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An average-sized mature fire ant colony of 100,000 workers can lose 50,000 workers and still have a sufficiently large labor force left over to produce a full batch of 5,000 new queens each spring (Cassill 2002). Hence, pest management strategies that target only workers might reduce colony size, but not colony density. The critical target of fire ant colonies is the queen.

Effective pest management strategies should focus on species-specific chemical castration or diseases that affect queens.

One of the research projects that Dr. Cassill is working on at USF St. Petersburg is to resolve the flow of fluids to fire ant queens as a first approximation for developing effective, long-term pest management strategies. Dr. Cassill makes “ant movies” to determine the rate and path-flow of fluids to fire ant queens.

It is known that the urine excreted by young ants (larvae) before they molt into adult workers stimulates egg production in queens. Dr. Cassill discovered the mechanism by which larval urine is fed to the queens.

In the future, working with the fire ant laboratory at Texas A&M University, Dr. Cassill will isolate and characterize the chemical hormone in larval urine and then develop a chemical compound that can castrate mature fire ant queens without affecting other animals.

In addition, Dr. Cassill is working with Dr. Alison Watkins (USFSP College of Business) to model the rate and path-flow of fluids to fire ant queens for use in developing species-specific pest management strategies and she is working with David Fries (USF College of Marine Science) to test potential delivery membranes for fluid baits such as latex, hydrogels and parafilm.

Dr. Cassill has just submitted a USDA grant proposal to conduct research on species-specific methods of queen castration.

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