Table 2. Summary of typically observed variation in leaf metabolism and thermal responses across the vertical gradient and/or between sun and shade leaves

trait	symbol	units	response*	forest type(s)[†]	reference(s)[‡]
Conductance					
boundary-layer conductance	g_b	$mmol^{-2}\ s^{-1}$	↑ H	TrB	3
		$mm\ s^{-1}$	↑ H	TeN	12
			≈ L	TeN	12
leaf hydraulic conductance	K_{leaf}	$m^{-2}\ s^{-1}\ MPa^{-1}$	↑ L	TeB	40
cuticle conductance	g_{min}	$mmol\ m^{-2}\ s^{-1}$	↑ L	TrB	41
max stomatal conductance	$g_{s\ max}$	$mol\ m^{-2}\ s^{-1}$	↑ H	TrB, TeB, BoN	1, 2, 4
			↑ L	TrB, TeB, TeN, BoN	8, 9, 10, 7, 4
stomatal conductance limitation	g_s	$mol\ m^{-2}\ s^{-1}$	↑ H	TrB, TeN	9, 39, 5, 6, 7
			↑ L	TrB, TeN	9, 39, 7
stomatal conductance at optimal temperature	g_s *at* T_{opt}	$mol\ m^{-2}\ s^{-1}$	≈↑ H	TeB	11
			↓ H	TrB	39
			≈↑ L	TrB	8
Photosynthesis					
maximum photosynthetic capacity	A_{max}	$mol\ m^{-2}\ s^{-1}$	↑ H	TrB, TeB, BoN	14, 11, 15, 4
			≈↓ H	TeB	16
			↑ L	TrB, TeB, TeN, BoN	14, 17, 18, 19, 10, 4
		$nmol\ g^{-1}\ s^{-1}$	≈ H	TrB	20, 21
			≈ L	TrB, TeB, TeN	20, 21, 19
maximum light-saturated net photosynthesis	A_{sat}	$\mu mol\ m^{-2}\ s^{-1}$	↑ H	TrB, TeB	22, 23
			↑ L	TrB, TeB	8, 23
A_{sat} at optimum temperature	A_{opt}	$\mu mol\ m^{-2}\ s^{-1}$	≈↑ H	TrB, TeB	13, 11
			↑ H	TrB	39
			↑ L	TrB	8, 13

trait	symbol	units	response*	forest type(s)†	reference(s)‡
optimum temperature for photosynthesis	T_{opt}	˚C	≈ H	TrB, TeB	24, 11, 13
			↓ H	TrB	39
			≈ L	TrB, TeB	9, 8, 11
photosynthetic light compensation point	*LCP*	µmol m^{-2}	↑ H	TrB, TeB, TeN	25, 16
			↑ L	TrB, TeB, TeN	8, 17, 16
maximal carboxylation rate	V_{cmax}	µmol m^{-2} s^{-1}	↑ H	TrB, TeB	2, 42, 23, 14
			↑ L	TrB, TeB, BoN	9, 42, 23, 14, 10
		nmol g^{-1} s^{-1}	≈ H	TrB, TeB	2, 23
			≈ L	TrB, TeB	2, 23
		nmol CO_2 g^{-1} s^{-1}	≈↓ L	TeB	26
optimum temperature for V_{cmax}	V_{cmax} (T_{opt})	µ mol m^{-2} s^{-1}	≈↑ H	TeB	11
			≈ L	TrB	9
electron transport rate	J_{max}	µmol m^{-2} s^{-1}	↑ H	TrB, TeB	2, 42, 39, 23, 14
			↑ L	TrB, TeB	9, 42, 23, 27, 14
		nmol g^{-1} s^{-1}	≈ H	TrB, TeB	2, 23
			≈ L	TrB, TeB	2, 23
		nmol e^{-1} g^{-1} s^{-1}	≈↓ L	TeB	26
optimal temperature of J_{max}	T_{optETR}	˚C	↓ H	TrB	39
	$J_{max}(T_{opt})$	µmol m^{-2} s^{-1}	≈ L	TrB	9
high-temperature CO_2 compensation point	T_{max}	˚C	≈ H	TrB	22
			≈ L	TrB	8
Respiration					
respiration rate at 25 ˚C	*R*	µmol CO_2 $m^{-2}s^{-1}$	↑ H	TrB, TeB, TeN	39, 31, 32, 33
		µmol CO_2 kg^{-1} s^{-1}	≈ H	TrB, TeB, TeN	31, 32
			↑ L	TrB, TeN	31, 33,
light respiration	R_L	µmol m^{-2} s^{-1}	↑ H	TrB	22
			↑ L	TrB	22

trait	symbol	units	response*	forest type(s)[†]	reference(s)[‡]
dark respiration	R_{dark}	µmol m^{-2} s^{-1}	↑ H	TrB, TeB, BoN	22, 14, 34, 23, 38
			↑ L	TrB, TeB, TeN, BoN	22, 14, 23, 17, 10, 38
		nmol g^{-1} s^{-1}	≈↑ H	TrB	2, 35
			≈ L	TrB	2, 35
R_{dark} at reference T	R_{dark} *at reference* T	µmol m^{-2} s^{-1}	↑ H	TrB, TeB, TeN	22, 14, 34, 32
		µmol (kg leaf)$^{-1}$ s^{-1}	↑ H	TrB, TeB, TeN	22, 14, 34, 32
		µmol (kg N)$^{-1}$ s^{-1}	↑ H	TeB,TeN	34, 32
		µmol m^{-2} s^{-1}	↑ L	TrB, TeB	22, 8, 34.
temperature sensitivity of R_{dark}	Q_{10}	˚C^{-1}	≈ H	TrB, TeB, TeN	22, 39, 34, 33
		˚C^{-1}	≈ ↑ H	TeB, TeN	36, 32
			≈ ↓ L	TrB, TeB, TeN	22, 34, 33
			↑ L	TeB	36
activation energy of R_{dark}	E_0	kJ mol^{-1} K^{-1}	≈ H	TrB, TeB, TeN	22, 37, 32
			≈ L	TrB	22, 8

1. Kafuti et al. 2020; **2.** Van Wittenberghe et al. 2012; **3.** Roberts et al. 1990; **4.** Dang et al. 1997; **5.** Marenco et al. 2017; **6.** Ambrose et al. 2015; **7.** Zweifel et al. 2001; **8.** Slot et al. 2019; **9.** Hernandez et al. 2020; **10.** Urban et al. 2007; **11.** Carter and Cavaleri 2018; **12.** Martin et al. 1999; **13.** Mau et al. 2018; **14.** Kosugi et al. 2012; **15.** Niinemets et al. 2015; **16.** Bachofen et al. 2020; **17.** Hamerlynck and Knapp 1994; **18.** Coble et al. 2017; **19.** Wyka et al. 2012; **20.** Rijkerse et al. 2000; **21.** Ishida et al. 1999; **22.** Weerasinghe et al. 2014; **23.** Scartazza et al. 2016; **24.** Miller et al. 2021; **25.** Harris and Medina 2013; **26.** Legner et al. 2014; **27.** Kitao et al. 2012; **28.** Fauset et al. 2018; **29.** Rey-Sanchez et al. 2016; **30.** Muller et al. 2021; **31.** Mier et al. 2001; **32.** Turnbull et al. 2003; **33.** Araki et al. 2017; **34.** Bolstad et al. 1999; **35.** Kenzo et al. 2015; **36.** Harley et al. 1996; **37.** Xu and Griffin 2006; **38.** Atherton et al. 2017; **39.** Carter et al. 2021; **40.** Sack et al. 2003; **41.** Slot et al. 2021; **42.** Carswell et al. 2000