

# **Urban Dominant Trees Followed the Optimal Partitioning Theory and Increased Root Biomass Allocation and Nutrient Uptake under Elevated Nitrogen Deposition**

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**Table S1.** List of plant functional traits selected

Trait	Unit	Description	Characteristic	Function
<b>Aboveground traits</b>				
SLA	cm <sup>2</sup> /g	Specific leaf area	Morphology	Assimilate utilization, Light interception, Palatability, Space niche in canopy
LA	cm <sup>2</sup>	Leaf area	Morphology	Light interception
LT	cm	Leaf thickness	Morphology	Water storage, Palatability
LDMC	%	Leaf dry matter content	Morphology	Assimilate utilization, Palatability, Decomposability
LTD	g/cm <sup>3</sup>	Leaf tissue density	Morphology	Assimilate utilization, Decomposability, Resource storage
LNC	%	Leaf N content	Chemical composition	Photosynthetic capacity, Palatability
LCC	%	Leaf C content	Chemical composition	Assimilate utilization, Leaf architecture
LCC/LNC	%	Leaf C/N ratio	Chemical composition	Leaf growth resource limitation
PL	cm	Plant height	Morphology	Light interception, Avoidance

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<b>Belowground traits</b>				
SRL	cm/g	Specific root length	Morphology	Assimilate utilization, Nutrient uptake, Space niche in soil, Root forage efficiency
SRA	cm <sup>2</sup> /g	Specific root area	Morphology	Assimilate utilization, Nutrient uptake, Space niche in soil
RL	cm	Root length	Morphology	Space niche in soil, Nutrient acquisition strategy
RA	cm <sup>2</sup>	Root area	Morphology	Space niche in soil, Nutrient acquisition strategy
RNC	%	Root N content	Chemical composition	Efficiency of nitrogen transport and utilization
RCC	%	Root C content	Chemical composition	Efficiency of carbon transport and utilization, Root architecture
RCC/RNC	%	Root C/N ratio	Chemical composition	Root growth resource limitation, Soil nutrient resource limitation
RTD	g/cm <sup>3</sup>	Root tissue density	Morphology	Assimilate utilization, Water transport, Resource storage
BRI	cm <sup>-1</sup>	Branching intensity	Morphology	Fungal colonization
RD	cm	Average root diameter	Morphology	Growth time strategy, Life span

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**Table S2.** Effects of N addition (no, low, and high N) and tree species (*Pinus tabuliformis* and *Fraxinus chinensis*) on plant biomass (aboveground, belowground and total biomass) and root-shoot ratio. Asterisks were added to *P* values at the levels of “\*\*\*” for *P* < 0.001, “\*\*” for *P* < 0.01, and “\*” for *P* < 0.05.

Variable	N addition (N)		Tree species (T)		N × T	
	F value	<i>P</i> value	F value	<i>P</i> value	F value	<i>P</i> value
Aboveground biomass	5.701	<b>0.008**</b>	21.000	<b>&lt; 0.001***</b>	0.058	0.944
Belowground biomass	19.756	<b>&lt; 0.001***</b>	247.414	<b>&lt; 0.001***</b>	9.738	<b>&lt; 0.001***</b>
Total biomass	10.648	<b>&lt; 0.001***</b>	83.122	<b>&lt; 0.001***</b>	1.095	0.348
Root-shoot ratio	35.690	<b>&lt; 0.001***</b>	770.730	<b>&lt; 0.001***</b>	17.940	<b>&lt; 0.001***</b>

**Table S3.** Effects of N addition (no, low, and high N) and tree species (*Pinus tabuliformis* and *Fraxinus chinensis*) on aboveground traits including leaf area (LA), specific leaf area (SLA), leaf thickness (LT), plant height (PL), leaf dry matter content (LDMC), and leaf tissue density (LTD) of *Pinus tabuliformis* and *Fraxinus chinensis*. Asterisks were added to *P* values at the levels of “\*\*\*” for *P* < 0.001, “\*\*” for *P* < 0.01, and “\*” for *P* < 0.05.

Variable	N addition (N)		Tree species (T)		N × T	
	F value	<i>P</i> value	F value	<i>P</i> value	F value	<i>P</i> value
LA	1.284	0.292	129.884	< <b>0.001</b> ***	1.392	0.264
SLA	1.191	0.318	31.604	< <b>0.001</b> ***	3.524	<b>0.042</b> *
LT	0.971	0.390	150.075	< <b>0.001</b> ***	0.567	0.573
PL	1.912	0.165	125.337	< <b>0.001</b> ***	2.438	0.104
LDMC	4.005	<b>0.029</b> *	8.696	<b>0.006</b> **	3.128	0.058
LTD	3.983	<b>0.029</b> *	0.010	0.920	3.099	0.060

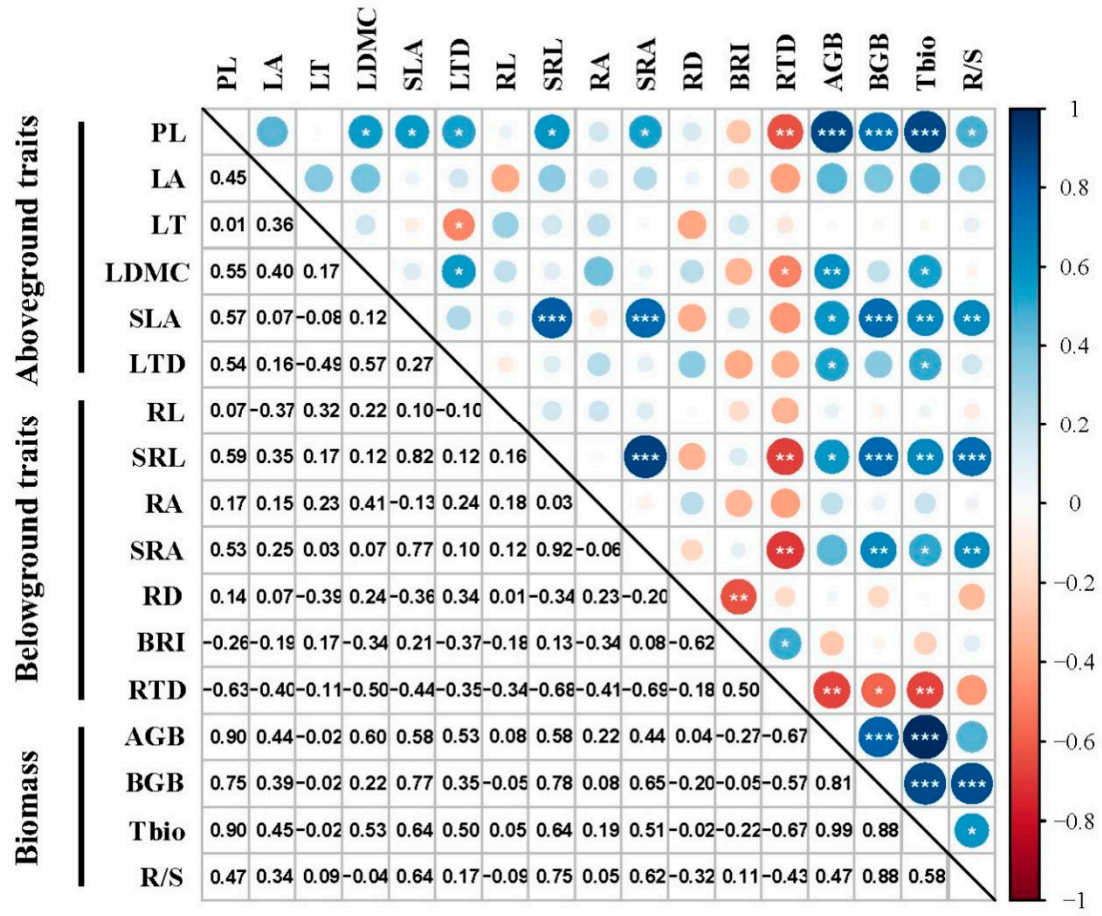
**Table S4.** Effects of N addition (no, low, and high N) and tree species (*Pinus tabuliformis* and *Fraxinus chinensis*) on belowground traits including root length (RL), specific root length (SRL), root area (RA), specific root area (SRA), average root diameter (RD), root tissue density (RTD) and branching intensity (BRI) of *Pinus tabuliformis* and *Fraxinus chinensis*. Asterisks were added to *P* values at the levels of “\*\*\*” for *P* < 0.001, “\*\*” for *P* < 0.01, and “\*” for *P* < 0.05.

Variable	N addition (N)		Tree species (T)		N × T	
	F value	<i>P</i> value	F value	<i>P</i> value	F value	<i>P</i> value
RL	8.329	<b>0.001**</b>	2.798	0.105	1.948	0.160
SRL	39.450	<b>&lt; 0.001***</b>	24.580	<b>&lt; 0.001***</b>	29.200	<b>&lt; 0.001***</b>
RA	5.533	<b>0.009**</b>	6.860	<b>0.014*</b>	2.821	0.075
SRA	24.850	<b>&lt; 0.001***</b>	15.310	<b>&lt; 0.001***</b>	19.750	<b>&lt; 0.001***</b>
RD	4.251	<b>0.024*</b>	2.640	0.115	4.947	<b>0.014*</b>
RTD	7.307	<b>0.003**</b>	2.869	0.101	3.372	<b>0.048*</b>
BRI	0.388	0.682	8.212	<b>0.008**</b>	2.204	0.128

**Table S5.** Effects of N addition (no, low, and high N) and tree species (*Pinus tabuliformis* and *Fraxinus chinensis*) on nutrient traits including leaf carbon content (LCC), leaf nitrogen content (LNC), root carbon content (RCC), root nitrogen content (RNC), LCC/LNC, and RCC/RNC of *Pinus tabuliformis* and *Fraxinus chinensis*. Asterisks were added to *P* values at the levels of “\*\*\*” for *P* < 0.001, “\*\*” for *P* < 0.01, and “\*” for *P* < 0.05.

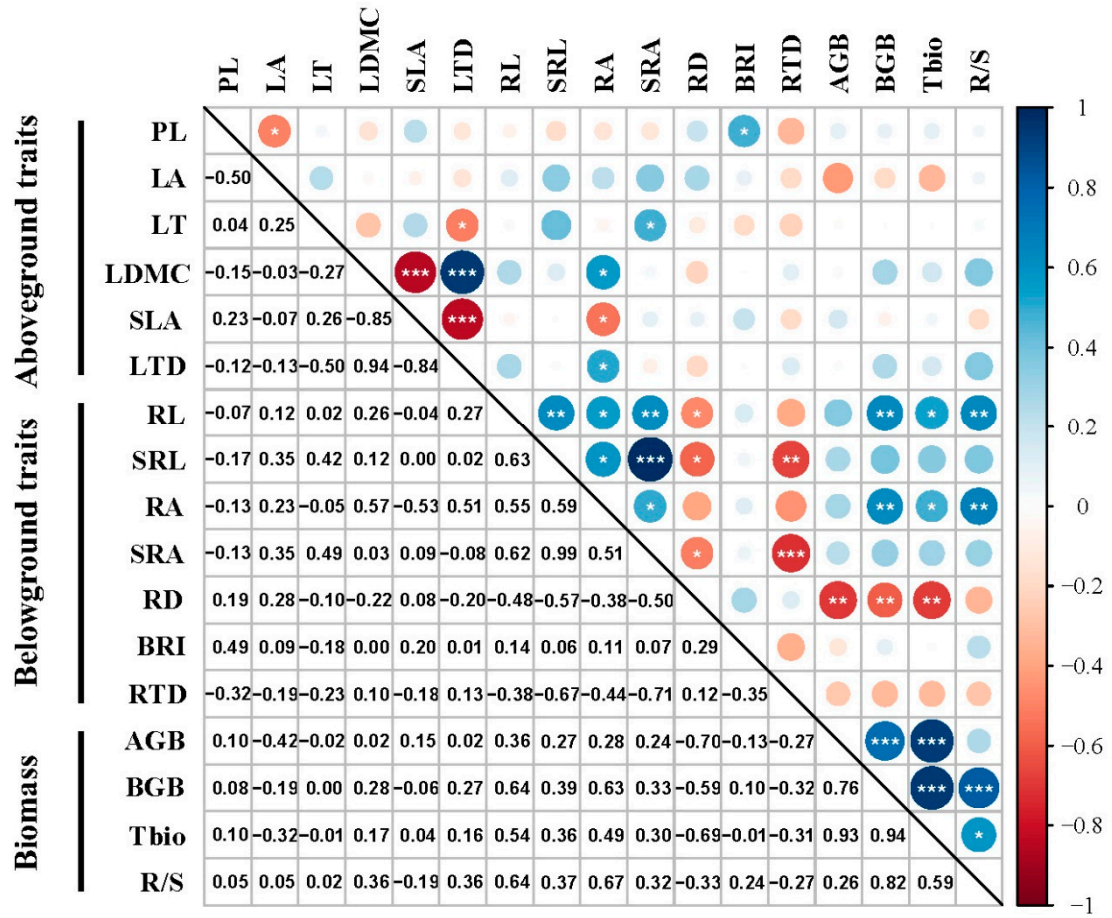
Variable	N addition (N)		Tree species (T)		N × T	
	F value	<i>P</i> value	F value	<i>P</i> value	F value	<i>P</i> value
LCC	0.851	0.437	1.502	0.230	4.953	<b>0.014*</b>
RCC	4.558	<b>0.019*</b>	22.155	< <b>0.001***</b>	0.319	0.729
LNC	21.810	< <b>0.001***</b>	123.190	< <b>0.001***</b>	12.280	< <b>0.001***</b>
RNC	32.767	< <b>0.001***</b>	51.812	< <b>0.001***</b>	0.296	0.746
LCC/LNC	16.476	< <b>0.001***</b>	278.604	< <b>0.001***</b>	0.494	0.615
RCC/RNC	11.661	< <b>0.001***</b>	7.768	<b>0.009**</b>	0.255	0.777

(a)

*Pinus tabulaeformis*

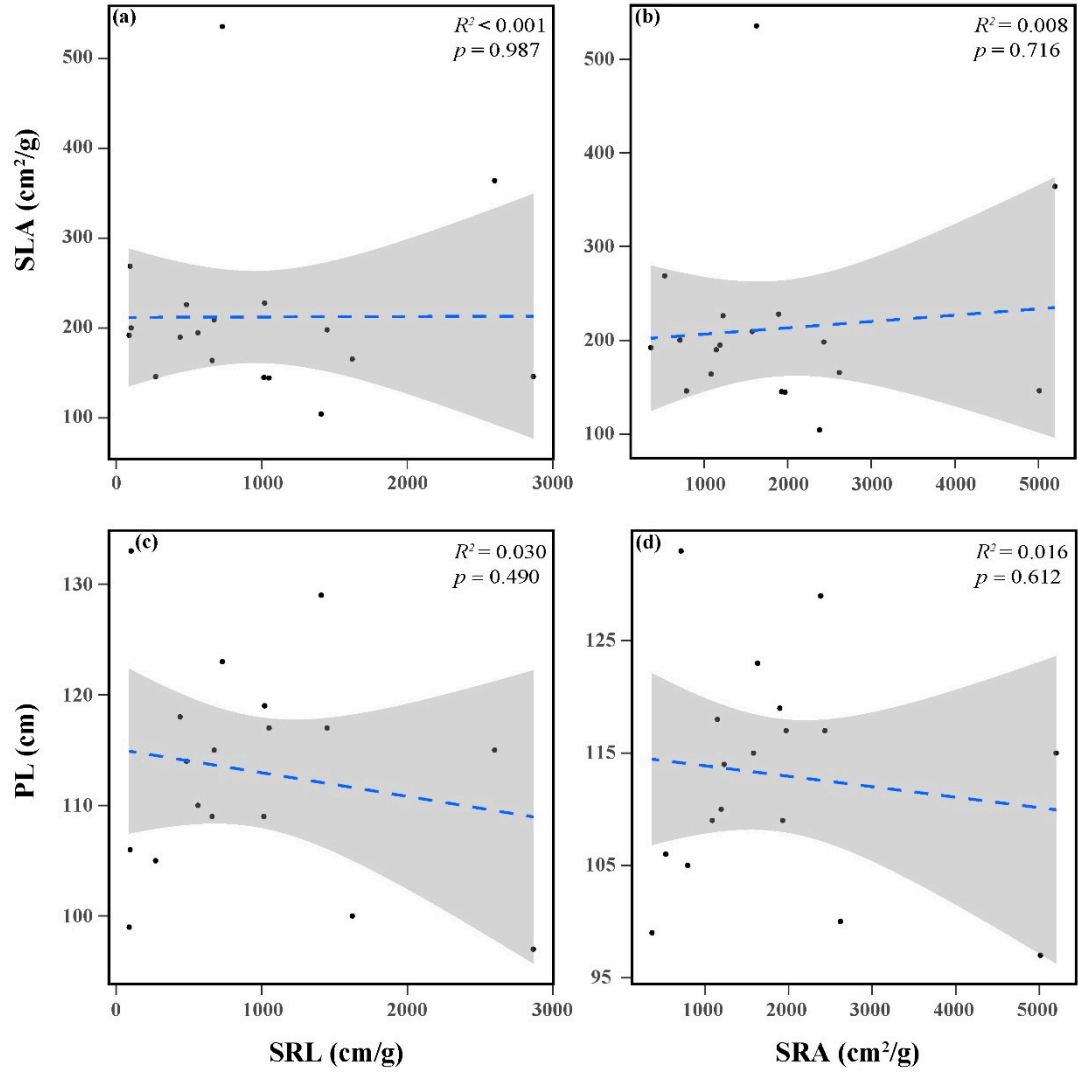


(b)

*Fraxinus chinensis*

**Figure S1.** Correlation matrix of plant functional traits and biomass of *Pinus tabuliformis* (a) and *Fraxinus chinensis* (b). In total, 17 trait indexes are used in this analysis: aboveground traits include plant height (PL), leaf area (LA), leaf thickness (LT), leaf dry matter content (LDMC), specific leaf area (SLA), and leaf tissue density (LTD); belowground traits include root length (RL), specific root length (SRL), root area (RA), specific root area (SRA), average root diameter (RD), branching intensity (BRI), and root tissue density (RTD); biomass traits include aboveground biomass (AGB), belowground biomass (BGB), total biomass (Tbio) and root-shoot biomass ratio (R/S). The lower triangle shows Pearson correlation coefficients, which are illustrated by the color in the upper triangle. The size of the circle in the upper triangle indicates the *P* value of the correlation, with asterisks added to significant results for *P* values at the levels of “\*\*\*” for  $P < 0.001$ , “\*\*” for  $P < 0.01$ , and “\*” for  $P < 0.05$ .

## *Fraxinus chinensis*



**Figure S2.** Relationships between SLA and SRL (a), SLA and SRA (b), PL and SRL (c), PL and SRA (d) of *Fraxinus chinensis*. Trait acronyms: SLA = specific leaf area, PL = plant height, SRL = specific root length, SRA = specific root area. The  $R^2$  (coefficient of determination), and  $p$ -values are obtained from the linear regression analyses. Shaded areas show a 95% confidence interval of the fit test.