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004 EPA STAR Graduate Fellowship Conference *Next Generation Scientists—Next Opportunities*

Understanding chimpanzee seed dispersal:
do microhabitat influences and post-dispersal seed fate matter?


Burned area in Nyungwe Forest National Park

verview

e loss of tropical forests due to anthropogenic vity is one of the greatest threats to global climate nge. These forests support a large percentage of the ld's plant and animal species. Our ability to protect these mmunities and mitigate global climate change requires a er understanding of tropical forest processes including eneration dynamics and the maintenance of tropical diversity.

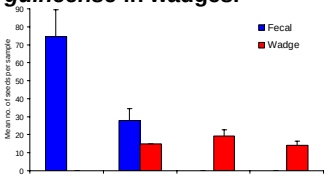
mates are important contributors to these processes ough their seed dispersal behaviors: (1) they consume e quantities of fruit, (2) they tend to swallow and not sticate larger seeds (≥ 5 mm), (3) have long gut retention es and (4) have large home ranges that facilitate long- ance dispersal away from underneath the parent crown.

research examines the post-dispersal fate of seeds osited by chimpanzees through a combination of field ervations and controlled experiments in the Nyungwe ional Park, Rwanda. The 970 km^2 Park is part of the ertine Rift, an area recognized for its high proportion of emic plants and animals. This is the first study to detail ecological importance of chimpanzee seed dispersal in a ntane environment by following the persistence and mination of dispersed seeds at the site of seed osition.

First Field Season

I used six microhabitat variables to characterize the deposition sites for chimpanzee dispersed seeds during a four month period. Seeds were dispersed in two forms: in a "wadge" and in feces.

Chimpanzees dispersed the seeds of two large, mature forest tree species although not consistently through time. **Seed dispersal behavior transitioned from the dispersal of *Olea capensis* seeds in chimpanzee feces to the dispersal of *Syzygium guineense* in wadges.**



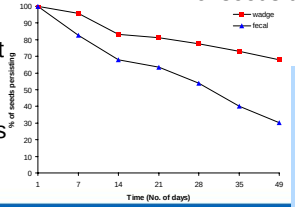
N= 49 (257) and 42 (56) for fecal and wadge samples, respectively, containing seed (total no. of samples).

Wadging

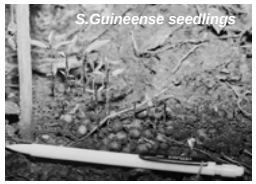
- The orally discarded fruit mass composed of pulp, skin, fiber and seeds.
- The ecological implications of wadging have largely been ignored
- In this study, wadged seeds experienced higher persistence and germination rates than defecated seeds
- Uniquely a chimpanzee behavior
- Few seed species are wadged
- Saliva may have certain properties that afford an advantage to the seed*

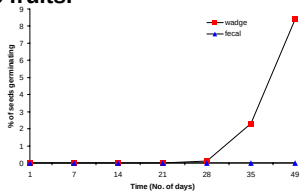
* For additional discussion see, Lambert, J.E. 2001. Red-tailed guenons (*Cercopithecus ascanius*) and *Strychnos mitis*: Evidence for plant benefits beyond seed dispersal. International Journal of Primatology 22(2): 189-201.

Although the seed species were different, wadged seeds experienced a greater likelihood of persistence than defecated seeds. Wadged seeds were deposited in markedly different habitats from defecated seeds based on a PCA of the microhabitat variables. The increase in persistence for wadge-dispersed seeds may be attributed to significant differences in microhabitat variables of wadge versus defecated seeds. These variables include elevation, slope, and distance to an adult conspecific.



Germination trials with *S. guineense* seeds further highlight the importance of wadging by chimpanzees. ***S. guineense* seeds deposited in wadges experienced higher germination rates than seeds planted as whole fruits.**





This study emphasizes the effects of elevation and slope on seed persistence and germination in montane forests. A greater proportion of seeds persisted in sites with higher elevations, while a greater proportion of seeds germinated in sites with lower slopes and higher elevations.

Variation in disperser handling behavior of different fruit species is significant for seed fate.

Study Continuation

In the second phase of my research, I will explore the hypothesis that **chimpanzees improve seed persistence and germination through their deposition of seeds into specific microsites**. Two experiments will be established to dissect aspects of this hypothesis. Questions guiding these experiments include: Does habitat type and elevation affect seed persistence and germination of seeds dispersed by chimpanzees? And, how does seed-handling by chimpanzees influence secondary dispersal and post-dispersal seed fate?

The Nyungwe Seed Dispersal Project
My study is a component of a larger project of the Conservation Project of Nyungwe Forest (PCFN/WCS) and the Center for Tropical Ecology & Conservation to tease apart the complex dynamic of ecological processes in the Nyungwe Forest National Park. Additional research includes long-term data sets of phenology, plant and animal inventories, regeneration studies, and human impact. Please see www.nyungwe.org for information on the Nyungwe Forest.

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The First Field Season results are *in review* for publication in the journal *Biotropica.* Please contact me at nicole_gross@antiochne.edu for additional detail.