Supplementary Table 1. Analysis of covariance (ANCOVA) examining the effect of species identity of seedlings and target adults on aboveground biomass of six-month old seedlings grown in the understory of the mainland forest, either near a conspecific adult, or near adults of each of the other species. Two additional ANCOVAs were constructed that either controlled for foliar damage caused by herbivores or pathogens. Because F-values of average negative feedback were not significantly reduced by inclusion of foliar herbivore or pathogen damage (and see Supplementary Fig. 2), these antagonists are not likely drivers of negative feedback.

		Not controlling for damage	Herbivore damage	Pathogen damage
Effect	d.f.	F ratio	F ratio	F ratio
Seedling species	4, 147	**56.38*****	**53.18*****	**64.84*****
Adult species	4, 38	0.81	0.85	0.88
Seedling species × adult species	16, 147	**2.64****	**2.52****	**2.36****
Average *Apeiba* feedback	1, 147	**6.28***	**5.39***	**5.47***
Average *Beilschmiedia* feedback	1, 147	**13.57*****	**13.61*****	**6.92****
Average *Brosimum* feedback	1, 147	**12.74*****	**13.70*****	**10.91****
Average *Lacmellea* feedback	1, 147	**20.11*****	**18.35*****	**18.41*****
Average *Simbaruba* feedback	1, 147	**9.79****	**10.40****	**8.85****
Initial seedling mass ($\log^{10}$)	1, 706†	**228.74*****	**251.04*****	**193.81*****
Days between initial and final census	1, 706†	**6.05***	**5.51***	**4.98***
Proportion herbivory damage	1, 706	---	**57.81*****	---
Proportion foliar-fungal damage	1, 706	---	---	**40.33*****

All models (SAS procedure MIXED) included 'site × adult species' and 'site × seedlings species × adult species' as random effects, with site defined as a single adult tree. †: denominator d.f. = 707 for the model not including herbivory or foliar-fungal damage as a covariate. *P < 0.05; ** P < 0.01; *** P < 0.001

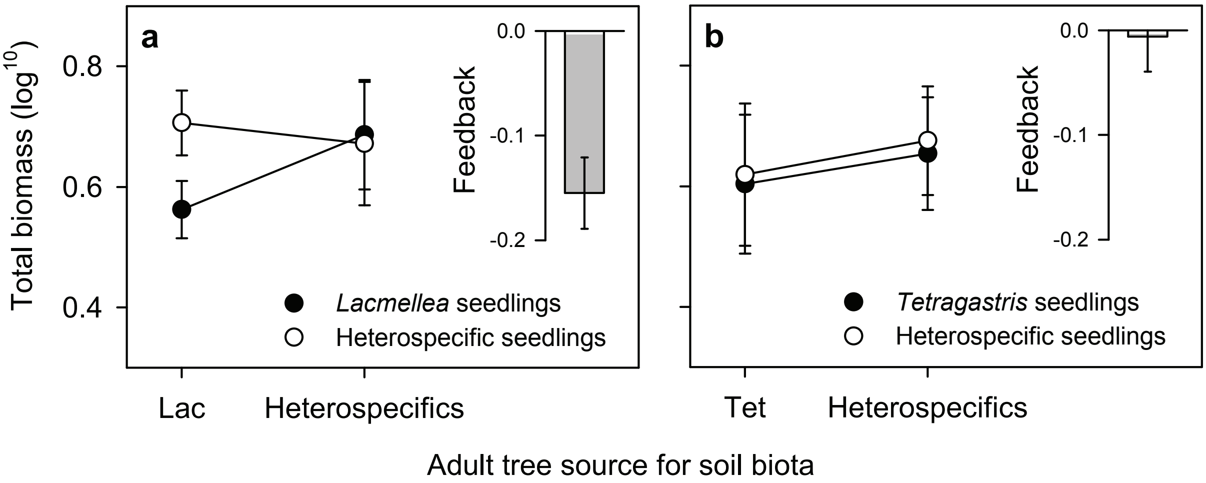
Supplementary Table 2. Logistic regression examining the relationship between estimated above ground biomass of seedlings measured at the end of the wet season (January 2009) and survival at the end of the subsequent dry season (May 2009). Proportion of seedlings surviving in each census is indicated in parentheses. Consistent across tree species, larger seedlings measured in January 2009 had a higher probability of surviving through the first dry season when measured in (May 2009) than did smaller seedlings.

Species	Estimate	S.E.	Chi-square	Initial number of seedlings planted in July 08	Number of seedlings surviving in Jan. 09	Number of seedlings surviving in May 2009
Apeiba aspera	4.441	0.790	31.61***	265	174 (0.66)	81 (0.31)
Beilschmiedia pendula	0.266	0.067	15.78***	265	201 (0.76)	156 (0.59)
Brosimum alicastrum	0.894	0.236	14.40***	215	167 (0.78)	157 (0.73)
Lacmellea panamensis	2.310	0.424	29.64***	265	217 (0.82)	176 (0.66)
Simbarouba amara	1.048	0.320	10.70***	260	186 (0.72)	156 (0.60)

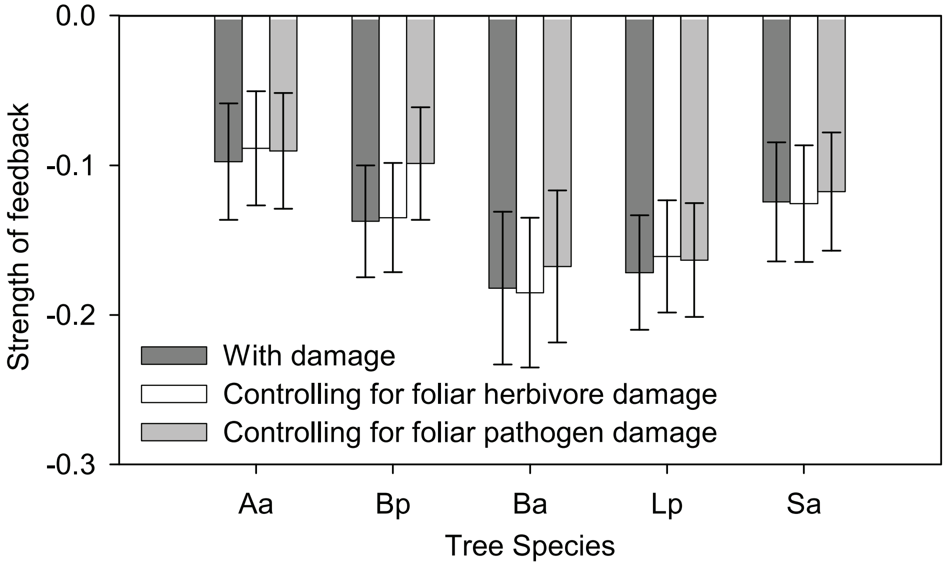
*** $P < 0.001$

Supplementary Table 3. Contrasts examining the strength of average feedback based on mortality per tree species at the end of the first wet season (January 2009), after the first dry season (May 2009) and near the end of the second wet season (November 2009). Each model (SAS procedure GLIMMIX) included seedlings species and adult species (and their interaction) as fixed effects, and 'site × adult species' and 'site × seedlings species × adult species' as random effects, with site defined as a single adult tree. Mortality-based feedbacks become more negative over time.

	Feedback based on mortality January 2009				Feedback based on morality May 2009				Feedback based on mortality November 2009			
Species	Estimate	S.E.	*F*	P	Estimate	S.E.	*F*	P	Estimate	S.E.	*F*	P
A. aspera	0.2107	0.4960	0.18	0.6716	-0.9197	0.5259	3.06	0.0823	-1.4453	0.6768	4.56	0.0343
B. pendula	0.5021	0.5571	0.81	0.3689	-0.4993	0.5060	0.97	0.3254	-1.0242	0.4656	4.84	0.0293
B. alicastrum	0.5419	0.7341	0.54	0.4615	-0.5419	0.7083	0.59	0.4443	-0.9182	0.6495	2.00	0.1595
L. panamensis	0.3541	0.5215	0.46	0.4982	-1.0664	0.5013	4.53	0.0350	-1.4467	0.4643	9.71	0.0022
S. amara	0.5272	0.5218	1.02	0.3140	-0.4756	0.5145	0.85	0.3568	-0.3850	0.5314	0.52	0.4698



Supplementary Figure 1. Performance of seedlings of both the target species and heterospecific seedlings when grown with soil biota collected from conspecific adults versus from heterospecific adults. The resulting interaction between seedling species and adult biota source was used to define the strength and direction of feedback. For example, **a**) *Lacmellea* in the shadehouse experiment exhibited strong negative feedback (insert) because their seedlings performed more poorly with biota from their own adults relative to with heterospecific biota, whereas heterospecific seedlings performed better with *Lacmellea* biota relative to with their own biota (i.e., significant interaction). **b**) Although *Tetragastris* tended to perform more poorly with soil biota from their own adults than with soil biota from adults of other species, no feedback occurred because seedling response of heterospecifics mirrored that of *Tetragastris* (i.e., no interaction).



Supplementary Figure 2. Comparison between strengths of negative feedback when no damage was controlled for (same as presented in Fig. 2a of the text), when percent herbivore damage was included as a covariate in the model, or when percent foliar pathogen damage was included as a covariate in the model. Total number of seedlings analyzed = 749.

Supplementary Discussion

When compared across both experiments, *L. panamensis* and *B. alicastrum* changed rank in both their strengths of growth-based negative feedback and their relative abundances (see Figures 1c and 2b). Such shifts may have been caused by variation in the composition of soil biota between the two forests. To confirm this hypothesis, further studies are required that characterize soil biota and their contribution to feedbacks at the seedling stage (and other developmental stages) across larger geographical scales.

Supplementary Equations

The probability of mortality (*m*) for species i was determined by the following:

$$m_i = (P_i M_i) \Big/ \sum_{i=1}^{S} P_i M_i$$

where S is the number of species in the population, P_i is the proportion of that species in the population, and M_i is its estimated per capita adult mortality rate. In simulations where species were assumed to be equivalent, M for all species was set to 1. In the simulation where this assumption was relaxed, M_i differed among species and was estimated as the inverse of adult longevity (L_i). Species-specific adult longevities were estimated using the equation $L_i = -233.45 \times \ln(g_i) + 452.98$, where g was the growth rate of that species (Laurance et al. 2004).

The probability of establishment (*e*) for species i was determined by the following:

$$e_i = (p_i F_i E_i) \Big/ \sum_{i=1}^{S} p_i F_i E_i$$

where p_i is the proportion of that species in the dispersal neighborhood, F_i is the contribution of feedback, and E_i is the relative growth rate of that species. The contribution of feedback was determined by:

$$F_i = \left(\sum_{d=1}^{D} \overline{f_i^d}\right) / D$$

where D is the radius that contains cells that influence the composition of soil biota. In this term, dividing by D inversely scales the individual adult effects with distance from the focal cell. In all simulations, this "interaction neighborhood" was assumed to contain the focal cell and the eight cells surrounding the focal cell. For each distance d from the focal cell, the average effects of plants within this neighborhood on growth of species i ($\overline{f_i^d}$) was determined by:

$$\overline{f_i^d} = \sum_{j=1}^{S} (P_j^d f_{ij})$$

where f_{ij} is the influence of soil biota associated with species j on the growth of species i and P_j^d is the proportion of soil biota influenced by species j at distance d. In simulations where all species were assumed to be equivalent, E for all species was set to 1. In the simulations allowing species-specific variation in life-history parameters, species specific E_i was estimated from the average growth rates in the shadehouse experiments.

31. Laurance, W. F., et al. Inferred longevity of Amazonian rainforest trees based on a long-term demographic study. *Forest Ecol. Manag.* **190**,131-143 (2004).