

The leaf economics spectrum in rice: leaf anatomical, biochemical and physiological traits trade-offs. Dongliang Xiong & Jaume Flexas

Supplementary data

Table S1. List of leaf traits in this study, and symbols and units adopted.

	Symbol	Trait	Unit
Function	A	Light-saturated photosynthetic rate	$\mu\text{mol m}^{-2} \text{s}^{-1}$
	g_s	Stomatal conductance to CO_2	$\text{mol m}^{-2} \text{s}^{-1}$
	g_m	Mesophyll conductance	$\text{mol m}^{-2} \text{s}^{-1}$
	K_{leaf}	Leaf hydraulic conductance	$\text{mmol m}^{-2} \text{s}^{-1} \text{MPa}^{-1}$
	V_{cmax}	Maximum carboxylation efficiency	$\mu\text{mol m}^{-2} \text{s}^{-1} \mu\text{mol}$
	J_{max}	Maximum rate of electron transport	$\text{m}^{-2} \text{s}^{-1}$
	A_m	Light-saturated photosynthetic rate per leaf mass	$\text{nmol g}^{-1} \text{s}^{-1}$
	g_{sm}	Stomatal conductance to CO_2 per leaf mass	$\text{nmol kg}^{-1} \text{s}^{-1}$
	g_{mm}	Mesophyll conductance per leaf mass	$\text{nmol kg}^{-1} \text{s}^{-1}$
	K_{leafm}	Leaf hydraulic conductance	$\text{mmol g}^{-1} \text{s}^{-1} \text{MPa}^{-1}$
Biochemistry	N_a	Nitrogen concentration per leaf area	g m^{-2}
	N_m	Nitrogen concentration per leaf mass	%
	Rubisco	Rubisco concentration per leaf area	g m^{-2}
	Rubisco _m	Rubisco concentration per leaf mass	g g^{-1}
Anatomy	LMA	Leaf mass per leaf area	g m^{-2}
	VLA	Leaf vein length per leaf area	mm mm^{-2}
	VLA _m	Leaf vein length per leaf mass	mm mg^{-1}
	LT	Leaf thickness	mm
	LD	Leaf density	mg mm^{-3}
	f_{IAS}	Fraction of leaf mesophyll volume occupied by intercellular air space	%
	T_{cw}	Cell wall thickness	μm
	S_m	Total mesophyll cell surface area exposed to intercellular air space per unit of leaf surface area	$\text{m}^{-2} \text{m}^{-2}$
	S_c	Total chloroplasts surface area exposed to intercellular air space per unit of leaf surface area	$\text{m}^{-2} \text{m}^{-2}$
	Efficiency	PNUE	Photosynthetic N use efficiency

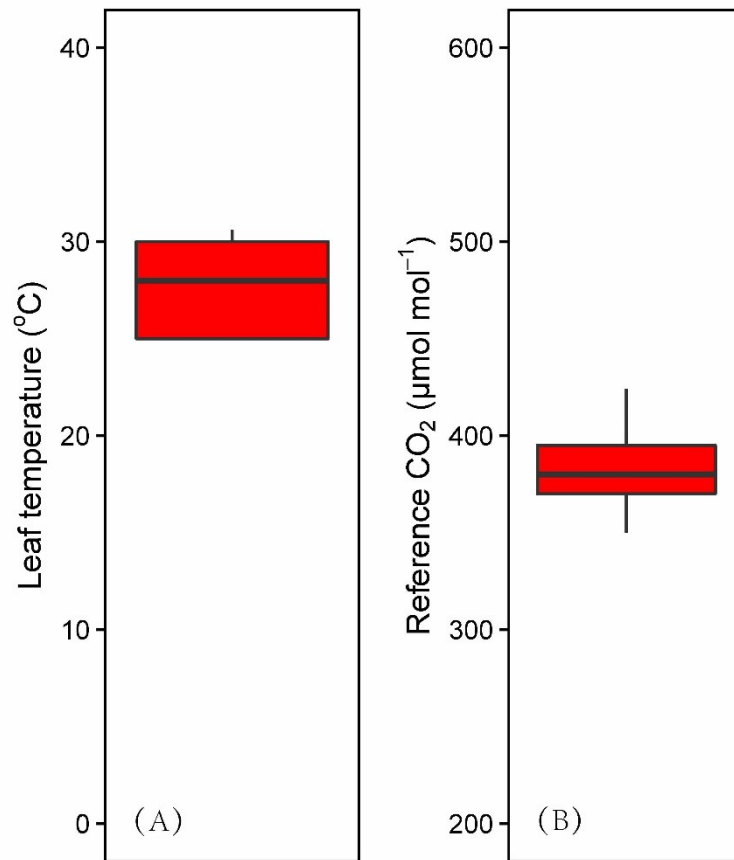


Figure S1 Leaf temperature (A) and the reference CO₂ concentration inside cuvette (B) for gas exchange measurements.

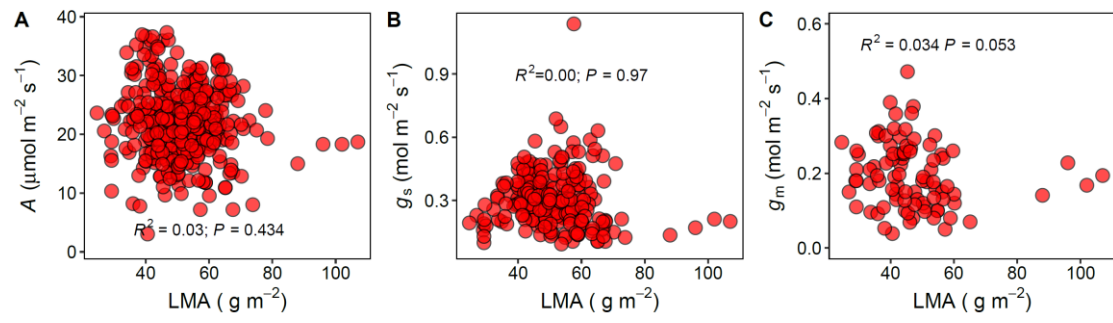


Fig. S2 Influences of the leaf mass per area (LMA) on the light-saturated photosynthetic rate (A), the stomatal conductance (g_s) and the mesophyll conductance (g_m).

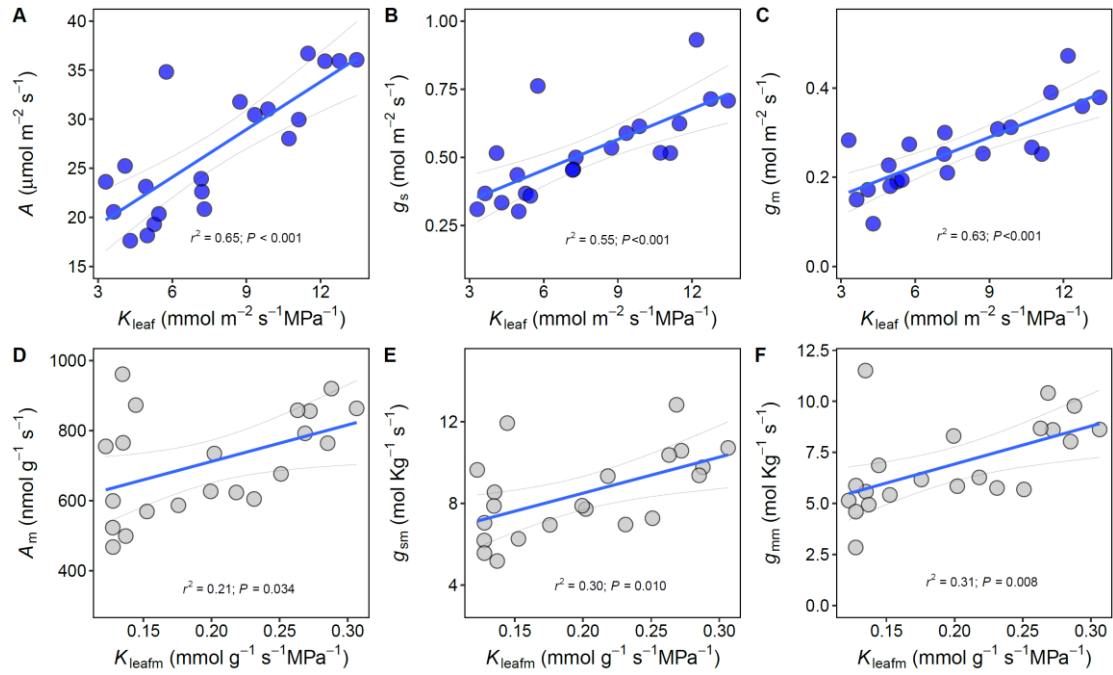


Figure S3. Correlations of the leaf hydraulic conductance (K_{leaf}) to (A, D) the light-saturated photosynthetic rate (A), (B, E) the stomatal conductance (g_s) and (C, F) the mesophyll conductance (g_m) in rice. A-C in the area-base and D-F in the mass-base.

The shaded area indicates the 95% CI of the fitting.

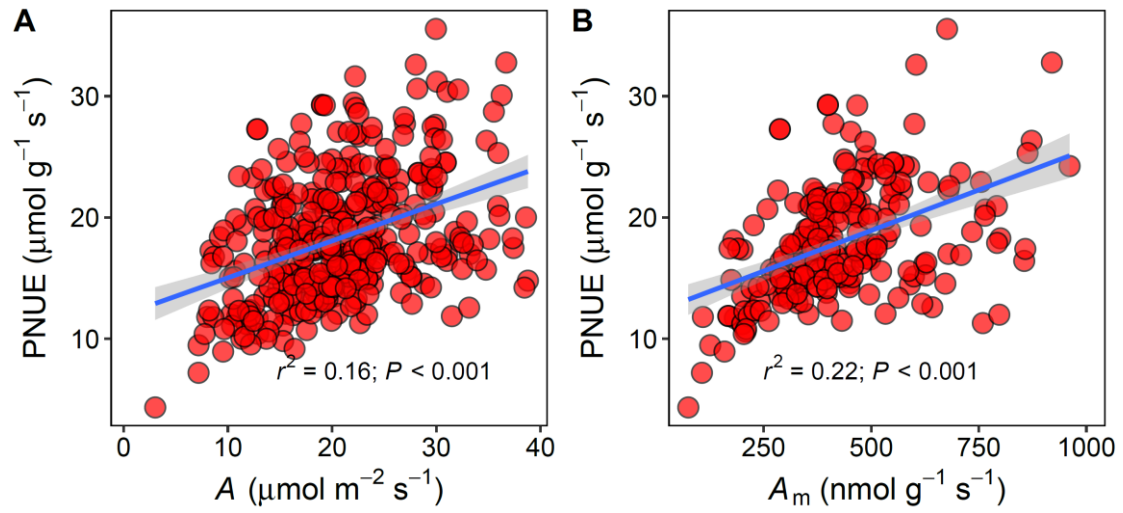


Figure S4. Correlations (A) between the area-based light-saturated photosynthetic rate (A) and the photosynthetic N use efficiency (PNUE); and (B) between the mass-based light-saturated photosynthetic rate (A_m) and the PNUE.

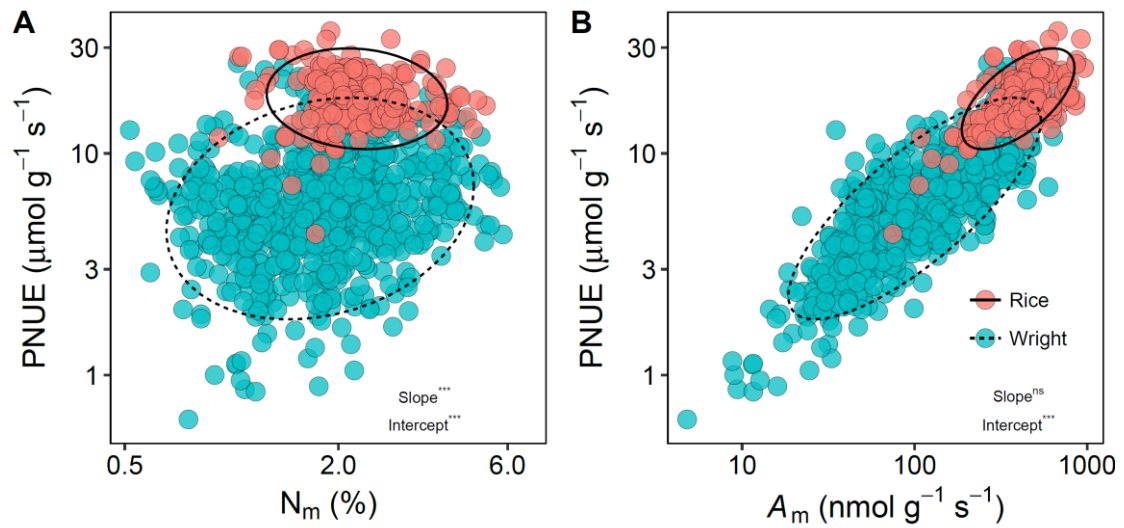


Figure S5. Effects of (A) the N concentration per leaf mass (N_m) and the mass-based light-saturated photosynthetic rate (A_m) on the photosynthetic N use efficiency (PNUE). Green circles represent the data from Glopnet (Wright *et al.*, 2004) and red circles represent rice.

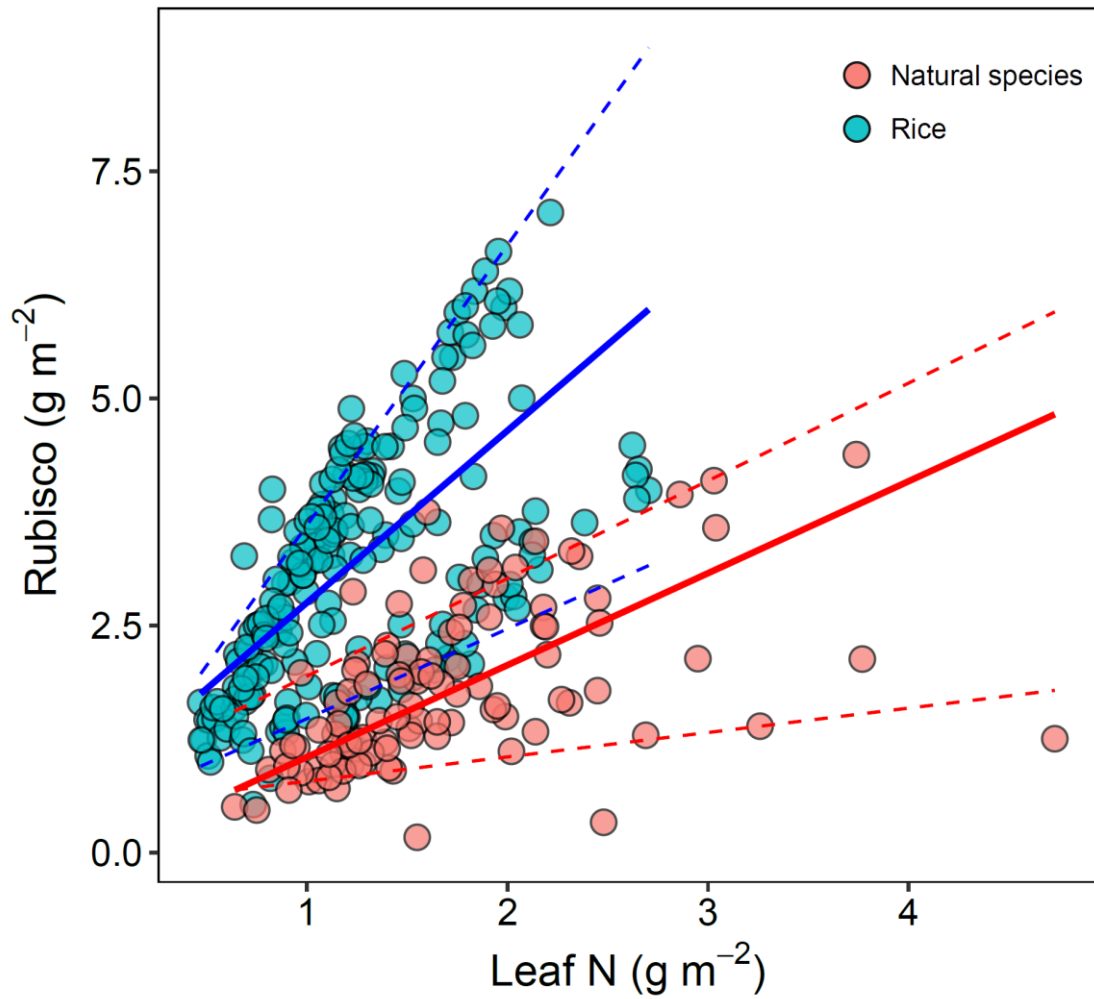


Figure S6. The correlation between Rubisco content and leaf N content within rice or among natural species (data from Onoda *et al.*, 2017). The lines were fitted using quantile regression model. Solid lines represent the quantile of 0.5 and dot lines represent the quantiles of 0.1 and 0.9.

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