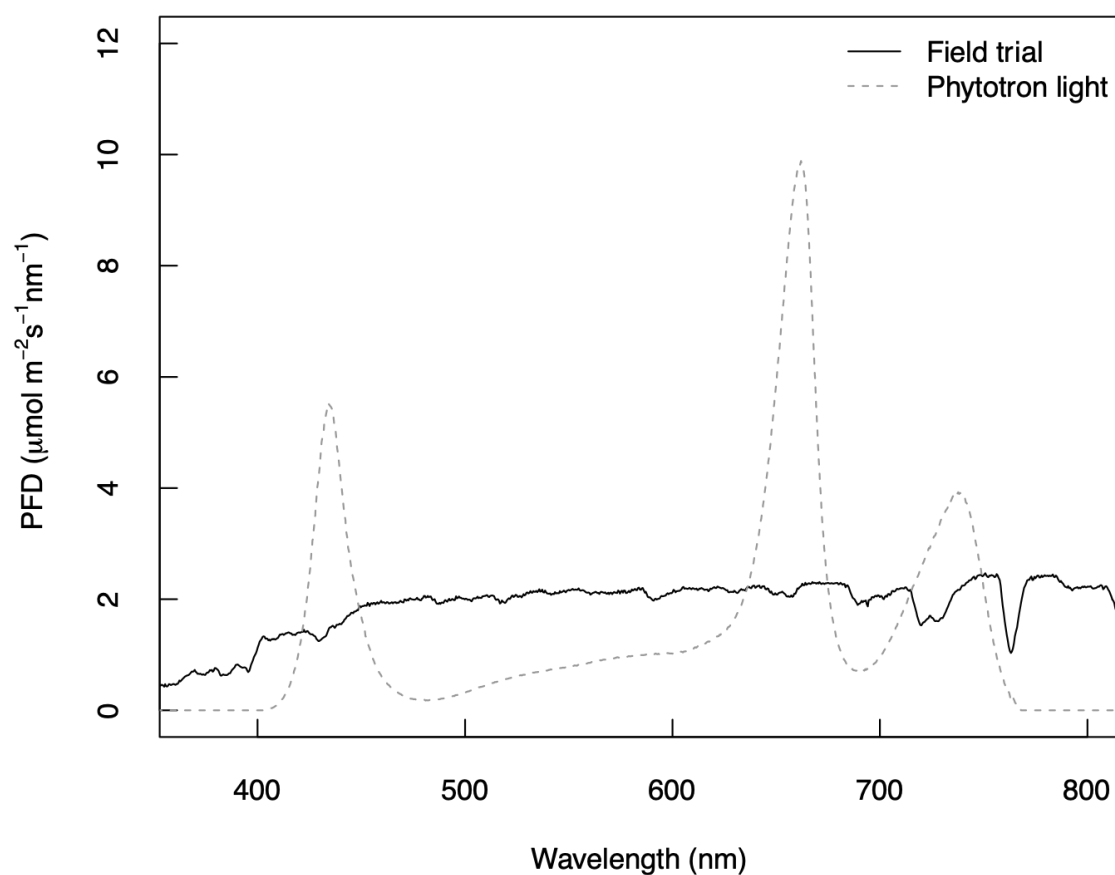


Supplementary materials:



Supplementary figure 1: Spectrum examples of the applied light. The field trial example corresponds to a sample of the sun spectra (28% Blue light, 36% Green, 36% Red and R:FR 1.1 in average), meanwhile the phytotron light quality corresponds to the used spectra in the phytotrons (25%B, 16%G, 59%R and R:FR 1.8). The integrated area between 400 and 700 nm corresponds to an approximately $575 \mu\text{mol m}^{-2}\text{s}^{-1}$ of photosynthetic photon flux density in each case

Supplementary table 1: Absolute values of all measured traits for each species and treatment. Values are means $\pm$ s.d., N=3 to 9 (see methods).

Species	<i>Alnus</i>					<i>Lactuca</i>				
Trial\Treatment	Outdoor	Fix L - Fix T	Fix L - Variable T	Variable L - Fix T	Variable L - Variable T	Outdoor	Fix L - Fix T	Fix L - Variable T	Variable L - Fix T	Variable L - Variable T
Biomass and Morphology										
Height	22.32 $\pm$ 3.6	9.88 $\pm$ 4.71	13.23 $\pm$ 7.41	10.7 $\pm$ 5.46	13.37 $\pm$ 6.5	-	-	-	-	-
SLA	34.76 $\pm$ 3.73	21.83 $\pm$ 12.58	19.7 $\pm$ 6.56	45.41 $\pm$ 14.95	38.07 $\pm$ 6.25	25.14 $\pm$ 5.32	27.19 $\pm$ 3.88	27.32 $\pm$ 4.86	52.3 $\pm$ 5.94	43.91 $\pm$ 9.28
Dry weight shoot	0.51 $\pm$ 0.15	0.17 $\pm$ 0.12	0.15 $\pm$ 0.13	0.09 $\pm$ 0.05	0.16 $\pm$ 0.13	-	-	-	-	-
Dry weight roots	0.52 $\pm$ 0.15	0.11 $\pm$ 0.11	0.2 $\pm$ 0.14	0.2 $\pm$ 0.14	0.24 $\pm$ 0.14	3.15 $\pm$ 0.93	6.86 $\pm$ 1.69	13.72 $\pm$ 3.32	4.66 $\pm$ 2.85	5.28 $\pm$ 3.13
Total dry weight	2.09 $\pm$ 0.57	0.65 $\pm$ 0.28	0.75 $\pm$ 0.38	0.53 $\pm$ 0.35	0.72 $\pm$ 0.48	11.94 $\pm$ 2.47	13.48 $\pm$ 2.33	20.42 $\pm$ 3.71	9.15 $\pm$ 3.33	10.17 $\pm$ 3.46
Root to Shoot ratio	0.34 $\pm$ 0.08	0.25 $\pm$ 0.23	0.44 $\pm$ 0.36	0.59 $\pm$ 0.15	0.57 $\pm$ 0.22	0.35 $\pm$ 0.06	1.06 $\pm$ 0.29	2.18 $\pm$ 0.72	1.07 $\pm$ 0.7	1.08 $\pm$ 0.57
Chlorophyll										
Chlorophyll a (mg g ⁻¹)	7.35 $\pm$ 1.93	3.02 $\pm$ 0.26	2.44 $\pm$ 0.56	7.63 $\pm$ 1.33	5.76 $\pm$ 0.85	2.51 $\pm$ 1.06	1.59 $\pm$ 0.28	1.8 $\pm$ 0.35	5.5 $\pm$ 0.65	4.65 $\pm$ 0.73
Chlorophyll b (mg g ⁻¹)	1.45 $\pm$ 0.5	0.64 $\pm$ 0.09	0.52 $\pm$ 0.12	1.74 $\pm$ 0.34	1.24 $\pm$ 0.26	0.57 $\pm$ 0.23	0.28 $\pm$ 0.06	0.31 $\pm$ 0.06	1.12 $\pm$ 0.2	0.91 $\pm$ 0.15
Chl a: b ratio	5.13 $\pm$ 0.45	4.72 $\pm$ 0.22	4.74 $\pm$ 0.15	4.42 $\pm$ 0.15	4.68 $\pm$ 0.29	4.38 $\pm$ 0.66	5.76 $\pm$ 0.63	5.84 $\pm$ 0.55	4.94 $\pm$ 0.47	5.11 $\pm$ 0.26
Carotenoids (mg g ⁻¹)	1.94 $\pm$ 0.36	1.89 $\pm$ 0.2	1.31 $\pm$ 0.43	2.9 $\pm$ 0.52	2.09 $\pm$ 0.3	0.68 $\pm$ 0.27	0.72 $\pm$ 0.12	0.96 $\pm$ 0.19	1.74 $\pm$ 0.14	1.57 $\pm$ 0.24
Fv/Fm	0.78 $\pm$ 0.01	0.77 $\pm$ 0.05	0.68 $\pm$ 0.04	0.81 $\pm$ 0.01	0.77 $\pm$ 0.01	0.85 $\pm$ 0.01	0.84 $\pm$ 0.01	0.81 $\pm$ 0.02	0.86 $\pm$ 0.01	0.85 $\pm$ 0.02
Pi	1.16 $\pm$ 0.47	1.13 $\pm$ 1.39	0.18 $\pm$ 0.14	1.66 $\pm$ 0.44	0.71 $\pm$ 0.09	3.5 $\pm$ 1.21	3.29 $\pm$ 1.26	1.7 $\pm$ 0.67	3.6 $\pm$ 0.95	3.23 $\pm$ 1.58
Photosynthesis										
Max photosynthesis**	8.37 $\pm$ 0.5	14.25 $\pm$ 1.18	9.82 $\pm$ 1.43	8.51 $\pm$ 1.37	9.17 $\pm$ 0.91	5.77 $\pm$ 1.13	13.5 $\pm$ 4.69	8.63 $\pm$ 5.07	13.76 $\pm$ 5.81	16 $\pm$ 2.38

Initial slope	30.33±4.62	27.33±3.06	40.67±11.93	36.33±9.07	35±4.36	38.33±10.6	35.67±12.66	31.33±9.8 1	28.67±4.93	34±10
Dark respiration	0.04±0	0.06±0	0.05±0	0.05±0	0.05±0.01	0.04±0	0.05±0.01	0.05±0.01	0.06±0.01	0.06±0
Compensation point	-1.74±0.12	-1.77±0.14	-2.01±0.54	-1.91±0.53	-1.72±0.24	-1.85±0.29	-1.88±0.61	-2.01±0.56	-1.92±0.17	-2.15±0.61

Supplementary table 1: (continued)

Species	<i>Melissa</i>					<i>Ocimum</i>				
Trial\Treatment	Outdoor	Fix L - Fix T	Fix L - Variable T	Variable L - Fix T	Variable L - Variable T	Outdoor	Fix L - Fix T	Fix L - Variable T	Variable L - Fix T	Variable L - Variable T
Biomass and Morphology										
Height	25.91±2.44	17.27±1.91	17.94±2.17	19.41±2.11	16.8±4.5	21.16±4.13	24.86±3.74	26.02±4.8 ₄	18.47±3.75	18.48±1.35
SLA	40.16±7.73	20.59±2.01	23.96±3.51	39.98±4.76	53.31±27.34	21.37±3.56	13.62±1.61	10.92±1.1 ₄	19.68±1.58	18.09±1.93
Dry weight shoot	-	-	-	-	-	0.38±0.13	0.54±0.11	0.78±0.29	0.3±0.12	0.27±0.08
Dry weight roots	2.1±1.16	3.01±0.64	3.07±0.82	1.07±0.41	0.55±0.29	0.37±0.16	1.62±0.45	1.86±0.66	1±0.58	0.91±0.62
Total dry weight	5.72±3.13	7.29±1.43	7.34±2.13	2.26±0.86	1.42±0.66	2±0.65	3.92±0.61	5.45±1.8	2.37±0.86	2.45±0.98
Root to Shoot ratio	0.58±0.06	0.71±0.11	0.74±0.11	0.9±0.14	0.63±0.22	0.23±0.07	0.73±0.25	0.54±0.18	0.74±0.44	0.58±0.32
Chlorophyll										
Chlorophyll a (mg g ⁻¹)	8.04±3.07	3.23±0.44	3.08±0.16	8.43±1.03	8.2±1.76	2.19±0.59	1.97±0.48	1.43±0.13	4.64±0.36	3.92±0.78
Chlorophyll b (mg g ⁻¹)	1.82±0.61	0.72±0.11	0.73±0.07	2.17±0.29	2.02±0.49	0.54±0.15	0.37±0.11	0.23±0.03	1.03±0.08	0.84±0.23
Chl a: b ratio	4.35±0.37	4.49±0.31	4.26±0.35	3.9±0.09	4.09±0.14	4.08±0.1	5.38±0.52	6.36±0.25	4.51±0.24	4.75±0.33
Carotenoids (mg g ⁻¹)	1.94±0.78	1.08±0.16	1.31±0.13	2.28±0.22	2.57±0.46	0.55±0.16	0.64±0.15	0.66±0.03	1.23±0.1	1.18±0.16
Fv/Fm	0.81±0.01	0.81±0.01	0.75±0.02	0.83±0.01	0.8±0.02	0.77±0.03	0.82±0.01	0.73±0.05	0.83±0.01	0.82±0.01
Pi	2.66±0.28	2.59±0.1	0.79±0.19	3.07±1.13	1.98±1.04	1.93±1.32	6.28±0.44	0.77±0.45	7.81±1.6	3.73±0.96
Photosynthesis										
Max photosynthesis**	11.08±0.56	13.45±1.95	13.46±2.98	15.22±2.46	14.93±0.66	6.73±0.52	16.46±1.83	14.7±3.63	18.07±4.69	19.19±0.73
Initial slope	24.33±2.08	26.33±6.11	46.67±3.21	22.67±8.74	22.33±1.53	76.33±5.86	37.33±5.77	47.33±4.5 ₁	36.33±10.69	34.33±0.58

Dark respiration	0.05±0.01	0.06±0	0.04±0.01	0.06±0	0.06±0	0.04±0	0.06±0.01	0.05±0.01	0.06±0	0.06±0
Compensation point	-1.63±0.16	-1.67±0.25	-2.01±0.31	-1.49±0.54	-1.51±0.08	-2.8±0.37	-2.18±0.12	-2.3±0.41	-2.29±0.7	-1.97±0.03

Supplementary table 1: (continued)

Species	<i>Raphanus</i>					<i>Triticum</i>				
Trial\Treatment	Outdoor	Fix L - Fix T	Fix L - Variable T	Variable L - Fix T	Variable L - Variable T	Outdoor	Fix L - Fix T	Fix L - Variable T	Variable L - Fix T	Variable L - Variable T
Biomass and Morphology										
Height	5.94±0.59	4.36±0.41	5±1.19	6.61±0.92	6.97±1.37	53.96±3.6 ₃	28.68±1.72	33.03±2.5 ₈	43.58±4.57	43.71±3.12
SLA	23±2.76	24.95±1.24	27.61±4.86	31.96±3.14	31.21±6.15	30.38±1.8 ₉	16.91±1.87	19.64±2.3	26.28±4.27	27.83±4.82
Dry weight shoot	0.53±0.16	0.22±0.06	0.2±0.16	0.32±0.12	0.24±0.1	-	-	-	-	-
Dry weight roots	4.7±1.59	4.54±1.33	3.31±1.39	3.18±0.77	2.66±0.76	21.6±7.46	47.88±13.68	61.08±16.3	111.5±20.28	48.41±17.43
Total dry weight	7.47±2.05	6.04±1.74	4.79±1.87	4.95±1.02	4.02±0.97	33.89±7.5 ₇	54.6±14.3	67.06±15.2	119.93±20.2	56.52±17.88
Root to Shoot ratio	1.69±0.39	3.07±0.49	2.39±0.82	1.87±0.69	1.95±0.38	1.86±0.86	7.24±2.21	11.36±5.4	13.47±3.12	5.99±1.87
Chlorophyll										
Chlorophyll a (mg g ⁻¹)	2.72±1.6	3.3±0.51	4.77±1.4	6.84±1.17	7.81±1.22	7.12±0.87	3.04±0.52	4.04±0.59	5.46±0.88	6.51±1.01
Chlorophyll b (mg g ⁻¹)	0.67±0.33	0.78±0.13	1.03±0.22	1.67±0.29	2.09±0.62	1.89±0.14	0.67±0.11	0.88±0.15	1.37±0.23	1.64±0.25
Chl a: b ratio	3.93±0.47	4.26±0.22	4.55±0.53	4.12±0.13	3.84±0.48	3.75±0.24	4.53±0.12	4.61±0.12	4.01±0.14	3.97±0.07
Carotenoids (mg g ⁻¹)	0.63±0.35	1.04±0.04	1.55±0.42	1.83±0.3	2.22±0.39	1.45±0.11	1.23±0.28	1.78±0.33	1.54±0.22	1.93±0.25
Fv/Fm	0.83±0.01	0.8±0	0.8±0.02	0.85±0	0.85±0.01	0.83±0.01	0.81±0.03	0.83±0.01	0.84±0.01	0.83±0
Pi	7.88±1.93	3.39±0.36	3.04±1.31	8.79±0.53	10.82±2.18	4.13±0.47	3.83±1.82	3.86±0.85	5.36±0.88	3.61±1.1
Photosynthesis										
Max photosynthesis**	13.77±3.41	15.53±2.79	16.16±4.16	19.62±4.51	19.7±3.49	9.12±0.82	18.19±8.91	16.66±6.3 ₄	13.92±0.61	14.02±2.57

Initial slope	22.33±2.31	24±5.29	37.67±6.11	25.33±2.08	27.67±6.66	35±0	23±6.08	23±7.55	30.67±12.66	26.33±8.02
Dark respiration	0.05±0	0.07±0	0.06±0	0.07±0	0.07±0	0.04±0	0.08±0.02	0.08±0.02	0.07±0.01	0.1±0.02
Compensation point	-1.05±0.02	-1.76±0.4	-2.35±0.27	-1.74±0.14	-1.95±0.48	-1.9±0.09	-2.12±0.86	-2.35±0.39	-2.38±0.63	-3.44±2.16

Supplementary table 1: (continued)

Species	<i>Ulmus</i>				
Trial\Treatment	Outdoor	Fix L - Fix T	Fix L - Variable T	Variable L - Fix T	Variable L - Variable T
Biomass and Morphology					
Height	26.67±9.16	24.46±4.92	23.93±2.18	30.69±10.31	25.59±9.8
SLA	28.71±2.78	22.1±1.3	22.3±3.86	33.8±5.28	31.16±3.14
Dry weight shoot	0.71±0.46	1.26±0.44	1±0.35	0.52±0.4	0.38±0.26
Dry weight roots	0.63±0.42	1.91±0.62	1.46±0.54	0.6±0.37	0.59±0.54
Total dry weight	2.77±1.69	5.19±1.39	4.37±1.41	1.99±1.12	1.65±1.25
Root to Shoot ratio	0.28±0.05	0.59±0.14	0.51±0.14	0.46±0.22	0.5±0.24
Chlorophyll					
Chlorophyll a (mg g ⁻¹)	6.8±0.86	1.8±0.15	2.16±0.4	5.78±1.75	4.28±0.37
Chlorophyll b (mg g ⁻¹)	1.54±0.19	0.36±0.04	0.46±0.08	1.35±0.49	1±0.07
Chl a: b ratio	4.43±0.1	5±0.33	4.67±0.44	4.37±0.31	4.3±0.16
Carotenoids (mg g ⁻¹)	1.15±0.18	0.64±0.07	0.91±0.05	1.62±0.41	1.26±0.15
Fv/Fm	0.81±0.01	0.77±0.01	0.65±0.05	0.82±0.01	0.79±0.02
Pi	3.46±0.8	1.37±0.32	0.3±0.17	3.59±0.42	1.63±0.55
Photosynthesis					
Max photosynthesis**	7.3±0.68	9.62±2.25	5.86±1.59	10.04±2.83	9.36±2.09
Initial slope	30.33±1.53	27±7.94	42±28.48	22±4.36	27.67±4.93
Dark respiration	0.03±0	0.05±0	0.04±0.01	0.05±0.01	0.05±0

Compensation point	-1.27±0.26	-1.59±0.24	-1.71±0.47	-1.33±0.26	-1.48±0.24
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Supplementary table 2: Statistical results considering the different treatments as a fix factor and species as random effect.

	Variable	P value - Treatment (Fix)	P value - Specie (Random)
Biomass and Morphology	Height*	1.97e-07	< 2e-16
	SLA	< 2e-16	< 2e-16
	Dry weight shoot	< 2e-16	< 2e-16
	Dry weight roots	< 2e-16	< 2e-16
	Total dry weight	1.76e-10	< 2e-16
	Root to shoot ratio	< 2e-16	< 2e-16
Chlorophyll	Chlorophyll A (mg g ⁻¹)	< 2e-16	< 2e-16
	Chlorophyll b (mg g ⁻¹)	< 2e-16	< 2e-16
	Chl A:B ratio	1.53e-14	< 2e-16
	Carotenoids(mg g ⁻¹)	< 2e-16	< 2e-16
	FvFm	< 2e-16	< 2e-16
	Pi	2.62e-09	< 2e-16
Stand. light	Max photosynthesis	4.39e-08	< 2e-16
	Compensation point	5.47e-04	< 2e-16
	Quantum yield for CO ₂ fixation	2.10e-15	< 2e-16
	Dark respiration	0.0261	< 2e-16