The Acceptability of Some Fats and Oils as Food to Imported Fire Ants[1]

C. S. Lofgren, F. J. Bartlett, and C. E. Stringer[2]
Plant Pest Control Division, Agr. Res. Serv.,
USDA, Gulfport, Mississippi

The acceptability of fats and oils as the food material in baits for the imported fire ant, *Solenopsis saevissima richteri* Forel, has been amply demonstrated (Hays and Arant 1960, Lofgren et al. 1961). The acceptance has been somewhat surprising because of lack of evidence that these comprise to any extent a part of the natural food of the imported fire ant. Presumably the main source of naturally occurring fats would be seeds. Hays and Hays (1959) reported that they occasionally found imported fire ants transporting seeds to their mounds. In one instance where ears of corn touched the ground, mounds were constructed around the ear and the corn kernels were eaten.

In our efforts to develop an effective toxic bait for imported fire ants, tests have been conducted to determine the acceptability of a wide variety of commercially available fats and oils. The effect of hydrogenation and rancidity on acceptance was also investigated. This paper presents the results of these tests.

Table 1.—The acceptability as foods of some fats and oils to the imported fire ant.

Fat or oil[a]	No. of tests	Acceptance ratio
Vegetable		
Almond, sweet	4	1.03
Apricot kernel	4	1.09
Avocado	2	0.71
Castor	6	.13
Chaulmoogra	2	.15
Coconut	3	.68
Corn	2	.92
Cottonseed	2	1.37
Linseed, raw	4	0.53
Linseed, sun thickened	2	.13
Oiticica	1	.05
Olive	2	1.01
Palm	1	1.15
Palm kernel	2	0.94
Peanut	—	1.00
Perilla	1	0.31
Poppyseed	2	1.26
Rapeseed	5	0.72
Ricebran, crude	4	.81
Safflower	3	1.01
Sesame	3	0.45
Soybean, crude[b]	49	.78
Soybean, once refined[c]	111	1.26
Tung	8	0.35
Wheat germ	4	1.05
Animal		
Butter	4	0.57
Butter oil	1	1.05
Cod liver	2	1.47
Dogfish liver	1	0.47
Grease oil	2	1.29
Grease, white	7	1.17
Grease, yellow	8	1.21
Lard, Sample A	4	1.75
Lard, Sample B	2	0.97
Neat's-foot	12	1.00
Tallow, fancy	6	1.97
Tallow, top white	3	1.80

[a] The exact grades of all the samples are not known, however, unless otherwise indicated they can be considered as refined.
[b] 16 different samples. Acceptance ratios ranged from 0.59 to 1.01.
[c] 38 different samples. Acceptance ratios ranged from 0.97 to 2.01.

Table 2.—The effect of hydrogenation on the acceptability of cottonseed oil as a food to imported fire ants.[a]

Degree of hydrogenation as indicated by iodine number	Acceptance ratio
27.7	0.14
33.8	.12
39.7	.22
47.7	.24
53.7	.32
63.9	.42
72.7	.56
79.9	.75
88.1	.76

[a] Average results from 2 tests with 8 replications each.

Procedures.—The test methods employed were the same as those described by Lofgren et al. (1961). Essentially, they consisted of comparing the feeding activity of the ants over a 5-min period on each fat or oil with that on a standard material (peanut oil). Captive ant colonies maintained in galvanized tubs were used for the evaluations. One or more tests with 8 replications each were made with each fat or oil. An acceptance ratio for each material was determined by dividing the total number of ants feeding on the candidate material by the total number of ants feeding on the standard.

Results and Discussion.—Three series of tests were conducted. In series I, tests were conducted with one or more samples or grades of 32 commercially available fats and oils. The results are presented in Table 1. Nineteen of the fats or oils gave acceptance ratio as good or better than peanut oil (>0.90). The most attractive fats were the samples of tallow and one of the lard samples. It is apparent also that the acceptance ratio for any fat can vary considerably from sample to sample, as evidenced by the results with lard and soybean oil. In general, a crude grade of fat is not so acceptable as the refined. This fact is illustrated by the results with the 2 grades of soybean oil. It is evident that highly unsaturated fats are the least attractive. In this category are linseed oil (iodine value of 170–204), oiticica oil (I.V. 139–155), perilla oil (I.V. 193–208), and tung oil (I.V. 160–175).

In test series II, the effect of hydrogenation on the acceptability of cottonseed oil was studied. Nine samples of hydrogenated oil with iodine values ranging from 27.7 to 88.1 were tested. The results indicated in Table 2 definitely show that hydrogenation made the oil less acceptable.

The acceptability of rancid oil was evaluated in test series III. A sample of rancid oil which had a peroxide value[3] of 600 was compared with a nonrancid oil with a peroxide value of 2. The average acceptance ratio for the rancid oil was 0.37 (5 tests) as compared with 0.87 for the nonrancid oil (6 tests). In a second part of this test the acceptability of 4 rancid oil samples which had been extracted with pentane from a bait of soybean oil-mirex-corncob grits was tested.[4] These baits had been exposed to normal weather conditions outdoors until the oil reached various stages of rancidity. It is evident from the results (Table 3) that

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[3] The peroxide value refers to the oxygen content in milliequivalents/kg of the fat sample and is a direct representation of the amount of oxidized fat.
[4] This bait is the same as that described by Lofgren et al. 1963.

Table 3.—Acceptability of soybean oil of different degrees of rancidity as food to imported fire ants.[a]

Rancidity of oil as indicated by peroxide value	Acceptance ratio
33	1.42
191	0.41
215	.16
224	.13

[a] Average of 2 tests with 8 replications each.

rancid oil is much less attractive to imported fire ants. In general when the peroxide value of soybean oil approaches 100 in rancidity, its acceptance by the ants will be affected. The acceptance values for rancid oils have been found to be inversely proportional to the peroxide values for every sample of oil tested, however the peroxide value at which repellency begins varies from sample to sample.

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