

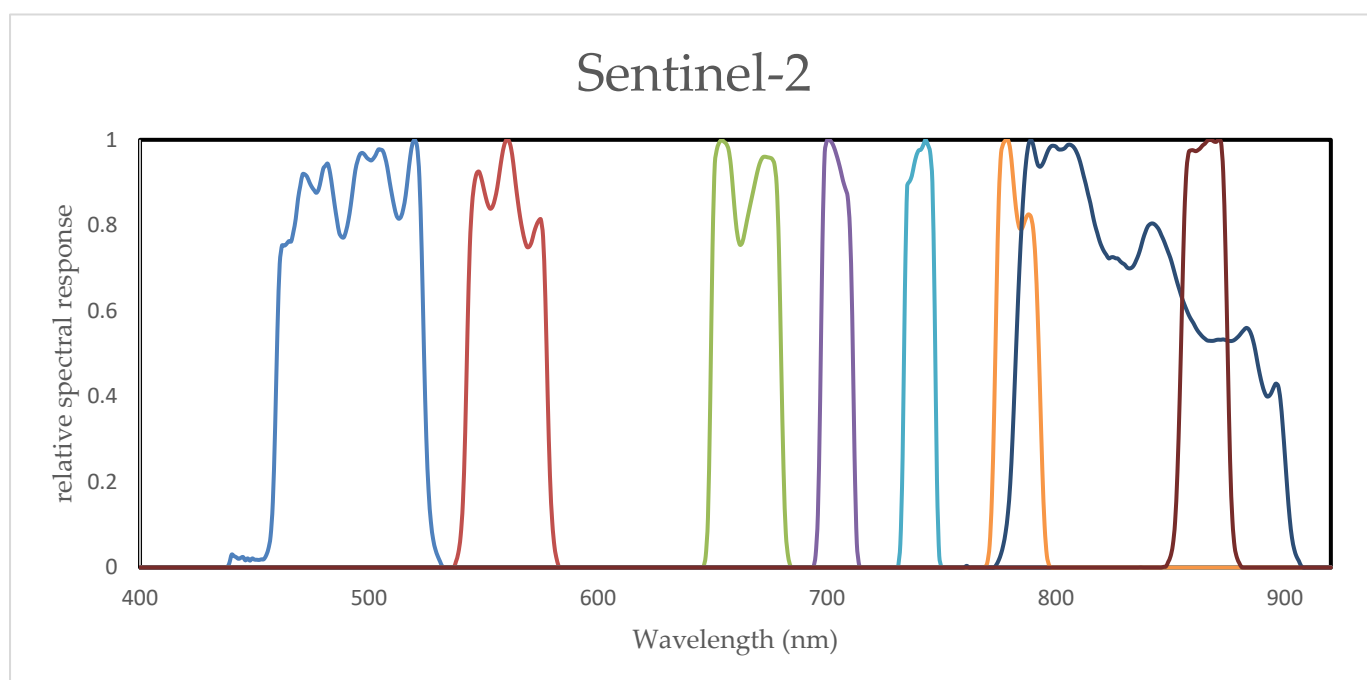
# Estimation of canopy structure of field crops using Sentinel-2 bands with vegetation indices and machine learning algorithms

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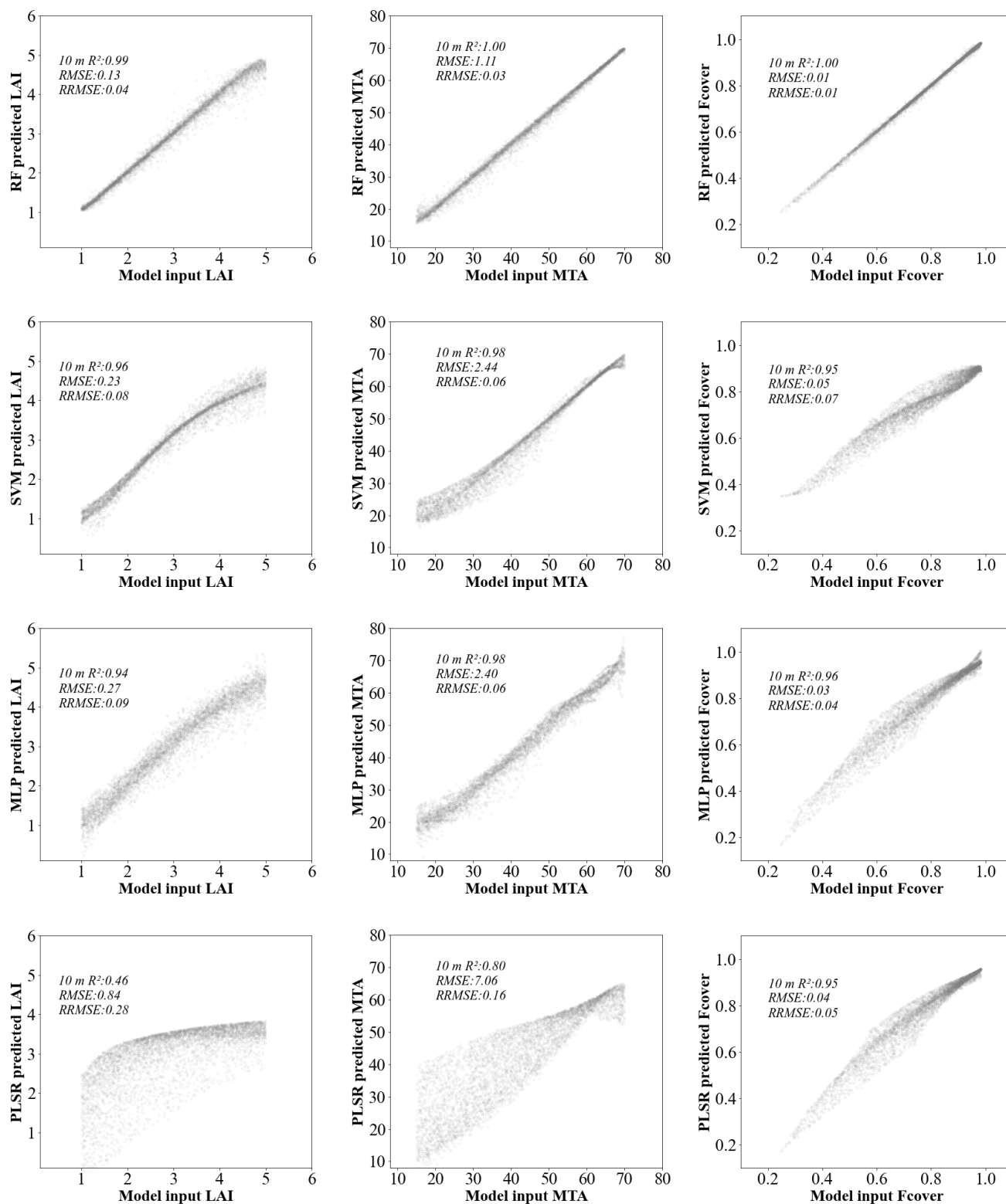
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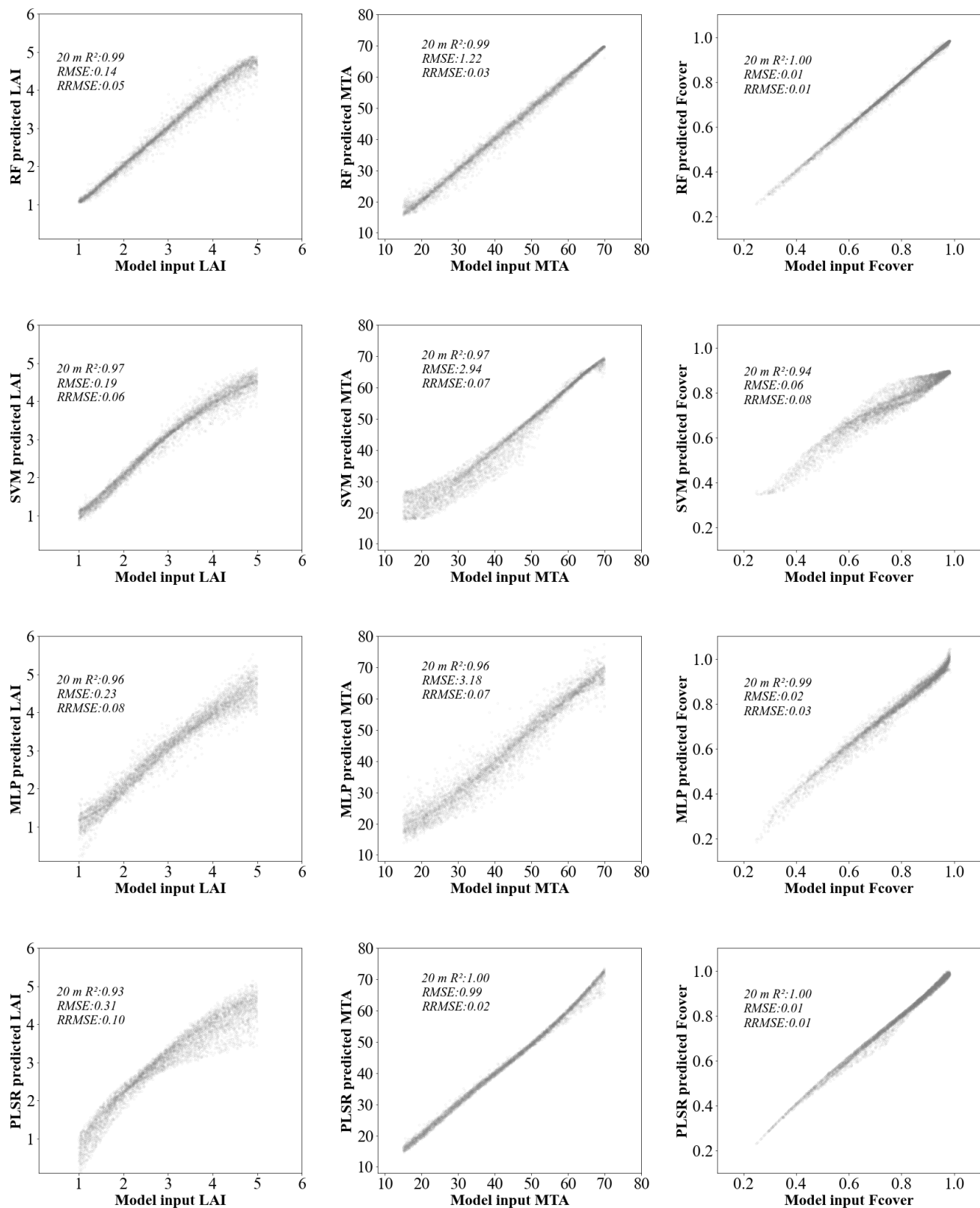
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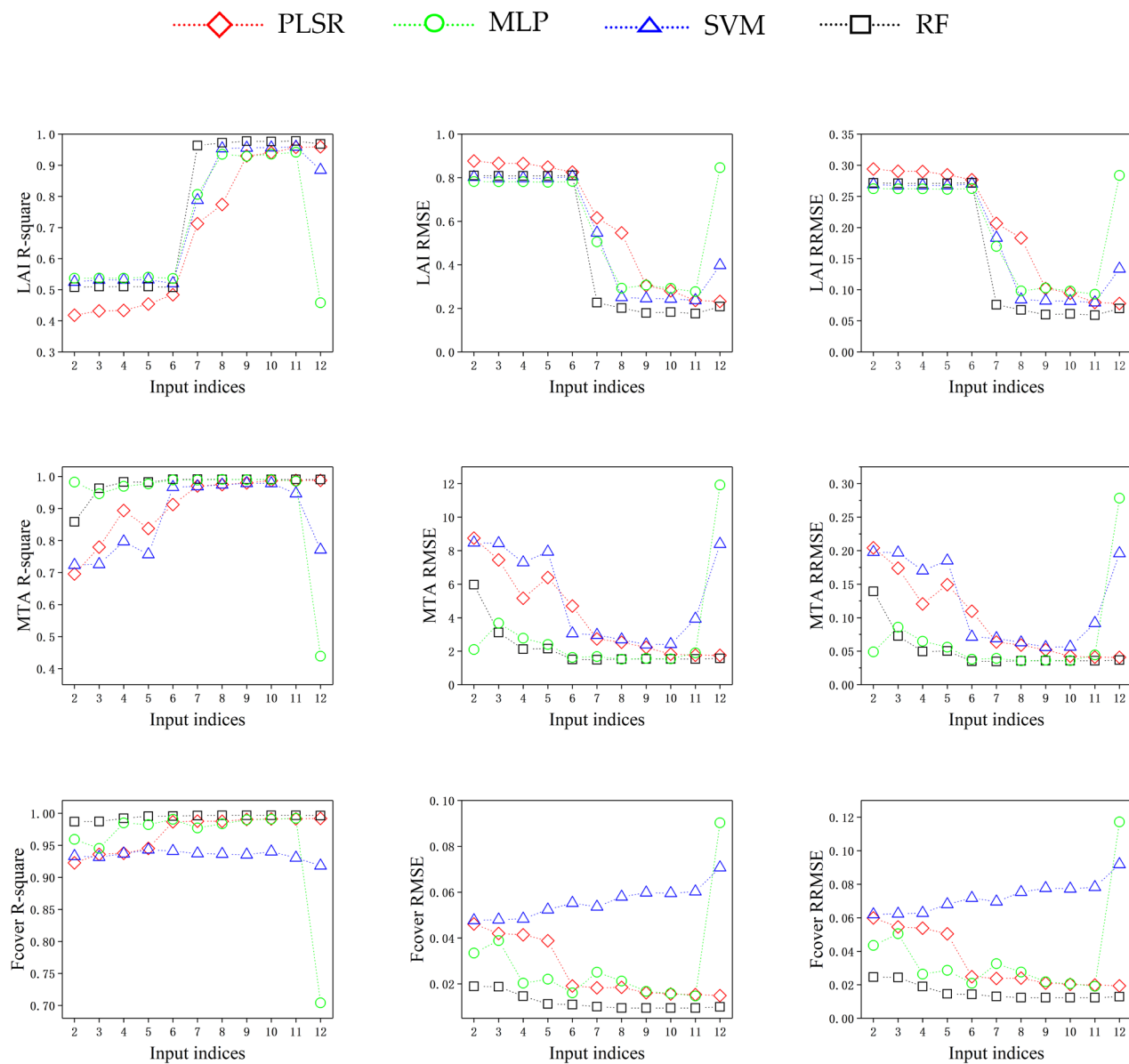
**Figure S1.** Eight Sentinel-2 spectral response functions used in this study.



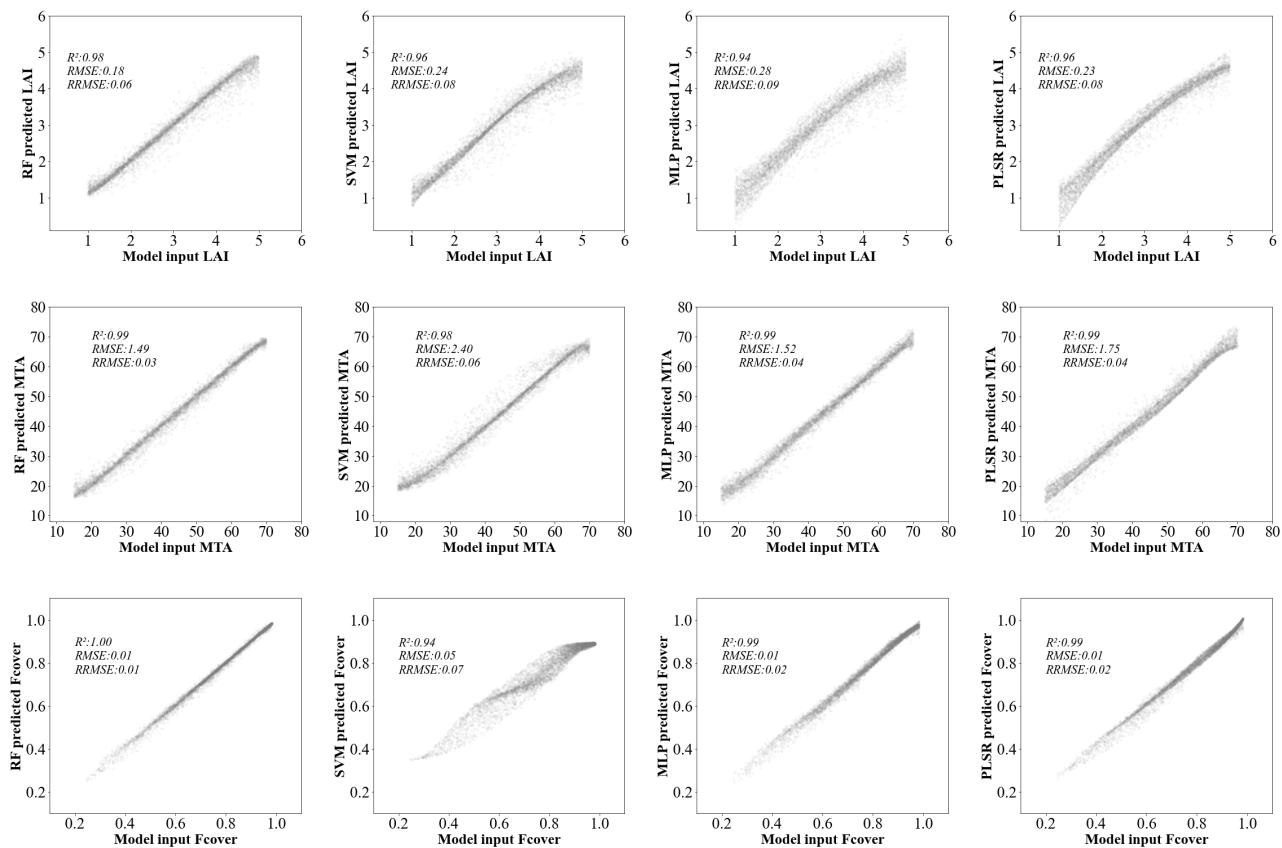
**Figure S2.** Canopy structure parameters estimated using the PROSAIL model simulated Sentinel-2 bands which have 10 m resolution.



**Figure S3.** Canopy structure parameters estimated using the PROSAIL model simulated Sentinel-2 bands which have 20 m resolution.



**Figure S4.** Effects of input vegetation indices on the model accuracy using the PROSAIL model simulations.



**Figure S5.** Performance of machine learning algorithms combined with optimized input indices using the PROSIAL model simulations.

**Table S1.** Statistics of estimated MTA data using simulated Sentinel-2 bands which have 10 m resolution.

Species	RF				SVM				MLP				PLSR			
	Max	Min	Mean	STD	Max	Min	Mean	STD	Max	Min	Mean	STD	Max	Min	Mean	STD
Faba bean	34.09	25.13	27.14	1.18	34.75	26.34	28.42	1.69	27.80	25.78	26.94	0.46	36.35	22.45	29.59	2.82
Narrow-leafed lupin	46.02	20.15	28.63	10.29	37.54	31.79	34.81	2.07	29.06	18.32	22.31	4.37	42.15	35.38	39.03	2.46
Turnip rape	33.30	33.06	33.12	0.10	43.56	43.44	43.49	0.04	32.47	31.37	31.86	0.41	16.53	15.42	16.20	0.46
Oat	56.20	50.29	54.06	2.30	54.10	52.70	53.25	0.56	58.11	53.08	55.40	1.94	50.61	46.61	48.19	1.53
Barley	53.79	28.00	42.18	8.32	53.99	34.48	44.47	5.68	52.08	28.00	45.22	6.50	62.80	36.07	46.86	7.73
Wheat	56.19	53.06	54.00	0.34	54.68	46.57	53.49	1.18	57.53	51.31	54.00	0.76	60.12	45.90	52.99	2.82

**Table S2.** Statistics of estimated MTA data using simulated Sentinel-2 bands which have 20 m resolution.

Species	RF				SVM				MLP				PLSR			
	Max	Min	Mean	STD	Max	Min	Mean	STD	Max	Min	Mean	STD	Max	Min	Mean	STD
Faba bean	27.45	23.27	26.87	0.61	34.36	26.80	28.00	1.60	28.90	25.95	26.91	0.53	29.65	22.97	26.52	1.52
Narrow-leafed lupin	45.85	21.37	29.60	9.54	39.25	30.05	34.65	3.32	30.21	20.32	25.61	3.62	34.54	30.92	32.67	1.29
Turnip rape	32.61	32.24	32.46	0.14	42.04	41.97	42.01	0.03	32.17	30.28	31.10	0.69	32.60	29.92	31.05	0.97
Oat	56.03	51.90	54.52	1.70	53.77	52.08	52.77	0.62	56.34	54.22	55.10	0.78	53.32	51.94	52.37	0.55
Barley	53.87	26.66	44.03	7.74	53.30	32.29	43.55	6.29	54.00	37.90	46.70	4.44	52.99	42.54	45.67	2.90
Wheat	56.62	52.57	53.99	0.39	54.22	46.48	53.75	0.85	54.58	49.21	53.87	0.57	60.92	46.60	53.94	2.20

**TableS3.** Statistics of estimated MTA data using machine learning algorithms combined with optimized input indices.

Species	RF				SVM				MLP				PLSR			
	Max	Min	Mean	STD	Max	Min	Mean	STD	Max	Min	Mean	STD	Max	Min	Mean	STD
Faba bean	27.00	22.80	26.48	1.05	32.19	26.84	27.77	1.21	27.91	23.69	26.87	0.69	31.82	22.71	26.93	2.29
Narrow-leaved lupin	37.30	22.73	28.36	5.41	34.16	27.98	30.53	2.27	23.67	8.85	17.41	6.02	27.11	23.95	25.22	1.22
Turnip rape	31.18	29.35	30.49	0.70	34.38	30.89	32.93	1.33	33.66	30.84	32.07	1.04	31.61	28.78	30.28	1.01
Oat	55.13	50.22	53.54	1.96	53.18	51.86	52.47	0.47	58.73	56.26	57.28	1.03	51.15	49.61	50.17	0.59
Barley	54.00	28.68	47.68	6.72	53.82	40.20	46.52	3.75	53.72	44.26	47.26	3.13	56.52	42.73	47.13	4.79
Wheat	55.33	48.93	53.90	0.65	54.21	49.25	53.83	0.61	55.14	46.87	53.84	0.83	57.40	46.38	53.99	1.58