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MASS DEFOLIATION OF THE MANGROVE TREE *AVICENNIA GERMINANS* BY THE MOTH *HYBLAEA PUERA* (LEPIDOPTERA: HYBLAEIDAE) IN EQUATORIAL BRAZIL

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This note reports mass defoliation of *Avicennia germinans* (L.) Stearn (Avicenniaceae) trees by larvae of the moth *Hyblaea puera* (Lepidoptera: Hyblaeidae; Fig. 1) in mangrove forests of Ajuruteua peninsula near Bragança, Pará state, Brazil (1°03'26"S, 46°45'45"W).

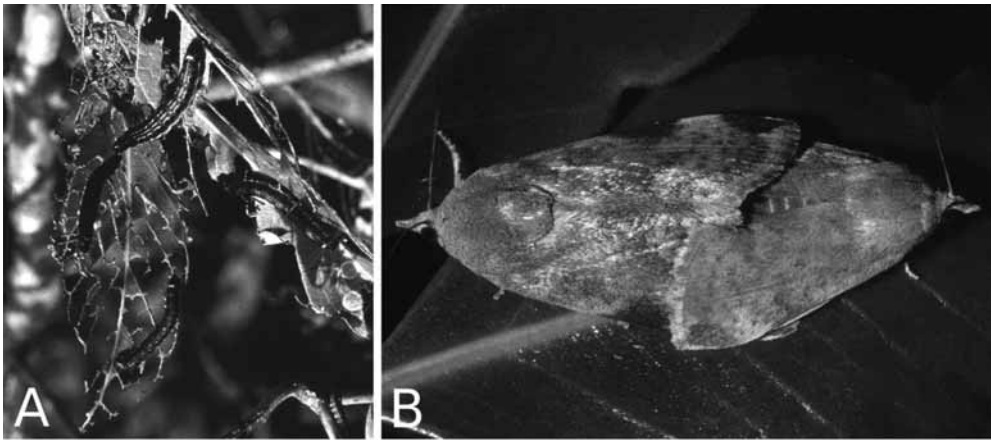

FIG. 1. Larvae (A) and adult individuals (B) of *Hyblaea puera* on *Avicennia germinans*.

Ajuruteua peninsula lies within a continuous mangrove belt of approximately 7000 km^2, extending from Marajó Bay south of the Amazon mouth to St. Marcos Bay, Maranhão (Lacerda *et al.*, 2001). Mangrove forest on the peninsula covers an area of >170 km^2; 5% of this forest are almost pure *A. germinans* stands. *Avicennia germinans* is further a major constituent of the remaining mixed forest (Menezes *et al.* 2003).

To the best of our knowledge, there is no published account on insect herbivory in this region. However, Saur *et al.* (1999) recorded defoliation of *A. germinans* by *H. puera* and larvae of the butterfly *Junonia evarete* after a hurricane on Guadeloupe. Infestation of Asian *Avicennia* species by *H. puera* has further

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been observed in Thailand (Murphy 1990) and India (Pirojshanagar; V. Kulkarni, pers. comm.). Factors controlling *H. puera* outbreaks are unknown, as are the consequences of infestation for the mangrove ecosystem.

On Ajuruteua peninsula, infestation of *A. germinans* by *H. puera* was observed during transition from the rainy to the dry season between March and July 1998. The other mangrove tree species occurring in the area, *Rhizophora mangle* L. and *Laguncularia racemosa* Gaertn. f., were not affected. Leaves of *A. germinans* were skeletonized; defoliated twigs died. The accumulation of frass on the forest floor beneath infested trees produced a distinct smell of ammonia. New shoots were produced directly on large branches and stems 4–5 weeks after defoliation. Further attacks on this fresh foliage were observed during subsequent waves of infestation. Monospecific *A. germinans* stands were completely defoliated, whereas in mixed forest several *A. germinans* trees remained unaffected, even in the immediate neighborhood of infested trees. During a survey from the air in July 1998, defoliated mangrove trees were observed not only on Ajuruteua peninsula, but also along the coastline between Bragança and Marajó Bay.

In our study area, *A. germinans* leaf litter fall shows a distinct peak between May and October. The attack in 1998 led to comparatively early shedding of *A. germinans* leaf material and to a significant reduction of the total amount of leaves shed during this year compared to the years 1996 and 1997 (Mehlig 2001).

According to locals, *H. puera* infestations occur every year. However, massive development with repeated waves of infestation was considered a rare event. The years with intense infestation are locally called "shrimp years" because fishermen found that *A. germinans* defoliation was coupled with higher shrimp catches. Unfortunately, due to lack of local fishery statistics, we cannot document any change in the shrimp production in 1998. Nevertheless, based on the litter fall observations, we may assume that in this year large amounts of *A. germinans* leaf material bypassed the normal benthic food chain of leaf-eating land crabs (Ocypodidae: *Ucides cordatus* L.; Nordhaus, 2004) and detritus-feeding organisms like fiddler crabs (*Uca* spp.; Koch 1999). In the form of easily degradable material like frass, faeces and dead *H. puera* larvae, this part of the annual *A. germinans* leaf production was rapidly removed from the forest by tidal flushing, possibly leading to enhanced nutritional conditions for aquatic organisms like shrimp.

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