

SHORT COMMUNICATION

Harvesting fig seeds from bird feces by an Oriental myrmicine ant species, *Acanthomyrmex ferox* Emery, 1893 (Hymenoptera: Formicidae)

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Nests of the Oriental endemic genus *Acanthomyrmex* often contain fig seeds (Moffet 1985). This genus is well known for having remarkably dimorphic worker castes (Moffet 1986), and the soldiers have huge heads that appear to be important for crushing fig seeds (Moffett 1985; Bushinger & Maschwitz 1998). However, no direct observations of seed crushing behavior by soldiers have been reported and, so far, seed-harvesting behavior has not been observed in nature. *Acanthomyrmex ferox* Emery, 1893 is one of the most common and widespread species in Southeast Asia and has been recorded from Java, Sumatra, Borneo, Peninsular Malaysia and southern Thailand (Moffett 1986). We have been investigating several aspects of the biology of this species in Ulu Gombak, Peninsular Malaysia, since 1992 (Gobin & Ito, 2000, 2003). In this short paper, the seed-foraging behavior of *A. ferox* workers is reported, based on field observations carried out in the Ulu Gombak field station from 1998 to 2002.

All of the foraging workers found by us on the forest floor (N = 100) were minor workers; no foraging soldiers were found. Foraging minor workers were frequently observed in small gaps

in the forest, and along the forest edge, where sunshine filtering through the foliage reached the forest floor. In such microhabitats, minor workers walked on accumulated dead leaves, small dead twigs, ground, and leaves of lower vegetation. Nests of this species, which are usually found in small dead twigs and in the accumulation of dead leaves, were also abundant in such microhabitats.

In order to reveal the sources of fig seeds, we carefully searched for workers of *A. ferox* on the trunks of 20 fig trees, and on and around several decayed fig fruits fallen on the forest floor. However, no workers harvesting fig seeds were observed. On the other hand, minor workers harvesting fig seeds were observed on 20 bird feces on the leaves of lower vegetation. These observations suggest that *A. ferox* workers harvest fig seeds exclusively from bird feces dropped on the ground level (forest floor and lower vegetation). Even though we do not have quantitative data of the distribution of bird feces on the forest floor and lower vegetation, anecdotal observations suggest that feces are more abundant along the forest edge and in the gaps of the forest, perhaps because feces dropped by birds can easily reach the ground level without being intercepted by

foliage in such microhabitats. Nests of *A. ferox* were usually found in such habitats, indicating a possible correlation with suitable foraging sites.

In contrast to field observations, *A. ferox* minors readily collected fresh fig seeds in the laboratory. We gave 20 to 40 fig seeds collected from fallen fruits to five colonies of *A. ferox* kept in the laboratory. All colonies harvested these seeds, indicating that bird feces are not necessary for eliciting harvesting behavior. Perhaps the stickiness of dropped fruit prevents foraging, and the ants prefer dry seeds contained in old bird feces.

In conclusion, foraging minor workers harvest the seeds when encountering them on the ground level. The fate of fig seeds harvested by the ants remains unknown. In the field, we often collected the ant nests without any seeds, indicating that the ants may not often find suitable fig seeds, or they readily consumed fig seeds. Another possibility is that the fig seeds were left when colonies moved to new nest sites. Although the frequency of nest site movement of *A. ferox* is unknown, their fragile nests, such as in hollows of heavily decayed dead twigs and interspaces of dead leaves, suggests frequent nest relocation. Fig seeds left in the old nests may successfully sprout and grow. Furthermore, it is possible that fig seeds sprout inside nests which are occupied by *A. ferox* colonies. Actually, we once observed that several fig seeds sprouted on the plaster-of-Paris floor of an artificial nest chamber occupied by *A. ferox* colony in the laboratory, following which, all colony members moved to the foraging arena. Therefore, seed-harvesting behavior by *A. ferox* seems to contribute to secondary seed dispersal of *Ficus* plants, as shown in *Xylopia aromatica* (Lam.) Mart, in which seeds are dispersed primarily by birds and then secondarily by ants in the Brazilian cerrado savanna (Christianini & Oliveira 2010).

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