Lime Seed Oil and Oil Cake

From *The Analyst*, October, 1926

IN view of the fact that Messrs. Marshall and Salamon have been unable to discover any published data on lime seed oil (*cf.* ANALYST, 1926, 237), it has occurred to me that some account of the work done in this laboratory on lime seed* oil may be of general interest.

In 1922 a sample of oil expressed from the seeds was sent to the Imperial Institute, and their report was published in the *Imp. Inst. Bull.* (1922, 20, 465). It has been found here that there is no difficulty in obtaining a yield of about 70 per cent. of the oil present in the seeds, by expression after a preliminary heating of the crushed meal at 120° F. The ground seed, when extracted with ether, yielded 39.83 per cent. of oil, and, by expression, about 30 per cent. The expressed oil is a somewhat turbid greenish-yellow to light brown liquid, which, when filtered, gives a clear brownish yellow oil.

The values obtained with a sample of the clarified oil are shown below in Table I.

Lime seed oil extracted by pressure, like the oil extracted by a volatile solvent, has an unpleasant bitter taste, which can be removed, however, by treatment with alcohol, the resulting product being a bland tasteless oil which, like arachis oil, could be utilized as a solid oil. It belongs to the class of semi-drying oils, and is readily saponified, even at the ordinary temperature.

The manurial and feeding values of lime seeds from Dominica are shown by the following results, in which the first column gives the values for the untreated crushed seeds (freed from pulp by washing), and the second column the corresponding values for the press cake, on the assumption of a 30 per cent. expression of oil.

	Per cent	Per cent
Nitrogen	3.43	4.9
Potash	0.48	0.68
Phosphoric anhydride	0.74	1.05

Analyses of seed from Antigua and Montserrat have also given percentages of nitrogen exceeding 3 per cent.

Analytical figures indicating the value of the unextracted seeds and the press residue as cattle food are shown in Table II.

It will be seen that lime seed oil cake compares favorably as a feeding stuff with similar cotton seed products, being slightly lower in carbohydrates but richer in crude proteins.

Table I—Showing Values Obtained from Clarified Oil

Sp. gr. at 27°/15.5° C.	Solidif Pt. °C.	n_D^{28}	Acid value	Sapon value	Iodine value (Hübl)	Sol. in alcohol Per cent	Unsap matter Per cent
0.9138	—3	1.4740	11.2	193.5	109.7	0.18	0.72

Table II—Showing Cattle Food Values

	Moisture Per cent	Ash Per cent	Oil Per cent	Crude proteins Per cent	Crude fibre Per cent	Carbohydrates Per cent
I	10.54	2.22	39.87	21.37	14.10	11.90
II	15.08	3.17	14.20	30.50	20.05	17.00

Cattle eat raw and crushed lime pulp with avidity, and so do pigs. Both appear to thrive on these products, and the local milk from cattle in Dominica, which are systematically fed with them, is usually very rich, and much above the minimal limits adopted under the Food and Drugs Ordinance (*viz.* Fat, 3.0; solids-not-fat, 8.5 p.c.).

An admixture with molasses should overcome any repugnance of cattle to the slightly bitter taste of the seed meal. In feeding experiments, made for this department on a small scale, it was found that horses, mules and cattle either readily consumed the mixture or could easily be educated to do so. Pigs, however, contrary to expectation, appeared indifferent to, or were repelled by the material.

The importance of disposing profitably of this waste product of the citrus industry is obvious from the fact that in the island of Dominica alone the average lime crop is about 400,000 barrels, each barrel containing the equivalent of 32 lbs. of wet, or 3 lbs. of dry seeds. In other words, about 535 tons of dry lime seeds are produced annually as a waste product in that presidency alone.

A. E. COLLENS
Government Laboratory for the
Leeward Islands, Antigua.

*The pips are termed seeds in the British West Indies.

Keeping Quality of Peanut Oil

(*Continued from page* 431)

fore if the crude peanut oil is to be stored at the oil mill while waiting for favorable market conditions or for shipment to the refinery the foots should be removed. This the authors also have shown to be the case with cottonseed oil.*

* J. Oil and Fat Ind., 3, 75 (1926).

ABSTRACTS

Inhibiting Agents in the Oxidation of Unsaturated Organic Compounds. O. M. Smith and R. E. Wood (Ind. Eng. Chem., 1926, 18, 691-694).—By measurement of the volume of oxygen absorbed the authors have examined the effect of numerous substances on the atmospheric oxidation of oils and fats, fatty acids, soaps, and rubber. Active inhibitants may be divided into two main groups, powerful reducing agents such as stannous compounds, sodium thiosulphate, etc., and strong bases, particularly amines. The action of sodium hydroxide, carbonate, silicate, and phosphate is possibly due to their combination with substances produced by oxidation which themselves act as catalysts. Aromatic alcohols and phenols are also effective as inhibitants. The inhibiting substance will prevent oxidation at any period during the oxidation and in general stability and resistance towards oxidation increases with the concentration of the inhibitant. In some cases, e. g., phenols, such as eugenol, there is a concentration at which the inhibitant is most effective and above which it acts as a positive oxygen catalyst. The influence of the inhibitant is only temporary, the period depending on the temperature, concentration, and products of oxidation. After the effect of the antioxidant is lost the rate of oxidation is the same as before. It is suggested that the basic inhibitors combine with acidic oxidation products and prevent them acting as autocatalysts in the oxidation, or that the partial valencies of the tervalen nitrogen atom (or other elements with free valencies) form intermediate compounds with the easily oxidized ethylenic carbon atoms. This temporary compound controls the rate of oxidation for a definite but limited time.—R. Brightman.

The Phytosterols of Rice Bran Fat, Fred P. Nabenhauer and R. J. Anderson. *The Phytosterols of Corn Oil,* R. J. Anderson and R. L. Shriver. *The Phytosterols of Wheat Germ Oil,* R. J. Anderson, R. L. Shriver and G. O. Burr.

The above three articles in the *Journal of the American Chemical Society,* November, 1926, are a valuable addition to the literature of the unsaponifiable constituents of vegetable oils.