

HERBICIDE CLASSIFICATION

Repeated use of herbicides with the same site of action can result in the development of herbicide-resistant weed populations.



by **MODE OF ACTION (MOA)** (effect on plant growth)

This chart groups herbicides by their modes and sites of action to assist you in selecting herbicides to...

1) maintain greater diversity in herbicide use and

2) rotate among effective herbicides with different **sites of action** to delay the development of herbicide resistance

1	2	3	4	5	6
LIPID SYNTHESIS INHIBITORS					
1	ACCASE INHIBITORS (acetyl CoA carboxylase)	14	Aryloxyphenoxypropionate (fops)	clodinafop	Discover NG
				cyhalofop	Clincher
				fenoxaprop	Ricestar HT, others
				fluaizop	Fusilade DX
				quizalofop	Assure II, others
			Cyclohexanedione (dims)	clethodim	Select Max, others
				sethoxydim	Poast, Poast Plus
			Phenylpyrazoline	pinoxaden	Axial XL

1. Site of Action Group
2. Site of Action
3. Number of Resistant Weed Species in U.S.
4. Chemical Family
5. Active Ingredient
6. Product Examples

AMINO ACID SYNTHESIS INHIBITORS					
2	ALS INHIBITORS (acetolactate synthase)	53	Imidazolinone	imazamox	Raptor, Beyond
				imazapic	Plateau
				imazapyr	Arsenal
				imazaquin	Scepter
				imazethapyr	Pursuit, Newpath
			Pyrimidinyl benzoates	bispyribac	Regiment
				pyrithiobac	Staple
			Sulfonylurea	bensulfuron	Londax
				chlorimuron	Classic
				chlorsulfuron	Glean
				halosulfuron	Permit, Sandea
				iodosulfuron	Autumn
				mesosulfuron	Osprey
				metsulfuron	Ally
				nicosulfuron	Accent Q, Zest
				orthosulfamuron	Strada
				primisulfuron	Beacon
				prosulfuron	Peak
				rimsulfuron	Matrix, Resolve
				sulfosulfuron	Outrider
				thifensulfuron	Harmony
				triasulfuron	Amber
				tribenuron	Express
				trifloxysulfuron	Envoke
				triflusulfuron	UpBeet
		53	Triazolinones	flucarbazone	Everest, Pre-Pare
				propoxycarbazone	Olympus
				thiencarbazone	Varro
		Triazopyrimidine - Type 1	Triazopyrimidine - Type 1	cloransulam	FirstRate
				florasulam	component of Orion, Quelex, Starane Flex
				flumetsulam	Python
		Triazopyrimidine - Type 2	Triazopyrimidine - Type 2	penoxsulam	Grasp
				pyroxsulam	PowerFlex HL
9	EPSP SYNTHASE INHIBITOR (5-enolpyruvyl-shikimate-3-phosphate)	18	Glycine	glyphosate	Roundup, several others

GROWTH REGULATORS

4	SYNTHETIC AUXINS (TIR1, AFB1-5 and unknown auxin receptors)	11	6-Arylpicolinates	florpyrauxifen	Loyant
				halauxifen	Elevore
			Benzoate	dicamba	Banvel, Clarity, DiFlexx, Engenia*, XtendiMax*, others
				2,4-D	2,4-D, Enlist One, others
			Phenoxy carboxylate	MCPA	MCPA, others
				aminopyralid	Milestone
			Pyridine carboxylate	clopyralid	Stinger
				halauxifen	Elevore
19	AUXIN TRANSPORT INHIBITOR	0	Aryl carboxylate	fluroxypyr	Starane Ultra
				triclopyr	Garlon, Remedy Ultra
				quinclorac	Facet

PHOTOSYNTHESIS INHIBITORS

5	PHOTOSYSTEM II INHIBITORS (D1 Serine 264 binders and non-histidine 215 binders)	28	Amide	propanil	SuperWham
				atrazine	AAtrex, others
			Triazine	ametryn	Evik
				prometon	Pramitol
				prometryn	Caparol
				simazine	Princep
			Triazinone	hexazinone	Velpar
				metribuzin	Metribuzin, others
			Triazolinone	amicarbazone	Xonerate
			Uracil	terbacil	Sinbar
6	PHOTOSYSTEM II INHIBITORS (D1 Histidine 215 binders)	1	Urea	diuron	Direx, Karmex
				fluometuron	Cotoran
				linuron	Lorox, Linex
				tebuthiuron	Spike
10	GLUTAMINE SYNTHETASE INHIBITOR	3	Phosphinic acid	glufosinate	Liberty Ultra, Rely, others

NITROGEN METABOLISM INHIBITOR

10	GLUTAMINE SYNTHETASE INHIBITOR	3	Phosphinic acid	glufosinate	Liberty Ultra, Rely, others
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PIGMENT INHIBITORS

12	PHYTOENE DESATURASE (PDS) INHIBITORS	1	Diphenyl heterocycle	fluridone	Brake, Sonar
			N-Phenyl heterocycle	norflurazon	Solicam
			Phenyl ether	diflufenican	Convintro*
13	DOXP SYNTHASE INHIBITOR (1-DEOXY-D-XYULOSE 5-PHOSPHATE)	2	Isoxazolidinone	clomazone	Command 3ME
27	HPPD INHIBITORS	3	Isoxazole	isoxaflutole	Alite 27, Balance Flexx
				pyrasulfotole	component of Huskie
				topramezone	Armezon, Impact
			Triketone	tolpyralate	Shieldex
				bicyclopyrone	Optogen
				mesotrione	Callisto
				tembotrione	Laudis

CELL MEMBRANE DISRUPTERS

14	PPO INHIBITORS	7	Diphenyl ether	acifluorfen	Ultra Blazer
				fomesafen	Flexstar, Reflex, others
				lactofen	Cobra, Phoenix
			N-Phenylimide	epyrifenacil	Rapidicil*
				flumiclorac	Resource
				flumioxazin	Valor, Chateau, others
				fluthiacet	Cadet
				saflufenacil	Sharpen
				tiafenacil	Reviton, Gamma
			N-Phenyltriazolinone	carfentrazone	Aim
				sulfentrazone	Spartan
22	PHOTOSYSTEM I ELECTRON DIVERTER	6	Pyridinium	diquat	Reglone
				paraquat	Gramoxone SL

SEEDLING ROOT GROWTH INHIBITORS

3	MICROTUBULE ASSEMBLY INHIBITORS	6	Benzamide	pronamide	Kerb
				ethalfluralin	Sonalan
			Dinitroaniline	pendimethalin	Prowl H₂O, others
				trifluralin	Treflan, others
			Pyridine	dithiopyr	Dimension

SEEDLING SHOOT GROWTH INHIBITORS

15	VERY LONG-CHAIN FATTY ACID SYNTHESIS INHIBITORS	8	Benzofurane	ethofumesate	Nortron
			α-Chloroacetamide	acetochlor	Harness, Surpass, Warrant, others
				dimethenamid-P	Outlook
				s-metolachlor	Dual Magnum, others
			Isoxazoline	pyroxasulfone	Zidua
			α-Oxyacetamide	flufenacet	Define
			Thiocarbamate	cycloate	Ro-Neet
				EPTC	Eradicane, Eptam
				thiobencarb	Bolero
29	CELLULOSE BIOSYNTHESIS INHIBITORS	3	Aylkylazine	indaziflam	Alion, Esplanade, Rezilon
				isoxaben	Gallery, Trellis
			Benzamide	isoxaben	Gallery, Trellis

UNDEFINED

0	UNKNOWN	1	Amide	napropamide	Devrinol
			Arsenical	MSMA	MSMA

COMPONENT

SITE-OF-ACTION GROUP

PREMIX

ACTIVE INGREDIENT

TRADE NAME

ACURON	bicyclopyrone	Optogen	27
	mesotrione	Callisto	27
	atrazine	AAtrex	5
	s-metolachlor	Dual II Magnum	15
ACURON FLEXI	bicyclopyrone	Optogen	27
	mesotrione	Callisto	27
	s-metolachlor	Dual II Magnum	15
ACURON GT	bicyclopyrone	Optogen	27
	mesotrione	Callisto	27
	s-metolachlor	Dual Magnum	15
	glyphosate	glyphosate	9
AFFINITY BROADSPEC (Affinity TankMix)	thifensulfuron	Harmony	2
	tribenuron	Express	2
AFFORIA	thifensulfuron	Harmony	2
	tribenuron	Express	2
	flumioxazin	Valor	14
ALLY EXTRA	thifensulfuron	Harmony	2
	tribenuron	Express	2
	metsulfuron	Ally	2
ANTHEM FLEX	pyroxasulfone	Zidua	15
	carfentrazone	Aim	14
ANTHEM MAXX	pyroxasulfone	Zidua	15
	fluthiacet	Cadet	14
ARMEZON PRO	topramezone	Armezon	27
	dimethenamid-P	Outlook	15
AUTHORITY ASSIST	sulfentrazone	Spartan	14
	imazethapyr	Pursuit	2
AUTHORITY EDGE	sulfentrazone	Spartan	14
	pyroxasulfone	Zidua	15
AUTHORITY FIRST	sulfentrazone	Spartan	14
	cloransulam	FirstRate	2
AUTHORITY SUPREME	sulfentrazone	Spartan	14
	pyroxasulfone	Zidua	15
AUTHORITY XL	sulfentrazone	Spartan	14
	chlorimuron	Classic	2
AUTUMN SUPER	iodosulfuron	Autumn	2
	thiencarbazon	Varro	2
AXIAL BOLD	pinoxaden	Axial XL	1
	fenoxaprop	Ricestar	1
AXIAL STAR	pinoxaden	Axial XL	1
	fluroxypyr	Starane	4
BASIS BLEND	rimisulfuron	Resolve	2
	thifensulfuron	Harmony	2
BICEP II MAGNUM (Bicep Lite II Magnum)	s-metolachlor	Dual II Magnum	15
	atrazine	AAtrex	5
BOUNDARY	s-metolachlor	Dual Magnum	15
	metribuzin	Metribuzin	5
BROADAXE XC	s-metolachlor	Dual Magnum	15
	sulfentrazone	Spartan 4F	14
BRONATE ADVANCED	bromoxynil	Maestro	6
	MCPA	MCPA	4
CALIBRA	s-metolachlor	Dual II Magnum	15
	mesotrione	Callisto	27
CALLISTO GT	mesotrione	Callisto	27
	glyphosate	glyphosate	9

by PREMIX

This chart lists premix herbicides alphabetically by their trade names so you can identify the premix's component herbicides and their respective site-of-action groups. Refer to the **Site of Action** chart above for more information.

CALLISTO XTRA	mesotrione	Callisto	27
	atrazine	AAtrex	5
CAPRENO	thiencarbazon	Varro	2
	tembotrione	Laudis	27
CARNIVORE	MCPA	MCPA	4
	fluroxypyr	Starane	4
CLEARPATH	quinclorac	Facet	4
	imazethapyr	Newpath	2
COLT AS	clopyralid	Stinger	4
	fluroxypyr	Starane	4
COLT + SALVO	2,4-D	2,4-D	4
	fluroxypyr	Starane	4
COLT + SWORD	MCPA	MCPA	4
	fluroxypyr	Starane	4
CORVUS	thiencarbazon	Varro	2
	isoxaflutole	Balance Flexx	27
COYOTE	s-metolachlor	Dual II Magnum	15
	mesotrione	Callisto	27
CURTAIL	clopyralid	Stinger	4
	2,4-D	2,4-D	4
CURTAIL M	clopyralid	Stinger	4
	MCPA	MCPA	4
DEGREE XTRA	acetochlor	Degree	15
	atrazine	AAtrex	5
DIFLEXX DUO	dicamba	DiFlexx	4
	tembotrione	Laudis	27
DIMETRIC CHARGED	metribuzin	Metribuzin	5
	flumioxazin	Valor	14
ENLIST DUO	2,4-D	2,4-D	4
	glyphosate	glyphosate	9
ENLITE	chlorimuron	Classic	2
	thifensulfuron	Harmony	2
ENVIVE	flumioxazin	Valor	14
	thifensulfuron	Harmony	2
FIERCE EZ	flumioxazin	Valor	14
	pyroxasulfone	Zidua	15
FIERCE MTZ	flumioxazin	Valor	14
	pyroxasulfone	Zidua	15
FIERCE XLT	flumioxazin	Valor	14
	pyroxasulfone	Zidua	15
FINESSE	chlorsulfuron	Glean	2
	metsulfuron	Ally	2
FIRSTSHOT	thifensulfuron	Harmony	2
	tribenuron	Express	2
FLEXSTAR GT	fomesafen	Flexstar	14
	glyphosate	glyphosate	9
FULTIME NXT	acetochlor	TopNotch	15
	atrazine	AAtrex	5
FUSION	fluazifop	Fusilade DX	1
	fenoxaprop	Puma	1

GOLDSKY	pyroxasulfone	PowerFlex HL	2
	florasulam	-----	2
GRAZONNEXT HL	fluroxypyr	Starane	4
	aminopyralid	Milestone	4
HALEX GT	2,4-D	2,4-D	4
	s-metolachlor	Dual Magnum	15
HARMONY EXTRA	mesotrione	Callisto	27
	glyphosate	glyphosate	9
HARNESS MAX	thifensulfuron	Harmony	2
	tribenuron	Express	2
HARNESS XTRA	acetochlor	Harness	15
	mesotrione	Callisto	27
HORNET	acetochlor	Harness	15
	atrazine	AAtrex	5
HUSKIE	clopyralid	Stinger	4
	flumetsulam	Python	2
HUSKIE COMPLETE	pyrasulfotole	-----	27
	bromoxynil	Maestro	6
HUSKIE FX	pyrasulfotole	-----	27
	bromoxynil	Maestro	6
IMPACT CORE	thiencarbazon	Varro	2
	pyrasulfotole	-----	27
IMPACTZ	pyrasulfotole	-----	27
	bromoxynil	Maestro	6
INTERMOC	pyrasulfotole	-----	27
	fluroxypyr	Starane Ultra	4
INTRAVA DX	acetochlor	Harness	15
	topramezone	Impact	27
KATAGON	atrazine	AAtrex	5
	topramezone	Impact	27
KEYSTONE NXT (Keystone LA NXT)	glufosinate	Liberty	10
	s-metolachlor	Dual Magnum	15
KOCHIAVORE	amicarbazon	Xonerate	5
	metribuzin	Metribuzin	5
KYBER PRO	nicosulfuron	Accent 0	2
	tolpyralate	Shieldex	27
KYRO	acetochlor	Surpass NXT	15
	atrazine	AAtrex	5
LEXAR EZ	2,4-D	2,4-D, others	4
	fluroxypyr	Starane	4
LUMAX EZ	bromoxynil	Maestro	6
	flumioxazin	Valor	14
MAVERICK	pyroxasulfone	Zidua	15
	metribuzin	Metribuzin	5
METRIC CHARGED	acetochlor	Surpass NXT	15
	topramezone	Impact	27
MILESTONE	clopyralid	Stinger	4
	mesotrione	Callisto	27
MOUNTAIN	s-metolachlor	Dual II Magnum	15
	atrazine	AAtrex	5
NEWPATH	mesotrione	Callisto	27
	s-metolachlor	Dual II Magnum	15
PUMA	pyroxasulfone	Zidua	15
	clopyralid	Stinger	4
STARANE	mesotrione	Callisto	27
	glyphosate	glyphosate	9

MAVERICK	pyroxasulfone	Zidua	15
	clopyralid	Stinger	4
	mesotrione	Callisto	27
NOVIXID	florpyrauxifen	Loyant	4
	penoxsulam	Grasp	2
OBEY	clomazone	Command 3ME	13
	quinclorac	Facet	4
OPENSKY	pyroxulam	PowerFlex HL	2
	fluroxypyr	Starane Ultra	4
ORION	florasulam	-----	2
	MCPA	MCPA	4
OSPREY XTRA	mesosulfuron	Osprey	2
	thiencarbazone	Varro	2
PANOFLEX	thifensulfuron	Harmony	2
	tribenuron	Express	2
PERFECTMATCH	clopyralid	Stinger	4
	fluroxypyr	Starane Ultra	4
	pyroxulam	PowerFlex HL	2
PERMIT PLUS	thifensulfuron	Harmony	2
	halosulfuron	Permit	2
PERPETUO	flumiclorac	Resource	14
	pyroxasulfone	Zidua	15
PIXXARO EC	fluroxypyr	Starane	4
	halauxifen	Elevore	4
PREFIX	s-metolachlor	Dual Magnum	15
	fomesafen	Reflex	14
QUELEX	halauxifen	Elevore	4
	florasulam	-----	2
RAVE	triasulfuron	Amber	2
	dicamba	Clarity	4
REALM Q	rimsulfuron	Resolve	2
	mesotrione	Callisto	27
REBELEX	cyhalofop	Clincher	1
	penoxsulam	Grasp	2
RESICORE REV	clopyralid	Stinger	4
	acetochlor	Surpass NXT	15
	mesotrione	Callisto	27
RESOLVE Q	rimsulfuron	Resolve	2
	thifensulfuron	Harmony	2
RESTRAINT	acetochlor	Harness	15
	tolpyralate	Shieldex	27
REVULIN Q	nicosulfuron	Accent Q	2
	mesotrione	Callisto	27
REZUVANT	halauxifen	Elevore	4
	fluroxypyr	Starane Ultra	4
	pinoxaden	Axial XL	1
RIMFIRE MAX	propoxycarbazone	Olympus	2
	mesosulfuron	Osprey	2
SENTRALLAS	thifensulfuron	Harmony	2
	fluroxypyr	Starane	4
SEQUENCE	s-metolachlor	Dual Magnum	15
	glyphosate	glyphosate	9
SINATE	glufosinate	Liberty	10
	topramezone	Impact	27
SOLSTICE	mesotrione	Callisto	27
	fluthiacet	Cadet	14
SONIC	sulfentrazone	Spartan	14
	cloransulam	FirstRate	2
SPARTAN CHARGE	sulfentrazone	Spartan	14
	carfentrazone	Aim	14
STARANE FLEX	florasulam	-----	2
	fluroxypyr	Starane	4

STARANE NXT	fluroxypyr	Starane	4
	bromoxynil	Maestro	6
STATUS	diflufenzopyr	-----	19
	dicamba	Clarity	4
STEADFAST Q	nicosulfuron	Accent Q	2
	rimsulfuron	Resolve	2
STOREN	bicyclopyrone	Optogen	27
	mesotrione	Callisto	27
	s-metolachlor	Dual II Magnum	15
	pyroxasulfone	Zidua	15
STORM	bentazon	Basagran	6
	acifluorfen	Ultra Blazer	14
SUPREMACY	fluroxypyr	Starane	4
	thifensulfuron	Harmony	2
	tribenuron	Express	2
SURESTART II	acetochlor	Surpass NXT	15
	clopyralid	Stinger	4
SURTAIN	flumetsulam	Python	2
	saflufenacil	Sharpen	14
SURVEIL	pyroxasulfone	Zidua	15
	flumioxazin	Valor	14
SYNCHRONY XP	cloransulam	FirstRate	2
	chlorimuron	Classic	2
TALINOR	thifensulfuron	Harmony	2
	bromoxynil	Maestro	6
TARZEC	bicyclopyrone	Optogen	27
	pyroxulam	PowerFlex HL	2
TENDOVO	halauxifen	Elevore	4
	s-metholachlor	Dual Magnum	15
TOLVERA	cloransulam	FirstRate	2
	metribuzin	Metribuzin	5
TRIPLEFLEX II	bromoxynil	Maestro	6
	tolpyralate	Shieldex	27
TRIPZIN ZC	acetochlor	Harness	15
	clopyralid	Stinger	4
TRIVENCE	flumetsulam	Python	2
	pendimethalin	Prowl	3
TRIVOLT	metribuzin	Metribuzin	5
	chlormimuron	Classic	2
VALOR XLT	flumioxazin	Valor	14
	metribuzin	Metribuzin	5
VARISTO	flufenacet	Define	15
	isoxaflutole	Balance Flexx	27
VELPAR ALFAMAX	thiencarbazone	Varro	2
	flumioxazin	Valor	14
VERDICT	chlormimuron	Classic	2
	metribuzin	Metribuzin	5
VIOS FX	saflufenacil	Sharpen	14
	dimethenamid-P	Outlook	15
WARRANT ULTRA	thifensulfuron	Harmony	2
	fluroxypyr	Starane	4
WELD	fomesafen	Reflex	14
	acetochlor	Warrant	15
WIDEARMATCH	MCPA	MCPA	4
	fluroxypyr	Starane	4
WIDEMATCH	clopyralid	Stinger	4
	clopyralid	Stinger	4
WOLVERINE ADVANCED	fluroxypyr	Starane	4
	fenoxaprop	Tecoma	1
YUKON	pyrasulfotole	----	27
	bromoxynil	Maestro	6
ZALO	dicamba	Banvel	4
	halosulfuron	Permit	2
ZIDUA PLUS*	quizalofop	Assure II	1
	glufosinate	Liberty	10
ZIDUA PRO	imazethapyr	Pursuit	2
	pyroxasulfone	Zidua	15
ZONE DEFENSE	imazethapyr	Pursuit	2
	saflufenacil	Sharpen	14
ZONED	pyroxasulfone	Zidua	15
	flumioxazin	Valor	14
ZONED	sulfentrazone	Spartan	14
	sulfentrazone	Spartan	14

WIDEMATCH	clopyralid	Stinger	4
	fluroxypyr	Starane	4
WOLVERINE ADVANCED	fenoxaprop	Tecoma	1
	pyrasulfotole	----	27
YUKON	dicamba	Banvel	4
	halosulfuron	Permit	2
ZALO	quizalofop	Assure II	1
	glufosinate	Liberty	10
ZIDUA PLUS*	imazethapyr	Pursuit	2
	pyroxasulfone	Zidua	15
ZIDUA PRO	imazethapyr	Pursuit	2
	saflufenacil	Sharpen	14
ZONE DEFENSE	pyroxasulfone	Zidua	15
	flumioxazin	Valor	14
ZONED	sulfentrazone	Spartan	14
	sulfentrazone	Spartan	14

¹ Site of Action Group numbers follow the revised 2024 Herbicide Resistance Action Committee (HRAC) classification.

*Indicates product is not registered for use at the time of printing.

Check for a label and Material Safety Data Sheet at www.cdms.net to confirm status. This chart contains some restricted use pesticides. Always consult label prior to use.

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