

Fire Ant Initiative Action Plan – FY 2006-2007

Maximum 500 words, double-spaced, type size at least 12 points, do not exceed boundaries. Include statement on anticipated outcomes.

We have characterized a number of bacterial species that are associated with the midgut of the red imported fire ant. Furthermore, we have successfully genetically transformed a subset of these bacterial species with a red fluorescent marker gene, DsRed. This has been performed both transiently with a shuttle plasmid and through integration of a transposable element vector, such that the transgenic bacteria stably express the reporter gene without antibiotic selection. This initial demonstration of the ability to genetically modify bacteria associated with the fire ant opens up the opportunity to use these strains to deliver recombinant molecules that negatively impact fire ant reproduction, development and behavior. Successful demonstration of these effects in laboratory colonies will allow for a progression to larger scale production and field-testing. There are a number of candidate genes available for testing, including digestive inhibitors, antibacterial peptides, molecules involved in signaling including peptide hormones, and a multitude of pro-toxins and active toxin genes. Many of these candidates are available commercially, which will facilitate the rapid testing of efficacy *in vivo*, followed by the expression of recombinant genes in the modified bacteria. One of the advantages of using the modified bacteria as a delivery vehicle is that we have already demonstrated that the bacteria can be spread within and between colonies by the normal processes of ant development and feeding. An investigation of the importance of the natural microbial fauna associated with fire ant will also be initiated by selective treatments with antibiotics. This will determine the relative importance of different classes of bacteria to normal fire ant reproduction, development and behavior and may lead to the identification of additional species for investigation and modification. The final component of this research proposal will be an extensive survey of the bacterial populations in fire ants collected from diverse geographic locations. This may identify additional candidates that may be more suitable targets in certain regions for fire ant control. The successful completion of these research objectives will result in the identification of candidate genes that can be effectively delivered by genetically modified bacteria to the red imported fire ant and result in a reduction in fire ant fitness.