

RESEARCH REPORT

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2003

This Research Report contains the progress reports of weed control studies conducted in the North Central States and Prairie Provinces of Canada in 2003. 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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imazethapyr&glyphosate

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Lightning 85, 87, 89, 93

imazethapyr&pendimethalin

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MCPA ester 25, 27

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mesotrione&s-metolachlor&CGA-154281

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nicosulfuron&dicamba&diflufenzopyr
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nicosulfuron&rimsulfuron
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rimsulfuron&atrazine&nicosulfuron
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rimsulfuron&clopyralid&flumetsulam&nicosulfuron
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rimsulfuron&nicosulfuron
 Steadfast 75, 77, 85, 87, 89, 93, 95, 97, 101, 104, 111, 115, 119, 121, 123, 126, 144, 150, 211

rimsulfuron&nicosulfuron&atrazine

Basis Gold 97

rimsulfuron&thifensulfuron

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s-metolachlor&atrazine&CGA-154281

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Cinch ATZ 97, 104, 119, 121, 128, 144

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s-metolachlor&atrazine&mesotrione&CGA-154281

Lumax 5, 12, 61, 70, 73, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 101, 119, 121, 150, 152, 214, 218

s-metolachlor&CGA-154281

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s-metolachlor&glyphosate&atrazine

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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.

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

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

Five-letter Code

ABUTH
 ACCVI
 AGRRE
 ALLVI
 ALOCA
 ALSPA
 AMABL
 AMACH
 AMAPA
 AMAPO
 AMARE
 AMASP
 AMASS
 AMATA
 AMATU
 AMBEL
 AMBTR
 ANNBR
 ARWLA
 ASCSY
 AVEFA
 BARVU
 BROJA
 BROSE
 BROTE
 BRSNS
 CAGSE
 CAPBP
 CERVU
 CHEAL
 CIRAR
 CYPES
 DATST
 DESPI
 DESSO
 DIGIS
 DIGSA
 ECHCG
 ERBVI
 ERICA
 ERIST
 ERYRE
 GASPA
 GGGAN
 HELAN
 HIBTR
 HORPU
 HPPVU
 IPOHE
 IPOLA
 IPOSS
 IVAXA
 KCHSC

Common Name

velvetleaf
 copperleaf, Virginia
 quackgrass
 garlic, wild
 foxtail, Carolina
 waterplantain, common
 pigweed, prostrate
 pigweed, smooth
 amaranth, Palmer
 amaranth, Powell
 pigweed, redroot
 amaranth, spiny
 pigweed, species
 waterhemp, common
 waterhemp, tall
 ragweed, common
 ragweed, giant
 broadleaves, annual
 horseradish
 milkweed, common
 oat, wild
 rocket, yellow
 brome, Japanese
 cheat
 brome, downy
 canola
 bindweed, hedge
 shepherds-purse
 chickweed, mouseear
 lambsquarters, common
 thistle, Canada
 nutsedge, yellow
 jimsonweed
 mustard, tansy
 flixweed
 crabgrass, smooth
 crabgrass, large
 barnyardgrass
 cupgrass, woolly
 horseweed
 fleabane, rough
 wallflower, bushy
 galinsoga, smallflower
 grasses, annual
 sunflower, common
 mallow, Venice
 barley, little
 marestalk
 morningglory, ivyleaf
 morningglory, pitted
 morningglory, species
 marshelder
 kochia

Botanical Name

Abutilon theophrasti
 Acalypha Virginica
 Elytrigia repens
 Allium vineale
 Alopecurus carolinianus
 Alisma plantago-aquatica
 Amaranthus blitoides
 Amaranthus hybridus
 Amaranthus palmeri
 Amaranthus powellii
 Amaranthus retroflexus
 Amaranthus spinosus
 Amaranthus species
 Amaranthus rudis
 Amaranthus tuberculatus
 Ambrosia artemisiifolia
 Ambrosia trifida

 Armoracia rusticana
 Asclepias syriaca
 Avena fatua
 Barbarea vulgaris
 Bromus japonicus
 Bromus secalinus
 Bromus tectorum
 Brassica napus
 Calystegia sepium
 Capsella bursa-pastoris
 Cerastium vulgatum
 Chenopodium album
 Cirsium arvense
 Cyperus esculentus
 Datura stramonium
 Descurainia pinnata
 Descurainia sophia
 Digitaria ischaemum
 Digitaria sanguinalis
 Echinochloa crus-galli
 Eriochloa villosa
 Conyza canadensis
 Erigeron strigosus
 Erysimum repandum
 Galinsoga parviflora

 Helianthus annuus
 Hibiscus trionum
 Hordeum pusillum
 Hippuris vulgaris L.
 Ipomoea hederacea
 Ipomoea lacunosa
 Ipomoea
 Iva xanthifolia
 Kochia scoparia

Five-letter Code

LACSE
LAMAM
LAMPU
LEPCA
LINUX
LOLMU
MALNE
MELAL
MOLVE
OTGUM
PANDI
PANMI
PHBPU
PHTAM
POAAN
POLCO
POLPE
POLPY
RANAB
RUMCR
SASKR
SECLE
SETFA
SETLU
SETSS
SETVI
SIDSP
SINAR
SOLPT
SONAR
SORHA
SORVU
SPGEU
STEME
TAROF
THLAR
TRFRE
TRZAZ
VERAR
XANST
ZEAMX

Common Name

lettuce, prickly
henbit
deadnettle, purple
pepperweed, field
flax, volunteer
ryegrass, Italian
mallow, common
campion, white
carpetweed
star-of-Bethlehem
panicum, fall
millet, wild-proso
morningglory, tall
pokeweed, common
bluegrass, annual
buckwheat, wild
ladysthumb
smartweed, Pennsylvania
buttercup, smallflower
dock, curly
thistle, Russian
rye
foxtail, giant
foxtail, yellow
foxtail, species
foxtail, green
sida, prickly
mustard, wild
nightshade, eastern black
sowthistle, perennial
johnsongrass
shattercane
burreed, giant
chickweed, common
dandelion
pennycress, field
clover, white
wheat
speedwell, corn
cocklebur, common
corn, volunteer

Botanical Name

Latuca serriola
Lamium amplexicaule
Lamium purpureum
Lepidium campestre
Linum usitatissimum
Lolium multiflorum
Malva neglecta
Silene alba
Mollugo verticillata
Ornithogalum umbellatum
Panicum dichotomiflorum
Panicum miliaceum
Ipomoea purpurea
Phytolacca americana
Poa annua
Polygonum convolvulus
Polygonum persicaria
Polygonum pennsylvanicum
Ranunculus abortivus
Rumex crispus
Salsola iberica
Secale cereale
Setaria faberi
Setaria glauca
Setaria species
Setaria viridis
Sida spinosa
Brassica kaber
Solanum ptycanthum
Sonchus arvensis
Sorghum halepense
Sorghum bicolor
Sparganium eurycarpum
Stellaria media
Taraxacum officinale
Thlaspi arvense
Trifolium repens
Triticum aestivum
Veronica arvensis
Xanthium strumarium
Zea mays

ABBREVIATIONS FOR HERBICIDE COMMON NAMES

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>
2,4-D	2,4-D
2,4-DB	2,4-DB
Acetochlor	Acet
Acifluorfen	Acif
Alachlor	Alac
Ametryn	Amet
Amitrole	Amit
Atrazine	Atra
Barban	Barb
Benzofluor	Befl
Benazolin	Bena
Bentazon	Bent
Benzoylprop	Bepr
Bifenox	Bife
Benefin	Bfn
Bromacil	Brcl
Bromoxynil	Brox
Butylate	Buty
Cacodylic acid	Caco
Carfentrazone	Carf
Cinemethylin	Cinm
Chloramben	Clam
Clethodim	Clet
Clodinafop	Clfp

Common Name	Abbreviation
Chlorimuron	Clim
Clomazone	Clom
Cloproxydim	Clpx
Clopyralid	Clpy
Cloransulam	Clsm
Chlorsulfuron	Clsu
Chloroxuron	Clxu
Cyanazine	Cyan
Cycloate	Cycl
Cyometrinil	Cyom
Dalapon	Dala
Diclofop	Dcfp
Dichlormid	Dcmd
Desmedipham	Desm
Diallate	Dial
Dichlobenil	Dibl
Dicamba	Dica
Diclosulam	Dicl
Difenzoquat	Dife
Diflufenzopyr	Difl
Dimethenamid	Dime
Dinoseb	Dino
Diphenamid	Diph
Diquat	Diqu
Dithiopyr	Dith
Diuron	Diur
Dietholate	Dlat
DSMA	DSMA
Diethyl	Dtyl
Ethametsulfuron	Emsu
Endothall	Endo
EPTC	EPTC
Ethalfuralin	Etha
Fenoxaprop	Fenx
Flamprop	Flam
Flucarbazone	Ffbz
Flurochloridone	Flcd
Flufenacet	Ffct
Fluazifop	Ffip
Fluazifop-P	Ffip-P
Fluroglycofen	Ffgf
Flumiclorac	Flmc
Flurtamone	Flmn
Flumetsulam	Flms
Flumioxazin	Flmx

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

Common Name	Abbreviation
Oxyfluorfen	Oxyf
Paraquat	Para
Pendimethalin	Pend
Perfluidone	Perf
Phenmedipham	Phen
Picloram	Picl
Propachlor	Prcl
Primisulfuron	Prim
Propanil	Pmnl
Pronamid	Pron
Prosulfuron	Pros
Prometryn	Prtr
Propazine	Przn
Pyridate	Pydt
Pyrithiobac	Pyrb
Pyrazon	Pyzn
Quinclorac	Qucl
Quizalofop	Qufp
Rimsulfuron	Rims
S-metolachlor	S-meto
Sethoxydim	Seth
Sulfosulfuron	Sfsu
Siduron	Sidu
Simazine	Sima
Sulfentrazone	Suen
Sulfometuron	Sume
Tebuthiuron	Tebu
Tebacil	Tecl
Terbutryn	Tert
Triflusulfuron	Tfsu
Thifensulfuron	Thif
Thiazopyr	Thzp
Tralkoxydim	Tral
Triclopyr	Trcp
Triallate	Tria
Tribenuron	Trib
Tridiphane	Trid
Trifluralin	Trif
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
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-hydroxybenzoxynitrile
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-155281	4-(dichloroacetyl)-3,4-dihydro-3-methyl-2H-1,4-benzoxazine
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
chlorsulfuron	2-chloro- <u>N</u> -[[[(4-methoxy-6-methyl-1,3,5-triazin-2-yl)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
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
diethatyl	<u>N</u> -(chloroacetyl)- <u>N</u> -(2,6-diethylphenyl)glycine
difenzoquat	1,2-dimethyl-3,5-diphenyl-1 <i>H</i> -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>]pyrazinedium 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

ethalfuralin	<u>N</u> -ethyl- <u>N</u> -(2-methyl-2-propenyl)-2,6-dinitro-4-(trifluoromethyl)benzenamine
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	<u>N</u> -(2,6-difluorophenyl)-5-methyl[1,2,4]triazolo[1,5- <u>a</u>]pyrimidine-2-sulfonamide
flumiclorac	[2-chloro-4-fluoro-5-(1,3,4,5,6,7-hexahydro-1,3-dioxo-2H-isoindol-2-yl)phenoxy]acetic acid
flumioxazin	2-[7-fluoro-3,4-dihydro-3-oxo-(2-propynyl)-2H-1,4-benzoxazin-6-yl]-4,5,6,7-tetrahydro-1H-isoindole-1,3(2H)-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(2H)-furanone
fluthiacet-methyl	methyl [[2-chloro-4-fluoro-5-[(tetrahydro-3-oxo-1H,3H-[1,3,4]thiadiazolo[3,4-a]pyridazin-1-ylidene)amino]phenyl]thio]acetate
fomesafen	5-[2-chloro-4-(trifluoromethyl)phenoxy]- <u>N</u> -(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	<u>N</u> -(phosphonomethyl)glycine
halosulfuron	methyl 3-chloro-5-(4,6dimethoxypyrimidin-2-ylcarbamoylsulfamoyl)-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(1H,3H)-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-1H-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

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	N-[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	N'-(3,4-dichlorophenyl)-N-methoxy-N-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	N-[2,4-dimethyl-5-[[trifluoromethyl]sulfonyl]amino]phenyl]acetamide
mesotrione	2-(4-mesyl-2-nitrobenzoyl)-3-hydroxycyclohex-2-enone
metolachlor	2-chloro-N-(2-ethyl-6-methylphenyl)-N-(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	N,N-diethyl-2-(1-naphthalenyloxy)propanamide
naptalam	2-[(1-naphthalenylamino)carbonyl]benzoic acid
nicosulfuron	2-[[[(4,6-dimethoxy-2-pyrimidinyl)amino]carbonyl]amino]sulfonyl]-N,N-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
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-quinoxalanyl)oxy]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
<i>s</i> -metolachlor	<i>s</i> -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)methanesulfonamide
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

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
triflusulfuron	methyl 2-[[[(4-(dimethylamino)-6-(2,2,2-trifluoroethoxy)-1,3,5-triazin-2-yl)amino] carbonyl]amino]sulfonyl]-3-methylbenzoate
vernolate	<u>S</u> -propyl dipropylcarbamothioate

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September 12, 2003

We are grateful for the support of the following

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