

Supplementary Figures

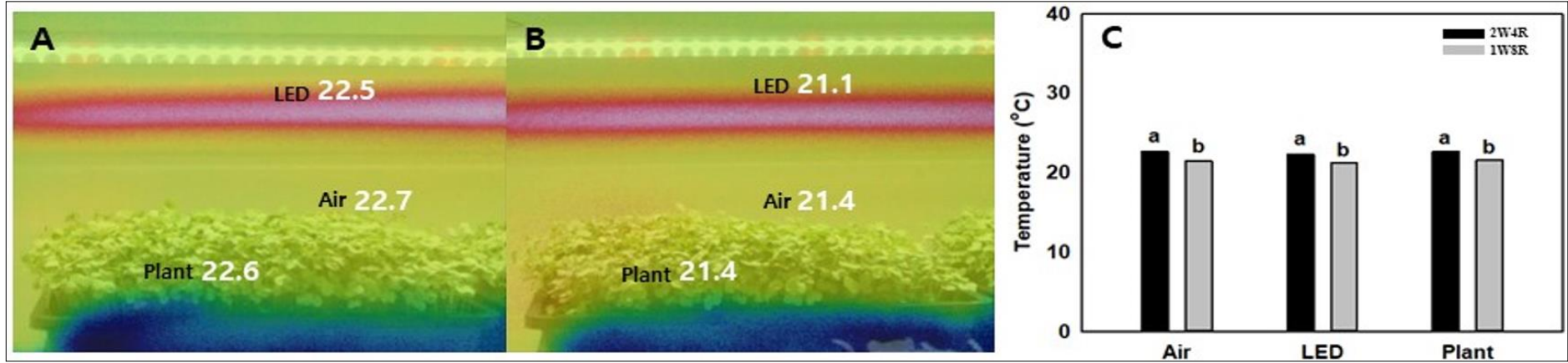


Fig. S1. The thermal images of 2W4R (A) and 1W8R (B) treatments and temperature for cultivation location (C) for 3 days. Statistically significant differences are detected at $p < 0.05$ in Duncan's multiple range test. Different letters indicate statistical differences between the treatments.

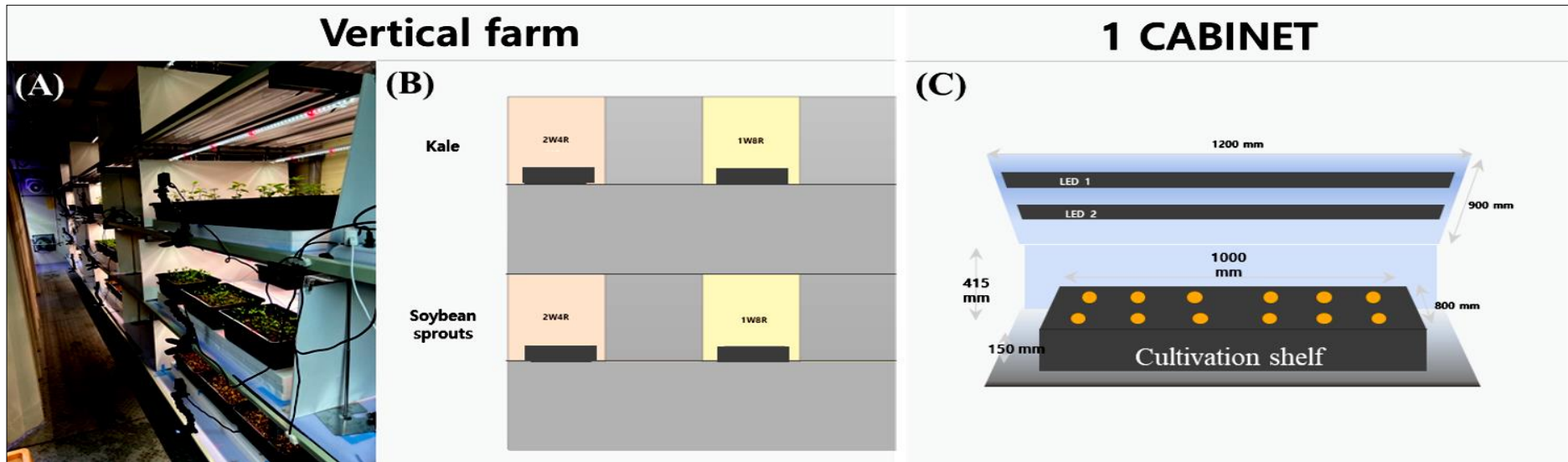


Fig. S2. Appearance diagram of the experimental cultivation area. Picture of the experimental site of vertical farming used in this study (A), the diagram of cabinets used to grow the plants (B) and the diagram of 1 cabinet (C), which includes the points of measured PPFD.

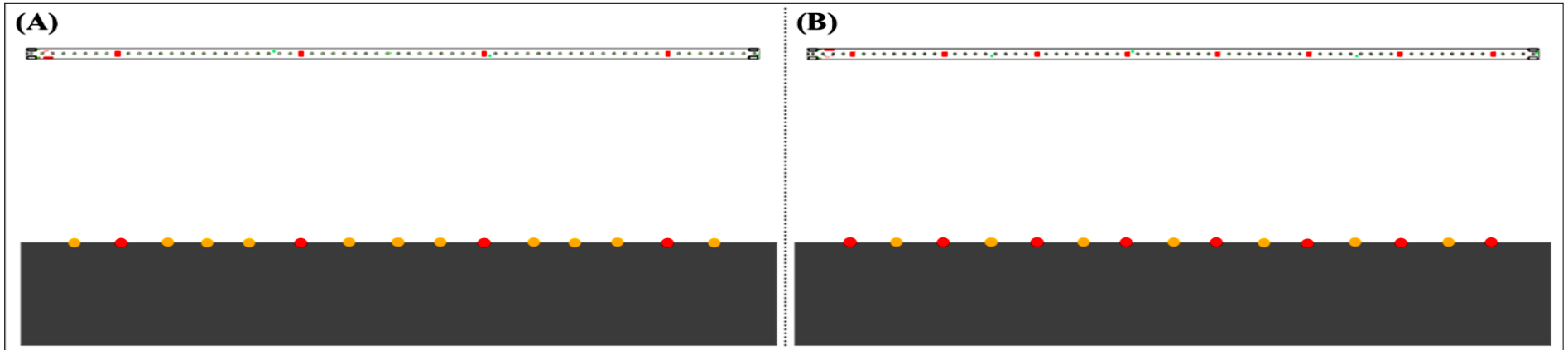


Fig. S3. The diagram of 2W4R (A) and 1W8R (B) with 15 light measuring points. The red point indicates the point immediately below the red chip and the yellow point indicates a certain point between the red chips.

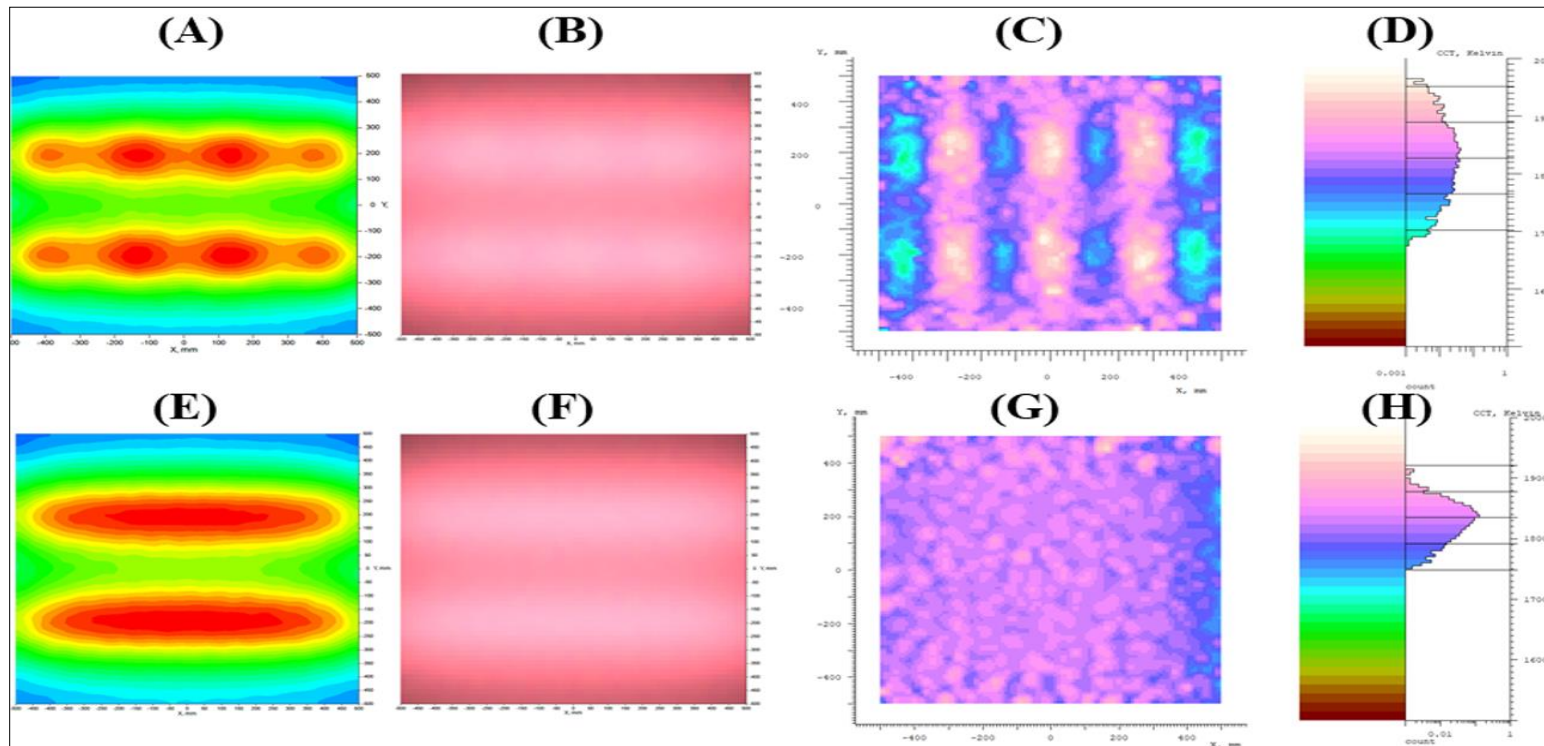


Fig. S4. Simulation of light distribution of cultivation shelves to different light sources. Simulation of light distribution in 2W4R (A-D), 1W8R (E-H) and distribution of PPFD (A, E), a real color view (B, F), CCT chart (C, G) and Kelvin (D, H).

Supplementary Tables

Table S1. Hogland nutrient solution components used in this study.

Type	Chemical	Amount (g L ⁻¹)
A	KNO ₃	236.15
	Ca(NO ₃) ₂ ·4H ₂ O	75.825
	Fe-EDTA	10.5275
B	KNO ₃	75.825
	NH ₄ H ₂ PO ₄	28.765
	MgSO ₄ ·7H ₂ O	123.24
	H ₃ BO ₃	0.3575
	MnSO ₄ ·4H ₂ O	0.22625
	ZnSO ₄ ·7H ₂ O	0.0275
	CuSO ₄ ·5H ₂ O	0.01
	Na ₂ MoO ₄ ·2H ₂ O	0.0025
Total	550.9563	

Table S2. Peak wavelength and spectral ratio of each light source.

Light source ^z	Range (nm)	Peak wavelength (nm)	Ratio (%)
2W4R	Blue (380-499)	437	20
	Green (500-599)	569	33
	Red (600-700)	660	47
1W8R	Blue (380-499)	437	20
	Green (500-599)	569	33
	Red (600-700)	660	47

^z 2W4R, 2-watt of 4 red LED chips; 1W8R, 1-watt of 8 red LED chips.