PECAN OIL

Contribution from the Oil, Fat and Wax Laboratory, Bureau of Chemistry & Soils, United States Department of Agriculture

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THE shelled nuts or "meats" from the tree *Hicoria pecan,* which is extensively cultivated in various regions in the Southern States usually contain from 60 to about 70 per cent of oil, but on account of their value for edible purposes, the salable "meats" cannot be used for the production of oil. However, the fine unsalable nut fragments which accumulate at the shelling plants can be utilized for the production of oil. The oil from sound nut waste has a very mild agreeable characteristic flavor and is an excellent salad oil.

Previous to the present investigation, pecan oil has received but little attention. Diehr and Fraps (J. Amer. Chem. Soc. 1910, 43, 90) examined a sample of the oil which they prepared with the following results: Specific gravity at 15/15° .9184, saponification value 198, and iodine number 106.

In view of a number of requests for further information on the characteristics and composition of pecan oil the following investigation was made on a sizable sample of the expressed oil which was kindly furnished by the Southland Pecan Company of Columbus, Georgia. This sample had a very mild, pleasant flavor. The chemical and physical characteristics of the oil are given in Table I.

TABLE I

Chemical and Physical Characteristics of Pecan Oil

Specific Gravity 25/25°	.9141
Refractive index 25°	1.4692
Saponification Value	190.
Iodine number (Hanus)	100.
Unsaponifiable matter (%)	.35
Acid value	7.0
Reichert-Meissl Value	.05
Polenske number	.30
Acetyl value	7.4
Saturated acids (Corrected) (%)	5.09
Unsaturated acids (Corrected) (%)	89.54
Iodine number of Unsaturated Acids	105.5

The percentage of saturated and unsaturated acids was determined by the lead-salt-ether method, and corrections were made for the small quantity of unsaturated acids that are precipitated and finally weighed with the saturated acid fraction (J. Amer. Chem. Soc. 1920, 42, 2398; Cotton Oil Press 1922, 6, 41). The percentage of unsaturated acids has also been corrected for the unsaponifiable matter that remains with the unsaturated acid fraction.

Unsaturated Acids

THE iodine number of the unsaturated acids is 105.5, indicating that this fraction consists of oleic acid (iodine number 90.1) and linolic acid (iodine number 181.4). The following percentage composition of the unsaturated acids was calculated from these figures.

		As Glycerides	
	Per cent	In Oil Per cent	In Oil Per cent
Oleic Acid	83.11	74.42	77.8
Linolic Acid	16.89	15.12	15.8

Slightly more than one hundred grams of the saturated acids were separated from the oil by the lead-salt-ether method and esterified in the usual manner with absolute methyl alcohol in the presence of dry hydrochloric acid gas (J. Amer. Chem. Soc. 1920, 42, 1200). The dry solvent free methyl esters (105 grams) were fractionated under a pressure of 3 mm. from a 500-cc. Claisson distilling bulb. The five fractions as well as the undistilled residue were redistilled under a pressure of 2 mm. from a 150-cc. Ladenburg fractionation flask. Five fractions were obtained, the first distilling from 160° to 163° and the fifth fraction from 180° to 190° C. The fractions were analyzed, and their composition was determined as previously described (J. Amer. Chem. Soc. 1924, 46, 775). The results given in Table II were calculated from the analytical data obtained.

TABLE II

Saturated Acids

Acids	Acids in Oil Per cent	Acids as Glycerides Per cent
Myristic	.04	.04
Palmitic	3.14	3.3
Stearic	1.82	1.9
Arachidic	.09	.1

The acids were recovered from some of the methyl ester fractions, and from the small undistilled residue, saponifying with alcoholic potash and decomposing the soaps with hydrochloric acid. The acids were collected and completely separated from the potassium chloride and the excess of hydrochloric acid which was used, by remelting them several times with water in the usual manner.

Palmitic, stearic, and arachidic acids were isolated from various fractions by fractional crystallization from alcohol. A small quantity of myristic acid was obtained from the acids of the first fraction. The arachidic acid was obtained from the fatty acids of the last (V) fraction, as well as from the undistilled ester residue. The identity of the acids was established by their melting points and by observing whether or not these melting points were lowered when the acids were mixed with equal quantities of the respective acids, which they were suspected of being, the purity of which had previously been established by elementary analysis. No depression of the melting point was observed in any case.

Summary

THE chemical and physical characteristics of a sample of expressed pecan oil have been determined. The composition of a pecan oil, which had an iodine number of 100 and a saponification value of 190, has been determined with the following results:

Glycerides of	Per cent
Oleic acid	77.8
Linolic acid	15.8
Myristic acid	trace
Palmitic acid	3.3
Stearic acid	1.9
Arachidic acid	.1
Unsaponifiable matter	.35

Lehman Johnson 1862-1929

WE regret to announce the death, suddenly, on September 23, of Edwin Lehman Johnson, of Memphis, Tennessee, Oil Mill Chemist and Engineer, and Charter Member of the American Oil Chemists' Society.

Mr. Johnson was found with his neck broken, in the wreck of his automobile, which was overturned in a deep ditch a few miles south of Tunica, Mississippi. He was returning to Memphis from a visit to several oil mill clients in the Delta section.

At the funeral services in Memphis, September 25, in addition to members of his family many sorrowing friends were in attendance including oil mill officials, managers and superintendents; city officials, members of civic clubs, clergymen and business men generally. Among the floral tributes was a large wreath from the National Cottonseed Products Association.

Lehman Johnson was born in Memphis in 1862. His father, the late J. C. Johnson, was a pioneer cottonseed crusher, operating the Hope Oil Mill in Memphis in the early eighties. Lehman was a graduate of Southwestern University, then the Presbyterian University at Clarksville, and of Brown University at Providence, R. I. He received his Ph.B. degree at Brown. He also took a course at Clemson Agricultural College in South Carolina, and for a time was a member of the faculty. Following some years of association with his father in the Hope Mill, during the period of intense development of oil milling processes and the utility of cottonseed products, he established the Johnson Commercial Laboratories, and began his long life of service to the industry as a chemist and operating specialist.

His loss will be felt keenly by his many friends of the American Oil Chemists' Society.

Cook, Swan Pays 100 Percent

MARK W. MACLAY, the Federal Court's receiver in the case of the Cook, Swan and Young Corporation, has announced that every creditor of this large fish and vegetable oil refining and dealing company is being paid 100 percent of his claims, plus interest. Furthermore, after the payment of all claims and the major portion of the receivership expense, there remains on hand a sum of approximately $75,000. This unusually successful windup of the affairs of an embarrassed company was considered by the receiver as a most convincing argument in favor of equity actions in receiverships as opposed to bankruptcy proceedings.