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Biological Control Agents of Fire Ants in Brazil

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In February 1984, the U.S. Department of Agriculture and the Empresa Brasileira de Pesquisa Agropecuária jointly established a laboratory at the EMPA-MT Agricultural Research Station in Cáceres, Mato Grosso (MT), Brasil, for the purpose of surveying for and evaluating the natural biological control agents of fire ants, primarily *S. invicta* Buren. Standard size samples of 2 1/2 liters of tumulus excavated from fire ant mounds are placed in buckets. The ants and myrmecophiles are separated from the soil by floatation with water (Jouvenaz et al., 1977). Individual ants and aqueous mass extracts of ants are examined microscopically for pathogens (Jouvenaz et al., 1977). Myrmecophiles are identified and preserved.

Since April 1986, 1000 fire ant colonies have been examined for natural enemies. All of the colonies were collected within 200 km of Cáceres, except for about 100 colonies that were collected near Campo Grande, Mato Grosso do Sul. Single colonies may commonly contain several species of pathogens and/or myrmecophiles. No correlation has been found between the occurrence of any of the pathogens and/or myrmecophiles.

The total numbers and other parameters for each pathogen and myrmecophile collected during the 21-month survey (July 1984 through March 1986) are given in Table 1. Of the 1000 colonies examined, 757 contained at least one species of pathogen and/or myrmecophile. The known biology of these pathogens and myrmecophiles is discussed, respectively, by Jouvenaz (1986) and Wojcik (1986). The microsporidians, *Thelohania solenopsae* and *Vairimorpha* sp., are known only from South America and infect brood and adult ants. The neogregarine, *Mattesia geminata*, has been found in *Solenopsis* spp. nests in North and South America and infects only immatures. The undescribed nematode (Mermithoidea: Tetradonematidae) was found for the first time in February 1985; it infects brood and adults. Several other pathogens, including virus-like particles, an undescribed neogregarine, a fungus, and possibly a bacterium, have been reported from fire ants in Brasil but have not been collected during this survey.

The scarab beetles (genus *Martinezia* and the unidentified *Thysanura* are predacious on fire ant brood. Nothing is known about the biology of the unidentified hister and chrysomelid (case-bearing larvae) beetles or the lygaeid bugs. The ectoparasitic larvae of the wasps of the genus *Orasema* (Eucharitidae) cause malformation and death of fire ant pupae. The adult wasps lay their eggs in plant tissue causing cosmetic damage. The workerless obligate parasitic ant, *Labauchena* sp., has been collected once during this survey, and our attempt to colonize this species in the United States was unsuccessful. One phorid fly puparium was dissected from an alate female fire ant. The unidentified millipedes are thought to be scavengers. Other myrmecophiles associated with fire ants in South America (Wojcik, 1986) have not been collected during this survey.

In the coming year, we will continue the pathogen and myrmecophile survey. We will emphasize the collection and colonization of the nematode and the *Labauchena* sp. in order to evaluate these organisms for possible introduction into the United States. The ultimate goal of our project is to establish, in the United States, a complex of specific natural enemies as a biological control component of an integrated pest management program for fire ants.

Table 1. Summary of collection records for pathogens and myrmecophiles found in 1000 fire ant colonies in Brazil.

Organism	Number of colonies with organism	No. of specimens	Avg. no. per nest	Range	Median	Mode
Pathogen						
<i>Thelohania</i>	22					
<i>Vairimorpha</i>	46					
<i>Mattesia</i>	64					
Nematode	7					
Myrmecophile						
Scarabaeidae	213	637	3.0	1-31	2	1
Histeridae	189	392	2.1	1-12	1	1
Chrysomelidae	2	3	1.5	1-2	1.5	-
Eucharitidae	413	7225	17.5	1-598	4	1
Formicidae	1	101	-	-	-	-
Lygaeidae	16	28	1.8	1-5	1	1
Thysanura	17	30	1.8	1-12	1	1
Diplopoda	111	554	5.0	1-48	2	1
TOTALS	757	8970				

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