**Appendix S1**

*Vegetation Comparison*

We used data collected by one of the authors from one hectare vegetation plots at each site. In these plots, we identified all trees, palms, and lianas with a diameter at breast height greater than 10 cm to the species level when possible, and if not, to the genus level (Supplementary data set 3). To compare the vegetative composition of Santa Rosa and Rey Zamuro, we calculated the Jaccard Index (number of shared genera/total number of genera; Janson & Vegelius 1981). Additionally, we used the data from this project, Tinigua National Park (Meta, Colombia), online herbarium specimens from the Field Museum, Missouri Botanical Garden, and Kew, and literature values from a Google Scholar search of “’species name’ AND seed” to determine the seed width of all the species dispersed by endozoochory. We used a Fligner-Policello test to determine whether the median seed width available at the two sites differed. There was no difference in the median seed width of trees, palms, and lianas dispersed by endozoochory at the two sites (FP Test: U = -0.292, p = 0.773).

**Appendix S2**

*Permutation Test for Equal Variances*

We used a permutation test to determine whether the distribution of sizes of seeds dispersed by each species had equal variance. This is an assumption by the Wilcoxon-Mann-Whitney test to compare medians. For each pair of primate species, we first calculated the actual differences in variance between the two species. Then, we permuted which seeds were dispersed by which species and recalculated the difference between variances 10,000 times. We next calculated the proportion of those permutations that were more extreme, on either tail, than the actual difference in variance between the two species. If this proportion was less than 0.05, we considered the species to have unequal variances.

**Table S1.** Results of two-tailed permutation tests (n=10,000) for differences in variance in the distribution of seed sizes dispersed by each species, *Lagothrix lagothricha, Alouatta seniculus,* and *Sapajus apella*. Results with p-values less than 0.05 indicate a statistically significant difference in variance.

|  |  |
| --- | --- |
| **Comparison** | **p-value** |
| *Lagothrix lagothricha* vs. *Alouatta seniculus* | < 0.001 |
| *Lagothrix lagothricha* vs. *Sapajus apella* | <0.001 |
| *Alouatta seniculus* vs. *Sapajus apella* | 0.010 |

The variance in the size of seeds dispersed by each species was not equal, except for between *Alouatta seniculus* and *Sapajus apella*. Therefore, we use the Fligner-Policello test to relax the assumption of equal variances when comparing the median seed size dispersed by each group.

**Appendix S3**

*Overall Seed Dispersal without Seeds < 1.1 mm*

*Lagothrix lagothricha* and *Sapajus apella* consumed *Miconia ternatifolia* (width = 0.8 mm) and *Ficus* sp. (width = 1 mm) in quantities in the hundreds to thousands, while *Alouatta seniculus* did not consume them at all. As mentioned in the Discussion, the large quantity of these seeds in the fecal samples may inhibit successful recruitment of these species in the absence of secondary dispersal. Thus, to account for this and to better visualize the dispersal of medium and large seeds of *L. lagothricha* and *S. apella*, we perform the analysis of median seed size dispersed without *M. ternatifolia* and *Ficus* sp.

**Table S2.** Comparisons in the median seed width dispersed by *Lagothrix lagothricha* (Ll), *Alouatta seniculus* (As), and *Sapajus apella* (Sa), within species among adult males (M), adult females (F), and juveniles (J), and post-hoc comparisons, excluding *Miconia ternatifolia* and *Ficus* spp. Represented is the U statistic and p-value. In bold are significant results (p < 0.003). For the analysis including smaller seeds, refer to Table 3 in the main text. Sample sizes, equal to the number of seeds dispersed, are as follows: *L. lagothricha* (total: 2011, adult males: 359, adult females: 1450, juveniles: 202), *A. seniculus* (total: 3960, adult males: 1595, adult females: 1898, juveniles: 467), *S. apella* (total: 2782, adult males: 871, adult females: 1429, juveniles: 482).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Hypothesis** | **Comparisons** | **U Statistic** | **p-value** | **Result** |

**Interspecific Comparison**

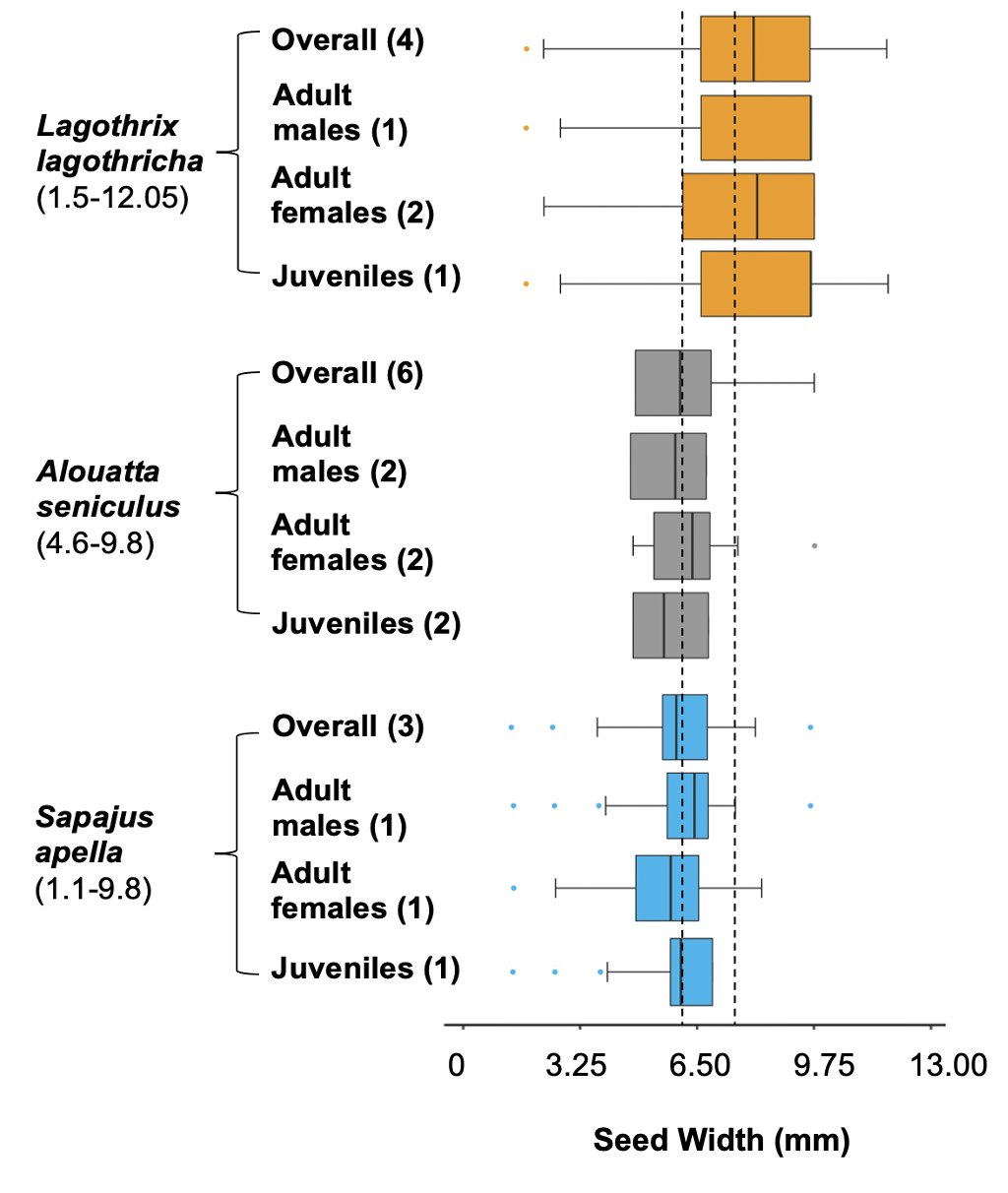
|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Ll > As > Sa | **Ll (8.15) vs. As (5.90)**  **Ll (8.15) vs. Sa (5.90)**  **As (5.90) vs. Sa (5.90)** | **-33.3**  **-41.8**  **-3.5** | **<0.001**  **<0.001**  **<0.001** | Ll > As > Sa |

**Intraspecific Comparison**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Ll: M > F > J | **M (9.80) vs. F (8.15)**  J (9.80) vs. M (9.80)  **J (9.80) vs. F (8.15)** | **-10.9**  0.6  **-9.5** | **<0.001**  0.621  **<0.001** | M = J > F |
| As: M > F > J | **M (5.90) vs. F (6.30)**  J (5.50) vs. M (5.90)  **J (5.50) vs. F (6.30)** | **4.8**  1.7  **5.6** | **<0.001**  0.087  **<0.001** | F > M = J |
| Sa: M > F > J | **M (6.40) vs. F (5.60)**  **J (5.60) vs. M (6.40)**  **J (5.60) vs. F (5.60)** | **-8.1**  **4.9**  **-3.2** | **<0.001**  **<0.001**  **0.002** | M > J > F |

**Post-hoc Comparison**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| LlF and As | **LlF (8.15) vs. As (5.90)** | **-20.3** | **<0.001** | **LlF > As** |
| AsF and Ll | **AsF (6.30) vs. Ll (8.15)** | **22.7** | **<0.001** | **AsF < Ll** |
| SaM and As | SaM (6.40) vs. As (5.90) | -1.6 | 0.105 | SaM = As |



**Figure S1.** Boxplots of the widths (mm) of seeds dispersed by each species (*Lagothrix lagothricha*: N = 2011 seeds*, Alouatta seniculus*: N = 3960*, Sapajus apella*: N = 2782) and age/sex class (adult males, adult females, juveniles). These boxplots do not include the smallest seeds (*Miconia ternatifolia*:0.8 mm*, Ficus* sp.: 1 mm, *Dipteryx micrantha*: 20 mm), as these were excluded from this analysis. The fecal samples for *L. lagothricha* are from Rey Zamuro (November 2018 to March 2020) and for *A. seniculus* and *S. apella* are from Santa Rosa (September to December 2006), both located in Meta, Colombia. Line: median, box: interquartile range, points: outliers, defined as greater than 1.5 times the interquartile range away from the first or third quartile.Under each species name is the range of seed sizes (included in the statistical analyses) they dispersed and next to each age/sex class is the number of individuals sampled. The dotted lines represent the thresholds for “large” and “very large” seeds used in this study: ≥ 5.9, > 7.5). For the analysis including smaller seeds, refer to Figure 2 in the main text.