

Prevalence and Localized Infection of the Entomopathogenic Fungus *Beauveria bassiana* on Kudzu Bug (Hemiptera: Plataspidae) in Eastern Tennessee¹

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The kudzu bug, *Megacopta cribraria* (F.) (Hemiptera: Plataspidae), is native to Asia and was discovered in nine northeastern counties in Georgia (USA) in mid-October 2009 (Eger et al. 2010, Insecta Mundi 0121: 1–11; Jenkins et al. 2010, J. Entomol. Sci. 45: 1–2). It is the only representative of the family Plataspidae in the continental United States (Suiter et al. 2010, J. Integr. Pest Manage. 1: 1–4) and has been documented in 13 states and the District of Columbia (Kudzu Bug 2016, University of Georgia Center for Invasive Species and Ecosystem Health. Accessed 16 June 2016. kudzubug.org/distribution-map). *Megacopta cribraria* are attracted to legumes, especially kudzu, *Pueraria montana* var. *lobata* (Willd.), and soybean, *Glycine max* (L.) Merrill, where they feed by sucking sap from stems, petioles, and leaves (Halbert and Eger 2010, Bean Plataspid, *Megacopta cribraria* (Fabricius) (Hemiptera: Plataspidae) an Exotic Legume Pest Established in Georgia, DACS-P-01725; Zhang et al. 2012, Environ. Entomol. 41: 40–50).

During population monitoring of *M. cribraria* in Tennessee in 2015, a fungal pathogen infecting immatures and adults in kudzu was first observed in Polk Co. on 1 September. The fungal pathogen was visually identified as *Beauveria bassiana* (Balsamo) Vuillemin by Mary Dee of the Department of Entomology and Plant Pathology at the University of Tennessee, Knoxville, and later confirmed by Dr. Maribel Portilla of the USDA-ARS, Stoneville, MS. *Beauveria bassiana* is a well-documented, generalist entomopathogen and has been known to infect *M. cribraria* in its native and expanded range (Ruberson et al. 2012, Appl. Entomol. Zool. 48: 3–13; Seiter et al. 2015, J. Entomol. Sci. 49: 326–330). Despite reported occurrence of *B. bassiana* in *M. cribraria* in South Carolina in 2012 and Georgia in 2013, little is known about its impact on population levels. A 6-week study was

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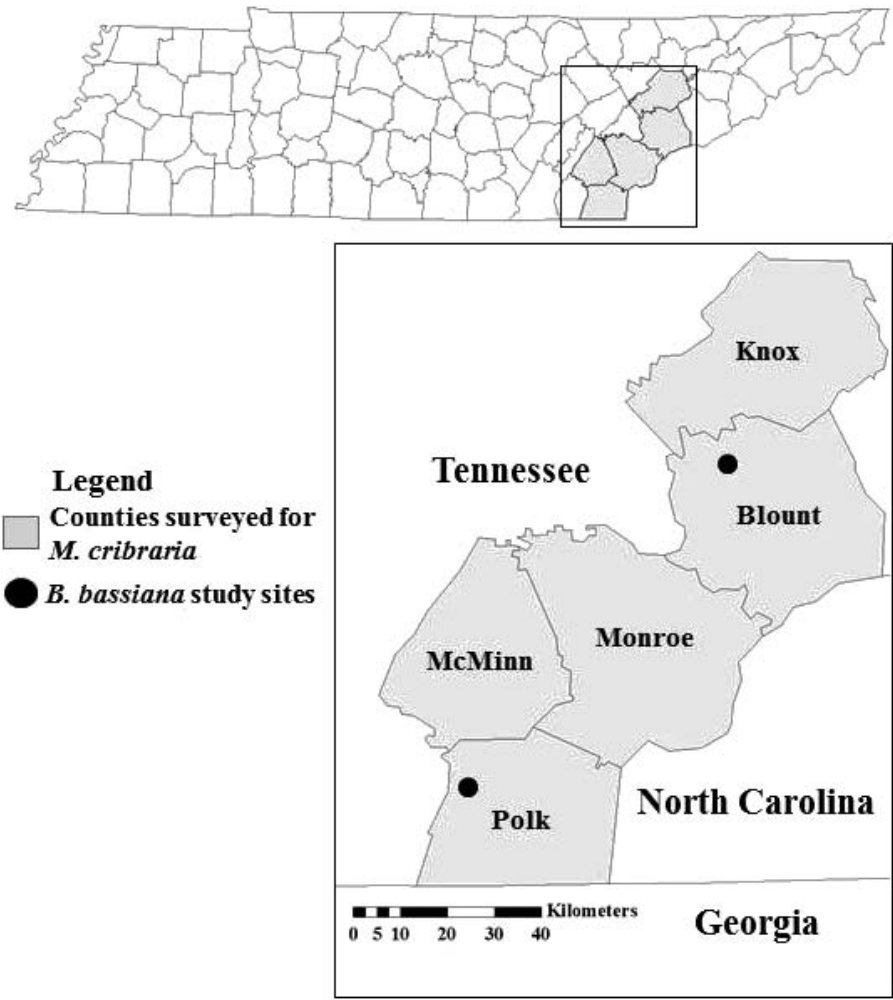


Fig. 1. Locations of study sites to assess incidence and phenology of *Beauveria bassiana* and *Megacopta cribraria* in eastern Tennessee, 2015.

initiated on 16 September 2015 to monitor prevalence of the pathogen on and associated mortality of *M. cribraria* due to infection by *B. bassiana* on kudzu. *Megacopta cribraria* was surveyed at two locations in eastern Tennessee—one location each in Blount (N 35.74912°, W 083.96170°; elevation 268 m) and Polk (N 35.16464°, W 084.68258°; elevation 207 m) counties (Fig. 1). At each location, 10 total collection sites were designated. Two 40-m transects separated by at least 5 m were measured. In each transect, one collection site was established every 10 m. Each transect had a total of five collection sites. At each collection site, kudzu

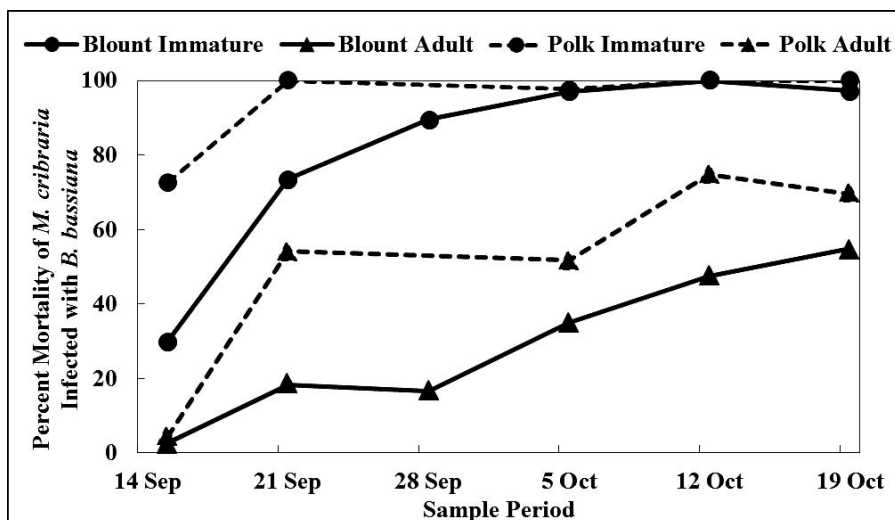


Fig. 2. Percentage mortality of *Megacopta cribraria* infected with *Beauveria bassiana* in Blount and Polk counties in eastern Tennessee, 2015.

stems and foliage containing infected and noninfected *M. cribraria* were clipped, bagged, and transported to the laboratory. Approximately 1.91 m of kudzu was clipped per collection site each sampling week. In the laboratory, all *M. cribraria* immatures and adults were examined and counted, and the percentage of *M. cribraria* infected by *B. bassiana* was calculated. *Megacopta cribraria* were classified as “infected” when fungal mycelia were found on the exterior of the body; all individuals with visible mycelia were dead at the time of collection. Thus, for the purpose of this study, infection by and mortality due to *B. bassiana* are synonymous.

Percentage infection of immature and adult *M. cribraria* by *B. bassiana* increased through the duration of the study (Fig. 2). Mortality of infected immature *M. cribraria* reached 100% by the end of sampling on 19 October 2015 at both sampling sites. Cumulative adult mortality was lower than that of the immatures, with percentage infection levels of 25.2% ($n = 256$ of 1,016 total adults) in Blount Co. and 49.06% ($n = 261$ of 532 total adults) in Polk Co. (Table 1). *Beauveria bassiana* was also documented at 11 additional sites in three other eastern Tennessee counties (Knox [9], McMinn [1], and Monroe [1]) in 2015 (Fig. 1), although percentage infection was not determined.

The observed occurrence and prevalence of *B. bassiana* in eastern Tennessee may have impacted overwintering populations of *M. cribraria* in that area and, thus, impact numbers of *M. cribraria* emerging from overwintering in 2016. Future efforts will consist of monitoring for *B. bassiana* on a wider scale throughout Tennessee, including examination of levels of infection of *M. cribraria* by *B. bassiana* in several additional counties, as well as continuing to conduct sampling to assess impact on population levels. Knowledge on incidence and prevalence of *B. bassiana*, and the

Table 1. Number (and percentage infected) of *Megacopta cribraria* (immatures, adults, and cumulative total) at sampling locations in Blount and Polk counties, TN, 16 September to 19 October 2015.

County	Total Collected			Number Infected*		
	Immature	Adult	Total	Immature	Adult	Total
Blount	645	1,016	1,661	460 (71.3)	256 (25.2)	716 (43.1)
Polk	176	532	708	160 (90.9)	261 (49.1)	421 (59.5)
Total	821	1,548	2,369	620 (75.5)	517 (33.4)	1,137 (48.0)

*Numbers in parentheses are percentage of kudzu bugs infected, calculated as number infected/cumulative total collected, for the respective immature, adult, and total kudzu bugs.

resulting mortality of *M. cribraria*, will enable pest management specialists to consider this biological control agent in management decisions.

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