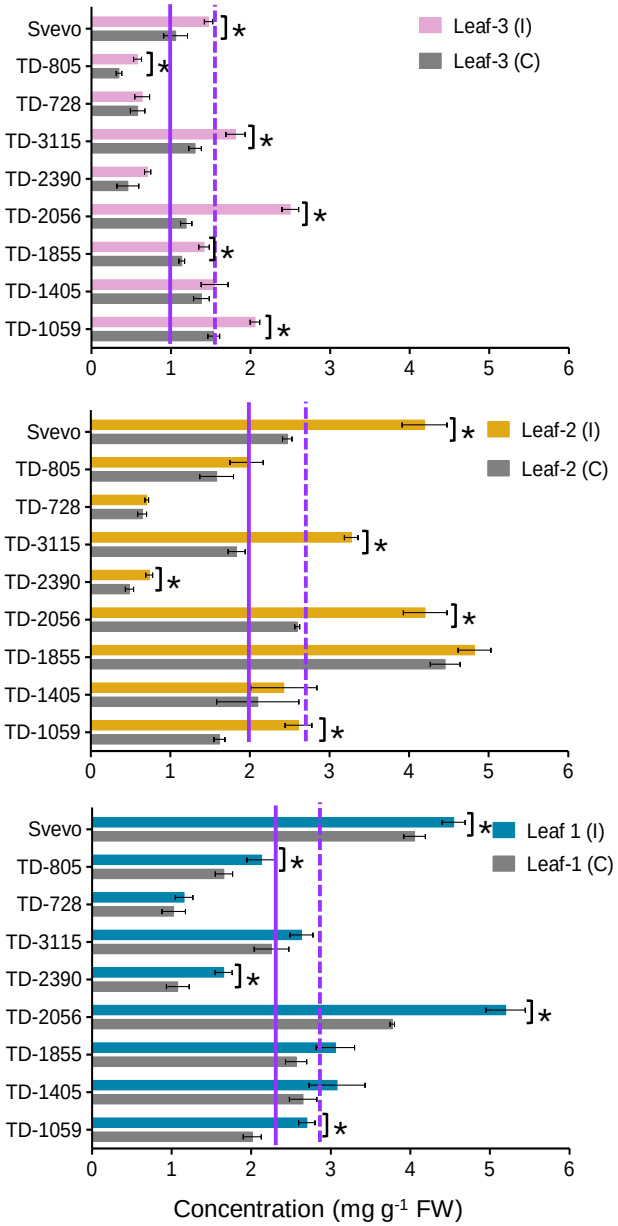
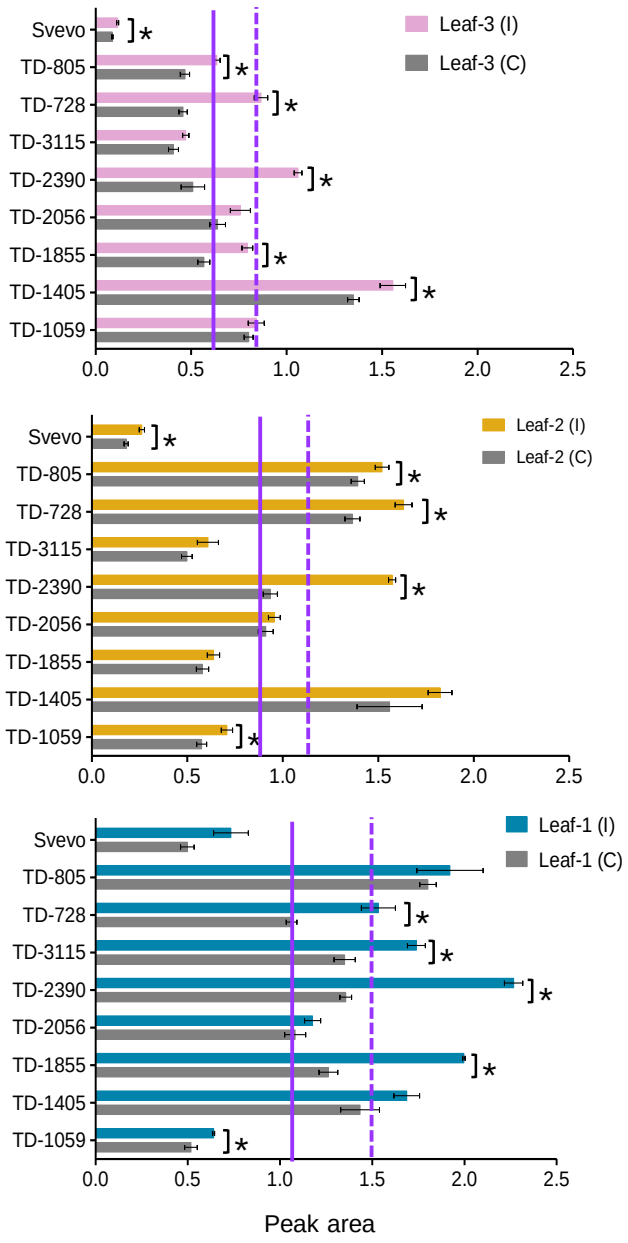
Figure S1




| Source | DF | F ratio | *P* value |
|---|---|---|---|
| Leaf position | 2, 215 | 366.40 | **p < 0.0001** |
| Accession | 8, 215 | 173.80 | **p < 0.0001** |
| Leaf position × accession | 16, 215 | 32.17 | **p < 0.0001** |
| Treatment | 1, 215 | 167.81 | **p < 0.0001** |
| Accession × treatment | 8, 215 | 9.07 | **p < 0.0001** |
| Leaf position × treatment | 2, 215 | 5.83 | p = 0.0036 |
| Leaf position × accession × treatment | 16, 215 | 1.58 | **p = 0.0782** |

**Figure S1. Quantification of DIM2BOA-Glc content from eight selected WEW accessions and one domesticated durum wheat cultivar.** DIM2BOA-Glc contents (mg $g^{-1}$ FW) was evaluated in leaf-1, leaf-2, and leaf-3 both under untreated- control (C) and 96 h following infestation (I) with *R. padi* using the 'whole-cage-choice bioassay'. Values are expressed as mean ± SE (n = 4). The purple solid and dotted line represents the overall mean value on individual leaf type under control and infested conditions among the accessions, respectively. The effect of leaf position, accession, treatment, and their interaction (leaf position × accession × treatment) were tested by two-way ANOVA analysis. Asterisk represents the significant difference between treatments in particular accession analyzed by Student's *t*-tests ($p < 0.05$). In bold, parameters that were significantly affected $p < 0.05$.

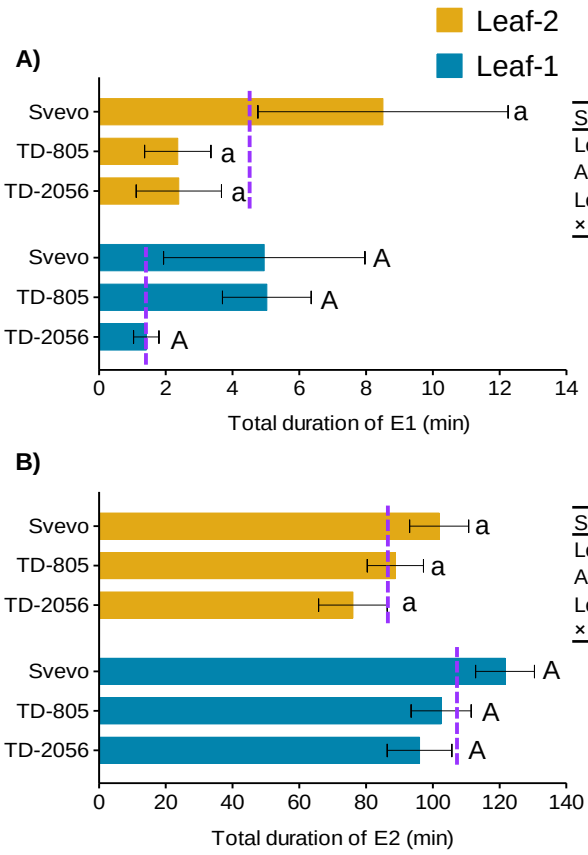
Figure S2




| Source | DF | F ratio | *P* value |
|---|---|---|---|
| Leaf position | 2, 215 | 640.72 | **p < 0.0001** |
| Accession | 8, 215 | 282.46 | **p < 0.0001** |
| Leaf position × accession | 16, 215 | 67.44 | **p < 0.0001** |
| Treatment | 1, 215 | 292.72 | **p < 0.0001** |
| Accession × treatment | 8, 215 | 19.73 | **p < 0.0001** |
| Leaf position × treatment | 2, 215 | 15.23 | **p < 0.0001** |
| Leaf position × accession × treatment | 16, 215 | 2.68 | **p = 0.0009** |

**Figure S2. Quantification of HDMBOA-Glc/HM2BOA-Glc content from selected wheat genotypes.** HDMBOA-Glc/HM2BOA-Glc contents (peak area) was evaluated in leaf-1, leaf-2, and leaf-3 both under untreated- control (C) and 96 h following infestation (I) with *R. padi* using the 'whole-cage-choice bioassay'. Values are expressed as mean ± SE (n = 4). The purple solid and dotted line represents the overall mean value on individual leaf type under control and infested conditions among the accessions, respectively. The effect of leaf position, accession, treatment and their interaction (leaf position × accession × treatment) were tested by two-way ANOVA analysis. Asterisk represents the significant difference between treatments in particular accession analyzed by Student's *t*-tests ($p < 0.05$). In bold, parameters that were significantly affected $p < 0.05$.

Figure S3




| Source | DF | F ratio | P value |
|---|---|---|---|
| Leaf position | 1, 107 | 0.1257 | p = 0.723 |
| Accession | 2, 107 | 2.581 | p = 0.080 |
| Leaf position × accession | 2, 107 | 1.060 | p = 0.350 |

| Source | DF | F ratio | P value |
|---|---|---|---|
| Leaf position | 1, 107 | 5.629 | **p = 0.019** |
| Accession | 2, 107 | 4.008 | **p = 0.021** |
| Leaf position × accession | 2, 107 | 0.0734 | p = 0.929 |

**Figure S3. Feeding behavior of R. padi aphid on leaf-1 and leaf-2 of selected wheat genotypes.** (A-B) summary of electrical penetration graph (EPG) waveforms recorded in minutes for the total duration of E1 (A) and total duration of E2 (B). Values are expressed as mean ± SE (n = 18). The purple dotted line represents the mean value for each leaf type among the accessions. The effect of leaf position, accession, and their interaction (leaf position × accession) were tested by two-way ANOVA analysis. Significant differences between accessions are indicated by different letters (one way ANOVA, Tukey's honestly significant difference, $p < 0.05$). In bold, parameters that were significantly affected $p < 0.05$.

Figure S4

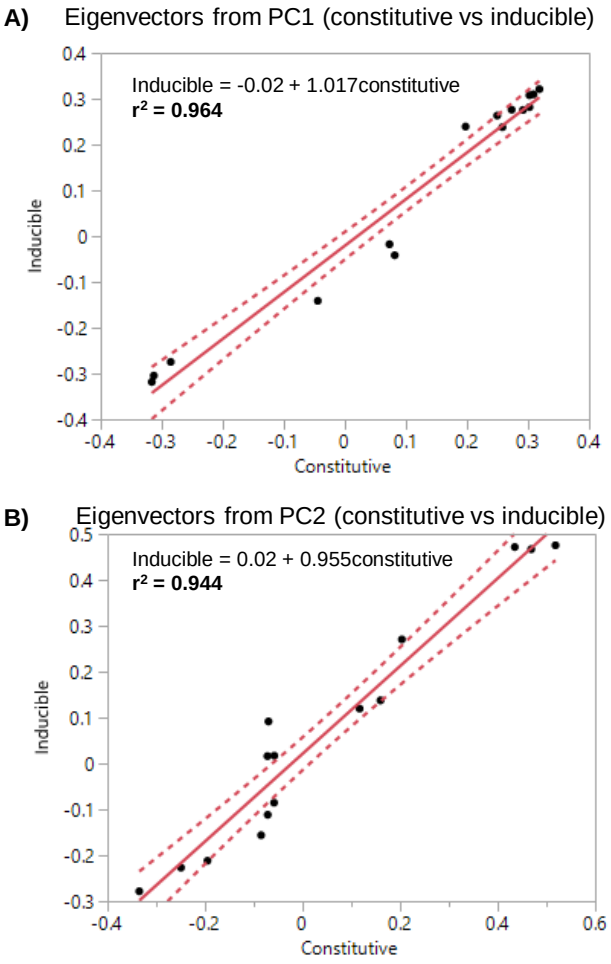
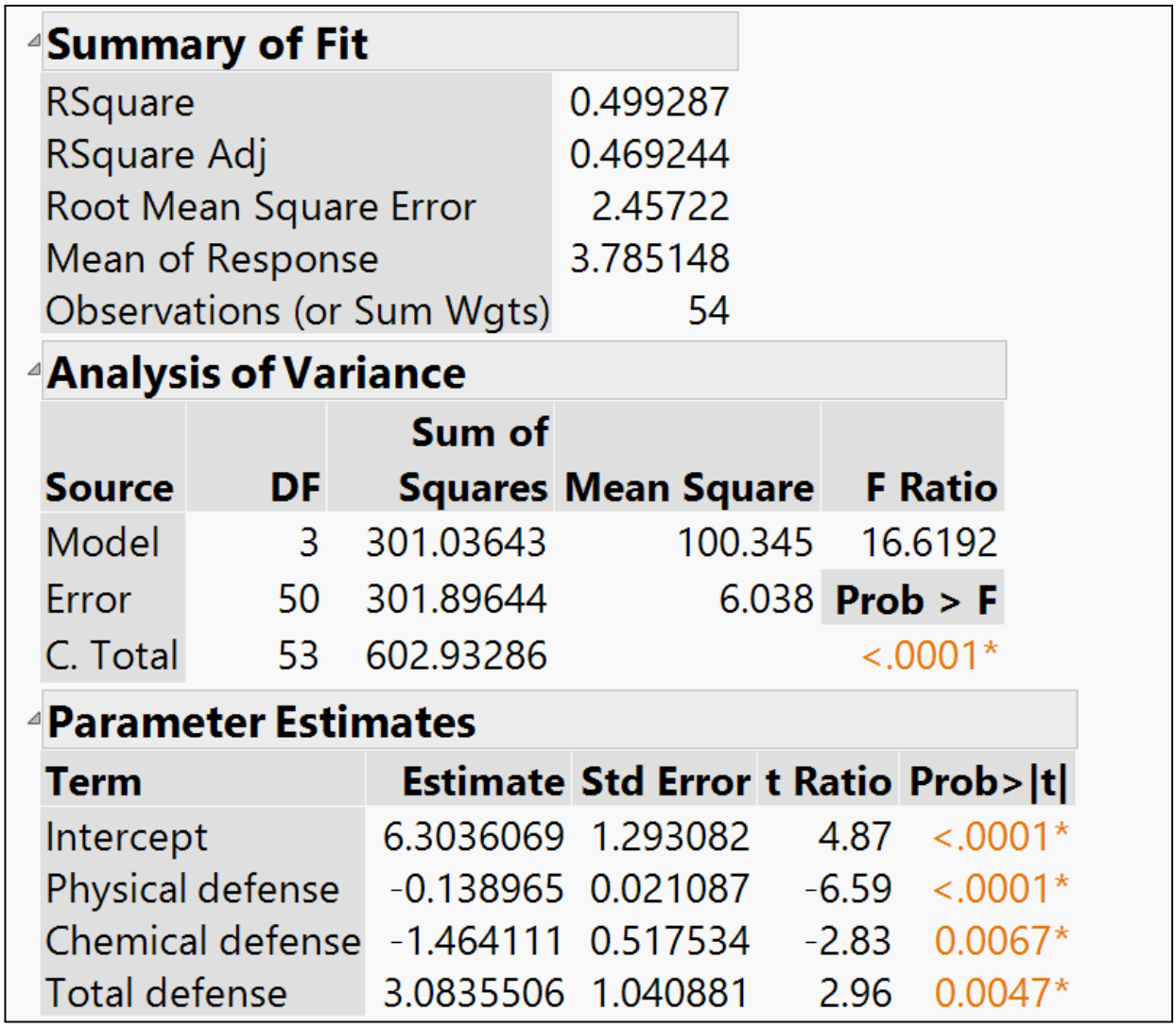



**Figure S4. Correlation analysis of eigenvectors from PC1 (A) and PC2 (B) under constitutive and aphid-induced conditions for the physical and chemical defensive traits of selected wheat genotypes.**

Figure S5



**Summary of Fit**

| | |
|---|---|
| RSquare | 0.499287 |
| RSquare Adj | 0.469244 |
| Root Mean Square Error | 2.45722 |
| Mean of Response | 3.785148 |
| Observations (or Sum Wgts) | 54 |

**Analysis of Variance**

| Source | DF | Sum of Squares | Mean Square | F Ratio |
|---|---|---|---|---|
| Model | 3 | 301.03643 | 100.345 | 16.6192 |
| Error | 50 | 301.89644 | 6.038 | Prob > F |
| C. Total | 53 | 602.93286 | | <.0001* |

**Parameter Estimates**

| Term | Estimate | Std Error | t Ratio | Prob>\|t\| |
|---|---|---|---|---|
| Intercept | 6.3036069 | 1.293082 | 4.87 | <.0001* |
| Physical defense | -0.138965 | 0.021087 | -6.59 | <.0001* |
| Chemical defense | -1.464111 | 0.517534 | -2.83 | 0.0067* |
| Total defense | 3.0835506 | 1.040881 | 2.96 | 0.0047* |

**Figure S5. Effectiveness of plant physical, chemical (sum of all three BXD), and total defenses (each value [trichomes and each BXD]) against aphid performance.** Data were obtained from eight selected WEW accessions and one cultivated durum wheat, normalized to median for multiple linear regression analysis.