SCIENTIFIC NOTE

THE ROLE OF Canthon humectus hidalgoensis (Bates) (Coleoptera: Scarabaeidae) IN DUNG REMOVAL FROM A CATTLE PASTURE

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As rearing livestock spread in Mexico, cattle dung became the main alternative food source for dung beetles in pastures (Amézquita and Favila 2010). The role of these beetles is fundamental to ecosystem functioning and recovery, given their contribution to several ecological processes including dung removal, nutrient cycling, secondary seed dispersal, and soil aeration (Nichols et al. 2008). In the cattle pastures of the state of Hidalgo, Mexico, Canthon humectus (Say) is one of the most common dung beetle species. In the Barranca de Meztitlán Biosphere Reserve, the subspecies Canthon humectus hidalgoensis (Bates) is a generalist dung feeder that represents up to 94% of the total number of dung beetles (Verdú et al. 2007), so studying the behavior of this beetle will allow us to describe its possible impact on ecological processes, especially that of dung removal in pastures.

Canthon humectus hidalgoensis is a diurnal beetle that makes dung balls and rolls them from the cow pat to another site. Lone beetles do this to feed and mating pairs do it for nesting. For nesting, the ball is rolled by the male who pulls the ball with his hind legs. The female is attracted by his pheromones and takes her place atop the ball to help the male roll it. The male buries the dung ball in the nesting site, and the female transforms it into a brood ball (Morón 2004). This species is common in xerophilous scrublands, in forests ranging from 1,400 to 2,000 m above sea level, as well as in open and isolated livestock areas (Halffter et al. 2011).

The purpose of this study was to describe some of the characteristics of the dung removal process performed by individuals and pairs (male and female) of C. humectus hidalgoensis. We measured: 1) the linear distance (m) from the source and duration (minutes) of dung rolling; 2) the size (mm) and weight (g) of the dung ball; and 3) the abundance and density of this species in order to estimate its impact on the ecosystem. The study was done in northern Hidalgo, Mexico, in the vicinity of Jacala (21°11’1.17” N 99°12’2.35” W). The area is located in the Sierra Madre Oriental mountain range, at 1,376 m elevation. Native vegetation is temperate mixed forest dominated by Juniperus flaccida Schltdl., Juniperus deppeana Steud., and Cupressus sp. (all Cupressaceae). Mean annual temperature is 17.8 °C, and the rainy season occurs from June to September. The study site is a 44.37-ha ranch, of which 60% preserves temperate forest remnants. The rest of the property has been induced pasture for livestock for at least the last 38 years. During the sampling period, there were approximately 20 head of cattle and 65 sheep on the property. We studied the dung relocation behavior of C. humectus hidalgoensis in the cattle pasture during 10 days in July 2010. At this site, the mean length of C. humectus hidalgoensis was 10.11 mm (n = 50, range = 7.8–16.1 mm) and mean weight was 0.18 g (n = 50, range = 0.06–0.8 g).

To determine the linear displacement of dung and the total rolling time, we followed individuals from the source cow pat to the burying site. Displacement trajectories were complex, changing directions, but mean linear distance from the source to the burying site was 2.6 m (n = 24, range = 0.28–9.65 m). Ball rolling lasted on average 23.6 min from departure from the cow pat until the burying process began (n = 25, range = 5–65 minutes; Fig. 1a). This suggests that this beetle species may be removing each dung pat, which is approximately 0.10 m² in area, scattering and burying it over an area of 21.24 m² (radius = 2.6 m, i.e. the mean linear displacement), and thus contributing to important ecosystem processes such as seed secondary dispersal and organic material decomposition.

To assess the size and weight of the dung balls, we collected from 50 individuals and 50 pairs recently formed balls that were no more than 1 m from the dung source. We took three measurements of the diameter with a digital caliper to calculate mean ball diameter and obtained the ball’s weight using a digital scale. Balls were significantly larger and heavier when they were constructed by mating pairs.