

Supplementary Figures

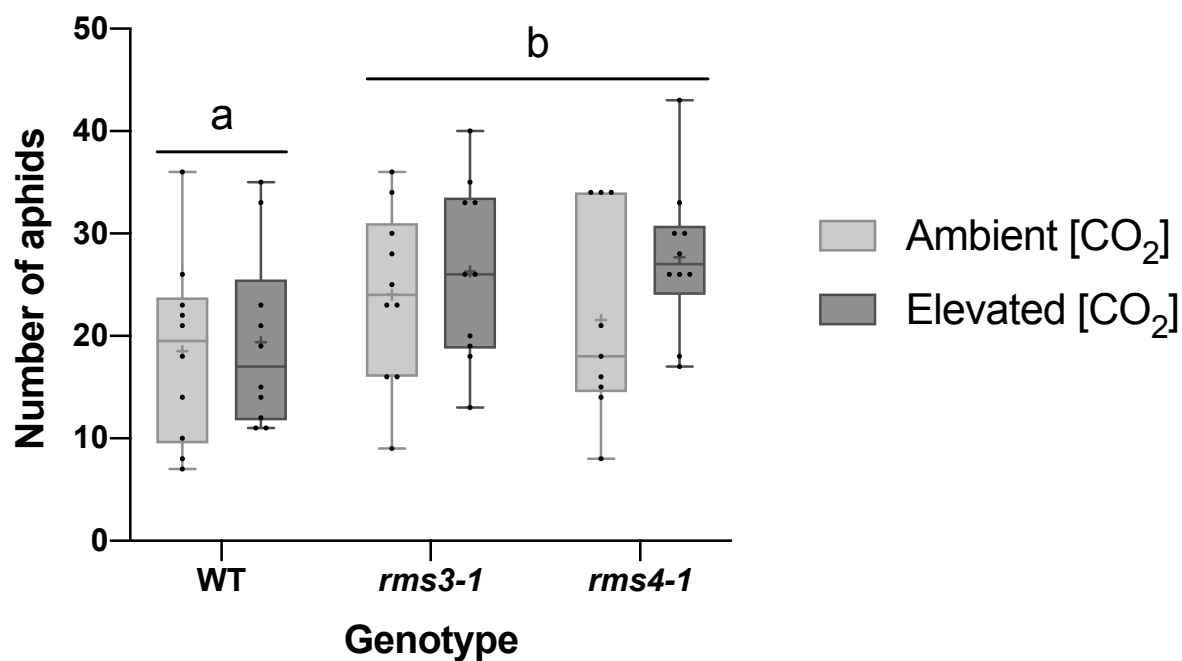


Figure S1: The effect of high CO₂ on aphid fecundity on wild type peas and mutants defective in strigolactone (SL) signalling (*rms3-1* and *rms4-1*). A single pea aphid nymph was placed on each 5-day old plant. Plants were then grown in air or under high [CO₂]. Aphid numbers per plant were determined 15 days later. Ten replicates were performed for each SL mutant and wild type under each [CO₂]. Different letters indicate a statistically significant difference ($p \leq 0.05$) between wild type and strigolactone mutants (grouped).

Supplementary Tables

Table S1: Evaluation of normality and heteroscedasity using D'Agostino-Pearson omnibus K2 test and Spearman's test, respectively.

Dataset	D'Agostino-Pearson omnibus K2 test for normality of residuals		Spearman's test for heteroscedasticity		Subsequent statistical test(s)/ transformation performed
	P-value	Passed (P > 0.05)?	P-value (one tailed)	Passed (P > 0.05)?	
Plant height					
Day 7	0.3523	Yes	0.3844	Yes	Two-way ANOVA
Day 14	0.0741	Yes	0.1697	Yes	Two-way ANOVA
Day 32	0.7717	Yes	0.3627	Yes	Two-way ANOVA
Total branching					
Day 7	0.9927	Yes	0.0530	Yes	Two-way ANOVA
Day 14	0.0035	No	0.0029	No	Log transformation
Day 14 log transformed	0.2478	Yes	0.1549	Yes	Two-way ANOVA
Day 32	0.3399	Yes	<0.0001	No	Welch's t-test (CO ₂); Welch's ANOVA (genotype)
Biomass					
Day 28 dry weight	0.0054	No	0.0004	No	Mann-Whitney (CO ₂); Kruskal-Wallis (genotype)
Day 28 fresh weight	0.0023	No	0.0225	No	Mann-Whitney (CO ₂); Kruskal-Wallis (genotype)
Day 28 plant water content	0.0995	Yes	0.3292	Yes	Two-way ANOVA
Day 32 dry weight	0.1875	Yes	0.0324	No	Welch's t-test (CO ₂); Welch's ANOVA (genotype)
Aphid fecundity					
Day 15; aCO ₂ (Fig. 5)	0.1956	Yes	0.3148	Yes	Unpaired t-test
Day 15; aCO ₂ & eCO ₂ (Fig. S1)	0.1290	Yes	0.1973	Yes	Unpaired t-test
[Phytohormone]					
ACC	0.3816	Yes	<0.0001	No	Welch's t-test (Aphid exposure); Welch's ANOVA (genotype)
tZ	0.0926	Yes	0.0001	No	Welch's t-test (Aphid exposure); Welch's ANOVA (genotype)
iP	0.2113	Yes	<0.0001	No	Welch's t-test (Aphid exposure); Welch's ANOVA (genotype)
GA1	0.1147	Yes	<0.0001	No	Welch's t-test (Aphid exposure); Welch's ANOVA (genotype)
GA3	<0.0001	No	0.0024	No	Mann-Whitney (Aphid exposure); Kruskal-Wallis (genotype)
GA4	0.9672	Yes	0.0613	Yes	Two-way ANOVA
IAA	0.4871	Yes	0.1459	Yes	Two-way ANOVA
ABA	0.1708	Yes	0.0100	No	Welch's t-test (Aphid exposure); Welch's ANOVA (genotype)
JA	0.0404	No	<0.0001	No	Log transformation
JA log transformed	0.8438	Yes	0.0482	No	Welch's t-test (Aphid exposure); Welch's ANOVA (genotype)
SA	0.3074	Yes	<0.0001	No	Welch's t-test (Aphid exposure); Welch's ANOVA (genotype)
[Carbohydrate]					
Glucose	0.9522	Yes	0.0683	Yes	Two-way ANOVA
Fructose	0.2311	Yes	0.0012	No	Welch's t-test (CO ₂); Welch's ANOVA (genotype)
Sucrose	0.4158	Yes	0.1408	Yes	Two-way ANOVA
Starch	0.6199	Yes	0.0925	Yes	Two-way ANOVA

Table S2: The effect of the independent variables (genotype and [CO₂] or aphid exposure) on the response measured (dependent variable) were determined. *, < 0.05; **, < 0.01; ***, < 0.001; ****, < 0.0001.

Dependent variable	Test performed	Source of variation	% of total variation	P-value	P-value summary	Subsequent statistical test
Plant height						
Day 7						
	Two-way ANOVA	Interaction	38.99	<0.0001	****	
		Genotype	9.853	0.0606	ns	None
		[CO ₂]	0.2606	0.6151	ns	None
Day 14						
	Two-way ANOVA	Interaction	3.573	0.5094	ns	
		Genotype	40.11	<0.0001	****	Tukey
		[CO ₂]	2.833	0.1099	ns	None
Day 32						
	Two-way ANOVA	Interaction	0.06934	0.9372	ns	
		Genotype	92.09	<0.0001	****	Tukey
		[CO ₂]	2.651	<0.0001	****	Sidak
Total branching						
Day 7						
	Two-way ANOVA	Interaction	3.175	0.4953	ns	
		Genotype	50.51	<0.0001	****	Tukey
		[CO ₂]	0.08741	0.7598	ns	None
Day 14						
	Two-way ANOVA	Interaction	1.849	0.5503	ns	
		Genotype	67.41	<0.0001	****	Tukey
		[CO ₂]	0.6997	0.2857	ns	None
Day 32						
	Welch's (one-way) ANOVA	Genotype	NA	<0.0001	****	Dunnett T3
	Welch's unpaired t-test	[CO ₂]	NA	0.0044	**	Holm-Sidak
Biomass						
Day 28 dry weight						
	Kruskal-Wallis	Genotype	NA	0.3347	ns	None
	Mann-Whitney	[CO ₂]	NA	0.0111	*	Holm-Sidak
Day 28 fresh weight						
	Kruskal-Wallis	Genotype	NA	0.3458	ns	None
	Mann-Whitney	[CO ₂]	NA	0.0177	*	Holm-Sidak
Day 28 plant water content						
	Two-way ANOVA	Interaction	4.557	0.3332	ns	
		Genotype	51.40	<0.0001	****	Tukey
		[CO ₂]	10.80	0.0019	**	Sidak
Day 32 dry weight						
	Welch's (one-way) ANOVA	Genotype	NA	0.0225	*	Dunnett T3
	Welch's unpaired t-test	[CO ₂]	NA	0.0044	**	Holm-Sidak
Aphid fecundity						
Day 15; aCO₂ (Fig. 5)						
	Unpaired t-test	WT vs <i>rms</i> mutants (grouped)	NA	0.0077	**	Dunnett T3
Day 15; aCO₂ & eCO₂ (Fig. S1)						
	Unpaired t-test	WT vs <i>rms</i> mutants (grouped)	NA	0.0226	*	Dunnett T3
	Unpaired t-test	[CO ₂]	NA	0.1873	ns	None
[Phytohormone]						
ACC						
	Welch's (one-way) ANOVA	Genotype	NA	0.8047	ns	None
	Welch's unpaired t-test	Aphid exposure	NA	<0.0001	****	Multiple unpaired t tests
tZ						

	Welch's (one-way) ANOVA	Genotype	NA	0.9809	ns	None
	Welch's unpaired t-test	Aphid exposure	NA	<0.0001	****	Holm-Sidak
iP						
	Welch's (one-way) ANOVA	Genotype	NA	0.8440	ns	None
	Welch's unpaired t-test	Aphid exposure	NA	<0.0001	****	Holm-Sidak
GA1						
	Welch's (one-way) ANOVA	Genotype	NA	0.7351	ns	None
	Welch's unpaired t-test	Aphid exposure	NA	<0.0001	****	Holm-Sidak
GA3						
	Kruskal-Wallis	Genotype	NA	0.0048	**	Dunn
	Mann-Whitney	Aphid exposure	NA	0.8153	ns	None
GA4						
	Two-way ANOVA	Interaction	4.079	0.0010	**	
		Genotype	3.369	0.0024	**	Sidak
		Aphid exposure	89.86	<0.0001	****	Sidak
IAA						
	Two-way ANOVA	Interaction	15.38	0.2105	ns	
		Genotype	4.425	0.6208	ns	None
		Aphid exposure	0.1441	0.8603	ns	None
ABA						
	Welch's (one-way) ANOVA	Genotype	NA	0.5007	ns	None
	Welch's unpaired t-test	Aphid exposure	NA	0.9585	ns	None
JA						
	Welch's (one-way) ANOVA	Genotype	NA	0.5554	ns	None
	Welch's unpaired t-test	Aphid exposure	NA	<0.0001	****	Holm-Sidak
SA						
	Welch's (one-way) ANOVA	Genotype	NA	0.0324	ns	Dunnett's T3 test
	Welch's unpaired t-test	Aphid exposure	NA	0.2973	ns	None
[Carbohydrate]						
Glucose						
	Two-way ANOVA	Interaction	1.923	0.9090	ns	
		Genotype	2.146	0.8913	ns	None
		[CO ₂]	56.78	<0.0001	****	Sidak
Fructose						
	Welch's (one-way) ANOVA	Genotype	NA	0.8688	ns	None
	Welch's unpaired t-test	[CO ₂]	NA	0.0009	***	Holm-Sidak
Sucrose						
	Two-way ANOVA	Interaction	1.462	0.7397	ns	
		Genotype	4.355	0.2473	ns	Tukey
		[CO ₂]	79.41	<0.0001	****	Sidak
Starch						
	Two-way ANOVA	Interaction	0.7123	0.5559	ns	
		Genotype	0.8778	0.4551	ns	None
		[CO ₂]	93.80	<0.0001	****	Sidak

Table S3: Multiple comparison tests to compare **genotype** means. *, < 0.05; **, < 0.01; ***, < 0.001; ****, < 0.0001.

Dependent variable	Multiple comparison test	Comparison	Adjusted P-value	Summary
Plant height				
Day 14	Tukey			
		WT vs. <i>rms3-1</i>	0.0018	**
		WT vs. <i>rms4-1</i>	<0.0001	****
		WT vs. <i>rms1-2</i>	<0.0001	****
		WT vs. <i>rms5-3</i>	0.0011	**
		<i>rms3-1</i> vs. <i>rms4-1</i>	0.6345	ns
		<i>rms3-1</i> vs. <i>rms1-2</i>	0.8457	ns
		<i>rms3-1</i> vs. <i>rms5-3</i>	0.9998	ns
		<i>rms4-1</i> vs. <i>rms1-2</i>	0.9956	ns
		<i>rms4-1</i> vs. <i>rms5-3</i>	0.7324	ns
		<i>rms1-2</i> vs. <i>rms5-3</i>	0.9108	ns
Day 32	Tukey			
		WT vs. <i>rms3-1</i>	<0.0001	****
		WT vs. <i>rms4-1</i>	<0.0001	****
		WT vs. <i>rms1-2</i>	<0.0001	****
		WT vs. <i>rms5-3</i>	<0.0001	****
		<i>rms3-1</i> vs. <i>rms4-1</i>	0.9981	ns
		<i>rms3-1</i> vs. <i>rms1-2</i>	0.9500	ns
		<i>rms3-1</i> vs. <i>rms5-3</i>	0.9932	ns
		<i>rms4-1</i> vs. <i>rms1-2</i>	0.8422	ns
		<i>rms4-1</i> vs. <i>rms5-3</i>	>0.9999	ns
		<i>rms1-2</i> vs. <i>rms5-3</i>	0.7809	ns
Total branching				
Day 7	Tukey			
		WT vs. <i>rms3-1</i>	0.1843	ns
		WT vs. <i>rms4-1</i>	0.0002	***
		WT vs. <i>rms1-2</i>	0.1752	ns
		WT vs. <i>rms5-3</i>	0.3999	ns
		<i>rms3-1</i> vs. <i>rms4-1</i>	0.1047	ns
		<i>rms3-1</i> vs. <i>rms1-2</i>	0.0004	***
		<i>rms3-1</i> vs. <i>rms5-3</i>	0.9905	ns
		<i>rms4-1</i> vs. <i>rms1-2</i>	<0.0001	****
		<i>rms4-1</i> vs. <i>rms5-3</i>	0.0353	*
		<i>rms1-2</i> vs. <i>rms5-3</i>	0.0017	**
Day 14	Tukey			
		WT vs. <i>rms3-1</i>	<0.0001	****
		WT vs. <i>rms4-1</i>	<0.0001	****
		WT vs. <i>rms1-2</i>	<0.0001	****
		WT vs. <i>rms5-3</i>	<0.0001	****
		<i>rms3-1</i> vs. <i>rms4-1</i>	0.0963	ns
		<i>rms3-1</i> vs. <i>rms1-2</i>	0.9061	ns
		<i>rms3-1</i> vs. <i>rms5-3</i>	0.0032	**
		<i>rms4-1</i> vs. <i>rms1-2</i>	0.4573	ns
		<i>rms4-1</i> vs. <i>rms5-3</i>	0.7064	ns
		<i>rms1-2</i> vs. <i>rms5-3</i>	0.0368	*
Day 32	Dunnett T3			
		WT vs. <i>rms3-1</i>	<0.0001	****
		WT vs. <i>rms4-1</i>	<0.0001	****
		WT vs. <i>rms1-2</i>	<0.0001	****
		WT vs. <i>rms5-3</i>	<0.0001	****
		<i>rms3-1</i> vs. <i>rms4-1</i>	0.9822	ns
		<i>rms3-1</i> vs. <i>rms1-2</i>	>0.9999	ns
		<i>rms3-1</i> vs. <i>rms5-3</i>	0.9194	ns

		<i>rms4-1</i> vs. <i>rms1-2</i>	0.9582	ns
		<i>rms4-1</i> vs. <i>rms5-3</i>	>0.9999	ns
		<i>rms1-2</i> vs. <i>rms5-3</i>	0.8856	ns
Biomass				
Day 28 plant water content	Tukey			
		WT vs. <i>rms3-1</i>	<0.0001	****
		WT vs. <i>rms4-1</i>	<0.0001	****
		WT vs. <i>rms1-2</i>	0.0003	***
		WT vs. <i>rms5-3</i>	0.0014	**
		<i>rms3-1</i> vs. <i>rms4-1</i>	0.9025	ns
		<i>rms3-1</i> vs. <i>rms1-2</i>	0.4055	ns
		<i>rms3-1</i> vs. <i>rms5-3</i>	0.1678	ns
		<i>rms4-1</i> vs. <i>rms1-2</i>	0.8631	ns
		<i>rms4-1</i> vs. <i>rms5-3</i>	0.5566	ns
		<i>rms1-2</i> vs. <i>rms5-3</i>	0.9864	ns
Day 32 dry weight	Dunnett T3			
		WT vs. <i>rms3-1</i>	>0.9999	ns
		WT vs. <i>rms4-1</i>	0.3580	ns
		WT vs. <i>rms1-2</i>	0.6315	ns
		WT vs. <i>rms5-3</i>	>0.9999	ns
		<i>rms3-1</i> vs. <i>rms4-1</i>	0.0762	ns
		<i>rms3-1</i> vs. <i>rms1-2</i>	0.3352	ns
		<i>rms3-1</i> vs. <i>rms5-3</i>	>0.9999	ns
		<i>rms4-1</i> vs. <i>rms1-2</i>	>0.9999	ns
		<i>rms4-1</i> vs. <i>rms5-3</i>	0.0681	ns
		<i>rms1-2</i> vs. <i>rms5-3</i>	0.3324	ns
Aphid fecundity				
Day 15; aCO₂ (Fig. 5)	Dunnett T3			
		WT vs. <i>rms3-1</i>	0.0228	*
		WT vs. <i>rms4-1</i>	0.1173	ns
		WT vs. <i>rms2-1</i>	0.6800	ns
		WT vs. <i>rms5-3</i>	0.3022	ns
Day 15; aCO₂ & eCO₂ (Fig. S1)	Dunnett T3			
		WT vs. <i>rms3-1</i>	0.0537	ns
		WT vs. <i>rms4-1</i>	0.0867	ns
Phytohormone []				
GA3	Dunn			
		WT vs. <i>rms3-1</i>	0.0778	ns
		WT vs. <i>rms4-1</i>	0.0044	**
		<i>rms3-1</i> vs. <i>rms4-1</i>	>0.9999	ns
GA4	Sidak			
		WT vs. <i>rms3-1</i>	0.0088	**
		WT vs. <i>rms4-1</i>	0.0050	**
		<i>rms3-1</i> vs. <i>rms4-1</i>	0.9564	ns
SA	Dunnett's T3 test			
		WT vs. <i>rms3-1</i>	0.4020	ns
		WT vs. <i>rms4-1</i>	0.0479	*
		<i>rms3-1</i> vs. <i>rms4-1</i>	0.3310	ns

Table S4: Multiple comparison tests to compare means between ambient and elevated [CO₂] within genotype. *, < 0.05; **, < 0.01; ***, < 0.001; ****, < 0.0001.

Dependent variable	Multiple comparison test	Comparison	Adjusted P-value	Summary
Plant height				
Day 32	Sidak	Ambient [CO ₂] - Elevated [CO ₂]		
		WT	0.0202	*
		<i>rms3-1</i>	0.0406	*
		<i>rms4-1</i>	0.3339	ns
		<i>rms1-2</i>	0.0960	ns
		<i>rms5-3</i>	0.0781	ns
Total branching				
Day 32	Holm-Sidak	Ambient [CO ₂] - Elevated [CO ₂]		
		WT	0.0004	***
		<i>rms3-1</i>	0.0609	ns
		<i>rms4-1</i>	0.0601	ns
		<i>rms1-2</i>	0.0302	*
		<i>rms5-3</i>	0.0779	ns
Biomass				
Day 28 dry weight	Holm-Sidak	Ambient [CO ₂] - Elevated [CO ₂]		
		WT	0.4785	ns
		<i>rms3-1</i>	0.2069	ns
		<i>rms4-1</i>	0.2951	ns
		<i>rms1-2</i>	0.6507	ns
		<i>rms5-3</i>	0.7369	ns
Day 28 fresh weight	Holm-Sidak	Ambient [CO ₂] - Elevated [CO ₂]		
		WT	0.7162	ns
		<i>rms3-1</i>	0.4887	ns
		<i>rms4-1</i>	0.4887	ns
		<i>rms1-2</i>	0.7355	ns
		<i>rms5-3</i>	0.7355	ns
Day 28 plant water content	Sidak	Ambient [CO ₂] - Elevated [CO ₂]		
		WT	0.0212	*
		<i>rms3-1</i>	0.2230	ns
		<i>rms4-1</i>	0.9933	ns
		<i>rms1-2</i>	0.9234	ns
		<i>rms5-3</i>	0.8572	ns
Day 32 dry weight	Holm-Sidak	Ambient [CO ₂] - Elevated [CO ₂]		
		WT	0.0031	**
		<i>rms3-1</i>	0.0011	**
		<i>rms4-1</i>	0.0099	**
		<i>rms1-2</i>	0.0098	**
		<i>rms5-3</i>	0.0015	**
Carbohydrate []				
Glucose	Sidak	Ambient [CO ₂] - Elevated [CO ₂]		
		WT	0.0804	ns
		<i>rms3-1</i>	0.0918	ns
		<i>rms4-1</i>	0.0457	*
		<i>rms1-2</i>	0.5064	ns
		<i>rms5-3</i>	0.1174	ns
Fructose	Holm-Sidak	Ambient [CO ₂] - Elevated [CO ₂]		
		WT	0.0376	*
		<i>rms3-1</i>	0.0530	ns
		<i>rms4-1</i>	0.0026	**
		<i>rms1-2</i>	0.0530	ns
		<i>rms5-3</i>	0.0075	**
Sucrose	Sidak	Ambient [CO ₂] - Elevated [CO ₂]		

		WT	0.0004	***
		<i>rms3-1</i>	0.0003	***
		<i>rms4-1</i>	0.0002	***
		<i>rms1-2</i>	0.0016	**
		<i>rms5-3</i>	0.0102	*
Starch	Sidak	Ambient [CO ₂] - Elevated [CO ₂]		
		WT	<0.0001	****
		<i>rms3-1</i>	<0.0001	****
		<i>rms4-1</i>	<0.0001	****
		<i>rms1-2</i>	<0.0001	****
		<i>rms5-3</i>	<0.0001	****

Table S5: Multiple comparison tests to compare means between aphid vs no aphid exposure within genotype. *, < 0.05; **, < 0.01; ***, < 0.001; ****, < 0.0001.

Dependent variable	Multiple comparison test	Comparison	Adjusted P-value	Summary
Phytohormone []				
ACC	Holm-Sidak	Control - Aphid exposed		
		WT	0.0154	*
		<i>rms3-1</i>	0.0082	**
		<i>rms4-1</i>	0.0154	*
tZ	Holm-Sidak	Control - Aphid exposed		
		WT	0.0028	**
		<i>rms3-1</i>	0.0016	**
		<i>rms4-1</i>	0.0028	**
iP	Holm-Sidak	Control - Aphid exposed		
		WT	0.0779	ns
		<i>rms3-1</i>	0.0452	*
		<i>rms4-1</i>	0.0779	ns
GA1	Holm-Sidak	Control - Aphid exposed		
		WT	0.0191	*
		<i>rms3-1</i>	0.0203	*
		<i>rms4-1</i>	0.0332	*
GA4	Sidak	Control - Aphid exposed		
		WT	<0.0001	****
		<i>rms3-1</i>	<0.0001	****
		<i>rms4-1</i>	<0.0001	****
JA	Holm-Sidak	Control - Aphid exposed		
		WT	<0.0001	****
		<i>rms3-1</i>	0.0001	***
		<i>rms4-1</i>	0.0006	***

Table S6: The correlation of aphid numbers to phytohormones in pea on which a single *Acyrtosiphon pisum* nymph was allowed to reproduce for a period of 15 days.

Hormone	Pearson correlation coefficient (<i>r</i>)	p-value (Pearson)	Coefficient of determination (<i>R</i> ²)
ACC	-0.161	0.395	0.026
tZ	-0.323	0.081	0.105
iP	0.103	0.588	0.011
GA1	0.014	0.942	0.000
GA3	-0.429	0.018	0.184
IAA	-0.186	0.326	0.034
ABA	0.024	0.901	0.001
JA	-0.328	0.077	0.107
SA	0.061	0.748	0.004
GA4	0.245	0.192	0.060