

## RESULTS

### *Within-experiment bleaching responses*

*F<sub>v</sub>/F<sub>m</sub>* values taken during CBASS became significantly lower with each subsequent treatment over 32.9 °C (T p < 0.0001; Fig. S2A), and treatments 32.9 °C and lower were not different from one another. *F<sub>v</sub>/F<sub>m</sub>* declined by 49% under 34.3 °C and 82% under 35.6 °C compared to the control treatment of 27.5 °C. Under the LT experiment, LT-OW end *F<sub>v</sub>/F<sub>m</sub>* values decreased by 42% compared to initial *F<sub>v</sub>/F<sub>m</sub>* values. LT-OW *F<sub>v</sub>/F<sub>m</sub>* initial values were on average 1.7-fold higher than end values (Welch's p < 0.0001). LT-Control end *F<sub>v</sub>/F<sub>m</sub>* values were significantly higher than LT-OW end values, but only for Upper Keys genotypes (T x G p < 0.05). CBASS total chlorophyll (µg/cm<sup>2</sup>; square-root transformed) in the 34.3 °C treatment declined by 45% and 85% declines were detected in the 35.6 °C treatment in comparison to the CBASS control (T p = 0.001; Fig. S2B). Under the LT experiment, there was a significant effect of treatment on all genotypes' total chlorophyll (TxG p < 0.0001; Fig. S2B), where chlorophyll declined by 92% under LT-OW (0.94 ± 0.44 µg/cm<sup>2</sup>) compared to LT-Control (10.93 ± 3.46 µg/cm<sup>2</sup>). Host protein (µg/cm<sup>2</sup>; square-root transformed) was much more variable and did not differ across CBASS treatments (T p > 0.05; Fig. S2C). Protein values ranged from 22.82 ± 11.29 µg/cm<sup>2</sup> (35.6 °C) to 50.23 ± 11.9 µg/cm<sup>2</sup> (27.5 °C) in the CBASS experiment. In the LT experiment, host protein declined by 58% in the LT-OW compared to LT-Control (T p < 0.001; Fig. S2C), although there was no treatment effect for genotypes LK31, LK50, and UK70 (TxG p > 0.05).

## TABLES & FIGURES

Table S1. Coral Genotype Source Location

| Genotype | Habitat    | Site Name                    | Latitude | Longitude |
|----------|------------|------------------------------|----------|-----------|
| LK31     | Offshore   | Porkys                       | 24.548   | -81.457   |
| LK41     | Offshore   | Haslun's                     | 24.553   | -81.438   |
| LK50     | Midchannel | 1.8nm WSW of Wonderland      | 24.549   | -81.533   |
| LK62     | Midchannel | Super Stag                   | 24.530   | -81.641   |
| LK7      | Midchannel | Wonderland                   | 24.560   | -81.501   |
| UK12     | Patch Reef | Plantation Key               | 24.966   | -80.489   |
| UK19     | Patch Reef | Tavernier                    | 24.988   | -80.478   |
| UK70     | Patch Reef | Inshore from Molasses Trench | 25.013   | -80.407   |
| UK76     | Forereef   | Lower Matecumbe              | 24.822   | -80.656   |
| UK80     | Patch Reef | Shallow patch reef near U10  | 25.021   | -80.401   |

Table S2. Summary of daily mean  $\pm$  SD water quality parameters for the long-term (LT) Control and Ocean Warming (OW) treatment tanks (Temperature, DO [Dissolved Oxygen], Salinity, pH, Photosynthetically Active Radiation [PAR], Flow).

| Treatment | Temp (°C)        | DO<br>(mg L <sup>-1</sup> ) | DO (%)           | Salinity<br>(ppt) | pH <sub>NBS</sub> | PAR<br>( $\mu\text{mol m}^{-2} \text{sec}^{-1}$ ) | Flow<br>(L hr <sup>-1</sup> ) |
|-----------|------------------|-----------------------------|------------------|-------------------|-------------------|---------------------------------------------------|-------------------------------|
| Control   | 26.92 $\pm$ 0.34 | 5.67 $\pm$ 0.28             | 87.58 $\pm$ 4.25 | 37.40 $\pm$ 0.53  | 8.08 $\pm$ 0.05   | 423.98 $\pm$ 216.24                               | 21.92 $\pm$ 0.63              |
| OW        | 30.84 $\pm$ 0.61 | 5.54 $\pm$ 0.34             | 91.02 $\pm$ 5.47 | 37.38 $\pm$ 0.63  | 8.09 $\pm$ 0.05   | 418.51 $\pm$ 218.97                               | 21.86 $\pm$ 0.64              |

Table S3. Summary of carbonate chemistry parameters for the long-term experiment. Water was collected from the main holding tank (“Header Tank”) and poisoned with mercuric chloride twice a week before analysis (pH<sub>T</sub> [total scale], pCO<sub>2</sub> [partial pressure of CO<sub>2</sub>], DIC [Dissolved Inorganic Carbon], HCO<sub>3</sub><sup>-</sup> [Bicarbonate], CO<sub>3</sub><sup>2-</sup> [Carbonate],  $\Omega_{\text{ar}}$  [Saturation state of seawater with respect to aragonite], TA [Total Alkalinity]).

|        | pH <sub>T</sub> | pCO <sub>2</sub> | DIC           | HCO <sub>3</sub> <sup>-</sup> | CO <sub>3</sub> <sup>2-</sup> | $\Omega_{\text{ar}}$ | TA                  |
|--------|-----------------|------------------|---------------|-------------------------------|-------------------------------|----------------------|---------------------|
| Header |                 | 490.29 $\pm$     | 2084.04 $\pm$ | 1848.71 $\pm$                 |                               |                      |                     |
| Tank   | 7.99 $\pm$ 0.08 | 111.89           | 69.98         | 79.20                         | 222.32 $\pm$ 35.79            | 3.51 $\pm$ 0.57      | 2397.92 $\pm$ 80.95 |

Table S4. Post-hoc Tukey HSD comparisons between genotype of *Fv/Fm* values under heat (LT-OW [31.5°C] and CBASS 34.3°C) treatments.

| CBASS 34.3°C |          |       |      |         |         | LT-OW       |          |       |      |         |         |
|--------------|----------|-------|------|---------|---------|-------------|----------|-------|------|---------|---------|
| Contrast     | estimate | SE    | df   | t.ratio | p.value | Contrast    | estimate | SE    | df   | t.ratio | p.value |
| LK31 - LK41  | -0.114   | 0.035 | 52   | -3.260  | 0.056   | LK31 - LK41 | 0.110    | 0.027 | 52   | 4.035   | 0.0064  |
| LK31 - LK50  | -0.026   | 0.035 | 52   | -0.751  | 0.999   | LK31 - LK50 | 0.009    | 0.027 | 52   | 0.334   | 1       |
| LK31 - LK62  | -0.039   | 0.035 | 52   | -1.122  | 0.9801  | LK31 - LK62 | 0.001    | 0.027 | 52   | 0.028   | 1       |
| LK31 - LK7   | -0.137   | 0.035 | 52   | -3.916  | 0.0091  | LK31 - LK7  | 0.022    | 0.027 | 52   | 0.814   | 0.9981  |
| LK31 - UK12  | -0.148   | 0.035 | 52   | -4.220  | 0.0036  | LK31 - UK12 | 0.167    | 0.027 | 52   | 6.139   | <.0001  |
| LK31 - UK19  | -0.143   | 0.035 | 52   | -4.078  | 0.0056  | LK31 - UK19 | 0.039    | 0.027 | 52   | 1.421   | 0.9149  |
| LK31 - UK70  | -0.111   | 0.035 | 52   | -3.156  | 0.0726  | LK31 - UK70 | 0.078    | 0.027 | 52   | 2.887   | 0.1354  |
| LK31 - UK76  | -0.131   | 0.040 | 52.4 | -3.316  | 0.0484  | LK31 - UK76 | 0.098    | 0.029 | 52.2 | 3.378   | 0.0412  |
| LK31 - UK80  | -0.051   | 0.035 | 52   | -1.445  | 0.9068  | LK31 - UK80 | 0.080    | 0.027 | 52   | 2.956   | 0.1162  |
| LK41 - LK50  | 0.088    | 0.035 | 52   | 2.509   | 0.2877  | LK41 - LK50 | -0.101   | 0.027 | 52   | -3.701  | 0.017   |
| LK41 - LK62  | 0.075    | 0.035 | 52   | 2.139   | 0.51    | LK41 - LK62 | -0.109   | 0.027 | 52   | -4.007  | 0.0069  |
| LK41 - LK7   | -0.023   | 0.035 | 52   | -0.656  | 0.9996  | LK41 - LK7  | -0.088   | 0.027 | 52   | -3.221  | 0.0618  |
| LK41 - UK12  | -0.034   | 0.035 | 52   | -0.960  | 0.9933  | LK41 - UK12 | 0.057    | 0.027 | 52   | 2.105   | 0.5328  |
| LK41 - UK19  | -0.029   | 0.035 | 52   | -0.817  | 0.998   | LK41 - UK19 | -0.071   | 0.027 | 52   | -2.614  | 0.2375  |
| LK41 - UK70  | 0.004    | 0.035 | 52   | 0.105   | 1       | LK41 - UK70 | -0.031   | 0.027 | 52   | -1.147  | 0.9769  |
| LK41 - UK76  | -0.017   | 0.040 | 52.4 | -0.430  | 1       | LK41 - UK76 | -0.012   | 0.029 | 52.2 | -0.404  | 1       |
| LK41 - UK80  | 0.064    | 0.035 | 52   | 1.816   | 0.7226  | LK41 - UK80 | -0.029   | 0.027 | 52   | -1.079  | 0.9848  |
| LK50 - LK62  | -0.013   | 0.035 | 52   | -0.371  | 1       | LK50 - LK62 | -0.008   | 0.027 | 52   | -0.306  | 1       |
| LK50 - LK7   | -0.111   | 0.035 | 52   | -3.165  | 0.0709  | LK50 - LK7  | 0.013    | 0.027 | 52   | 0.480   | 1       |
| LK50 - UK12  | -0.122   | 0.035 | 52   | -3.469  | 0.0324  | LK50 - UK12 | 0.158    | 0.027 | 52   | 5.806   | <.0001  |
| LK50 - UK19  | -0.117   | 0.035 | 52   | -3.327  | 0.0472  | LK50 - UK19 | 0.030    | 0.027 | 52   | 1.087   | 0.9839  |
| LK50 - UK70  | -0.084   | 0.035 | 52   | -2.405  | 0.3442  | LK50 - UK70 | 0.069    | 0.027 | 52   | 2.554   | 0.2656  |
| LK50 - UK76  | -0.105   | 0.040 | 52.4 | -2.651  | 0.2207  | LK50 - UK76 | 0.089    | 0.029 | 52.2 | 3.066   | 0.0901  |
| LK50 - UK80  | -0.024   | 0.035 | 52   | -0.694  | 0.9994  | LK50 - UK80 | 0.071    | 0.027 | 52   | 2.622   | 0.2336  |
| LK62 - LK7   | -0.098   | 0.035 | 52   | -2.795  | 0.1653  | LK62 - LK7  | 0.021    | 0.027 | 52   | 0.785   | 0.9985  |
| LK62 - UK12  | -0.109   | 0.035 | 52   | -3.099  | 0.0834  | LK62 - UK12 | 0.166    | 0.027 | 52   | 6.111   | <.0001  |
| LK62 - UK19  | -0.104   | 0.035 | 52   | -2.956  | 0.1162  | LK62 - UK19 | 0.038    | 0.027 | 52   | 1.393   | 0.9239  |
| LK62 - UK70  | -0.071   | 0.035 | 52   | -2.034  | 0.58    | LK62 - UK70 | 0.078    | 0.027 | 52   | 2.859   | 0.144   |
| LK62 - UK76  | -0.092   | 0.040 | 52.4 | -2.323  | 0.392   | LK62 - UK76 | 0.097    | 0.029 | 52.2 | 3.352   | 0.0441  |
| LK62 - UK80  | -0.011   | 0.035 | 52   | -0.323  | 1       | LK62 - UK80 | 0.080    | 0.027 | 52   | 2.928   | 0.1238  |
| LK7 - UK12   | -0.011   | 0.035 | 52   | -0.304  | 1       | LK7 - UK12  | 0.145    | 0.027 | 52   | 5.326   | 0.0001  |
| LK7 - UK19   | -0.006   | 0.035 | 52   | -0.162  | 1       | LK7 - UK19  | 0.017    | 0.027 | 52   | 0.608   | 0.9998  |
| LK7 - UK70   | 0.027    | 0.035 | 52   | 0.760   | 0.9988  | LK7 - UK70  | 0.056    | 0.027 | 52   | 2.074   | 0.5533  |
| LK7 - UK76   | 0.006    | 0.040 | 52.4 | 0.150   | 1       | LK7 - UK76  | 0.076    | 0.029 | 52.2 | 2.616   | 0.2364  |
| LK7 - UK80   | 0.087    | 0.035 | 52   | 2.471   | 0.3076  | LK7 - UK80  | 0.058    | 0.027 | 52   | 2.143   | 0.5075  |
| UK12 - UK19  | 0.005    | 0.035 | 52   | 0.143   | 1       | UK12 - UK19 | -0.128   | 0.027 | 52   | -4.718  | 0.0007  |
| UK12 - UK70  | 0.037    | 0.035 | 52   | 1.065   | 0.9861  | UK12 - UK70 | -0.088   | 0.027 | 52   | -3.252  | 0.0572  |
| UK12 - UK76  | 0.017    | 0.040 | 52.4 | 0.420   | 1       | UK12 - UK76 | -0.069   | 0.029 | 52.2 | -2.376  | 0.3605  |
| UK12 - UK80  | 0.097    | 0.035 | 52   | 2.776   | 0.172   | UK12 - UK80 | -0.086   | 0.027 | 52   | -3.183  | 0.0679  |
| UK19 - UK70  | 0.032    | 0.035 | 52   | 0.922   | 0.995   | UK19 - UK70 | 0.040    | 0.027 | 52   | 1.466   | 0.8991  |
| UK19 - UK76  | 0.012    | 0.040 | 52.4 | 0.293   | 1       | UK19 - UK76 | 0.059    | 0.029 | 52.2 | 2.046   | 0.5719  |
| UK19 - UK80  | 0.092    | 0.035 | 52   | 2.633   | 0.2289  | UK19 - UK80 | 0.042    | 0.027 | 52   | 1.535   | 0.8716  |
| UK70 - UK76  | -0.021   | 0.040 | 52.4 | -0.523  | 0.9999  | UK70 - UK76 | 0.019    | 0.029 | 52.2 | 0.672   | 0.9996  |
| UK70 - UK80  | 0.060    | 0.035 | 52   | 1.711   | 0.7843  | UK70 - UK80 | 0.002    | 0.027 | 52   | 0.069   | 1       |
| UK76 - UK80  | 0.081    | 0.040 | 52.4 | 2.037   | 0.5779  | UK76 - UK80 | -0.018   | 0.029 | 52.2 | -0.607  | 0.9998  |

Table S5. Post-hoc Tukey HSD comparisons between genotype of Total Chlorophyll values under heat (LT-OW [31.5°C] and CBASS 34.3°C) treatments.

| CBASS 34.3°C       |               |              |           |               |                  | LT-OW              |               |              |             |               |                  |
|--------------------|---------------|--------------|-----------|---------------|------------------|--------------------|---------------|--------------|-------------|---------------|------------------|
| Contrast           | estimate      | SE           | df        | t.ratio       | p.value          | Contrast           | estimate      | SE           | df          | t.ratio       | p.value          |
| LK31 - LK41        | 0.685         | 0.210        | 29        | 3.263         | 0.0711           | LK31 - LK41        | -0.026        | 0.178        | 29.7        | -0.145        | 1                |
| LK31 - LK50        | 0.415         | 0.210        | 29        | 1.978         | 0.62             | LK31 - LK50        | -0.471        | 0.157        | 29.4        | -2.996        | 0.1243           |
| <b>LK31 - LK62</b> | <b>0.827</b>  | <b>0.210</b> | <b>29</b> | <b>3.940</b>  | <b>0.0144</b>    | LK31 - LK62        | -0.327        | 0.163        | 29.4        | -2.004        | 0.6032           |
| LK31 - LK7         | 0.047         | 0.210        | 29        | 0.224         | 1                | LK31 - LK7         | -0.271        | 0.177        | 29.6        | -1.525        | 0.8712           |
| <b>LK31 - UK12</b> | <b>1.204</b>  | <b>0.210</b> | <b>29</b> | <b>5.734</b>  | <b>0.0001</b>    | <b>LK31 - UK12</b> | <b>0.740</b>  | <b>0.157</b> | <b>29.4</b> | <b>4.704</b>  | <b>0.002</b>     |
| LK31 - UK19        | 0.451         | 0.210        | 29        | 2.150         | 0.5103           | LK31 - UK19        | 0.170         | 0.195        | 29.2        | 0.871         | 0.9963           |
| LK31 - UK70        | -0.226        | 0.210        | 29        | -1.078        | 0.9833           | LK31 - UK70        | 0.004         | 0.176        | 29.4        | 0.025         | 1                |
| LK31 - UK76        | 0.437         | 0.210        | 29        | 2.083         | 0.5524           | LK31 - UK76        | 0.088         | 0.177        | 29.6        | 0.495         | 1                |
| LK31 - UK80        | 0.022         | 0.210        | 29        | 0.103         | 1                | LK31 - UK80        | 0.142         | 0.171        | 29          | 0.826         | 0.9975           |
| LK41 - LK50        | -0.270        | 0.210        | 29        | -1.285        | 0.9493           | LK41 - LK50        | -0.445        | 0.157        | 29.4        | -2.835        | 0.1708           |
| LK41 - LK62        | 0.142         | 0.210        | 29        | 0.677         | 0.9995           | LK41 - LK62        | -0.301        | 0.162        | 29.2        | -1.853        | 0.698            |
| LK41 - LK7         | -0.638        | 0.210        | 29        | -3.038        | 0.1146           | LK41 - LK7         | -0.245        | 0.179        | 29.8        | -1.368        | 0.9275           |
| LK41 - UK12        | 0.519         | 0.210        | 29        | 2.472         | 0.3237           | <b>LK41 - UK12</b> | <b>0.766</b>  | <b>0.157</b> | <b>29.4</b> | <b>4.875</b>  | <b>0.0012</b>    |
| LK41 - UK19        | -0.234        | 0.210        | 29        | -1.113        | 0.9793           | LK41 - UK19        | 0.196         | 0.196        | 29.4        | 0.998         | 0.9901           |
| <b>LK41 - UK70</b> | <b>-0.911</b> | <b>0.210</b> | <b>29</b> | <b>-4.340</b> | <b>0.0052</b>    | LK41 - UK70        | 0.030         | 0.183        | 30.1        | 0.166         | 1                |
| LK41 - UK76        | -0.248        | 0.210        | 29        | -1.179        | 0.9699           | LK41 - UK76        | 0.114         | 0.179        | 29.8        | 0.636         | 0.9997           |
| LK41 - UK80        | -0.663        | 0.210        | 29        | -3.160        | 0.0889           | LK41 - UK80        | 0.168         | 0.178        | 29.7        | 0.942         | 0.9935           |
| LK50 - LK62        | 0.412         | 0.210        | 29        | 1.962         | 0.6297           | LK50 - LK62        | 0.144         | 0.143        | 29.2        | 1.011         | 0.9892           |
| LK50 - LK7         | -0.368        | 0.210        | 29        | -1.753        | 0.7571           | LK50 - LK7         | 0.201         | 0.157        | 29.4        | 1.275         | 0.9516           |
| <b>LK50 - UK12</b> | <b>0.789</b>  | <b>0.210</b> | <b>29</b> | <b>3.757</b>  | <b>0.0226</b>    | <b>LK50 - UK12</b> | <b>1.211</b>  | <b>0.133</b> | <b>29</b>   | <b>9.118</b>  | <b>&lt;.0001</b> |
| LK50 - UK19        | 0.036         | 0.210        | 29        | 0.172         | 1                | <b>LK50 - UK19</b> | <b>0.641</b>  | <b>0.182</b> | <b>29.5</b> | <b>3.526</b>  | <b>0.0387</b>    |
| LK50 - UK70        | -0.641        | 0.210        | 29        | -3.055        | 0.1106           | LK50 - UK70        | 0.476         | 0.157        | 29.4        | 3.029         | 0.1162           |
| LK50 - UK76        | 0.022         | 0.210        | 29        | 0.106         | 1                | <b>LK50 - UK76</b> | <b>0.559</b>  | <b>0.157</b> | <b>29.4</b> | <b>3.554</b>  | <b>0.0363</b>    |
| LK50 - UK80        | -0.394        | 0.210        | 29        | -1.875        | 0.6848           | <b>LK50 - UK80</b> | <b>0.613</b>  | <b>0.157</b> | <b>29.4</b> | <b>3.897</b>  | <b>0.0158</b>    |
| <b>LK62 - LK7</b>  | <b>-0.780</b> | <b>0.210</b> | <b>29</b> | <b>-3.716</b> | <b>0.025</b>     | LK62 - LK7         | 0.056         | 0.168        | 29.9        | 0.335         | 1                |
| LK62 - UK12        | 0.377         | 0.210        | 29        | 1.794         | 0.7333           | <b>LK62 - UK12</b> | <b>1.067</b>  | <b>0.143</b> | <b>29.2</b> | <b>7.481</b>  | <b>&lt;.0001</b> |
| LK62 - UK19        | -0.376        | 0.210        | 29        | -1.790        | 0.7357           | LK62 - UK19        | 0.497         | 0.187        | 29.4        | 2.653         | 0.2384           |
| <b>LK62 - UK70</b> | <b>-1.053</b> | <b>0.210</b> | <b>29</b> | <b>-5.017</b> | <b>0.0009</b>    | LK62 - UK70        | 0.331         | 0.168        | 29.8        | 1.976         | 0.6206           |
| LK62 - UK76        | -0.390        | 0.210        | 29        | -1.857        | 0.6959           | LK62 - UK76        | 0.415         | 0.168        | 29.9        | 2.466         | 0.3254           |
| <b>LK62 - UK80</b> | <b>-0.806</b> | <b>0.210</b> | <b>29</b> | <b>-3.837</b> | <b>0.0186</b>    | LK62 - UK80        | 0.469         | 0.163        | 29.4        | 2.872         | 0.1591           |
| <b>LK7 - UK12</b>  | <b>1.157</b>  | <b>0.210</b> | <b>29</b> | <b>5.510</b>  | <b>0.0002</b>    | <b>LK7 - UK12</b>  | <b>1.010</b>  | <b>0.157</b> | <b>29.4</b> | <b>6.424</b>  | <b>&lt;.0001</b> |
| LK7 - UK19         | 0.404         | 0.210        | 29        | 1.925         | 0.6531           | LK7 - UK19         | 0.440         | 0.195        | 29.3        | 2.253         | 0.446            |
| LK7 - UK70         | -0.273        | 0.210        | 29        | -1.302        | 0.9452           | LK7 - UK70         | 0.275         | 0.176        | 29.4        | 1.564         | 0.8544           |
| LK7 - UK76         | 0.390         | 0.210        | 29        | 1.859         | 0.6944           | LK7 - UK76         | 0.358         | 0.171        | 29          | 2.090         | 0.5479           |
| LK7 - UK80         | -0.025        | 0.210        | 29        | -0.121        | 1                | LK7 - UK80         | 0.412         | 0.177        | 29.6        | 2.324         | 0.4038           |
| <b>UK12 - UK19</b> | <b>-0.753</b> | <b>0.210</b> | <b>29</b> | <b>-3.585</b> | <b>0.0341</b>    | UK12 - UK19        | -0.570        | 0.182        | 29.5        | -3.137        | 0.0926           |
| <b>UK12 - UK70</b> | <b>-1.430</b> | <b>0.210</b> | <b>29</b> | <b>-6.812</b> | <b>&lt;.0001</b> | <b>UK12 - UK70</b> | <b>-0.735</b> | <b>0.157</b> | <b>29.4</b> | <b>-4.683</b> | <b>0.0021</b>    |
| <b>UK12 - UK76</b> | <b>-0.767</b> | <b>0.210</b> | <b>29</b> | <b>-3.651</b> | <b>0.0292</b>    | <b>UK12 - UK76</b> | <b>-0.652</b> | <b>0.157</b> | <b>29.4</b> | <b>-4.145</b> | <b>0.0084</b>    |
| <b>UK12 - UK80</b> | <b>-1.182</b> | <b>0.210</b> | <b>29</b> | <b>-5.631</b> | <b>0.0002</b>    | <b>UK12 - UK80</b> | <b>-0.598</b> | <b>0.157</b> | <b>29.4</b> | <b>-3.804</b> | <b>0.0199</b>    |
| UK19 - UK70        | -0.678        | 0.210        | 29        | -3.227        | 0.0768           | UK19 - UK70        | -0.165        | 0.201        | 29.6        | -0.823        | 0.9976           |
| UK19 - UK76        | -0.014        | 0.210        | 29        | -0.066        | 1                | UK19 - UK76        | -0.082        | 0.195        | 29.3        | -0.419        | 1                |
| UK19 - UK80        | -0.430        | 0.210        | 29        | -2.047        | 0.5758           | UK19 - UK80        | -0.028        | 0.195        | 29.2        | -0.144        | 1                |
| UK70 - UK76        | 0.664         | 0.210        | 29        | 3.161         | 0.0886           | UK70 - UK76        | 0.083         | 0.176        | 29.4        | 0.474         | 1                |
| UK70 - UK80        | 0.248         | 0.210        | 29        | 1.181         | 0.9697           | UK70 - UK80        | 0.137         | 0.176        | 29.4        | 0.777         | 0.9984           |
| UK76 - UK80        | -0.416        | 0.210        | 29        | -1.980        | 0.6183           | UK76 - UK80        | 0.054         | 0.177        | 29.6        | 0.303         | 1                |

Table S6. Post-hoc Tukey HSD comparisons between genotype Host Protein values under heat (LT-OW [31.5°C] and CBASS 34.3°C) treatments.

| CBASS 34.3°C |          |       |      |         |         | LT-OW              |               |              |             |               |               |
|--------------|----------|-------|------|---------|---------|--------------------|---------------|--------------|-------------|---------------|---------------|
| Contrast     | estimate | SE    | df   | t.ratio | p.value | Contrast           | estimate      | SE           | df          | t.ratio       | p.value       |
| LK31 - LK41  | -1.647   | 1.291 | 29.1 | -1.276  | 0.9514  | LK31 - LK41        | 1.077         | 1.197        | 29.7        | 0.899         | 0.9953        |
| LK31 - LK50  | 0.889    | 1.291 | 29.1 | 0.689   | 0.9994  | LK31 - LK50        | -0.283        | 0.967        | 30.3        | -0.293        | 1             |
| LK31 - LK62  | 0.657    | 1.291 | 29.1 | 0.509   | 0.9999  | LK31 - LK62        | 1.307         | 1.003        | 30.1        | 1.303         | 0.9452        |
| LK31 - LK7   | -0.290   | 1.291 | 29.1 | -0.224  | 1       | LK31 - LK7         | 0.362         | 1.088        | 30.5        | 0.333         | 1             |
| LK31 - UK12  | 2.285    | 1.291 | 29.1 | 1.770   | 0.7477  | <b>LK31 - UK12</b> | <b>3.822</b>  | <b>0.967</b> | <b>30.3</b> | <b>3.953</b>  | <b>0.0133</b> |
| LK31 - UK19  | -0.122   | 1.291 | 29.1 | -0.095  | 1       | LK31 - UK19        | 1.521         | 1.197        | 29.7        | 1.270         | 0.9528        |
| LK31 - UK70  | -1.159   | 1.291 | 29.1 | -0.898  | 0.9953  | LK31 - UK70        | -0.348        | 0.999        | 29.7        | -0.349        | 1             |
| LK31 - UK76  | -0.375   | 1.291 | 29.1 | -0.290  | 1       | LK31 - UK76        | 0.996         | 1.088        | 30.5        | 0.916         | 0.9947        |
| LK31 - UK80  | 1.709    | 1.291 | 29.1 | 1.324   | 0.9397  | LK31 - UK80        | 1.448         | 1.054        | 29.1        | 1.374         | 0.9256        |
| LK41 - LK50  | 2.536    | 1.291 | 29.1 | 1.965   | 0.6282  | LK41 - LK50        | -1.359        | 1.118        | 30.5        | -1.215        | 0.964         |
| LK41 - LK62  | 2.305    | 1.291 | 29.1 | 1.785   | 0.7386  | LK41 - LK62        | 0.231         | 1.152        | 30.4        | 0.200         | 1             |
| LK41 - LK7   | 1.358    | 1.291 | 29.1 | 1.052   | 0.9858  | LK41 - LK7         | -0.714        | 1.199        | 29.9        | -0.596        | 0.9998        |
| LK41 - UK12  | 3.932    | 1.291 | 29.1 | 3.046   | 0.1127  | LK41 - UK12        | 2.745         | 1.118        | 30.5        | 2.454         | 0.331         |
| LK41 - UK19  | 1.525    | 1.291 | 29.1 | 1.181   | 0.9696  | LK41 - UK19        | 0.444         | 1.291        | 29.1        | 0.344         | 1             |
| LK41 - UK70  | 0.489    | 1.291 | 29.1 | 0.378   | 1       | LK41 - UK70        | -1.425        | 1.147        | 30.1        | -1.243        | 0.9587        |
| LK41 - UK76  | 1.273    | 1.291 | 29.1 | 0.986   | 0.9909  | LK41 - UK76        | -0.080        | 1.199        | 29.9        | -0.067        | 1             |
| LK41 - UK80  | 3.356    | 1.291 | 29.1 | 2.600   | 0.262   | LK41 - UK80        | 0.372         | 1.197        | 29.7        | 0.311         | 1             |
| LK50 - LK62  | -0.232   | 1.291 | 29.1 | -0.179  | 1       | LK50 - LK62        | 1.590         | 0.876        | 29.6        | 1.816         | 0.7204        |
| LK50 - LK7   | -1.179   | 1.291 | 29.1 | -0.913  | 0.9947  | LK50 - LK7         | 0.645         | 0.967        | 30.3        | 0.667         | 0.9995        |
| LK50 - UK12  | 1.396    | 1.291 | 29.1 | 1.081   | 0.9829  | <b>LK50 - UK12</b> | <b>4.105</b>  | <b>0.816</b> | <b>29.1</b> | <b>5.027</b>  | <b>0.0008</b> |
| LK50 - UK19  | -1.011   | 1.291 | 29.1 | -0.783  | 0.9983  | LK50 - UK19        | 1.803         | 1.118        | 30.5        | 1.612         | 0.8321        |
| LK50 - UK70  | -2.048   | 1.291 | 29.1 | -1.586  | 0.844   | LK50 - UK70        | -0.066        | 0.878        | 29.9        | -0.075        | 1             |
| LK50 - UK76  | -1.264   | 1.291 | 29.1 | -0.979  | 0.9913  | LK50 - UK76        | 1.279         | 0.967        | 30.3        | 1.323         | 0.9402        |
| LK50 - UK80  | 0.820    | 1.291 | 29.1 | 0.635   | 0.9997  | LK50 - UK80        | 1.731         | 0.967        | 30.3        | 1.791         | 0.7357        |
| LK62 - LK7   | -0.947   | 1.291 | 29.1 | -0.734  | 0.999   | LK62 - LK7         | -0.945        | 1.031        | 31.2        | -0.917        | 0.9947        |
| LK62 - UK12  | 1.627    | 1.291 | 29.1 | 1.260   | 0.9548  | LK62 - UK12        | 2.514         | 0.876        | 29.6        | 2.872         | 0.1588        |
| LK62 - UK19  | -0.780   | 1.291 | 29.1 | -0.604  | 0.9998  | LK62 - UK19        | 0.213         | 1.152        | 30.4        | 0.185         | 1             |
| LK62 - UK70  | -1.816   | 1.291 | 29.1 | -1.407  | 0.9153  | LK62 - UK70        | -1.656        | 0.940        | 30.6        | -1.762        | 0.7525        |
| LK62 - UK76  | -1.032   | 1.291 | 29.1 | -0.799  | 0.998   | LK62 - UK76        | -0.311        | 1.031        | 31.2        | -0.302        | 1             |
| LK62 - UK80  | 1.052    | 1.291 | 29.1 | 0.815   | 0.9977  | LK62 - UK80        | 0.141         | 1.003        | 30.1        | 0.141         | 1             |
| LK7 - UK12   | 2.574    | 1.291 | 29.1 | 1.994   | 0.6095  | <b>LK7 - UK12</b>  | <b>3.460</b>  | <b>0.967</b> | <b>30.3</b> | <b>3.579</b>  | <b>0.0335</b> |
| LK7 - UK19   | 0.168    | 1.291 | 29.1 | 0.130   | 1       | LK7 - UK19         | 1.158         | 1.199        | 29.9        | 0.966         | 0.9922        |
| LK7 - UK70   | -0.869   | 1.291 | 29.1 | -0.673  | 0.9995  | LK7 - UK70         | -0.711        | 0.998        | 29.6        | -0.712        | 0.9992        |
| LK7 - UK76   | -0.085   | 1.291 | 29.1 | -0.066  | 1       | LK7 - UK76         | 0.634         | 1.054        | 29.1        | 0.602         | 0.9998        |
| LK7 - UK80   | 1.999    | 1.291 | 29.1 | 1.548   | 0.8612  | LK7 - UK80         | 1.086         | 1.088        | 30.5        | 0.999         | 0.9901        |
| UK12 - UK19  | -2.407   | 1.291 | 29.1 | -1.864  | 0.6912  | UK12 - UK19        | -2.301        | 1.118        | 30.5        | -2.057        | 0.5685        |
| UK12 - UK70  | -3.443   | 1.291 | 29.1 | -2.667  | 0.2331  | <b>UK12 - UK70</b> | <b>-4.170</b> | <b>0.878</b> | <b>29.9</b> | <b>-4.749</b> | <b>0.0017</b> |
| UK12 - UK76  | -2.659   | 1.291 | 29.1 | -2.060  | 0.5673  | UK12 - UK76        | -2.826        | 0.967        | 30.3        | -2.923        | 0.1428        |
| UK12 - UK80  | -0.576   | 1.291 | 29.1 | -0.446  | 1       | UK12 - UK80        | -2.373        | 0.967        | 30.3        | -2.455        | 0.3311        |
| UK19 - UK70  | -1.037   | 1.291 | 29.1 | -0.803  | 0.998   | UK19 - UK70        | -1.869        | 1.147        | 30.1        | -1.630        | 0.8233        |
| UK19 - UK76  | -0.253   | 1.291 | 29.1 | -0.196  | 1       | UK19 - UK76        | -0.524        | 1.199        | 29.9        | -0.437        | 1             |
| UK19 - UK80  | 1.831    | 1.291 | 29.1 | 1.418   | 0.9114  | UK19 - UK80        | -0.072        | 1.197        | 29.7        | -0.060        | 1             |
| UK70 - UK76  | 0.784    | 1.291 | 29.1 | 0.607   | 0.9998  | UK70 - UK76        | 1.345         | 0.998        | 29.6        | 1.347         | 0.9335        |
| UK70 - UK80  | 2.868    | 1.291 | 29.1 | 2.222   | 0.4655  | UK70 - UK80        | 1.797         | 0.999        | 29.7        | 1.798         | 0.7312        |
| UK76 - UK80  | 2.084    | 1.291 | 29.1 | 1.614   | 0.8308  | UK76 - UK80        | 0.452         | 1.088        | 30.5        | 0.416         | 1             |

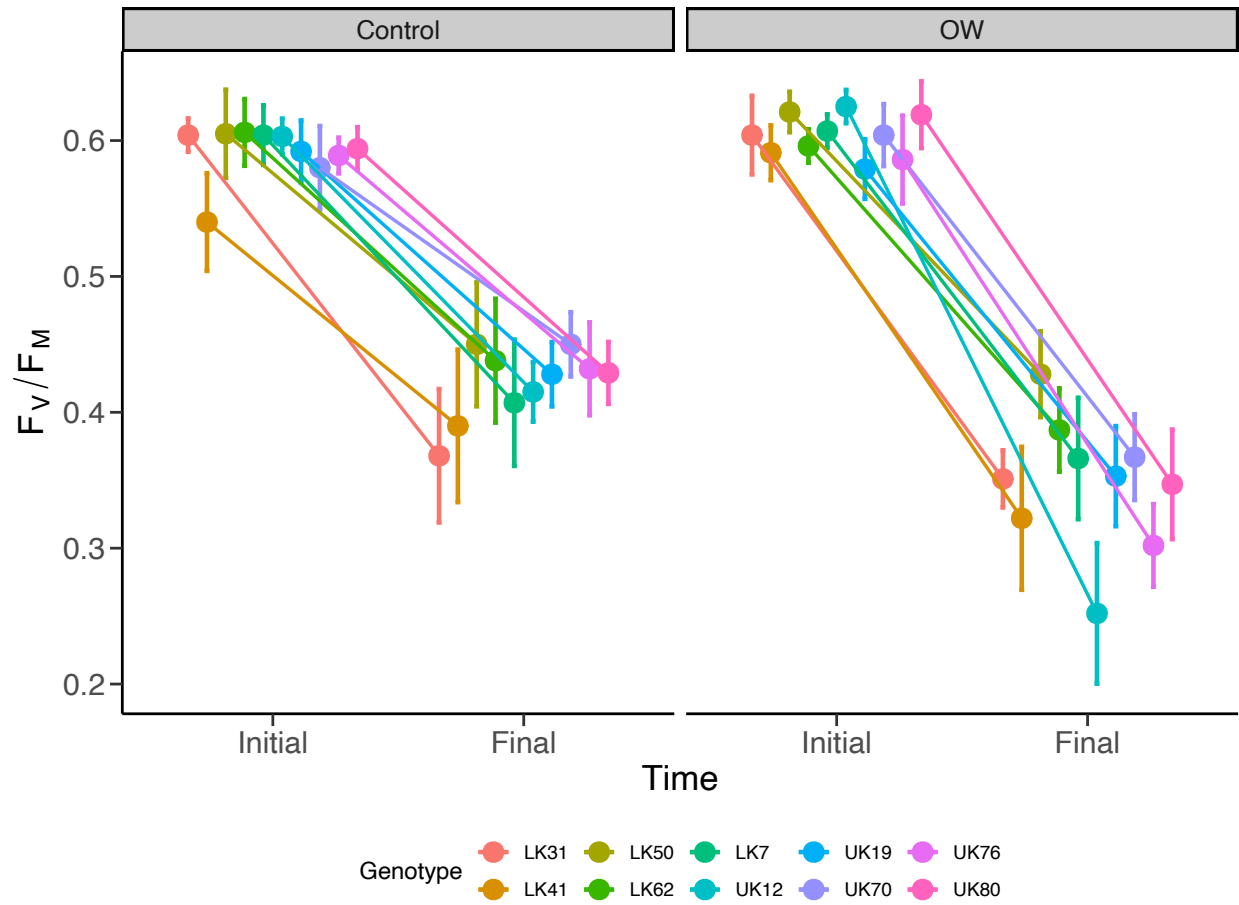


Figure S1. Evidence for photoacclimation over time under LT exposure. Mean ( $\pm$  95% CI) values for each genotype are faceted by treatment (Control, OW).

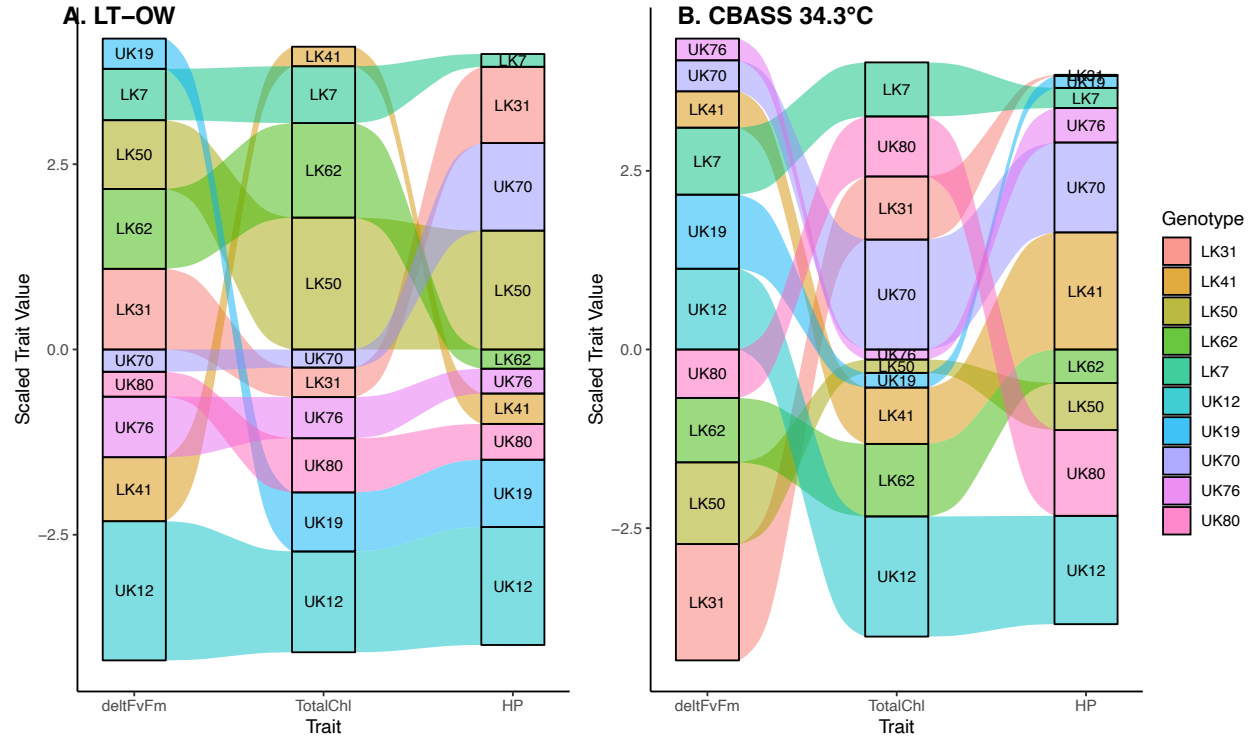


Figure S2. Alluvial plot for ranked genotypic scaled trait values across bleaching traits measured under (A) LT-OW and (B) CBASS 34.3 °C. Strata (boxes) are in descending order and sized based on scaled trait value between adjacent genotypes (colors).

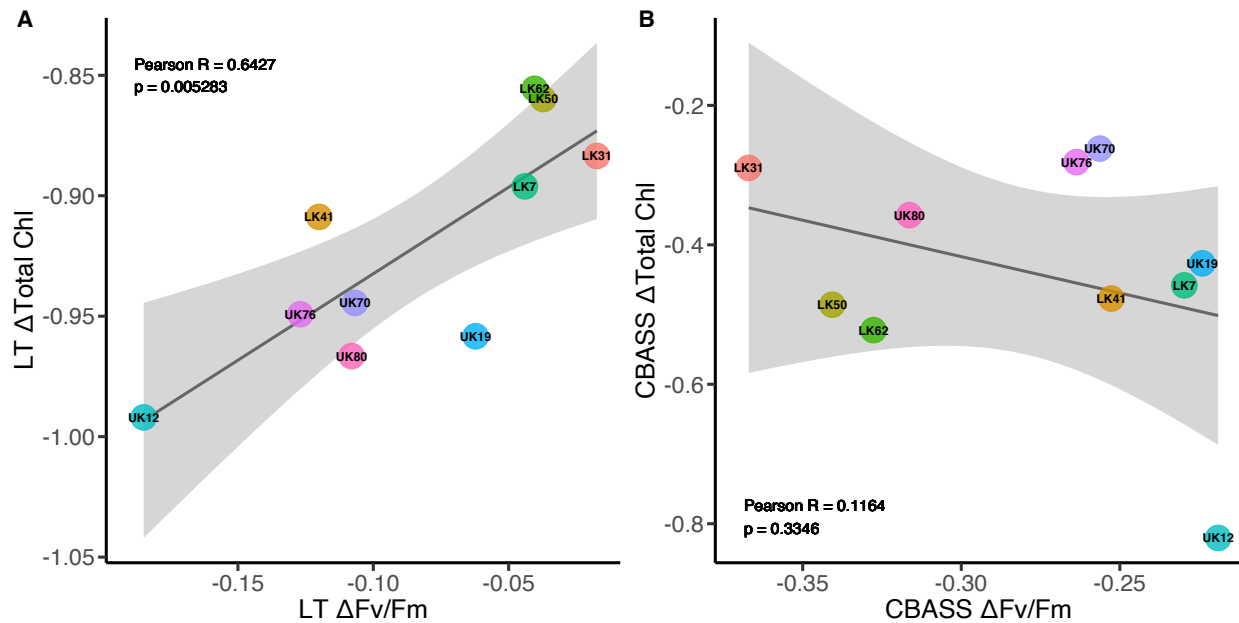


Figure S3. Correlations of the linear relationship between the relative change ( $\Delta$ ) in  $F_v/F_m$  and total chlorophyll ( $\mu\text{g cm}^{-2}$ ) for (A) LT-OW and (B) CBASS 34.3 °C treatments. Linear regression results are reported and the gray-shaded area represents 95% confidence intervals.

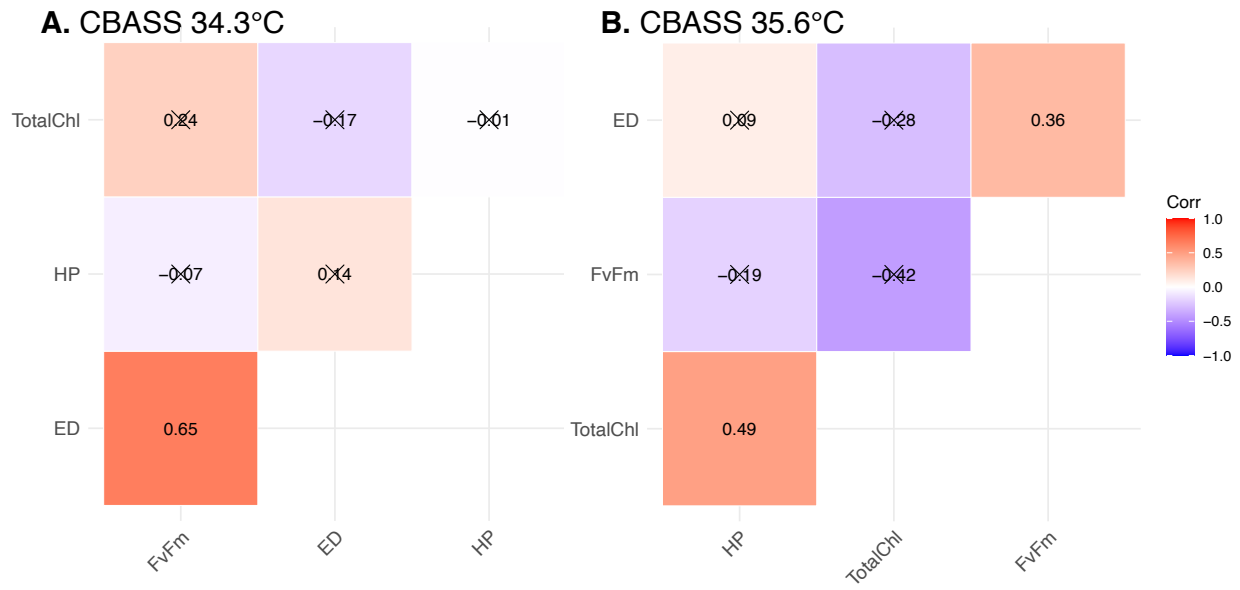


Figure S4. Correlation plot matrix among all bleaching traits (ED50 [ED],  $F_v/F_m$ , total chlorophyll [TotalChl], and host protein [HP]) for the CBASS treatments of (A) 34.3 °C and (B) 35.6 °C. Numbers inside boxes represent Pearson correlation coefficients and “X” represents non-significance.

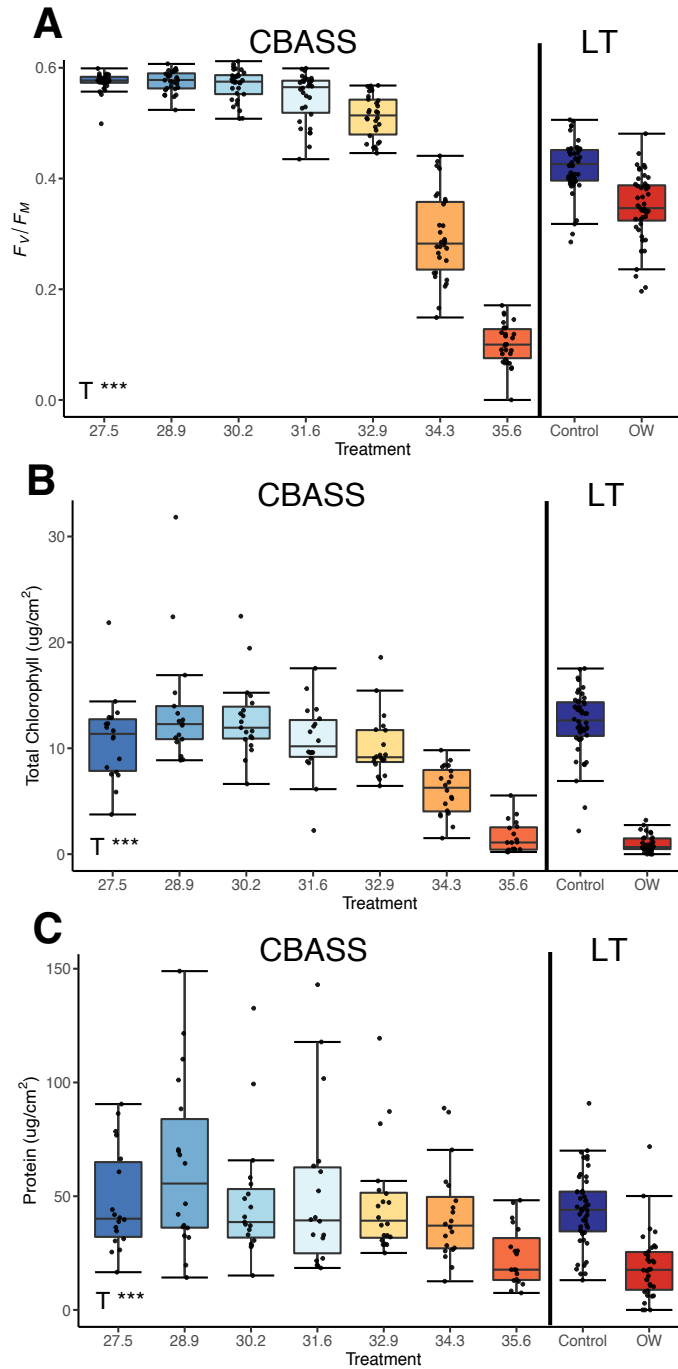


Figure S5. Median boxplots of phenotypic traits of (A)  $F_v/F_m$ , (B) total chlorophyll ( $\mu\text{g}/\text{cm}^2$ ), and (C) host soluble protein ( $\mu\text{g}/\text{cm}^2$ ) measured by treatment in the LT and CBASS experiment. Boxplots for each trait are separated by experiment type, with significant effects treatment (T) reported (\* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.0001$ ).

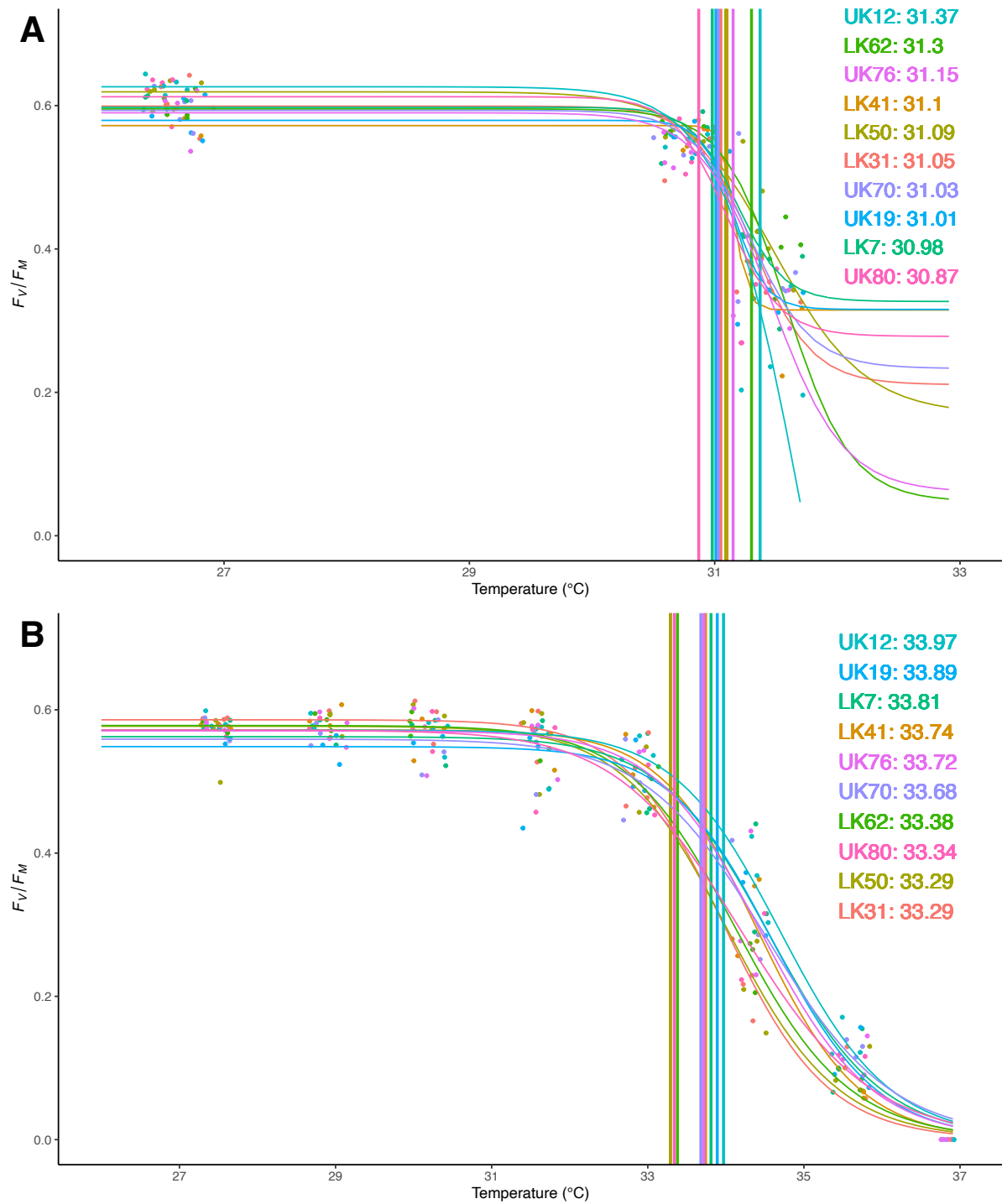


Figure S6. ED25 values of each genotype under (A) LT-OW and (B) CBASS.  $F_v/F_m$  values were fit against temperature using a log-logistic dose-response curve. Although non-significant, genotypes are ordered by ED25 values.

Table S7. PERMANOVA pairwise adonis test results of all traits modeled against Experiment (LT and CBASS) treatments.

| Pairs                           | F.Model         | R2              | p.value      | p.adjusted   |
|---------------------------------|-----------------|-----------------|--------------|--------------|
| CBASS-34.3 vs CBASS-30.2        | 5.79E+02        | 9.40E-01        | 0.009        | 0.315        |
| CBASS-34.3 vs CBASS-35.6        | -1.80E+01       | -9.50E-01       | 0.897        | 1            |
| CBASS-34.3 vs CBASS-28.9        | 1.70E+02        | 8.30E-01        | 0.007        | 0.245        |
| CBASS-34.3 vs CBASS-31.6        | 6.40E+01        | 6.40E-01        | 0.027        | 0.945        |
| CBASS-34.3 vs CBASS-27.5        | 3.26E+03        | 9.89E-01        | 0.005        | 0.175        |
| CBASS-34.3 vs CBASS-32.9        | 8.21E+03        | 9.95E-01        | 0.025        | 0.875        |
| CBASS-34.3 vs LT-Control        | 2.67E+02        | 8.02E-01        | 0.105        | 1            |
| CBASS-34.3 vs LT-OW             | -3.17E+01       | -1.6414178      | 1            | 1            |
| <b>CBASS-30.2 vs CBASS-35.6</b> | <b>2.62E+03</b> | <b>9.86E-01</b> | <b>0.001</b> | <b>0.035</b> |
| CBASS-30.2 vs CBASS-28.9        | 1.24E+00        | 3.51E-02        | 0.401        | 1            |
| CBASS-30.2 vs CBASS-31.6        | 3.92E+01        | 5.28E-01        | 0.105        | 1            |
| CBASS-30.2 vs CBASS-27.5        | 4.45E+00        | 1.13E-01        | 0.24         | 1            |
| CBASS-30.2 vs CBASS-32.9        | -5.81E+00       | -0.1864212      | 0.882        | 1            |
| CBASS-30.2 vs LT-Control        | 1.09E+02        | 6.27E-01        | 0.322        | 1            |
| <b>CBASS-30.2 vs LT-OW</b>      | <b>1.41E+06</b> | <b>1.00E+00</b> | <b>0.001</b> | <b>0.035</b> |
| <b>CBASS-35.6 vs CBASS-28.9</b> | <b>2.48E+05</b> | <b>1.00E+00</b> | <b>0.001</b> | <b>0.035</b> |
| <b>CBASS-35.6 vs CBASS-31.6</b> | <b>6.13E+02</b> | <b>9.46E-01</b> | <b>0.001</b> | <b>0.035</b> |
| <b>CBASS-35.6 vs CBASS-27.5</b> | <b>1.75E+05</b> | <b>1.00E+00</b> | <b>0.001</b> | <b>0.035</b> |
| CBASS-35.6 vs CBASS-32.9        | 4.41E+02        | 9.23E-01        | 0.044        | 1            |
| CBASS-35.6 vs LT-Control        | -1.84E+01       | -3.96E-01       | 0.85         | 1            |
| <b>CBASS-35.6 vs LT-OW</b>      | <b>NaN</b>      | <b>NaN</b>      | <b>NA</b>    | <b>0.035</b> |
| CBASS-28.9 vs CBASS-31.6        | -6.31E+00       | -0.2366371      | 0.686        | 1            |
| CBASS-28.9 vs CBASS-27.5        | 2.14E+00        | 6.08E-02        | 0.309        | 1            |
| CBASS-28.9 vs CBASS-32.9        | -6.80E+00       | -0.2410131      | 0.898        | 1            |
| CBASS-28.9 vs LT-Control        | 2.90E+01        | 3.15E-01        | 0.35         | 1            |
| <b>CBASS-28.9 vs LT-OW</b>      | <b>1.45E+05</b> | <b>1.00E+00</b> | <b>0.001</b> | <b>0.035</b> |
| CBASS-31.6 vs CBASS-27.5        | 7.20E+01        | 6.79E-01        | 0.113        | 1            |
| CBASS-31.6 vs CBASS-32.9        | 1.03E+03        | 9.66E-01        | 0.381        | 1            |
| CBASS-31.6 vs LT-Control        | -1.34E+01       | -2.64E-01       | 0.745        | 1            |
| <b>CBASS-31.6 vs LT-OW</b>      | <b>2.78E+03</b> | <b>9.83E-01</b> | <b>0.001</b> | <b>0.035</b> |
| CBASS-27.5 vs CBASS-32.9        | 4.55E+01        | 5.58E-01        | 0.072        | 1            |
| CBASS-27.5 vs LT-Control        | -1.26E+01       | -2.44E-01       | 0.727        | 1            |
| <b>CBASS-27.5 vs LT-OW</b>      | <b>6.25E+04</b> | <b>9.99E-01</b> | <b>0.001</b> | <b>0.035</b> |
| CBASS-32.9 vs LT-Control        | 2.56E+04        | 9.97E-01        | 0.305        | 1            |
| <b>CBASS-32.9 vs LT-OW</b>      | <b>8.19E+06</b> | <b>1.00E+00</b> | <b>0.001</b> | <b>0.035</b> |
| LT-Control vs LT-OW             | 1.74E+03        | 9.57E-01        | 0.023        | 0.805        |

Table S8. Post-hoc Tukey HSD comparisons of Fv/Fm, Total Chlorophyll, and Host Protein values between Treatment (LT-OW [31.5°C] and CBASS 34.3°C) and Region (Upper Keys and Lower Keys)

| <b>CBASS-34.3°C - LT-OW</b>    |                 |               |             |                |                  |
|--------------------------------|-----------------|---------------|-------------|----------------|------------------|
|                                | <b>Estimate</b> | <b>SE</b>     | <b>df</b>   | <b>t.ratio</b> | <b>p.value</b>   |
| A. Fv/Fm                       |                 |               |             |                |                  |
| <b>Lower Keys</b>              | <b>-0.255</b>   | <b>0.0274</b> | <b>10.5</b> | <b>-9.306</b>  | <b>&lt;.0001</b> |
| <b>Upper Keys</b>              | <b>-0.138</b>   | <b>0.0278</b> | <b>11.2</b> | <b>-4.957</b>  | <b>0.0004</b>    |
| B. Total Chlorophyll           |                 |               |             |                |                  |
| Lower Keys                     | -0.0173         | 0.174         | 45.1        | -0.099         | 0.9213           |
| <b>Upper Keys</b>              | <b>0.5755</b>   | <b>0.136</b>  | <b>46.5</b> | <b>4.247</b>   | <b>0.0001</b>    |
| C. Host Protein                |                 |               |             |                |                  |
| Lower Keys                     | 0.546           | 0.735         | 45.3        | 0.742          | 0.4618           |
| <b>Upper Keys</b>              | <b>1.286</b>    | <b>0.566</b>  | <b>46</b>   | <b>2.272</b>   | <b>0.0278</b>    |
| <b>Lower Keys - Upper Keys</b> |                 |               |             |                |                  |
|                                | <b>Estimate</b> | <b>SE</b>     | <b>df</b>   | <b>t.ratio</b> | <b>p.value</b>   |
| A. Fv/Fm                       |                 |               |             |                |                  |
| <b>CBASS 34.3°C</b>            | <b>-0.0526</b>  | <b>0.0223</b> | <b>68.1</b> | <b>-2.362</b>  | <b>0.021</b>     |
| <b>LT-OW</b>                   | <b>0.0642</b>   | <b>0.0171</b> | <b>68.1</b> | <b>3.751</b>   | <b>0.0004</b>    |
| B. Total Chlorophyll           |                 |               |             |                |                  |
| <b>CBASS 34.3°C</b>            | <b>1.21</b>     | <b>0.201</b>  | <b>7.97</b> | <b>6.009</b>   | <b>0.0003</b>    |
| <b>LT-OW</b>                   | <b>1.8</b>      | <b>0.205</b>  | <b>8.34</b> | <b>8.805</b>   | <b>&lt;.0001</b> |
| C. Host Protein                |                 |               |             |                |                  |
| <b>CBASS 34.3°C</b>            | <b>1.89</b>     | <b>0.771</b>  | <b>9.34</b> | <b>2.454</b>   | <b>0.0356</b>    |
| <b>LT-OW</b>                   | <b>2.63</b>     | <b>0.773</b>  | <b>9.24</b> | <b>3.407</b>   | <b>0.0075</b>    |