

Supplementary Statistical Tables

Post-hoc comparisons of PER probability across time intervals within each imidacloprid dose

Post-hoc pairwise comparisons were derived from the generalized linear mixed model (binomial distribution, logit link) using Tukey-adjusted estimated marginal means. Comparisons are shown on the log-odds scale. Significant differences indicate changes in the probability of eliciting the proboscis extension response (PER) over time within each treatment.

Table S1. Generalized linear mixed model (GLMM) results for proboscis extension response (PER) and sting extension response (SER).

Binomial models with logit link; fixed effects included Dose, Time, and their interaction. Pairwise comparisons were obtained using estimated marginal means (Tukey-adjusted).

A. Overall model effects

Behavior	Effect	Test statistic	p-value	Interpretation
PER	Dose	$\chi^2 = 152.84$	<0.0001	Strong concentration-dependent reduction in PER
PER	Time	$z = 4.73$	<0.0001	PER changes across time
PER	Dose $\times$ Time	—	<0.0001	Time-dependent impairment at higher doses
SER	Dose	$\chi^2 = 189.57$	<0.0001	Strong concentration-dependent reduction in SER
SER	Time	$z = 0.10$	0.92	No overall time effect
SER	Dose $\times$ Time	—	0.18	Limited temporal modulation

Note: Likelihood ratio tests were used for overall dose effects; fixed-effect significance derives from GLMM estimates.

B. Pairwise dose comparisons (odds ratios)

SER

Contrast	Odds ratio	SE	z value	p-value
Control / 0.3Im	1.55	0.3	2.16	0.136
Control / 0.6Im	3.2	0.6	6.19	<0.0001
Control / 3Im	12.49	2.4	13.12	<0.0001

0.3Im / 0.6Im	2.07	0.3	4.35	<0.0001
0.3Im / 3Im	8.05	1.4	12.14	<0.0001
0.6Im / 3Im	3.9	0.6	8.89	<0.0001

SER

Contrast	Odds ratio	SE	z value	p-value
Control / 0.3Im	1.12	0.31	0.41	0.98
Control / 0.6Im	5.99	1.38	7.8	<0.0001
Control / 3Im	11.08	2.5	10.65	<0.0001
0.3Im / 0.6Im	5.34	1.18	7.58	<0.0001
0.3Im / 3Im	9.87	2.14	10.55	<0.0001
0.6Im / 3Im	1.85	0.27	4.18	0.0002

C. Time contrasts at the highest dose (3Im)

Behavior	Contrast (Time)	Estimate (log-odds)	SE	z value	p-value
PER	I ₁ – I ₂	–0.99	0.1	–7.23	<0.0001
PER	I ₁ – I ₃	–1.98	0.3	–7.23	<0.0001
SER	I ₁ – I ₂	0.33	0.1	2.8	0.014
SER	I ₁ – I ₃	0.65	0.2	2.8	0.014

Supplementary table S2. Statistical models and test results for individual movement

Segmental motion (CoV)	Head pixel intensity variability	One-way ANOVA	Substance (Control vs 0.3 Im)	F _{1,10396} =934.52	1.3×10 ^{–196}	0.082	Fig. 5B
Segmental motion (CoV)	Thorax pixel intensity variability	One-way ANOVA	Substance (Control vs 0.3 Im)	F _{1,10396} =1218.01	1.9×10 ^{–252}	0.105	Fig. 5B

Segmental motion (CoV)	Abdomen pixel intensity variability	One-way ANOVA	Im) Substance (Control vs 0.3 Im)		$F_{1,10396}=2865.98$	$<1 \times 10^{-300}$	0.216	Fig. 5B
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Supplementary table S5. Statistical models and test results for group movement

Group motion (Angular displacement)	Absolute angular displacement (angle)	One-way ANOVA (type II)	Treatment (3 levels: Control, 0.3 Im, 0.6 Im)	Tukey HSD	$F_{2,18782}=1529.14$	<0.0001	0.140	Fig. 4A
Group motion (Angular speed)	Absolute angular speed (angular speed)	One-way ANOVA	Treatment (3 levels)	Tukey HSD	$F_{2,18096}=1192.70$	<0.0001	—	Fig. 4B