

RESEARCH REPORT

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This Research Report contains the progress reports of weed control studies conducted in the North Central States and Prairie Provinces of Canada in 2004. While some of the experiments are not yet completed, the preliminary reports may be quite useful to weed control workers interested in keeping abreast of the newest developments in herbicide evaluation and utilization. The brief reports are not intended to supplant full publication of the completed research in scientific journals.

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Christina Cannova, Cover Art

Darwin Stearns Productions Ltd., Program Authoring

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ABBREVIATIONS FOR HERBACEOUS WEEDS

The common names, botanical names and five-letter WSSA computer codes, for weeds correspond to the WSSA *Composite List Of Weeds*, Revised 1989. Abbreviations are designed primarily for use in tables to save space. Their use is optional, but if used they must conform to the abbreviations given in this list or in the WSSA *Composite List Of Weeds*, Revised 1989. In text, use common names only, and no abbreviations.

<u>Common Name</u>	<u>Botanical Name</u>	<u>Five-letter Code</u>
amaranth, Palmer	Amaranthus palmeri	AMAPA
amaranth, Powell	Amaranthus powellii	AMAPO
amaranth, spiny	Amaranthus spinosus	AMASP
barley, little	Hordeum pusillum	HORPU
barnyardgrass	Echinochloa crus-galli	ECHCG
bindweed, hedge	Calystegia sepium	CAGSE
bluegrass, annual	Poa annua	POAAN
broadleaves, annual		ANNBR
brome, downy	Bromus tectorum	BROTE
brome, Japanese	Bromus japonicus	BROJA
buckwheat, wild	Polygonum convolvulus	POLCO
burreed, giant	Sparganium eurycarpum	SPGEU
buttercup, smallflower	Ranunculus abortivus	RANAB
campion, white	Silene alba	MELAL
canola	Brassica napus	BRSNS
carpetweed	Mollugo verticillata	MOLVE
cheat	Bromus secalinus	BROSE
chickweed, common	Stellaria media	STEME
chickweed, mouseear	Cerastium vulgatum	CERVU
clover, white	Trifolium repens	TRFRE
cocklebur, common	Xanthium strumarium	XANST
copperleaf, Virginia	Acalypha Virginica	ACCVI
corn, volunteer	Zea mays	ZEAMX
crabgrass, large	Digitaria sanguinalis	DIGSA
crabgrass, smooth	Digitaria ischaemum	DIGIS
cupgrass, woolly	Eriochloa villosa	ERBVI
dandelion	Taraxacum officinale	TAROF
deadnettle, purple	Lamium purpureum	LAMPU
dock, curly	Rumex crispus	RUMCR
flax, volunteer	Linum usitatissimum	LINUX
fleabane, rough	Erigeron strigosus	ERIST
flixweed	Descurainia sophia	DESSO
foxtail, Carolina	Alopecurus carolinianus	ALOCA
foxtail, giant	Setaria faberi	SETFA
foxtail, green	Setaria viridis	SETVI
foxtail, species	Setaria species	SETSS
foxtail, yellow	Setaria glauca	SETLU
galinsoga, smallflower	Galinsoga parviflora	GASPA
garlic, wild	Allium vineale	ALLVI
grasses, annual		GGGAN
henbit	Lamium amplexicaule	LAMAM
horseradish	Armoracia rusticana	ARWLA
horsenettle	Solanum carolinense	SOLCA
horseweed	Conyza canadensis	ERICA
ironweed, western	Vernonia baldwinii	VENBA
jimsonweed	Datura stramonium	DATST
johnsongrass	Sorghum halepense	SORHA

<u>Common Name</u>	<u>Botanical Name</u>	<u>Five-letter Code</u>
kochia	Kochia scoparia	KCHSC
ladysthumb	Polygonum persicaria	POLPE
lambsquarters, common	Chenopodium album	CHEAL
lettuce, prickly	Latuca serriola	LACSE
mallow, common	Malva neglecta	MALNE
mallow, Venice	Hibiscus trionum	HIBTR
marestail	Hippuris vulgaris L.	HPPVU
marshelder	Iva xanthifolia	IVAXA
milkweed, common	Asclepias syriaca	ASCSY
millet, wild-proso	Panicum miliaceum	PANMI
morningglory, ivyleaf	Ipomoea hederacea	IPOHE
morningglory, pitted	Ipomoea lacunosa	IPOLA
morningglory, species	Ipomoea	IPOSS
morningglory, tall	Ipomoea purpurea	PHBPU
mustard, tansy	Descurainia pinnata	DESPI
mustard, wild	Brassica kaber	SINAR
nightshade, eastern black	Solanum tyacanthum	SOLPT
nutsedge, yellow	Cyperus esculentus	CYPES
oat, wild	Avena fatua	AVEFA
panicum, fall	Panicum dichotomiflorum	PANDI
pennycress, field	Thlaspi arvense	THLAR
pepperweed, field	Lepidium campestre	LEPCA
pigweed, prostrate	Amaranthus blitoides	AMABL
pigweed, redroot	Amaranthus retroflexus	AMARE
pigweed, smooth	Amaranthus hybridus	AMACH
pigweed, species	Amaranthus species	AMASS
pokeweed, common	Phytolacca americana	PHTAM
quackgrass	Elytrigia repens	AGRRE
ragweed, common	Ambrosia artemisiifolia	AMBEL
ragweed, giant	Ambrosia trifida	AMBTR
rocket, yellow	Barbarea vulgaris	BARVU
rye	Secale cereale	SECLE
ryegrass, Italian	Lolium multiflorum	LOLMU
shattercane	Sorghum bicolor	SORVU
shepherds-purse	Capsella bursa-pastoris	CAPBP
sida, prickly	Sida spinosa	SIDSP
smartweed, Pennsylvania	Polygonum pennsylvanicum	POLPY
sowthistle, perennial	Sonchus arvensis	SONAR
soybean	Glycine max	GLXMA
speedwell, corn	Veronica arvensis	VERAR
star-of-Bethlehem	Ornithogalum umbellatum	OTGUM
sunflower, common	Helianthus annuus	HELAN
thistle, Canada	Cirsium arvense	CIRAR
thistle, Russian	Salsola iberica	SASKR
velvetleaf	Abutilon theophrasti	ABUTH
wallflower, bushy	Erysimum repandum	ERYRE
waterhemp, common	Amaranthus rudis	AMATA
waterhemp, tall	Amaranthus tuberculatus	AMATU
waterplantain, common	Alisma plantago-aquatica	ALSPA
wheat	Triticum aestivum	TRZAZ

<u>Five-letter Code</u>	<u>Common Name</u>	<u>Botanical Name</u>
ABUTH	velvetleaf	Abutilon theophrasti
ACCVI	copperleaf, Virginia	Acalypha Virginica
AGRRE	quackgrass	Elytrigia repens
ALLVI	garlic, wild	Allium vineale
ALOCA	foxtail, Carolina	Alopecurus carolinianus
ALSPA	waterplantain, common	Alisma plantago-aquatica
AMABL	pigweed, prostrate	Amaranthus blitoides
AMACH	pigweed, smooth	Amaranthus hybridus
AMAPA	amaranth, Palmer	Amaranthus palmeri
AMAPO	amaranth, Powell	Amaranthus powellii
AMARE	pigweed, redroot	Amaranthus retroflexus
AMASP	amaranth, spiny	Amaranthus spinosus
AMASS	pigweed, species	Amaranthus species
AMATA	waterhemp, common	Amaranthus rudis
AMATU	waterhemp, tall	Amaranthus tuberculatus
AMBEL	ragweed, common	Ambrosia artemisiifolia
AMBTR	ragweed, giant	Ambrosia trifida
ANNBR	broadleaves, annual	
ARWLA	horseradish	Armoracia rusticana
ASCSY	milkweed, common	Asclepias syriaca
AVEFA	oat, wild	Avena fatua
BARVU	rocket, yellow	Barbarea vulgaris
BROJA	brome, Japanese	Bromus japonicus
BROSE	cheat	Bromus secalinus
BROTE	brome, downy	Bromus tectorum
BRSNS	canola	Brassica napus
CAGSE	bindweed, hedge	Calystegia sepium
CAPBP	shepherds-purse	Capsella bursa-pastoris
CERVU	chickweed, mouseear	Cerastium vulgatum
CHEAL	lambsquarters, common	Chenopodium album
CIRAR	thistle, Canada	Cirsium arvense
CYPES	nutsedge, yellow	Cyperus esculentus
DATST	jimsonweed	Datura stramonium
DESPI	mustard, tansy	Descurainia pinnata
DESSO	flixweed	Descurainia sophia
DIGIS	crabgrass, smooth	Digitaria ischaemum
DIGSA	crabgrass, large	Digitaria sanguinalis
ECHCG	barnyardgrass	Echinochloa crus-galli
ERBVI	cupgrass, woolly	Eriochloa villosa
ERICA	horseweed	Conyza canadensis
ERIST	fleabane, rough	Erigeron strigosus
ERYRE	wallflower, bushy	Erysimum repandum
GASPA	galinsoga, smallflower	Galinsoga parviflora
GGGAN	grasses, annual	
GLXMA	soybean	Glycine max
HELAN	sunflower, common	Helianthus annuus
HIBTR	mallow, Venice	Hibiscus trionum
HORPU	barley, little	Hordeum pusillum
HPPVU	marestail	Hippuris vulgaris L.
IPOHE	morningglory, ivyleaf	Ipomoea hederacea
IPOLA	morningglory, pitted	Ipomoea lacunosa
IPOSS	morningglory, species	Ipomoea
IVAXA	marshelder	Iva xanthifolia
KCHSC	kochia	Kochia scoparia

<u>Five-letter Code</u>	<u>Common Name</u>	<u>Botanical Name</u>
LACSE	lettuce, prickly	Lactuca serriola
LAMAM	henbit	Lamium amplexicaule
LAMPU	deadnettle, purple	Lamium purpureum
LEPCA	pepperweed, field	Lepidium campestre
LINUX	flax, volunteer	Linum usitatissimum
LOLMU	ryegrass, Italian	Lolium multiflorum
MALNE	mallow, common	Malva neglecta
MELAL	campion, white	Silene alba
MOLVE	carpetweed	Mollugo verticillata
OTGUM	star-of-Bethlehem	Ornithogalum umbellatum
PANDI	panicum, fall	Panicum dichotomiflorum
PANMI	millet, wild-proso	Panicum miliaceum
PHBPU	morningglory, tall	Ipomoea purpurea
PHTAM	pokeweed, common	Phytolacca americana
POAAN	bluegrass, annual	Poa annua
POLCO	buckwheat, wild	Polygonum convolvulus
POLPE	ladysthumb	Polygonum persicaria
POLPY	smartweed, Pennsylvania	Polygonum pennsylvanicum
RANAB	buttercup, smallflower	Ranunculus abortivus
RUMCR	dock, curly	Rumex crispus
SASKR	thistle, Russian	Salsola iberica
SECLE	rye	Secale cereale
SETFA	foxtail, giant	Setaria faberi
SETLU	foxtail, yellow	Setaria glauca
SETSS	foxtail, species	Setaria species
SETVI	foxtail, green	Setaria viridis
SIDSP	sida, prickly	Sida spinosa
SINAR	mustard, wild	Brassica kaber
SOLCA	horsenettle	Solanum carolinense
SOLPT	nightshade, eastern black	Solanum ptycanthum
SONAR	sowthistle, perennial	Sonchus arvensis
SORHA	johnsongrass	Sorghum halepense
SORVU	shattercane	Sorghum bicolor
SPGEU	burreed, giant	Sparganium eurycarpum
STEME	chickweed, common	Stellaria media
TAROF	dandelion	Taraxacum officinale
THLAR	pennycress, field	Thlaspi arvense
TRFRE	clover, white	Trifolium repens
TRZAZ	wheat	Triticum aestivum
VENBA	ironweed, western	Vernonia baldwinii
VERAR	speedwell, corn	Veronica arvensis
XANST	cocklebur, common	Xanthium strumarium
ZEAMX	corn, volunteer	Zea mays

ABBREVIATIONS FOR HERBICIDE COMMON NAMES - 2004

The abbreviations listed below have been established by the NCWSS for common names of herbicides, herbicide safeners, and other herbicide-modifying chemicals for which common names have been assigned. Abbreviations only should be used in tables and figures to save space. Authors are encouraged to spell common names wherever possible and must use the full name of each herbicide at least once in each table. When abbreviations are used, they must either conform to this NCWSS approved list or they must be footnoted. New abbreviations will be assigned as new common names are approved.

The & symbol also shall be employed when designating the inclusion within a package mix of substances other than the active ingredients (i.e. acetochlor plus dichlormid becomes acet&dcmid"). Package mix products (consisting of 2 or more active ingredients blended by the manufacturer into one product) shall be abbreviated by placing the "&" symbol between the abbreviations of the active ingredients. For example, the package mix of chlorimuron plus thifensulfuron shall be abbreviated "clim&thif". The & symbol is to be avoided for all other uses. Tank mix combinations shall use the + symbol. The / symbol shall be used to indicate a time gap between different treatments applied to the same plot. For example: Trifluralin (PPI) / Bentazon (POST).

<u>Common Name</u>	<u>Abbreviation</u>
Acetochlor	Acet
Acifluorfen	Acif
Alachlor	Alac
Ametryn	Amet
Amitrole	Amit
Atrazine	Atra
Barban	Barb
Benefin	Bnfn
Benazolin	Bena
Benoxcor	Beco
Bentazon	Bent
Benzofluor	Befl
Benzoylprop	Bepr
Bifenox	Bife
Bromacil	Brcl
Bromoxynil	Brox
Butylate	Buty
Cacodylic acid	Caco
Carfentrazone	Carf
Chloramben	Clam
Chlorimuron	Clim
Chloroxuron	Clxu
Chlorsulfuron	Clsu
Cinemethylin	Cinm
Clethodim	Clet
Clodinafop	Clfp

Common Name	Abbreviation
Clomazone	Clom
Cloproxydim	Clpx
Clopyralid	Clpy
Cloransulam	Clsm
Cyanazine	Cyan
Cycloate	Cycl
Cyometrinil	Cyom
Dalapon	Dala
Desmedipham	Desm
Diallate	Dial
Dicamba	Dica
Dichlobenil	Dibl
Dichlormid	Dcmd
Diclofop	Dcfp
Diclosulam	Dicl
Diethatyl	Dtyl
Dietholate	Dlat
Difenzoquat	Dife
Diflufenzopyr	Difl
Dimethenamid	Dimt
Dinoseb	Dino
Diphenamid	Diph
Diquat	Diqu
Dithiopyr	Dith
Diuron	Diur
DSMA	DSMA
Endothall	Endo
EPTC	EPTC
Ethalfuralin	Etha
Ethametsulfuron	Emsu
Fenoxaprop	Fenx
Flamprop	Flam
Fluazifop	Flfp
Fluazifop-P	Flfp-P
Flucarbazone	Flbz
Flufenacet	Flct
Flumetsulam	Flms
Flumiclorac	Flmc
Flumioxazin	Flmx
Flurochloridone	Flcd
Flurazole	Flzl
Fluroglycofen	Flgf
Fluroxpyr	Flox
Flurtamone	Flmn
Fomesafen	Fome

Common Name	Abbreviation
Foramsulfuron	Fora
Glufosinate	Gluf
Glyphosate	Glyt
Halosafen	Halo
Halosulfuron	Hasu
Haloxypop	Halx
Hexazinone	Heaz
Imazamethabenz	Immb
Imazamox	Immx
Imazapic	Impc
Imazapyr	Impr
Imazaquin	Imqn
Imazethapyr	Imep
Iodosulfuron	Iodo
Isouron	Isur
Isoxaben	Isox
Isoxaflutole	Isxf
Lactofen	Lact
Linuron	Linu
MAA	MAA
MAMA	MAMA
MCPA	MCPA
MCPB	MCPB
Mecoprop	Meco
Mefluidide	Mefl
Mesotrione	Meso
Methazole	Mezl
Metolachlor	Meto
S-metolachlor	S-meto
Metosulam	Mesl
Metribuzin	Metr
Metsulfuron	Mets
Molinate	Moli
MSMA	MSMA
Naphthalic anhydride	NA
Napropamide	Napr
Naptalam	Napt
Nicosulfuron	Nico
Nitrofen	Nifn
Norflurazon	Norf
Oryzalin	Oryz
Oxadiazon	Oxad
Oxyfluorfen	Oxyf
Paraquat	Para
Pendimethalin	Pend

Common Name	Abbreviation
Perfluidone	Perf
Phenmedipham	Phen
Picloram	Picl
Primisulfuron	Prim
Prometryn	Prtr
Pronamid	Pron
Propachlor	Prcl
Propanil	Prnl
Propazine	Przn
Prosulfuron	Pros
Pyrazon	Pyzn
Pyridate	Pydt
Pyrithiobac	Pyrb
Quinclorac	Qucl
Quizalofop	Qufp
Rimsulfuron	Rims
Sethoxydim	Seth
Siduron	Sidu
Simazine	Sima
Sulfentrazone	Suen
Sulfometuron	Sume
Tebuthiuron	Tebu
Tebacil	Tecl
Terbutryn	Tert
Thiazopyr	Thzp
Tralkoxydim	Tral
Triallate	Tria
Tribenuron	Trib
Triclopyr	Trcp
Tridiphane	Trid
Thifensulfuron	Thif
Trifluralin	Trif
Triflusulfuron	Tfsu
2,4-D	2,4-D
2,4-DB	2,4-DB
Vernolate	Vern

CHEMISTRY OF HERBICIDES

Nomenclature is based on Weed Science Society of America designations of common names for herbicides whenever available. If no common name has been assigned, herbicides are listed by code numbers. This is an incomplete list of chemical names and nomenclature. Please refer to the WSSA Herbicide Handbook or WSSA website for further information.

Herbicide	Chemistry
2,4-D	(2,4-dichlorophenoxy)acetic acid
2,4-DB	4-(2,4-dichlorophenoxy)butanoic acid
AC263,222	(±)-2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1H-imidazol-2-yl]-5-methyl-3-pyridinecarboxylic acid
acetochlor	2-chloro-N-(ethoxymethyl)-N-(2-ethyl-6-methylphenyl)acetamide
acifluorfen	5-[2-chloro-4-(trifluoromethyl)phenoxy]-2-nitrobenzoic acid
alachlor	2-chloro-N-(2,6-diethylphenyl)-N-(methoxymethyl) acetamide
ametryn	N-ethyl-N'-(1-methylethyl)-6-(methylthio)-1,3,5-triazine-2,4-diamine
amitrole	1H-1,2,4-triazol-3-amine
asulam	methyl [(4-aminophenyl)sulfonyl]carbamate
atrazine	6-chloro-N-ethyl-N'-(1-methylethyl)-1,3,5-triazine-2,4-diamine
azafenidin	2-[2,4-dichloro-5-(2-propynyloxy)phenyl]-5,6,7,8-tetrahydro-1,2,4-triazolo[4,3-a]pyridin-3(2H)-one
BAS 514H	3,7-dichloro-8-quinolinecarboxylic acid
BAS-51702	2-[1-(ethoxyimino)butyl]-3-hydroxy-5-(2H-tetrahydrothiopyran-3-yl)-2-cyclohexen-1-one
benefin	N-butyl-N-ethyl-2,6-dinitro-4-(trifluoromethyl)benzenamine
benoxacor (CGA-154281)	4-(dichloroacetyl)-3,4-dihydro-3-methyl-2H-1,4-benzoxazine
bensulide	O,O-bis(1-methylethyl) S-[2-[(phenylsulfonyl)amino]ethyl]phosphorodithioate
bentazon	3-(1-methylethyl)-(1H)-2,1,3-benzothiadiazin-4(3H)-one 2,2-dioxide
bromoxynil	3,5-dibromo-4-hydroxybenzotrile
butylate	S-ethyl bis(2-methylpropyl)carbamothioate
carfentrazone	X,2-dichloro-5-[4-(difluoromethyl)-4,5-dihydro-3-methyl-5-oxo-1H-1,2,4-triazol-1-yl]-4-fluorobenzenepropanoic acid
CGA-133205	1-(4-chlorophenyl)-2,2,2-trifluoro-1-ethanone O-(1,3-dioxolan-2-ylmethyl)oxime
CGA-277476	2-[[[(4,6-dimethyl-2-pyrimidinyl)-amino]carbonyl]amino]sulfonyl]benzoic acid, 3-oxetanyl ester
CGA-92194	a-[1,3-dioxolan-2ylmethoxy]imino]benzeneacetonitrile
chlorimuron	ethyl 2-[[[(4-chloro-6-methoxy-2-pyrimidinyl)amino]carbonyl]amino]sulfonyl]benzoate

Herbicide	Chemistry
chlorsulfuron	2-chloro- <u>N</u> -[[[(4-methoxy-6-methyl-1,3,5-triazin-2yl)amino]carbonyl]benzenesulfonamide
cinmethylin	<u>exo</u> -1-methyl-4-(1-methylethyl)-2-[(2-methylphenyl)methoxy]-7-oxabicyclo[2.2.1]heptane
clethodim	(<u>E,E</u>)-(+)-2-[1-[[[(3-chloro-2-propenyl)oxy]imino]propyl]-5-[2-(ethylthio)propyl]-3-hydroxy-2-cyclohexen-1-one
clodinafop	(2 <i>R</i>)-2-[4-[(5-chloro-3-fluoro-2-pyridinyl)oxy]phenoxy]propanoic acid
clomazone	2-[(2-chlorophenyl)methyl]-4,4-dimethyl-3-isoxazolidinone
clopyralid	3,6-dichloro-2-pyridinecarboxylic acid
cloquintocet	[(5-chloro-8-quinolinyl)oxy]acetic acid
cloransulam	<u>N</u> -(2-carboxymethyl-6-chlorophenyl)-5-ethoxy-7-fluoro(1,2,4)triazolo-(1,5c)-pyrimidine-2-sulfonamide
cyanazine	2-[[4-chloro-6-(ethylamino)-1,3,5-triazin-2-yl]amino]-2-methylpropanenitrile
cycloate	<u>S</u> -ethyl cyclohexylethylcarbamoithoate
dalapon	2,2-dichloropropanoic acid
DCPA	dimethyl 2,3,5,6-tetrachloro-1,4-benzenedicarboxylate
desmedipham	ethyl [3-[[[(phenylamino)carbonyl]oxy]phenyl]carbamate
dicamba	3,6-dichloro-2-methoxybenzoic acid
dichlobenil	2,6-dichlorobenzonitrile
dichlormid	2,2-dichloro- <u>N,N</u> -di-2-propenylacetamide
dichlorprop	(+)-2-(2,4-dichlorophenoxy)propanoic acid
diclofop	(+)-2-[4-(2,4-dichlorophenoxy)phenoxy]propanoic acid
diethylatyl	<u>N</u> -(chloroacetyl)- <u>N</u> -(2,6-diethylphenyl)glycine
difenzoquat	1,2-dimethyl-3,5-diphenyl-1 <u>H</u> -pyrazolium
diflufenzopyr	2-[1-[[[(3,5-difluorophenyl)amino]carbonyl]hydrazono]ethyl]-3-pyridinecarboxylic acid
dimethenamid	(<u>RS</u>) 2-chloro- <u>N</u> -(2,4-dimethyl-3-thienyl)- <u>N</u> -(2-methoxy-1-methylethyl)acetamide
diphenamid	<u>N,N</u> -dimethyl-2,2-diphenylacetamide
diquat	6,7-dihydrodipyrido[1,2- <u>a</u> :2',1'- <u>c</u>]pyrazinediium ion
dithiopyr	<u>S,S</u> -dimethyl 2-(difluoromethyl)-4-(2-methylpropyl)-6-(trifluoromethyl)-3,5-pyridinedicarbothioate
diuron	<u>N'</u> -(3,4-dichlorophenyl)- <u>N,N</u> -dimethylurea
endothall	7-oxabicyclo[2.2.1]heptane-2,3-dicarboxylic acid
EPTC	<u>S</u> -ethyl dipropyl carbamoithoate
ethalfluralin	<u>N</u> -ethyl- <u>N</u> -(2-methyl-2-propenyl)-2,6-dinitro-4-(trifluoromethyl)benzenamine

Herbicide	Chemistry
ethametsulfuron	methyl 2-[[[[[4-ethoxy-6-(methylamino)-1,3,5-triazin-2-yl]amino]carbonyl]amino]sulfonyl]benzoate
ethofumesate	(±)-2-ethoxy-2,3-dihydro-3,3-dimethyl-5-benzofuranyl methanesulfonate
fenoxaprop	(±)-2-[4-[(6-chloro-2-benzoxazolyl)oxy]phenoxy]propanoic acid
fluazifop-P	(R)-2-[4[[5-(trifluoromethyl)-2-pyridinyl]oxy]phenoxy]propanoic acid
flucarbazone	4,5-dihydro-3-methoxy-4-methyl-5-oxo- <i>N</i> -[[2-(trifluoromethoxy)phenyl]sulfonyl]-1 <i>H</i> -1,2,4-triazole-1-carboxamide
flufenacet	<i>N</i> -(4-fluorophenyl)- <i>N</i> -(1-methylethyl)-2-[5-trifluoromethyl]-1,3,4-thiadiazol-2-yl]acetamide
flumetsulam	<i>N</i> -(2,6-difluorophenyl)-5-methyl[1,2,4]triazolo[1,5- <i>a</i>]pyrimidine-2-sulfonamide
flumiclorac	[2-chloro-4-fluoro-5-(1,3,4,5,6,7-hexahydro-1,3-dioxo-2 <i>H</i> -isoindol-2-yl)phenoxy]acetic acid
flumioxazin	2-[7-fluoro-3,4-dihydro-3-oxo-(2-propynyl)-2 <i>H</i> -1,4-benzoxazin-6-yl]-4,5,6,7-tetrahydro-1 <i>H</i> -isoindole-1,3(2 <i>H</i>)-dione
fluorochloridone	3-chloro-4-(chloromethyl)-1-[3-(trifluoromethyl)phenyl]-2-pyrrolidinone
flurazole	phenylmethyl 2-chloro-4-(trifluoromethyl)-5-thiazolecarboxylate
fluroxypyr	[(4-amino-3,5-dichloro-6-fluoro-2-pyridinyl)oxy] acetic acid
flurtamone	5-(methylamino)-2-phenyl-4-(3-trifluoromethylphenyl)-3(2 <i>H</i>)-furanone
fluthiacet-methyl	methyl [[2-chloro-4-fluoro-5-[(tetrahydro-3-oxo-1 <i>H</i> ,3 <i>H</i> -[1,3,4]thiadiazolo[3,4- <i>a</i>]pyridazin-1-ylidene)amino]phenyl]thio]acetate
fomesafen	5-[2-chloro-4-(trifluoromethyl)phenoxy]- <i>N</i> -(methylsulfonyl)-2-nitrobenzamide
foramsulfuron	2-[[[[[4,6-dimethoxy-2-pyrimidinyl]amino]carbonyl]amino]sulfonyl]-4-(formylamino)- <i>N,N</i> -dimethylbenzamide
fosamine	ethyl hydrogen (aminocarbonyl)phosphate
glufosinate	2-amino-4-(hydroxymethylphosphinyl)butanoic acid
glyphosate	<i>N</i> -(phosphonomethyl)glycine
halosulfuron	methyl 3-chloro-5-(4,6dimethoxypyrimidin-2-ylcarbamoysulfamoyl)-1-methylpyrazole-4-carboxylate
haloxyfop	(±)-2-[4-[[3-chloro-5-(trifluoromethyl)-2-pyridinyl]oxy]phenoxy]propanoic acid
hexazinone	3-cyclohexyl-6-(dimethylamino)-1-methyl-1,3,5-triazine-2,4(1 <i>H</i> ,3 <i>H</i>)-dione
ICIA-0051	2-(2-chloro-4-mesybenzoyl)cyclohexane-1,3-dione
ICIA-0224	trimethylsulfonium carboxymethylaminomethyl phosphonate
imazamethabenz	(±)-2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1 <i>H</i> -imidazol-2-yl]-4(and 5)-methylbenzoic acid (3:2)
imazamox	2-(4-isopropyl-4-methyl-5-oxo-2-imidazolin-2-yl)-5-(methoxymethyl)nicotinic acid

Herbicide	Chemistry
imazapic	(+)-2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1H-imidazol-2-yl]-5-methyl-3-pyridinecarboxylic acid
imazapyr	(±)-2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1H-imidazol-2-yl]-3-pyridinecarboxylic acid
imazaquin	2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1H-imidazol-2-yl]-3-quinolinecarboxylic acid
imazethapyr	2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1H-imidazol-2-yl]-5-ethyl-3-pyridinecarboxylic acid
iodosulfuron	4-iodo-2-[[[(4-methoxy-6-methyl-1,3,5-triazin-2-yl)amino]carbonyl]amino]sulfonyl]benzoic acid
isoxaben	<u>N</u> -[3-(1-ethyl-1-methylpropyl)-5-isoxazolyl]-2,6-dimethoxybenzamide
isoxaflutole	(5-cyclopropyl-4-isoxazolyl)[2-(methylsulfonyl)-4-(trifluoromethyl)-phenyl]methanone
lactofen	(±)-2-ethoxy-1-methyl-2-oxoethyl 5-[2-chloro-4-(trifluoromethyl)phenoxy]-2-nitrobenzoate
linuron	<u>N</u> '-(3,4-dichlorophenyl)- <u>N</u> -methoxy- <u>N</u> -methylurea
MCPA	(4-chloro-2-methylphenoxy)acetic acid
MCPB	4-(4-chloro-2-methylphenoxy)butanoic acid
mecoprop	(±)-2-(4-chloro-2-methylphenoxy)propanoic acid
mefluidide	<u>N</u> -[2,4-dimethyl-5-[(trifluoromethyl)sulfonyl]amino]phenyl]acetamide
mesotrione	2-(4-mesyloxy-2-nitrobenzoyl)-3-hydroxycyclohex-2-enone
metolachlor	2-chloro- <u>N</u> -(2-ethyl-6-methylphenyl)- <u>N</u> -(2-methoxy-1-methylethyl)acetamide
metribuzin	4-amino-6-(1,1-dimethylethyl)-3-(methylthio)-1,2,4-triazin-5(4H)-one
metsulfuron	methyl 2-[[[(4-methoxy-6-methyl-1,3,5-triazin-2-yl)amino]carbonyl]amino]sulfonyl]benzoate
MKH 6561	methyl 2-({[(4-methyl-5-oxo-3-propoxy-4,5-dihydro-1H-1,2,4-triazol-1-yl)carbonyl]amino}sulfonyl)benzoate
MON 13900	(±)-3-dichloroacetyl-5-(2-furyl)-2,2-dimethyl-1,3-oxazolidine
MON 4660	4-(dichloroacetyl)-1-oxa-4azaspiro[4,5]decane
napropamide	<u>N,N</u> -diethyl-2-(1-naphthalenyloxy)propanamide
naptalam	2-[(1-naphthalenylamino)carbonyl]benzoic acid
nicosulfuron	2-[[[(4,6-dimethoxy-2-pyrimidinyl)amino]carbonyl]amino]sulfonyl]- <u>N,N</u> -dimethyl-3-pyridinecarboxamide
norflurazon	4-chloro-5-(methylamino)-2-(3-(trifluoromethyl)phenyl)-3(2H)-pyridazinone
oryzalin	4-(dipropylamino)-3,5-dinitrobenzenesulfonamide
oxadiazon	3-[2,4-dichloro-5-(1-methylethoxy)phenyl]-5-(1,1-dimethylethyl)-1,3,4-oxadiazol-2-(3H)-one

Herbicide	Chemistry
oxyfluorfen	2-chloro-1-(3-ethoxy-4-nitrophenoxy)-4-(trifluoromethyl)benzene
paraquat	1,1'-dimethyl-4,4'-bipyridinium ion
pendimethalin	<u>N</u> -(1-ethylpropyl)-3,4-dimethyl-2,6-dinitrobenzeneamine
phenmedipham	3-[(methoxycarbonyl)amino]phenyl(3-methylphenyl)carbamate
picloram	4-amino,3,5,6-trichloro-2-pyridinecarboxylic acid
primisulfuron	methyl 2-[[[[[4,6-bis(difluoromethoxy)-2-pyrimidinyl]amino]carbonyl]amino]sulfonyl]benzoate
prodiamine	2,4-dinitro- <u>N</u> ³ , <u>N</u> ³ -dipropyl-6-(trifluoromethyl)-1,3-benzenediamine
prometryn	<u>N</u> , <u>N</u> '-bis(1-methylethyl)-6-(methylthio)-1,3,5-triazine-2,4-diamine
pronamide	3,5-dichloro(<u>N</u> -1,1-dimethyl-2-propynyl)benzamide
propachlor	2-chloro- <u>N</u> -(1-methylethyl)- <u>N</u> -phenylacetamide
propanil	<u>N</u> -(3,4-dichlorophenyl)propanamide
propazine	6-chloro- <u>N</u> , <u>N</u> '-bis(1-methylethyl)-1,3,5-triazine-2,4-diamine
prosulfuron	<i>N</i> -[[[(4-methoxy-6-methyl-1,3,5-triazin-2-yl)amino]carbonyl]-2-(3,3,3-trifluoropropyl)benzenesulfonamide
pyrazon	5-amino-4-chloro-2-phenyl-3(2H)-pyridazinone
pyridate	<u>O</u> -(6-chloro-3-phenyl-4-pyridazinyl) <u>S</u> -octyl carbonothioate
quinclorac	3,7-dichloro-9-quinolinecarboxylic acid
quizalofop-P	(<u>R</u>)-2-[4-[(6-chloro-2-quinoxalinyloxy]phenoxy]propanoic acid
R-29148	3-(dichloroacetyl)-2,2,5-trimethyloxazolidine
rimsulfuron	<u>N</u> -[[[4,6-dimethoxy-2-pyrimidinyl]amino]carbonyl]-3-(ethylsulfonyl)-2-pyridinesulfonamide
RP-020630	5- <i>tert</i> -butyl-3-(2,4-dichloro-5-propargyloxyphenyl)-1,3,4-oxadiazol-2(3 <i>H</i>)-one
s-metolachlor	s-2-chloro- <i>N</i> -(2-ethyl-6-methylphenyl)- <u>N</u> -(2-methoxy-1-methylethyl)acetamide
sethoxydim	2-[1-(ethoxyamino)-butyl]-5-[2-(ethylthio)propyl]-3-hydroxy-2-cyclohexen-1-one
simazine	6-chloro- <u>N</u> , <u>N</u> '-diethyl-1,3,5-triazine-2,4-diamine
sulfentrazone	2',4'-dichloro-5'-(4-difluoromethyl-4,5-dihydro-3-methyl-5-oxo-1H-1,2,4-triazol-1-yl)methanesulfonanilide
sulfometuron	2-[[[[[4,6-dimethyl-2-pyrimidinyl]amino]carbonyl]amino]sulfonyl]benzoate
sulfosulfuron	<i>N</i> -[[[(4,6-dimethoxy-2-pyrimidinyl)amino]carbonyl]-2-(ethylsulfonyl)imidazo[1,2- <i>a</i>]pyridine-3-sulfonamide
terbacil	5-chloro-3-(1,1-dimethylethyl)-6-methyl-2,4-(1H,3H)-pyrimidinedione
terbutryn	<u>N</u> -(1,1-dimethylethyl)- <u>N</u> 'ethyl-6-(methylthio)-1,3,5-triazine-2,4-diamine
thiazopyr	methyl 2-(difluoromethyl)-5-(4,5-dihydro-2-thiazoyl)-4-(2-methylpropyl)-6-(trifluoromethyl)-3-pyridinecarboxylate

Herbicide	Chemistry
thifensulfuron	methyl 3-[[[(4-methoxy-6-methyl-1,3,5-triazin-2-yl)amino]carbonyl]amino]sulfonyl]-2-thiophenecarboxylate
thiobencarb	<u>S</u> -[(4-chlorophenyl)methyl]diethylcarbamothioate
tralkoxydim	2-[1-(ethoxyimino)propyl]-3-hydroxy-5-(2,4,6-trimethylphenyl)-cyclohex-2-enone
triallate	<u>S</u> -(2,3,3-trichloro-2-propenyl)bis(1-methylethyl)carbamothioate
triasulfuron	2-(2-chloroethoxy)- <u>N</u> -[[4-methoxy-6-methyl-1,3,5-triazin-2-yl)amino]carbonyl]benzenesulfonamide
tribenuron	methyl 2-[[[(4-methoxy-6-methyl-1,3,5-triazin-2-yl)methyl]amino]carbonyl]amino]sulfonyl]benzoate
triclopyr	[(3,5,6-trichloro-2-pyridinyl)oxy]acetic acid
trifluralin	2,6-dinitro- <u>N,N'</u> -dipropyl-4-(trifluoromethyl)benzenamine
triflurosulfuron	methyl 2-[[[(4-(dimethylamino)-6-(2,2,2-trifluoroethoxy)-1,3,5-triazin-2-yl)amino]carbonyl]amino]sulfonyl]-3-methylbenzoate
trinexapac-ethyl (proposed)	4-(Cyclopropyl- α -hydroxymethylene)-3,5-dioxo-cyclohexanecarboxylic acid ethylester
vernolate	<u>S</u> -propyl dipropylcarbamothioate

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