

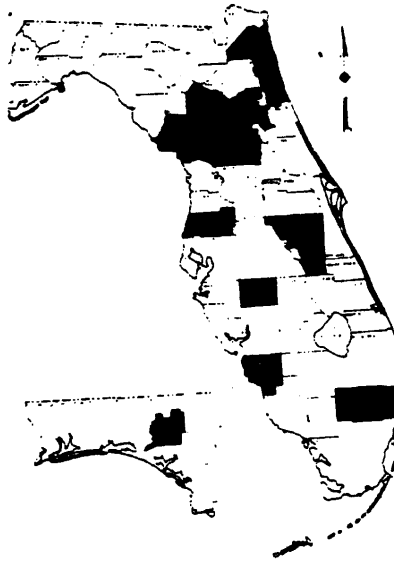
Will multiple-queen fire ants mean more problems for Florida growers?

By W. A. Banks*

The arrival of South American fire ants, in the early years of the twentieth century, heralded the beginning of numerous agricultural problems. The black fire ant, *Solenopsis richteri*, was first observed along Mobile Bay sometime around 1918. In 1929, it was reported to damage Satsuma trees, by girdling the trunk near the graft union. Widespread dispersal of fire ants throughout the South did not begin, however, until the imported red fire ant, *Solenopsis invicta*, arrived at Mobile some 20 to 25 years later.

As populations of the fire ants increased in the Mobile area in the 1940s, they invaded horticultural nurseries, building their nests in potted plants and around the base of larger shrubs and trees. Fire ants can spread naturally through mating flights, but they are also adept at hitchhiking. In fact, the principal means of their spread throughout the South has been inadvertent transport by man. Surveys conducted in the late 1940s and early 1950s show that much of the early spread of fire ants could be traced to transport of infested plants from Mobile to

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Counties in red have confirmed infestations of multiple-queen fire ants; counties in blue are suspected to have multiple-queen colonies.

nurseries in other states.

The dispersal of fire ants in nursery stock was essentially stopped in the late 1950s, both by enactment of a Federal quarantine regulating movement of items that might harbor imported fire ants and by the widespread use of chlorinated hydrocarbon insecticides in nurseries. By that time, however, new infestations had been established in eight other states.

Infestations had become so widespread and troublesome by the late 1950s that large-scale control programs were begun, continuing through the 1960s and 70s. These programs provided temporary relief from the ants, but infestations quickly returned when insecticide treatments were stopped. Indeed, the name for the red imported fire ant, "invicta" which means "invincible" or "unconquered", is very appropriate. The ants are more widespread and numerous than ever, despite efforts of the USDA and state agriculture departments to eliminate them. Although the black fire ant is now limited to a small area in northwestern Alabama and northeastern Mississippi, the red species, *S. invicta* has spread to more than 250 million acres in 11 southern states and Puerto Rico.

Northward spread of the ants is limited by winter temperatures, yet they are now found further north than was earlier believed possible. They have survived colder temperatures by building nests under concrete slabs, roadways, embankments, and even in shopping malls. It appears unlikely that such colonies could produce mating flights or, if they do, that colonies founded by new queens would survive the first winter. However, doubting the ability of fire ants to adapt and survive is risky. The dryness of the Southwest has slowed westward movement of the ants but recent infestations in Arizona and California show that they can



Multiple queens in laboratory colony of imported fire ants.



Typical pattern of mound distribution in many multiple-queen colonies: large parental mound surrounded by several small satellite mounds.

leapfrog the desert as stowaways in trucks and other conveyances. Eventual establishment of the ants in Arizona and California appears inevitable. Once established in California, they will likely infest much of the Western Seaboard.

Fire ant colonies can produce thousands of winged queens and males each year. These winged reproductives fly throughout the summer months, usually a day or two after rainfall. Mating occurs at 500 to 800 feet in the air, after which the males fall to the ground and die. The new queens may land nearby or fly a mile or more, depending on wind conditions. Upon landing, a new queen breaks off her wings and burrows a short distance into the soil to begin a new colony. The queen lays eggs within 24 to 36 hours after mating and the first, very tiny workers emerge 25 to 35 days later. The colony continues to grow and within one year can easily contain more than 100,000 workers. Workers range in size from less than 1/8 to about 1/4 inch; they are all sterile females with a stinger. They maintain and defend the nest, care for the queen and immature ants, and search the area around the nest for food. The workers live one to six months, depending on their size. Queens in mature colonies may live six to seven years and can produce over 2000 eggs per day.

For many years imported fire ant colonies were considered to have only one queen. In excavating hundreds of colonies during the 1960s and early 70s, researchers never found more than one queen in large colonies. Studies showed that, although many new queens might cluster together to begin a colony, all but one of the queens were killed by the first workers that emerged; consequently, large colonies wound up with only one queen. In 1973, Dr. Michael Glancey discovered colonies with multiple queens near Hurley, Mississippi. His finding initially appeared to be little more than an oddity. But within one year, multiple queen colonies were discovered in eastern Texas and shortly thereafter, when mature colonies that contained many fertile queens were also found in Alabama, Georgia, Louisiana, and Florida, it became apparent that a major change had occurred in fire ant behavior. By 1987, multiple-queen colonies had been found in eight of the 11 infested states. In parts of north central Florida multiple-queen colonies have completely replaced single queen colonies. Similar replacement has been reported in areas of Texas.

Multiple-queen fire ant colonies differ from single queen in a number of respects: (1) Many wingless queens can be readily observed when the nest is broken open. (2) Worker ants tend to be smaller and more uniform in size. (3) Most importantly, the average number of ants per acre is greater because of much higher nest densities. Multiple-queen infestations can reach densities of 300-500 mounds per acre compared to 20-50 mounds per acre for single queen colonies. In some cases, multiple-queen colonies may have no mound; queens, workers, and immatures may cluster under pieces of cardboard, tin cans, rocks, etc.

Worker ants from single queen colonies normally kill new fire ant queens landing in their area and fight with workers from neighboring fire ant colonies, whereas multiple-queen colonies readily accept new queens and freely exchange worker ants with neighboring mounds. This results in colonies that become interconnected. It is impossible to distinguish between colonies in most multiple-queen areas. In fact, we suspect that many areas may be occupied by one or a very few "super colonies". Some improved pastures in north central Florida are so heavily infested with multiple-queen colonies that one can literally step from mound to mound across the entire field. One pasture with multiple-queen colonies in Marion Co., Florida contained an average of 181 mounds per acre and an estimated 43,100 ants per mound for a total of over 7,800,000 ants per acre.

The presence of so many ants is expected to cause greater damage to crops on which fire ants feed, such as okra, potatoes, soybeans, and citrus. For example, multiple-queen fire ants caused an estimated loss of about \$90,000 of eggplants in one 12-acre field in Marion County in 1982, and more than \$30,000 in 1984 in a 25-acre field of Irish potatoes near Hastings, Florida. Fire ants from single queen colonies have been shown to severely damage young citrus trees, by stripping bark and cambium, often completely girdling the trunk. They also feed on young tender leaf growth, and on flowers and developing fruit. They will also tend aphids, mealy bugs, and scales on the trees. All these problems will likely increase as multiple-queen colonies become more prevalent in the groves. The greater density and reduced visibility of mounds will certainly increase the chances of fruit pickers being stung. Although multiple-queen colonies have been found in only two of Florida's prime

citrus producing counties (Osceola and Pasco), their presence is suspected in several others.

The effect of multiple-queen colonies on beneficial insects (such as bees), ground-nesting birds, and small mammals will be great; because fire ants can harass or kill almost anything that cannot move quickly enough to escape. Very heavily infested areas may become virtual ecological deserts, with few native species surviving.

Some reports have suggested that multiple-queen colonies are more difficult to control, due to the sheer numbers of ants that must share bait toxicants or be contacted by drenches. The hundreds of queens present in the multiple-queen colony must be killed or sterilized to ensure fire ant suppression, because any surviving queens are capable of sustaining the colony. However, in tests by the U.S. Department of Agriculture at Gainesville, the recommended rates of 1-1.5 lb per acre of Armdro or Logic baits gave comparable control of both single and multiple-queen populations. Although neither bait is currently registered for bearing citrus, Logic is registered for non-bearing citrus where fire ants appear to be most damaging. Although damage to young trees can be prevented more effectively by applying the bait four to six months prior to tree set, and retreating at six-month intervals until the tree reaches bearing age, reduction of ant populations at any time during this interval will help minimize damage.

The contact insecticides approved for use in citrus, such as Lorsban, Rotate, Orthene, and Nema-cur, have not been tested against multiple-queen populations. They could be expected to give similar control of single and multiple-queen colonies—however, the effects against multiple-queen colonies may be much shorter term because of the tremendous number of queens that can rebuild populations very quickly.

Dealing with multiple-queen populations within the bounds of label restrictions on pesticide use may require considerable persistence on the part of growers. Meanwhile, research is continuing to learn more about multiple-queen fire ants and to develop methods for coping with the greater problems that are anticipated as they become increasingly prevalent in the southern United States. ■