N O T E

Argentine Ant (Hymenoptera: Formicidae) Worker Attacks on Post-Nuptial Red Imported Fire Ant (Hymenoptera: Formicidae) Queens in Central Georgia[1]

Mark A. Brinkman[2]

Division of Mathematics and Natural Sciences, Gordon College, 419 College Drive, Barnesville, Georgia 30204 USA

J. Entomol. Sci. 41(4): 394-396 (October 2006)

Key Words *Linepithema humile*, *Solenopsis invicta*, fire ant queens, nuptial flight

Red imported fire ants, *Solenopsis invicta* Buren, and Argentine ants, *Linepithema humile* (Mayr), are originally from South America. Both species have become important pests in the southern U.S. since their arrival in this country (Callcott and Collins 1996, Florida Entomol. 79: 240-248; Suarez et al. 1999, Biol. Invasions 1: 43-53). Both ant species have been implicated in displacing native ants (Porter et al. 1988, Ann. Entomol. Soc. Am. 81: 913-918; Porter and Savignano 1990, Ecology 71: 2095-2106; Cherry and Nuessly 1992, Environ. Entomol. 21: 767-770; Kennedy 1998, Am. Mid. Nat. 140: 343-350), and they have relatively few natural enemies of their own here in the U.S. (Jouvenaz et al. 1977, Florida Entomol. 60: 275-279; Holway 1999, Ecology 80: 238-251). Spiders, dragonflies, birds, and other native ants are known predators of fire ant queens following nuptial flights (Whitcomb et al. 1973, Environ. Entomol. 2: 1101-1103; Nichols and Sites 1991, Environ. Entomol. 20: 1024-1029; Lockley 1995, Florida Entomol. 78: 609-610). The observations reported herein document the killing and removal of large numbers of red imported fire ant queens by Argentine ant workers at a site in central Georgia.

On the afternoon of 02 August 2005, there was a light rainfall event in Barnesville, GA (Lamar Co.), and at 1849 h, a large number of dealate red imported fire ant queens were observed on the edge of an asphalt parking lot of Gordon College. It was assumed that these queens had completed their nuptial flights (Whitcomb et al. 1973) and were searching for nesting sites. A total of 732 fire ant queens were observed (Table 1). In addition, Argentine ant workers were observed attacking dealate queens. Of the living queens, 53% were engaged by one or more Argentine ant workers. All dead queens were being carried away by Argentine ant workers.

There were very few Argentine ants or fire ant queens in the area during midday over the next few dates, but numerous queens and Argentine ant workers were

[1]Received 24 February 2006; accepted for publication 16 April 2006.
[2]Address inquires (email: mbrinkman@gdn.edu).

Table 1. Number of dealate fire ant queens attacked and killed by Argentine ants following nuptial flights. The attacks on fire ant queens took place in a 164 m^2 area on the edge of a Gordon College (Barnesville, Georgia) parking lot

Sampling date	Number of queens				
	02 Aug	03 Aug	04 Aug	05 Aug	08 Aug
Live fire ant queens not under attack by Argentine ants	318	28	13	27	87
Live fire ant queens under attack by one or more Argentine ants	356	43	6	51	117
Dead fire ant queens not surrounded by Argentine ants	0	52	2	4	12
Dead fire ant queens with one or more Argentine ants attached	58	169	35	50	154
Total	732	292	56	132	370

observed in the area later in the evenings. It is not known whether the Argentine ants were absent during midday because they had removed most of the fire ant queens, or because the concrete and asphalt surfaces were too hot from exposure to full sun.

On 03, 04, 05, and 08 August, the area where the queens were attacked was treated as a belt transect (Brower and Zar 1984, Field and laboratory methods for general ecology. Wm. C. Brown Publ. pp. 86), and all queens along the 179.7 m length of curb and within 15.2 cm of each side of the 60.96 cm wide curb were counted. This was done between 1816-1856 h each night. Specimens of both species were collected, preserved, and identification was confirmed in the laboratory using a key compiled by Ipser (2004, Native and exotic ants [Hymenoptera: Formicidae] of Georgia: ecological relationships with implications for development of biologically-based management strategies. Ph.D. Diss., University of Georgia, pp. 145-165). On 03 Aug, a total of 292 queens was counted; 75% of them were dead. Most dead queens were missing legs, and 169 of them were being carried away by Argentine ant workers. Over 60% of live queens were under attack by Argentine ants. Only 56 queens were observed in the transect on 04 Aug, but the number of queens increased to 132 on 05 Aug and then 370 on 08 Aug. The percentages of queens that were deceased on 04, 05, and 08 Aug was 66, 41, and 45%, respectively. On those dates, 45-86% of the dead queens were being carried away by Argentine ant workers. The percentage of live queens that were being attacked by Argentine ants on 04, 05, and 08 Aug was 32, 65, and 57%, respectively. There was precipitation later in the evening on 04 Aug and during the day on 07 Aug; this may have triggered additional nuptial flights.

According to Nickerson et al. (1975, Florida Entomol. 58: 75-82), ants are very aggressive toward founding queens, and cannibalism of founding fire ant queens is common. In the study by Nickerson et al. (1975), 613 newly-mated red imported fire ant queens were observed in an area of northern Florida and >96% of them were

under various stages of attack by *Conomyrma insana* (Buckley) workers. There were similarities between the attacks by Argentine ants and *C. insana* on fire ant queens. When attacked by Argentine ants, queens would often curl their gasters under their thorax. Nickerson et al. (1975) described this behavior as an attempt to dislodge the attacker rather than sting it. Queens were usually successful in dislodging solitary Argentine ants until they apparently tired from the repeated attacks. Nickerson et al. (1975) observed the same behavior with fire ant queens and *C. insana* workers. Also, *C. insana* workers removed legs of fire ant queens prior to dragging the dead and living queens to nests.

Both the red imported fire ant and Argentine ant are exotic pests that have invaded rural and urban habitats in the southern U.S. In areas where the territories of Argentine ants and red imported fire ants overlap, there is intense competition. Ant species can compete with other species indirectly by monopolizing food and nesting sites, and directly by killing other workers and preying on reproductive females. Brinkman et al. (2004, J. Entomol. Sci. 39: 679-680) earlier observed raiding of newly-established fire ant colonies in simulated electric utility cabinets. In that study, 100 fire ant workers along with food were placed in each test cabinet. Two of the cabinets were raided by Argentine ants resulting in all of the fire ants in those cabinets being killed. The fire ants remaining in the cabinets were legless.

Results from the study herein suggest that Argentine ants may have a large impact on survival of newly-mated red imported fire ant queens. By eliminating queens, the Argentine ants reduced potential future competition from fire ant colonies. The competition between fire ants and Argentine ants does not benefit native ants however, because one dominant pest species is replaced with another (Buren 1983, Florida Entomol. 66: 92-100). Humans may benefit from the conflict because each founding fire ant queen that is killed results in fewer mounds and thousands fewer stinging workers.