**Table S1:** Statistical models testing the genetic specificity of the plant-insect food web.

|  |  |  |  |
| --- | --- | --- | --- |
| **Response** | **df** | ***F*** or **χ2** | ***P*** |
| Gall size1 |  |  |  |
| Leaf gall | 23,57 | 2.17 | **0.009** |
| Bud gall | 21,44 | 0.98 | 0.504 |
| Apical-stem gall | 16,12 | 0.29 | 0.988 |
| Gall abundance2 | 25,119 | 202.40 | **0.001** |
| Leaf gall |  | 74.60 | **0.001** |
| Bud gall |  | 55.02 | **0.006** |
| Apical-stem gall |  | 44.47 | **0.042** |
| Mid-stem gall |  | 28.27 | 0.295 |
| Composition of gall community3 | 22,89 | 1.96 | **0.001** |
| Abundance of gall-parasitoid interactions2 | 25,119 | 357.10 | **0.001** |
| Leaf gall |  |  |  |
| *Platygaster* sp. |  | 79.51 | **0.001** |
| *Mesopolobus* sp. |  | 50.00 | **0.009** |
| *Torymus* sp. |  | 60.11 | **0.001** |
| *Tetrastichus* sp. |  | 32.96 | 0.105 |
| Mymarid sp. A |  | 6.37 | 0.448 |
| Bud gall |  |  |  |
| *Platygaster* sp. |  | 18.04 | 0.276 |
| *Mesopolobus* sp. |  | 6.37 | 0.497 |
| *Torymus* sp. |  | 39.81 | *0.079* |
| *Tetrastichus* sp. |  | 18.09 | 0.492 |
| *Lestodiplosis* sp. |  | 16.05 | 0.552 |
| Apical-stem gall |  |  |  |
| *Torymus* sp. |  | 23.13 | **0.048** |
| Mid-stem gall |  |  |  |
| *Platygaster* sp. |  | 6.64 | 0.452 |
| Composition of gall-parasitoid interactions3 | 12,45 | 1.57 | **0.007** |
| Proportion of galls parasitized4 |  |  |  |
| Leaf gall | 23,58 | 75.79 | **<0.001** |
| *Platygaster* sp. |  | 93.47 | **<0.001** |
| *Mesopolobus* sp. |  | 42.56 | **0.008** |
| *Torymus* sp. |  | 42.92 | **0.007** |
| *Tetrastichus* sp. |  | 29.55 | 0.163 |
| Mymarid sp. A |  | 3.97 | 0.999 |
| Bud gall | 21,46 | 49.84 | *0.072* |
| Apical-stem gall | 18,12 | 15.69 | 0.614 |
| Composition of trophic interactions in the plant-insect food web3 | 22,89 | 1.90 | **0.001** |

Notes: 1GLM (error distribution = Gaussian, link function = identity), log-transformed; 2multivariate GLM (error distribution = negative binomial, link function = log); 3PERMANOVA on Bray-Curtis dissimilarities (999 permutations);

4GLM (error distribution = binomial, link function = logit). *P*-values in bold (*P* < 0.05), italics (*P* < 0.10), and normal font (*P* > 0.10) denote degree of statistical significance.

**Table S2:** Statistical models explaining insect food web responses to genetic variation in coastal willow (*Salix hookeriana*). We report the coefficients of all predictor variables that were included in the final statistical models, which were determined using AIC and likelihood-ratio tests.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Response** | **Predictors** | | | |
| **Gall size1** | **Salicylates/**  **Tannins PC1** | **Flavones/**  **Flavonols PC1** |  |  |
| Leaf gall | **-0.20** | **-0.26** |  |  |
| **Gall abundance2** | **C:N** | **Flavanones/**  **Flavanonols PC1** | **Plant size** |  |
| Leaf gall | *0.04* | -0.03 | -0.36 |  |
| Bud gall | *0.08* | -0.07 | **-1.01** |  |
| Apical-stem gall | 0.01 | **0.46** | 0.26 |  |
| Mid-stem gall | 0.02 | -1.81 | -*4.77* |  |
| **Abundance of gall-parasitoid interactions2** | **Leaf gall**  **size** | **Leaf gall abundance** | **Bud gall abundance** | **Apical-stem gall abundance** |
| Leaf gall |  |  |  |  |
| *Platygaster* sp. | **-0.22** | **1.22** | 0.20 | -0.15 |
| *Mesopolobus* sp. | **-0.27** | **0.90** | -0.26 | 0.44 |
| *Torymus* sp. | *0.19* | **0.76** | -0.30 | 0.72 |
| *Tetrastichus* sp. | -*0.24* | 0.71 | 0.45 | -1.09 |
| Mymarid sp. A | -1.67 | **20.83** | -2.07 | 3.35 |
| Bud gall |  |  |  |  |
| *Platygaster* sp. | 0.43 | 0.23 | **5.81** | -14.25 |
| *Mesopolobus* sp. | 0.16 | 0.30 | 0.77 | 1.95 |
| *Torymus* sp. | **-0.17** | 0.31 | **1.39** | -0.43 |
| *Tetrastichus* sp. | 0.15 | 0.51 | **1.83** | 0.08 |
| *Lestodiplosis* sp. | 0.04 | -0.61 | *1.46* | 1.75 |
| Apical-stem gall |  |  |  |  |
| *Torymus* sp. | -0.12 | 0.05 | -0.64 | **4.09** |
| Mid-stem gall |  |  |  |  |
| *Platygaster* sp. | 1.54 | -*15.03* | 0.53 | -9.23 |

Notes: 1GLM (error distribution = Gaussian, link function = identity), log-transformed; 2multivariate GLM (error distribution = negative binomial, link function = log). *P*-values in bold (*P* < 0.05), italics (*P* < 0.10), and normal font (*P* > 0.10) denote degree of statistical significance.

**Table S3:** Generalized linear models (error distribution = binomial, link function = logit) explaining the proportion of leaf galls parasitized. Final models were determined using AIC and likelihood-ratio tests.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Response** | **Predictor** | **df** | **χ2** | ***P*** |
| Total parasitism | Gall size | 1,79 | 22.28 | **<0.001** |
| *Platygaster* sp. | Gall size | 1,77 | 17.58 | **<0.001** |
|  | Gall abundance | 1,77 | 0.73 | 0.394 |
|  | Gall size x abundance | 1,77 | 8.71 | **0.003** |
| *Mesopolobus* sp. | Gall size | 1,77 | 7.28 | **0.007** |
|  | Gall abundance | 1,77 | 0.29 | 0.588 |
|  | Gall size x abundance | 1,77 | 4.21 | **0.040** |
| *Torymus* sp. | Gall size | 1,78 | 3.83 | *0.050* |
|  | Gall abundance | 1,78 | 5.24 | **0.022** |

**Calculating quantitative-weighted linkage density (food-web complexity).**

Quantitative-weighted linkage density, , was calculated using the following equations. Given an *s*-by-*s* food web matrix **b** = , with corresponding to the number of individuals of species *j* (galls or parasitoids) emerging from species *i* (willow or galls) per willow branch over a single growing season, is the sum of row *i*, is the sum of column *j*, and is the total sum. The Shannon indices for the prey and predatory interactions were calculated as,

The effective number of prey and predatory interactions were calculated as and respectively. Finally, quantitative-weighted link density was calculated as,