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

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The red imported fire ant (RIFA), *Solenopsis invicta* Buren is both an agricultural and a human pest. For many years, this species was thought to be monogynous, i.e. there was a single fertile queen in each colony. However, about 15 years ago, Glancey et al. (1973) reported the occurrence of polygynous colonies in Mississippi. Since then polygynous colonies have been found to be spreading throughout the South and are particularly abundant in Texas. Polygynous colonies, because they are correlated with an increase in total ants per colony and increased mound density (Lofgren & Williams 1984), may be capable of causing greater damage to agricultural crops. For example, Adams et al. (1987) reported a loss of more than \$40,600 associated with damage to potatoes and increased harvesting and grading costs in a single field near Hastings, Florida. This field was infested with polygynous RIFA colonies.

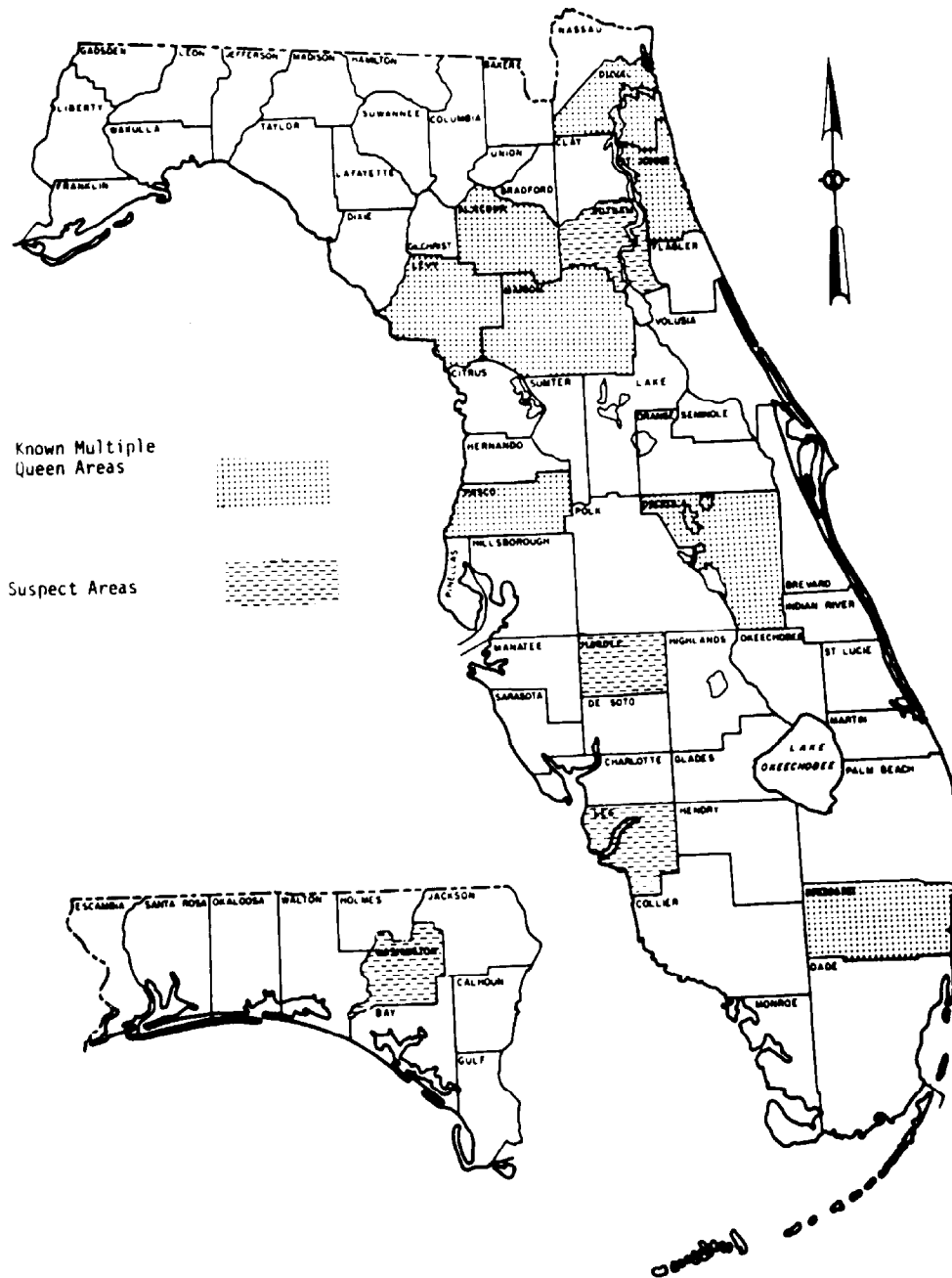


Fig. 1. Florida counties positively identified as having populations of multiple queen colonies or suspected of having such populations.

The first occurrence of polygynous RIFA colonies in the state of Florida was reported by Lofgren and Williams (1984). They were found at the University of Florida's Institute of Food and Agricultural Science's Horse Research Center, located in Marion County, about 16 km north of Ocala, Florida.

During the past two years, the authors have collected ants at various locations within the state. If the collections were found to have numerous dealates, the dealates were isolated for a 5 hr oviposition test (Fletcher et al. 1980) and then sacrificed for insemination studies. We can now report from our observations that polygynous colonies of RIFA have been positively identified from 8 other counties and are suspected to exist in 4 additional counties. Figure 1 shows the counties infested with, or suspected of harboring polygynous RIFA.

Personnel of the Florida Department of Agriculture, Division of Plant Industry found that in 3 counties (Marion, Pasco, and Osceola), their attempts to control fire ants with Amdro® bait were only partially effective. The colonies surviving after treatment were polygynous (J. C. E. Nickerson, unpublished data). Recent investigations by W. A. Banks (unpublished data) have shown that the normal rate of application of Amdro (1.12 kg/ha) does not control polygynous colonies as effectively as higher application rates (2.24 and 3.36 kg/ha). Since polygynous and monogynous colonies may be intermixed in the same field, a possible concern is that if single-queen colonies are eliminated more easily with pesticides, surviving polygynous colonies may have a competitive advantage in reinfestation of the treated area.

Studies by Greenberg et al. (1985) on the characteristics of polygynous colonies indicate that as the number of queens increases within a given mound, the average worker size decreases and the workers appear to be monomorphic. Recent observations of some polygynous RIFA in Alachua County, Florida contradict these findings. In one of the new areas sampled, 9 queens were removed from the mound while the remainder of the queens were left within the colony. Workers of this particular colony did not exhibit the reported uniformity of size, but displayed polymorphism similar to that of monogynous colonies. In addition, when the queens were weighed before dissection to confirm insemination, it was discovered that their weights ranged from 13 mg to 19.5 mg. This also contrasts with other observations made by the senior author in which queen weights in polygynous colonies were very uniform. All of the 9 queens were inseminated. Colonies of this type may represent the incipient stages of polygyny.

The significance of the increase in polygyny in Florida remains to be determined. However, greater mound densities (e.g. 1000 per ha), numbers of ants per colony, and the possibility that they will be more difficult to control suggest increased problems for man and other organisms which compete in this environment.

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