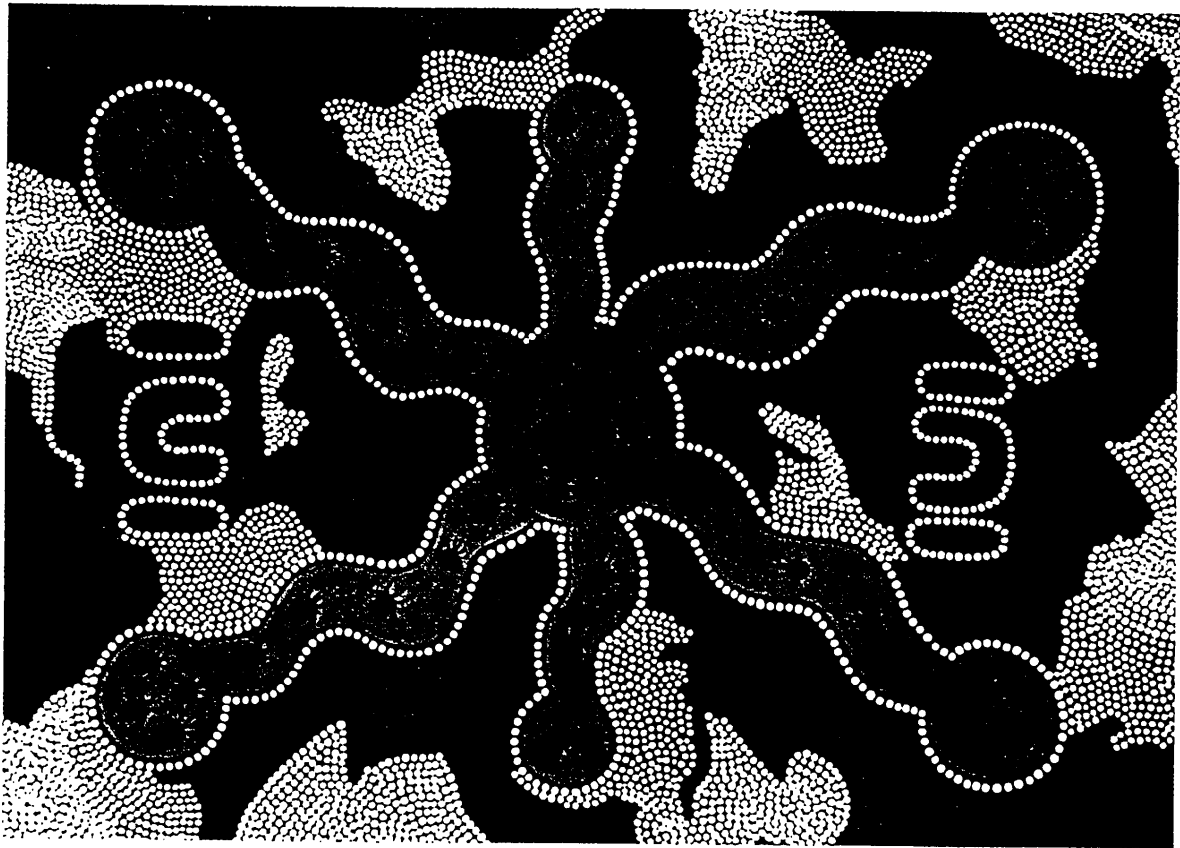


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at the turn of the Millennium



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BEHAVIOR MODIFICATION OF THE FIRE ANT *SOLENOPSIS INVICTA*: PAST AND FUTURE

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Behavior modification has broad meaning when it comes to controlling fire ants to reduce the risk to the human population and to reduce the impact of insecticides on the environment. Fire ant management through behavior modification began several decades ago with the development of toxic baits. Here the food preferences, foraging system, and feeding behavior of fire ants were used to focus and deliver the formicide active ingredient to the fire ant colonies. This method relied on foraging workers to find and gather the bait particles or ingest the phagostimulant/toxicant and then to distribute the active ingredient to other colony members through trophallaxis (Lofgren 1986). The use of baits allowed the use of relatively small amounts of active ingredient, but non-target ant species were often affected too. The non-target ant species could offer some resistance toward reinfestation of fire ants into treated areas if they were not as affected.

More recently the utility of pheromone enhanced ant baits was investigated using fire ants as the model organism. The enhanced bait consisted of an active ingredient (AI), soybean oil (phagostimulant and AI solvent), defatted corn grit (carrier), and "invictolide", an attractive component of the fire ant queen recognition pheromone. The most difficult problems were associated with the many variables in the field that contribute to the high variance in bait efficacy, thus making the detection of differences between standard and treatment difficult. The pheromone enhanced bait was discovered almost twice as fast as standard bait particles. In addition, controlled field studies using single mound treatments demonstrated that besides being discovered faster, more active ingredient was getting to each target colony, because more bait particles were discovered. Thus, pheromone enhanced ant baits offer several advantages over standard baits, especially the potential reduction of insecticide usage and diminished effects on non-target ant species (Vander Meer 1996). However, insecticides are still a part of the enhanced bait method.

We have commenced behavior modification research that is not linked with insecticides, but is instead focused on the basic elements of the control of colony functions by the queen through releaser and primer pheromones. These studies focus on the biochemical and physiological definition of female sexual development from immature, to newly inseminated queen, to mature colony queen. We anticipate that points of attack will be discovered that will enable us to reduce the reproductive capacity of fire ant colonies. The queen produced worker attractant pheromone is a key element for the dissemination of other primer or releaser pheromones. For example utilization of the following the supernumerary queen execution pheromone, pheromone regulation of sexual production, pheromonal suppression of queen egg production, or a newly discovered primer pheromone that controls conspecific aggression / nestmate recognition could result in diminished worker populations or reproductive potential.

Lofgren C. S. (1986) in: **Fire Ants and Leaf-Cutting Ants**; eds. C. S. Lofgren and R. K. Vander Meer. Boulder, CO, Westview Press, pp. 36-47.

Vander Meer R. K. (1996) in: **Proceedings of the 2nd International Conference on Insect Pests in the Urban Environment**; ed. K. B. Wildey. Exeter, 640 p., BPCC Wheatons Ltd., pp. 531-539.

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