

## 2. Pesticide Toxicity and Activity

LD<sub>50</sub> is a measure of relative toxicity. It is the amount of product in milligrams used, per kilogram of body weight, that kills 50% of the test animals. This is commonly measured as the acute oral LD<sub>50</sub>, which refers to the toxicity of the chemical when it is ingested through the mouth or nose. Dermal LD<sub>50</sub> figures are also available. These refer to the toxicity of the chemical when it enters the body through the skin. The lower the LD<sub>50</sub> figure, the more toxic the product is to humans.

The LD<sub>50</sub> of various pesticides is listed in Table 2–1. *Insecticide and Miticide Toxicity* and Table 2–2. *Fungicide Toxicity*.

**Note:** Many pesticides with low acute toxicity cause long-term effects in laboratory animals. Users are therefore warned that even pesticides with high LD<sub>50</sub> values could be detrimental to human health. Reduce exposure to all pesticides to a minimum by wearing protective clothing, including latex gloves, goggles and long-sleeved shirts. See Chapter 1 for more details.

**Read every product label to ensure that the product is used properly and safely.**

### Pesticide Injury to Vegetable Crops

Although greenhouse pesticides have been selected and formulated to avoid plant injury, damage can still occur under some conditions. Consider these general rules before applying pesticides:

- No product is safe on all plants under all conditions, although wettable powders are generally less injurious than liquid formulations.
- Weather conditions at the time of application are important. Pesticides are more likely to harm plants when applied during bright, sunny weather than if applied during dull, overcast conditions.
- Well-watered, unstressed plants are less likely to be damaged by pesticides.
- Low-volume applications are generally less likely to cause plant injury than high-volume applications.
- Excessive spray pressure may damage leaf tissue.

**Table 2–1.** Insecticide and miticide toxicity

Common Name or Active Ingredient	Trade Name	Oral LD <sub>50</sub> (mg product/ kg body weight)*
abamectin	Avid 1.9% EC	300
acequinocyl	Shuttle 5 SC	>5,000
acetamiprid	Tristar 70 WSP	1,064
<i>Autographa californica</i> Nucleopolyhedrovirus FV11	Loopex	not available
<i>Bacillus thuringiensis</i> subsp. <i>aizawai</i> strain ABTS-1857	XenTari WG	>5,000
<i>Bacillus thuringiensis</i> subsp. <i>israelensis</i> , serotype H-14, strain AM 65-52	VectoBac 600L	>5,000
<i>Bacillus thuringiensis</i> subsp. <i>kurstaki</i> strain ABTS-351	DiPel 2X DF DiPel WP	>5,050
	Foray 48BA	>5,000
<i>Bacillus thuringiensis</i> subsp. <i>kurstaki</i> strain EVB113-19	BioProtec 3P BioProtec CAF	not available
<i>Bacillus thuringiensis</i> subsp. <i>kurstaki</i> strain SA-12	Thuricide HPC	not available
<i>Beauveria bassiana</i> strain ANT-03	Bio-Ceres G WB Bio-Ceres G WP	>5,000
<i>Beauveria bassiana</i> strain GHA	BotaniGard 22WP	>5,000
<i>Beauveria bassiana</i> PPRI 5339	Velifer	>5,000
bifenazate	Floramite SC	>5,000
buprofezin	Talus	>5,000
canola oil	Vegol Crop Oil	>5,000
chlorantraniliprole	Coragen SC	>5,000
chlorfenapyr	Pylon	560–567
cyantraniliprole	Exirel	>5,000
cyprodinil + fludioxonil	Palladium WG	>5,000
cyromazine	Citation 75 WP	>4,460
dichlorvos	DDVP 20% EC	56
etoxazole	TetraSan 5 WDG	4,500
fenbutatin oxide	Vendex 50W Vendex 50WP	>5,000
fenpyroximate	FujiMite	Male: 7,193 Female: 6,789

\* Figures obtained from Safety Data Sheets for each individual product.

**Table 2–1.** Insecticide and miticide toxicity

Common Name or Active Ingredient	Trade Name	Oral LD <sub>50</sub> (mg product/ kg body weight)*	
flonicamid	Beleaf 50 SG	>2,000	
flupyradifurone	Altus	Female: >2,000	
garlic	Influence LC Influence WP	>5,000	
imidacloprid	Intercept 60 WP	1,858	
lambda-cyhalothrin	Matador 120 EC	93	
malathion	Fyfanon 50% EC	89	
	Malathion 85 E	5,500	
<i>Metarhizium anisopliae</i> strain F52	Met52 EC	not available	
mineral oil	Purespray Green Spray Oil 13E	>5,000	
naled	Dibrom	235	
novaluron	Rimon 10 EC	3,914	
permethrin	Ambush 50 EC	2,280	
	Bio-environmental Permethrin	not available	
	Pounce 384 EC	1,030	
potassium salts of fatty acids	Kopa Insecticidal Soap Neudosan Commercial Opal Insecticidal Soap Opal2 Insecticidal Soap Safer's Insecticidal Soap	>5,000	
	potassium salts of fatty acids + pyrethrins	Safer's Trounce Insecticidal Soap	>5,000
		Endeavor 50 WG	>5,000
		Dyno-Mite 75 WP SanMite	1,930
pyriproxyfen	Distance	>3,773	
spinetoram	Delegate WG	>5,000	
spinosad	Entrust 80 W Entrust SC Success	>5,000	
	Forbid 240 SC	>2,000	
	Kontos	>2,000	
tebufenozide	Confirm 240 F	>5,000	
thiamethoxam	Flagship WG	>5,000	

\* Figures obtained from Safety Data Sheets for each individual product.

Table 2–2. Fungicide toxicity

Common Name or Active Ingredient	Trade Name	Oral LD <sub>50</sub> (mg product/kg body weight)*
ametoctradin + dimethomorph	Zampro	
<i>Aureobasidium pullulans</i> DSM 14940 and DSM 14941	Botector	>2,000
<i>Bacillus amyloliquefaciens</i> strain D747	Double Nickel 55 Double Nickel LC	>5,000
<i>Bacillus mycooides</i> isolate J	LifeGard WG	>5,000
<i>Bacillus subtilis</i> strain MBI 600	Serifel	>5,000
<i>Bacillus subtilis</i> strain QST 713	Cease Rhapsody ASO	>5,000
<i>Bacillus subtilis</i> var. <i>amyloliquefaciens</i> strain FZB24	Taegro2 WP Taegro WP	very low acute oral toxicity
bacteriophage of <i>Clavibacter michiganensis</i> subsp. <i>michiganensis</i>	AgriPhage-CMM	no toxicity reported
BLAD polypeptide	Fracture Problad Plus	>5,000
boscalid + pyraclostrobin	Pristine	>1,490
captan	Captan 50 WP Captan 80 WP Maestro 80 DF Supra Captan 80 DF	>5,000
citric and lactic acid	Cyclone	Citric acid: >3,000 Lactic acid: >4,000
copper hydroxide	Kocide 3000 DF	1,847
copper octanoate	Cueva Commercial	>2,000
copper oxychloride	Copper Spray Fungicide WP	1,600
cyazofamid	Torrent 400 SC	>5,000
cyprodinil + fludioxinil	Palladium WG	>5,000
fenhexamid	Decree 50 WDG	>2,000
ferbam	Ferbam 76 WDG	>5,000
garlic powder	Influence LC Influence WP	not available
<i>Gliocladium catenulatum</i> strain J1446	Prestop	>2,000

\* Figures obtained from Safety Data Sheets for each individual product.

Table 2–2. Fungicide toxicity

Common Name or Active Ingredient	Trade Name	Oral LD <sub>50</sub> (mg product/kg body weight)*
hydrogen peroxide	StorOx	330
hydrogen peroxide + peroxyacetic acid	OxiDate OxiDate 2.0	3,622
iprodione	Rovral 50 WP Rovrol WDG	>2,000
kasugamycin	Kasumin 2L	>5,000
mancozeb	Manzate 200 WP Manzate DF Manzate Pro-Stick	>5,000
mandipropamid	Micora Revus	>5,000
metalaxyl-m	Ridomil Gold 480 EC Ridomil Gold 480 SL Subdue Maxx	1,172
mineral oil	Purespray Green Spray Oil 13E	>5,000
mono- and dibasic sodium, potassium, and ammonium phosphites	Phostrol	>5,000
mono- and di-potassium salts of phosphorous acid	Confine Extra Rampart	>5,000
myclobutanil	Nova 40 W	3,129
oxathiapiprolin	Orondis Orondis Ultra B Zorvec Enicade	>5,000
penthiopyrad	Fontelis	>5,000
polyoxin D zinc salt	Polyoxin D Zinc Salt 5SC	not available
potassium bicarbonate	MilStop Sirocco	2,700
propamocarb hydrochloride	Previcur N	2,000
pyrimethanil	Scala SC	>5,000
<i>Reynoutria sachalinensis</i> (extract)	Regalia Maxx	>5,000
<i>Streptomyces griseoviridis</i> strain K61	Mycostop WP	>5,000

\* Figures obtained from Safety Data Sheets for each individual product.

**Table 2–2.** Fungicide toxicity

<b>Common Name or Active Ingredient</b>	<b>Trade Name</b>	<b>Oral LD<sub>50</sub> (mg product/ kg body weight) *</b>
<i>Streptomyces lydicus</i> strain WYEC 108	Actinovate SP	no toxicity reported
sulphur	Agrotek Vaporized Sulphur	>5,000
	Bartlett Microscopic Wetttable Sulphur	
	Cosavet DF Edge	
	Kumulus DF	
tea tree oil	Microscopic Sulphur WP	>2,200
	Kumulus DF	
	Microthiol Disperss	
tea tree oil	Timorex Gold	>2,000
<i>Trichoderma harzianum</i> Rifai strain KRL-AG2	Bora HC Bora WP	Active ingredient is practically non-toxic and non-pathogenic to mammals
<i>Trichoderma harzianum</i> Rifai strain KRL-AG2	RootShield Granules RootShield HC RootShield WP	Active ingredient is practically non-toxic, non-allergenic and non-pathogenic to mammals
<i>Trichoderma harzianum</i> Rifai strain KRL-AG2 + <i>Trichoderma virens</i> strain G-41	BW240 WP	not available
<i>Trichoderma harzianum</i> Rifai strain T-22	Trianum G Trianum P	not available

\* Figures obtained from Safety Data Sheets for each individual product.