

Reprinted from *The Florida Entomologist*, Volume 69, Number (4), December 1986.

AN EVALUATION OF THE STRAW ITCH MITE,
PYEMOTES TRITICI (ACARI: PYEMOTIDAE)
FOR CONTROL OF THE RED IMPORTED FIRE ANT,
SOLENOPSIS INVICTA (HYMENOPTERA: FORMICIDAE)

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The straw itch mite, *Pyemotes tritici* (LaGreze-Fossat and Montagne) was proposed by Bruce and LeCato (1980) as a potential biological control agent for the red imported fire ant, *Solenopsis invicta* Buren. Although *P. tritici* may be regarded as a pest species (a cause of dermatitis in man and animals), it is an effective parasite of stored product insects (Bruce and LeCato 1979). In their 1980 paper, Bruce and LeCato reviewed the desirable characteristics of this mite, and reported success in preliminary tests against individual *S. invicta* colonies sufficient to warrant further evaluation. We are aware of only one other reference to attempted ant control with *P. tritici*, and that was on leaf-cutting ants (species not specified) in Brazil (Vilela 1986). He reported that the ant nests became inactive after 2 or 3 days but recovered within 16 days.

Jouvenaz et al. (1981) reviewed the status of biological control of imported fire ants and concluded that non-specific predators, such as *P. tritici*, might be useful if they could be applied without danger to the user or environment. While the goal of our USDA-ARS research program on biological control of fire ants is to establish a complex

of specific natural enemies in the United States, we still believe that non-specific agents could be useful. Thus, we conducted additional evaluations that are reported here.

The mites were reared by Dr. W. A. Bruce on pupae of the cigarette beetle (CBP), *Lasioderma serricornis* (F.), at the Stored Products Insects Research and Development Laboratory, USDA, ARS, Savannah, Georgia, by the methods of Bruce and LeCato (1980). Single-mound doses of mite-infested CBP were dispensed into individual containers and transported in a cool styrofoam chest to Gainesville, Florida, for application to *S. invicta* mounds just as the adult progeny were emerging from the gravid females. Each 25 ml of CBP contained several thousand gravid female mites, each of which produced ca. 250 progeny (conservatively, $5-7.5 \times 10^6$ mites/25 ml). The viability of the mites was confirmed visually at the time of application.

Three widely separated (> 5 km apart) test sites with large numbers of mature, queen-right (worker brood present) colonies of *S. invicta* were selected in Alachua County, Florida. We have not observed polygynous colonies in the test areas. The test colonies at site #1 were located along a fence on the edge of a pasture and in a stand of young (ca. 12 cm diameter) pine trees. Sites #2 and #3 were in open pastures. At each site, 40 mature, widely separated (> 4 m) colonies (10 for each of 3 dosages, plus 10 controls) were selected and rated before and at intervals of 1, 2, 4, and 8 weeks after treatment by the population index method of Lofgren and Williams (1982). Colonies of *S. invicta* often relocate their nests spontaneously or in response to disturbance (ineffective control measures or repeated examinations). This is a common problem in fire ant population studies (Williams and Lofgren 1983). Therefore, we assumed that new mounds within ca. 4 m of abandoned test mounds were the result of nest relocation.

Tests were initiated at sites #2 and #3 two and four weeks, respectively, after treatment of site #1. Thus, different generations of mites were applied to the mounds at each site. Ambient (shade) temperatures ranged from ca. 29-33°C during the study period (May-June). Mite-infested CBP were applied in dosages of 25, 50, or 100 ml per mound by scraping soil from the top of the tumulus and sprinkling CBP on the exposed tunnel system. Assuming an average of 10^6 ants per colony (Lofgren and Williams 1985) these dosages equal 5-7.5, 10-15, and 20-30 mites per ant, respectively. Due to a limited supply of CBP, control mounds were opened for examination but did not receive CBP. The CBP were attacked immediately by the excited worker ants and quickly taken into the nest.

Our test results (Table 1) show that a single application of *P. tritici* at any of the three doses did not reduce the *S. invicta* population significantly (Newman-Keuls multiple range test). Even discounting movement of colonies (scoring all unoccupied mounds as dead, even if a new mound was found within 4 m), *P. tritici* did not reduce the population when applied at the two lower dosages. Ten of the 30 check colonies relocated at least once during the evaluation period, whereas nine of 30 colonies treated with 25 ml, and 11 of 30 colonies treated with 50 ml of mite-infested CBP relocated. Seventeen of the 30 colonies treated with 100 ml of CBP relocated; thus, high concentrations of mites may prove sufficiently irritating to stimulate colony movement.

Since there was no reduction of the *S. invicta* population index, we felt that further tests were not warranted. Even if adequate control of fire ants were possible through repeated applications of *P. tritici*, such repetitious treatments do not seem to us to be practical. Formicidal baits and drench treatments approved by the U. S. Environmental Protection Agency for single-mound treatments are available and may be safer, since pyemotid mites present a hazard of dermatitis which may be severe enough to require medical treatment and even hospitalization (Baggett et al. 1981, Moser 1975).

We thank Mr. Henry Beauchamp for excellent technical assistance. Dr. William A. Bruce, USDA, ARS, Savannah, Georgia, kindly supplied the mites and helpful advice.

TABLE 1. RESULTS OF FIELD TRIALS WITH *PYEMOTES TRITICI* FOR CONTROL OF RED IMPORTED FIRE ANTS, *SOLENOPSIS INVICTA*. (ONE APPLICATION OF MITE-INFESTED CIGARETTE BEETLE PUPAE (CBP) MADE TO EACH OF 10 MOUNDS AT RATE INDICATED).

Application rate (ml mite-infested CBP/mound)	Application rate (mites/ant) ^a	Percent reduction in population index after indicated weeks ^b			
		1	2	4	8
25	5-7.5	9	22	37	43
50	10-15	22	27	33	38
100	20-30	18	25	39	45
Check	—	11	18	23	35

^aMites conservatively estimated at 5-7.5 X 10³/25 ml CBP. Assumes 10² ants/colony.

^bMean of 3 replicates. No significant difference between treatments at a given post-treatment time (Newman-Keuls multiple range test).

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