HERBICIDE CLASSIFICATION

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

Take ACTION Herbicide-Resistance Management

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

This chart groups herbicides by their modes of action to assist you in selecting herbicides **1)** to maintain greater diversity in herbicide use and **2)** to rotate among effective herbicides with different sites of action to delay the development of herbicide resistance.

SITE-OF-ACTION GROUP[1]	SITE OF ACTION	NUMBER OF RESISTANT WEED SPECIES IN U.S.	CHEMICAL FAMILY	ACTIVE INGREDIENT	PRODUCT EXAMPLES (TRADE NAME)
LIPID SYNTHESIS INHIBITORS					
1	ACCASE INHIBITORS (acetyl CoA carboxylase)	14	Aryloxyphenoxypropionate (fops)	clodinafop	*Discover NG*
				cyhalofop	*Clincher*
				fenoxaprop	*Ricestar HT, others*
				fluazifop	*Fusilade DX*
				quizalofop	*Aggressor, Assure II, Targa*
			Cyclohexanedione (dims)	clethodim	*Select Max, others*
				sethoxydim	*Poast, Poast Plus*
			Phenylpyrazoline	pinoxaden	*Axial XL*
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*
			Triazolinones	flucarbazone	*Everest, Pre-Pare*
				propoxycarbazone	*Olympus*
				thiencarbazone	*Varro*
			Triazolopyrimidine - Type 1	florasulam	*component of Orion, Quelex, Starane Flex*
				flumetsulam	*Python*
			Triazolopyrimidine - Type 2	penoxsulam	*Grasp*
				pyroxsulam	*PowerFlex HL*
9	EPSP SYNTHASE INHIBITOR (5-enolpyruvyl-shikimate-3-phosphate)	17	Glycine	glyphosate	*Roundup, several others*
GROWTH REGULATORS					
4	SYNTHETIC AUXINS (TIR1, AFB1-5 and unknown auxin receptor)	10	Benzoate	dicamba	*Banvel, Clarity, DiFlexx, Engenia, XtendiMax, others*
			Phenoxy carboxylate	2,4-D	*2,4-D, Enlist One, others*
				MCPA	*MCPA, others*
			Pyridine carboxylate	aminopyralid	*Milestone*
				clopyralid	*Stinger HL*
				halauxifen	*Elevore*
			Pyridyloxy carboxylate	fluroxypyr	*Starane Ultra*
				triclopyr	*Garlon, Remedy Ultra*
			Quinoline carboxylate	quinclorac	*Facet*
19	AUXIN TRANSPORT INHIBITOR	0	Aryl carboxylate	diflufenzopyr	*component of Status*
PHOTOSYNTHESIS INHIBITORS					
5	PHOTOSYSTEM II INHIBITORS (D1 Serine 264 binders and non-histidine 215 binders)	28	Amide	propanil	*SuperWham*
			Triazine	atrazine	*AAtrex, others*
				prometon	*Pramitol*
				prometryn	*Caparol*
				simazine	*Princep*
			Triazinone	hexazinone	*Velpar*
				metribuzin	*Metribuzin, others*
			Uracil	terbacil	*Sinbar*
			Urea	diuron	*Direx, Karmex*
				fluometuron	*Cotoran*
				linuron	*Lorox, Linex*
				tebuthiuron	*Spike*
6	PHOTOSYSTEM II INHIBITORS (D1 Histidine 215 binders)	1	Benzothiadiazinone	bentazon	*Basagran, others*
			Nitrile	bromoxynil	*Maestro, Moxy, others*
			Phenyl pyridazine	pyridate	*Tough*
NITROGEN METABOLISM INHIBITOR					
10	GLUTAMINE SYNTHETASE INHIBITORS	3	Phosphinic acid	glufosinate	*Liberty, Rely, Nuventa, others*
PIGMENT INHIBITORS					
12	PHYTOENE DESATURASE (PDS) INHIBITORS	1	Diphenyl heterocycle	fluridone	*Brake, Sonar*
			N-Phenyl heterocycle	norflurazon	*Solicam*
			Phenyl ether	diflufenican	-----
13	DOXP SYNTHASE INHIBITOR (1-DEOXY-D-XYULOSE 5-PHOSPHATE)	2	Isoxazolidinone	clomazone	*Command 3ME*
27	HPPD INHIBITORS	2	Isoxazole	isoxaflutole	*Alite 27, Balance Flexx*
			Pyrazole	pyrasulfotole	*component of Huskie*
				topramezone	*Armezon, Impact*
				tolpyralate	*Shieldex*
			Triketone	bicyclopyrone	*Optagen*
				mesotrione	*Callisto*
				tembotrione	*Laudis*
CELL MEMBRANE DISRUPTERS					
14	PPO INHIBITORS	5	Diphenyl ether	acifluorfen	*Ultra Blazer*
				fomesafen	*Flexstar, Reflex, others*
				lactofen	*Cobra, Phoenix*
			N-Phenyl imide	flumiclorac	*Resource*
				flumioxazin	*Valor, Chateau, others*
				saflufenacil	*Sharpen*
				tiafenacil	*Reviton, Gamma*
			N-Phenyl triazolinone	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*
			Dinitroaniline	ethalfluralin	*Sonalan*
				pendimethalin	*Prowl H2O, others*
				trifluralin	*Treflan, others*
			Pyridine	dithiopyr	*Dimension*
SEEDLING SHOOT GROWTH INHIBITORS					
15	VERY LONG-CHAIN FATTY ACID SYNTHESIS INHIBITORS	8	Benzofuranе	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*
				triallate	*Far-Go*
29	CELLULOSE BIOSYNTHESIS INHIBITORS	1	Aylkylazine	indaziflam	*Esplanade, Rezilon*
			Benzamide	isoxaben	*Gallery, Trellis*
UNDEFINED					
0	UNKNOWN	1	Amide	napropamide	*Devrinol*
			Arsenical	MSMA	*MSMA*

[1]Site-of-action group numbers follow the revised 2020 Herbicide Resistance Action Committee (HRAC) classification.

For more information and links to additional resources, visit ***IWillTakeAction.com***

TAKE ACTION IS ENDORSED BY THE FOLLOWING ORGANIZATIONS:

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 on the left for more information.

PREMIX	COMPONENT ACTIVE INGREDIENT	COMPONENT SITE-OF-ACTION GROUP	COMPONENT TRADE NAME
ACURON	bicyclopyrone	27	*Optagen*
	mesotrione	27	*Callisto*
	atrazine	5	*AAtrex*
	s-metolachlor	15	*Dual II Magnum*
ACURON FLEXI	bicyclopyrone	27	*Optagen*
	mesotrione	27	*Callisto*
	s-metolachlor	15	*Dual II Magnum*
ACURON GT	bicyclopyrone	27	*Optagen*
	mesotrione	27	*Callisto*
	s-metolachlor	15	*Dual Magnum*
	glyphosate	9	*glyphosate*
AFFINITY BROADSPEC (Affinity TankMix)	thifensulfuron	2	*Harmony*
	tribenuron	2	*Express*
AFFORIA	thifensulfuron	2	*Harmony*
	tribenuron	2	*Express*
	flumioxazin	14	*Valor*
AGILITY SG	dicamba	4	*Clarity*
	thifensulfuron	2	*Harmony*
	tribenuron	2	*Express*
	metsulfuron	2	*Ally*
ALLY EXTRA	thifensulfuron	2	*Harmony*
	tribenuron	2	*Express*
	metsulfuron	2	*Ally*
ANTHEM FLEX	pyroxasulfone	15	*Zidua*
	carfentrazone	14	*Aim*
ANTHEM MAXX	pyroxasulfone	15	*Zidua*
	fluthiacet	14	*Cadet*
ARMEZON PRO	topramezone	27	*Armezon*
	dimethenamid-P	15	*Outlook*
AUTHORITY ASSIST	sulfentrazone	14	*Spartan*
	imazethapyr	2	*Pursuit*
AUTHORITY EDGE	sulfentrazone	14	*Spartan*
	pyroxasulfone	15	*Zidua*
AUTHORITY ELITE	sulfentrazone	14	*Spartan*
	s-metolachlor	15	*Dual Magnum*
AUTHORITY FIRST	sulfentrazone	14	*Spartan*
	cloransulam	2	*FirstRate*
AUTHORITY MTZ (Preview 2.1)	sulfentrazone	14	*Spartan*
	metribuzin	5	*Metribuzin*
AUTHORITY SUPREME	sulfentrazone	14	*Spartan*
	pyroxasulfone	15	*Zidua*
AUTHORITY XL (Authority Maxx)	sulfentrazone	14	*Spartan*
	chlorimuron	2	*Classic*
AUTUMN SUPER	iodosulfuron	2	*Autumn*
	thiencarbazone	2	*Varro*
AXIAL BOLD	pinoxaden	1	*Axial XL*
	fenoxaprop	1	*Ricestar*
AXIAL STAR	pinoxaden	1	*Axial XL*
	fluroxypyr	4	*Starane*
BASIS BLEND	rimsulfuron	2	*Resolve*
	thifensulfuron	2	*Harmony*
BICEP II MAGNUM (Bicep Lite II Magnum)	s-metolachlor	15	*Dual II Magnum*
	atrazine	5	*AAtrex*
BOUNDARY	s-metolachlor	15	*Dual Magnum*
	metribuzin	5	*Metribuzin*
BROADAXE XC	s-metolachlor	15	*Dual Magnum*
	sulfentrazone	14	*Spartan 4F*
BRONATE ADVANCED	bromoxynil	6	*Maestro*
	MCPA	4	*MCPA*
CALIBRA	s-metolachlor	15	*Dual II Magnum*
	mesotrione	27	*Callisto*
CALLISTO GT	mesotrione	27	*Callisto*
	glyphosate	9	*glyphosate*
CALLISTO XTRA	mesotrione	27	*Callisto*
	atrazine	5	*AAtrex*
CANOPY	chlorimuron	2	*Classic*
	metribuzin	5	*Metribuzin*
CANOPY EX	chlorimuron	2	*Classic*
	tribenuron	2	*Express*
CAPRENO	thiencarbazone	2	*Varro*
	tembotrione	27	*Laudis*
CARNIVORE	MCPA	4	*MCPA*
	clopyralid	4	*Stinger*
	bromoxynil	6	*Maestro*
CHEETAH MAX	glufosinate	10	*Liberty*
	fomesafen	14	*Reflex*
CINCH ATZ (Cinch ATZ Lite)	s-metolachlor	15	*Dual II Magnum*
	atrazine	5	*AAtrex*
CLEARPATH	quinclorac	4	*Facet*
	imazethapyr	2	*Newpath*
COLT AS	clopyralid	4	*Stinger*
	fluroxypyr	4	*Starane*
COLT + SALVO	2,4-D	4	*2,4-D*
	fluroxypyr	4	*Starane*
COLT + SWORD	MCPA	4	*MCPA*
	fluroxypyr	4	*Starane*
CORVUS	thiencarbazone	2	*Varro*
	isoxaflutole	27	*Balance Flexx*
COYOTE	s-metolachlor	15	*Dual II Magnum*
	mesotrione	27	*Callisto*
CRUSHER	rimsulfuron	2	*Resolve*
	thifensulfuron	2	*Harmony*
CURTAIL	clopyralid	4	*Stinger*
	2,4-D	4	*2,4-D*
CURTAIL M	clopyralid	4	*Stinger*
	MCPA	4	*MCPA*
DEGREE XTRA	acetochlor	15	*Degree*
	atrazine	5	*AAtrex*
DIFLEXX DUO	dicamba	4	*DiFlexx*
	tembotrione	27	*Laudis*
DIMETRIC CHARGED	metribuzin	5	*Metribuzin*
	flumioxazin	14	*Valor*
ENLIST DUO	2,4-D	4	*2,4-D*
	glyphosate	9	*glyphosate*
ENLITE	chlorimuron	2	*Classic*
	thifensulfuron	2	*Harmony*
	flumioxazin	14	*Valor*
ENVIVE	chlorimuron	2	*Classic*
	thifensulfuron	2	*Harmony*
	flumioxazin	14	*Valor*
EXTREME	imazethapyr	2	*Pursuit*
	glyphosate	9	*glyphosate*
FIERCE EZ	flumioxazin	14	*Valor*
	pyroxasulfone	15	*Zidua*
FIERCE MTZ	flumioxazin	14	*Valor*
	pyroxasulfone	15	*Zidua*
	metribuzin	5	*Metribuzin*
FIERCE XLT	flumioxazin	14	*Valor*
	pyroxasulfone	15	*Zidua*
	chlorimuron	2	*Classic*
FINESSE	chlorsulfuron	2	*Glean*
	metsulfuron	2	*Ally*
FIRSTSHOT	thifensulfuron	2	*Harmony*
	tribenuron	2	*Express*
FLEXSTAR GT	fomesafen	14	*Flexstar*
	glyphosate	9	*glyphosate*
FULLTIME NXT	acetochlor	15	*TopNotch*
	atrazine	5	*AAtrex*
FUSION	fluazifop	1	*Fusilade DX*
	fenoxaprop	1	*Puma*
GOLDSKY	pyroxasulfone	15	*PowerFlex HL*
	florasulam	2	-----
	fluroxypyr	4	*Starane*
GRAZONNEXT HL	aminopyralid	4	*Milestone*
	2,4-D	4	*2,4-D*
HALEX GT	s-metolachlor	15	*Dual Magnum*
	mesotrione	27	*Callisto*
	glyphosate	9	*glyphosate*
HARMONY EXTRA	thifensulfuron	2	*Harmony*
	tribenuron	2	*Express*
HARNESS MAX	acetochlor	15	*Harness*
	mesotrione	27	*Callisto*
HARNESS XTRA	acetochlor	15	*Harness*
	atrazine	5	*AAtrex*
HORNET	clopyralid	4	*Stinger*
	flumetsulam	2	*Python*
HUSKIE	pyrasulfotole	27	-----
	bromoxynil	6	*Maestro*
HUSKIE COMPLETE	pyrasulfotole	27	-----
	bromoxynil	6	*Maestro*
	thiencarbazone	2	*Varro*
HUSKIE FX	pyrasulfotole	27	-----
	bromoxynil	6	*Maestro*
	fluroxypyr	4	*Starane Ultra*

PREMIX	COMPONENT ACTIVE INGREDIENT	COMPONENT SITE-OF-ACTION GROUP	COMPONENT TRADE NAME
IMPACT CORE	acetochlor	15	*Harness*
	topramezone	27	*Impact*
IMPACTZ	atrazine	5	*AAtrex*
	topramezone	27	*Impact*
INTERMOC	glufosinate	10	*Liberty*
	s-metolachlor	15	*Dual Magnum*
KATAGON	nicosulfuron	2	*Accent Q*
	tolpyralate	27	*Shieldex*
KEYSTONE NXT (Keystone LA NXT)	acetochlor	15	*Surpass NXT*
	atrazine	5	*AAtrex*
KOCHAVORE	2,4-D	4	*2,4-D, others*
	fluroxypyr	4	*Starane*
	bromoxynil	6	*Maestro*
KYBER	flumioxazin	14	*Valor*
	pyroxasulfone	15	*Zidua*
	metribuzin	5	*Metribuzin*
LEADOFF	rimsulfuron	2	*Resolve*
	thifensulfuron	2	*Harmony*
LEXAR EZ	mesotrione	27	*Callisto*
	s-metolachlor	15	*Dual II Magnum*
	atrazine	5	*AAtrex*
LUMAX EZ	mesotrione	27	*Callisto*
	s-metolachlor	15	*Dual II Magnum*
	atrazine	5	*AAtrex*
MARVEL	fluthiacet	14	*Cadet*
	fomesafen	14	*Flexstar*
MAVERICK	pyroxasulfone	15	*Zidua*
	clopyralid	4	*Stinger*
	flumetsulam	2	*Python*
NOVIXID	florpyrauxifen	4	*Loyant*
	penoxsulam	2	*Grasp*
OBEY	clomazone	13	*Command 3ME*
	quinclorac	4	*Facet*
OPENSKY	pyroxsulam	2	*PowerFlex HL*
	fluroxypyr	4	*Starane Ultra*
ORION	florasulam	2	-----
	MCPA	4	*MCPA*
OSPREY XTRA	mesosulfuron	2	*Osprey*
	thiencarbazone	2	*Varro*
PANOFLEX	thifensulfuron	2	*Harmony*
	tribenuron	2	*Express*
PERFECTMATCH	clopyralid	4	*Stinger*
	fluroxypyr	4	*Starane Ultra*
	pyroxsulam	2	*PowerFlex HL*
PERMIT PLUS	thifensulfuron	2	*Harmony*
	halosulfuron	2	*Permit*
PERPETUO	flumiclorac	14	*Resource*
	pyroxasulfone	15	*Zidua*
PIXXARO EC	fluroxypyr	4	*Starane*
	halauxifen	4	*Elevore*
PREFIX	s-metolachlor	15	*Dual Magnum*
	fomesafen	14	*Reflex*
QUELEX	halauxifen	4	*Elevore*
	florasulam	2	-----
RAVE	thifensulfuron	2	*Harmony*
	tribenuron	2	*Amber*
REALM Q	dicamba	4	*Clarity*
	rimsulfuron	2	*Resolve*
	mesotrione	27	*Callisto*
REBELEX	cyhalofop	1	*Clincher*
	penoxsulam	2	*Grasp*
RESICORE XL	clopyralid	4	*Stinger*
	acetochlor	15	*Surpass NXT*
	mesotrione	27	*Callisto*
RESOLVE Q	rimsulfuron	2	*Resolve*
	thifensulfuron	2	*Harmony*
RESTRAINT	acetochlor	15	*Harness*
	tolpyralate	27	*Shieldex*
REVULIN Q	nicosulfuron	2	*Accent Q*
	mesotrione	27	*Callisto*
REZUVANT	halauxifen	4	*Elevore*
	fluroxypyr	4	*Starane Ultra*
	pinoxaden	1	*Axial XL*
RIMFIRE MAX	propoxycarbazone	2	*Olympus*
	mesosulfuron	2	*Osprey*
SENTRALLAS	thifensulfuron	2	*Harmony*
	fluroxypyr	4	*Starane*
SEQUENCE	s-metolachlor	15	*Dual Magnum*
	glyphosate	9	*glyphosate*
SINATE	glufosinate	10	*Liberty*
	topramezone	27	*Impact*
SOLSTICE	mesotrione	27	*Callisto*
	fluthiacet	14	*Cadet*
SONIC	sulfentrazone	14	*Spartan*
	cloransulam	2	*FirstRate*
SPARTAN CHARGE	sulfentrazone	14	*Spartan*
	carfentrazone	14	*Aim*
STARANE FLEX	florasulam	2	-----
	fluroxypyr	4	*Starane*
STARANE NXT	fluroxypyr	4	*Starane*
	bromoxynil	6	*Maestro*
STATUS	diflufenzopyr	19	-----
	dicamba	4	*Clarity*
STEADFAST Q	nicosulfuron	2	*Accent Q*
	rimsulfuron	2	*Resolve*
STORM	bentazon	6	*Basagran*
	acifluorfen	14	*Ultra Blazer*
SUPREMACY	fluroxypyr	4	*Starane*
	thifensulfuron	2	*Harmony*
	tribenuron	2	*Express*
SURESTART II	acetochlor	15	*Surpass NXT*
	clopyralid	4	*Stinger*
	flumetsulam	2	*Python*
SURVEIL	flumioxazin	14	*Valor*
	cloransulam	2	*FirstRate*
SYNCHRONY XP	chlorimuron	2	*Classic*
	thifensulfuron	2	*Harmony*
TALINOR	bromoxynil	6	*Maestro*
	bicyclopyrone	27	*Optagen*
TARZEC	pyroxasulam	2	*PowerFlex HL*
	halauxifen	4	*Elevore*
TAVIUM	dicamba	4	*XtendiMax*
	s-metholachlor	15	*Dual Magnum*
TENDOVO	s-metholachlor	15	*Dual Magnum*
	cloransulam	2	*FirstRate*
	metribuzin	5	*Metribuzin*
TRIPLEFLEX II	acetochlor	15	*Harness*
	clopyralid	4	*Stinger*
	flumetsulam	2	*Python*
TRIPZIN ZC	pendimethalin	3	*Prowl*
	metribuzin	5	*Metribuzin*
TRIVENCE	chlorimuron	2	*Classic*
	flumioxazin	14	*Valor*
	metribuzin	5	*Metribuzin*
TRIVOLT	flufenacet	15	*Define*
	isoxaflutole	27	*Balance Flexx*
	thiencarbazone	2	*Varro*
VALOR XLT	flumioxazin	14	*Valor*
	chlorimuron	2	*Classic*
VARISTO	imazamox	2	*Raptor*
	bentazon	6	*Basagran*
VELPAR ALFAMAX	hexazinone	5	*Velpar*
	diuron	5	*Karmex*
VERDICT	saflufenacil	14	*Sharpen*
	dimethenamid-P	15	*Outlook*
WARRANT ULTRA	fomesafen	14	*Reflex*
	acetochlor	15	*Warrant*
WELD	MCPA	4	*MCPA*
	fluroxypyr	4	*Starane*
	clopyralid	4	*Stinger*
WIDEARMATCH	clopyralid	4	*Stinger*
	fluroxypyr	4	*Starane*
	halauxifen	4	*Elevore*
WIDEMATCH	clopyralid	4	*Stinger*
	fluroxypyr	4	*Starane*
WOLVERINE	fenoxaprop	1	*Tecoma*
	pyrasulfotole	27	-----
	bromoxynil	6	*Maestro*
YUKON	dicamba	4	*Banvel*
	halosulfuron	2	*Permit*
ZIDUA PRO	imazethypyr	2	*Pursuit*
	saflufenacil	14	*Sharpen*
	pyroxasulfone	15	*Zidua*
ZONE DEFENSE	sulfentrazone	14	*Spartan*
	flumioxazin	14	*Valor*

*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.
Technical editing for this publication was led by Christy Sprague, Ph.D., Michigan State University, in partnership with other universities in the soybean-growing regions of the United States.
This chart was developed with funding from the soy checkoff.
The United Soybean Board and all Take Action partners neither recommend nor discourage the implementation of any advice contained herein, and are not liable for the use or misuse of the information provided.
PRINTED WITH SOY INK. ©2022 United Soybean Board. (UCTIH-1-1122)