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POLYGYNOUS COLONIES OF THE RED IMPORTED FIRE ANT, *SOLENOPSIS INVICTA* (HYMENOPTERA: FORMICIDAE) IN FLORIDA

C. S. LOFGREN AND D. F. WILLIAMS
Insects Affecting Man & Animals Research Laboratory
ARS, USDA
Gainesville, FL 32604 USA

We report here the first occurrence in Florida of polygynous (multiple queen) colonies of the red imported fire ant (RIFA), *Solenopsis invicta* Buren. Polygynous strains of RIFA have been reported previously in Mississippi (Glancey et al. 1973 and Glancey et al. 1975), Texas (Hung et al. 1974 and Mirenda and Vinson 1982), Georgia and Louisiana (Fletcher 1983).

Our discovery of polygynous colonies was made while conducting ecological studies at the Horse Research Center, Institute of Food and Agricultural Science, University of Florida. The Center is located about 13 km north of Ocala, Florida midway between Highways 301 and old 441. The first indica-

tion of polygynous colonies was suggested by an unusually high density of small mounds in 1 of the pastures and the presence of numerous dealated queens in several of the mounds. Twelve queens were returned to the laboratory and all contained sperm in their spermathecae. Subsequently, 20 mounds were excavated and placed in 5-gal buckets. The inside upper 2 to 3 inches of each bucket were painted with Fluon® to prevent escape of the ants. After their return to the laboratory the ants were collected by the drip-floatation method (Banks et al. 1981.). No queens were found in 9 of the collections, but 7 to 68 queens were found in the other 11 collections. The percent of fertilized queens in these 11 collections ranged from 57 to 93% with an average of 86% (220 of 255). The average number of inseminated queens per mound was 20. Subsequently, other colonies were collected in the same manner and held in laboratory nests. The dealated queens in these colonies were attractive to their workers and oviposited.

We then made a general survey of the farm by counting the number of mounds in one-half acre circles at 11 different locations. Converted to 1-acre equivalents, the mound densities ranged from 70 to 260 per acre (170 to 640 per hectare) with an average of 164 (405 per hectare). Next, we located 2 very large mounds near the extrance to the horse farm. We collected about one-third of the dirt and ants from each mound in two 5-gal buckets, returned them to the laboratory, and collected the ants by the drip-floatation method. The workers and brood were separated and weighed and the number of individual ants in 4 subsamples of each colony were counted. An estimation of the total ants collected from each colony was made by comparing the number of ants per g of subsample with the total weight of ants. On this basis we collected 215,000 workers and 91,000 immatures from 1 colony and 109,000 workers and 35,000 immatures from the other. On the basis that 1/3 of the colony was collected, it can be assumed there were about 500,000 individual ants of all stages in each colony. The highest estimate of ants in a single-queen colony is about 230,000 (Markin et al. 1973). A total of 60 queens was found in the 2 colony collections, of which 55 were inseminated.

Seven additional colony collections were made along Highways 301 and old 441 (ca. 1 mi east and west of the horse farm, respectively). One colony from old 441 contained 4 queens, 2 of which were mated. Unusual clumping of mounds in a farm pasture east of Williston, FL (about 40 km northwest of the Ocala site) prompted us to collect ants from one of the colonies. Three queens were found after the ants were floated with water from the soil and 2 of these were mated. This suggests that polygynous colonies may occur at many other sites in Florida. Mirenda and Vinson (1982) found polygynous colonies at 9 different sites in Texas.

The reasons for the appearance of the polygynous strain of *S. invicta* at numerous loctions from Texas to Florida are not evident and there is no way at this time to determine whether or not the phenomenon has developed independently at each site or as a result of queen dispersal from one original site via transport of articles of commerce (hay, sod, ornamental plants, etc.).

The economic and ecological significance of polygynous colonies also remains to be determined; however, the increase in mound density and numbers of ants per colony suggest increased problems for man and other competing organisms in the environment. Certainly this is true for man

and his domestic animals, since the primary site of contact is the nest. It follows that increased nest density means there will be increased interactions.

Hölldobler and Wilson (1977) suggest that unicolonial species dominate their environment and are associated with sparse ant faunas. The polygynous colonies we observed were not aggressive towards each other and therefore could be considered unicolonial. This implies, although it has not been demonstrated as yet, that polygynous *S. invicta* strains could eliminate, through competition and abundance, many other ant species and, possibly, numerous other invertebrate species.

Control of polygynous colonies could be more difficult because of the need to eliminate many versus a single queen. This may be especially important for future chemical control with baits containing insect growth regulators (Banks et al. 1978) since the effect of these compounds is on brood development rather than the queens. It is evident that much research is needed to answer these as well as other more basic questions about their origin, mating behavior and ecology.

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