

Sublethal effect	Type of study and intoxication pathway	Value of the LOEC
Reflex of proboscis extension (measuring conditioned memory and learning in honeybees)	Laboratory study on effects from reiterated oral administration of imidacloprid (chronic intoxication)	0.4 ng/honeybee (12 ppb) NOEC: 0.2 ng/honeybee (6 ppb) 11 days of treatment and observation
Frequentation of the feeding source Length of the feeding time	Under-tunnel study of effects from repeated consumption of imidacloprid (4 days to 4 weeks) (chronic intoxication)	0.075-0.21 ng/honeybee (3 ppb)
Recognition of the related honeybees inside the hive	Laboratory study on effects from reiterated oral administration of imidacloprid (chronic intoxication)	0.25-0.7 ng/honeybee (10 ppb) > 1 month of observation
Pollen consumption and wax production		0.31-0.87 ng/honeybee (12.5 ppb) 5 days of observation
Knockdown effect and locomotion coordination	Laboratory study of effects from repeated oral administration of imidacloprid metabolites	0.0022 ng/honeybee (0.1 ppb) Metabolite: 6-chloronicotinic acid Starting with the 6 <sup>th</sup> day
		0.004 ng/honeybee (0.1 ppb) Metabolite: urea derivate Starting with the 6 <sup>th</sup> day
Precision of angle appreciation Trembling dances Wagging dances	Field study of the effects of single exposure to imidacloprid	0.5 – 1.4 ng/honeybee (20 ppb) NOEC: 0.25–0.7 ng/honeybee (10 ppb)
Precision of distance appreciation		2.5 – 7 ng/honeybee (100 ppb) NOEC: 0.5–1.4 ng/honeybee (20 ppb)
Diminished frequency of movements (knockdown effect)	Laboratory study of effects from one or several topical administrations of imidacloprid	5 ng/honeybee After 30 minutes
Proboscis extension reflex		0.1 ng/honeybee (after 15 minutes and 4 hours), for honeybees aged of 4–7 days 0.1 ng/honeybee (after 15 minutes and 1 hour), for honeybees aged 8–10 days

Table 1: Sublethal effects of imidacloprid and its metabolites on honeybees  
CST (Comité scientifique et technique de l'étude multifactorielle des troubles des abeilles), 2003. *Imidaclopride utilisé en enrobage de semences (Gaucho®) et troubles des abeilles, rapport final*, 106 pp.,

<http://www.agriculture.gouv.fr/spip/IMG/pdf/rapportfin.pdf>