

## ACCEPTABILITY OF PLANT OILS TO THE RED IMPORTED FIRE ANT (HYMENOPTERA: FORMICIDAE)

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Bait-formulated insecticides for the red imported fire ant (RIFA), *Solenopsis invicta*, normally are composed of de-fatted hydrogenated corn grit coated with soybean oil, which contains the active ingredient. Oil-soaked cards are also used to evaluate foraging intensity in field situations. These tests were conducted to evaluate if the soybean oil available at local grocery stores was as attractive as other plant-derived or vegetable oils.

### Materials and Methods

A. TRIAL 1: To determine the acceptability of seven oils (**Table 1**) by RIFA, oils were presented to standardized laboratory colonies. Micro-Hematocrit tubes (capillary tubes) containing 40 mm of each of the oil samples were presented to the ant colonies. The volume of oil consumed from each sample was calculated by measuring the length of the oil in the capillary tubes before and following by measuring the length of the oil in the capillary tubes before and following exposure and applying the formula: volume of a cylinder = length x pi x radius<sup>2</sup> (Note: inside diameter of Micro-Hematocrit tubes = 1.10 mm). Different methods of presenting the capillary tubes to the ants were used 1) tubes were imbedded in dissecting tray wax; 2) tubes were supported on microscopes slides and held in place using double-sided tape; and 3) tubes were inserted through holes made in Parafilm® stretched across a large petri dish. In all cases, the capillary tubes were tilted slightly (at approximately 11 degrees) to the horizontal with the lower end approximately 1 mm above the surface accessible to the foraging worker ants. The volume of oil consumed in each of the three trials testing delivery methods was analyzed as one test (3 replications) using the Least Significant Difference analysis of variance test (P # 0.05).

**Table 1.** Oil types offered to laboratory red imported fire ant colonies.

<b>Oil type</b>
1) NuMade® Natural Vegetable (Soybean) Oil
2) Mazola® Corn Oil
3) Hollywood® Safflower Oil
4) Olio Sasso® Olive Oil
5) Pompeian® Olive Oil
6) Numade® Sunflower Oil
7) Planters® Peanut Oil

B. TRIAL 2: Soybean, olive and pecan oil were offered to RIFA colonies in capillary tubes and the amount of material removed was recorded after 3 to 4 hours exposure. Four colonies (replications) were involved in each of two evaluations. Resulting oil consumed values were analyzed as above.

## **Results and Discussion**

A. Results are presented in **Table 2**. The capillary tubes imbedded in dissecting tray wax did not result in a high level of oil consumption due to one or more factors: 1) smaller colony size or vigor which did not consume much oil, or 2) the ants spent more time consuming wax for nesting material, being distracted from feeding on the oils. The method in which capillary tubes were mounted on microscope slides with double-sided tape was the preferred, since the ants consumed the largest was the preferred, since the ants consumed the largest volume of oils when tubes were presented in this manner.

In this test, RIFA consumed various amounts of the oils tested (**Table 2**), preferring the Pompeian olive oil, numerically followed by sunflower oils. The remaining oils were not consumed to a great extent, but proved equally attractive statistically. RIFA consumed the least corn oil. Traditionally, soybean oil has been considered most attractive to RIFA., and has been used to a great extent in formulating insecticidal baits for this pest (Amdro® or Hydramethylnon, ProDrone, Logic® or fenoxycarb and Affirm® or avermectrin). Results show that RIFA favor certain types of oils over others.

**Tables 2.** Volume of various oils removed by red imported fire ant workers in laboratory colonies during a 3.75hr. exposure period.

Capillary tube holding method:	Imbedded in wax	Supported on microscope slides tape	Stuck through Parafilm®	
Colony:	S	H	C	
Sample no.	Volume consumed (micro liters)			Mean
1	1.9	2.8	4.7	3.1b
2	0.0	0.0	2.8	0.9b
3	1.0	5.7	3.8	6.0b
4	0.0	5.7	11.4	5.7b
5	0.0	29.4	38.0	22.5a
6	0.0	24.7	2.8	9.2ab
7	0.0	5.7	3.8	3.1b
1-7	0.41	10.57a	9.61ab	LSD 5% =14.7
	LSD 5% = 9.638			

Note: Means followed by different letters in last column or across bottom of table are significantly different from on another using the Least Significant Difference (LSD) analysis of variance (P#0.05).

B. Soybean, olive and pecan oil were statistically equally attractive in these two evaluation, although ants consumed a greater volume of olive oil:

--Micro liters of oil consumed--

Exposure time	Soybean	Olive	Pecan	LSD (5%)
3 hours	12.5a	21.3a	17.8a	9.18
4 hours	23.5a	33.8a	22.6a	16.82

Pecan oil may a suitable substitute for soybean oil in the formulation of bait-formulated insecticides provided that the oils are cost equivalent. These results also support the observation that RIFA will forage in cracked pecans on the orchard floor, presumably to feed on the pecan oil.