# GREEN TURTLE OIL

BY
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The chemical literature contains very little on the subject of turtle oil. Lewkowitsch gives only a few values on several species. The following data should therefore prove interesting as representing marketed oils, freshly rendered with low fatty acidity and iodine values far below those given in the text.

The green turtle belongs to the genus Chelonia, family Chelonidae and species Chelonia Mydas. It is a sea-going animal, said to feed exclusively on sea-weed. For this reason, the iodine content of the oil was determined.

The samples analyzed by the writer were received from the Canal Zone* and represent bulk shipments sold here. The turtles slaughtered varied in live weight from 80 to over 300 pounds. The fatty parts only were removed, hashed fine and boiled in open kettles with water and steam.

The color of the oil thus obtained is a golden to an orange yellow; odor of fish nil, rather of mild tallow odor and not unpleasant. It is peculiarly sweet. The consistency of course depends on the temperature, here being semi-liquid to almost solid fat, with considerable stearine graining out on standing. Light bleaches it very easily to a snow-white color. While the original oil turned rancid rather quickly under ordinary conditions, the refined and bleached oil kept very well. Only a trace of moisture and impurities were present in the samples as received. The oil is at present in great demand in cosmetics, of uncertain and restricted supply and high-priced.

| Samples | 1934 | 1933 |
|---|---|---|
| Specific Gravity @ 15.5° C.... | 0.9205 | 0.9211 |
| Rise per degree C. 0.00071 gm. | | |
| Iodine Value (Wijs)..... | 61.5 | 61.1 |
| Saponification Value .....213.5 | | 211.7 |
| Free Fatty Acids (oleic)..... | 0.28% | 0.32% |
| Acetyl Value (double sap. method) ..... | 1.9 | 2.4 |
| Hehner Value (insoluble acids) | 94.54% | 94.36% |
| Unsaponifiable Matter (yellow and partially crystalline)..... | 0.45% | 0.39% |
| Ether Insoluble Bromides..... | 2.57% | 2.60% |
| Content of Iodine (Parts per million.) | None | 2.5 |
| Solidifying Point ..... | 16.7° C | 18.4° C |
| Titer of the Fatty Acids..... | 27.1° C | 27.3° C |
| Neutralization Value Acids....217.9 | | 216.5 |
| Smoke Point (F.A.C.).....360° F | | 360° F |
| Flash Point (A.S.T.M.—open cup) .....600° F | | 605° F |
| Fire Point (A.S.T.M.—open cup) .....665° F | | 670° F |
| Color of Original Oil (Lovibond —5¼ inch column)..... | 35 Yellow 7 Red | 35 Yellow 7.3 Red |
| Color of Refined Oil..... | 35 Yellow | 35 Yellow |
| Color of Bleached Oil (6% earth) ..... | 5.2 Red 50 Yellow 1.9 Red | 5.4 Red 50 Yellow 2.1 Red |
| Refining Loss (12 Bé lye)..... | 2.0% | 2.2% |

Unusual Features: low iodine and insoluble bromide values.

Two other samples incompletely analyzed had iodine values 58.5 and 60.6, saponification values 211.5 and 212.2 and free fatty acidity 0.60% and 4.04% respectively.

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# MAGNOLIA SEED OIL

By C. E. COATES
and M. M. VICK

The magnolia of the south is the magnolia grandiflora, which grows many places in Louisiana, Mississippi, Alabama, Georgia and other southern states, sometimes in groves, but ordinarily in groups of five or six trees. The beauty and fragrance of the flower have made it of more than ordinary sentimental value, and it is the state flower of both Louisiana and Mississippi. When the fruit ripens in the early fall the seeds fall to the ground and are eagerly devoured by birds and small animals.

It was with this in mind that Mr. A. V. Bird, a prominent planter of Sicily Island, Louisiana, sent us a couple of years ago about a gallon of magnolia seed with the request that we let him know what the oil was good for.

About twenty years ago a planter in south Louisiana undertook to market a preparation, the receipt of which had been handed down in his family for several generations. This receipt was presumably of Indian and negro origin, and the preparation was supposed to be good for the hair and blemishes of the skin. We understood that it was made from the seed, fruit and smaller leaves of the magnolia, but we are not absolutely certain, as the process was presumably a secret. The verture was not a financial success, although we are told that the preparaton was really good.

With these two men in mind we undertook to make a short investigation of the magnolia seed properties. The only reference to magnolia seed oil we could find was an article by So Uchida, of Japan, in the Journal of the Society of Chemical Industry, Vol. 35, pp. 1092-3. Uchida worked on the magnolia hypoleuca, which is rather different from the grandiflora. The seed kernel of the grandiflora is white, while that of the Japanese variety is black. Uchida gave the constants for the fruit oil, flesh oil and seed oil.

In our investigation we found that the moisture content of the seeds was 6.94%. These seeds were dried and crushed for extraction. The whole seed was crushed and extracted three times with $CCl_4$ since the amount of seed available was too meager to justify pressing in a large press. The $CCl_4$ was removed from the oil by careful heating on a water bath accompanied by agitation. Prolonged heating will cause oxidation of the oil, as will bubbling air through the liquid.

The oil so obtained was dark brown in color and possessed the characteristic odor of the magnolia. It was viscous, but did not deposit any solids upon standing for four months. In this it did not resemble the oil from the Japanese tree.

Starting with 886 grams of seeds, 351 grams of the oil were obtained (by $CCl_4$ extraction), or a yield of 39.62%. Upon extraction with ether a yield of 46.23% was received. These represent yields higher than those found by Uchida, but may contain extracted matter not present in the expressed product.

The iodine absorption number, 102.4, gives evidence

that the oil is of a semi-drying nature. Upon being spread in a thin film and heated at 100° for 14 hours the oil became more viscous, but did not dry. Hence, its drying properties are very small. However, if the oil from the kernel were extracted separately, an oil with drying properties would result.

With concentrated $H_2SO_4$ the oil became a dark reddish brown; with $HNO_3$, the same color, of a lighter shade resulted. These reactions have been proposed and considerably used in the detection of various oils. However, these have been found to be unreliable. The oil was of an unsaturated nature.

The acid value of the magnolia fruit oil, 12.01, shows the presence of considerable free acid. Because of the dark color of the oil an end point, using phenolphthalein as an indicator, was difficult to read. For this reason methyl red was used in all the titrations and as dilute solutions were titrated as was plausible.

The amount of insoluble fatty acids (Hehner value) found present, 88.42, was smaller than that found in the oil from magnolia hypoleuca, while the Reichert-Meissl value (volatile acids), 5.21, was larger. This may account for the failure of deposits to settle out on standing. Uchida did not include anything concerning the odor of the Japanese oil. That from the magnolia grandiflora was very pronounced. An attempt was made to extract this odor with alcohol and, by concentration of the solution, the scent was intensified. However, nothing could be isolated from the resulting solution.

Activated charcoal did not decolorize the oil, but NaOH and fullers earth were partially successful. Most of the color came from the kernel oil, which is almost black.

If a practical use were found for magnolia oil, by-products would be necessary to help defray the expense of gathering and extraction in order that the project might be successful. For this reason the value of the extracted matter as a feedstuff was determined. The nitrogen free extract of the entire seed was 16.70%, the crude protein 9.07%, and the crude fiber 19.10%.

A summary of the physical constants on the seeds and oil of magnolia grandiflora is as follows:

SEEDS

| | |
|---|---|
| Moisture content | 6.94% |
| Ash | 1.96 |
| Ether extract | 46.23 |
| Crude protein | 9.07 |
| Crude fiber | 19.10 |
| Nitrogen free extract | 16.70 |
| Total | 100.00% |
| Carbon tetrachloride extract | 39.62% |

OIL

| | |
|---|---|
| Sp. Gr. (15° C.) | 0.9700 |
| Refr. Ind. (20° C.) | 1.4951 |
| Acid number | 12.01 |
| Saponif. value | 219.2 |
| Hehner value | 88.42 |
| Reichert-Meissl No. | 5.21 |
| Iodine value | 102.4 |

The possible uses of this oil are: an ingredient in soaps and lotions or as a source of perfume, but the scent is not strong. Another species of the magnolia, the sweet bay tree, is used to prepare magnolia perfume. Synthetic magnolia perfume is also prepared and sold on the market.

Note: The foregoing investigation was done under the personal supervision of Dr. E. A. Fieger, to whom we wish to express our thanks.