**Supplementary Tables:**

#### **Table S1:** Type II ANOVA showing χ2, degree of freedom, and p-values from mixed effects model results fit using treatments as fixed effect predictors for (a) soil temperature, (b) daily temperature range, (c) volumetric water content, (d) volumetric water content, (e, f) soil organic matter, (g, h) microbial biomass carbon, (i, j) soil respiration, (k) above ground biomass, (l) below ground biomass, and (m) seed cotton yield. The bolded and italicized values are significant at P < 0.05. R2m: Marginal r-square value; R2c: Conditional r-squared value.

(a)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Categorical fixed effect predictors | χ2 | Df | P | R2m/R2c |
| OTC | 1.48 | 1 | 0.22 | 0.23/0.32 |
| Residue | 17.18 | 1 | ***< 0.001*** |
| Irrigation | 18.51 | 1 | ***< 0.001*** |
| OTC: Residue | 0.58 | 1 | 0.44 |  |
| OTC: Irrigation | 0.03 | 1 | 0.87 |  |
| Residue: Irrigation | 0.34 | 1 | 0.56 |  |
| OTC: Residue: Irrigation | 0.03 | 1 | 0.85 |  |

(b)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Categorical fixed effect predictors | χ2 | Df | P | R2m/R2c |
| OTC | 7.05 | 1 | ***0.007*** | 0.20/0.66 |
| Residue | 80.15 | 1 | ***< 0.001*** |
| Irrigation | 1.83 | 1 | 0.18 |
| OTC: Residue | 1.91 | 1 | 0.17 |
| OTC: Irrigation | 0.23 | 1 | 0.63 |
| Residue: Irrigation | 0.03 | 1 | 0.86 |
| OTC: Residue: Irrigation | 0.35 | 1 | 0.55 |

#### 

(c)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Categorical fixed effect predictors | χ2 | Df | P | R2m/R2c |
| OTC | 2.65 | 1 | 0.10 | 0.08/0.71 |
| Residue | 8.56 | 1 | ***0.003*** |
| Irrigation | 3.49 | 1 | 0.06 |
| OTC: Residue | 5.69 | 1 | ***0.017*** |
| OTC: Irrigation | 5.52 | 1 | ***0.019*** |
| Residue: Irrigation | 0.47 | 1 | 0.49 |
| OTC: Residue: Irrigation | 4.96 | 1 | ***0.026*** |

(d)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Categorical fixed effect predictors | χ2 | Df | P | R2m/R2c |
| OTC | 498.31 | 1 | ***< 0.001*** | 0.42/0.95 |
| Residue | 3.59 | 1 | 0.058 |
| Irrigation | 12.64 | 1 | ***< 0.001*** |
| OTC: Residue | 0.28 | 1 | 0.59 |
| OTC: Irrigation | 11.09 | 1 | ***< 0.001*** |
| Residue: Irrigation | 3.29 | 1 | 0.069 |
| OTC: Residue: Irrigation | 1.69 | 1 | 0.19 |

(e)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Categorical fixed effect predictors | χ2 | Df | P | R2m/R2c |
| OTC | 0.96 | 1 | 0.33 | 0.44/0.70 |
| Residue | 2.19 | 1 | 0.14 |
| Irrigation | 8.04 | 1 | ***0.005*** |
| OTC: Residue | 0.22 | 1 | 0.64 |
| OTC: Irrigation | 0.44 | 1 | 0.50 |
| Residue: Irrigation | 0.18 | 1 | 0.68 |
| OTC: Residue: Irrigation | 0.41 | 1 | 0.52 |

(f)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Continuous fixed effect predictors | χ2 | Df | P | R2m/R2c |
| Volumetric water content | 0.77 | 1 | 0.38 | 0.05/0.69 |
| Temperature | 4.03 | 1 | **0.045** |

(g)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Categorical fixed effect predictors | χ2 | Df | P | R2m/R2c |
| OTC | 1.07 | 1 | 0.30 | 0.36/0.39 |
| Residue | 10.73 | 1 | ***0.001*** |
| Irrigation | 4.74 | 1 | ***0.029*** |
| OTC: Residue | 7.37 | 1 | ***0.006*** |
| OTC: Irrigation | 0.66 | 1 | 0.42 |
| Residue: Irrigation | 0.14 | 1 | 0.71 |
| OTC: Residue: Irrigation | 0.86 | 1 | 0.35 |

(h)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Continuous fixed effect predictors | χ2 | Df | P | R2m/R2c |
| Organic matter | 10.24 | 1 | ***0.001*** | 0.35/0.35 |
| Temperature | 0.13 | 1 | 0.72 |
| pH | 0.02 | 1 | 0.90 |
| NO3- | 7.42 | 1 | ***0.006*** |
| P | 0.002 | 1 | 0.99 |
| Volumetric water | 0.006 | 1 | 0.93 |

(i)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Categorical fixed effect predictors | χ2 | Df | P | R2m/R2c |
| OTC | 4.86 | 1 | ***0.03*** | 0.05/0.06 |
| Residue | 72.84 | 1 | ***< 0.001*** |
| Irrigation | 1.52 | 1 | 0.21 |
| OTC: Residue | 2.94 | 1 | 0.08 |
| OTC: Irrigation | 5.64 | 1 | ***0.02*** |
| Residue: Irrigation | 1.20 | 1 | 0.27 |
| OTC: Residue: Irrigation | 0.02 | 1 | 0.88 |

(j)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Continuous fixed effect predictors | χ2 | Df | P | R2m/R2c |
| Volumetric water content | 2.42 | 1 | 0.12 | 0.01/0.026 |
| Temperature | 1.22 | 1 | 0.27 |  |
| Organic matter | 0.22 | 1 | 0.64 |  |
| pH | 22.33 | 1 | ***< 0.001*** |  |

(k)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Categorical fixed effect predictors | χ2 | Df | P | R2m/R2c |
| OTC | 1.50 | 1 | 0.21 | 0.66/0.81 |
| Residue | 0.29 | 1 | 0.58 |
| Irrigation | 22.62 | 1 | ***< 0.001*** |
| OTC: Residue | 0.12 | 1 | 0.73 |
| OTC: Irrigation | 0.52 | 1 | 0.47 |
| Residue: Irrigation | 0.31 | 1 | 0.58 |
| OTC: Residue: Irrigation | 1.29 | 1 | 0.25 |

(l)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Categorical fixed effect predictors | χ2 | Df | P | R2m/R2c |
| OTC | 1.15 | 1 | 0.28 | 0.42/0.61 |
| Residue | 3.69 | 1 | ***0.05*** |
| Irrigation | 9.02 | 1 | ***0.002*** |
| OTC: Residue | 0.72 | 1 | 0.39 |
| OTC: Irrigation | 1.03 | 1 | 0.30 |
| Residue: Irrigation | 0.92 | 1 | 0.24 |
| OTC: Residue: Irrigation | 0.001 | 1 | 0.99 |

(m)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Categorical fixed effect predictors | χ2 | Df | P | R2m/R2c |
| OTC | 0.05 | 1 | 0.83 | 0.38/0.55 |
| Residue | 4.84 | 1 | ***0.03*** |
| Irrigation | 6.87 | 1 | ***0.008*** |
| OTC: Residue | 0.63 | 1 | 0.43 |
| OTC: Irrigation | 3.00 | 1 | 0.08 |
| Residue: Irrigation | 0.07 | 1 | 0.79 |
| OTC: Residue: Irrigation | 3.56 | 1 | 0.06 |