

Supplementary information

Effects of the novel pesticide flupyradifurone (Sivanto) on honeybee taste and cognition

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	Test	Value	df	P-value
Mortality 120 min after 1,7 *10⁻⁴ mol/l flupyradifurone	Chi Square Test	7.5	1	0.006

Supplementary table T 1: Test results of preliminary mortality study.



Harnessed honeybees, fed once with varying doses of flupyradifurone (8.3 *10⁻⁴ mol/l, 8.3 *10⁻⁵ mol/l, 8.3 *10⁻⁶ mol/l, control)



Cages in the incubator for 72 h (temperature 28 °C, relative humidity 60%, sugar 50% ad libitum)



Honeybees released in cages (internal dimensions 8 cm x 5 cm x 5 cm)

Supplementary Figure S 1: Schematic figure, showing the practical performance of the mortality experiment.

	Test	Value	df	P-value
First trial	Chi Square Test	4.0	3	0.265
Second trial		2.2	3	0.528

Supplementary table T 2: Test results of the mortality study.

	Treatment	Test	Value	df	P-value
Taste behavior		Logistic Regression	51.3	3	.000
	8.3 * 10 ⁻⁶ mol/l	Least Significant Difference Test		1	.808
	8.3 * 10 ⁻⁵ mol/l		1	.731	
	8.3 * 10 ⁻⁴ mol/l		1	.000	
Taste behavior		Kruskal-Wallis H Test	43.0	3	.000
	8.3 * 10 ⁻⁶ mol/l	Dunn's Post-Hoc-Test		1	.798
	8.3 * 10 ⁻⁵ mol/l		1	.757	
	8.3 * 10 ⁻⁴ mol/l		1	.000	
GRS¹		Kruskal-Wallis H Test	.6	3	.902
Spontaneous reactions		Chi Square Test	3.0	3	.388
Conditioning		Logistic Regression	26.6	3	.000
	8.3 * 10 ⁻⁶ mol/l	Least Significant Difference Test		1	.166
	8.3 * 10 ⁻⁵ mol/l		1	.954	
	8.3 * 10 ⁻⁴ mol/l		1	.000	
Conditioning		Kruskal-Wallis H Test	18.1	3	.000
	8.3 * 10 ⁻⁶ mol/l	Dunn's Post-Hoc-Test		1	.203
	8.3 * 10 ⁻⁵ mol/l		1	.945	
	8.3 * 10 ⁻⁴ mol/l		1	.001	
Extinction		Kruskal-Wallis H Test	14.6	3	.002
	8.3 * 10 ⁻⁶ mol/l	Dunn's Post-Hoc-Test		1	.382
	8.3 * 10 ⁻⁵ mol/l		1	.975	
	8.3 * 10 ⁻⁴ mol/l		1	.003	
Discrimination		Kruskal-Wallis H Test	.7	3	.869

Supplementary table T 3: Test results of pollen foraging bees. Post hoc comparisons show treatment against control. For number of bees per treatment see table 1. GRS¹: GRS of conditioned bees.

	Treatment	Test	Value	df	P-value
Taste behavior		Logistic Regression	72.0	3	.000
	8.3 * 10 ⁻⁶ mol/l	Least Significant Difference Test		1	.200
	8.3 * 10 ⁻⁵ mol/l		1	.696	
	8.3 * 10 ⁻⁴ mol/l		1	.000	
Taste behavior		Kruskal-Wallis H Test	52.6	3	.000
	8.3 * 10 ⁻⁶ mol/l	Dunn's Post-Hoc-Test		1	.242
	8.3 * 10 ⁻⁵ mol/l		1	.700	
	8.3 * 10 ⁻⁴ mol/l		1	.000	
GRS¹		Kruskal-Wallis H Test	14.9	3	.002
	8.3 * 10 ⁻⁶ mol/l	Dunn's Post-Hoc-Tests		1	.819
	8.3 * 10 ⁻⁵ mol/l		1	.299	
	8.3 * 10 ⁻⁴ mol/l		1	.001	
Spontaneous reactions		Chi Square Test	11.1	3	.011
Conditioning		Logistic Regression	25.2	3	.000
	8.3 * 10 ⁻⁶ mol/l	Least Significant Difference Test		1	.491
	8.3 * 10 ⁻⁵ mol/l		1	.180	
	8.3 * 10 ⁻⁴ mol/l		1	.000	
Conditioning		Kruskal-Wallis H Test	18.5	3	.000
	8.3 * 10 ⁻⁶ mol/l	Dunn's Post-Hoc-Test		1	.627
	8.3 * 10 ⁻⁵ mol/l		1	.234	
	8.3 * 10 ⁻⁴ mol/l		1	.000	
Extinction		Kruskal-Wallis H Test	8.9	3	.031
	8.3 * 10 ⁻⁶ mol/l	Dunn's Post-Hoc-Test		1	.299
	8.3 * 10 ⁻⁵ mol/l		1	.316	
	8.3 * 10 ⁻⁴ mol/l		1	.116	
Discrimination		Kruskal-Wallis H Test	.8	3	.860

Supplementary table T 4: Test results of nectar foraging bees. Post hoc comparisons show treatment against control. For number of bees per treatment see table 1. GRS¹: GRS of conditioned bees.