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# Effects of predator body size on the mortality of tropical forest tree seeds


Taliwas, 50 km south from Danum Valley Fiel Center

## Theme

**Understanding the mechanisms maintaining high levels of tree diversity in tropical forests**

## Aim

Testing the effect of predator body size on the Janzen-Connell hypothesis.

## Background

Janzen and Connell proposed that species-specific seed predators and herbivores could be a key factor in the processes maintaining high levels of tree diversity in tropical forests.
They predicted higher mortality from specialist seed predators near the maternal parent than further away, therefore inhibiting the reproduction of abundant species.
Even though a growing body of evidence suggests that large numbers of species are affected by density- or distance-dependence in tropical forests it is unclear whether this dependence is brought about by pathogens, or by small or large predators.

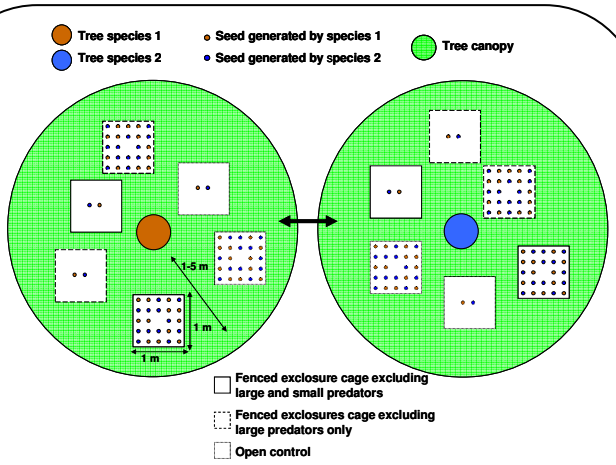


**Figure 1.** The experimental design consists in three exclosure treatments (1x1 m large x 0.5 m tall): (1) fenced exclosure cage excluding both large and small predators, (2) fenced exclosure cage excluding large predators only and (3) open controls; and two densities: high density (24 seeds, 12 seeds from the mother tree (conspecific) and 12 seeds from a distant tree of a different species (heterospecific)) and low density (2 seeds, 1 con- and 1 hetero-specific).

## Experimental design

Situated in an alluvial plain on the east coast of Sabah, Malaysian Borneo, the site covers an area of 5.4 ha.

In February 2007, we selected ten fruiting trees belonging to five species of Dipterocarpaceae. Trees of different species were paired. For each pair, seeds were collected and placed at two densities near (conspecific) and away (heterospecific) from the mother tree (Figure 1). Each seed was tethered with a 3 m string to a nail dug into the soil at the original position of the seed. We investigated the contribution of pathogens, small and large predators to the J-C model separately, using vertebrate exclosure wire cages (1x1 m large x 0.5 m tall) with and without holes, and open controls. We compared seed survival, pathogens and predation on day 18.

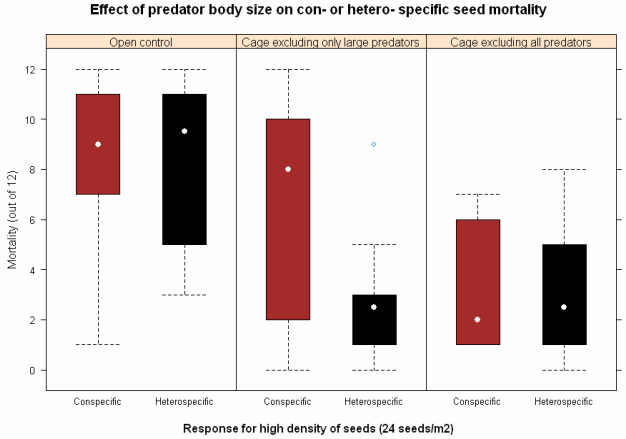


**Figure 2**. Mortality response for the high density treatment in function of predator body size and distance to maternal parent.

## Results & Discussion

In our study, large predators inflicted high seed mortality independently of the distance from the maternal parent (left panel in figure 2). However for small predators, seed survival was only limited when close to the parent tree (J-C model, central panel in figure 2). In the time of the study, pathogens had a low impact on seed survival (right panel in figure 2). Together, these results suggest a combination of limitation of seed dispersal by large predators and higher conspecific seed mortality caused by small predators.

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