

Is a native rodent competitively dominant over an invasive rodent in lowland agro-forest habitat of the Philippines?

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Abstract

In the lowland agro-forest of the Sierra Madre Biodiversity Corridor (SMBC), it is considered that a native rodent species, *Rattus everetti* is competitively dominant over an invasive pest species, *Rattus tanezumi*. The main aim of this study was to assess the response of *R. tanezumi* following short term removal of *R. everetti*. We tested this experimentally by trapping and removing *R. everetti* from two treatment sites in agro-forest habitat on three occasions over three consecutive months. This was followed by three months of non-removal trapping. Two non-treatment sites were trapped for comparison. Following *R. everetti* removal, *R. everetti* individuals rapidly immigrated into the treatment sites and a significantly higher proportion of *R. tanezumi* females were in breeding condition in the treatment sites than in the non-treatment sites. The results from this study provide evidence of competition between native and invasive rodent species in complex agro-ecosystems. We were also able to demonstrate that *R. everetti* populations are able to recover rapidly from the non-target effects of short-term lethal control in and around agro-forest.

Keywords: interspecific competition, microhabitat use, pest management, Philippines, *Rattus everetti*, *R. tanezumi*, removal experiment

Introduction

In the Philippines, little is known about the interactions that take place between native and non-native rodent species in complex agro-ecosystems. Previous studies suggest that non-native pest species of rodents are restricted to heavily disturbed areas except where native species are absent (Balete et al., 2009; Heaney et al., 1989; Rickart and Heaney, 1991). In the lowland agro-forest of the Sierra Madre Biodiversity Corridor (SMBC), the abundance of the non-native pest species *Rattus tanezumi* is low relative to nearby agricultural habitats, whereas, the abundance of the native rodent *Rattus everetti* is high (Stuart et al., 2008). It is considered that *R. everetti* may block or inhibit *R. tanezumi* from establishing within the agro-forest areas because of interspecific competition (Stuart et al., 2008). The main aim of this study was to assess the response of *R. tanezumi* and the other rodent species in the community following short term removal of *R. everetti* from an agro-forest habitat.

Methods

Trapping grids of 42 cage-traps were placed in two treatment and two non-treatment sites in agro-forest habitat. At each site, a trapping grid of 42 (6 x 7) locally-made single-capture live cage-traps (300 mm x 140 mm x 140 mm) was used. Traps were spaced 15 m apart, giving a grid area of 6750 m². Trapping sites were at least 500 m apart. Trapping was conducted over six sessions from May to October. In the treatment sites, three sessions of *R. everetti* removal trapping was followed by three sessions of non-removal trapping. At each trap station, the vegetation structure ('microhabitat') was assessed by measuring the ground vegetation cover, understorey vegetation cover and canopy cover within a circular quadrat of one metre radius, centred on the trap entrance.

Results

Following *R. everetti* removal, *R. everetti* individuals rapidly immigrated into the treatment sites and a significantly higher proportion of *R. tanezumi* females were in breeding condition in the treatment sites than in the non-treatment sites. Irrespective of the treatment, there was a clear contrast in the use of canopy cover by *R. tanezumi* and *R. everetti*. *R. tanezumi* preferred microhabitat with less canopy cover, which one would associate with severely disturbed habitat with few trees, whereas, *R. everetti* preferred microhabitat with a dense canopy.

Discussion

These findings support the hypothesis that *R. everetti* has a negative effect on female *R. tanezumi* reproductive activity in the non-treatment sites due to interspecific competition. This study thus provides evidence of a native rodent, *R. everetti*, out-competing an invasive rodent, *R. tanezumi*, in a complex agro-ecosystem in the Philippines. Ong and Rickart (2008) suggest that non-native pest rodents predominate in severely disturbed habitat and that practices that minimise habitat disturbance, and instead encourage the regeneration of second-growth forest, would be an effective management action against non-native pest rodents. The results from this study support this suggestion. We were also able to demonstrate that *R. everetti* populations are able to recover rapidly from the non-target effects of short-term lethal control in and around agro-forest.

References

- Balete DS, Heaney LR, Josefa Veluz M, Rickart EA 2009 Diversity patterns of small mammals in the Zambales Mts. Luzon, Philippines, *Mammalian Biology - Zeitschrift für Säugetierkunde* 74:456-466
- Heaney LR, Heideman PD, Rickart EA, Uzzurum RB, Klompen JSH 1989 Elevational zonation of mammals in the Central Philippines. *Journal of Tropical Ecology* 5: 259-280
- Ong PS, Rickart EA 2008 Ecology of native and pest rodents in the Philippines. In: Joshi RC, Singleton GR, Sebastian LS (eds.) *Philippine rats: ecology and management*. p. 101-116, Philippine Rice Research Institute, Science City of Muñoz, Nueva Ecij, Philippines
- Rickart EA, Heaney LR 1991 A new species of *Chrotomys* (Rodentia, Muridae) from Luzon Island, Philippines. *Proceedings of the Biological Society of Washington* 104: 387-398
- Stuart AM, Prescott CV, Singleton GR, Joshi RC 2008 Rodent diversity in the lowland agro-ecosystems of the Sierra Madre Biodiversity Corridor. Philippines, *Sylvatrop* 18:111-126