assume that it is desired to obtain a remaining color value of 18, which is represented by the line "E." Since curve "B" is the only one which crosses this line it can readily be seen that this is the only carbon which would be suitable and the other carbons would, naturally, have to be eliminated.

However, let us take as more representative, the color represented by the line "F." It will be noted that 1 per cent of carbon "A" will be required to give the desired color. Likewise 2 per cent of the carbon "B," 2.2 per cent of carbon "C" and 3.5 per cent of carbon "D" will be required. Naturally, if the prices of these various carbons were all the same, carbon "A" would be the natural one to select. However, if carbon "A" would cost 25c per lb., "B" and "C" 10c per lb. and "D" 5c per lb., it would be necessary to determine the cost for accomplishing the decolorization. Since 1 per cent of carbon "A" at 25c per lb. is required, the cost for decolorizing 100 lbs. of the solution would be 25c. Carbon "C" of course could be entirely eliminated from consideration since carbon "B" is more efficient at the same price. Since 2 per cent of the carbon "B" is necessary, the decolorization costs in this case would be 20c per 100 lbs. of the solution as the value of "B" is 10c. Carbon "B" is, therefore, more economical than carbon "A." Similar calculations in the case of "B" show that the decolorizing cost would be 17½c so that it can readily be seen that the least efficient decolorizing carbon in this particular case is the most economical when the prices are taken into consideration.

Where it is found that two or more activated carbons are very nearly alike for efficiency in color removal, it is desirable to select the one which will best accomplish the other results above mentioned.

Water Washing of Crude Cottonseed Oil

By JAMES J. GANUCHEAU and E. L. d'AQUIN

THIS paper, prepared as part of the work of the Committee on Crude Mill Operations, is intended to show to what extent concomitants other than free fatty acid and neutral oil in crude cottonseed oil effect the refining loss. It is our firm opinion that low refining losses are made in the crude mill and not in the refinery.

The composition of crude cottonseed oil has been determined by Jamieson,[1] and can be roughly divided into three components, namely,

Neutral Oil
Free Fatty Acid
Minor constituents consisting of resins, phosphatides, pigments, etc.

The percentage of neutral oil in crude cottonseed oil can be obtained by the Wesson method.[2] The usual caustic soda refining of crude cottonseed oil consists of the following losses:

1. Free fatty acid
2. Neutral oil (*oil entrained or emulsified in "soapstock"*)
3. Fat saponified
4. Loss-not-fat (*minor constituents*)

The theoretical refining loss is, then, the free fatty acid loss plus the "non-fat" loss.

In commercial practice, and for purposes of fat accounting, in analyzing crude oil losses these minor constituents are erroneously referred to as non-fats (*lecithin, for example, being a compound of phosphorus, glycerine and fatty acid, cannot be classed as a "non-fat"*).

Previous experiments have shown that a synthetic crude oil made by mixing refined oil and separated fatty acids will often show a higher refining loss, when refined by A. O. C. S. standard rules, than some crude cotton-

[1] *Journal of Oil and Fat Industries,* Vol. 3, No. 10, October, 1926.
[2] *Cotton Oil Press* 6; 4, 33. August, 1922.

DATA SHEET

	F. F. A. after W. Ref.	F. F. A. rebuilt to orig.	Per cent water for agitation.	Time of agit. in minutes.	Per cent loss on refining low-lye. 6.7% at 16°B	Per cent loss on refining high-lye. 8.4% at 16°B
Experiment No. 1—						
Original crude	....	2.00	..	..	6.8	7.6
After 1st w. ref.	1.85	2.00	10	7	5.3	6.2
After 2nd w. ref.	1.80	2.00	10	14	5.9	7.3
After 3rd w. ref.	1.80	2.00	10	21	7.8	8.1
Experiment No. 2—						
Original crude	....	2.00	..	..	6.8	7.6
After 1st w. ref.	1.80	2.00	10	15	6.2	7.4
After 2nd w. ref.	1.80	2.00	10	30	7.3	8.3
After 3rd w. ref.	1.76	2.00	10	45	7.7	8.5
Experiment No. 3—						
Original crude	....	1.10	..	..	8.7	...
After 1st w. ref.	1.00	1.10	10	30	9.0	...
Experiment No. 4—						
Original crude	....	0.90	..	..	4.4	...
After 1st w. ref.	0.82	0.90	10	15	5.9	...
After 2nd w. ref.	0.78	0.90	10	30	6.1	...
After 3rd w. ref.	0.78	0.90	10	45	6.5	...

Note: All agitation was done at 250 r.p.m. using the official laboratory refining machine. In experiments 4 and 5, only the low lye refinings were made. Temperature of the oil during agitation was 40 deg. C., except in experiment No. 2—here it was 60 deg. C.

seed oils of the same f.f.a. This would indicate rather definitely that some minor constituents in crude oil act as inhibitors to emulsification and seem to lower the refining loss, and that on the other hand, some "non-fats" aid emulsifications and raise the refining loss.

By water-refining, or water-washing, in these experiments is meant a thorough agitation with 10% of distilled water.

It is the object of this paper to show how a variation of the "non-fats" by water washing will affect the percentage loss of a given crude oil.

Selection of Crude Oil Samples:

All such crudes which were available at this time, and which gave unusually low or unusually high refining losses were set aside, and the following were selected as typical for the experiment:

a 0.90 F.F.A. oil, giving a very low loss.
a 1.10 F.F.A. oil, giving a very high loss.
a 2.00 F.F.A. oil, giving a very low loss.

Procedure:

The 2.00 f.f.a. crude, losing 6.8 and 7.6% on the low and high lyes respectively, was agitated thoroughly with filter-cel and then filtered. This filtered crude was water refined using the regular official refining machine, with 10% of distilled water, at a speed of 250 r.p.m. for seven minutes at a temperature of 40 deg. C. In this way, a portion of the minor constituents was removed. The resulting oil was left to settle, was filtered, and was refined with caustic in the regular way, it being necessary, first, to rebuild the f.f.a. up to 2.00%, a small portion (0.20%) having been carried down along with the other material extracted by the water. The water-treated oil gave a 5.3 loss as against a 6.8% loss on the original crude, yet the amount of material removed was only 0.25% of the whole. It is plain, then, that the 1.5% lowering in the loss must necessarily have been caused by the removal of this small portion of mucilaginous substances. The same water-refined crude was filtered and again refined in this same way with caustic. Here the loss went up to 5.9%. Stranger yet, a third water-refining gave an oil losing 7.8%.

The experiment above was repeated using the same original crude, and water-refining progressively three times as above, but for fifteen minutes at a time, while the temperature was run up to 60 deg. C. instead of 40 deg. C., as at first. The results here were approximately in line with those in Experiment 1.

At this point, a single water extraction was made for a full hour on the same crude and a caustic refining on this oil gave 7.6%, indicating a sort of maximum to be reached under the conditions. Also, it was found that varying the amount of water used caused no noteworthy change either in the amount of material extracted from the oil, or in the ultimate refining of the treated oil with caustic. Lowering the temperature, however, gave slightly larger extractions. We observed that the mucilaginous matter forming the first copious extract, comprised about 85% of the total "non-fats" removed by all three extractions; the second was small, while the third gave hardly any. Yet, the removal of these last portions, however small (they were apparently the same substance) must positively have put an end to the low refining loss which we expected might still have been reduced further. At the same time, we noticed that the removal of the first portion effected a lower loss than the original crude.

In Experiment 1, the original crude lost 6.8%. After being water-washed once, the loss dropped to 5.3%. After a second water-refining of the sample, the loss recorded was 5.9%. Water-washing a third time raised this loss to 7.8% or 1% more than on the original crude.

Experiment 2, which served as a repetition or check on Experiment 1, gave the same results.

Experiment 3 shows that water-refining a different crude oil increased the refining loss 0.3%.

In Experiment 4 we used a third crude oil. After water-washing this crude three times, the refining loss was raised to the extent of 2.1%.

Figure 1 shows the changes in refining losses due to water washing.

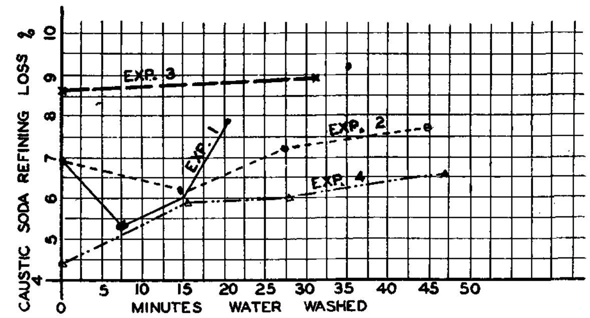

Figure 1—Changes in refining losses due to water washing.

Many interesting deductions might be formed from the above experiments. It would seem that in certain crude oils, some of the minor constituents act as inhibitors, thus helping the refining; while others seem to act as emulsifiers tending to raise the losses.

Some of these minor constituents have been isolated and identified, but progress is slow and research is still wanting. Such chemical and physical properties as catalytic action, emulsifying powers, effect of the presence of each in much larger quantities by addition, etc., should be investigated.

Obligatory Consortiums in the Italian Olive Industry

A report from Commercial Attache Mitchell at Rome states that four obligatory consortiums have now been formed among olive growers in Italy. Under a recent Italian law, a consortium must be formed when 70 per cent of the producers, or producers representing 80 per cent of the output on a given industry so desire, and all similar producers in the industry, within certain territorial limits must join and be bound by the rules thereof.

In the present case, each of the consortiums cover a province, there being one for each of the provinces of Genoa, Sassari, Napoli and Pisa. No details are available as to the terms of these agreements, but it is probable that they will cover forced anti-pest measures, new acreage limitations and prices.

Tunis—1932 Olive Oil Industry

The 1932 olive oil production in Tunis is rated as exceptionally good, but as prices are so low the advantages are largely offset. The estimated yield is placed at 50,000 metric tons, which is well above the past ten-year average of 31,000 tons. (Report from Consul Nester at Tunis, Tunisia, January 8, 1933.)

Hankow Sesame Seed Report, January, 1933

The January sesame seed market review shows extremely low direct exports, only 30 short tons, of which 20 tons came to the United States and 10 to Japan. Hankow stocks increased to 5,000 short tons. Spot quotation was $2.09 per picul but trend was lower.