Supplementary material table S1 (**Table S1**). Literature relationships evaluated for LAI retrieval. Equation and reference are presented.

Nr.	VI	Equation	Ref.	Nr	VI	Equation	Ref.
1	RDVI	y=0.0918exp(6.0002x)	[48]	34	Red EdgeWDRVI	$y=1.6x^2+9.6x-0.25$	[36]
2	MSAVI	y=0.1663exp(4.2731x)	[48]	35	MTCI	$y= -0.11x^2+19x-1.4$	[36]
3	TVI2	y=0.2227exp(3.6566x)	[48]	36	NDVI	$y=0.059e^{4.82x}$	[58]
4	WDVI	y = 0.109x − 0.3233	[54]	37	NDVI	y=8.87x-4.6	[58]
5	NDI	y=13.448x-0.91876	[77]	38	NDVI	y=6.31ln(x)+3.88	[58]
6	NDI	y=6.753x	[77]	39	WDVI	$y=0.24e^{4.18x}$	[58]
7	NDI	y=6.63x-0.13	[77]	40	SAVI	$y=0.06e^{4.83x}$	[58]
8	EVI	$y = (2.42x + 0.34)^2$	[55]	41	WDVI	y=7.73x-1.72	[58]
9	RDVI	y= 4.2815x – 0.3069	[78]	42	SAVI	y=8.90x -4.09	[58]
10	NDVI	y= 2.9792x – 0.4858	[78]	43	SAVI	y=5.92ln(x)+4.28	[58]
11	NDVI	$y = \log_{0.6}[-(x – 0.943)/0.731]$	[52]	44	WDVI	y=3.59ln(x)+4.68	[58]
12	SR	$y = x^{0.654} – 1.24$	[52]	45	TRBI	y = 4.39exp(-1.42x)	[49]
13	WDRVI2	$y = \log_{0.775}(1.61 – x) + 1.61$	[52]	46	TRBI	$y = 0.44x^2 - 3.27x + 3.84$	[49]
14	TVI2	$y = \log_{0.81}(1.05 – x)$	[52]	47	SR	$y = -0.01x^2 + 0.33x + 0.55$	[49]
15	GNDVI	y = - {[ln(0.876 – x) + 0.66]/0.409}	[52]	48	SR	y = 2.59exp(0.01x) - 6.19exp(-0.71x)	[49]
16	CI_{green}	$y = [(x – 0.931)/1.44]^{0.971}$	[52]	49	NDVI783.665	y = 3.93x - 0.18	[49]
17	EVI2	y = (x + 0.863)4.08 – 0.863	[52]	50	NDVI783.665	y = 0.68exp(1.78x)	[49]
18	NDRE	$y = \log_{0.716}(0.88 – x) – 0.623$	[52]	51	NDVI783.665	$y = -1.98 x^2 + 5.93x- 0.55$	[49]
19	TVI	$y = (x/8.85)^{1.73}$	[52]	52	NDI	$y = - 6.51 x^2 + 9.33x + 0.16$	[49]
20	$CI_{red-edge}$	$y = [(x – 0.15)/0.642]^{0.775}$	[52]	53	TRBI	y = -2.55x + 3.62	[49]
21	MTCI	$y = (x – 1.49)^{0.926}$	[52]	54	SR	y = 0.15x + 1.11	[49]
22	SR	$y=−0.008x^2+0.40x−0.25$	[36]	55	NDI	y = 3.58x + 0.91	[49]
23	CI_{green}	$y=−0.018x^2+0.74x−0.54$	[36]	56	SR	y = 1.51exp(0.04x)	[49]
24	$CI_{red-edge}$	$y=−0.036x^2+1.08x−0.07$	[36]	57	NDI	y = 1.33exp(1.18x)	[49]
25	MTCI	$y=−0.012x^2+0.90x−1.1$	[36]	58	WDVI	$y = 0.1384e^{13.9611x}$	[57]

26	greenWDRVI	$y=5.7x^2+1.7x-0.08$	[36]	59	MSAVI	$y= 0.0655e^{6.0641x}$	[57]
27	rededgeWDRVI	$y=-1.6x^2 +9.6x-0.29$	[36]	60	NDVI	$y= 0.1119e^{6.3954x}$	[57]
28	$CI_{red-edge}$	$y=-0.067x^2+1.5x-0.22$	[36]	61	NDVI	$y = [(x - 0.931)/1.44]^{0.971}$	[59]
29	CI_{green}	$y=-0.003x^2+0.64x-0.37$	[36]	62	CI_{green}	$y=1.677x+0.994$	[59]
30	CI_{green}	$y=-0.003x^2+0.64x-0.37$	[36]	63	SR	$y= 3.799x+0.468$	[59]
31	greenWDRVI	$y=5.7x^2+1.7x-0.08$	[36]	64	$CI_{red-edge}$	$y=1.125x-0.230$	[59]
32	SR	$y=-0.0005x^2+0.20x+0.20$	[36]	65	MTCI	$y=1.160x+1.036$	[59]
33	$CI_{red-edge}$	$y=-0.067x^2+1.5x-0.22$	[36]	66	NDVI	$y = (-1.6*\log(-1.36986*(x - 0.934)))$	[59]

Supplementary material table S2 (**Table S2**). R^2, RMSE and nRMSE (%) obtained between field measured and retrieved LAI from physical approaches (LUT, NNET and $PE_{physical}$)

Method	VIs	Type	Equation	Ref	nRMSE (%)	R^2	RMSE
Empirical models	SR	empirical linear	-0.114 + 0.349x	This paper	8.36	0.95	0.66
	VARIrededge		-0.500 + 9.631x		21.97	0.58	0.59
	EVI2	empirical polynomial	0.985 - 4.719x + 12.053		17.36	0.69	0.50
	MTCI		0.921 + 0.229x + 0.007x²		29.85	0.13	0.48
	MTVI2		0.625 - 2.190x + 14.091x²		26.72	0.19	0.55
	NDGI43		1.498-8.048x + 13.528x²		19.30	0.70	0.86
Literature empirical models	MSAVI	literature exponential		[57]	8.09	0.95	0.64
	NDVI	literature linear		[58]	28.27	0.19	0.45
	VARIrededge			[77]	25.65	0.38	0.60
	MTVI2	literature logarithmic		[52]	18.18	0.67	0.52
	rededgeWDRVI	literature polynomial		[36]	18.60	0.70	0.83
PROSAIL	CIgreen	synthetic linear	0.771 + 0.265x	This paper	27.01	0.26	0.43
	SR		0.605 + 0.157x		26.70	0.20	0.55
	NDRE	synthetic polynomial	0.041 -1.731x + 10.286x²		17.57	0.72	0.78
	OSAVI		0.301 -3.421x + 10.82x²		16.60	0.75	0.81
	RDVI		-1.350 + 7.712x+1.771x²		23.51	0.45	0.63
	LUT	LUT	-		17.73	0.78	0.78
	NNET	NNET	-		28.56	0.35	0.71

Supplementary material table S3 (**Table S3**). R^2, RMSE and nRMSE (%) obtained between field measured and retrieved LAI from empirical, empirical literature models compared to $PE_{physical}$

Method	VIs	Type	Ref	nRMSE (%)	R^2	RMSE
Empirical models	CIre	empirical linear	This paper	11.76	0.66	0.96
	SR			8.66	0.81	0.71
	EVI2	empirical polynomial		10.03	0.75	0.82
	MSAVI			10.00	0.75	0.81
	NDGI43			10.25	0.74	0.83
	NDVI			10.30	0.74	0.84
	OSAVI			9.68	0.77	0.79
	RDVI			9.90	0.76	0.81
	VARIrededge			10.95	0.70	0.89
	WDRVI3			9.37	0.78	0.76
Literature empirical models	VARIrededge	literature linear	[77]	12.81	0.67	1.04
	RDVI	literature exponential	[48]	10.86	0.77	0.88
	MSAVI		[48]	10.88	0.77	0.89
	EVI2		[52]	14.47	0.77	1.18
	SR		[52]	9.55	0.81	0.78
	NDGI43		[49]	13.52	0.70	1.10
	NDVI	literature logarithmic	[52]	9.56	0.79	0.78
	OSAVI		[52]	29.47	0.81	2.40
	WDRVI3		[52]	9.42	0.80	0.77
	CIre	literature polynomial	[36]	11.06	0.70	0.90
PROSAIL	EVI2	synthetic linear	This paper	11.35	0.70	0.92
	CIre	synthetic polynomial		12.76	0.70	1.04
	MSAVI			11.08	0.70	0.90
	NDGI43			14.19	0.72	1.16
	NDVI			14.43	0.70	1.18
	OSAVI			10.34	0.77	0.84
	RDVI			11.50	0.69	0.94
	SR			13.35	0.82	1.09
	VARIrededge			11.92	0.68	0.97
	WDRVI3			13.53	0.78	1.10

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