

No ark for ants: species loss of ground-dwelling forest ants in oil palm plantations in Sabah, Malaysia (Borneo)

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Introduction

The increase of oil palm (*Elaeis guineensis*) cultivation is cited as a driver of deforestation and biodiversity loss in tropical countries. Oil palm plantations are now covering over 13 million hectares, primarily in Southeast Asia. Malaysia has the highest levels of palm oil production per area but also the highest relative number of endangered species, and impacts on biodiversity are expected. However, to date studies addressing this topic are few.

Forest litter ant species diversity and genetic variation was reduced in smaller primary forest fragments in Sabah (Brühl *et al.* 2003, Bickel *et al.* 2006), implying that ant populations in forest remnants were effectively isolated. Therefore the ground ant community in oil palm plantations surrounding forest remnants was studied to evaluate if this agricultural matrix is suitable as a possible habitat for forest ant species which are recognised as 'ecosystem engineers'.

Results

Transect descriptions and number of ground dwelling ants recorded

Transects	SFR			THFR			DFR		MOP
	1	2	3	1	2	3	1	2	1
Number of bait sites	5	13	13	13	13	10	13	10	10
Distance between bait sites (m)	25	10	10	50	10	100	10	100	20
Transect length (m)	100	120	120	600	120	900	120	900	180
Number of species	3	4	6	11	5	10	1	7	9

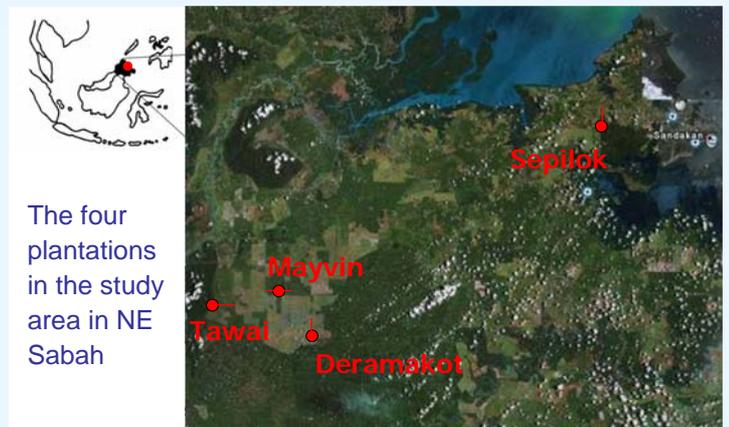
- In total 23 ant species in 14 genera were recorded along nine transects at 100 bait sites in four oil palm plantations.
- Species richness estimates for all samples ranged from 25 to 48 species.
- Species number per transect ranged from 1-11.
- The crazy ant (*Anoplolepis gracilipes*) was the most common ground dwelling ant, present at 70% of all bait sites.
- In the DFR 1 transect only *A. gracilipes* was recorded.



The crazy ant (*A. gracilipes*), an invasive species is dominating the ground dwelling ant community in oil palm plantations.

Methods

The ground dwelling ant community was recorded in two different years in four oil palm plantations varying in undergrowth cover, age and proximity to forest remnants using tuna baits along nine transects (see table). Transects extended from the forest edge into the oil palm plantation at Tawai Hills Forest Reserve (THFR), Deramakot Forest Reserve (DFR) and Sepilok Forest Reserve (SFR). The transect at Mayvin oil palm estate (MOP) was situated in the center of a large plantation area.



Discussion

The ground ant fauna of the studied oil palm plantations is severely reduced compared to surrounding rainforest where 187 ant species were recorded in leaf litter (Brühl *et al.* 2003). The number of species in the different transects did not vary greatly between the four plantations. This was unexpected since a close source pool (SFR, THFR and DFR transects were connected to forest) could promote an influx of forest ant species into the plantations. Instead species numbers were similar to the MOP transect which was situated in the core of a large oil palm estate.

Nine of the 23 ant species of oil palm plantations were never observed at forest ground level. The fourteen remaining species which were also recorded in forest leaf litter were all rare in the plantations. Oilpalm plantations are therefore not considered a suitable habitat for forest ant species and act as effective dispersal barriers.

The most dominant ant, *A. gracilipes*, is a highly invasive tramp ant species. Crazy ants form supercolonies and can cause 'ecological meltdowns' affecting mostly other arthropods but also vertebrates.

Although the impact of *A. gracilipes* on vertebrates was so far never observed outside an island context, it seems possible that this species not only affects the ant community in oil palms but also poses more wide-ranging threats to the residual amphibian, reptile, bird and mammal fauna in oil palm plantations. The overall presence of this species might therefore concern any potential biodiversity in oil palm plantations.