

## Fire Ant Biocontrol with Phorid and other Natural Enemies

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**t**hey are called fire ants, and anyone who has been stung knows why. Fire ants are as much a part of life in the South as grits and kudzu. With average densities of 1,200 to 3,000 ants per square yard, they can be impossible to avoid - especially for workers in nursery and landscape businesses.

The Red Imported Fire Ant, *Solenopsis invicta*, was accidentally introduced into the United States from South America about 60 years ago at the port of Mobile, Alabama. Today this pest is found throughout the Southeast, as far north as Virginia and as far west as Texas. Quarantine measures have helped, but eventual expansions are expected westward into Arizona and California and southward into Mexico and the Caribbean.

The name *Solenopsis invicta* means the unconquerable or invincible fire ant. This scientific name was conferred on this ant after it successfully withstood a 200 million dollar extermination campaign in the 1960's and early 1970's.

Recent studies, however, suggest that this ant may have its weaknesses. Fire ants in South America are only about 1/5 as abundant as they are in the United States. Dozens of natural enemies have also been discovered in South America compared to only one or two in the United States. This information suggests that the fire ant's success in the United States may be a result of its escape from numerous natural enemies that were left behind in South America - especially since differences in climate and habitat have not explained intercontinental differences in fire ant abundance.

Importing natural fire ant enemies from South America could help tilt the ecological balance in the United States so that our native ants could compete

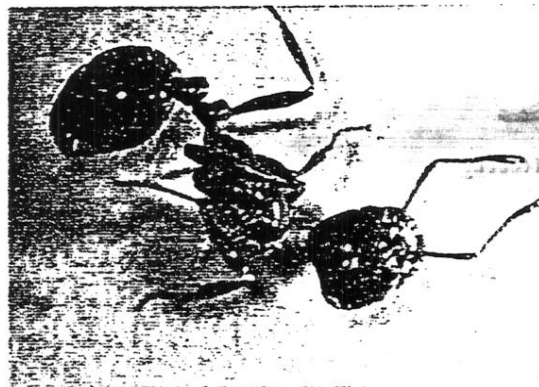
with this imported pest on an "even playing field". If these natural enemies can tilt the ecological balance, then fire ant populations in the United States could be reduced to levels similar to those found in South America, where fire ants are rarely considered a significant problem.

Parasitic phorid flies in the genus *Pseudacteon* are one promising area of research. These miniature flies lay their eggs in the bodies of fire ant workers. When the eggs hatch, the maggots slither into the ant head, where they slowly develop. Just before these maggots begin to change into flies, they appear to release an enzyme that dissolves the membranes holding the ant's exoskeleton together. The maggot

consumes the entire contents of the ant's head, a process that usually severs the head from the ant's still twitching body. The maggot then cuts away the ant's mouth parts and pupates inside the empty head capsule. It is positioned so that the front part of the pupa hardens and precisely fills the ant's mouth.

These flies appear to meet three important requirements of good biocontrol agents: 1) they are highly specific in their host preferences. They are only known to attack fire ants. 2) They are broadly distributed across season, habitat, and climate so they could survive in a variety of situations. 3) They impact fire ant populations. Specifically, these flies have caused fire ants to evolve several of phorid-specific defenses. For example, when-

ever a phorid fly appears overhead, ants outside the nest will stop collecting



**Above, phorid fly attack only fire ants. The female deposits an egg on or in a fire ant's body. Below, weeks later, the head of the fire ant falls off.**

food in a matter of minutes and flee back to the nest or curl into a c-shaped defensive posture. Other species of ants can then use fire ant territories whenever the flies are active.

In addition to the phorid fly, other potential South American biological control agents include the parasite ant, *Solenopsis daguerrei*, which is reported to kill mature fire ant mounds in 1-2 years, and the microsporidian disease *Theobania solenopsae*, a specialized pathogen of fire ant colonies which appears to reduce colony growth potential.

Introduction of natural fire ant enemies will require several years of effort because each potential enemy needs to be carefully screened to ensure that it does not present a threat to ants and other non-target animals in North America. Nevertheless, there have been encouraging early results from the USDA-ARS in Gainesville, Florida and the University of Texas at Austin. Biological control is a promising avenue of research that offers the possibility of permanently reducing fire ant densities in the United States. Lower populations of fire ants similar to those in South America could save tens of millions of dollars annually in pesticide costs and crop losses. It would also benefit the half million or so people in the South who are seriously allergic to fire ant stings. Diminished fire ant populations would also benefit the environment by reducing pesticide use and helping to restore natural biodiversity. ♀

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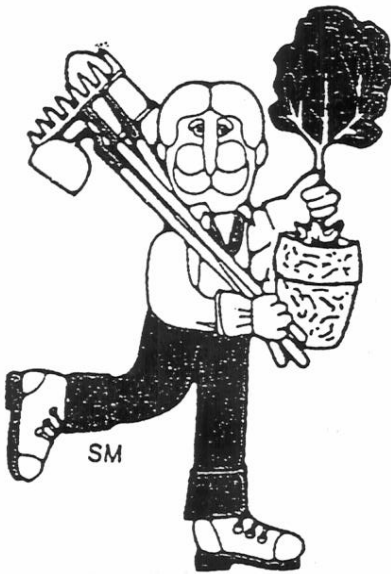
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