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Marine and Freshwater Research

Supplementary Material

When and how much a non-native tree species changes the temporal patterns and biomass of litterfall input in subtropical streams

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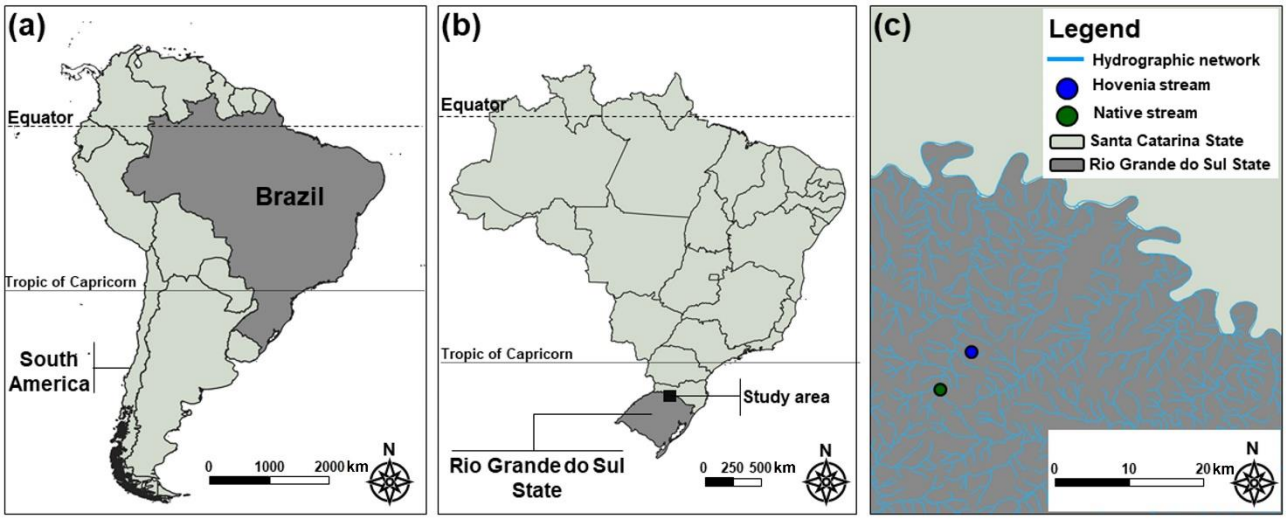

Fig. S1. Localisation of (*a*) Brazil, (*b*) state of Rio Grande do Sul, and (*c*) study area and studied streams. Prepared using QGIS (ver. 3.4, for creation of maps) and Microsoft PowerPoint 365 (formatting and presentation of maps). The spatial data were obtained from the database provided by DIVA-GIS (https://www.diva-gis.org/Data) (the countries in *a*), by Instituto Brasileiro de Geografia e Estatística - IBGE (https://www.ibge.gov.br) (Brazil and the Brazilian states in *b* and *c*), and by Fundação Estadual de Proteção Ambiental Henrique Luís Roessler - FEPAM (http://www.fepam.rs.gov.br) (hydrographic network in *c*).

Table S1. Results of repeated-measures ANOVA evaluating the variation of allochthonous litterfall inputs throughout the seasons for the studied streams.

Factors	d.f.	SS	MS	*F*	*P*
Native stream					
Leaves					
Error: stream collection point	2	0.428	0.214		
Seasons	3	1.993	0.664	6.0	0.0024*
Residuals	30	3.297	0.1099		
Branches					
Error: stream collection point	2	0.272	0.136		
Seasons	3	9.814	3.271	8.9	< 0.001*
Residuals	30	11.021	0.367		
Reproductive parts					
Error: stream collection point	2	3.371	1.686		
Seasons	3	11.830	3.943	9.1	< 0.001*
Residuals	30	12.980	0.433		
Total					
Error: stream collection point	2	0.692	0.346		
Seasons	3	1.301	0.433	4.1	0.015*
Residuals	30	3.166	0.105		
Hovenia stream					
Leaves					
Error: stream collection point	2	0.479	0.239		
Seasons	3	5.397	1.798	3.6	0.025*
Residuals	30	15.139	0.504		
Branches					
Error: stream collection point	2	1.399	0.699		
Seasons	3	7.769	2.589	5.4	0.004*
Residuals	30	14.465	0.482		
Reproductive parts					
Error: stream collection point	2	2.558	1.279		
Seasons	3	5.600	1.866	1.6	0.215
Residuals	30	35.48	1.183		
Total					
Error: stream collection point	2	0.154	0.077		
Seasons	3	8.362	2.787	18.1	<0.001*
Residuals	30	4.619	0.154		

The degrees of freedom (d.f.), sum of squares (SS), mean squares (MS), test value (*F*) and test significance (*P*) are described. For paired comparisons, see Table 1. Statistical differences between seasons are given by: *, $P < 0.05$.

Table S2. Results of repeated-measures ANOVA evaluating the variation of allochthonous litterfall inputs from native tree species and *H. dulcis* in the *Hovenia* stream.

Factors	d.f.	SS	MS	*F*	*P*
Native leaves					
Error: stream collection point	2	1.662	0.803		
Seasons	3	6.251	2.084	2.9	0.052
Residuals	30	21.722	0.724		
Native branches					
Error: stream collection point	2	8.798	4.399		
Seasons	3	3.721	1.240	2.6	0.073
Residuals	30	14.523	0.484		
Native reproductive parts					
Error: stream collection point	2	0.012	0.006		
Seasons	3	1.658	0.553	5.6	0.003*
Residuals	30	2.968	0.098		
Native total					
Error: stream collection point	2	4.200	2.100		
Seasons	3	9.183	3.061	10.6	<0.001*
Residuals	30	8.652	0.288		
H. dulcis leaves					
Error: stream collection point	2	4.485	2.242		
Seasons	3	42.750	14.252	14.9	<0.001*
Residuals	30	28.640	0.955		
H. dulcis branches					
Error: stream collection point	2	0.371	0.185		
Seasons	3	19.200	6.399	13.6	<0.001*
Residuals	30	14.111	0.470		
H. dulcis reproductive parts					
Error: stream collection point	2	2.382	1.191		
Seasons	3	5.170	1.722	1.5	0.242
Residuals	30	35.130	1.171		
H. dulcis total					
Error: stream collection point	2	2.946	1.476		
Seasons	3	39.810	13.271	24.3	<0.001*
Residuals	30	16.400	0.547		

The degrees of freedom (d.f.), sum of squares (SS), mean squares (MS), test value (*F*) and test significance (*P*) are described. For paired comparisons, see Table 2. Statistical differences between seasons are given by: *, $P < 0.05$.

Table S3. Comparative allochthonous litterfall inputs (g m^{-2} $month^{-1}$; mean ± s.d.) of leaves, branches, reproductive parts and total litterfall in the studied streams.

Litterfall fractions	Native stream	*Hovenia* stream	*t* test
Autumn (d.f. = 16)			
Leaves	51.4 ± 24.1	93.3 ± 67.0	t = 1.06, P = 0.302
Branches	2.7 ± 0.8	18.3 ± 9.4	t = 8.55, P < 0.001*
Reproductive parts	0.8 ± 1.8	14.2 ± 30.5	t = 2.04, P = 0.057
Total	**54.9 ± 25.6**	**126.1 ± 56.7**	***t* = 3.57, *P* = 0.002***
Winter (d.f. = 16)			
Leaves	63.5 ± 22.0	25.7 ± 7.7	t = -5.26, P < 0.001*
Branches	4.6 ± 1.9	5.5 ± 6.4	t = -0.18, P = 0.857
Reproductive parts	0.1 ± 0.2	3.1 ± 3.6	t = 2.75, P = 0.013*
Total	**68.3 ± 21.7**	**34.3 ± 7.3**	***t* = -5.31, *P* < 0.001***
Spring (d.f. = 16)			
Leaves	56.9 ± 23.3	45.7 ± 20.1	t = -1.11, P = 0.281
Branches	18.2 ± 15.7	9.8 ± 7.3	t = -1.47, P = 0.158
Reproductive parts	3.7 ± 5.0	7.9 ± 9.4	t = 1.00, P = 0.329
Total	**78.8 ± 35.3**	**63.5 ± 21.9**	***t* = -1.09, *P* = 0.291**
Summer (d.f. = 16)			
Leaves	32.3 ± 6.7	29.8 ± 13.0	t = -0.90, P = 0.377
Branches	8.9 ± 6.8	6.5 ± 4.0	t = -0.57, P = 0.578
Reproductive parts	5.1 ± 4.2	0.9 ± 0.6	t = -3.49, P = 0.002*
Total	**46.3 ± 11.6**	**37.3 ± 13.5**	***t* = -1.52, *P* = 0.147**
Year (d.f. = 70)			
Leaves	51.1 ± 22.7	48.6 ± 43.6	t = -1.75, P = 0.084
Branches	8.5 ± 10.2	10.1 ± 8.5	t = 0.98, P = 0.329
Reproductive parts	2.4 ± 3.9	6.5 ± 16.2	t = 1.65, P = 0.102
Total	**62.1 ± 27.1**	**65.3 ± 47.9**	***t* = -0.62, *P* = 0.535**

The test value (*t*), degrees of freedom (d.f.) and test significance (*P*) are described. Statistical differences between seasons are given by: *, $P < 0.05$.