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## Seed dispersal potential of Asian elephants

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### Abstract

Elephants, the largest terrestrial mega-herbivores, play an important ecological role in maintaining forest ecosystem diversity. While several plant species strongly rely on African elephants (*Loxodonta africana*; *L. cyclotis*) as seed dispersers, little is known about the dispersal potential of Asian elephants (*Elephas maximus*). We examined the effects of elephant fruit consumption on potential seed dispersal using the example of a tree species with mega-faunal characteristics, *Dillenia indica* L., in Thailand. We conducted feeding trials with Asian elephants to quantify seed survival and gut passage times (GPT). In total, 1200 ingested and non-ingested control seeds were planted in soil and in elephant dung to quantify differences in germination rates in terms of GPT and dung treatment. We used survival analysis as a novel approach to account for the right-censored nature of the data obtained from germination experiments. The average seed survival rate was 79% and the mean GPT was 35 h. The minimum and maximum GPT were 20 h and 72 h, respectively. Ingested seeds were significantly more likely to germinate and to do so earlier than non-ingested control seeds ( $P = 0.0002$ ). Seeds with the longest GPT displayed the highest germination success over time. Unexpectedly, seeds planted with dung had longer germination times than those planted without. We conclude that *D. indica* does not solely depend on but benefits from dispersal by elephants. The declining numbers of these mega-faunal seed dispersers might, therefore, have long-term negative consequences for the recruitment and dispersal dynamics of populations of certain tree species.

### Keywords

*Dillenia indica*; *Elephas maximus*; Seed germination; Survival analysis; Thailand