

Estimation of the number of tree species in French Guiana by extrapolation of permanent plots richness

Supplementary Material

The supplementary material contains three sections. Section 1 derives the variance of the product of two independent random variables. Section 2 discusses the dominance of a small number of species. Section 3 provides information to reproduce the results of the paper. References are in the article.

1. Variance of the product of two independent random variables

Let X and Y two random variables, here the estimators of c and A^z .

The variance of their product XY is

$$\text{Var}(XY) = \mathbb{E}(X^2Y^2) - \mathbb{E}(XY)^2 = \mathbb{E}(X^2)\mathbb{E}(Y^2) + \text{Cov}(X^2, Y^2) - [\mathbb{E}(X)\mathbb{E}(Y) + \text{Cov}(X, Y)]^2$$

If X and Y are independent (this applies to c and A^z), covariances are 0 and the variance reduces to

$$\begin{aligned}\text{Var}(XY) &= \mathbb{E}(X^2)\mathbb{E}(Y^2) - [\mathbb{E}(X)\mathbb{E}(Y)]^2 \\ &= [\text{Var}(X) + \mathbb{E}(X)^2][\text{Var}(Y) + \mathbb{E}(Y)^2] - [\mathbb{E}(X)\mathbb{E}(Y)]^2 \\ &= \text{Var}(X)\text{Var}(Y) + \mathbb{E}(X)^2\text{Var}(Y) + \mathbb{E}(Y)^2\text{Var}(X)\end{aligned}$$

2. Hyperdominance

Hyperdominance is a characteristic of many distributions of species. Figure S1 shows the accumulation of individuals from the most abundant to the rarest species. Only 90 species, i.e. 4% of their estimated number, contain half the number of trees.

3. Reproducibility

The code and data to reproduce this paper are available on GitHub (<https://github.com/EricMarcon/JTE-22-105>) as an RStudio project with an R Markdown document that can be downloaded.

The Guyadiv database is not publicly available so species are anonymized in abundance data.

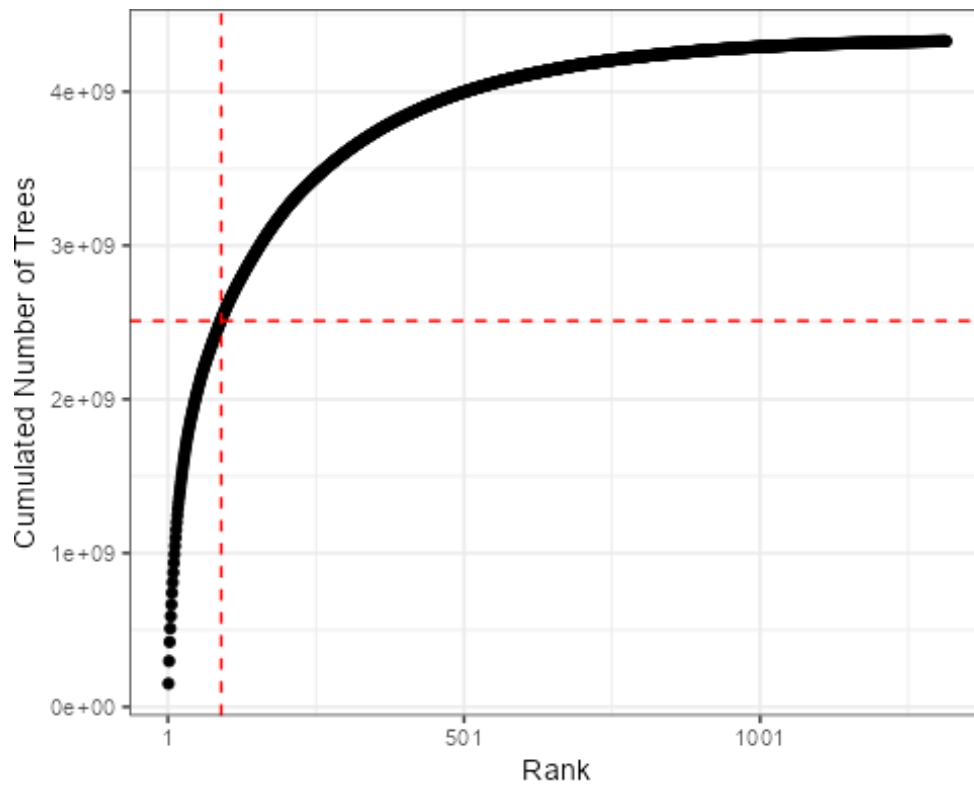


Figure S1: Accumulation of the number of individuals from the most abundant to the rarest species. The horizontal line corresponds to half the individuals. The vertical line allows reading the corresponding rank of the species.