

About the RT₂₅ Data Table

Background Information

The residual time to 25% mortality (referred to as the RT₂₅) values provided in the table below were compiled from registrant-submitted data submitted in order to fulfill the data requirement for *Honey Bee (Apis mellifera) Toxicity of Residues on Foliage* study ([OPPTS Guideline 850.3030^a](#)). This study is conditionally required if the honey bee acute contact (or oral) median lethal dose (LD₅₀) value (Obtained from a honey bee acute toxicity test such as [OCSPP 850.3020^b](#)) is less than 11 µg/bee¹.

The honey bee toxicity of residues on foliage study is a laboratory test designed to determine the length of time over which field weathered foliar residues remain toxic to honey bees, or other species of terrestrial insects. The test substance (*e.g.*, a representative end-use product) is applied to crop foliage, the foliage is harvested at predetermined post-application intervals (*i.e.*, aged residues), and test adult bees are confined on foliage with aged residues for 24 hours. Three treatment intervals (different durations of time that residues are aged between application and harvest) are typically used (*e.g.*, 3, 8 and 24 hours post-application). At a minimum, the test substance should be evaluated at the maximum application rate specified on the product label. If mortality of bees exposed to the foliage harvested 24 hours after the application is greater than 25%, bees should continue to be exposed to aged residues on foliage samples collected every 24 hours (*i.e.*, 48, 72, 96, 120 hours, *etc.* after the application) until mortality is 25% or less.

OPP Residual Time to 25% Mortality (RT₂₅) Table

The table below represents all available RT₂₅ values from studies submitted to the Agency which have undergone quality assurance reviews to ensure that the data are scientifically sound. Depending on the chemical tested, either the technical grade active ingredient or a specific formulation was tested using either the honey bee or a species of terrestrial insects that are native to North America; the table lists the test material and species tested. The table also denotes the plant species on which residues were aged.

RT₂₅ values are a function of a number of factors including application rate, physical-chemical properties, dissipation, crop, and pesticide formulation. Thus, there is considerable variability in RT₂₅ values within a single formulation, between formulations, between crops, and across application rates. The values included in the database are chemical and formulation specific. There are limited RT₂₅ values available in the table below for the numerous pesticide/formulation/use combinations. This table shows all the data submitted to the Agency that meets the EPA's quality assurance criteria. EPA plans to update this table as a more robust data set becomes available.

OPP Residual Time to 25% Mortality (RT₂₅)

Active Ingredient	Formulation ² (% a.i.)	Application Rate (lbs/A) ³	Crop ⁴	Qualifier ⁵	RT ₂₅ ⁶ (hours)	Test Species Name ⁷	Study Citation (MRID)
Abamectin (avermectin)	L 676, 863-28W02	0.0016 lb ai/tree	citrus	--	60	Honey bee (<i>Apis mellifera</i>)	00159161
		0.0008 lb ai/tree		--	41.5		
		0.008 lb ai/tree		--	30		
		0.0003 lb ai/tree		<	8		
		0.1	seed alfalfa	<	48		
		0.05		--	15		
		0.025		<	8		
		0.0125		<	4		
Amitraz	BTS 27419 EC (20)	4 g a.i./L	apple trees	--	0	Honey bee (<i>Apis mellifera</i>)	00030455
Azinphos-methyl	Guthion® 50 WP (50)	3	alfalfa	>	312	Honey bee (<i>Apis mellifera</i>)	40466301
Bifenazate	Acramite® 50WS (48.8)	0.733	alfalfa	<	3	Honey bee (<i>Apis mellifera</i>)	45052305
Carbaryl	80WP (80)	2		>	42		05008936

Active Ingredient	Formulation ² (% a.i.)	Application Rate (lbs/A) ³	Crop ⁴	Qualifier ⁵	RT ₂₅ ⁶ (hours)	Test Species Name ⁷	Study Citation (MRID)
		1	white clover	>	42	Honey bee (<i>Apis mellifera</i>)	
		0.5		>	42		
		0.25		>	42		
Chlorantraniliprole	35WG (35)	0.1	alfalfa	<	3	Honey bee (<i>Apis mellifera</i>)	46889129
Chlorfenapyr	PIRATE® 3 SC (29.8)	0.34	alfalfa	<	3	Honey bee (<i>Apis mellifera</i>)	43492845
Chlorpyrifos	Dursban® 4 lb EC	0.25	alfalfa	--	16	Honey bee (<i>Apis mellifera</i>)	00040602
		0.5		>	24		
		1		>	24		
		0.25		--	19	Alkali bee (<i>Nomia melanderi</i>)	
		0.5		>	24		
		1		>	24		
		0.25		>	24	Alfalfa Leafcutting bee (<i>Megachile rotundata</i>)	
		0.5		>	24		
		1		>	24		
Clothianidin	V-10066 (49.8)	0.066	alfalfa	--	112		45490702

Active Ingredient	Formulation ² (% a.i.)	Application Rate (lbs/A) ³	Crop ⁴	Qualifier ⁵	RT ₂₅ ⁶ (hours)	Test Species Name ⁷	Study Citation (MRID)
		0.132		--	179	Honey bee (<i>Apis mellifera</i>)	
		0.198		--	512		
Cymoxanil	Cymoxanil/Famoxadone 50WG (25/25)	0.1875	alfalfa	<	1	Honey bee (<i>Apis mellifera</i>)	46350403 Mixture: Cymoxanil, Famoxadone
Cypermethrin	Cymbush® 3E (35.6)	0.06	oilseed rape	>	96	Honey bee (<i>Apis mellifera</i>)	40274001
		0.14		>	96		
Deltamethrin	Decis® EC (20)	0.02	alfalfa	--	5.2	Honey bee (<i>Apis mellifera</i>)	42773902
Diazinon	40 WP (40)	1	white clover	>	42	Honey bee (<i>Apis mellifera</i>)	05008936
		0.5		>	42		
		0.25		<	42		
		0.125		<	42		
Dichlorvos	50 EC (50)	0.31	white clover	<	3	Honey bee (<i>Apis mellifera</i>)	05002083
		0.155		<	3		
		0.077		<	3		
		0.039		<	3		

Active Ingredient	Formulation ² (% a.i.)	Application Rate (lbs/A) ³	Crop ⁴	Qualifier ⁵	RT ₂₅ ⁶ (hours)	Test Species Name ⁷	Study Citation (MRID)
		0.019		<	3		
	DDVP 4E (42.39)	0.5	alfalfa	<	3	Honey bee (<i>Apis mellifera</i>)	43366701
Dicrotophos	9 lb EC	0.5	alfalfa	<	48	Honey bee (<i>Apis mellifera</i>)	05000837
		0.5		>	48	Alfalfa Leafcutting bee (<i>Megachile rotundata</i>)	
		0.5		>	48	Alkali bee (<i>Nomia melanderi</i>)	
Dimethoate	2.67 lb EC	0.5	alfalfa	<	120	Honey bee (<i>Apis mellifera</i>)	00045046
		0.5		<	120	Alfalfa Leafcutting bee (<i>Megachile rotundata</i>)	
		0.5		>	72	Alkali bee (<i>Nomia melanderi</i>)	

Active Ingredient	Formulation ² (% a.i.)	Application Rate (lbs/A) ³	Crop ⁴	Qualifier ⁵	RT ₂₅ ⁶ (hours)	Test Species Name ⁷	Study Citation (MRID)
Dinotefuran	MTI-446 20 SG	0.134	alfalfa	--	39	Honey bee (<i>Apis mellifera</i>)	45639728
Disulfoton	Di-System® 8 EC	1	alfalfa	--	5.5	Honey bee (<i>Apis mellifera</i>)	00163423
D-phenothrin	Multicide® 2798 D-phenothrin/Prallethrin/PBO (5/1/5)	0.0008 lbs ai/A prallethrin; 0.0036 lb ai/A d-phenothrin; and 0.0038 lbs ai/A PBO	alfalfa	<	3	Honey bee (<i>Apis mellifera</i>)	47431601 Mixture: D-phenothrin, PBO, Prallethrin
Emamectin benzoate	MK-244 (TGAI, 97.5)	0.015	alfalfa	--	11	Honey bee (<i>Apis mellifera</i>)	43393006
Endosulfan	35 EC (35)	0.77	clover blossoms	<	3	Honey bee (<i>Apis mellifera</i>)	05008936
Etofenprox	RF2056 OL (20)	0.007	alfalfa	<	3	Honey bee (<i>Apis mellifera</i>)	47326001
Famoxadone	Cymoxanil/Famoxadone 50WG (1:1) (25/25)	0.1875	alfalfa	<	1	Honey bee (<i>Apis mellifera</i>)	46350403 Mixture: Cymoxanil, Famoxadone
Fenazaquin	GWN-1708 (18.53)	0.45	alfalfa	<	3	Honey bee (<i>Apis mellifera</i>)	48436403

Active Ingredient	Formulation ² (% a.i.)	Application Rate (lbs/A) ³	Crop ⁴	Qualifier ⁵	RT ₂₅ ⁶ (hours)	Test Species Name ⁷	Study Citation (MRID)
Fenbutatin oxide	SD 14114 50WP (50)	1.75	cherry limbs	<	3	Honey bee (<i>Apis mellifera</i>)	00088398
		0.4375		<	3		
Fenitrothion	Sumithion® 8 EC	0.5	alfalfa	<	24	Honey bee (<i>Apis mellifera</i>)	00126931
		1		--	101		
		0.5		--	106	Alfalfa Leafcutting bee (<i>Megachile rotundata</i>)	
		1		>	120		
		0.5		--	98	Alkali bee (<i>Nomia melanderi</i>)	
		1		>	120		
Fenpropathrin	Danitol® 2.4 EC	0.1 lb ai/200 gal/A	Valencia Orange trees	<	192	Honey bee (<i>Apis mellifera</i>)	00164240
		0.2 lb ai/200 gal/A		--	276		
		0.4 lb ai/200 gal/A		<	336		
Fenvalerate	Pydrin® 2.4 lb/gal EC	0.1	alfalfa	--	7	Honey bee (<i>Apis mellifera</i>)	00086064
		0.4		>	8		
		0.4	alfalfa	>	8		00121835

Active Ingredient	Formulation ² (% a.i.)	Application Rate (lbs/A) ³	Crop ⁴	Qualifier ⁵	RT ₂₅ ⁶ (hours)	Test Species Name ⁷	Study Citation (MRID)
		0.1		--	7	Honey bee (<i>Apis mellifera</i>)	
		0.4		>	8	Alkali bee (<i>Nomia melanderi</i>)	
		0.1		--	7		
		0.4		>	8	Alfalfa Leafcutting bee (<i>Megachile pacifica</i>)	
		0.1		>	8		
Flutolanil	Moncut® Dry Flowable (65)	0.327	rapeseed	--	0	Honey bee (<i>Apis mellifera</i>)	40342939
Fonofos	EC	2	alfalfa	<	8	Honey bee (<i>Apis mellifera</i>)	00056152
		1		<	3		
Gamma cyhalothrin	XR-225. GF-231 (14.7)	0.015	alfalfa	>	24	Honey bee (<i>Apis mellifera</i>)	45464805
Imidacloprid	NTN 33893 240FS	0.1	alfalfa	<	2	Honey bee (<i>Apis mellifera</i>)	42480503
		0.1		<	2	Alfalfa Leafcutting bee	

Active Ingredient	Formulation ² (% a.i.)	Application Rate (lbs/A) ³	Crop ⁴	Qualifier ⁵	RT ₂₅ ⁶ (hours)	Test Species Name ⁷	Study Citation (MRID)
						(<i>Megachile rotundata</i>)	
						0.1	
		0.5	alfalfa	--	8	Honey bee (<i>Apis mellifera</i>)	
		0.167		<	2		
		0.045		<	2		
Indoxacarb	30WG (30.7)	0.15	alfalfa	--	24	Honey bee (<i>Apis mellifera</i>)	44477236
Lambda-Cyhalothrin	EC	0.013	alfalfa	--	22	Honey bee (<i>Apis mellifera</i>)	40436302
		0.031		--	54		
Lindane	20 EC (20)	1.5	alfalfa	--	72	Honey bee (<i>Apis mellifera</i>)	00164548
		1		--	72		
		0.5		--	24		
	25WP (25)	1.5		--	72		
		1		--	72		
		0.5		--	24		

Active Ingredient	Formulation ² (% a.i.)	Application Rate (lbs/A) ³	Crop ⁴	Qualifier ⁵	RT ₂₅ ⁶ (hours)	Test Species Name ⁷	Study Citation (MRID)
	40 F (40)	1.5		--	72		
		1		--	72		
		0.5		--	24		
Malathion	57 EC (57)	1.6	alfalfa	<	24	Honey bee (<i>Apis mellifera</i>)	41208001
Methidathion	Supracide® 2E (25.2)	5	alfalfa	--	114	Honey bee (<i>Apis mellifera</i>)	42081708
Methyl parathion	450g/L CS	0.4	alfalfa	--	207	Honey bee (<i>Apis mellifera</i>)	44173914
		0.4		--	171		
Mevinphos	SC (89.5)	0.81	alfalfa	<	4	Honey bee (<i>Apis mellifera</i>)	41306302
Oxamyl	Vydate® L (24)	1	alfalfa	>	144	Honey bee (<i>Apis mellifera</i>)	40994301
	24L (24)	1	alfalfa	--	22	Honey bee (<i>Apis mellifera</i>)	45086001
		2		--	75		
Parathion	4 lb E	0.5	clover	>	24	Honey bee (<i>Apis mellifera</i>)	00091653

Active Ingredient	Formulation ² (% a.i.)	Application Rate (lbs/A) ³	Crop ⁴	Qualifier ⁵	RT ₂₅ ⁶ (hours)	Test Species Name ⁷	Study Citation (MRID)
Phosalone	3 lb EC (NA)	1.5	alfalfa	<	3	Alkali bee (<i>Nomia melanderi</i>)	05000837
		1.5		<	3	Alfalfa Leafcutting bee (<i>Megachile rotundata</i>)	
Phosmet	50W (50)	0.5	alfalfa	--	51	Honey bee (<i>Apis mellifera</i>)	00060625
		1		>	24		
	50WP (50)	1	alfalfa	>	3	Honey bee (<i>Apis mellifera</i>)	05000837
		1		>	3	Alfalfa Leafcutting bee (<i>Megachile rotundata</i>)	
		1		>	3	Alkali bee (<i>Nomia melanderi</i>)	
Piperonyl butoxide	Multicide® 2798 D-phenothrin/Prallethrin/PBO (5/1/5)	0.0008 lbs ai/A prallethrin; 0.0036 lb ai/A d-phenothrin; and 0.0038 lbs ai/A PBO	alfalfa	<	3	Honey bee (<i>Apis mellifera</i>)	47431601 Mixture: D-phenothrin, PBO, Prallethrin

Active Ingredient	Formulation ² (% a.i.)	Application Rate (lbs/A) ³	Crop ⁴	Qualifier ⁵	RT₂₅ ⁶ (hours)	Test Species Name ⁷	Study Citation (MRID)
	Scourge® [Piperonyl butoxide/Resmethrin mixture] (46/18)	0.007	alfalfa	<	3	Honey bee (<i>Apis mellifera</i>)	44501701 Mixture: Piperonyl butoxide, Resmethrin
Prallethrin	LX119-04 (ETOC) L (2.45)	0.005	alfalfa	<	8	Honey bee (<i>Apis mellifera</i>)	43749301
	Multicide® 2798 D-phenothrin/Prallethrin/PBO (5/1/5)	0.0008 lbs ai/A prallethrin; 0.0036 lb ai/A d-phenothrin; and 0.0038 lbs ai/A PBO	alfalfa	<	3	Honey bee (<i>Apis mellifera</i>)	47431601 Mixture: D-phenothrin, PBO, Prallethrin
Propoxur	50WP (50)	0.75	alfalfa	>	5	Honey bee (<i>Apis mellifera</i>)	00060625
Pyridaben	BAS 300 WP (76.8)	0.5	alfalfa	--	20	Honey bee (<i>Apis mellifera</i>)	43680424
Resmethrin	Scourge® [Piperonyl butoxide/Resmethrin mixture] (46/18)	0.007	alfalfa	<	3	Honey bee (<i>Apis mellifera</i>)	44501701 Mixture: Piperonyl butoxide, Resmethrin
Spinetoram	GF-1640 (24.7)	0.109	alfalfa	<	3	Honey bee (<i>Apis mellifera</i>)	47689702

Active Ingredient	Formulation ² (% a.i.)	Application Rate (lbs/A) ³	Crop ⁴	Qualifier ⁵	RT ₂₅ ⁶ (hours)	Test Species Name ⁷	Study Citation (MRID)
Spinosad	NAF-315 (23.5)	0.16	alfalfa	<	3	Honey bee (<i>Apis mellifera</i>)	45007701
		0.16	alfalfa	<	3	Honey bee (<i>Apis mellifera</i>)	44420603
Spiroxamine	KWG 4168 300CS (32.4)	0.54	alfalfa	<	2	Honey bee (<i>Apis mellifera</i>)	45090317
Thiacloprid	YRC 2894 (41.9)	0.16	alfalfa	<	2	Honey bee (<i>Apis mellifera</i>)	44927812
Thiamethoxam	CGA-293343 (25.5)	0.004	alfalfa	<	24	Honey bee (<i>Apis mellifera</i>)	44727501
		0.088		>	72		
Tralomethrin	HAG-107 0.3 lb EC	0.015	alfalfa	<	0.5	Honey bee (<i>Apis mellifera</i>)	00132764

Footnotes

¹ U.S. CFR 40 Part 158 Subpart G §158.630, Test Note no. 24: Data are required only when the formulation contains one or more active ingredients having an acute LD₅₀ of <11 micrograms per bee as determined in the honey bee acute contact study [OCSP 850.3020] and the use pattern(s) indicate(s) that honey bees may be exposed to the pesticide.

² End use product tested. % active ingredient (a.i.) is provided where available. Product names where specified are listed; otherwise, product codes are listed

³ Application rate is lbs a.i. /acre unless noted otherwise.

⁴ Agricultural commodity used in study.

⁵ **Less than** (<) value indicates that there was less than 25% mortality at the shortest aged foliage tested; **greater than** (>) value indicates that there was greater than 25% mortality at the longest aged residue tested; **equal** value (--) indicates that 25% mortality was reported at the time documented in the next column.

⁶ Residual Time to 25% mortality. This is the length of time post-application that residues of the test substance on foliage are toxic to 25% of honey bees tested.

⁷ Species tested in the submitted study. *Apis mellifera* (honey bee); *Aphidius rhopalosiphi* (parasitic wasp); *Aphytis lignanensis* (parasitic wasp); *Aphytis melinus* (parasitic wasp); *Chrysoperla carnea* (green lacewing); *Copidosoma truncatellus* (parasitic wasp); *Diglyphus intermedius* (parasitic wasp); *Megachile pacifica* (Alfalfa leafcutting bee); *Megachile rotundata* (Alfalfa leafcutting bee); *Metaphycus luteolus* (parasitic wasp); *Nomia melanderi* (alkali bee); *Opius bruneipus* (parasitic wasp); *Stethorus punctum* (ladybird beetle); *Telenomus remus* (parasitic wasp); *Typhlodromus pyri* (predatory mite).

Definitions

a.i. = active ingredient

CS = capsule suspension

E = emulsifiable

EC = emulsifiable concentrate

F = flowable

L = liquid

OL = liquid formulation

RT25 = residual time to 25% mortality

SC = soluble concentrate

SG = soluble granule

TGAI = technical grade active ingredient

W = wettable powder

WDG = water dispersible granular

WG = wettable granule

WP = wettable powder

WS = water soluble

Other letter/number combinations specified in the formulation column of the table refer to product codes and are not defined.

References

^aUSEPA. 2012. Ecological Effects Test Guidelines: OCSPP 850.3030: Honey Bee Toxicity of Residues on Foliage. United States Environmental Protection Agency, Office of Chemical Safety and Pollution Prevention, EPA 712-C-018. January 2012.
<http://www.epa.gov/ocspp/pubs/frs/home/guidelin.htm>

^bUSEPA. 2012. Ecological Effects Test Guidelines: OCSPP 850.3020: Honey Bee Acute Contact Toxicity Test. United States Environmental Protection Agency, Office of Chemical Safety and Pollution Prevention, EPA 712-C-019. January 2012.
<http://www.epa.gov/ocspp/pubs/frs/home/guidelin.htm>