

Bloom Pesticides – Relative Toxicity to Pollinators, by Trade Name

Janet van Zoeren and Anna Wallis, Cornell University

Trade Name	Active Ingredient	Toxicity Rating	Mix Synergies (do not mix with)
Aliette	fosetyl-al	Low	
Assail*	acetamiprid	Moder./High	Synergizes with some fungicides and adjuvants
Badge	copper octanoate + copper hydroxide	Low	Synergizes with imidacloprid (Admire Pro, Leverage)
Cabrio	pyraclostrobin	Moderate	Synergizes with tau-fluvalinate** , and with Portal
Captan/Captec	captan	Moderate	Toxic to honeybee larvae and to wild bees
Cueva	copper octanoate	Low	
Ferbam Granuflo	ferbam	Low	
Fireline	oxytetracycline	Low	
Firewall	streptomycin	Low	
Flint	trifloxystrobin	Low	
Fontelis	penthiopyrad	Low	
Indar	fenbuconazole	Moderate	Synergizes with tau-fluvalinate**
Inspire Super	difenoconazole + cyprodinil	Moderate	Synergizes with tau-fluvalinate** , and with thiacloprid
Intrepid	methoxyfenozide	Moderate	Causes long term sub-lethal damage
Luna Sensation	fluopyram + trifloxystrobin	Low	
Luna Tranquility	fluopyram + pyrimethanil	Low	
Manzate	mancozeb	Low	Synergizes with pyrethroid insecticides including Raid and Warrior II
Merivon	fluxapyroxad + pyraclostrobin	Moderate	Synergizes with tau-fluvalinate**
MycosShield	oxytetracycline	Low	
Penncozeb	mancozeb	Low	Synergizes with pyrethroid insecticides including Raid and Warrior II
Polyram	metiram	Low	
Procure	triflumizole	Low	Synergizes with acetamiprid , imidacloprid and thiacloprid insecticides
Rally	myclobutanil	Moderate	Synergizes with tau-fluvalinate** , and with neonicotinoids
Rhyme	flutriafol	Moderate	Synergizes with lambda-cyhalothrin insecticides (i.e. Warrior II)
Serenade	<i>Bacillus subtilis</i>	Low	Wet application damages bee reproductive success
Sovran	kresoxim-methyl	Low	
Streptrol	streptomycin	Low	
Topsin M	thiophanate-methyl	Moderate	Synergizes with tau-fluvalinate** , and lambda-cyhalothrin , flumethrin , imidacloprid , deltamethrin insecticides, and chlorothalonil (i.e. Bravo)
Vivando	metrafenone	Low	

*If at all possible, do not apply Assail during bloom. If necessary, only apply at night and when temperatures are low enough that bees are not flying (i.e. below 50F).

**Miticide commonly used in bee hives

As always, consult the label directly before applying any pesticide to ensure it is registered for your situation, and for regulations and guidance on how to apply the product to minimize impact on pollinators.

Bloom Pesticides – Relative Toxicity to Pollinators, by Active Ingredient

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Active Ingredient	Trade Name	Toxicity Rating	Mix Synergies (do not mix with)
acetamiprid*	Assail	Moder./High	Synergizes with some fungicides and adjuvants
<i>Bacillus subtilis</i>	Serenade	Low	Wet application damages bee reproductive success
captan	Captan/Captec	Moderate	Toxic to honeybee larvae and to wild bees
copper octanoate	Cueva	Low	
copper octanoate + copper hydroxide	Badge	Low	Synergizes with imidacloprid (Admire Pro, Leverage)
difenoconazole + cyprodinil	Inspire Super	Moderate	Synergizes with tau-fluvalinate** , and with thiacloprid
fenbuconazole	Indar	Moderate	Synergizes with tau-fluvalinate**
ferbam	Ferbam Granuflo	Low	
fluopyram + trifloxystrobin	Luna Sensation	Low	
fluopyram + pyrimethanil	Luna Tranquility	Low	
flutriafol	Rhyme	Moderate	Synergizes with lambda-cyhalothrin insecticides (i.e. Warrior II)
fluxapyroxad + pyraclostrobin	Merivon	Moderate	Synergizes with tau-fluvalinate**
fosetyl-al	Aliette	Low	
kresoxim-methyl	Sovran	Low	
mancozeb	Manzate	Low	Synergizes with pyrethroid insecticides including Raid and Warrior II
mancozeb	Penncozeb	Low	Synergizes with pyrethroid insecticides including Raid and Warrior II
methoxyfenozide	Intrepid	Moderate	Causes long term sub-lethal damage
metiram	Polyram	Low	
metrafenone	Vivando	Low	
myclobutanil	Rally	Moderate	Synergizes with tau-fluvalinate** , and with neonicotinoids
oxytetracycline	Fireline	Low	
oxytetracycline	MycoShield	Low	
penhiopyrad	Fontelis	Low	
pyraclostrobin	Cabrio	Moderate	Synergizes with tau-fluvalinate** , and with Portal
streptomycin	Firewall	Low	
streptomycin	Streptrol	Low	
thiophanate-methyl	Topsin M	Moderate	Synergizes with tau-fluvalinate** , and lambda-cyhalothrin , flumethrin , imidacloprid , deltamethrin insecticides, and chlorothalonil (i.e. Bravo)
trifloxystrobin	Flint	Low	
triflumizole	Procure	Low	Synergizes with acetamiprid , imidacloprid and thiacloprid insecticides

*If at all possible, do not apply acetamiprid/Assail during bloom. If necessary, only apply at night and when temperatures are low enough that bees are not flying (i.e. below 50F).

**Miticide commonly used in bee hives

As always, consult the label directly before applying any pesticide to ensure it is registered for your situation, and for regulations and guidance on how to apply the product to minimize impact on pollinators.

Bloom Pesticides – Relative Toxicity to Adult Honeybees*, by Toxicity Level

Janet van Zoeren and Anna Wallis, Cornell University

High	Moderate	Low
Assail**	Cabrio ^{Syn}	Aliette
	Captan ^{Syn}	Badge ^{Syn}
	Indar ^{Syn}	Cueva
	Inspire Super ^{Syn}	Ferbam Granuflo
	Intrepid ^{Syn}	Fireline
	Merivon ^{Syn}	Firewall
	Rally ^{Syn}	Flint
	Rhyme ^{Syn}	Fontelis
	Topsin M ^{Syn}	Luna Sensation
		Luna Tranquility
		Manzate ^{Syn}
		MycoShield
		Penncozeb ^{Syn}
		Phostrol
		Polyram
		Procure ^{Syn}
		Prophyt
		Revisto
		Sercadis
		Serenade ^{Syn}
		Sovran
		Streptrol
		Thiophanate Methyl
		Torino
		Vintage
		Vivando

*Note that these toxicity ratings are based largely on the EPA toxicity ratings, which are based only on information about the direct, short-term toxicity to adult honeybees. There are many other complexities when choosing a product to apply at bloom, including effects on bee larvae, long-term sub-lethal damage, effects on wild pollinators, and potential synergies (combinations of products that cause worse damage than either product would on its own). For a more complete resource to guide pesticide choice decision making during bloom, see the above tables “Bloom Pesticides – Relative Toxicity to Pollinators, by Trade Name” and “Bloom Pesticides – Relative Toxicity to Pollinators, by Active Ingredient”, or view the “Pesticide Decision-Making Guide to Protect Pollinators in Tree Fruit Orchards” by Maria van Kyke, Emma Mullen, Dan Wixted and Scott McArt.

**Assail is toxic to bees on its own, and can synergize with many other products causing high mortality. If necessary during bloom, Assail should only be applied at night and when temperatures are low enough that bees are not flying (i.e. below 50F).

^{Syn} This product synergizes with other fungicides or insecticides. Use caution when applying it at the same time as another product.

As always, consult the label directly before applying any pesticide to ensure it is registered for your situation, and for regulations and guidance on how to apply the product to minimize impact on pollinators.