphuric acid with standard alkali, again using glass electrode in determining the end point.
5. Standardize alkali to be calibrated against recrystallized tetrasodium pyrophosphate, using glass electrode in the same manner as in the actual determination."

The Uniform Methods and Planning committee approved the report of the Soap Analysis committee and recommended the adoption of this method as tentative. This recommendation was adopted by the society.

There was a request from the Finished Materials Standards committee of the National Soybean Processors association that the Fat Analysis committee be requested to change the F.F.A. range from 0-0.5 per cent to 0-0.2 per cent specifying 56.4 gms. as the sample weight and that 0.5-1.0 per cent be changed to 0.2-1.0 per cent with 28.2 gms. as the sample weight. The Uniform Methods and Planning committee have considered this request and have approved the change. The society adopted this recommendation.

The Fat Analysis committee recommended a few changes in the specifications for the titer thermometer, so as to get the same instrument adopted by the A.S.T.M. Inasmuch as these changes are all of minor character, being largely editorial, the Uniform Methods and Planning committee recommended that they be approved and the society adopted this recommendation.

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