Table S1. List of tested vegetation indices. The top three vegetation indices for predicting their corresponding leaf trait responses are bolded in green. ρ represents fresh leaf reflectance (expressed as percentage) of corresponding wavelengths. The "ns" superscript on R^2 indicates no significant relationship between vegetation index and its corresponding trait response.

No.	Index/Reference	Formula	ETR		qP		Ψ_{leaf}		SLA		Estimated parameter
			R^2	RMSE	R^2	RMSE	R^2	RMSE	R^2	RMSE	
1	Double-peak optical index (DPi) [48]	(ρ688 × ρ710)/(ρ697)^2	**0.281**	**28.950**	**0.168**	**0.096**	**0.111**	**0.694**	0.00^{ns}	26.21	Steady-state chlorophyll *a* fluorescence
2	Gitelson et al. [82]	ρ735/ρ700	**0.238**	**29.820**	**0.132**	**0.099**	0.11	0.70	0.00^{ns}	26.20	Chlorophyll content
3	Modified normalized difference (mND) [83]	(ρ750 - ρ705)/(ρ750 + ρ705 - 2 × ρ445)	**0.233**	**29.900**	**0.127**	**0.099**	0.09	0.70	0.00^{ns}	26.20	Leaf pigment content
4	Gitelson and Merzlyak [110]	(ρ750 - ρ705)/(ρ750 + ρ705)	0.233	29.910	0.126	0.099	0.092	0.701	0.001^{ns}	26.194	Chlorophyll content
5	Gitelson and Merzlyak [111]	ρ750/ρ700	0.229	29.990	0.125	0.099	0.101	0.698	0.001^{ns}	26.195	Chlorophyll content
6	Sims and Gamon [83]	(ρ750 - ρ445)/(ρ705 - ρ445)	0.227	30.030	0.123	0.099	0.093	0.701	0.001^{ns}	26.196	Chlorophyll content
7	Gitelson and Merzlyak [110]	ρ750/ρ705	0.226	30.040	0.121	0.099	0.095	0.700	0.001^{ns}	26.190	Chlorophyll content
8	Curvature optical index (COI) [112]	(ρ683)^2/(ρ675 × ρ691)	0.222	30.117	0.127	0.099	0.077	0.707	0.004^{ns}	26.150	Chlorophyll fluorescence
9	Red -edge chlorophyll index [113]	(ρ783 /ρ705) - 1	0.222	30.129	0.118	0.099	0.092	0.701	0.002^{ns}	26.187	Chlorophyll content
10	Red-edge hyperspectral index 1 (REHI 1) [114]	ρ747/ρ708	0.217	30.210	0.114	0.100	0.091	0.701	0.001^{ns}	26.189	LAI
11	Le Maire et al. [115]	(ρ749 - ρ720) - (ρ701 - ρ672)	0.216	30.230	0.116	0.099	0.081	0.705	0.000^{ns}	26.202	Chlorophyll content
12	Maccioni et al. [116]	(ρ780 - ρ710)/(ρ780 - ρ680)	0.216	30.240	0.115	0.099	0.080	0.706	0.001^{ns}	26.196	Chlorophyll content
13	MERIS terrestrial chlorophyll index (MTCI) [117]	(ρ754 - ρ709) / (ρ709 – ρ681)	0.215	30.260	0.113	0.100	0.086	0.704	0.001^{ns}	26.191	Chlorophyll content
14	Datt [118]	(ρ850 - ρ710)/(ρ850 - ρ680)	0.212	30.315	0.112	0.100	0.078	0.707	0.001^{ns}	26.196	Chlorophyll content
15	ND_{chl} [46]	(ρ925 - ρ710)/(ρ925 + ρ710)	0.205	30.459	0.105	0.100	0.081	0.706	0.001^{ns}	26.191	Canopy-level leaf chlorophyll content
16	Red edge optical index (REOI) [119]	ρ750/ρ710	0.204	30.460	0.105	0.100	0.086	0.704	0.001^{ns}	26.188	Chlorophyll content

No.	Index/Reference	Formula	ETR		qP		Ψ_{leaf}		SLA		Estimated parameter
			R^2	RMSE	R^2	RMSE	R^2	RMSE	R^2	RMSE	
17	Red edge position: linear interpolation method (REP-li) [120]	700 + 40 × ((ρ670 + ρ780)/2-ρ700)/(ρ740 - ρ700)	0.204	30.470	0.115	0.100	0.067	0.711	0.001^{ns}	26.199	Chlorophyll content
18	Carter [121]	ρ695/ρ760	0.189	30.750	0.107	0.100	0.069	0.710	0.000^{ns}	26.203	Plant stress
19	REHI 2 [114]	ρ741/ρ717	0.182	30.890	0.090	0.101	0.077	0.707	0.001^{ns}	26.189	LAI
20	Red edge ratio index (RERI) [122]	ρ700/ρ670	0.181	30.912	0.102	0.100	0.061	0.713	0.000^{ns}	26.205	Chlorophyll content
21	Wen et al. [123]	ρ764/ρ716	0.179	30.940	0.088	0.101	0.075	0.708	0.002^{ns}	26.185	Leaf nitrogen remobilization
22	REHI 3 [114]	ρ735/ρ720	0.179	30.950	0.087	0.101	0.075	0.708	0.001^{ns}	26.191	LAI
23	REHI 4 [114]	ρ738/ρ720	0.175	31.010	0.085	0.101	0.074	0.708	0.001^{ns}	26.190	LAI
24	Normalized photochemical reflectance index (PRI_{norm}) [72]	[(ρ570-ρ531)/(ρ570+ρ531)] / [((ρ800-ρ670)/(ρ800+ρ670)^0.5) ×(ρ700/ρ670)]	0.18	31.02	0.09	0.10	**0.128**	**0.687**	0.01^{ns}	26.14	Pigment content, stomatal conductance, water stress, and Ψ_{leaf}
25	Normalized difference red edge index (NDRE) [69]	(ρ790 - ρ720)/(ρ790 + ρ720)	0.175	31.020	0.086	0.101	0.071	0.709	0.002^{ns}	26.187	Nitrogen and water stress
26	Vogelmann et al. [124]	ρ740/ρ720	0.174	31.040	0.085	0.101	0.074	0.708	0.001^{ns}	26.190	Chlorophyll content
27	Modified chlorophyll absorption in reflectance index (MCARI) [125]	[(ρ700 - ρ670) - (0.2×(ρ700 - ρ550))] × (ρ700/ρ670))	0.170	31.110	0.091	0.101	0.051	0.717	0.000^{ns}	26.206	Chlorophyll content
28	Photochemical Reflectance Index (PRI) [49]	(ρ531 - ρ570)/(ρ531 + ρ570)	0.16	31.33	0.08	0.10	**0.107**	**0.695**	0.00^{ns}	26.16	Photosynthetic radiation use efficiency and photosystem II photochemical efficiency
29	Stimson et al. [126]	(ρ860 - ρ690)/(ρ860 + ρ690)	0.145	31.580	0.080	0.101	0.057	0.715	0.001^{ns}	26.198	Ψ_{leaf} and leaf water content
30	Fluorescence ratio index (FRI) [73]	ρ740/ρ800	0.141	31.660	0.066	0.102	0.050	0.717	0.004^{ns}	26.151	CO_2 assimilation and steady-state chlorophyll *a* fluorescence
31	Datt [127]	ρ672/(ρ550 × ρ708)	0.130	31.860	0.074	0.102	0.025	0.726	0.001^{ns}	26.199	Chlorophyll and total carotenoid content

No.	Index/Reference	Formula	ETR		qP		Ψ_{leaf}		SLA		Estimated parameter
			R^2	RMSE	R^2	RMSE	R^2	RMSE	R^2	RMSE	
32	Green NDVI [128]	(ρ750 - ρ550)/(ρ750 + ρ550)	0.120	32.040	0.071	0.102	0.019^{ns}	0.729	0.001^{ns}	26.187	Chlorophyll content
33	TCARI/OSAVI (Transformations into chlorophyll absorption in reflectance index/Optimized soil-adjusted vegetation index) [129]	[3×[(ρ700-ρ670)-0.2×(ρ700-ρ550)× (ρ700/ ρ670)]]/[(1+0.16) ×(ρ800-ρ670)/(ρ800+ρ670+0.16)]	0.110	32.220	0.057	0.103	0.013^{ns}	0.731	0.000^{ns}	26.204	Chlorophyll content
34	TCARI [129]	3×[(ρ700 - ρ670) - 0.2×(ρ700 - ρ550) × (ρ700/ρ670)]	0.104	32.335	0.053	0.103	0.011^{ns}	0.732	0.000^{ns}	26.205	Chlorophyll content
35	Zarco-Tejada et al. [112]	ρ750/ρ800	0.098	32.430	0.043	0.103	0.026	0.726	0.009^{ns}	26.083	Chlorophyll fluorescence
36	Elsayed et al. [130]	(ρ940/ρ960) × NDVI	0.061	33.088	0.029	0.104	0.025	0.726	0.017^{ns}	25.982	Ψ_{leaf}
37	Normalized difference vegetation index (NDVI) [71]	(ρ800 - ρ670)/(ρ800 + ρ670)	0.054	33.223	0.025	0.104	0.035	0.723	0.004^{ns}	26.152	Vegetation greenness and structural index
38	Structural intensive pigment index (SIPI) [131]	(ρ800 - ρ445)/(ρ800 - ρ680)	0.038	33.492	0.015^{ns}	0.105	0.038	0.722	0.001^{ns}	26.199	Carotenoids/chlorophyll *a* ratio
39	SR_{LMA} [46]	ρ2295/ρ1500	0.037	33.512	0.011^{ns}	0.105	0.000^{ns}	0.736	0.424	19.894	Leaf-level leaf mass per area (LMA)
40	ND_{LMA} [46]	(ρ2295 - ρ1500)/(ρ2295 + ρ1500)	0.036	33.539	0.010^{ns}	0.105	0.000^{ns}	0.736	0.414	20.065	Leaf-level LMA
41	Modified simple ratio (mSR_{LMA}) [46]	(ρ2265 - ρ2400)/(ρ1620 - ρ2400)	0.03	33.64	0.01^{ns}	0.11	0.00^{ns}	0.74	**0.524**	**18.080**	Leaf-level LMA
42	Ali et al. [45]	ρ1370/ρ1615	0.029	33.651	0.041	0.104	0.061	0.713	0.342	21.255	SLA
43	OSAVI [45]	(1 + 0.16) × (ρ1370 -ρ1615)/(ρ1370 + ρ1615 + 0.16)	0.029	33.656	0.041	0.104	0.058	0.714	0.349	21.151	Leaf-level SLA
44	Water Index (WI) [50]	ρ970/ρ900	0.027	33.691	0.016^{ns}	0.105	0.015^{ns}	0.730	0.210	23.300	Ψ_{leaf} and plant water status
45	ND_{LMA} [46]	(ρ2260 - ρ1490)/(ρ2260 + ρ1490)	0.026	33.699	0.007^{ns}	0.105	0.000^{ns}	0.736	0.379	20.660	Canopy-level LMA
46	Feret et al. [132]	ρ1368/ρ1722	0.026	33.701	0.039	0.104	0.062	0.713	0.381	20.615	LMA
47	Feret et al. [132]	(ρ1368 - ρ1722)/(ρ1368 + ρ1722)	0.025	33.720	0.038	0.104	0.059	0.714	0.389	20.488	LMA
48	Disease-water stress index (DWSI) [133]	(ρ800 + ρ550)/(ρ1660 + ρ680)	0.023	33.760	0.022	0.105	0.063	0.712	0.271	22.382	Orange rust disease
49	D_{LAI} [46]	ρ1725 - ρ970	0.018^{ns}	33.842	0.007^{ns}	0.105	0.006^{ns}	0.734	0.318	21.640	Canopy-level LAI

No.	Index/Reference	Formula	ETR		qP		Ψ_{leaf}		SLA		Estimated parameter
			R^2	RMSE	R^2	RMSE	R^2	RMSE	R^2	RMSE	
50	ND_{Bleaf} [46]	(ρ2160 - ρ1540)/(ρ2160 + ρ1540)	0.014^{ns}	33.904	0.003^{ns}	0.106	0.021^{ns}	0.728	0.444	19.549	Canopy leaf biomass
51	OSAVI [45]	(1 + 0.16) × (ρ1537 - ρ1543)/(ρ1537 + ρ1543 + 0.16)	0.013^{ns}	33.925	0.004^{ns}	0.106	0.039	0.721	0.176	23.797	Canopy-level SLA
52	Datt [84]	(ρ850 - ρ2218)/(ρ850 - ρ1928)	0.01^{ns}	33.99	0.00^{ns}	0.11	0.03	0.72	**0.480**	**18.900**	Equivalent water thickness (Volume of water per unit leaf area)
53	mND_{LMA} [46]	(ρ2285 - ρ1335)/(ρ2285 + ρ1335 – 2 × ρ2400)	0.01^{ns}	34.00	0.00^{ns}	0.11	0.01^{ns}	0.73	**0.553**	**17.515**	Leaf-level LMA
54	D_{LMA} [46]	ρ2395 - ρ2295	0.005^{ns}	34.058	0.018^{ns}	0.105	0.043	0.720	0.313	21.730	Leaf-level LMA
55	ND_{LMA} [46]	(ρ1710 - ρ1340)/(ρ1710 + ρ1340)	0.005^{ns}	34.063	0.015^{ns}	0.105	0.063	0.712	0.438	19.634	Leaf-level LMA
56	Datt [84]	(ρ850 - ρ1788)/(ρ850 - ρ1928)	0.002^{ns}	34.110	0.000^{ns}	0.106	0.048	0.718	0.423	19.915	Leaf water content
57	Normalized difference water index (NDWI) [70]	(ρ860 - ρ1240)/(ρ860 + ρ1240)	0.001^{ns}	34.140	0.001^{ns}	0.106	0.027	0.726	0.195	23.507	Vegetation liquid water
58	R_{LMA} [46]	ρ2300	0.000^{ns}	34.149	0.004^{ns}	0.106	0.032	0.724	0.383	20.582	Leaf-level LMA

Table S2. The mean, standard error (SE), median, minimum, maximum, and sample size (*n*) of electron transport rate (ETR), photochemical quenching (qP), leaf water potential (Ψ_{leaf}), specific leaf area (SLA), and air temperature (T_a) measures.

Parameter	**Units**	**Mean**	**SE**	**Median**	**Minimum**	**Maximum**	***n***
ETR	μmol s^{-1}	72.26	2.47	66.53	2.19	176.71	199
qP	-	0.233	0.008	0.233	0.005	0.504	199
Ψ_{leaf}	MPa	−1.43	0.06	−1.40	−0.10	−3.40	169
SLA	cm^2 g^{-1}	101.73	1.87	97.36	41.43	206.55	194
T_a	°C	25.24	0.47	24.34	14.76	33.72	201