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Quantity and Quality of Orangutan Seed Dispersal in Gunung Palung National Park, Borneo, Indonesia

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Orangutans are large-bodied frugivores predicted to be effective seed dispersers. We studied Bornean orangutan (*Pongo pygmaeus wurmbii*) seed dispersal effectiveness, by measuring the quantity of seeds dispersed and the quality of dispersal in Gunung Palung National Park, Borneo, Indonesia (August 2018 to August 2019). For dispersal quality we conducted germination experiments, measured germination rates, and modeled dispersal distances. We systematically collected orangutan fecal samples, feeding behavior, and GPS tracks during focal follows. We sieved 549 fecal samples collected from 36 orangutans and identified the seeds, and of the fecal samples collected 75.2% contained seeds. A total of 24 genera were dispersed via endozoochory. Germination experiments were conducted with orangutan defecated seeds and seeds from fruits. A significantly higher percent of orangutan defecated seeds germinated for 5 out of 6 genera than control seeds with pulp ($p < 0.01$). A significantly higher percent of orangutan defecated seeds germinated for 3 out of 6 genera compared to control seeds without pulp ($p < 0.01$). Gut transit times in wild orangutans ranged from 39.5 to 87 hours. Finally, we modeled seed dispersal distances using orangutan movement tracks ($n = 30$) with gut passage durations of 45 and 60 hours. Gut retention times of 45 hours resulted in a mean dispersal distance of $507 \pm 123\text{m}$, and 60 hours resulted in a mean distances of $592 \pm 115\text{m}$. We conclude orangutans are effective seed dispersers, as orangutans disperse a wide variety of genera over medium to long distances and defecated seeds exhibit high germinability.

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