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# DISPERSAL OF THE FIRE ANT DECAPITATING FLY, *PSEUDACTEON CURVATUS* (DIPTERA: PHORIDAE) IN NORTHEAST MISSISSIPPI

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*Pseudacteon curvatus* Borgmeier is one of three species of phorid decapitating flies currently approved for release in the U.S. for the suppression of the red, black, and hybrid imported fire ants, *Solenopsis invicta* Buren, *S. richteri* Forel, and *S. invicta* × *richteri*, respectively. Two biotypes of *P. curvatus* are established in the U.S. The Las Flores, Argentina biotype prefers black and hybrid imported fire ants (Porter & Briano 2000) and is established at sites in Alabama, Mississippi, and Tennessee (Graham et al. 2003; Thead et al. 2003; Vogt & Streett 2003; Vail et al. 2004; Ward et al. 2004). The Formosa, Argentina biotype prefers red imported fire ants and is established at sites in Florida (R. J. Vasquez & S. D. Porter, pers. comm.).

This study reports dispersal of flies of the Las Flores biotype, first released in spring, 2002 in a grazed pasture (Knox site) in Clay Co., MS (3.25 ha, 33°40'05.87"N, 88°34'48.02"W) (Fig. 1) (Vogt & Streett 2003). By Sept. 2002, flies had established on a mixture of black and hybrid imported fire ants and had spread up to 600 m from the original release site (Vogt & Streett 2003). Additional releases, with the same protocol, were made during spring 2002 and 2003 in a grazed pasture (Prima site) in Clay Co., MS, about 8.8 km and 149.7° SE of the Knox site (Fig. 1). Fly presence was confirmed at both sites during 2003 (J. T. V. & L. G. T., unpubl. data).

Observations were made outside the release sites on 23 dates from May-Sept. 2004, between 09:25 and 15:45 hours at 134 active fire ant mounds. Sampling areas were randomly selected and located on roadsides that were bordered by forests with overhanging vegetation or by grazed pastures. The presence of *P. curvatus* was determined by making a round depression (about 4-5 cm wide and 5-10 cm deep) in black and hybrid imported fire ant mounds. Hovering flies were counted within and around the depression. Ants were macerated and dropped into the depression to release semiochemicals that attract the flies (Porter et al. 2004). All sampled areas were georeferenced. Mounds were observed for up to 35 min. If flies were found in an area, we moved and sampled farther from the release sites. An area was re-sampled later unless flies were found farther from the release sites along a similar compass bearing. Average air temperature during sampling was 29.9 ± 2.6°C (±SD), with a mean relative humidity of 66.3 ± 18.5%, and a mean wind speed of 1.2 ± 1.45 km/h.

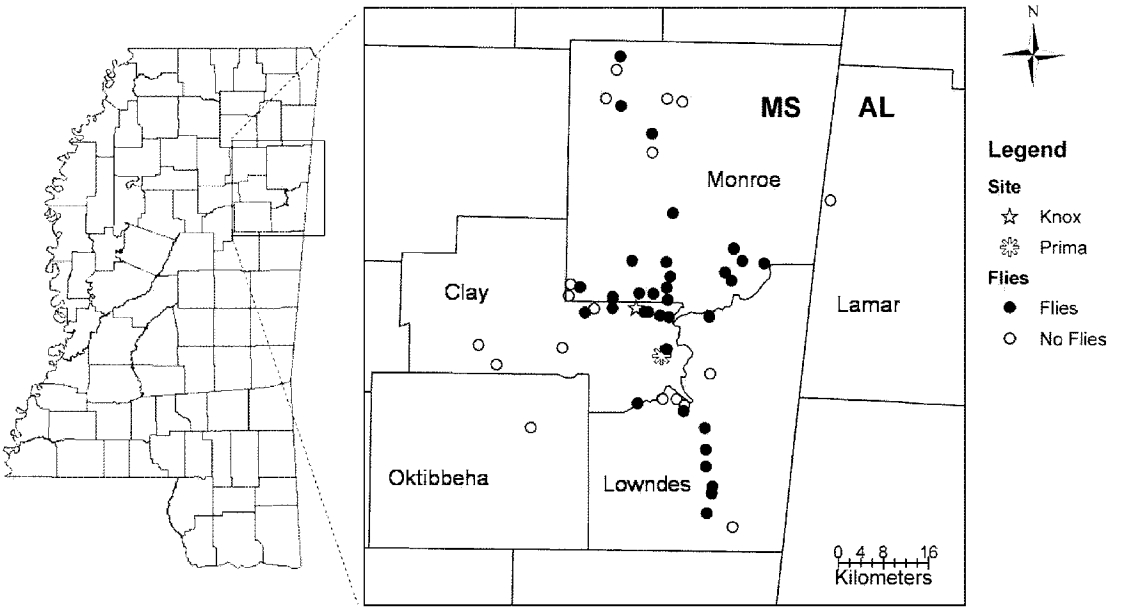


Fig. 1. Dispersal, as of 2004, of the decapitating fly *P. curvatus* from 2002 and 2003 releases at two sites in Clay Co., MS.

A total of 130 flies were recorded attacking ants in approximately 33% (44/134) of the mounds. Each of 44 mounds had from 1 to 14 flies with an average of 3.0 ± 2.7 flies. Time of fly arrival at a mound ranged from about 10 sec to 20 min, averaging 6.1 ± 5.3 min.

A modified electric livestock prod, TheBlueOne™ LMPlus®, (Hot-Shot Products Co., Inc., Savage, MN) was used randomly to shock the ants to provoke alarm pheromone release (Vander Meer et al. 2002; Barr 2004) in approximately 40% (53/134) of the mounds. Flies were attracted to ants in about 25% (13/53) of the stimulated mounds and approximately 38% (31/81) of unstimulated mounds. It took longer for flies to arrive at stimulated mounds (8.2 ± 6.7 min) than unstimulated mounds (5.1 ± 4.3 min). Unlike *P. tricuspis* (Barr 2004),the use of the electric livestock prod on ants did not appear to attract *P. curvatus* as quickly or at a greater rate.

Regression analysis showed no correlation ($P > 0.05$) between time to fly arrival and temperature, relative humidity, wind speed or time of day. A significant correlation ($P < 0.001$) between time to fly arrival and day sampled explained 61% of variance, but confounding of sampling farther from the release sites as the season progressed made the model ($y = 2E - 10x^{4.43}$) unreliable. Therefore, a significant correlation ($P < 0.001$) between time to fly arrival and distance from Knox site is shown (Fig. 2). It is likely that there were fewer flies at the more distant sites (Porter et al. 2004).

Fly dispersal from the Knox and Prima sites is illustrated in Fig. 1. By spring 2004, *P. curvatus* populations at the Knox and Prima sites had merged. By Sept. 2004, flies had spread over 44 km (356° NW), 37 km (162° SE), and 24 km (70° NE) from the center of the Knox site. The outer boundaries of fly expansion to the north, south, and east of the release sites may have extended farther than we were able to observe in this study. Time restraints prevented sampling beyond Sept. 2004. Fly movement to the west of the release sites appeared to be slower than in other directions. By Aug. 2004, dispersal was about 11 km (291° NW) from the Knox site. No flies were found farther than 11 km west of the Knox site in Sept. 2004. Habitat variation or sampling effort may explain slower dispersal (Porter et al. 2004).

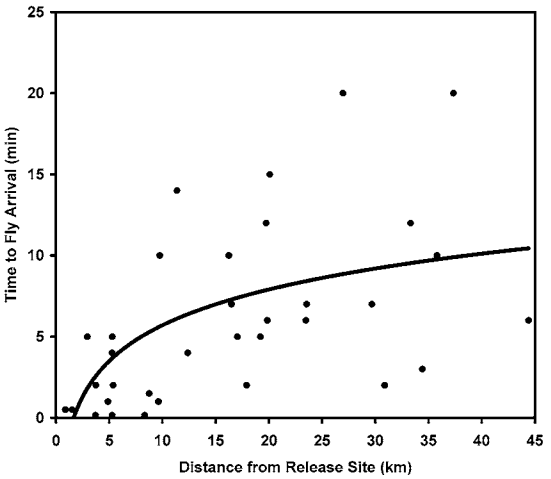


Fig. 2. Time to fly arrival at a fire ant mound as a function of distance from Knox release site. A logarithmic regression is plotted ($y = 3.18\ LN(x) - 1.63$, $R^2 = 0.30$, $P < 0.001$).

*P. curvatus* occupied an area that encompassed more than 2249 km² (>224,914 ha) by Sept. 2004 (Fig. 1). Dispersal was 11 to at least 44 km in 2½ years.

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## Summary

The fire ant decapitating fly, *Pseudacteon curvatus*, first released in Clay County Mississippi during spring 2002, occupied an area of over 2249 km² by Sept. 2004. Dispersal was at least 44 km in 2½ years.

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