

HERBICIDE MODE OF ACTION TABLE

High resistance risk

Group 1

Inhibition of acetyl co-enzyme A carboxylase (ACC'ase inhibitors)

Chemical family	Active constituent (first registered trade name)
Aryloxyphenoxy-propionates (FOPs)	clodinafop (Topik®), cyhalofop (Agixa®*, Barnstorm®), diclofop (Cheetah® Gold* Decision®*, Hoegrass®), fenoxaprop (Cheetah®, Gold*, Wildcat®), fluazifop (Fusilade®, RoundupFNG Weedkiller®*), haloxyfop (Verdict®), propaquizafop (Shogun®), quizalofop (Targa®)
Cyclohexanediones (DIMs)	butoxydim (Factor®*), clethodim (Select®, Zero Triple Action Garden Weedkiller®*), profoxydim (Aura®), sethoxydim (Cheetah® Gold*, Decision®*), tralkoxydim (Achieve®)
Phenylpyrazoles (DENS)	pinoxaden (Axial®)

Group 2

Inhibition of acetolactate synthase (ALS inhibitors), acetohydroxyacid synthase (AHAS)

Chemical family	Active constituent (first registered trade name)
Imidazolinones (IMIs)	imazamox (Intervix®*, Raptor®), imazapic (Bobcat I-Maxx®*, Flame®, Midas®*, OnDuty®*), imazapyr (Arsenal Xpress®*, Intervix®*, Lightning®*, Midas®* OnDuty®*, Roundup PNG Weedkiller®*), imazethapyr (Lightning®*, Spinnaker®)
Pyrimidinyl-thio-benzoates	bispyribac (Nominee®), pyrithiobac (Staple®)
Sulfonylureas (SUs)	azimsulfuron (Gulliver®), bensulfuron (Londax®), chlorsulfuron (Glean®), ethoxysulfuron (Hero®), flazasulfuron (Katana®), foramsulfuron (Tribute®), halosulfuron (Sempra®), iodosulfuron (Hussar®), mesosulfuron (Atlantis®), metsulfuron (Ally®, , Stinger®*, Trounce®*, Ultimate Brushweed®* Herbicide), prosulfuron (Casper®*), rimsulfuron (Titus®), sulfometuron (Oust®, Eucmix Pre Plant®*, Trimac Plus®*), sulfosulfuron (Monza®), , triasulfuron (Logran®, Logran® B-Power®*), tribenuron (Express®), trifloxysulfuron (Envoke®, Krismat®*)
Triazolopyrimidines-Type 1	florasulam (Crest®*, Gangster®*, Paradigm®*, Vortex®*, X-Pand®*), flumetsulam (Broadstrike®, Thistrol® Gold*), metosulam (Eclipse®)
Triazolopyrimidines-Type 2	pyroxulam (Crusader® Rexade®*)

* This product contains more than one active constituent.

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Moderate resistance risk

Group 3

Inhibition of microtubule assembly - α -tubulin

Chemical family	Active constituent (first registered trade name)
Dinitroanilines: (DNAs)	oryzalin (Rout [®] , Surflan [®]), pendimethalin (Freehand [®] , OH2 Ornamental Herbicide [®] , Stomp [®]), prodiamine (Barricade [®]), trifluralin (Bolta Duo [®] , Jeti Duo [®] , Treflan [®])
Pyridines	dithiopyr (Dimension [®])

Group 4

Disruptors of plant cell growth (Auxin mimics)

Chemical family	Active constituent (first registered trade name)
Benzoates	dicamba (Banvel [®] , Banvel M [®] , Barrel [®] , Casper [®] , Lawnweeder plus [®] , Lawn weedkiller [®] , Mecoban [®] , Methar Tri-Kombi [®] , Nuturf Millennium [®] , Sandoban [®])
Phenoxy-carboxylates (Phenoxys)	2,4-D (Actril DS [®] , Amicide [®] , Fallow Boss Tordon [®] , Methar Tri-Kombi [®] , Pyresta [®] , Vortex [®]), 2,4-DB (Trifolamine [®]), dichlorprop (Lantana 600 [®]), MCPA (Agtryne [®] MA [®] , Banvel M [®] , Barrel [®] , Basagran [®] M60 [®] , Bucril [®] MA [®] , Buffalo Pro Weedkiller [®] , Condor [®] , Flight [®] , Lawnweeder plus [®] , Lawn Weedkiller [®] , Midas [®] , Paragon [®] , Precept [®] , Quadrant [®] , Silverado [®] , Spearhead [®] , Thistrol Gold [®] , Tigrex [®] , Tordon 242 [®] , Triathlon [®] , Zero Triple Action Garden Weedkiller [®]), MCPB (Legumine [®] , Thistrol Gold [®]), mecoprop (Mecoban [®] , Mecopropamine [®] , Methar TriKombi [®] , Multiweed [®])
Pyridine carboxylates (Pyridines)	Aminocyclopyrachlor (Method [®]), aminopyralid (Fallow Boss Tordon [®] , ForageMax [®] , Grazon Extra [®] , Grindstone [®] , Hotshot [®] , Stinger [®] , Vigilant II [®]), clopyralid (Lontrel [®] , Nuturf Millennium [®] , Spearhead [®] , Trimac Plus [®] , Velmac Plus [®]), florypyrauxifen (Agixa [®] , Ubeniq [®]), halauxifen (ForageMax [®] , Paradigm [®] , Pixxaro [®] , Rexade [®]), picloram (Fallow Boss Tordon [®] , Grazon Extra [®] , Tordon [®] , Tordon 242 [®] , Tordon Regrowth Master [®] , Trinoc [®] , Vigilant II [®]),
Quinoline-carboxylates	quinclorac (Drive [®])
Pyridyloxy-carboxylates	fluroxypyr (Crest [®] , Hotshot [®] , Monsoon [®] , Pixxaro [®] , Roundup FNG Weedkiller [®] , Roundup PNG Weedkiller [®] , Starane [®]), triclopyr (Garlon [®] , Grazon Extra [®] , Tordon Regrowth Master [®] , Tough Roundup [®] Weedkiller [®] , Ultimate Brushweed [®] Herbicide)

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Group 5

Inhibition of photosynthesis at photosystem II - D1 Serine 264 binders (and other non-histidine binders)
(PS II Serine 264 inhibitors)

Chemical family	Active constituent (first registered trade name)
Amides	propanil (Stam®)
Phenylcarbamates	phenmedipham (Betanal®)
Pyridazinones	chloridazon (Pyramin®)
Triazines	ametryn (Amigan®*, Gesapax® Combi*, Krismat®, Primatol Z®), atrazine (Gesapax® Combi*, Gesaprim®, Primextra® Gold*), cyanazine (Bladex®), prometryn (Bandit®*, Cotogard®*, Gesagard®), propazine (Agaprop®), simazine (Bunnings RTU Path Weeder®*, Gesatop®, Bantox®*, Yates Once A Year Path Weeder®*), terbutylazine (Effigy®*, Firestorm®*, Palmero TX®*, Terbyne®), terbutryn (Agtryne® MA*, Amigan®*, Igran®)
Triazinones	amicarbazone (Amitron®*) hexazinone (Bobcat I-Maxx®*, Velmac Plus®*, Velpar® K4*, Velpar® L), metribuzin (Aptitude®*, Sencor®)
Uracils	bromacil (Hyvar®, Krovar®*), terbacil (Eucmix Pre Plant®*, Sinbar®, Trimac Plus®*)
Ureas	diuron (Karmex®, Krovar®*, Velpar® K4*), fluometuron (Bandit®*, Cotogard®*, Cotoran®), linuron (Afolon®), metobromuron (Soletto®), methabenzthiazuron (Tribunil®), siduron (Tupersan®), tebuthiuron (Graslan®)

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Group 6

Inhibition of photosynthesis at photosystem II - D1 Histidine 215 binders (PS II Histidine 215 inhibitors)

Chemical family	Active constituent (first registered trade name)
Benzothiadiazinones	bentazone (Basagran®, Basagran® M60*, Lawnweeder Plus®*)
Nitriles	bromoxynil (Barrel®*, Buctril®, Buctril® MA*, Buffalo Pro Weedkiller®*, Eliminar C®*, Flight®*, Jaguar®*, Monsoon®*, Quadrant®*, Talinor®*, Triathlon®*, Velocity®*), ioxynil (Actril® DS*, Totril®)

Group 9

Inhibition of 5-enolpyruvyl shikimate-3 phosphate synthase (EPSP inhibition)

Chemical family	Active constituent (first registered trade name)
Glycines	glyphosate (Arsenal Xpress®*, Bantox®, Broadway®*, Firestorm®*, Illico®*, Resolva®*, Roundup®, Sandoban®*, Tough Roundup® Weedkiller®, Trounce®*, Pathweeder®*)

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Group 10

Inhibition of glutamine synthetase

Chemical family	Active constituent (first registered trade name)
Phosphinic acids	glufosinate-ammonium (Basta®, Hellcat®*, Liberty®), glufosinate-p-ammonium (Basta® Ultra, Liberty® Ultra)

Group 12

Inhibition of carotenoid biosynthesis at the phytoene desaturase step (PDS inhibitors)

Chemical family	Active constituent (first registered trade name)
N-Phenyl heterocycles	norflurazon (Solicam®)
Phenyl-ethers	diflufenican (Brodal®, Gangster®*, Infinity Ultra®*, Jaguar®*, Mateno® Complete*, Quadrant®*, Spearhead®*, Tigrex®*, Triathlon®*, Pathweeder®*), picolinafen (Eliminar C®*, Flight®*, Paragon®*, Quadrant®*, Sniper®)

Group 13

Inhibition of deoxy-D-xyulose phosphate synthase (DOXP inhibitors)

Chemical family	Active constituent (first registered trade name)
Isoxazolidinones	bixlozone (Overwatch®), clomazone (Altiplano®*, Command®)

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Group 14

Inhibition of protoporphyrinogen oxidase (PPO inhibitors)

Chemical family	Active constituent (first registered trade name)
Diphenyl ethers	acifluorfen (Blazer®), fomesafen (Reflex®), oxyfluorfen (Goal®, OH2 Ornamental Herbicide®*, Rout®, Pathweeder®)
N-Phenyl-oxadiazolones	oxadiargyl (Raft®), oxadiazon (Ronstar®)
Phenylpyrazoles	pyraflufen (Condor®*, Ecopar®, Pyresta®*)
N-Phenyl-imides	butafenacil (B-Power®*, Logran® B-Power®*, Resolva®*), flumioxazin (Valor®, Terrain®), saflufenacil (Sharpen®, Voraxor®*), tiafenacil (Terrad'Or®), trifludimoxazin (Voraxor®*)
N-Phenyl-triazolinones	carfentrazone (Affinity®, Aptitude®*, Broadway®, Buffalo Pro Weedkiller®*, Hellcat®*, Silverado®*)

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Group 15

Inhibition of very long chain fatty acid synthesis (VLCFA inhibitors)

Chemical family	Active constituent (first registered trade name)
α -Chloroacetamides	dimethenamid-p (Freehand*, Frontier®-P, Outlook®), metazachlor (Butisan®), metolachlor (Boxer® Gold*, Dual® Gold, Primextra® Gold*), propachlor (Prothal®*, Ramrod®)
Benzofurans	ethofumesate (Tramat®)
Isoxazolines	pyroxasulfone (Mateno® Complete*, Sakura®)
Thiocarbamates	EPTC (Eptam®), molinate (Ordram®), pebulate (Tillam®), prosulfocarb (Arcade®, Bolta Duo®*, Boxer® Gold*, Diablo Duo®*), thiobencarb (Saturn®), tri-allate (Avadex®, Diablo Duo®*, Jeti Duo®*), vernolate (Vernam®)

Group 18

Inhibition of dihydropteroate synthase (DHP inhibitors)

Chemical family	Active constituent (first registered trade name)
Carbamates	asulam (Asulox®)

Group 19

Inhibition of auxin transport (ATIs)

Chemical family	Active constituent (first registered trade name)
Aryl-carboxylates	naptalam (Alanap-L®)

Group 22

Inhibition of photosynthesis at photosystem I via electron diversion (PSI electron diversion)

Chemical family	Active constituent (first registered trade name)
Pyridiniums	diquat (Reglone®, Spray Seed®*), paraquat (Alliance®*, Gramoxone®, Spray Seed®*)

Group 23

Microtubule interference – unclear site of action

Chemical family	Active constituent (first registered trade name)
Benzamides	propyzamide (Effigy®*, Kerb®)
Carbamates	carbetamide (Carbetamex®, Ultro®), chlorpropham (Chlorpropham®)

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Group 27

Inhibition of 4-hydroxyphenyl-pyruvate dioxygenase (HPPD inhibitors)

Chemical family	Active constituent (first registered trade name)
Isoxazoles	isoxaflutole (Balance® Palmero TX®*)
Pyrazoles	benzofenap (Taipan®), pyrasulfotole (Galaxy®, Infinity Ultra®*, Precept®*, Velocity®*), topramezone (Frequency®)
Triketones	bicyclopyrone (Talinor®*), mesotrione (Callisto®)

Group 29

Inhibition of cellulose biosynthesis

Chemical family	Active constituent (first registered trade name)
Alkylazines	indaziflam (Specticle®)
Benzamides	isoxaben (Gallery®, X-Pand®*)
Nitriles	dichlobenil (Casoron®)

Group 30

Inhibition of fatty acid thioesterase

Chemical family	Active constituent (first registered trade name)
Benzyl ether	cinmethylin (Luximax®), methiozolin (PoaCure Turf®)

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Group 31

Inhibition of serine-threonine protein phosphatase (STPP inhibitors)

Chemical family	Active constituent (first registered trade name)
Unknown	endothal (Endothal®)

Group 32

Inhibition of solanesyl diphosphate synthase

Chemical family	Active constituent (first registered trade name)
Diphenyl ether	aclonifen (Mateno® Complete*)

Group 34

Inhibition of lycopene cyclase

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Chemical family	Active constituent (first registered trade name)
Triazoles	amitrole (Alliance®*, Amitrole®, RTU Pathweeder®*, Illico®*, Firestorm®*, Onceyear Pathweeder®*)

Group 0

Herbicides with unknown mode of action

Chemical family	Active constituent (first registered trade name)
Arylamino propionic acids	flamprop (Mataven® L)
Acetamides	napropamide (Altiplano®*, Devrinol®)
Organoarsenicals	DSMA (disodium methylarsonate) (Methar®, Trinoc®*), MSMA (monosodium methylarsonate) (Daconate®)
Fatty acids	Pelargonic acid (Nonanoic acid) Roundup FNG Weedkiller®*, Roundup PNG Weedkiller®*, Slasher®, Zero Triple Action Garden Weedkiller®*)
Chlorocarbonic acids	dalapon (Dalapon®, Onceyear Pathweeder®*, flupropanate (Frenock®)
Phosphorodithioates	bensulide (Prefar®)

** This product contains more than one active constituent*

Notes

1. List of approved active constituents in each “Group” and, for ease of identification, at the discretion of the Expert Committee on Herbicide Resistance.
2. The trade name of the first registered product or successor.
3. Refer to the APVMA website (www.apvma.gov.au) to obtain a complete list of registered products from the PUBCRIS database.

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