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## SURVEY OF IMPORTED FIRE ANT (HYMENOPTERA: FORMICIDAE) POPULATIONS IN MISSISSIPPI

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The red imported fire ant (RIFA), *Solenopsis invicta* Buren, has been encroaching on the range of the black imported fire ant (BIFA), *Solenopsis richteri* Forel to the extent that the current range of BIFA is limited to only three states: northern Mississippi, northwestern Alabama, and southern Tennessee. In Mississippi where the two species coexist, evidence of hybridization has been reported (Vander Meer et al. 1985; Ross et al. 1987). These two species produce reproductively viable F1 hybrids that were found to occupy a broad band across the northern tier of Mississippi, Alabama, and Georgia (Diffie et al. 1988). The objective of this study was to determine the distribution of the RIFA, BIFA, and hybrid populations in Mississippi.

**Study Site:** Samples of worker ants were collected from field colonies in northern and central Mississippi. Mounds were mapped with a backpack Trimble 124 beacon DGPS system utilizing GIS Solo CE V3.0 software (TDS) installed on a Compaq iPAQ Pocket PC H3900 series. A vial sample containing 100-1000 ants was removed from each mound, labeled for identification, and stored on ice until frozen. Frozen samples of major caste workers were examined and identified to species. Ant samples identified as *S. richteri* were analyzed by gas chromatography for venom alkaloids and cuticular hydrocarbons (Vander Meer et al. 1985). These two classes of compounds readily distinguish BIFA and hybrid ants which are morphologically identical. Field data and the results from species and hybrid identification were entered into ArcView 3.2a Geographic Information Systems (GIS) for analysis, and for spatial presentation of the data.

The distribution of RIFA, BIFA, and hybrid populations in Mississippi for 2001-2003 are shown in Fig. 1. A total of 176 mounds were surveyed from 52 counties in Mississippi. An earlier report found hybrid populations in five counties from northeastern Mississippi (Diffie et al. 1988). In this investigation, hybrid populations were found in twenty-seven counties extending as far west as Bolivar County in the Mississippi Delta (Fig. 1). Earlier reports showed BIFA populations in eight counties of northeast Mississippi (Diffie et al. 1988). In this investigation, BIFA populations were found in twenty-two counties extend-

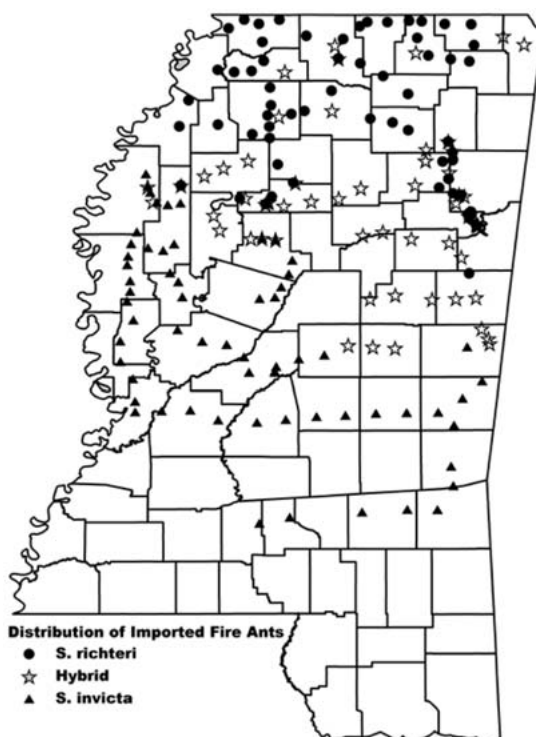


Fig. 1. Spatial distribution of *S. richteri*, *S. invicta*, and hybrid imported fire ant colonies within Mississippi counties, 2001 to 2003.

ing northwest to Tunica and De Soto County, and as far south as Noxubee County in eastern Mississippi. RIFA populations were found as far north as Bolivar County in west Mississippi. However, the northeast range of RIFA populations extends to Kemper County. RIFA populations further south in Mississippi extend throughout the central and southern region of the state (Fig. 1).

Several general conclusions can be reached regarding the distribution of imported fire ants in Mississippi. RIFA populations extend further north in the west than in east Mississippi, whereas BIFA/hybrid populations extend further south in eastern than in western Mississippi and can be found in several northwestern counties.

This shift in spatial distribution for RIFA, BIFA, and hybrid populations in Mississippi suggests that BIFA populations will eventually be replaced by RIFA and hybrid populations in Mississippi and perhaps even in the United States. Currently the RIFA and hybrid populations extend further north in the western part of Mississippi, whereas in the eastern part of Mississippi the BIFA/hybrid populations extend as far south as Noxubee County. The distribution RIFA, BIFA, and hybrid populations can have a significant effect on the implementation of an areawide program to manage fire ants in Mississippi. Vogt et al. (2004) listed several of these factors, including sampling, treatment thresholds, and biological control agents. The presence of RIFA, BIFA, and/or hybrid populations at a release site for biological control agents would prove critical in targeting specific fire ant populations because most biological control agents are relatively host specific.

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#### SUMMARY

This study determined the distribution of the red and black imported fire ant, and their hybrid ant populations in Mississippi. The range of black imported fire ant populations was found to extend to twenty-two counties, whereas hybrid populations were found in twenty-seven counties in Mississippi. The distribution of species and hybrid fire ant populations will be important in the development of area-wide programs to control imported fire ants in this area of the United States.

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