Lettuce crop protection products
A guide to potential impacts on beneficials

Relative potential impact of Australian lettuce industry crop protection products on beneficials and the environment

This quick reference guide is designed to assist you to choose effective crop protection products which mininise impact on beneficial insects in your crop and on the overall environment.

Always refer to the current product label and product registration documents before product application.
Note that when you apply and how you use a product may alter its' potential impact. A preplant product application may differ in impact compared to applications at later stages of the crop.

Colour Key: **Low Impact** **Moderate Impact** **High Impact**

Lettuce - Australian Registered actives and current permits as at December 2010

	Active Ingredient	Example Common Trade Name	Chemical Group	Use	Impact on Beneficial Insects and Fungi Data from USA Cornell University Rating *	Total Environmental Impact Data from USA Cornell University Rating *	Impact on Beneficial Insects and Mites Australian data HAL report rating	Impact on Beneficials Colour Key Some known impacts
Insecticide	abamectin	Vertimec	6A	sucking pests	29	35	High	
	alpha-cypermethrin	Dominex Duo	3A	insecticide	23	27		
	Bacillus thuringiensis (kustaki)	Xentari, Dipel	11C	soft option insecticide	16	13	Low	
	bifenthrin	Talstar	3A	chewing / sucking pests	48	44		Very toxic to all parasitic wasps,predatory beetles ,bugs,lacewings and spiders
	botanical oil - emulsifiable			insecticide			Derived Impact	
	chlorantraniliprole	Coragen	28	chewing pests	10	18	Low	
	chlorantraniliprole + thiomethoxam#	Durivo	28 + 4A	chewing and sucking insects	For impact see ratings for the component products			
	chlorpyrifos	Lorsban	1B	chewing / sucking pests	25	27	Harmful	
	diazinon	Diazinon	1B	chewing pests	47	44		Very toxic to all parasitic wasps,predatory beetles ,bugs,lacewings and spiders
	dimethoate	Rogor	1B	sucking pests	47	33		Very toxic to all parasitic wasps,predatory beetles ,bugs,lacewings and spiders
	emamectin as benzoate	Proclaim	6A	soft option insecticide	8	26	Low / Moderate	Predatory bugs
	fatty acids - K salt	Natrasoap		insecticide			Derived Impact	
	fenitrothion	Sumithion	1B	insecticide			Group 1B Derived Impact	
	flubendiamide	Belt	28	soft option insecticide	10	19	Low / Low	
	Helicoverpa NPV	Gemstar / Vivus Gold		soft option insecticide			Derived Impact	
	imidacloprid#	Confidor/ Senator/ Nuprid	4A	insecticide	39	37	Moderate / High	Trichogramma, bugs,beetles
	indoxacarb	Avatar	22A	soft option insecticide	18	31	Low / Moderate	Predatory beetles
	maldison	Maldison	1B	insecticide				Parasitic wasps,beetles,bugs,lacewings
	methamidophos	Monitor	1B	insecticide	25	37		Very toxic to all parasitic wasps,predatory beetles ,bugs,lacewings and spiders
	methomyl	Lannate	1A	insecticide	25	22		Very toxic to all parasitic wasps,predatory beetles ,bugs,lacewings and spiders
	permethrin	Ambush	3A	insecticide	25	39		Very toxic to all parasitic wasps,predatory beetles ,bugs,lacewings and spiders
	petroleum oil			insecticide			Derived Impact	
	pirimicarb	Pirimor	1A	aphid pests	15	16	Low	Egg parasitic wasp (Trichogramma)
	pymetrozine	Chess	9A	aphid pests	11	20	Low	Parasitoids & ladybird beetles
	pyrethrins	pyrethrin insecticide	3A	insecticide	25	37		Very toxic to all parasitic wasps,predatory beetles ,bugs,lacewings and spiders
	spinosad	Success	5A	soft option insecticide	12	14	Low / Moderate	Egg parasitic wasps
	spirotetromat	Movento	23	soft option sucking pests	47	35	Safe to common vegetable predators	
	sulphur	elemental sulphur	M2	fungicide / insecticide			Low / Low	Trichogramma
	thiomethoxam		4A	insecticide	Not registered as a stand alone product for brassica or lettuce			
	trichlorfon	Dipetrex	1B	insecticide	20	15		
	vegetable oil	Protec oil		insecticide			Derived Impact	
Herbicide	chlorthal-dimethyl	Dacthal	D	herbicide			Group D Derived Impact	
	clethodim	Select	A	herbicide	15	17	Low / Moderate	
	fluazifop-P as butyl	Fusilade	A	herbicide	21	29		
	pendimethalin	Stomp / Rifle	D	herbicide	30	30		
	phenmedipham	Betanal	C	herbicide	17	16		
	propachlor	Ramrod	K	herbicide			Group K Derived Impact	
	propyzamide	Kerb	D	herbicide	18	19		
	sethoxydim	Poast	A	herbicide	24	21		
Fungicide	azoxystrobin	Amistar	11	fungicide	33	27	Low / Low	
	boscalid	Filan	7	fungicide erradicant	16	26	Low / Low	
	Cu as ammonium acetate	Liquicop	M1	fungicide protectant			Derived Impact	
	Cu as cuprous oxide	Norshield	M1	fungicide protectant			Low / Low	
	Cu as hydroxide	Kocide	M1	fungicide protectant	16	39		
	Cu as oxychloride	Copper oxychloride	M1	fungicide protectant			Group M1 Derived Impact	
	Cu as sulfate (tribasic)	Tri-base blue	M1	fungicide protectant	77	62		
	cyprodinil + fludioxonil combines 2 actives	Switch	9	fungicide erradicant	20	27		
	cyprodinil + fludioxonil combines 2 actives	(second active)	12	fungicide erradicant	19	26		
	dimethomorph + mancozeb	Acrobat	40	fungicide erradicant	24	24		
	iprodione	Rovral	2	fungicide protectant	20	24		
	mancozeb	Mancozeb	M3	fungicide protectant	24	26	Low / Low	Predatory mites
	mancozeb + metalaxyl	Ridomil Gold	4	fungicide erradicant	39	44		
	metiram	Polyram	M3	fungicide erradicant	46	40	Low / Moderate	
	phosphorous acid	Agriphos	33	fungicide erradicant	5	7		
	potassium bicarbonate	Armicarb, Kaligreen	28	fungicide protectant	5	8		
	prochloraz as MnCl2 complex	Octave	3	fungicide erradicant	15	22		
	propineb	Antracol	M3	fungicide protectant	8	17		
	propineb + oxadixyl	Rebound	4	fungicide erradicant			Low / Low	
	sulphur	elemental sulphur	M2	fungicide / insecticide			Low / Low	Trichogramma
	tebuconazole	Folicur	3	fungicide erradicant	25	40		
	thiram	Thiram	M3	fungicide protectant	15	30		

Note that these ratings are for foliar application not as seedling drench

*** The higher the figure the higher the impact**

Derived Impact
This indicates the assumed impact based on the chemical or product group.

The benefits and impacts of a product within an IPM program must be considered in your individual crop situation and growing environment.

Explanatory Notes

What do the rating figures mean?
These are not to indicate the scale and level of impact but provide a comparison (relative measure) between the different chemicals or product group.

Note: some ratings of moderate impact chemicals may appear high but this will be due to the range of beneficials and fungi affected.

Impact on Beneficial Insects and Fungi
(Cornell University data) is based on test results exposing seven beneficial insects and three beneficial fungi test species to the above products (details appear in the reference listed below).

Impact on Beneficial Insects
Australian Data is based on test results exposing a range of beneficial insects and mites to a range of products (details appear in the reference).

Total Environmental Impact
(Cornell University data) This score represents the overall effect of each pesticide on; the applicator, picker, consumer, groundwater, aquatic life, bird, bee, beneficial insect and fungi.

These figures are shown to provide guidance as to the environmental impact of these chemicals.

The Environmental Impact Quotient (EIQ)
The formula for determining the EIQ value of individual pesticides is listed below and is the average of farm worker, consumer, and ecological components (see reference 1).

EIQ={C[(DT*5)+(DT*P)]+[(C*((S+P)/2)*SY)+(L)]+[(F*R)+(D*((S+P)/2)*3)+(Z*P*3)+(B*P*5)]}/3

DT = dermal toxicity,
C = chronic toxicity,
SY = systemicity, F = fish toxicity
L = leaching potential
R = surface loss potential
D = bird toxicity
S = soil half-life
Z = bee toxicity
B = beneficial arthropod toxicity
P = plant surface half-life

Environmental impact is determined by the underlying impact of the product adjusted according to product formulation and the application rate.

References

1. *A Method to Measure the Environmental Impact of Pesticides* - http://nysipm.cornell.edu/publications/eiq/ J. Kovach*, C. Petzoldt, J. Degni**, and J. Tette, IPM Program, Cornell University, New York State Agricultural Experiment Station Geneva, New York 14456.
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   **current address: Cornell Cooperative Extension, Lewis County, Lowville, New York 13367.
2. *Classification of side effects to beneficial organisms.* International Organisation for Biological and Integrated Control of Noxious Animals and Plants.
3. *Pesticide Effects on Beneficial Insects and Mites in Vegetables* (HAL Project Number VG06087) Unpublished at the time of printing. P Horne,P.Cole and A. Cutler, IPM Technologies Pty Ltd. http ://www.horticulture.com.au/reports/search_final_reports.asp?src= (Type in project code 6087 do a search and then open the document).
4. *Tandem use of selective insecticides and natural enemies for effective, reduced-risk pest management.* Gentz, M.C., et al. Biological Control (2009), doi:10.1016/j.biocontrol.2009.07.012.
5. *Sensitivity of non-target arthropods and beneficial fungal species to chemical and biological plant protection products: results of laboratory and semi-field trials.* Sterk.G et al 1st International Symposium on Biological Control of Arthropods.
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