

## SUPPLEMENTARY DATA



**Supplementary Figure 1:** Flight mill with honey bee forager attached.



**Supplementary Figure 2:** Four flight mills arranged inside the temperature-controlled incubator.



**Supplementary Figure 2:** Collection of forager *Apis mellifera scutellata* honey bees from the entrance of an experimental hive.

**Supplementary Table 1:** Principal components binomial regression analysis of honey bee morphometric data comparison.

	<b>Estimate</b>	<b>Standard Error</b>	<b>Z value</b>	<b>Pr (&gt; z )</b>
<b>(Intercept)</b>	0.0003455	0.2434044	0.001	0.9989
<b>PC1</b>	0.0937869	0.1149623	0.816	0.4146
<b>PC2</b>	0.1666662	0.1722320	0.968	0.3332
<b>PC3</b>	-0.2263734	0.2030784	-1.115	0.2650
<b>PC4</b>	-0.0856721	0.2323235	-0.369	0.7123
<b>PC5</b>	0.2607100	0.2377876	1.096	0.2729
<b>PC6</b>	0.0204768	0.2578756	0.079	0.9367
<b>PC7</b>	-0.5810410	0.2831383	-2.052	0.0402 *
<b>PC8</b>	0.4712969	0.3893645	1.210	0.2261
<b>PC9</b>	-0.4653991	0.4218892	-1.103	0.2700
<b>PC10</b>	-1.0639088	0.5564846	-1.912	0.0559
<b>PC11</b>	-0.7915564	0.5678135	-1.394	0.1633
<b>PC12</b>	0.8339161	0.6107176	1.365	0.1721
<b>PC13</b>	-1.8032980	0.7878243	-2.289	0.221

Significance: '\*\*\*\*' 0.001; '\*\*\*' 0.01; '\*\*' 0.05

**Supplementary Table 2:** Mean honey bee body weight (grams) of all bees sampled per temperature, per treatment, for both successful and unsuccessful flights. Honey bees were exposed to either the control (CONT), thiamethoxam (THX), clothianidin (CLO) or imidacloprid (IMI) dosed sucrose diet. Flight mill runs were conducted at 25°C, 30°C and 35°C respectively for each treatment.

Temperature	Treatment	Flight	Mean bee weight (g)		Sample size (n)
		success			
25 °C	CONT	Yes	0.0831	± 0.0211	37
		No	0.0875	± 0.0231	15
	THX	Yes	0.0896	± 0.0123	25
		No	0.0826	± 0.0127	8
	IMI	Yes	0.0984	± 0.0091	8
		No	0.0851	± 0.0178	12
	CLO	Yes	0.0807	± 0.0127	14
		No	0.0792	± 0.0160	22
30 °C	CONT	Yes	0.0765	± 0.0160	35
		No	0.0747	± 0.0167	12
	THX	Yes	0.0847	± 0.0119	12
		No	0.0732	± 0.0139	11
	IMI	Yes	0.0777	± 0.0192	7
		No	0.0843	± 0.0174	11
	CLO	Yes	0.0795	± 0.0155	10
		No	0.0894	± 0.0187	16
35 °C	CONT	Yes	0.0755	± 0.0186	27
		No	0.0649	± 0.0152	9
	THX	Yes	0.0859	± 0.0138	13
		No	0.0867	± 0.0124	7

IMI	Yes	0.0840	± 0.0132	11
	No	0.0772	± 0.0142	23
CLO	Yes	0.0901	± 0.0157	16
	No	0.0796	± 0.0184	15

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**Supplementary Table 3:** Average honey bee flight speed ( $\text{m}\cdot\text{s}^{-1}$ ) and average flight distance (m) of all bees sampled per temperature, per treatment. Honey bees were exposed to either the control (CONT), thiamethoxam (THX), clothianidin (CLO) or imidacloprid (IMI) dosed sucrose diet. Flight mill runs were conducted at 25°C, 30°C and 35°C respectively for each treatment.

Temperature	Treatment	Average flight speed ( $\text{m}\cdot\text{s}^{-1}$ )	Average flight distance (m)	Average number of flights
25 °C	CONT	0,952 ± 0,494	161,772 ± 267,503	8,222 ± 8,596
	THX	1,020 ± 0,432	488,126 ± 1325,192	16,058 ± 12,831
	IMI	0,8179 ± 0,226	117,602 ± 125,761	19 ± 24,952
	CLO	2,446 ± 2,028	417,919 ± 755,143	11,125 ± 5,509
30 °C	CONT	1,439 ± 1,437	271,809 ± 662,421	18 ± 23,871
	THX	1,167 ± 0,513	93,824 ± 82,705	13,5 ± 5,315
	IMI	1,015 ± 0,092	105,405 ± 77,305	9,666 ± 11,556
	CLO	1,275 ± 0,658	223,271 ± 180,424	36,3 ± 26,294
35 °C	CONT	1,527 ± 1,188	253,931 ± 587,868	10,275 ± 12,987
	THX	1,400 ± 1,263	923,140 ± 1564,231	9,363 ± 8,326
	IMI	1,136 ± 0,884	2056,725 ± 2052,327	3 ± 2
	CLO	0,978 ± 0,3891	216,577 ± 546,294	14 ± 15,451

**Supplementary Table 4:** Chi-squared analysis of the effects of neonicotinoid treatments (*treat*), temperature(*temp*) and their interacting effects (*temp:treat*) for the generalised linear model for flight speed.

	<b>LR Chisq</b>	<b>Df</b>	<b>Pr(&gt;Chisq)</b>
<i>treat</i>	5.1897	3	0.15842
<i>temp</i>	1.1030	1	0.29360
<i>treat:temp</i>	10.4586	3	0.15040