

Ozone pollution alters olfaction and behavior of pollinators

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Table S1. Conditions of ozone exposure and sample sizes for electrophysiological experiments.

Pollinator species	Tested VOCs	Exposure duration (min)	O ₃ concentration (ppb)	Sample size (number of individuals)
<i>Blastophaga psenes</i>	Linalool mixture	60	0	21
			200	17
	Linalool oxides	180	0	12
			80	11
Benzyl alcohol	180	120	11	
		0	30	
<i>Bombus terrestris</i>	R-linalool	60	80	30
			120	30
			200	30
	Benzaldehyde	180	0	30
			80	30
			120	30
Nonanal	180	200	30	
		0	30	

Table S2. Provider, CAS (Chemical Abstracts Service) number and purity of the synthetic VOCs used during the experiments.

Synthetic VOCs	Models	Provider	CAS number	Purity
R-linalool	Bumblebee	Sigma-Aldrich	126-91-0	≥ 95 %
Linalool mixture	Fig wasp	Fluka	78-70-6	~ 97 %
Linalool oxides	Fig wasp	Fluka	68780-91-6	> 97 %
Benzyl alcohol	Fig wasp	Fluka	100-51-6	> 99.5 %
Benzaldehyde	Bumblebee	Sigma-Aldrich	100-52-7	≥ 99.5 %
Nonanal	Bumblebee	Sigma-Aldrich	124-19-6	≥ 99.5 %

Table S3. Conditions of ozone exposure and sample sizes for behavioral assays.

Pollinator species	Tested VOCs	Exposure duration (min)	O ₃ concentration (ppb)	Sample size (number of individuals)
<i>Blastophaga psenes</i>	VOCs mix mimicking the odour of the fig host	60	0	49
			120	50
			200	50
	Benzaldehyde	180	0	50
			80	50
			120	50
<i>Bombus terrestris</i>	Benzaldehyde	60	0	30
			80	30
			120	30
			200	30

Table S4. Statistical outputs (p-values) regarding the impact of ozone exposure on antennal sensitivity in fig wasps. Significant differences are in bold.

Comparison between 0 and 200 ppb for 60-min exposure					
VOCs		VOC dose (μg)			
		1	10	100	1000
Benzyl alcohol		0.850	0.928	0.067	0.017
Linalool oxides		0.956	0.782	0.190	0.133
Linalool mixture		0.753	0.856	0.117	0.187
Multiple pairwise comparisons for 180-min exposure					
VOCs	Ozone concentrations	VOC dose (μg)			
		1	10	100	1000
Benzyl alcohol	0 ppb vs 80 ppb	0.079	0.081	0.812	0.238
	0 ppb vs 120 ppb	0.018	0.064	0.198	0.431
	80 ppb vs 120 ppb	0.535	0.917	0.304	0.700
Linalool oxides	0 ppb vs 80 ppb	0.289	0.560	0.960	0.229
	0 ppb vs 120 ppb	0.945	0.064	0.511	0.450
	80 ppb vs 120 ppb	0.331	0.211	0.489	0.056
Linalool mixture	0 ppb vs 80 ppb	0.641	0.026	0.478	0.625
	0 ppb vs 120 ppb	0.187	0.007	0.809	0.885
	80 ppb vs 120 ppb	0.081	0.623	0.647	0.737

Table S5. Statistical outputs (p-values) regarding the impact of ozone exposure on antennal sensitivity in bumblebee workers. Significant differences are in bold.

Multiple pairwise comparisons for 60-min exposure					
Ozone concentrations		VOC dose (μg)			
		1	10	100	1000
Benzaldehyde	0 ppb vs 80 ppb	0.883	0.686	0.769	0.907
	0 ppb vs 120 ppb	0.574	0.023	0.002	0.026
	0 ppb vs 200 ppb	0.658	0.244	0.048	0.045
	80 ppb vs 120 ppb	0.678	0.061	0.006	0.034
	80 ppb vs 200 ppb	0.768	0.446	0.092	0.059
	120 ppb vs 200 ppb	0.905	0.265	0.275	0.819
R-Linalool	0 ppb vs 80 ppb	0.723	0.460	0.455	0.663
	0 ppb vs 120 ppb	0.527	0.111	0.012	0.014
	0 ppb vs 200 ppb	0.426	0.122	0.014	0.004
	80 ppb vs 120 ppb	0.781	0.392	0.077	0.044
	80 ppb vs 200 ppb	0.658	0.419	0.086	0.013
	120 ppb vs 200 ppb	0.869	0.961	0.956	0.643
Nonanal	0 ppb vs 80 ppb	0.752	0.956	0.816	0.380
	0 ppb vs 120 ppb	0.874	0.687	0.043	0.300
	0 ppb vs 200 ppb	0.839	0.526	0.037	0.159
	80 ppb vs 120 ppb	0.875	0.728	0.074	0.056
	80 ppb vs 200 ppb	0.604	0.563	0.064	0.022
	120 ppb vs 200 ppb	0.718	0.817	0.950	0.708

Multiple pairwise comparisons for 180-min exposure					
Ozone concentrations		VOC dose (μg)			
		1	10	100	1000
Benzaldehyde	0 ppb vs 80 ppb	0.915	0.814	0.243	0.144
	0 ppb vs 120 ppb	0.943	0.524	0.077	0.052
	0 ppb vs 200 ppb	0.980	0.386	0.031	0.012
	80 ppb vs 120 ppb	0.859	0.688	0.549	0.629
	80 ppb vs 200 ppb	0.935	0.527	0.319	0.292
	120 ppb vs 200 ppb	0.923	0.818	0.691	0.568
R-Linalool	0 ppb vs 80 ppb	0.947	0.993	0.291	0.025
	0 ppb vs 120 ppb	0.904	0.622	0.074	0.082
	0 ppb vs 200 ppb	0.764	0.421	0.032	0.003
	80 ppb vs 120 ppb	0.851	0.616	0.462	0.611
	80 ppb vs 200 ppb	0.713	0.416	0.274	0.490
	120 ppb vs 200 ppb	0.857	0.755	0.720	0.231

Nonanal	0 ppb vs 80 ppb	0.796	0.757	0.695	0.538
	0 ppb vs 120 ppb	0.955	0.919	0.436	0.737
	0 ppb vs 200 ppb	0.801	0.868	0.294	0.491
	80 ppb vs 120 ppb	0.753	0.681	0.699	0.780
	80 ppb vs 200 ppb	0.996	0.887	0.511	0.941
	120 ppb vs 200 ppb	0.757	0.788	0.786	0.724
