Calculating quantitative weighted linkage density (food web complexity).

Quantitative weighted linkage density, LD_q, was calculated using the following equations. Given an *s*-by-*s* food web matrix **b** = $[b_{ij}]$, with b_{ij} 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, $b_i.$ is the sum of row *i*, $b._j$ is the sum of column *j*, and $b..$ is the total sum. The Shannon indices for the prey and predatory interactions were calculated as,

$$H_j = -\sum_{i=1}^{s} \frac{b_{ij}}{b._j} \ln \frac{b_{ij}}{b._j}$$

$$H_i = -\sum_{j=1}^{s} \frac{b_{ij}}{b_i.} \ln \frac{b_{ij}}{b_i.}$$

The effective number of prey and predatory interactions were calculated as $N_j^* = \exp(H_j)$ and $N_i^* = \exp(H_i)$, respectively. Finally, quantitative weighted link density was calculated as,

$$LD_q = \frac{1}{2b..}\left(\sum_{i=1}^{s} b_i. N_i^* + \sum_{j=1}^{s} b._j N_j^*\right)$$

Table S1: Genetic basis to willow-gall and gall-parasitoid interaction networks.

Response	df	*F* or χ^2	*P*
Gall size[1]			
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 abundance[2]	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 community[3]	22,89	1.96	**0.001**
Abundance of gall-parasitoid interactions[2]	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**
Eulophid		32.96	0.105
Mymarid		6.37	0.448
Bud gall			
Platygaster sp.		18.04	0.276
Mesopolobus sp.		6.37	0.497
Torymus sp.		39.81	*0.079*
Eulophid		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 interactions[3]	12,45	1.57	**0.007**
Proportion of galls parasitized[4]			
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**
Eulophid		29.55	0.163
Mymarid		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 web[3] composition[3]	22,89	1.90	**0.001**

Notes: [1]GLM (error distribution = Gaussian, link function = identity), log-transformed; [2]multivariate GLM (error distribution = negative binomial, link function = log); [3]PERMANOVA on Bray-Curtis dissimilarities (999 permutations); [4]GLM (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: Pearson correlations (*r*) of gall sizes and abundances that varied among willow genotypes.

	LG size	LG abundance	BG abundance	ASG abundance
Leaf gall size	1	0.03	-0.11	-0.04
Leaf gall abundance	*0.02*	1	**0.19**	0.03
Bud gall abundance	*0.08*	***0.44***	1	0.13
Apical-Stem gall abundance	*0.02*	*0.31*	*0.30*	1

Notes: Italicized values below the diagonal represent genetic correlations (n = 24 between leaf gall size and gall abundances, n = 26 between gall abundances), while values above the diagonal represent phenotypic correlations (n = 81 between leaf gall size and gall abundances, n = 145 between gall abundances). Statistically significant correlations ($P < 0.05$) are indicated in boldface type.

Table S3: Models explaining insect food web responses to genetic variation in coastal willow (*Salix hookeriana*). Final models were determined using AIC and likelihood-ratio tests.

Response	**Predictors**			
Gall size[1]	**Salicylates/ Tannins PC1**	**Flavones/ Flavonols PC1**		
Leaf gall	**-0.20**	**-0.26**		
Gall abundance[2]	**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*	
Gall-parasitoid interaction abundance[2]	**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
Eulophid	*-0.24*	0.71	0.45	-1.09
Mymarid	-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
Eulophid	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: [1]GLM (error distribution = Gaussian, link function = identity), log-transformed; [2]multivariate 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 S4: Models explaining the proportion of leaf galls parasitized.

Response	**Predictor**	**df**	χ^2	***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**