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(54) **PYRIMIDINYLOXY BENZENE DERIVATIVES AS HERBICIDES**

(71) Applicant: **FMC CORPORATION**, PHILADELPHIA, PA (US)

(72) Inventors: **Nicholas Ryan Deprez**, East Windsor, NJ (US); **Ravisekhara Pochimireddy Reddy**, Secunderabad (IN); **Paula Louise Sharpe**, Middletown, DE (US); **Thomas Martin Stevenson**, Newark, DE (US)

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(57) **ABSTRACT**

Disclosed are compounds of Formula 1, including all stereoisomers, N-oxides, and salts thereof,

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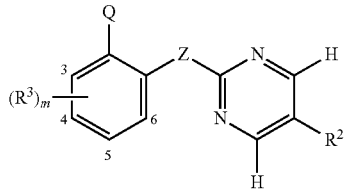

wherein

Q, Z, R^2, R^3 and m are as defined in the disclosure.

Also disclosed are compositions containing the compounds of Formula 1 and methods for controlling undesired vegetation comprising contacting the undesired vegetation or its environment with an effective amount of a compound or a composition of the invention.

PYRIMIDINYLOXY BENZENE DERIVATIVES AS HERBICIDES

FIELD OF THE INVENTION

[0001] This invention relates to certain pyrimidinyloxy benzene derivatives, their N-oxides, salts and compositions, and methods of their use for controlling undesirable vegetation.

BACKGROUND OF THE INVENTION

[0002] The control of undesired vegetation is extremely important in achieving high crop efficiency. Achievement of selective control of the growth of weeds especially in such useful crops as rice, soybean, sugar beet, maize, potato, wheat, barley, tomato and plantation crops, among others, is very desirable. Unchecked weed growth in such useful crops can cause significant reduction in productivity and thereby result in increased costs to the consumer. The control of undesired vegetation in noncrop areas is also important. Many products are commercially available for these purposes, but the need continues for new compounds that are more effective, less costly, less toxic, environmentally safer or have different sites of action.

[0003] JP 61236766 A (Sumitomo, 1986) discloses certain carbon-linked pyrimidinyloxy benzene derivitaves as herbicides. WO 94/17059 (Nippon Soda, 1994) discloses certain carbon linked pyrimidinyloxy benzene derivative as herbicides.

SUMMARY OF THE INVENTION

[0004] This invention is directed to compounds of Formula 1 (including all stereoisomers), (N-oxides, and salts thereof), agricultural compositions containing them and their use as herbicides:

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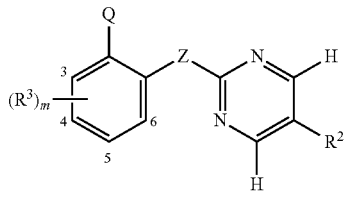


[0005] Q is a 5- or 6-membered aromatic heterocylic ring, bound to the remainder of Formula 1 through a carbon atom, and optionally substituted with 1 to 4 R^1;

[0006] Z is O or S;

[0007] each R^1 is independently halogen, cyano, nitro, SF_5, CHO, $C(=O)NH_2$, $C(=S)NH_2$, SO_2NH_2, C_1-C_4 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, C_1-C_4 haloalkyl, C_2-C_4 haloalkenyl, C_2-C_4 haloalkynyl, C_3-C_6 cycloalkyl, C_3-C_6 halocycloalkyl, C_4-C_8 alkylcycloalkyl, C_4-C_8 cycloalkylalkyl, C_2-C_6 alkylcarbonyl, C_2-C_6 haloalkylcarbonyl, C_2-C_6 alkoxycarbonyl, C_3-C_7 cycloalkylcarbonyl, C_2-C_8 alkylaminocarbonyl, C_3-C_{10} dialkylaminocarbonyl, C_1-C_4 alkoxy, C_3-C_4 alkenyloxy, C_3-C_4 alkynyloxy, C_1-C_4 haloalkoxy, C_3-C_4 haloalkenyloxy, C_3-C_4 haloalkynyloxy, C_3-C_6 cycloalkoxy, C_3-C_6 halocycloalkoxy, C_4-C_8 cycloalkylalkoxy, C_2-C_6 alkoxyalkyl, C_2-C_6 haloalkoxyalkyl, C_2-C_6 alkoxyhaloalkyl, C_2-C_6 alkoxyalkoxy, C_2-C_4 alkylcarbonyloxy, C_2-C_6 cyanoalkyl, C_2-C_6 cyanoalkoxy, C_1-C_4 hydroxyalkyl, C_2-C_4 alkylthioalkyl, SO_nR^{1A}, $Si(CH_3)_3$ or $B(—OC(R^{1B})_2C(R^{1B})_2O—)$; or a phenyl ring optionally substituted with up to 5 substituents independently selected from R^{1C}; or a 5- or 6-membered heteroaromatic ring containing ring members selected from carbon atoms and up to 4 heteroatoms independently selected from up to 2 O, up to 2 S and up to 4 N atoms, each ring optionally substituted with up to 3 substituents independently selected from R^{1C} on carbon atom ring members and R^{1D} on nitrogen atom ring members;

[0008] R^2 is halogen, cyano, nitro, C_1-C_4 alkoxy, C_1-C_4 alkyl, C_2-C_6 alkenyl, C_2-C_6 alkynyl, SO_nR^{2A}, C_1-C_4 haloalkyl or C_3-C_6 cycloalkyl;

[0009] each R^3 is independently halogen, cyano, hydroxy, nitro, amino, CHO, $C(=O)NH_2$, $C(=S)NH_2$, SO_2NH_2, C_1-C_4 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, C_1-C_4 haloalkyl, C_2-C_4 haloalkenyl, C_2-C_4 haloalkynyl, C_3-C_6 cycloalkyl, C_3-C_6 halocycloalkyl, C_4-C_8 alkylcycloalkyl, C_4-C_8 cycloalkylalkyl, C_2-C_6 alkylcarbonyl, C_2-C_6 haloalkylcarbonyl, C_2-C_6 alkoxycarbonyl, C_3-C_7 cycloalkylcarbonyl, C_1-C_4 alkoxy, C_3-C_4 alkenyloxy, C_3-C_4 alkynyloxy, C_1-C_4 haloalkoxy, C_3-C_4 haloalkenyloxy, C_3-C_4 haloalkynyloxy, C_3-C_6 cycloalkoxy, C_3-C_6 halocycloalkoxy, C_4-C_8 cycloalkylalkoxy, C_2-C_6 alkoxyalkyl, C_2-C_6 haloalkoxyalkyl, C_2-C_6 alkoxyhaloalkyl, C_2-C_6 alkoxyalkoxy, C_2-C_6 cyanoalkyl, C_2-C_6 cyanoalkoxy, C_2-C_4 alkylthioalkyl, $Si(CH_3)_3$, $C{\equiv}CSi(CH_3)_3$, $C(=O)N(R^{3A})(R^{3B})$, $C(=NOR^{3C})H$, $C(=NR^{3D})H$, SO_nR^{3E}; or a phenyl ring optionally substituted with up to 5 substituents independently selected from R^{3F}; or a 5- or 6-membered heteroaromatic ring containing ring members selected from carbon atoms and up to 4 heteroatoms independently selected from up to 2 O, up to 2 S and up to 4 N atoms, each ring optionally substituted with up to 3 substituents independently selected from R^{3F} on carbon atom ring members and R^{3G} on nitrogen atom ring members; or pyrimidinyloxy;

[0010] m is 0, 1, 2 or 3;

[0011] each n is independently 0, 1 or 2;

[0012] each R^{1A}, R^{2A} and R^{3E} is independently C_1-C_4 alkyl, C_1-C_4 haloalkyl, C_1-C_4, alkylamino or C_2-C_6 dialkylamino;

[0013] each R^{1B} is independently H or C_1-C_4 alkyl;

[0014] each R^{1C} is independently hydroxy, halogen, cyano, nitro, C_1-C_6 alkyl, C_1-C_6 haloalkyl, C_1-C_6 alkoxy or C_1-C_6 haloalkoxy;

[0015] each R^{1D} is independently cyano, C_1-C_6 alkyl, C_1-C_6 haloalkyl, C_1-C_6 alkoxy or C_2-C_6 alkylcarbonyl;

[0016] each R^{3A} is independently C_1-C_4 alkyl or C_1-C_4 haloalkyl;

[0017] each R^{3B} is independently H, C_1-C_4 alkyl or C_1-C_4 haloalkyl;

[0018] each R^{3C} is independently H or C_1-C_4 alkyl;

[0019] each R^{3D} is independently H, amino, C_1-C_4 alkyl or C_1-C_4 alkylamino;

[0020] each R^{3F} is independently hydroxy, halogen, cyano, nitro, C_1-C_6 alkyl, C_1-C_6 haloalkyl, C_1-C_6 alkoxy or C_1-C_6 haloalkoxy; and

[0021] each R^{3G} is independently cyano, C_1-C_6 alkyl, C_1-C_6 haloalkyl, C_1-C_6 alkoxy or C_2-C_6 alkylcarbonyl;

[0022] More particularly, this invention pertains to a compound of Formula 1 (including all stereoisomers), an N-oxide or a salt thereof. This invention also relates to a herbicidal composition comprising a compound of the invention (i.e. in a herbicidally effective amount) and at least one component selected from the group consisting of surfactants, solid diluents and liquid diluents. This invention further relates to a method for controlling the growth of undesired vegetation comprising contacting the vegetation or its environment with a herbicidally effective amount of a compound of the invention (e.g., as a composition described herein).

[0023] This invention also includes a herbicidal mixture comprising (a) a compound selected from Formula 1, N-oxides, and salts thereof, and (b) at least one additional active ingredient selected from (b1) through (b16); and salts of compounds of (b1) through (b16).

DETAILS OF THE INVENTION

[0024] As used herein, the terms "comprises," "comprising," "includes," "including," "has," "having," "contains", "containing," "characterized by" or any other variation thereof, are intended to cover a non-exclusive inclusion, subject to any limitation explicitly indicated. For example, a composition, mixture, process or method that comprises a list of elements is not necessarily limited to only those elements but may include other elements not expressly listed or inherent to such composition, mixture, process or method.

[0025] The transitional phrase "consisting of" excludes any element, step, or ingredient not specified. If in the claim, such would close the claim to the inclusion of materials other than those recited except for impurities ordinarily associated therewith. When the phrase "consisting of" appears in a clause of the body of a claim, rather than immediately following the preamble, it limits only the element set forth in that clause; other elements are not excluded from the claim as a whole.

[0026] The transitional phrase "consisting essentially of" is used to define a composition, process or method that includes materials, steps, features, components, or elements, in addition to those literally disclosed, provided that these additional materials, steps, features, components, or elements do not materially affect the basic and novel characteristic(s) of the claimed invention. The term "consisting essentially of" occupies a middle ground between "comprising" and "consisting of".

[0027] Where applicants have defined an invention or a portion thereof with an open-ended term such as "comprising," it should be readily understood that (unless otherwise stated) the description should be interpreted to also describe such an invention using the terms "consisting essentially of" or "consisting of."

[0028] Further, unless expressly stated to the contrary, "or" refers to an inclusive or and not to an exclusive or. For example, a condition A or B is satisfied by any one of the following: A is true (or present) and B is false (or not present), A is false (or not present) and B is true (or present), and both A and B are true (or present).

[0029] Also, the indefinite articles "a" and "an" preceding an element or component of the invention are intended to be nonrestrictive regarding the number of instances (i.e. occurrences) of the element or component. Therefore "a" or "an" should be read to include one or at least one, and the singular word form of the element or component also includes the plural unless the number is obviously meant to be singular.

[0030] As referred to herein, the term "seedling", used either alone or in a combination of words means a young plant developing from the embryo of a seed.

[0031] As referred to herein, the term "broadleaf" used either alone or in words such as "broadleaf weed" means dicot or dicotyledon, a term used to describe a group of angiosperms characterized by embryos having two cotyledons. As used herein, the term "alkylating agent" refers to a chemical compound in which a carbon-containing radical is bound through a carbon atom to a leaving group such as halide or sulfonate, which is displaceable by bonding of a nucleophile to said carbon atom. Unless otherwise indicated, the term "alkylating" does not limit the carbon-containing radical to alkyl; the carbon-containing radicals in alkylating agents include the variety of carbon-bound substituent radicals specified for Q, R^1 and R^3.

[0032] In the above recitations, the term "alkyl", used either alone or in compound words such as "alkylthio" or "haloalkyl" includes straight-chain or branched alkyl, such as, methyl, ethyl, n-propyl, i-propyl, or the different butyl, pentyl or hexyl isomers. "Alkenyl" includes straight-chain or branched alkenes such as ethenyl, 1-propenyl, 2-propenyl, and the different butenyl, pentenyl and hexenyl isomers. "Alkenyl" also includes polyenes such as 1,2-propadienyl and 2,4-hexadienyl. "Alkynyl" includes straight-chain or branched alkynes such as ethynyl, 1-propynyl, 2-propynyl and the different butynyl, pentynyl and hexynyl isomers.

[0033] "Alkoxy" includes, for example, methoxy, ethoxy, n-propyloxy, isopropyloxy and the different butoxy, pentoxy and hexyloxy isomers. "Alkoxyalkyl" denotes alkoxy substitution on alkyl. Examples of "alkoxyalkyl" include CH_3OCH_2, $CH_3OCH_2CH_2$, $CH_3CH_2OCH_2$, $CH_3CH_2CH_2CH_2OCH_2$ and $CH_3CH_2OCH_2CH_2$. "Alkenyloxy" includes straight-chain or branched alkenyloxy moieties. Examples of "alkenyloxy" include $H_2C{=}CHCH_2O$, $(CH_3)_2C{=}CHCH_2O$, $(CH_3)CH{=}CHCH_2O$, $(CH_3)CH{=}C(CH_3)CH_2O$ and $CH_2{=}CHCH_2CH_2O$. "Alkynyloxy" includes straight-chain or branched alkynyloxy moieties. Examples of "alkynyloxy" include $HC{\equiv}CCH_2O$, $CH_3C{\equiv}CCH_2O$ and $CH_3C{\equiv}CCH_2CH_2O$. "Alkylthio" includes branched or straight-chain alkylthio moieties such as methylthio, ethylthio, and the different propylthio, butylthio, pentylthio and hexylthio isomers. "Alkylthioalkyl" denotes alkylthio substitution on alkyl. Examples of "alkylthioalkyl" include CH_3SCH_2, $CH_3SCH_2CH_2$, $CH_3CH_2SCH_2$, $CH_3CH_2CH_2CH_2SCH_2$ and $CH_3CH_2SCH_2CH_2$. "Alkylthioalkoxy" denotes alkylthio substitution on alkoxy. "Cyanoalkyl" denotes an alkyl group substituted with one cyano group. Examples of "cyanoalkyl" include $NCCH_2$, $NCCH_2CH_2$ and $CH_3CH(CN)CH_2$. "Alkylamino", "dialkylamino", and the like, are defined analogously to the above examples.

[0034] "Cycloalkyl" includes, for example, cyclopropyl, cyclobutyl, cyclopentyl and cyclohexyl. The term "halogen", either alone or in compound words such as "haloalkyl", or when used in descriptions such as "alkyl substituted with halogen" includes fluorine, chlorine, bromine or iodine. Further, when used in compound words such as "haloalkyl", or when used in descriptions such as "alkyl substituted with halogen" said alkyl may be partially or fully substituted with halogen atoms which may be the same or different. Examples of "haloalkyl" or "alkyl substituted with

halogen" include F_3C, $ClCH_2$, CF_3CH_2 and CF_3CCl_2. The terms "haloalkoxy", and the like, is defined analogously to the term "haloalkyl". Examples of "haloalkoxy" include CF_3O—, CCl_3CH_2O—, $HCF_2CH_2CH_2O$— and CF_3CH_2O—. "Alkylcarbonyl" denotes a straight-chain or branched alkyl moieties bonded to a C(═O) moiety. Examples of "alkylcarbonyl" include $CH_3C(═O)$—, $CH_3CH_2CH_2C(═O)$— and $(CH_3)_2CHC(═O)$—. Examples of "alkoxycarbonyl" include $CH_3OC(═O)$—, $CH_3CH_2OC(═O)$—, $CH_3CH_2CH_2OC(═O)$—, $(CH_3)_2CHOC(═O)$— and the different butoxy- or pentoxycarbonyl isomers.

[0035] The total number of carbon atoms in a substituent group is indicated by the "C_i-C_j" prefix where i and j are numbers from 1 to 6. For example, C_1-C_4 alkylsulfonyl designates methylsulfonyl through butylsulfonyl; C_2 alkoxyalkyl designates CH_3OCH_2—; C_3 alkoxyalkyl designates, for example, $CH_3CH(OCH_3)$—, $CH_3OCH_2CH_2$— or $CH_3CH_2OCH_2$—; and C_4 alkoxyalkyl designates the various isomers of an alkyl group substituted with an alkoxy group containing a total of four carbon atoms, examples including $CH_3CH_2CH_2OCH_2$— and $CH_3CH_2OCH_2CH_2$—.

[0036] When a compound is substituted with a substituent bearing a subscript that indicates the number of said substituents can exceed 1, said substituents (when they exceed 1) are independently selected from the group of defined substituents, (e.g., $(R^3)_n$, n is 0, 1, 2 or 3). Further, when the subscript indicates a range, e.g. $(R)_{i-j}$, then the number of substituents may be selected from the integers between i and j inclusive. When a group contains a substituent which can be hydrogen, for example (when m=0), then when this substituent is taken as hydrogen, it is recognized that this is equivalent to said group being unsubstituted. When a variable group is shown to be optionally attached to a position, (for example $(R^1)_n$ attached to Q wherein n may be 0, then hydrogen may be at the position even if not recited in the variable group definition. When one or more positions on a group are said to be "not substituted" or "unsubstituted", then hydrogen atoms are attached to take up any free valency.

[0037] Unless otherwise indicated, a "ring" as a component of Formula 1 (e.g., substituent Q) is carbocyclic or heterocyclic. The term "ring member" refers to an atom or heteroatom forming the backbone of a ring. When a fully unsaturated carbocyclic ring satisfies Hückel's rule, then said ring is also called an "aromatic ring". "Saturated carbocyclic" refers to a ring having a backbone consisting of carbon atoms linked to one another by single bonds; unless otherwise specified, the remaining carbon valences are occupied by hydrogen atoms.

[0038] The terms "heterocyclic ring", "heterocycle" denote a ring in which at least one atom forming the ring backbone is not carbon, e.g., nitrogen, oxygen or sulfur. Typically a heterocyclic ring contains no more than 4 nitrogens, no more than 2 oxygens and no more than 2 sulfurs. Unless otherwise indicated, a heterocyclic ring can be a saturated, partially unsaturated, or fully unsaturated ring. When a fully unsaturated heterocyclic ring satisfies Hückel's rule, then said ring is also called a "heteroaromatic ring" or "aromatic heterocyclic ring". Unless otherwise indicated, heterocyclic rings can be attached through any available carbon or nitrogen by replacement of a hydrogen on said carbon or nitrogen.

[0039] "Aromatic" indicates that each of the ring atoms is essentially in the same plane and has a p-orbital perpendicular to the ring plane, and that (4n+2) π electrons, where n is a positive integer, are associated with the ring to comply with Hückel's rule.

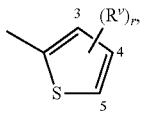
[0040] The term "optionally substituted" in connection with the heterocyclic rings refers to groups which are unsubstituted or have at least one non-hydrogen substituent that does not extinguish the biological activity possessed by the unsubstituted analog. As used herein, the following definitions shall apply unless otherwise indicated. The term "optionally substituted" is used interchangeably with the phrase "substituted or unsubstituted" or with the term "(un) substituted." Unless otherwise indicated, an optionally substituted group may have a substituent at each substitutable position of the group, and each substitution is independent of the other.

[0041] When Q is a 5- or 6-membered (nitrogen-containing) heterocyclic ring, it may be attached to the remainder of Formula 1 though any available carbon or nitrogen ring atom, unless otherwise described. As noted above, Q can be (among others) phenyl optionally substituted with one or more substituents selected from a group of substituents as defined in the Summary of the Invention. An example of phenyl optionally substituted with one to five substituents is the ring illustrated as U-1 in Exhibit 1, wherein R^V is R^1 as defined in the Summary of the Invention for Q and r is an integer (from 0 to 4).

[0042] As noted above, Q can be (among others) 5- or 6-membered aromatic heterocyclic ring, which may be saturated or unsaturated, optionally substituted with one or more substituents selected from a group of substituents as defined in the Summary of the Invention. Examples of a 5- or 6-membered unsaturated aromatic heterocyclic ring optionally substituted with from one or more substituents include the rings U-2 through U-61 illustrated in Exhibit 1 wherein R^V is any substituent as defined in the Summary of the Invention for Q (i.e. R^1) and r is an integer from 0 to 4, limited by the number of available positions on each U group. As U-29, U-30, U-36, U-37, U-38, U-39, U-40, U-41, U-42 and U-43 have only one available position, for these U groups r is limited to the integers 0 or 1, and r being 0 means that the U group is unsubstituted and a hydrogen is present at the position indicated by $(R^V)_r$.

Exibit 1

U-2



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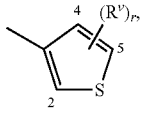

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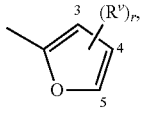

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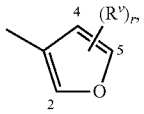
U-5



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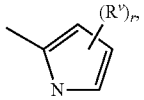

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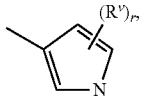

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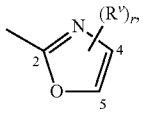

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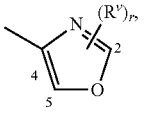

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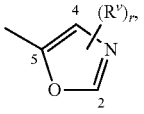

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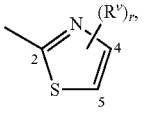

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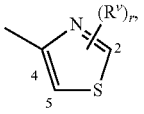
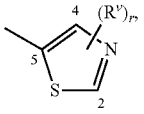


U-14



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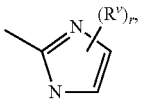

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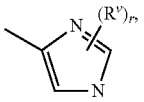

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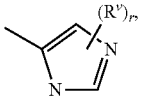

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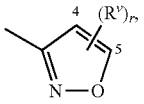

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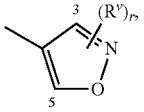

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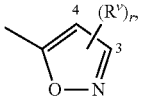

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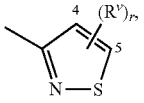

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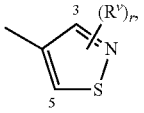

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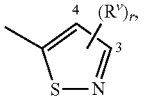

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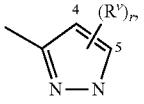

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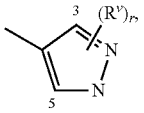

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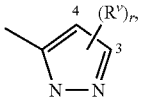

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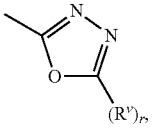

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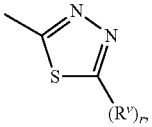

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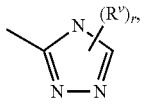

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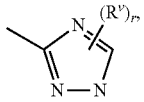

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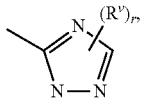

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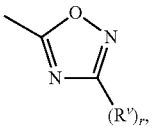

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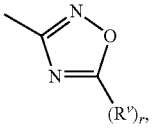

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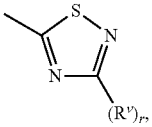

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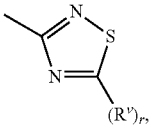

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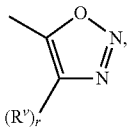

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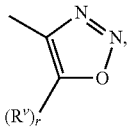

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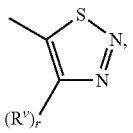

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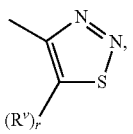

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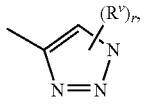

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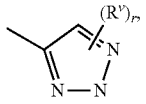

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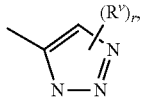

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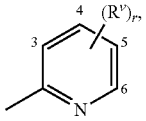

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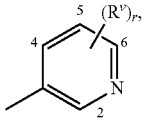

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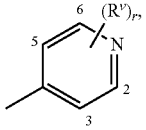

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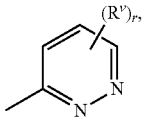

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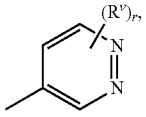

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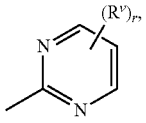

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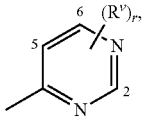

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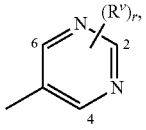

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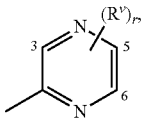

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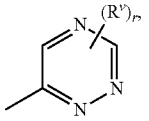

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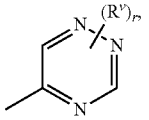

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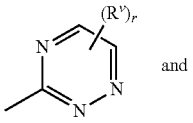
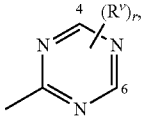


and

U-61



[0043] Although R^V groups are shown in the structures U-1 through U-61, it is noted that they do not need to be present since they are optional substituents. Note that when R^V is H when attached to an atom, this is the same as if said atom is unsubstituted. The nitrogen atoms that require substitution to fill their valence are substituted with H or R^V. Note that when the attachment point between $(R^V)_r$ and the U group is illustrated as floating, $(R^V)_r$ can be attached to any available carbon atom or nitrogen atom of the U group. Note that when the attachment point on the U group is illustrated as floating, the U group can be attached to the remainder of Formula 1 through any available carbon or nitrogen of the U group by replacement of a hydrogen atom. Note that some U groups can only be substituted with less than 4 R^V groups (e.g., U-2 through U-47 and U-52 through U-61).

[0044] A wide variety of synthetic methods are known in the art to enable preparation of aromatic and nonaromatic heterocyclic rings and ring systems; for extensive reviews see the eight volume set of *Comprehensive Heterocyclic Chemistry*, A. R. Katritzky and C. W. Rees editors-in-chief, Pergamon Press, Oxford, 1984 and the twelve volume set of *Comprehensive Heterocyclic Chemistry II*, A. R. Katritzky, C. W. Rees and E. F. V. Scriven editors-in-chief, Pergamon Press, Oxford, 1996.

[0045] Compounds of this invention can exist as one or more stereoisomers. The various stereoisomers include enantiomers, diastereomers, atropisomers and geometric isomers. Stereoisomers are isomers of identical constitution but differing in the arrangement of their atoms in space and include enantiomers, diastereomers, cis-trans isomers (also known as geometric isomers) and atropisomers. Atropisomers result from restricted rotation about single bonds where the rotational barrier is high enough to permit isolation of the isomeric species. One skilled in the art will appreciate that one stereoisomer may be more active and/or may exhibit beneficial effects when enriched relative to the other stereoisomer(s) or when separated from the other stereoisomer (s). Additionally, the skilled artisan knows how to separate, enrich, and/or to selectively prepare said stereoisomers. The compounds of the invention may be present as a mixture of stereoisomers, individual stereoisomers or as an optically active form.

[0046] Compounds of Formula 1 typically exist in more than one form, and Formula 1 thus include all crystalline and non-crystalline forms of the compounds they represent. Non-crystalline forms include embodiments which are solids such as waxes and gums as well as embodiments which are liquids such as solutions and melts. Crystalline forms include embodiments which represent essentially a single crystal type and embodiments which represent a mixture of polymorphs (i.e. different crystalline types). The term "polymorph" refers to a particular crystalline form of a chemical compound that can crystallize in different crystalline forms, these forms having different arrangements and/or conformations of the molecules in the crystal lattice. Although polymorphs can have the same chemical composition, they can also differ in composition due the presence or absence of co-crystallized water or other molecules, which can be weakly or strongly bound in the lattice. Polymorphs can differ in such chemical, physical and biological properties as crystal shape, density, hardness, color, chemical stability, melting point, hygroscopicity, suspensibility, dissolution rate and biological availability. One skilled in the art will appreciate that a polymorph of a compound of Formula 1 can exhibit beneficial effects (e.g., suitability for preparation of useful formulations, improved biological performance) relative to another polymorph or a mixture of polymorphs of the same compound of Formula 1. Preparation and isolation of a particular polymorph of a compound of Formula 1 can be achieved by methods known to those skilled in the art including, for example, crystallization using selected solvents and temperatures. For a comprehensive discussion of polymorphism see R. Hilfiker, Ed., *Polymorphism in the Pharmaceutical Industry*, Wiley-VCH, Weinheim, 2006.

[0047] One skilled in the art will appreciate that not all nitrogen-containing heterocycles can form N-oxides since the nitrogen requires an available lone pair for oxidation to the oxide; one skilled in the art will recognize those nitrogen-containing heterocycles which can form N-oxides. One skilled in the art will also recognize that tertiary amines can form N-oxides. Synthetic methods for the preparation of N-oxides of heterocycles and tertiary amines are very well known by one skilled in the art including the oxidation of heterocycles and tertiary amines with peroxy acids such as peracetic and m-chloroperbenzoic acid (MCPBA), hydrogen peroxide, alkyl hydroperoxides such as t-butyl hydroperoxide, sodium perborate, and dioxiranes such as dimethyldioxirane. These methods for the preparation of N-oxides have been extensively described and reviewed in the literature, see for example: T. L. Gilchrist in *Comprehensive Organic Synthesis*, vol. 7, pp 748-750, S. V. Ley, Ed., Pergamon Press; M. Tisler and B. Stanovnik in *Comprehensive Heterocyclic Chemistry*, vol. 3, pp 18-20, A. J. Boulton and A. McKillop, Eds., Pergamon Press; M. R. Grimmett and B. R. T. Keene in *Advances in Heterocyclic Chemistry*, vol. 43, pp 149-161, A. R. Katritzky, Ed., Academic Press; M. Tisler and B. Stanovnik in *Advances in Heterocyclic Chemistry*, vol. 9, pp 285-291, A. R. Katritzky and A. J. Boulton, Eds.,

Academic Press; and G. W. H. Cheeseman and E. S. G. Werstiuk in *Advances in Heterocyclic Chemistry*, vol. 22, pp 390-392, A. R. Katritzky and A. J. Boulton, Eds., Academic Press.

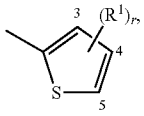
[0048] One skilled in the art recognizes that because in the environment and under physiological conditions salts of chemical compounds are in equilibrium with their corresponding nonsalt forms, salts share the biological utility of the nonsalt forms. Thus a wide variety of salts of a compound of Formula 1 are useful for control of undesired vegetation (i.e. are agriculturally suitable). The salts of a compound of Formula 1 include acid-addition salts with inorganic or organic acids such as hydrobromic, hydrochloric, nitric, phosphoric, sulfuric, acetic, butyric, fumaric, lactic, maleic, malonic, oxalic, propionic, salicylic, tartaric, 4-toluenesulfonic or valeric acids. When a compound of Formula 1 contains an acidic moiety such as a carboxylic acid or phenol, salts also include those formed with organic or inorganic bases such as pyridine, triethylamine or ammonia, or amides, hydrides, hydroxides or carbonates of sodium, potassium, lithium, calcium, magnesium or barium. Accordingly, the present invention comprises compounds selected from Formula 1, N-oxides and agriculturally suitable salts thereof.

[0049] Embodiments of the present invention as described in the Summary of the Invention include (where Formula 1 as used in the following Embodiments includes N-oxides and salts thereof):

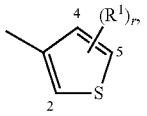
Embodiment 1

[0050] A compound of Formula 1 wherein Q is selected from

Q-1



Q-2



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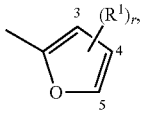

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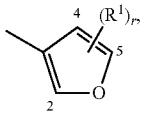

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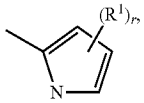

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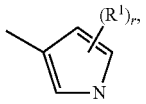
Q-6



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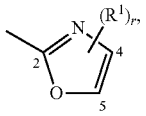

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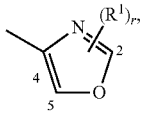

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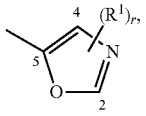

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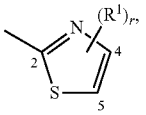

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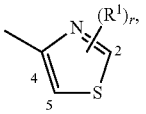

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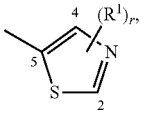

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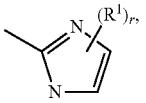

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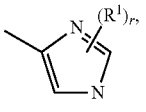

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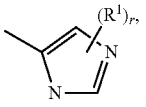

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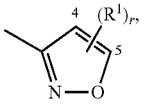

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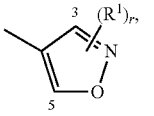

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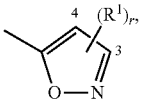

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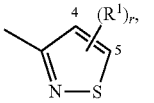

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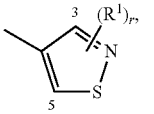

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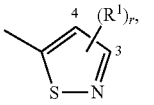

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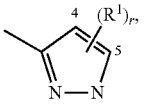

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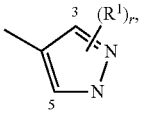

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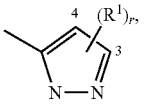

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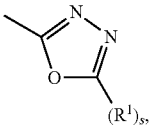

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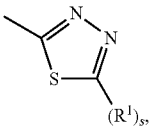

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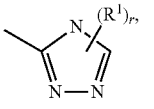

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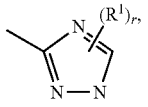

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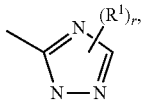

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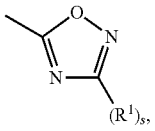

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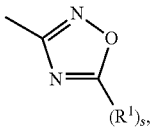

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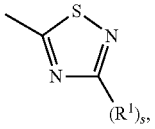

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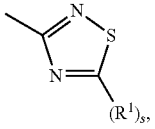

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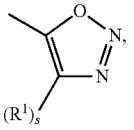

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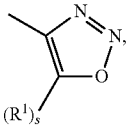

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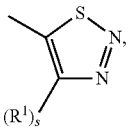

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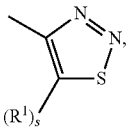

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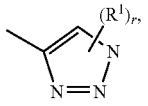

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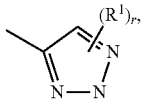

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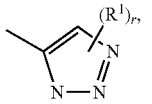

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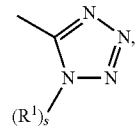

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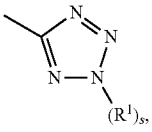

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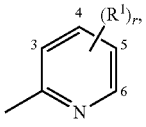

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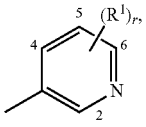

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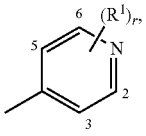

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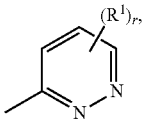

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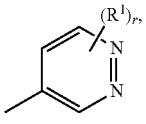

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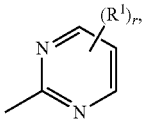

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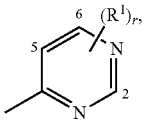

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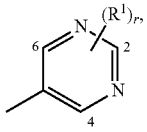
Q-50



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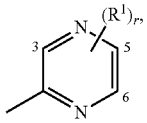

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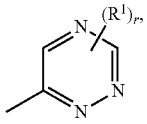

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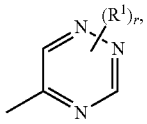

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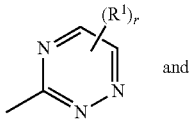
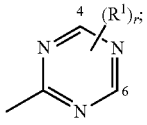


and

Q-55

 ;

[0051] wherein r is 0, 1, 2 or 3; and s is 0 or 1.

Embodiment 2

[0052] A compound of Embodiment 1 wherein Q is selected from Q-1 through Q-42.

Embodiment 3

[0053] A compound of Embodiment 2 wherein Q is selected from Q-7 through Q-24.

Embodiment 4

[0054] A compound of Embodiment 3 wherein Q is selected from Q-16 and Q-18.

Embodiment 5

[0055] A compound of Embodiment 4 wherein Q is Q-16.

Embodiment 6

[0056] A compound of Embodiment 4 wherein Q is Q-18.

Embodiment 7

[0057] A compound of Embodiment 1 wherein Q is selected from Q-43 through Q-55.

Embodiment 8

[0058] A compound of Embodiment 7 wherein Q is selected from Q-43, Q-44, Q-45, Q-48, Q-49 and Q-50.

Embodiment 9

[0059] A compound of Embodiment 8 wherein Q is selected from Q-43, Q-44 and Q-45.

Embodiment 10

[0060] A compound of Embodiment 9 wherein Q is Q-43.

Embodiment 11

[0061] A compound of Embodiment 10 wherein Q is Q-45.

Embodiment 12

[0062] A compound of Formula 1 or any one of Embodiments 1 through 11 either alone or in combination, wherein Z is O.

Embodiment 13

[0063] A compound of Formula 1 or any one of Embodiments 1 through 12 either alone or in combination, wherein each R^1 is independently halogen, cyano, SF_5, CHO, C_1-C_4 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, C_1-C_4 haloalkyl, C_2-C_4 haloalkenyl, C_2-C_4 haloalkynyl, C_2-C_6 alkylcarbonyl, C_2-C_6 haloalkylcarbonyl, C_2-C_6 alkoxycarbonyl, C_1-C_4 alkoxy, C_3-C_4 alkenyloxy, C_3-C_4 alkynyloxy, C_1-C_4 haloalkoxy, C_3-C_4 haloalkenyloxy, C_3-C_4 haloalkynyloxy, C_2-C_6 alkoxyalkyl, C_2-C_6 haloalkoxyalkyl, C_2-C_6 cyanoalkyl, C_1-C_4 hydroxyalkyl, C_2-C_4 alkylthioalkyl or SO_nR^{1A}.

Embodiment 14

[0064] A compound of Embodiment 13 wherein each R^1 is independently halogen, cyano, CHO, C_1-C_4 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, C_1-C_4 haloalkyl, C_2-C_4 haloalkenyl, C_2-C_4 haloalkynyl, C_1-C_4 alkoxy, C_3-C_4 alkenyloxy, C_3-C_4 alkynyloxy, C_1-C_4 haloalkoxy, C_3-C_4 haloalkenyloxy, C_3-C_4 haloalkynyloxy, C_2-C_6 alkoxyalkyl, C_2-C_6 haloalkoxyalkyl, C_1-C_4 hydroxyalkyl, C_2-C_4 alkylthioalkyl or SO_nR^{1A}.

Embodiment 15

[0065] A compound of Embodiment 14 wherein each R^1 is independently halogen, cyano, C_1-C_4 alkyl, C_1-C_4 haloalkyl, C_1-C_4 alkoxy, C_1-C_4 haloalkoxy or SO_nR^{1A}.

Embodiment 16

[0066] A compound of Embodiment 15 wherein each R^1 is independently halogen, C_1-C_4 alkyl, C_1-C_4 haloalkyl or C_1-C_4 haloalkoxy.

Embodiment 17

[0067] A compound of Embodiment 16 wherein each R^1 is independently halogen, C_1-C_4 haloalkyl or C_1-C_4 haloalkoxy.

Embodiment 18

[0068] A compound of Embodiment 17 wherein each R^1 is independently halogen or C_1-C_4 haloalkyl.

Embodiment 19

[0069] A compound of Embodiment 18 wherein each R^1 is independently F, Cl, Br, CF_3, CHF_2 or CH_2F.

Embodiment 20

[0070] A compound of Formula 1 or any one of Embodiments 1 through 19 either alone or in combination, wherein r is 0, 1 or 2.

Embodiment 20a

[0071] A compound of Embodiment 20 wherein r is 1.

Embodiment 21

[0072] A compound of Formula 1 or any one of Embodiments 1 through 19 either alone or in combination, wherein s is 1.

Embodiment 21a

[0073] A compound of Formula 1 or any one of Embodiments 1 through 20a either alone or in combination, wherein when Q is Q-16 and r is 1 then R^1 is attached at the 5 position of the Q-16 ring.

Embodiment 21b

[0074] A compound of Formula 1 or any one of Embodiments 1 through 20a either alone or in combination, wherein when Q is Q-18 and r is 1 then R^1 is attached at the 3 position of the Q-18 ring.

Embodiment 22

[0075] A compound of Formula 1 or any one of Embodiments 1 through 21b either alone or in combination, wherein R^2 is halogen, C_1-C_4 alkyl or C_1-C_4 haloalkyl.

Embodiment 23

[0076] A compound of Embodiment 22 wherein R^2 is halogen or C_1-C_4 alkyl.

Embodiment 24

[0077] A compound of Embodiment 23 wherein R^2 is halogen or CH_3.

Embodiment 25

[0078] A compound of Embodiment 24 wherein R^2 is halogen.

Embodiment 26

[0079] A compound of Embodiment 25 wherein R^2 is F, Cl or Br.

Embodiment 27

[0080] A compound of Formula 1 or any one of Embodiments 1 through 26 either alone or in combination, wherein m is 0, 1 or 2.

Embodiment 28

[0081] A compound of Embodiment 27 wherein m is 0 or 1.

Embodiment 29

[0082] A compound of Embodiment 28 wherein m is 1.

Embodiment 30

[0083] A compound of Embodiment 27 wherein m is 0 (i.e. the 3-, 4-, 5- and 6-positions are unsubstituted by R^3).

Embodiment 31

[0084] A compound of Formula 1 or any one of Embodiments 1 through 30 either alone or in combination, wherein each R^3 is independently halogen, cyano, CHO, C_1-C_4 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, C_1-C_4 haloalkyl, C_2-C_4 haloalkenyl, C_2-C_4 haloalkynyl, C_3-C_6 cycloalkyl, C_3-C_6 halocycloalkyl, C_4-C_8 alkylcycloalkyl, C_2-C_6 alkylcarbonyl, C_2-C_6 haloalkylcarbonyl, C_2-C_6 alkoxycarbonyl, C_1-C_4 alkoxy, C_3-C_4 alkenyloxy, C_3-C_4 alkynyloxy, C_1-C_4 haloalkoxy, C_3-C_4 haloalkenyloxy, C_3-C_4 haloalkynyloxy, C_3-C_6 cycloalkoxy, C_3-C_6 halocycloalkoxy, C_2-C_6 alkoxyalkyl, C_2-C_6 haloalkoxyalkyl, C_2-C_4 alkylcarbonyloxy, C_2-C_6 cyanoalkyl, C(=O)N(R^{3A})(R^{3B}), C(=NOR^{3C})H, SO_nR^{3E}; or a phenyl ring optionally substituted with up to 5 substituents independently selected from R^{3F}; or a 5- or 6-membered heteroaromatic ring containing ring members selected from carbon atoms and up to 4 heteroatoms independently selected from up to 2 O, up to 2 S and up to 4 N atoms, each ring optionally substituted with up to 3 substituents independently selected from R^{3F} on carbon atom ring members and R^{3G} on nitrogen atom ring members.

Embodiment 32

[0085] A compound of Embodiment 31 wherein each R^3 is independently halogen, cyano, CHO, C_1-C_4 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, C_1-C_4 haloalkyl, C_2-C_4 haloalkenyl, C_2-C_4 haloalkynyl, C_3-C_6 cycloalkyl, C_3-C_6 halocycloalkyl, C_2-C_6 alkylcarbonyl, C_2-C_6 haloalkylcarbonyl, C_2-C_6 alkoxycarbonyl, C_1-C_4 alkoxy, C_1-C_4 haloalkoxy, C_2-C_6 alkoxyalkyl, C_2-C_6 haloalkoxyalkyl, C_2-C_6 cyanoalkyl, SO_1R^{3E}; or a 5- or 6-membered heteroaromatic ring containing ring members selected from carbon atoms and up to 4 heteroatoms independently selected from up to 2 O, up to 2 S and up to 4 N atoms, each ring optionally substituted with up to 3 substituents independently selected from R^{3F} on carbon atom ring members and R^{3G} on nitrogen atom ring members.

Embodiment 33

[0086] A compound of Embodiment 32 wherein each R^3 is independently halogen, cyano, C_1-C_4 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, C_1-C_4 haloalkyl, C_2-C_6 alkylcarbonyl, C_2-C_6 haloalkylcarbonyl, C_2-C_6 alkoxycarbonyl, C_1-C_4 alkoxy, C_1-C_4 haloalkoxy, C_2-C_6 alkoxyalkyl or C_2-C_6 haloalkoxyalkyl.

Embodiment 34

[0087] A compound of Embodiment 33 wherein each R^3 is independently halogen, cyano, C_1-C_4 alkyl or C_1-C_4 haloalkyl.

Embodiment 35

[0088] A compound of Embodiment 34 wherein each R^3 is independently halogen or cyano.

Embodiment 36

[0089] A compound of Embodiment 35 wherein each R^3 is independently halogen.

Embodiment 37

[0090] A compound of Formula 1 or any one of Embodiments 1 through 36 either alone or in combination, wherein R^3 is attached to the remainder of Formula 1 at the 3-position.

Embodiment 38

[0091] A compound of Formula 1 or any one of Embodiments 1 through 37 either alone or in combination, wherein each R^{1A} is independently C_1-C_4 alkyl or C_1-C_4 haloalkyl.

Embodiment 39

[0092] A compound of Embodiment 38 wherein each R^{1A} is independently C_1-C_4 haloalkyl.

Embodiment 40

[0093] A compound of Formula 1 or any one of Embodiments 1 through 39 either alone or in combination, wherein each R^{3E} is independently C_1-C_4 alkyl.

Embodiment 41

[0094] A compound of Formula 1 or any one of Embodiments 1 through 40 either alone or in combination, wherein each R^{3A} is independently C_1-C_4 alkyl.

Embodiment 42

[0095] A compound of Formula 1 or any one of Embodiments 1 through 41 either alone or in combination, wherein each R^{3B} is independently H or C_1-C_4 alkyl.

Embodiment 43

[0096] A compound of Formula 1 or any one of Embodiments 1 through 42 either alone or in combination, wherein each R^{3C} is independently H or C_1-C_4 alkyl.

Embodiment 44

[0097] A compound of Formula 1 or any one of Embodiments 1 through 43 either alone or in combination, wherein each R^{3D} is independently H or C_1-C_4 alkyl.

Embodiment 45

[0098] A compound of Formula 1 or any one of Embodiments 1 through 44 either alone or in combination, wherein each n is independently 0 or 2.

Embodiment 46

[0099] A compound of Embodiment 45 wherein n is 2.

Embodiment 47

[0100] A compound of Embodiment 45 wherein n is 0.

Embodiment 48

[0101] A compound of Formula 1 or any one of Embodiments 1 through 47 either alone or in combination, provided that i) when Q is 5-chloro-2-pyridinyl; Z is O; and R3 is 4

chloro, then R2 is other than Cl or Br; ii) when Q is 4-CF3-2-pyrimidinyl; Z is O; and m is 0, then R2 is other than Cl or Br; and iii) when Q is 6-CF3-2-pyridinyl; Z is O; and m is 0, then R2 is other than Br.

[0102] Embodiments of the present invention as described in the Summary of the Invention and Embodiment AAA also include the following:

Embodiment 1P

[0103] A compound of Formula 1 (including all stereoisomers), N-oxides, and salts thereof, agricultural compositions containing them and their use as herbicides as described in the Summary of the Invention.

Embodiment 2P

[0104] A compound of Embodiment 1 wherein Q is a 5- or 6-membered aromatic heterocylic ring, bound to the remainder of Formula 1 through a carbon atom, and optionally substituted with 1 to $3R^1$.

Embodiment 3P

[0105] A compound of Embodiment 2 wherein Q is selected from

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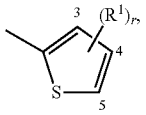

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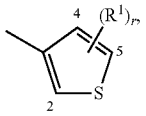

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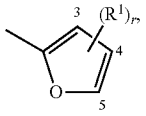

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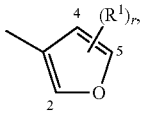

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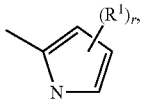

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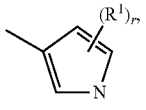

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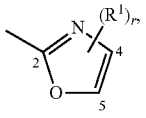

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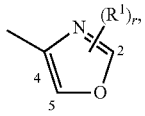

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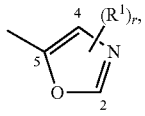

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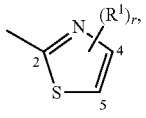

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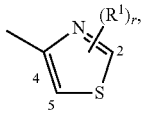

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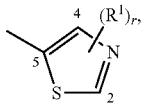

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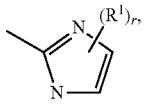

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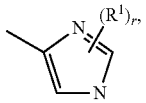

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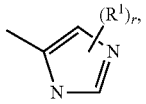

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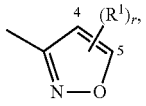

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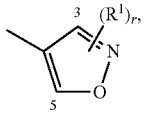

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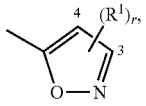

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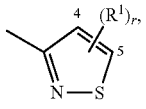

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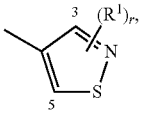

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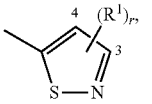

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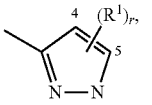

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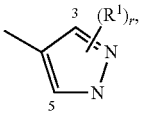

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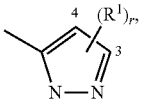

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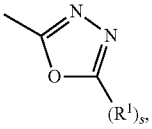

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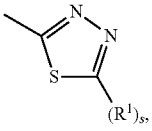

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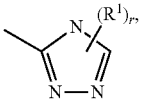

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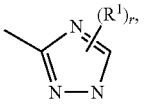

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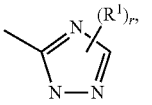

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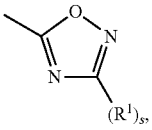

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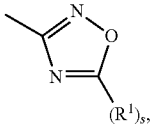

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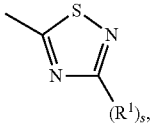

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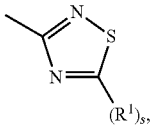

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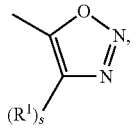

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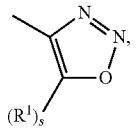

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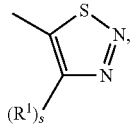

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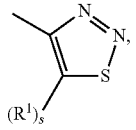

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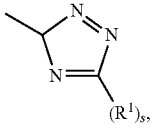

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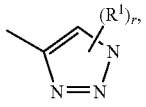

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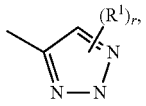

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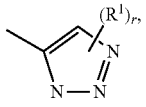

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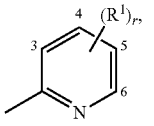

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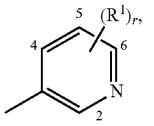

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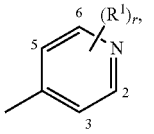

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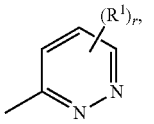

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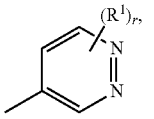

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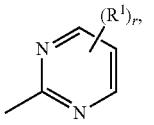

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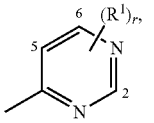

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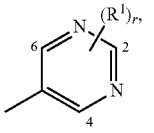
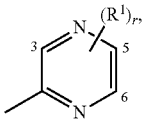


Q-50



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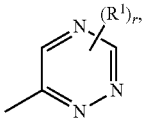

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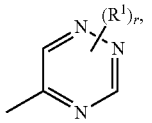
Q-52



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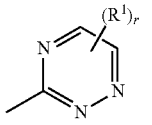
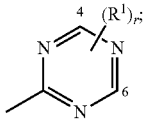


and

Q-54



r is 0, 1, 2 or 3; and
s is 0 or 1.

Embodiment 4P

[0106] A compound of any one of Embodiments 1 through 3 wherein Q is a 5-membered aromatic heterocylic ring, bound to the remainder of Formula 1 through a carbon atom, optionally substituted with R^1, and is selected from Q-1 through Q-41.

Embodiment 5P

[0107] A compound of Embodiment 4 wherein Q is selected from Q-7 through Q-24.

Embodiment 6P

[0108] A compound of Embodiment 5 wherein Q is selected from Q-9, Q-11, Q-12, Q-16, Q-18, Q-22, Q-23, Q-24 and Q-25.

Embodiment 7P

[0109] A compound of Embodiment 6 wherein Q is selected from Q-11, Q-18 and Q-22.

Embodiment 8P

[0110] A compound of any one of Embodiments 1 through 3 wherein Q is 6-membered aromatic heterocylic ring, bound to the remainder of Formula 1 through a carbon atom, optionally substituted with R^1, and is selected from Q-42 through Q-54.

Embodiment 9P

[0111] A compound of Embodiment 8 wherein Q is selected from Q-42, Q-43, Q-44, Q-47, Q-48 and Q-49.

Embodiment 10P

[0112] A compound of Embodiment 9 wherein Q is selected from Q-42, Q-43, Q-47 and Q-48.

Embodiment 11P

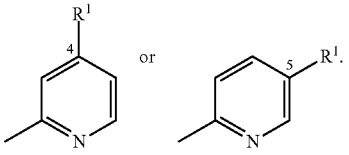
[0113] A compound of Embodiment 10 wherein Q is selected from Q-42, Q-47 and Q-48.

Embodiment 12P

[0114] A compound of Embodiment 11 wherein Q is selected from Q-42.

Embodiment 13P

[0115] A compound of Embodiment 12 wherein Q is



Embodiment 14P

[0116] A compound of any one of Embodiments 1 through 3 wherein Q is selected from Q-7 through Q-24, Q-42, Q-43, Q-44, Q-47, Q-48 and Q-49.

Embodiment 15P

[0117] A compound of Embodiment 14 wherein Q is selected from Q-9, Q-11, Q-12, Q-16, Q-18, Q-22, Q-23, Q-24, Q-25, Q-42, Q-43, Q-47 and Q-48.

Embodiment 16P

[0118] A compound of Embodiment 1 wherein Q is phenyl substituted with 1 to 3 R^1.

Embodiment 17P

[0119] A compound of Embodiment 16 wherein Q is phenyl substituted with 1 to 2 R^1.

Embodiment 18P

[0120] A compound of Embodiment 17 wherein Q is phenyl substituted with 1 R^1 at the 3- or 4-positions (i.e. meta or para to the attachment of phenyl to the remainder of Formula 1).

Embodiment 19P

[0121] A compound of Embodiment 1 wherein when Q is phenyl substituted with 1 to 3 R^1, m is 1, 2 or 3.

Embodiment 20P

[0122] A compound of Embodiment 1 wherein when Q is phenyl substituted with 1 to 3 R^1, m is 1 or 2.

Embodiment 21P

[0123] A compound of Embodiment 1 wherein Q is other than phenyl substituted with 1 to 4 R^1.

Embodiment 22P

[0124] A compound of any one of Embodiments 1 through 21 wherein R^1 is halogen, cyano, CHO, C_1-C_4 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, C_1-C_4 alkoxy, C_3-C_4 alkenyloxy, C_3-C_4 alkynyloxy, C_1-C_4 haloalkyl, C_1-C_4 haloalkoxy, C_2-C_4 alkoxyalkyl, C_2-C_4 alkylthioalkyl or SO_nR^{1A}.

Embodiment 23P

[0125] A compound of Embodiment 22 wherein R^1 is halogen, cyano, C_1-C_4 alkyl, C_1-C_4 alkoxy, C_1-C_4 haloalkyl, C_1-C_4 haloalkoxy, or SCF_3.

Embodiment 24P

[0126] A compound of Embodiment 23 wherein R^1 is halogen, C_1-C_4 alkyl or C_1-C_4 haloalkyl or C_1-C_4 haloalkoxy.

Embodiment 25P

[0127] A compound of Embodiment 24 wherein R^1 is halogen C_1-C_4 haloalkyl or C_1-C_4 haloalkoxy.

Embodiment 26P

[0128] A compound of Embodiment 25 wherein R^1 is Cl, Br, CF_3 or OCF_3.

Embodiment 27P

[0129] A compound of any one of Embodiments 1 through 22 wherein each n is independently 0, 1 or 2.

Embodiment 28P

[0130] A compound of Embodiment 27 wherein each n is independently 0.

Embodiment 29P

[0131] A compound of Embodiment 28 wherein each n is independently 2.

Embodiment 30P

[0132] A compound of any one of Embodiments 1 through 29 wherein R^2 is halogen, C_1-C_4 alkyl or C_1-C_4 haloalkyl.

Embodiment 31P

[0133] A compound of Embodiment 30 wherein R^2 is halogen or C_1-C_4 alkyl.

Embodiment 32P

[0134] A compound of Embodiment 31 wherein R^2 is halogen or CH_3.

Embodiment 33P

[0135] A compound of Embodiment 32 wherein R^2 is halogen.

Embodiment 34P

[0136] A compound of Embodiment 33 wherein R^2 is F, Cl or Br.

Embodiment 35P

[0137] A compound of any one of Embodiments 1 through 34 wherein m is 0, 1 or 2.

Embodiment 36P

[0138] A compound of Embodiment 35 wherein m is 0 or 1.

Embodiment 37P

[0139] A compound of Embodiment 36 wherein m is 1.

Embodiment 38P

[0140] A compound of Embodiment 37 wherein m is 0 (i.e. the 3-, 4-, 5- and 6-positions of the benzene ring are unsubstituted by R^3).

Embodiment 39P

[0141] A compound of any one of Embodiments 1 through 37 wherein each R^3 is independently halogen, cyano, hydroxy, nitro, amino, CHO, C_1-C_4 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, C(=O)N(R^{3A})(R^{3B}), C(=NOR^{3C})H, C(=N)(R^{3D})H, C_1-C_4 alkoxy, C_2-C_4 cyanoalkoxy, C_2-C_4 alkylcarbonyl, C_2-C_4 alkoxycarbonyl, C_2-C_4 alkylcarbonyloxy, C_2-C_4 alkoxyalkyl, C_1-C_4 haloalkyl, C_1-C_4 haloalkoxy, SO_nR^{3E} or C_3-C_6 cycloalkyl.

Embodiment 40P

[0142] A compound of Embodiment 39 wherein each R^3 is independently halogen, cyano, amino, C_1-C_4 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, C_1-C_4 alkoxy, C_2-C_4 alkoxycarbonyl, C_2-C_4 alkylcarbonyloxy, C_2-C_4 alkoxyalkyl or C_1-C_4 haloalkyl.

Embodiment 41P

[0143] A compound of Embodiment 40 wherein each R^3 is independently halogen, cyano, amino or C_1-C_4 alkyl.

Embodiment 42P

[0144] A compound of Embodiment 41 wherein each R^3 is independently cyano.

Embodiment 43P

[0145] A compound of any one of Embodiments 1 through 37 or 39 through 42 wherein each R^3 is attached to the remainder of Formula 1 at the 3-, 4- or 6-position.

Embodiment 44P

[0146] A compound of Embodiments 43 wherein each R^3 is attached to the remainder of Formula 1 at the 3- or 4-position.

Embodiment 45P

[0147] A compound of Embodiment 44 wherein R^3 is attached to the remainder of Formula 1 at the 3-position.

Embodiment 46P

[0148] A compound of any one of Embodiments 1 through 22 or 27 or 29 through 45 wherein R^{1A} is C_1-C_4 alkyl or C_1-C_4 haloalkyl.

Embodiment 47P

[0149] A compound of Embodiment 46 wherein R^{1A} is C_1-C_4 haloalkyl.

Embodiment 48P

[0150] A compound of any one of Embodiments 1 through 37 or 39 wherein R^{3E} is C_1-C_4 alkyl.

Embodiment 49P

[0151] A compound of any one of Embodiments 1 through 37 or 39 wherein R^{3A} is C_1-C_4 alkyl.

Embodiment 50P

[0152] A compound of any one of Embodiments 1 through 37 or 39 wherein R^{3B} is H or C_1-C_4 alkyl.

Embodiment 51P

[0153] A compound of any one of Embodiments 1 through 37 or 39 wherein R^{3C} is H or C_1-C_4 alkyl.

Embodiment 52P

[0154] A compound of any one of Embodiments 1 through 37 or 39 wherein R^{3D} is H or C_1-C_4 alkyl.

Embodiment 53P

[0155] A compound of any one of Embodiments 1 through 52 wherein Z is O.

Embodiment 54P

[0156] A compound of any one of Embodiments 1 through 53 wherein when m is 1, R^3 is positioned at the 3-, 5- or 6-positions (i.e. the 3-, 5- and 6-positions of the benzene ring).

Embodiment 55P

[0157] A compound of any one of Embodiments 1 through 53 wherein when m is 1, R^3 is other than Cl at the 4-position.

[0158] Embodiments of this invention, including Embodiments 1-48 and 1P-55P above as well as any other embodiments described herein, can be combined in any manner, and the descriptions of variables in the embodiments pertain not only to the a compound of Formula 1 but also to the starting compounds and intermediate compounds useful for preparing the compounds of Formula 1. In addition, embodiments of this invention, including Embodiments 1-48 and 1P-55P above as well as any other embodiments described herein, and any combination thereof, pertain to the compositions and methods of the present invention.

Embodiment AAA

[0159] A compound of Formula 1 wherein

[0160] Q is a 5- or 6-membered aromatic heterocylic ring, bound to the remainder of Formula 1 through a carbon atom, and optionally substituted with 1 to 4 R^1; or

[0161] Q is phenyl substituted with 1 to 4 R^1;

[0162] Z is O or S;

[0163] R^1 is halogen, cyano, CHO, C_1-C_4 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, C_1-C_4 alkoxy, C_3-C_4 alkenyloxy, C_3-C_4 alkynyloxy, C_1-C_4 haloalkyl, C_1-C_4 haloalkoxy, C_2-C_4 alkoxyalkyl, C_2-C_4 alkylthioalkyl, SO_nR^{1A}, C_2-C_6 dialkylamino, C_1-C_4 cyanoalkyl, C_1-C_4 hydroxyalkyl, CH(=NOH) or C_3-C_6 cycloalkyl; or unsubstituted phenyl; or unsubstituted pyridyl;

[0164] R^2 is halogen, cyano, nitro, C_1-C_4 alkoxy, C_1-C_4 alkyl, C_2-C_6 alkenyl, C_2-C_6 alkynyl, SO_nR^{2A} or C_1-C_4 haloalkyl;

[0165] each R^3 is independently halogen, cyano, hydroxy, nitro, amino, CHO, C_1-C_4 alkyl, C_2-C_4 alk-

enyl, C_2-C_4 alkynyl, C(=O)N(R^{3A})(R^{3B}), C(=NOR^{3C})H, C(=N)(R^{3D})H, C_1-C_4 alkoxy, C_2-C_4 cyanoalkoxy, C_2-C_4 alkylcarbonyl, C_2-C_4 alkoxycarbonyl, C_2-C_4 alkylcarbonyloxy, C_2-C_4 alkoxyalkyl, C_1-C_4 haloalkyl, C_1-C_4 haloalkoxy, SO_nR^{3E} or C_3-C_6 cycloalkyl; or phenyl optionally substituted with cyano, halogen or C_1-C_4 alkyl;

[0166] m is 0, 1, 2 or 3;

[0167] each R^{1A}, R^{2A} and R^{3E} is independently C_1-C_4 alkyl, C_1-C_4 haloalkyl, C_1-C_4 alkylamino or C_2-C_6 dialkylamino;

[0168] R^{3A} is C_1-C_4 alkyl or C_1-C_4 haloalkyl;

[0169] R^{3B} is H, C_1-C_4 alkyl or C_1-C_4 haloalkyl;

[0170] R^{3C} is independently H or C_1-C_4 alkyl;

[0171] R^{3D} is independently H or C_1-C_4 alkyl; and

[0172] n is 0, 1, or 2;

[0173] provided the compound of Formula 1 is other than 5-chloro-2-[(4'-methyl[1,1'-biphenyl]2-yl)oxy]-pyrimidine (CAS #107492-74-0), 5-chloro-2-[(4'-chloro[1,1'-biphenyl]2-yl)oxy]-pyrimidine (CAS #107492-72-8), 5-chloro-2-[(3'-chloro[1,1'-biphenyl]2-yl)oxy]-pyrimidine (CAS #107492-76-2) and 5-chloro-2-[[3'-(trifluoromethyl)[1,1'-biphenyl]2-yl]oxy]-pyrimidine (CAS #107492-75-1); and provided i) when Q is 5-chloro-2-pyridinyl; Z is O; and R^3 is 4-chloro, then R^2 is other than Cl or Br; ii) when Q is 4-CF_3-2-pyrimidinyl; Z is O; and m is 0, then R^2 is other than Cl or Br; and iii) when Q is 6-CF_3-2-pyridinyl; Z is O; and m is 0, then R^2 is other than Br.

Embodiment AA

[0174] A compound of Embodiment AAA or a compound of Formula 1 as described in the Summary of the Invention wherein

[0175] Q is a 5- or 6-membered aromatic heterocylic ring, bound to the remainder of Formula 1 through a carbon atom, and optionally substituted with 1 to 4 R^1;

[0176] Z is O or S;

[0177] each R^1 is independently halogen, cyano, nitro, SF_5, CHO, C(=O)NH_2, C(=S)NH_2, SO_2NH_2, C_1-C_4 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, C_1-C_4 haloalkyl, C_2-C_4 haloalkenyl, C_2-C_4 haloalkynyl, C_3-C_6 cycloalkyl, C_3-C_6 halocycloalkyl, C_4-C_8 alkylcycloalkyl, C_4-C_8 cycloalkylalkyl, C_2-C_6 alkylcarbonyl, C_2-C_6 haloalkylcarbonyl, C_2-C_6 alkoxycarbonyl, C_3-C_7 cycloalkylcarbonyl, C_2-C_8 alkylaminocarbonyl, C_3-C_{10} dialkylaminocarbonyl, C_1-C_4 alkoxy, C_3-C_4 alkenyloxy, C_3-C_4 alkynyloxy, C_1-C_4 haloalkoxy, C_3-C_4 haloalkenyloxy, C_3-C_4 haloalkynyloxy, C_3-C_6 cycloalkoxy, C_3-C_6 halocycloalkoxy, C_4-C_8 cycloalkylalkoxy, C_2-C_6 alkoxyalkyl, C_2-C_6 haloalkoxyalkyl, C_2-C_6 alkoxyhaloalkyl, C_2-C_6 alkoxyalkoxy, C_2-C_4 alkylcarbonyloxy, C_2-C_6 cyanoalkyl, C_2-C_6 cyanoalkoxy, C_1-C_4 hydroxyalkyl, C_2-C_4 alkylthioalkyl, SO_nR^{1A}, $Si(CH_3)_3$ or B(—OC(R^{1B})$_2$C(R^{1B})$_2$O—); or a phenyl ring optionally substituted with up to 5 substituents independently selected from R^{1C}; or a 5- or 6-membered heteroaromatic ring containing ring members selected from carbon atoms and up to 4 heteroatoms independently selected from up to 2 O, up to 2 S and up to 4 N atoms, each ring optionally substituted with up to 3 substituents independently selected from R^{1C} on carbon atom ring members and R^{1D} on nitrogen atom ring members;

[0178] R^2 is halogen, cyano, nitro, C_1-C_4 alkoxy, C_1-C_4 alkyl, C_2-C_6 alkenyl, C_2-C_6 alkynyl, SO_nR^{2A}, C_1-C_4 haloalkyl or C_3-C_6 cycloalkyl;

[0179] each R^3 is independently halogen, cyano, hydroxy, nitro, amino, CHO, C(=O)NH_2, C(=S)NH_2, SO_2NH_2, C_1-C_4 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, C_1-C_4 haloalkyl, C_2-C_4 haloalkenyl, C_2-C_4 haloalkynyl, C_3-C_6 cycloalkyl, C_3-C_6 halocycloalkyl, C_4-C_8 alkylcycloalkyl, C_4-C_8 cycloalkylalkyl, C_2-C_6 alkylcarbonyl, C_2-C_6 haloalkylcarbonyl, C_2-C_6 alkoxycarbonyl, C_3-C_7 cycloalkylcarbonyl, C_1-C_4 alkoxy, C_3-C_4 alkenyloxy, C_3-C_4 alkynyloxy, C_1-C_4 haloalkoxy, C_3-C_4 haloalkenyloxy, C_3-C_4 haloalkynyloxy, C_3-C_6 cycloalkoxy, C_3-C_6 halocycloalkoxy, C_4-C_8 cycloalkylalkoxy, C_2-C_6 alkoxyalkyl, C_2-C_6 haloalkoxyalkyl, C_2-C_6 alkoxyhaloalkyl, C_2-C_6 alkoxyalkoxy, C_2-C_4 alkylcarbonyloxy, C_2-C_6 cyanoalkyl, C_2-C_6 cyanoalkoxy, C_2-C_4 alkylthioalkyl, $Si(CH_3)_3$, C≡C$Si(CH_3)_3$, C(=O)N(R^{3A})(R^{3B}), C(=NOR^{3C})H, C(=NR^{3D})H, SO_nR^{3E}; or a phenyl ring optionally substituted with up to 5 substituents independently selected from R^{3F}; or a 5- or 6-membered heteroaromatic ring containing ring members selected from carbon atoms and up to 4 heteroatoms independently selected from up to 2 O, up to 2 S and up to 4 N atoms, each ring optionally substituted with up to 3 substituents independently selected from R^{3F} on carbon atom ring members and R^{3G} on nitrogen atom ring members; or pyrimidinyloxy;

[0180] m is 0, 1, 2 or 3;

[0181] each n is independently 0, 1 or 2;

[0182] each R^{1A}, R^{2A} and R^{3E} is independently C_1-C_4 alkyl, C_1-C_4 haloalkyl, C_1-C_4, alkylamino or C_2-C_6 dialkylamino;

[0183] each R^{1B} is independently H or C_1-C_4 alkyl;

[0184] each R^{1C} is independently hydroxy, halogen, cyano, nitro, C_1-C_6 alkyl, C_1-C_6 haloalkyl, C_1-C_6 alkoxy or C_1-C_6 haloalkoxy;

[0185] each R^{1D} is independently cyano, C_1-C_6 alkyl, C_1-C_6 haloalkyl, C_1-C_6 alkoxy or C_2-C_6 alkylcarbonyl;

[0186] each R^{3A} is independently C_1-C_4 alkyl or C_1-C_4 haloalkyl;

[0187] each R^{3B} is independently H, C_1-C_4 alkyl or C_1-C_4 haloalkyl;

[0188] each R^{3C} is independently H or C_1-C_4 alkyl;

[0189] each R^{3D} is independently H, amino, C_1-C_4 alkyl or C_1-C_4 alkylamino;

[0190] each R^{3F} is independently hydroxy, halogen, cyano, nitro, C_1-C_6 alkyl, C_1-C_6 haloalkyl, C_1-C_6 alkoxy or C_1-C_6 haloalkoxy; and

[0191] each R^{3G} is independently cyano, C_1-C_6 alkyl, C_1-C_6 haloalkyl, C_1-C_6 alkoxy or C_2-C_6 alkylcarbonyl;

Embodiment A

[0192] A compound of Embodiment AA wherein

[0193] Q is selected from Q-1 through Q-55 wherein r is 0, 1, 2 or 3; and s is 0 or 1;

[0194] each R^1 is independently halogen, cyano, SF_5, CHO, C_1-C_4 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, C_1-C_4 haloalkyl, C_2-C_4 haloalkenyl, C_2-C_4 haloalkynyl, C_2-C_6 alkylcarbonyl, C_2-C_6 haloalkylcarbonyl, C_2-C_6 alkoxycarbonyl, C_1-C_4 alkoxy, C_3-C_4 alkenyloxy, C_3-C_4 alkynyloxy, C_1-C_4 haloalkoxy, C_3-C_4 haloalkenyloxy, C_3-C_4 haloalkynyloxy, C_2-C_6 alkoxy-

alkyl, C_2-C_6 haloalkoxyalkyl, C_2-C_6 cyanoalkyl, C_1-C_4 hydroxyalkyl, C_2-C_4 alkylthioalkyl or SO_nR^{1A};

[0195] R^3 is independently halogen, cyano, CHO, C_1-C_4 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, C_1-C_4 haloalkyl, C_2-C_4 haloalkenyl, C_2-C_4 haloalkynyl, C_3-C_6 cycloalkyl, C_3-C_6 halocycloalkyl, C_4-C_8 alkylcycloalkyl, C_2-C_6 alkylcarbonyl, C_2-C_6 haloalkylcarbonyl, C_2-C_6 alkoxycarbonyl, C_1-C_4 alkoxy, C_3-C_4 alkenyloxy, C_3-C_4 alkynyloxy, C_1-C_4 haloalkoxy, C_3-C_4 haloalkenyloxy, C_3-C_4 haloalkynyloxy, C_3-C_6 cycloalkoxy, C_3-C_6 halocycloalkoxy, C_2-C_6 alkoxyalkyl, C_2-C_6 haloalkoxyalkyl, C_2-C_4 alkylcarbonyloxy, C_2-C_6 cyanoalkyl, $C(=O)N(R^{3A})(R^{3B})$, $C(=NOR^{3C})H$, SO_nR^{3E}; or a phenyl ring optionally substituted with up to 5 substituents independently selected from R^{3F}; or a 5- or 6-membered heteroaromatic ring containing ring members selected from carbon atoms and up to 4 heteroatoms independently selected from up to 2 O, up to 2 S and up to 4 N atoms, each ring optionally substituted with up to 3 substituents independently selected from R^{3F} on carbon atom ring members and R^{3G} on nitrogen atom ring members;

[0196] Z is O; and

[0197] m is 0, 1 or 2.

Embodiment B

[0198] A compound of Embodiment A wherein

[0199] each R^1 is independently halogen, cyano, CHO, C_1-C_4 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, C_1-C_4 haloalkyl, C_2-C_4 haloalkenyl, C_2-C_4 haloalkynyl, C_1-C_4 alkoxy, C_3-C_4 alkenyloxy, C_3-C_4 alkynyloxy, C_1-C_4 haloalkoxy, C_3-C_4 haloalkenyloxy, C_3-C_4 haloalkynyloxy, C_2-C_6 alkoxyalkyl, C_2-C_6 haloalkoxyalkyl, C_1-C_4 hydroxyalkyl, C_2-C_4 alkylthioalkyl or SO_nR^{1A};

[0200] R^2 is halogen, C_1-C_4 alkyl or C_1-C_4 haloalkyl;

[0201] each R^3 is independently halogen, cyano, CHO, C_1-C_4 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, C_1-C_4 haloalkyl, C_2-C_4 haloalkenyl, C_2-C_4 haloalkynyl, C_3-C_6 cycloalkyl, C_3-C_6 halocycloalkyl, C_2-C_6 alkylcarbonyl, C_2-C_6 haloalkylcarbonyl, C_2-C_6 alkoxycarbonyl, C_1-C_4 alkoxy, C_1-C_4 haloalkoxy, C_2-C_6 alkoxyalkyl, C_2-C_6 haloalkoxyalkyl, C_2-C_6 cyanoalkyl, SO_nR^{3E}; or a 5- or 6-membered heteroaromatic ring containing ring members selected from carbon atoms and up to 4 heteroatoms independently selected from up to 2 O, up to 2 S and up to 4 N atoms, each ring optionally substituted with up to 3 substituents independently selected from R^{3F} on carbon atom ring members and R^{3G} on nitrogen atom ring members; and

[0202] m is 0 or 1.

Embodiment C1

[0203] A compound of Embodiment B wherein

[0204] Q is selected from Q-7 through Q-24;

[0205] each R^1 is independently halogen, cyano, C_1-C_4 alkyl, C_1-C_4 haloalkyl, C_1-C_4 alkoxy, C_1-C_4 haloalkoxy or SO_nR^{1A};

[0206] R^2 is halogen or C_1-C_4 alkyl;

[0207] each R^3 is independently halogen, cyano, C_1-C_4 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, C_1-C_4 haloalkyl, C_2-C_6 alkylcarbonyl, C_2-C_6 haloalkylcarbonyl, C_2-C_6 alkoxycarbonyl, C_1-C_4 alkoxy, C_1-C_4 haloalkoxy, C_2-C_6 alkoxyalkyl or C_2-C_6 haloalkoxyalkyl; and

[0208] each R^{1A} is independently C_1-C_4 alkyl or C_1-C_4 haloalkyl.

Embodiment C2

[0209] A compound of Embodiment B wherein

[0210] Q is selected from Q-43, Q-44, Q-45, Q-48, Q-49 and Q-50;

[0211] each R^1 is independently halogen, cyano, C_1-C_4 alkyl, C_1-C_4 haloalkyl, C_1-C_4 alkoxy, C_1-C_4 haloalkoxy or SO_nR^{1A};

[0212] R^2 is halogen or C_1-C_4 alkyl;

[0213] each R^3 is independently halogen, cyano, C_1-C_4 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, C_1-C_4 haloalkyl, C_2-C_6 alkylcarbonyl, C_2-C_6 haloalkylcarbonyl, C_2-C_6 alkoxycarbonyl, C_1-C_4 alkoxy, C_1-C_4 haloalkoxy, C_2-C_6 alkoxyalkyl or C_2-C_6 haloalkoxyalkyl; and

[0214] each R^{1A} is independently C_1-C_4 alkyl or C_1-C_4 haloalkyl.

Embodiment D1

[0215] A compound of Embodiment C1 wherein

[0216] Q is selected from Q-16 and Q-18;

[0217] each R^1 is independently halogen, C_1-C_4 alkyl, C_1-C_4 haloalkyl or C_1-C_4 haloalkoxy;

[0218] R^2 is halogen or CH_3; and

[0219] each R^3 is independently halogen, cyano, C_1-C_4 alkyl or C_1-C_4 haloalkyl.

Embodiment D2

[0220] A compound of Embodiment C2 wherein

[0221] Q is selected from Q-43, Q-44 and Q-45;

[0222] each R^1 is independently halogen, C_1-C_4 alkyl, C_1-C_4 haloalkyl or C_1-C_4 haloalkoxy;

[0223] R^2 is halogen or CH_3; and

[0224] each R^3 is independently halogen, cyano, C_1-C_4 alkyl or C_1-C_4 haloalkyl.

[0225] Specific embodiments include compounds of Formula 1 selected from the group consisting of:

[0226] 5-chloro-2-[2-(5-chloro-2-pyridinyl)phenoxy]pyrimidine (Compound 1),

[0227] 5-chloro-2-[2-[5-(fluoromethyl)-3-isoxazolyl]phenoxy]pyrimidine (Compound 32),

[0228] 2-[2-(3-bromo-5-isoxazolyl)phenoxy]-5-chloropyrimidine (Compound 12),

[0229] 5-chloro-2-[2-[5-(trifluoromethyl)-2-pyridinyl]phenoxy]pyrimidine (Compound 27),

[0230] 5-chloro-2-[3-chloro-2-(5-chloro-2-pyridinyl)phenoxy]pyrimidine (Compound 23),

[0231] 4-[2-[(5-bromo-2-pyrimidinyl)oxy]phenyl]-2-(trifluoromethyl)pyrimidine (Compound 21),

[0232] 2-[2-(2-bromo-5-thiazolyl)phenoxy]-5-(trifluoromethyl)pyrimidine (Compound 15),

[0233] 5-chloro-2-[4-methyl-2-[2-(trifluoromethyl)-4-pyridinyl]phenoxy]pyrimidine (Compound 24),

[0234] 5-chloro-2-[2-[5-(difluoromethyl)-3-isoxazolyl]phenoxy]pyrimidine (Compound 35),

[0235] 5-chloro-2-[2-[3-(difluoromethyl)-5-isoxazolyl]phenoxy]pyrimidine (Compound 53),

[0236] 5-chloro-2-[2-[5-(difluoromethyl)-3-isoxazolyl]-3-fluorophenoxy]pyrimidine (Compound 55),

[0237] 5-bromo-2-[2-[5-(difluoromethyl)-3-isoxazolyl] phenoxy]pyrimidine (Compound 62),

[0238] 5-chloro-2-[2-[3-(trifluoromethyl)-5-isoxazolyl] phenoxy]pyrimidine (Compound 63),

[0239] 5-chloro-2-[2-[3-(difluoromethyl)-5-isoxazolyl]-3-fluorophenoxy]pyrimidine (Compound 144),

[0240] 5-bromo-2-[2-[3-(difluoromethyl)-5-isoxazolyl]-3-fluorophenoxy]pyrimidine (Compound 145),

[0241] 5-chloro-2-[2-[5-(trifluoromethyl)-3-isoxazolyl]-3-fluorophenoxy]pyrimidine (Compound 168) and

[0242] 5-chloro-2-[2-[5-(trifluoromethyl)-3-isoxazolyl] phenoxy]pyrimidine (Compound 200).

[0243] Embodiments of the present invention as described in the Summary of the Invention and Embodiment AAA also include the following:

Embodiment Ap

[0244] A compound of the Summary of the Invention wherein

[0245] Q is a 5- or 6-membered aromatic heterocylic ring, bound to the remainder of Formula 1 through a carbon atom, and optionally substituted with 1 to 3 R^1; or

[0246] Q is phenyl substituted with 1 to 3 R^1;

[0247] R^1 is halogen, cyano, CHO, C_1-C_4 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, C_1-C_4 alkoxy, C_3-C_4 alkenyloxy, C_3-C_4 alkynyloxy, C_1-C_4 haloalkyl, C_1-C_4 haloalkoxy, C_2-C_4 alkoxyalkyl, C_2-C_4 alkylthioalkyl or SO_nR^{1A};

[0248] each n is independently 0, 1 or 2

[0249] R^2 is halogen, C_1-C_4 alkyl or C_1-C_4 haloalkyl;

[0250] m is 0, 1 or 2;

[0251] each R^3 is independently halogen, cyano, hydroxy, nitro, amino, CHO, C_1-C_4 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, $C(=O)N(R^{3A})(R^{3B})$, $C(=NOR^{3C})H$, $C(=N)(R^{3D})H$, C_1-C_4 alkoxy, C_2-C_4 cyanoalkoxy, C_2-C_4 alkylcarbonyl, C_2-C_4 alkoxycarbonyl, C_2-C_4 alkylcarbonyloxy, C_2-C_4 alkoxyalkyl, C_1-C_4 haloalkyl, C_1-C_4 haloalkoxy, SO_nR^{3E} or C_3-C_6 cycloalkyl;

[0252] each R^3 is attached to the remainder of Formula 1 at the 3-, 4- or 6-position;

[0253] R^{1A} is C_1-C_4 alkyl or C_1-C_4 haloalkyl;

[0254] R^{3E} is C_1-C_4 alkyl;

[0255] R^{3A} is C_1-C_4 alkyl;

[0256] R^{3B} is H or C_1-C_4 alkyl;

[0257] R^{3C} is H or C_1-C_4 alkyl; and

[0258] R^{3D} is H or C_1-C_4 alkyl.

Embodiment Bp

[0259] A compound of Embodiment A wherein

[0260] Q is selected from Q-1 through Q-54 (i.e. as described in Embodiment 3);

[0261] Z is O;

[0262] R^1 is halogen, cyano, C_1-C_4 alkyl, C_1-C_4 alkoxy, C_1-C_4 haloalkyl, C_1-C_4 haloalkoxy, or SCF_3;

[0263] R^2 is halogen or C_1-C_4 alkyl;

[0264] m is 0 or 1;

[0265] each R^3 is independently halogen, cyano, amino, C_1-C_4 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, C_1-C_4 alkoxy, C_2-C_4 alkoxycarbonyl, C_2-C_4 alkylcarbonyloxy, C_2-C_4 alkoxyalkyl or C_1-C_4 haloalkyl; and

[0266] each R^3 is attached to the remainder of Formula 1 at the 3- or 4-position.

Embodiment Cp

[0267] A compound of Embodiment B wherein

[0268] Q is a 5-membered aromatic heterocylic ring, bound to the remainder of Formula 1 through a carbon atom, optionally substituted with R^1, and is selected from Q-1 through Q-41;

[0269] R^1 is halogen C_1-C_4 haloalkyl or C_1-C_4 haloalkoxy;

[0270] R^2 is halogen or CH_3; and

[0271] each R^3 is independently halogen, cyano, amino or C_1-C_4 alkyl.

Embodiment Dp

[0272] A compound of Embodiment C wherein

[0273] Q is 6-membered aromatic heterocylic ring, bound to the remainder of Formula 1 through a carbon atom, optionally substituted with R^1, and is selected from Q-42 through Q-54;

[0274] R^1 is halogen C_1-C_4 haloalkyl or C_1-C_4 haloalkoxy;

[0275] R^2 is halogen or CH_3; and

[0276] each R^3 is independently halogen, cyano, amino or C_1-C_4 alkyl.

Embodiment Ep

[0277] A compound of Embodiment D wherein

[0278] Q is selected from Q-42, Q-43, Q-44, Q-47, Q-48 and Q-49;

[0279] R^1 is Cl, Br, CF_3 or OCF_3;

[0280] R^2 is halogen; and

[0281] each R^3 is independently cyano.

[0282] Specific embodiments include a compound of Formula 1 selected from the group consisting of:

[0283] 5-chloro-2-[2-(5-chloro-2-pyridinyl)phenoxy]pyrimidine (Compound 1);

[0284] 5-chloro-2[2-[5-(fluoromethyl)-3-isoxazolyl]phenoxy]pyrimidine (Compound 32);

[0285] 2-[2-(3-bromo-5-isoxazolyl)phenoxy]-5-chloropyrimidine (Compound 12);

[0286] 5-chloro-2-[[4'-(trifluoromethoxy)[1,1'-biphenyl]-2-yl]oxy]pyrimidine (Compound 42);

[0287] 5-chloro-2-[2-[5-(trifluoromethyl)-2-pyridinyl] phenoxy]pyrimidine (Compound 27);

[0288] 5-chloro-2-[3-chloro-2-(5-chloro-2-pyridinyl)phenoxy]pyrimidine (Compound 23);

[0289] 4-[2-[(5-bromo-2-pyrimidinyl)oxy]phenyl]-2-(trifluoromethyl)pyrimidine (Compound 21);

[0290] 2-[2-(2-bromo-5-thiazolyl)phenoxy]-5-(trifluoromethyl)pyrimidine (Compound 15); and

[0291] 5-chloro-2-[4-methyl-2-[2-(trifluoromethyl)-4-pyridinyl]phenoxy]pyrimidine (Compound 24).

[0292] This invention also relates to a method for controlling undesired vegetation comprising applying to the locus of the vegetation herbicidally effective amounts of the compounds of the invention (e.g., as a composition described herein). Of note as embodiments relating to methods of use are those involving the compounds of embodiments described above. Compounds of the invention are particularly useful for selective control of weeds in crops

such as wheat, barley, maize, soybean, sunflower, cotton, oilseed rape and rice, and specialty crops such as sugarcane, citrus, fruit and nut crops.

[0293] Also noteworthy as embodiments are herbicidal compositions of the present invention comprising the compounds of embodiments described above.

[0294] This invention also includes a herbicidal mixture comprising (a) a compound selected from Formula 1, N-oxides, and salts thereof, and (b) at least one additional active ingredient selected from (b1) photosystem II inhibitors, (b2) acetohydroxy acid synthase (AHAS) inhibitors, (b3) acetyl-CoA carboxylase (ACCase) inhibitors, (b4) auxin mimics and (b5) 5-enol-pyruvylshikimate-3-phosphate (EPSP) synthase inhibitors, (b6) photosystem I electron diverters, (b7) protoporphyrinogen oxidase (PPO) inhibitors, (b8) glutamine synthetase (GS) inhibitors, (b9) very long chain fatty acid (VLCFA) elongase inhibitors, (b10) auxin transport inhibitors, (b11) phytoene desaturase (PDS) inhibitors, (b12) 4-hydroxyphenyl-pyruvate dioxygenase (HPPD) inhibitors, (b13) homogentisate solenesyltransererase (HST) inhibitors, (b14) cellulose biosynthesis inhibitors, (b15) other herbicides including mitotic disruptors, organic arsenicals, asulam, bromobutide, cinmethylin, cumyluron, dazomet, difenzoquat, dymron, etobenzanid, flurenol, fosamine, fosamine-ammonium, metam, methyldymron, oleic acid, oxaziclomefone, pelargonic acid and pyributicarb, and (b16) herbicide safeners; and salts of compounds of (b1) through (b16).

[0295] "Photosystem II inhibitors" (b1) are chemical compounds that bind to the D-1 protein at the Q_B-binding niche and thus block electron transport from Q_A to Q_B in the chloroplast thylakoid membranes. The electrons blocked from passing through photosystem II are transferred through a series of reactions to form toxic compounds that disrupt cell membranes and cause chloroplast swelling, membrane leakage, and ultimately cellular destruction. The Q_B-binding niche has three different binding sites: binding site A binds the triazines such as atrazine, triazinones such as hexazinone, and uracils such as bromacil, binding site B binds the phenylureas such as diuron, and binding site C binds benzothiadiazoles such as bentazon, nitriles such as bromoxynil and phenyl-pyridazines such as pyridate. Examples of photosystem II inhibitors include ametryn, amicarbazone, atrazine, bentazon, bromacil, bromofenoxim, bromoxynil, chlorbromuron, chloridazon, chlorotoluron, chloroxuron, cumyluron, cyanazine, daimuron, desmedipham, desmetryn, dimefuron, dimethametryn, diuron, ethidimuron, fenuron, fluometuron, hexazinone, ioxynil, isoproturon, isouron, lenacil, linuron, metamitron, methabenzthiazuron, metobromuron, metoxuron, metribuzin, monolinuron, neburon, pentanochlor, phenmedipham, prometon, prometryn, propanil, propazine, pyridafol, pyridate, siduron, simazine, simetryn, tebuthiuron, terbacil, terbumeton, terbuthylazine, terbutryn and trietazine.

[0296] "AHAS inhibitors" (b2) are chemical compounds that inhibit acetohydroxy acid synthase (AHAS), also known as acetolactate synthase (ALS), and thus kill plants by inhibiting the production of the branched-chain aliphatic amino acids such as valine, leucine and isoleucine, which are required for protein synthesis and cell growth. Examples of AHAS inhibitors include amidosulfuron, azimsulfuron, bensulfuron-methyl, bispyribac-sodium, cloransulam-methyl, chlorimuron-ethyl, chlorsulfuron, cinosulfuron, cyclosulfamuron, diclosulam, ethametsulfuron-methyl, ethoxysulfuron, flazasulfuron, florasulam, flucarbazone-sodium, flumetsulam, flupyrsulfuron-methyl, flupyrsulfuron-sodium, foramsulfuron, halosulfuron-methyl, imazamethabenz-methyl, imazamox, imazapic, imazapyr, imazaquin, imazethapyr, imazosulfuron, iodosulfuron-methyl (including sodium salt), iofensulfuron (2-iodo-N-[[(4-methoxy-6-methyl-1,3,5-triazin-2-yl)amino]carbonyl]benzenesulfonamide), mesosulfuron-methyl, metazosulfuron (3-chloro-4-(5,6-dihydro-5-methyl-1,4,2-dioxazin-3-yl)-N-[[(4,6-dimethoxy-2-pyrimidinyl)amino]carbonyl]-1-methyl-1H-pyrazole-5-sulfonamide), metosulam, metsulfuron-methyl, nicosulfuron, oxasulfuron, penoxsulam, primisulfuron-methyl, propoxycarbazone-sodium, propyrisulfuron (2-chloro-N-[[(4,6-dimethoxy-2-pyrimidinyl)amino]carbonyl]-6-propylimidazo[1,2-b]pyridazine-3-sulfonamide), prosulfuron, pyrazosulfuron-ethyl, pyribenzoxim, pyriftalid, pyriminobac-methyl, pyrithiobac-sodium, rimsulfuron, sulfometuron-methyl, sulfosulfuron, thiencarbazone, thifensulfuron-methyl, triafamone (N-[2-[(4,6-dimethoxy-1,3,5-triazin-2-yl)carbonyl]-6-fluorophenyl]-1,1-difluoro-N-methylmethanesulfonamide), triasulfuron, tribenuron-methyl, trifloxysulfuron (including sodium salt), triflusulfuron-methyl and tritosulfuron.

[0297] "ACCase inhibitors" (b3) are chemical compounds that inhibit the acetyl-CoA carboxylase enzyme, which is responsible for catalyzing an early step in lipid and fatty acid synthesis in plants. Lipids are essential components of cell membranes, and without them, new cells cannot be produced. The inhibition of acetyl CoA carboxylase and the subsequent lack of lipid production leads to losses in cell membrane integrity, especially in regions of active growth such as meristems. Eventually shoot and rhizome growth ceases, and shoot meristems and rhizome buds begin to die back. Examples of ACCase inhibitors include alloxydim, butroxydim, clethodim, clodinafop, cycloxydim, cyhalofop, diclofop, fenoxaprop, fluazifop, haloxyfop, pinoxaden, profoxydim, propaquizafop, quizalofop, sethoxydim, tepraloxydim and tralkoxydim, including resolved forms such as fenoxaprop-P, fluazifop-P, haloxyfop-P and quizalofop-P and ester forms such as clodinafop-propargyl, cyhalofop-butyl, diclofop-methyl and fenoxaprop-P-ethyl.

[0298] Auxin is a plant hormone that regulates growth in many plant tissues. "Auxin mimics" (b4) are chemical compounds mimicking the plant growth hormone auxin, thus causing uncontrolled and disorganized growth leading to plant death in susceptible species. Examples of auxin mimics include aminocyclopyrachlor (6-amino-5-chloro-2-cyclopropyl-4-pyrimidinecarboxylic acid) and its methyl and ethyl esters and its sodium and potassium salts, aminopyralid, benazolin-ethyl, chloramben, clacyfos, clomeprop, clopyralid, dicamba, 2,4-D, 2,4-DB, dichlorprop, fluroxypyr, halauxifen (4-amino-3-chloro-6-(4-chloro-2-fluoro-3-methoxyphenyl)-2-pyridinecarboxylic acid), halauxifen-methyl (methyl 4-amino-3-chloro-6-(4-chloro-2-fluoro-3-methoxyphenyl)-2-pyridinecarboxylate), MCPA, MCPB, mecoprop, picloram, quinclorac, quinmerac, 2,3,6-TBA, triclopyr, and methyl 4-amino-3-chloro-6-(4-chloro-2-fluoro-3-methoxyphenyl)-5-fluoro-2-pyridinecarboxylate.

[0299] "EPSP (5-enol-pyruvylshikimate-3-phosphate) synthase inhibitors" (b5) are chemical compounds that inhibit the enzyme, 5-enol-pyruvylshikimate-3-phosphate synthase, which is involved in the synthesis of aromatic amino acids such as tyrosine, tryptophan and phenylalanine. EPSP inhibitor herbicides are readily absorbed through plant

foliage and translocated in the phloem to the growing points. Glyphosate is a relatively nonselective postemergence herbicide that belongs to this group. Glyphosate includes esters and salts such as ammonium, isopropylammonium, potassium, sodium (including sesquisodium) and trimesium (alternatively named sulfosate).

[0300] "Photosystem I electron diverters" (b6) are chemical compounds that accept electrons from Photosystem I, and after several cycles, generate hydroxyl radicals. These radicals are extremely reactive and readily destroy unsaturated lipids, including membrane fatty acids and chlorophyll. This destroys cell membrane integrity, so that cells and organelles "leak", leading to rapid leaf wilting and desiccation, and eventually to plant death. Examples of this second type of photosynthesis inhibitor include diquat and paraquat.

[0301] "PPO inhibitors" (b7) are chemical compounds that inhibit the enzyme protoporphyrinogen oxidase, quickly resulting in formation of highly reactive compounds in plants that rupture cell membranes, causing cell fluids to leak out. Examples of PPO inhibitors include acifluorfen-sodium, azafenidin, benzfendizone, bifenox, butafenacil, carfentrazone, carfentrazone-ethyl, chlomethoxyfen, cinidon-ethyl, fluazolate, flufenpyr-ethyl, flumiclorac-pentyl, flumioxazin, fluoroglycofen-ethyl, fluthiacet-methyl, fomesafen, halosafen, lactofen, oxadiargyl, oxadiazon, oxyfluorfen, pentoxazone, profluazol, pyraclonil, pyraflufen-ethyl, saflufenacil, sulfentrazone, thidiazimin, tiafenacil (methyl N-[2-[[2-chloro-5-[3,6-dihydro-3-methyl-2,6-dioxo-4-(trifluoromethyl)-1(2H)-pyrimidinyl]-4-fluorophenyl]thio]-1-oxopropyl]-β-alaninate) and 3-[7-fluoro-3,4-dihydro-3-oxo-4-(2-propyn-1-yl)-2H-1,4-benzoxazin-6-yl]dihydro-1,5-dimethyl-6-thioxo-1,3,5-triazine-2,4(1H,3H)-dione.

[0302] "GS (glutamine synthase) inhibitors" (b8) are chemical compounds that inhibit the activity of the glutamine synthetase enzyme, which plants use to convert ammonia into glutamine. Consequently, ammonia accumulates and glutamine levels decrease. Plant damage probably occurs due to the combined effects of ammonia toxicity and deficiency of amino acids required for other metabolic processes. The GS inhibitors include glufosinate and its esters and salts such as glufosinate-ammonium and other phosphinothricin derivatives, glufosinate-P ((2S)-2-amino-4-(hydroxymethylphosphinyl)butanoic acid) and bilanaphos.

[0303] "VLCFA (very long chain fatty acid) elongase inhibitors" (b9) are herbicides having a wide variety of chemical structures, which inhibit the elongase. Elongase is one of the enzymes located in or near chloroplasts which are involved in biosynthesis of VLCFAs. In plants, very-long-chain fatty acids are the main constituents of hydrophobic polymers that prevent desiccation at the leaf surface and provide stability to pollen grains. Such herbicides include acetochlor, alachlor, anilofos, butachlor, cafenstrole, dimethachlor, dimethenamid, diphenamid, fenoxasulfone (3-[[(2,5-dichloro-4-ethoxyphenyl)methyl]sulfonyl]-4,5-dihydro-5,5-dimethylisoxazole), fentrazamide, flufenacet, indanofan, mefenacet, metazachlor, metolachlor, naproanilide, napropamide, napropamide-M ((2R)—N,N-diethyl-2-(1-naphthalenyloxy)propanamide), pethoxamid, piperophos, pretilachlor, propachlor, propisochlor, pyroxasulfone, and thenylchlor, including resolved forms such as S-metolachlor and chloroacetamides and oxyacetamides.

[0304] "Auxin transport inhibitors" (b10) are chemical substances that inhibit auxin transport in plants, such as by binding with an auxin-carrier protein. Examples of auxin transport inhibitors include diflufenzopyr, naptalam (also known as N-(1-naphthyl)phthalamic acid and 2-[(1-naphthalenylamino)carbonyl]benzoic acid).

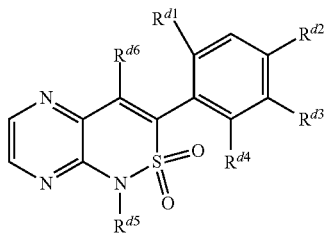
[0305] "PDS (phytoene desaturase inhibitors) (b11) are chemical compounds that inhibit carotenoid biosynthesis pathway at the phytoene desaturase step. Examples of PDS inhibitors include beflubutamid, diflufenican, fluridone, flurochloridone, flurtamone norflurzon and picolinafen.

[0306] "HPPD (4-hydroxyphenyl-pyruvate dioxygenase) inhibitors" (b12) are chemical substances that inhibit the biosynthesis of synthesis of 4-hydroxyphenyl-pyruvate dioxygenase. Examples of HPPD inhibitors include benzobicyclon, benzofenap, bicyclopyrone (4-hydroxy-3-[[2-[(2-methoxyethoxy)methyl]-6-(trifluoromethyl)-3-pyridinyl]carbonyl]bicyclo[3.2.1]oct-3-en-2-one), fenquinotrione (2-[[8-chloro-3,4-dihydro-4-(4-methoxyphenyl)-3-oxo-2-quinoxalinyl]carbonyl]-1,3-cyclohexanedione), isoxachlortole, isoxaflutole, mesotrione, pyrasulfotole, pyrazolynate, pyrazoxyfen, sulcotrione, tefuryltrione, tembotrione, topramezone, 5-chloro-3-[(2-hydroxy-6-oxo-1-cyclohexen-1-yl)carbonyl]-1-(4-methoxyphenyl)-2(1H)-quinoxalinone, 4-(2,6-diethyl-4-methylphenyl)-5-hydroxy-2,6-dimethyl-3(2H)-pyridazinone, 4-(4-fluorophenyl)-6-[(2-hydroxy-6-oxo-1-cyclohexen-1-yl)carbonyl]-2-methyl-1,2,4-triazine-3,5(2H,4H)-dione, 5-[(2-hydroxy-6-oxo-1-cyclohexen-1-yl)carbonyl]-2-(3-methoxyphenyl)-3-(3-methoxypropyl)-4(3H)-pyrimidinone, 2-methyl-N-(4-methyl-1,2,5-oxadiazol-3-yl)-3-(methylsulfinyl)-4-(trifluoromethyl)benzamide and 2-methyl-3-(methylsulfonyl)-N-(1-methyl-1H-tetrazol-5-yl)-4-(trifluoromethyl)benzamide.

[0307] HST (homogentisate solenesyltransererase) inhibitors (b13) disrupt a plant's ability to convert homogentisate to 2-methyl-6-solanyl-1,4-benzoquinone, thereby disrupting carotenoid biosynthesis. Examples of HST inhibitors include haloxydine, pyriclor, 3-(2-chloro-3,6-difluorophenyl)-4-hydroxy-1-methyl-1,5-naphthyridin-2 (1H)-one, 7-(3,5-dichloro-4-pyridinyl)-5-(2,2-difluoroethyl)-8-hydroxypyrido[2,3-b]pyrazin-6(5H)-one and 4-(2,6-diethyl-4-methylphenyl)-5-hydroxy-2,6-dimethyl-3(2H)-pyridazinone.

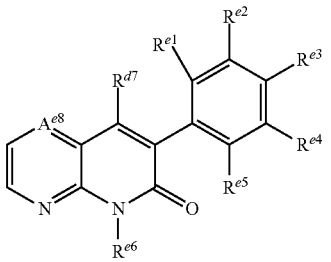
[0308] HST inhibitors also include compounds of Formulae A and B.

A



-continued

B



[0309] wherein R^{d1} is H, Cl or CF_3; R^{d2} is H, Cl or Br; R^{d3} is H or Cl; R^{d4} is H, Cl or CF_3; R^{d5} is CH_3, CH_2CH_3 or CH_2CHF_2; and R^{d6} is OH, or —OC(═O)-i-Pr; and R^{e1} is H, F, Cl, CH_3 or CH_2CH_3; R^{e2} is H or CF_3; R^{e3} is H, CH_3 or CH_2CH_3; R^{e4} is H, F or Br; R^{e5} is Cl, CH_3, CF_3, OCF_3 or CH_2CH_3; R^{e6} is H, CH_3, CH_2CHF_2 or C≡CH; R^{e7} is OH, —OC(═O)Et, —OC(═O)-i-Pr or —OC(═O)-t-Bu; and A^{e8} is N or CH.

[0310] Cellulose biosynthesis inhibitors (b14) inhibit the biosynthesis of cellulose in certain plants. They are most effective when using a pre-aplication or early post-application on young or rapidly growing plants. Examples of cellulose biosynthesis inhibitors include chlorthiamid, dichlobenil, flupoxam, indaziflam (N^2-[(1R,2S)-2,3-dihydro-2,6-dimethyl-1H-inden-1-yl]-6-(1-fluoroethyl)-1,3,5-triazine-2,4-diamine), isoxaben and triaziflam.

[0311] Other herbicides (b15) include herbicides that act through a variety of different modes of action such as mitotic disruptors (e.g., flamprop-M-methyl and flamprop-M-isopropyl) organic arsenicals (e.g., DSMA, and MSMA), 7,8-dihydropteroate synthase inhibitors, chloroplast isoprenoid synthesis inhibitors and cell-wall biosynthesis inhibitors. Other herbicides include those herbicides having unknown modes of action or do not fall into a specific category listed in (b1) through (b14) or act through a combination of modes of action listed above. Examples of other herbicides include aclonifen, asulam, amitrole, bromobutide, cinmethylin, clomazone, cumyluron, cyclopyrimorate (6-chloro-3-(2-cyclopropyl-6-methylphenoxy)-4-pyridazinyl 4-morpholinecarboxylate), daimuron, difenzoquat, etobenzanid, fluometuron, flurenol, fosamine, fosamine-ammonium, dazomet, dymron, ipfencarbazone (1-(2,4-dichlorophenyl)-N-(2,4-difluorophenyl)-1,5-dihydro-N-(1-methylethyl)-5-oxo-4H-1,2,4-triazole-4-carboxamide), metam, methyldymron, oleic acid, oxaziclomefone, pelargonic acid, pyributicarb and 5-[[(2,6-difluorophenyl)methoxy]methyl]-4,5-dihydro-5-methyl-3-(3-methyl-2-thienyl)isoxazole.

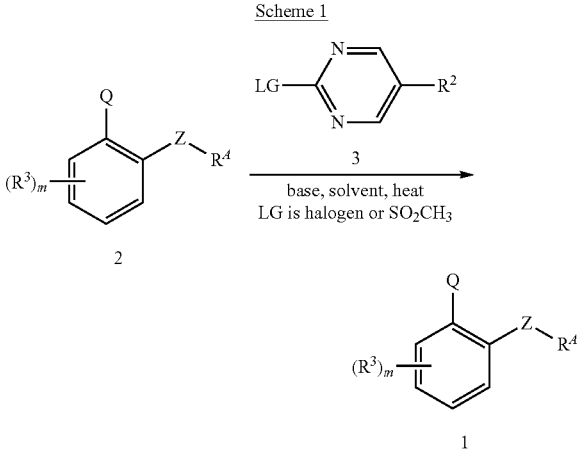
[0312] "Herbicide safeners" (b16) are substances added to a herbicide formulation to eliminate or reduce phytotoxic effects of the herbicide to certain crops. These compounds protect crops from injury by herbicides but typically do not prevent the herbicide from controlling undesired vegetation. Examples of herbicide safeners include but are not limited to benoxacor, cloquintocet-mexyl, cumyluron, cyometrinil, cyprosulfamide, daimuron, dichlormid, dicyclonon, dimepiperate, fenchlorazole-ethyl, fenclorim, flurazole, fluxofenim, furilazole, isoxadifen-ethyl, mefenpyr-diethyl, mephenate, methoxyphenone, naphthalic anhydride, oxabetrinil, N-(aminocarbonyl)-2-methylbenzenesulfonamide and N-(aminocarbonyl)-2-fluorobenzenesulfonamide, 1-bromo-4-[(chloromethyl)sulfonyl]benzene, 2-(dichloromethyl)-2-methyl-1,3-dioxolane (MG 191), 4-(dichloroacetyl)-1-oxa-4-azospiro[4.5]decane (MON 4660).

[0313] The compounds of Formula 1 can be prepared by general methods known in the art of synthetic organic chemistry. One or more of the following methods and variations as described in Schemes 1-9 can be used to prepare the compounds of Formula 1. The definitions of Q, R^1, R^2 and R^3 in the compounds of Formulae 1-11 below are as defined above in the Summary of the Invention unless otherwise noted. Compounds of Formulae 1A-1C, 2A-2F, 4A and 8A are various subsets of the compounds of Formula 1, 2 4 and 8 and all substituents for Formulae 1A-1C, 2A-2F, 4A and 8A are as defined above for Formula 1 unless otherwise noted.

[0314] One or more of the following methods and variations as described in Schemes 1-9 can be used to prepare the compounds of Formula 1. The definitions of Q, R^1, R^2 and R^3 in the compounds of Formulae 1-11 below are as defined above in the Summary of the Invention unless otherwise noted.

[0315] As shown in Scheme 1 a compound of Formula 1 can be prepared by nucleophilic substitution by heating a compound of Formula 2 in a suitable solvent, such as acetonitrile, tetrahydrofuran or N,N-dimethylformamide in the presence of a base such as potassium or cesium carbonate, at temperatures ranging from 50 to 110° C., with a compound of Formula 3 (where LG is halogen or SO_2Me). The reaction is typically conducted at temperatures ranging from 50 to 110° C.

Scheme 1

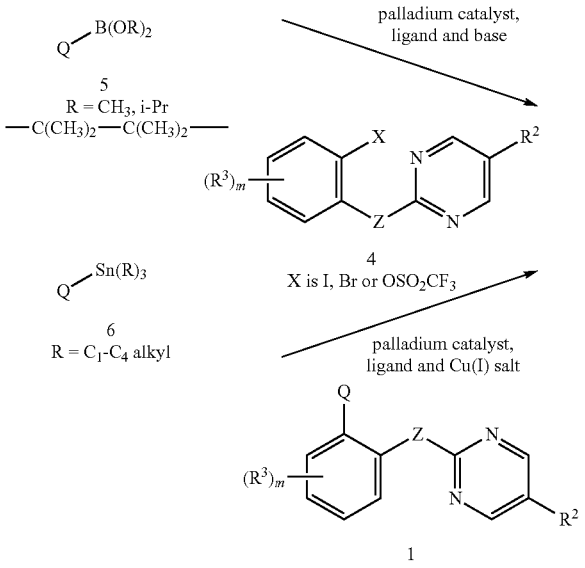


R^A is H

[0316] Alternatively, as shown in Scheme 2, boron compounds of Formula 5 or tin compounds of Formula 6 can be coupled with intermediates of Formula 4 under Suzuki or Stille conditions to give compounds of Formula 1. Suzuki couplings typically are conducted in the presence of Pd(0) or Pd(II) salts, a suitable ligand, and a base. Suitable bases for this transformation include potassium carbonate or cesium carbonate, while Pd(II) salts such as $Pd(OAc)_2$ or $PdCl_2$ can be used in conjunction with ligands such as triphenylphosphine or 1,1'-bis(diphenylphosphino)ferrocene (dppf). Conditions for Suzuki couplings are well documented in the literature (see for example *Angewandte Chemie International Edition* 2006, 45, 3484 and *Tetrahedron Letters* 2002,

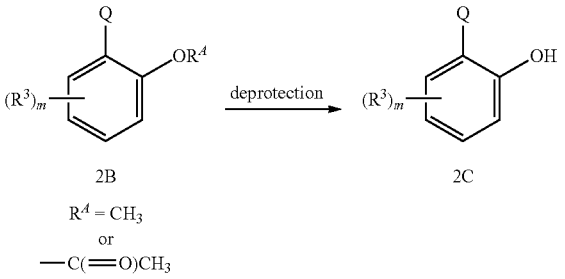
58(14), 2885). Boron intermediates of Formula 5 are commercially available or can be prepared from the corresponding halides or trifluoromethanesulfonates by methods known in the literature (see for example PCT Patent Publication WO 2007/043278, U.S. Pat. No. 8,080,566, *Organic Letters* 2011, 13(6), 1366 and *Organic Letters* 2012, 14(2), 600). Stille couplings typically can be conducted in the presence of Pd(0) or a Pd(II) salt, a ligand and a Cu(I) salt such as copper(I) iodide. The reaction can be run in a solvent such as dioxane, 1,2-dimethoxyethane or toluene at a temperature ranging from ambient to reflux. For conditions and reagents employed in Stille couplings see *Chemical Reviews* 2007, 107(1), 133-173.

Scheme 2



[0317] As shown in Scheme 3, a compound of Formula 2C (i.e. a compound of Formula 2 where Z is O) can be prepared by deprotection of a compound of Formula 2B (i.e. a compound of Formula 2A wherein Z is O; and R^A is CH_3 or —C(═O)CH_3) with a suitable deprotecting agent. Suitable methoxy (i.e. when R^A is CH_3) deprotecting reagents such as BBr_3, $AlCl_3$ and HBr in acetic acid can be used in the presence of solvents such as toluene, dichloromethane and dichloroethane at a temperature of from −80 to 120° C. Suitable acetoxy (i.e. when R^A is —C(═O)CH_3) deprotecting agents include potassium carbonate in methanol or ammonium acetate in aqueous methanol at room temperature can be used as discussed in Das, et al., *Tetrahedron* 2003, 59, 1049-1054 and methods cited therein. Alternatively, a compound of Formula 2B can be combined with Amberlyst 15© in methanol (as discussed in Das, et al. *Tet. Lett.* 2003, 44, 5465-5468) or combined with sodium acetate in ethanol (as discussed in Narender, T., et al. *Synthetic Communications* 2009, 39(11), 1949-1956) to obtain a compound of Formula 2C. Other useful phenolic protecting groups suitable for use in preparing a compound of Formula 2C can be found in Greene, T. W.; Wuts, P. G. M. *Protective Groups in Organic Synthesis,* 4th ed.; Wiley: Hoboken, N.J., 1991.

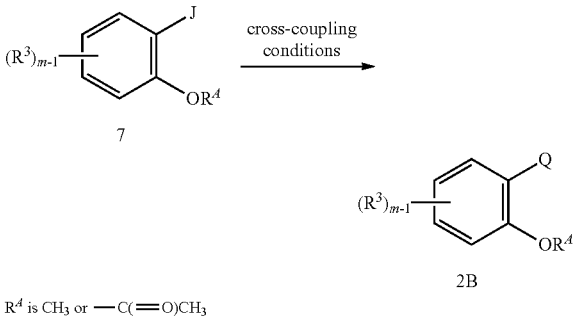
Scheme 3



[0318] An intermediate of Formula 2B can be prepared as shown in Scheme 4 from an intermediate of Formula 7 by a variety of methods known to one skilled in the art. Compounds of Formula 2B can be accessed by coupling precursors of Formula 7 wherein J is Br, Cl, I or trifluoromethanesulfonate with boronate or trialkyltin group-containing heterocycles (i.e compounds of Formula 5 or Formula 6 using the Suzuki conditions or the Stille conditions of Scheme 2). Alternatively, compounds of Formula 7 wherein J is a boronate or trialkyltin group may be coupled with halogen-substituted heterocycles Q-X using the methods shown in Scheme 2 to afford compounds of Formula 2B. The skilled chemist will realize that with the prudent choice of groups X and J in reactions involving compounds of Formula 7 and Q-X can synthesize the intermediate 2B utilizing various cross coupling procedures such as Kumada coupling, Hiyama coupling or Negishi coupling described in "Metal-Catalyzed Cross-Coupling Reactions", Eds. A. de Meijere and F. Diederich, Wiley-VCH, Weinheim, 2004, vols 1 and 2.

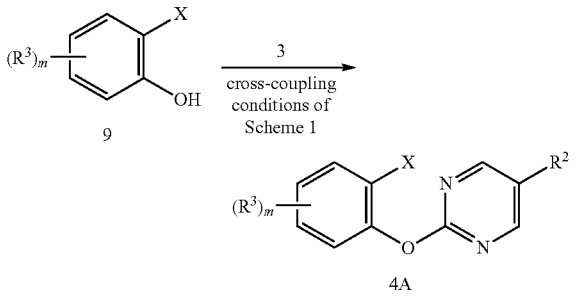
[0319] When J in Formula 7 is an alkene, alkyne, oxime, nitrile or ketone, various heterocycles can be prepared using methods described in Katritsky, *Advances in Heterocyclic Chemistry*, Vol. 1-104, Elsevier. In cases where regioisomeric mixtures are produced, the desired product can be isolated using routing separation techniques known in the art.

Scheme 4



[0320] As shown in Scheme 5, a compound of Formula 4A can be prepared by coupling of phenols of Formula 9 with a compound of Formula 3 under the nucleophilic substitution conditions described in Scheme 1.

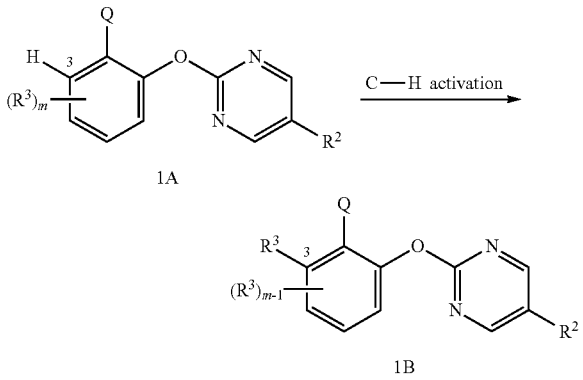
Scheme 5



X is I, Br or OSO_2CF_3

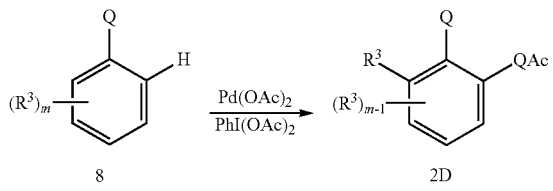
[0321] As shown in Scheme 6, a compound of Formula 1B, (i.e. a compound of Formula 1 where Z is O; and m is 1 at the 3-position) can be prepared by "C—H activation" of a compound of Formula 1A (a compound of Formula 1 wherein Z is O; and m is 0). For example, paladium(II) acetate along with either an N-halosuccinimide, $PhI(OAc)_2$, N-fluoropyridinium tetrafluoroborate, or a lower alkyl boronic acid can be used to introduce the R^3 variable as I, Br, Cl, —OAc, F, and lower alkyl substituents respectively. These methods are detailed in reviews of selective activation of C—H bonds in *Chemical Reviews* 2010, 110, 575-1211 and references cited therein. Methods for "C—H activation" can also be found in Wencel-Delord et al., *Nature Chemistry* 2013, 5, 369-375 and a series of reviews of "C—H activation" in *Accounts of Chemical Research* 2012, 45, 777-958 and references cited therein. Iodides and bromides of Formula 1B can then be further functionalized by various cross coupling procedures described in "Metal-Catalyzed Cross-Coupling Reactions", Eds A. de Meijere and F. Diederich, Wiley-VCH, Weinheim, 2004, vols 1 and 2.

Scheme 6



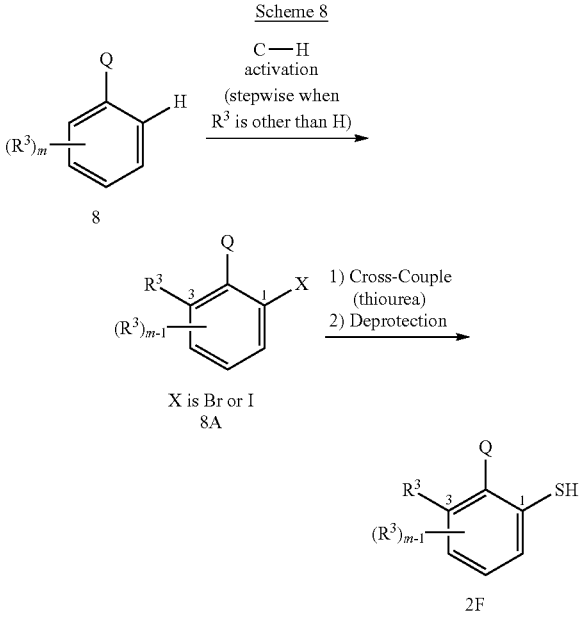
[0322] Chemistry based on "C—H activation" can also be used to prepare a compound of Formula 2D (i.e. a compound of Formula 2 wherein Z is O; R^4 is $—C(O)CH_3$; and m is 1 at the 3-position) as shown in Scheme 7 utilizing palladium (II) acetate and (diacetoxyiodo)benzene as described above for Scheme 6. A compound of Formula 2D can subsequently be converted via methods disclosed in Schemes 1 and 6 to provide a compound of Formula 1.

Scheme 7



[0323] Similarly, chemistry based on "C—H activation" can be used to prepare a compound of Formulae 2F (i.e. a compound of Formula 2A wherein Z is S) as shown in Scheme 8. A compound of Formula 8 can first be converted to a compound of Formula 8A (i.e. a compound of Formula 6 wherein the ortho "H" is X; and X is Br or I) by utilizing a stepwise introduction of substituents using "C—H activation". Iodides and bromides of Formula 8A can then be further functionalized by copper mediated cross-coupling with thiourea as described in Qi, Junsheng, *Chin. J. Chem.* 2010, 28, 1441-1443 to provide the aryl thiol after acidic deprotection. Palladium catalyzed cross-coupling reactions of aryl halides can give protected thiols that can, in turn, be deprotected under either acidic conditions or basic conditions (e.g. cesium fluoride) to provide a compound of Formula 2F. These conditions are discussed in Organ, Michael G., *Angew. Chem. Int. Ed.* 2012, 51, 3314-3322 and the references cited therein. Also, relevant conditions can be found in Takashiro Itoh, *J. Org. Chem.* 2006, 71, 2203-2206. A compound of Formula 2F can then be converted via methods disclosed in Schemes 1 and 7 to provide a compound of Formula 1.

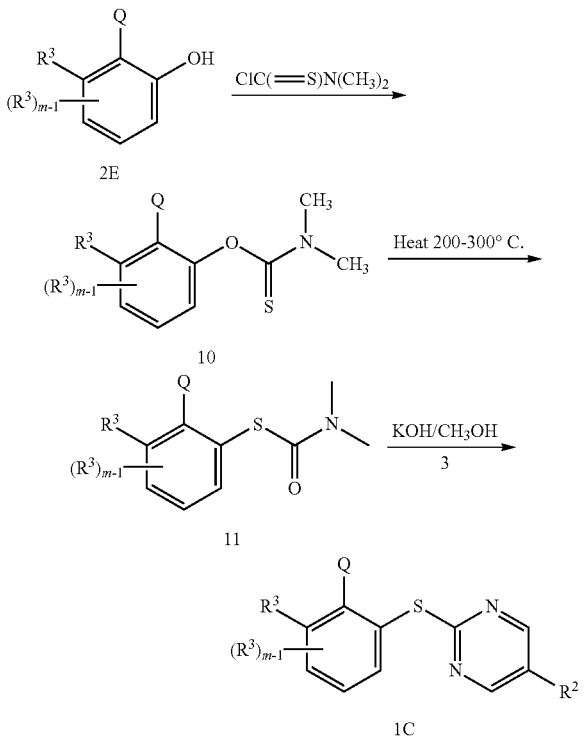
Scheme 8



[0324] In Scheme 9, the phenol, 2E is reacted with N,N-dimethyl thiocarbamoyl chloride in N,N-dimethylformamide in the presence of a strong tertiary amine base such as 1,4-diazabicyclo[2.2.2]octane or N-methylmorpholine for

acidic phenols (for less-acidic phenols, prior deprotonation with sodium hydride may be advantageous) to form the O-aryl N,N-dimethylthiocarbamate of Formula 10. Newman-Kwart rearrangement of a compound of Formula 10 at temperatures ranging from 200 to 300° C. provides the intermediate S-aryl dimethylthiocarbamate of Formula 11. A one-pot deprotection of a compound of Formula 11 is readily achieved using 10% aqueous sodium hydroxide or methanolic potassium hydroxide to afford the corresponding aryl thiol. Subsequent reaction with a compound of Formula 3 at or slightly above room temperature provides the product 1C (i.e. a compound of Formula 1 wherein Z is S). Methods for Newman-Kwart rearrangements are found in Lloyd-Jones, Guy C., *Synthesis* 2008, 661-689.

Scheme 9



[0325] It is recognized by one skilled in the art that various functional groups can be converted into others to provide different a compound of Formula 1. For a valuable resource that illustrates the interconversion of functional groups in a simple and straightforward fashion, see Larock, R. C., *Comprehensive Organic Transformations: A Guide to Functional Group Preparations, 2nd Ed.*, Wiley-VCH, New York, 1999. For example, intermediates for the preparation of a compound of Formula 1 may contain aromatic nitro groups, which can be reduced to amino groups, and then be converted via reactions well known in the art such as the Sandmeyer reaction, to various halides, providing a compound of Formula 1. The above reactions can also in many cases be performed in alternate order

[0326] It is recognized that some reagents and reaction conditions described above for preparing a compound of Formula 1 may not be compatible with certain functionalities present in the intermediates. In these instances, the incorporation of protection/deprotection sequences or functional group interconversions into the synthesis will aid in obtaining the desired products. The use and choice of the protecting groups will be apparent to one skilled in chemical synthesis (see, for example, Greene, T. W.; Wuts, P. G. M. *Protective Groups in Organic Synthesis,* 4th ed.; Wiley: Hoboken, N.J., 1991). One skilled in the art will recognize that, in some cases, after the introduction of a given reagent as it is depicted in any individual scheme, it may be necessary to perform additional routine synthetic steps not described in detail to complete the synthesis of a compound of Formula 1. One skilled in the art will also recognize that it may be necessary to perform a combination of the steps illustrated in the above schemes in an order other than that implied by the particular presented to prepare a compound of Formula 1.

[0327] One skilled in the art will also recognize that a compound of Formula 1 and the intermediates described herein can be subjected to various electrophilic, nucleophilic, radical, organometallic, oxidation, and reduction reactions to add substituents or modify existing substituents.

[0328] Without further elaboration, it is believed that one skilled in the art using the preceding description can utilize the present invention to its fullest extent. The following Examples are, therefore, to be construed as merely illustrative, and not limiting of the disclosure in any way whatsoever. Steps in the following Examples illustrate a procedure for each step in an overall synthetic transformation, and the starting material for each step may not have necessarily been prepared by a particular preparative run whose procedure is described in other Examples or Steps. Percentages are by weight except for chromatographic solvent mixtures or where otherwise indicated. Parts and percentages for chromatographic solvent mixtures are by volume unless otherwise indicated. ^{1}H NMR spectra are reported in ppm downfield from tetramethylsilane in $CDCl_3$; "s" means singlet, "d" means doublet, "t" means triplet, "q" means quartet, "m" means multiplet, "dd" means doublet of doublets, "dt" means doublet of triplets, and "bs" means broad singlet.

[0329] It is recognized by one skilled in the art that various functional groups can be converted into others to provide different compounds of Formula 1. For a valuable resource that illustrates the interconversion of functional groups in a simple and straightforward fashion, see Larock, R. C., *Comprehensive Organic Transformations: A Guide to Functional Group Preparations, 2nd Ed.*, Wiley-VCH, New York, 1999. For example, intermediates for the preparation of compounds of Formula 1 may contain aromatic nitro groups, which can be reduced to amino groups, and then be converted via reactions well known in the art such as the Sandmeyer reaction, to various halides, providing compounds of Formula 1. The above reactions can also in many cases be performed in alternate order

[0330] It is recognized that some reagents and reaction conditions described above for preparing compounds of Formula 1 may not be compatible with certain functionalities present in the intermediates. In these instances, the incorporation of protection/deprotection sequences or functional group interconversions into the synthesis will aid in obtaining the desired products. The use and choice of the protecting groups will be apparent to one skilled in chemical synthesis (see, for example, Greene, T. W.; Wuts, P. G. M. *Protective Groups in Organic Synthesis,* 2nd ed.; Wiley:

New York, 1991). One skilled in the art will recognize that, in some cases, after the introduction of a given reagent as it is depicted in any individual scheme, it may be necessary to perform additional routine synthetic steps not described in detail to complete the synthesis of compounds of Formula 1. One skilled in the art will also recognize that it may be necessary to perform a combination of the steps illustrated in the above schemes in an order other than that implied by the particular presented to prepare the compounds of Formula 1.

[0331] One skilled in the art will also recognize that compounds of Formula 1 and the intermediates described herein can be subjected to various electrophilic, nucleophilic, radical, organometallic, oxidation, and reduction reactions to add substituents or modify existing substituents.

[0332] Without further elaboration, it is believed that one skilled in the art using the preceding description can utilize the present invention to its fullest extent. The following Examples are, therefore, to be construed as merely illustrative, and not limiting of the disclosure in any way whatsoever. Steps in the following Examples illustrate a procedure for each step in an overall synthetic transformation, and the starting material for each step may not have necessarily been prepared by a particular preparative run whose procedure is described in other Examples or Steps. Percentages are by weight except for chromatographic solvent mixtures or where otherwise indicated. Parts and percentages for chromatographic solvent mixtures are by volume unless otherwise indicated. ^{1}H NMR spectra are reported in ppm downfield from tetramethylsilane at 500 MHz in $CDCl_3$ unless otherwise indicated; "s" means singlet, "d" means doublet, "t" means triplet, "q" means quartet, "m" means multiplet, "dd" means doublet of doublets and "dt" means doublet of triplets.

Synthesis Example 1

Synthesis of 3-[2-[(5-chloro-2-pyrimidinyl)oxy] phenyl]-5-isoxazolemethanol (Compound 31)

Step A: Synthesis of 5-chloro-2-[2-[5-[[[(1,1-dimethylethyl)diphenylsilyl]oxy]methyl]-3-isoxazolyl] phenoxy]pyrimidine

[0333] To a solution of 3-(2-methoxyphenyl)-5-isoxazolemethanol (prepared as described in *Bioorganic Med. Chem.* 2004, 12, 3965 (0.500 mg, 0.243 mmol) in tetrahydrofuran (25 mL) was added t-butyldiphenylsilyl chloride (0.804 mg, 2.92 mmol) followed by imidazole (0.199 mg, 2.92 mmol). After 2 h the solvent was removed under vacuum. Purification using chromatography on silica gel eluting with 0 to 100% ethyl acetate in hexanes to afford the intermediate 5-[[[(1,1-dimethylethyl)diphenylsilyl]oxy] methyl]-3-(2-methoxyphenyl)isoxazole and the material was taken on without further purification.

[0334] To a solution of 5-[[[(1,1-dimethylethyl)diphenylsilyl]oxy]methyl]-3-(2-methoxyphenyl)isoxazole (3.10 g, 0.699 mmol) in dichloromethane (35 mL) at 0° C. was added a 1.0 M solution of boron tribromide (34.9 mL) and the reaction was stirred at this temperature for 1 h. The reaction was quenched with a saturated solution of sodium bicarbonate. The phases were separated, and the aqueous layer was washed with additional dichloromethane. The combined organic phases were combined, dried with $MgSO_4$ and concentrated under vacuum. Purification by chromatography on silica gel eluting with 0 to 100% ethyl acetate in hexanes afforded 2-[5-[[[(1,1-dimethylethyl)diphenylsilyl] oxy]methyl]-3-isoxazolyl]phenol which was taken taken to the next step without further purification.

[0335] To a solution of 2-[5-[[[(1,1-dimethylethyl)diphenylsilyl]oxy]methyl]-3-isoxazolyl]phenol (2.78 g, 6.47 mmol) in acetonitrile (60 mL) was added 2,5-dichloropyrimidine (1.15 g, 7.70 mmol) and potassium carbonate (2.24 g, 16.2 mmol) and the reaction was heated to 80° C. for 6 h. The reaction mixture was allowed to warm to room temperature and the solvent was removed under vacuum. Purification by chromatography on silica gel eluting with 0 to 100% ethyl acetate in hexanes afforded the title product (2.27 g).

[0336] ^{1}H NMR δ 8.41 (s, 2H), 8.00-7.97 (m, 1H), 7.67-7.61 (m, 4H), 7.56-7.50 (m, 1H), 7.47-7.36 (m, 7H), 7.28-7.26 (m, 1H), 6.56 (t, 1H), 1.05 (s, 9H). MS (AP^+)=542.

Step B: Synthesis of 3-[2-[(5-chloro-2-pyrimidinyl) oxy]phenyl]-5-isoxazolemethanol

[0337] To a solution of 5-chloro-2-[5-[[[(1,1-dimethylethyl)diphenylsilyl]oxy]methyl]-3-isoxazolyl]phenoxy]pyrimidine (i.e. the product from Step A) (2.27 g, 4.19 mmol) in tetrahydrofuran (15 mL) was added acetic acid (0.50 mL) followed by a solution of 75% tetrabutylammonium fluoride in water (2.9 mL) and the reaction was allowed to stir for 2 h. The reaction was quenched with a saturated solution of sodium bicarbonate and the phases were partitioned and the aqueous phase was further washed with ethyl acetate. The combined organic phases were combined, dried over $MgSO_4$ and concentrated under vacuum. Purification by chromatography on silica gel eluting with 0 to 100% ethyl acetate in hexanes afforded the title product, a compound of the present invention (1.21 g).

[0338] ^{1}H NMR δ 8.45 (s, 2H), 7.99-7.95 (m, 1H), 7.56-7.52 (m, 1H), 7.42-7.38 (m, 1H), 7.28-7.25 (m, 1H), 6.64-6.61 (m, 1H), 4.77-4.73 (m, 2H).

Synthesis Example 2

Synthesis of 3-[2-[(5-chloro-2-pyrimidinyl)oxy] phenyl]-5-isoxazolecarboxaldehyde (Compound 33)

Step A: Synthesis of 3-[2-[(5-chloro-2-pyrimidinyl) oxy]phenyl]-5-isoxazolecarboxaldehyde

[0339] Pyridinium chlorochromate (263 mg, 1.22 mmol) and silica gel (200 mg) were combined and mixed as solids. This mixture was then added to a stirring solution of 3-[2-[(5-chloro-2-pyrimidinyl)oxy]phenyl]-5-isoxazolemethanol (i.e. the product obtained in Step A of Example 1) (309 mg, 1.02 mmol) in dichloromethane (5.0 mL) and the reaction was allowed to stir for 18 h. The solution was filtered to remove the silica gel and the organic phase was washed with a 1 M hydrochloric acid solution. The organic phase was dried with $MgSO_4$ and concentrated under vacuum. Purification by chromatography on silica gel eluting with 0 to 100% ethyl acetate in hexanes to afforded the title product, a compound of the present invention (0.307 g).

[0340] ^{1}H NMR δ 9.95 (s, 1H), 8.46 (s, 2H), 8.06-8.01 (m, 1H), 7.61-7.56 (m, 1H), 7.47-7.41 (m, 1H), 7.38 (s, 1H), 7.32-7.29 (m, 1H). MS (AP^+)=302.

Synthesis Example 3

Synthesis of 5-chloro-2-[2-[5-(difluoromethyl)-3-isoxazolyl]phenoxy]pyrimidine (Compound 35)

Step A Synthesis of 5-chloro-2-[2-[5-(difluoromethyl)-3-isoxazolyl]phenoxy]pyrimidine

[0341] To a stirred solution of 3-[2-[(5-chloro-2-pyrimidinyl)oxy]phenyl]-5-isoxazolecarboxaldehyde (i.e. the product from Step A of Example 2) (100 mg, 0.332 mmol) in dichloromethane (3.0 mL) at −78° C. was added Deoxo-Fluor® (161 mg, 0.729 mmol) and the reaction was allowed to return to ambient temperature. Upon consumption of the starting material as evidenced by thin-layer chromatography, the solvent was removed under vacuum. Purification by chromatography on silica gel eluting with 0 to 100% ethyl acetate in hexanes to afforded the title product, a compound of the present invention (36.3 mg).

[0342] ^{1}H NMR δ 8.46 (s, 2H), 8.01-7.96 (m, 1H), 7.59-7.54 (m, 1H), 7.44-7.38 (m, 1H), 7.31-7.27 (m, 1H), 6.98-6.96 (s, 1H), 6.83-6.60 (m, 1H). MS (ESI$^+$)=324.

Synthesis Example 4

Synthesis of 2-[2-(3-bromo-5-isoxazolyl)phenoxy]-5-chloropyrimidine (Compound 12)

Step A: Synthesis of 3-bromo-5-(2-methoxyphenyl)isoxazole

[0343] To a solution of 1-ethynyl-2-methoxybenzene (0.78 g, 5.92 mmol) in dichloromethane (10 mL) was added dibromoformaldoxime (1.00 g, 4.93 mmol). The mixture was cooled to 0° C. and potassium bicarbonate (1.48 g, 14.8 mmol) was added, followed by heating to 40° C. for 18 h. Water was added to the reaction mixture, the phases separated, and the aqueous layer was again washed with dichloromethane. The combined organic phases were dried over $MgSO_4$, concentrated under vacuum, and purified by chromatography on silica gel eluting with 0 to 100% ethyl acetate in hexanes to afford the title product, a compound of the present invention (1.04 g).

[0344] ^{1}H NMR δ 7.94 (dd, 1H), 7.47-7.42 (m, 1H), 7.09 (dd, 1H), 7.02 (dd, 1H), 6.85 (s, 1H), 3.97 (s, 3H). MS (AP+)=254.

Step B: Synthesis of 2-(3-bromo-5-isoxazolyl)phenol

[0345] To a solution of 3-bromo-5-(2-methoxyphenyl) isoxazole (i.e. the product from Step A) (0.50 g, 1.97 mmol) in dichloromethane (20 mL) was added a 1 M solution of boron tribromide in dichloromethane (9.86 mmol) at −78° C. and the solution was allowed to warm to room temperature and stir for 18 h. Dichloroethane (20 mL) was added, and reaction mixture was concentrated to remove the excess dichloromethane. Boron tribromide in dichloromethane (9.86 mmol) was again added and the reaction was heated to 80° C. until completion as evidenced by thin-layer chromatography. The reaction mixture was allowed to cool to ambient temperature and quenched with a saturated solution of sodium bicarbonate. The phases were separated and the aqueous layer was again washed with dichloromethane. The combined organic phases were dried with $MgSO_4$, concentrated under vacuum, and purified by chromatography on silica gel eluting with 0 to 100% ethyl acetate in hexanes to afford the title product (0.395 g).

[0346] ^{1}H NMR δ 7.76 (dd, 1H), 7.39-7.33 (m, 1H), 7.09-7.02 (m, 1H), 6.96-6.93 (m, 1H), 6.02 (s, 1H). MS (AP$^-$)=238.

Step C: 2-[2-(3-bromo-5-isoxazolyl)phenoxy]-5-chloropyrimidine

[0347] To a solution of 2-(3-bromo-5-isoxazolyl)phenol (i.e. the product from Step B) (100 mg, 0.417 mmol) in acetonitrile (5 mL) was added 2,5-dichloropyrimidine (75.0 mg, 0.503 mmol) and potassium carbonate (288 mg, 2.08 mmol) then the solution was stirred at ambient temperature for 18 h. The reaction was then heated at 40° C. for 2 h followed by 80° C. for two hours. The solution was then cooled to ambient temperature, water was added, the phases were separated and the aqueous layer was again washed with dichloromethane. The combined organic phases were dried over $MgSO_4$, concentrated under vacuum, and purified by chromatography on silica gel eluting with 0 to 100% ethyl acetate in hexanes to afford the title product, a compound of the present invention (122 mg).

[0348] ^{1}H NMR δ 8.49 (s, 2H), 8.03 (dd, 1H), 7.58-7.53 (m, 1H), 7.43 (dt, 1H), 7.29 (dd, 1H), 6.74 (s, 1H). MS (AP$^+$)=352.

Synthesis Example 5

Synthesis of 5-chloro-2-[2-[4-(trifluoromethyl)-2-pyridinyl]phenoxy]pyrimidine (Compound 25)

Step A: Synthesis of 2-[4-(trifluoromethyl)-2-pyridinyl]phenol

[0349] 2-Chloro-4-trifluoromethylpyridine (1.0 g, 5.5 mmol) and 2-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl) phenol (1.57 g, 7.16 mmol) were combined in dimethoxyethane (18 mL) and water (1.8 mL). To this mixture were added sodium carbonate (2.28 g, 16.5 mmol) and tetrakis (triphenylphosphine)palladium(0) (0.32 g, 0.27 mmol). The reaction was heated at 90° C. for 2.5 h and allowed to stir at 23° C. for 18 h. The mixture was diluted with water (20 mL) and dichloromethane (20 mL) and the layers separated. The aqueous layer was washed with dichloromethane (10 mL). The combined dichloromethane layers were washed with saturated aqueous sodium chloride solution (10 mL) and dried over sodium sulfate. After filtration the organic layer was evaporated and the solid thus obtained was triturated with hexanes (20 mL). The filtrate was concentrated to provide 1.18 g of the title compound as a yellow solid which was used in Step B without further purification.

[0350] ^{1}H NMR δ 13.61 (s, 1H), 8.72 (d, 1H), 8.12 (s, 1H), 7.83 (d, 1H), 7.47 (m, 1H), 7.36 (s, 1H), 7.06 (d, 1H), 6.96 (t, 1H).

Step B Synthesis of 5-chloro-2-[2-[4-(trifluoromethyl)-2-pyridinyl]phenoxy]pyrimidine

[0351] 2-[4-(Trifluoromethyl)-2-pyridinyl]phenol (i.e. the product from Step A) (0.20 g, 0.84 mmol) and 2,5-dichloropyrimidine (0.14 g, 0.92 mmol) were dissolved in acetonitrile (2 mL) and treated with powdered potassium carbonate (0.34 g, 2.5 mmol). The mixture was heated to 80° C. for 18 h. After cooling, the reaction mixture was diluted with water (10 mL) and ethyl acetate (10 mL) and the layers separated.

The aqueous layer was washed with ethyl acetate (10 mL). The combined ethyl acetate solution was washed with saturated aqueous sodium chloride solution (10 mL) and dried over $MgSO_4$. The filtrate was evaporated under reduced pressure and subjected to chromatography through 12 g silica gel eluting with 10 to 20% ethyl acetate in hexanes. Appropriate fractions were pooled and evaporated to provide the title compound, a compound of the present invention (0.2 g) as a clear oil.

[0352] ^{1}H NMR δ 8.75 (d, 1H), 8.39 (s, 2H), 7.91 (s, 1H), 7.88 (m, 1H), 7.54 (m, 1H), 7.44 (m, 1H), 7.37 (d, 1H), 7.28 (m, 1H).

Synthesis Example 6

Synthesis of 5-chloro-2-[4-methyl-2-[6-(trifluoromethyl)-3-pyridinyl]phenoxy]pyrimidine (Compound 22)

Step A: Synthesis of 2-(2-bromo-4-methylphenoxy)-5-chloropyrimidine

[0353] 2-Bromo-4-methylphenol (280 mg, 1.5 mmol) and 2,5-dichloropyrimidine (246 mg, 1.65 mmol) were combined in 6 mL of acetonitrile under a nitrogen atmosphere. Powdered potassium carbonate (455 mg, 3.3 mmol) was added and the resulting mixture was heated at reflux for 6 h. The reaction mixture was cooled and diluted with de-ionized water and ethyl acetate. The aqueous layer was separated and extracted twice with ethyl acetate. The combined organic layers were washed with brine, dried over $MgSO_4$, filtered and concentrated under reduced pressure. The resulting residue was purified by medium pressure liquid chromatography on silica gel eluting with 0 to 15% ethyl acetate in hexanes to yield the title compound (270 mg).

[0354] ^{1}H NMR δ 8.48 (s, 2H), 7.47 (d, 1H), 7.18 (m, 1H), 7.11 (m, 1H), 2.37 (s, 3H).

Step B Synthesis of 5-chloro-2-[4-methyl-2-[6-(trifluoromethyl)-3-pyridinyl]phenoxy]pyrimidine

[0355] A mixture of 2-(2-bromo-4-methylphenoxy)-5-chloropyrimidine (i.e. the product of Step A; 190 mg, 0.63 mmol), B[6-(trifluoromethyl)-3-pyridinyl]-boronic acid (133 mg, 0.70 mmol), sodium carbonate (0.6 mL of 2 M aqueous solution, 1.26 mmol) and tetrakis(triphenylphosphine)palladium(0) (73 mg, 0.06 mmol) in toluene (9 mL) and ethanol (1 mL) was heated at 90° C. for 2 h. The reaction mixture was then concentrated under reduced pressure, and the residue was purified by medium pressure liquid chromatography on silica gel eluted with 0 to 10% ethyl acetate in hexanes to yield the title compound, a compound of the present invention (190 mg).

[0356] ^{1}H NMR δ 8.77 (d, 1H), 8.36 (s, 2H), 8.02 (m, 1H), 7.64 (d, 1H), 7.31 (m, 2H), 7.15 (d, 1H), 2.45 (s, 3H).

Synthesis Example 7

Synthesis of 5-chloro-2-[2-[3-(difluoromethyl)-5-isoxazolyl]phenoxy]pyrimidine (Compound 53)

Step A: Synthesis of 2-(3-difluoromethyl-5-isoxazolyl)phenol

[0357] To a solution of 25% sodium methoxide in methanol (5 mL) and tetrahydrofuran (10 mL), acetophenone (1 g, 7.3 mmol) and difluoroacetate (1 g, 8.1 mmol) in tetrahydrofuran (2 mL) was added and heated at 60° C. for 5 h. The reaction was cooled to room temperature and treated with 36% aq hydrochloric acid (4 mL) and stirred at 60° C. for 2 h. The reaction was quenched by adding water (15 mL) and the organic solvent was removed under vacuum. The precipitated product 2-difluoromethyl-4-chromenone (1.4 g) was filtered and dissolved in ethanol (5 mL). To this solution, hydroxylamine acetate (22 mmol) in water (5 mL) was added and the mixture was heated at 60° C. for 3 h. After cooling the reaction to ambient temperature 4,4-difluoro-1-(2-hydroxyphenyl)-butane-1,3-dione 3-oxime was precipitated with the addition of water (20 mL). This product was collected by filtration and suspended in acetic acid (5 mL) and 36% aqueous hydrochloric acid (1.8 mL) at room temperature and stirred at 80° C. for 15 min to obtain the title compound as a beige solid (800 mg).

[0358] ^{1}H NMR δ 7.82 (m, 1H), 7.36 (s, 1H), 7.07 (m, 1H), 6.95 (m, 2H), 6.82 (t, 1H), 6.05 (s, 1H). MS (ESI^+)=212

Step B: Synthesis of 5-chloro-2-[2-[3-(difluoromethyl)-5-isoxazolyl]phenoxy]-pyrimidine

[0359] To a solution of 2-(3-difluoromethyl-5-isoxazolyl) phenol (i.e. the product from Step A) (2.1 g, 9.71 mmol) in anhydrous N,N-dimethylformamide (8 mL) was added 2,5-dichloropyrimidine (1.5 g, 10.2 mmol) and potassium carbonate (2.9 g, 21.3 mmol). The reaction was heated at 90° C. for 1 h. The solution was cooled to ambient temperature and diluted with water. The phases were separated and the aqueous phase was washed with additional ethyl acetate. The organic phases were combined, dried with magnesium sulfate and concentrated under vacuum. Purification by chromatography on silica gel eluting with 0 to 10% ethyl acetate in hexanes afforded the title compound, a compound of the present invention, as a solid (2.2 g).

[0360] ^{1}H NMR δ 8.49 (s, 2H), 8.06 (m, 1H), 7.57 (m, 1H), 7.44 (m, 1H), 7.31 (m, 1H), 6.88 (s, 1H), 6.74 (t, 1H). MS (ESI^+)=324

Synthesis Example 8

Synthesis of 5-chloro-2-[2-[3-(difluoromethyl)-5-isoxazolyl]-3-fluorophenoxy]pyrimidine (Compound 144)

Step A: Synthesis of 4,4-difluoro-1-(2-fluoro-6-methoxyphenyl)butane-1,3-dione

[0361] To a solution of 1-(2-fluoro-6-methoxyphenyl) ethanone (2.6 g, 15.5 mmol) and difluoroacetic acid ethyl ester (3.9 mL, 31.0 mmol) in anhydrous N,N-dimethylformamide at 0° C. was added sodium hydride (1.2 g, 31.0 mmol). The reaction mixture was heated at 80° C. for 1 h. The reaction was then cooled to 0° C., diluted with ethyl acetate and acidified with 1 N aqueous hydrochloric acid. The phases were separated and the aqueous phase was washed with additional ethyl acetate. The organic phases were combined and dried with magnesium sulfate and concentrated under vacuum. Purification by chromatography on silica gel eluting with 0 to 15% ethyl acetate in hexanes afforded the title compound (2.5 g).

[0362] ^{1}H NMR δ 7.39 (m, 1H), 6.77 (m, 2H), 6.24 (s, 1H), 6.01 (t, 1H), 3.87 (s, 3H). MS (ESI^+)=247

Step B: Synthesis of 3-difluoromethyl-5-(2-fluoro-6-methoxyphenyl)isoxazole

[0363] A solution of 4,4-difluoro-1-(2-fluoro-6-methoxyphenyl)butane-1,3-dione (i.e. the product from Step A) (2.5 g, 10 mmol) and hydroxylamine hydrochloride (2.1 g, 30 mmol) in ethanol (25 mL) was stirred at 80° C. After 1 h the solvent was removed under vacuum. The resulting residue was diluted with water and extracted with dichloromethane. The organic phase was dried with magnesium sulfate and concentrated under vacuum. Purification by chromatography on silica gel eluting with 0 to 15% ethyl acetate in hexanes afforded the title compound (1.5 g).

[0364] ^{1}H NMR δ 7.41 (m, 1H), 6.69-6.98 (m, 4H), 3.93 (s, 3H). MS (ESI+)=244

Step C: Synthesis of 2-(3-difluoromethyl-5-isoxazolyl)-3-fluorophenol

[0365] To a solution of 3-difluoromethyl-5-(2-fluoro-6-methoxyphenyl)isoxazole (i.e. the product from Step B) (1.5 g, 6.2 mmol.) in dichloromethane (10 mL) at 0° C. was added a 1.0 M solution of boron tribromide in dichloromethane (31 mL, 31 mmol). The reaction mixture was warmed to ambient temperature and stirred for 6 h. The reaction was cooled to 0° C. and slowly quenched with a saturated aqueous solution of sodium bicarbonate. The biphasic mixture was stirred at room temperature for 1 h. The phases were separated and the aqueous phase was extracted with dichloromethane. The combined organic phases were dried and concentrated under vacuum. The crude residue was purified by chromatography on silica gel, eluting with 0 to 10% ethyl acetate in hexanes, to afford the title compound (980 mg).

[0366] ^{1}H NMR δ 7.33 (m, 1H), 6.66-6.99 (m, 4H). MS (ESI+)=230

Step D: Synthesis of 5-chloro-2-[2-[3-(difluoromethyl)-5-isoxazolyl]-3-fluorophenoxy]pyrimidine

[0367] To a solution of 2-(3-difluoromethyl-5-isoxazolyl)-3-fluorophenol (i.e. the product from Step C) (120 mg, 0.5 mmol) in anhydrous N,N-dimethylformamide (2 mL) was added 2,5-dichloropyrimidine (85 mg, 0.57 mmol) and potassium carbonate (244 mg, 1.04 mmol). The reaction was heated at 80° C. for 4 h. The mixture was cooled to ambient temperature and diluted with water. The phases were separated and the aqueous phase was washed with additional ethyl acetate. The organic phases were combined, dried with magnesium sulfate and concentrated under vacuum. Purification by chromatography on silica gel eluting with 0 to 15% ethyl acetate in hexanes afforded the title compound, a compound of the present invention, as a solid (110 mg).

[0368] ^{1}H NMR δ 8.46 (s, 2H), 7.56 (m, 1H), 7.21 (m, 1H), 7.13 (m, 1H), 6.87 (m, 1H), 6.74 (t, 1H). MS (ER^+) =342

Synthesis Example 9

Synthesis of 5-chloro-2-[2-[5-(difluoromethyl)-3-isoxazolyl]-3-fluorophenoxy]pyrimidine (Compound 55)

Step A: Synthesis of 4,4-difluoro-1-(2-fluoro-6-methoxyphenyl)butane-1,3-dione

[0369] A solution of 2-fluoro-6-methoxyacetophenone (6.83 g, 40.6 mmol) and ethyl difluoroacetate (7.45 g, 60 mmol) in tetrahydrofuran (35 mL) was added dropwise to a solution of tetrahydrofuran (20 mL) and 25% sodium methoxide (10.2 g, 47.2 mmol) over 15 minutes. The reaction was complete in 3 h as determined by high pressure liquid chromatography. The reaction was partially concentrated under vacuum to remove most of the tetrahydrofuran and methanol, and then diluted with toluene and water. The aqueous phase was acidified with 37% hydrochloric acid (5 g), followed by extraction with toluene. The combined organic phases were concentrated under vacuum to provide title compound (7.98 g).

[0370] ^{1}H NMR δ 7.39 (td, 1H) 6.72-6.81 (m, 2H) 6.25 (d, 1H) 5.87-6.14 (m, 1H) 3.88 (s, 3H).

Step B: Synthesis of 5-(difluoromethyl)-3-(2-fluoro-6-methoxyphenyl)-4H-isoxazol-5-ol

[0371] To a solution of 4,4-difluoro-1-(2-fluoro-6-methoxyphenyl)butane-1,3-dione (i.e. the product from Step A) (7.98 g, 32.4 mmol) in 35 mL methanol at room temperature was added a 50% hydroxylamine solution (2.78 g, 42.1 mmol) and IN sodium hydroxide solution (1.50 mL, 1.50 mmol) followed by heating to 65° C. for 2 h. The reaction was cooled to room temperature and diluted with water and toluene. The phases were separated and the organic phase was concentrated under vacuum to provide the title compound (7.99 g).

[0372] ^{1}H NMR δ 7.36 (td, 1H) 6.73-6.82 (m, 2H) 5.79-6.05 (m, 1H) 3.88 (s, 3H) 3.67-3.73 (m, 1H) 3.47-3.51 (m, 1H) 3.34-3.42 (m, 1H).

Step C: Synthesis of 5-(difluoromethyl)-3-(2-fluoro-6-methoxyphenyl)isoxazole

[0373] To toluene (80 mL) was added 5-(difluoromethyl)-3-(2-fluoro-6-methoxyphenyl)-4H-isoxazol-5-ol (i.e. the product from Step B) (7.99 g, 30.6 mmol) followed by p-toluenesulfonic acid monohydrate (0.700 g, 3.68 mmol). The mixture was heated to a vigorous reflux (107-111° C.) for two hours at which point high pressure liquid chromatography determined the reaction was complete. The cooled reaction mixture was washed with a saturated sodium bicarbonate solution, followed by water. The organic phase was concentrated under vacuum to provide the title compound (7.44 g).

[0374] ^{1}H NMR δ 7.40 (td, 1H) 6.69-6.94 (m, 4H) 3.88 (s, 3H).

Step D: Synthesis of 2-[5-(difluoromethyl)-3-isoxazolyl]-3-fluorophenol

[0375] To a solution of 5-(difluoromethyl)-3-(2-fluoro-6-methoxyphenyl)isoxazole (i.e. the product from Step C) (3.72 g, 15.3 mmol) in dichloromethane (15 mL) at 3° C. was added a 1M solution of boron tribromide in dichloromethane (18.0 mL, 18 mmol) over 5 min. The reaction was then allowed to warm to room temperature. After 90 minutes it was determined the reaction was complete using high pressure liquid chromatography and the reaction was treated with a 10% aqueous solution of potassium bicarbonate (10 mL). The phases were separated and the organic phase was concentrated under vacuum. The resulting brown solid was triturated with a water/methanol solution (~2/1) providing the title compound (3.34 g).

[0376] ^{1}H NMR δ 9.63-9.75 (m, 1H) 7.33 (td, 1H) 7.21 (ddd, 1H) 6.71-6.96 (m, 3H).

Step E: Synthesis of 5-chloro-2-[2-[5-(difluoromethyl)-3-isoxazolyl]-3-fluorophenoxy]pyrimidine

[0377] To a solution of 2-[5-(difluoromethyl)-3-isoxazolyl]-3-fluorophenol (i.e. the product from Step D) (1.61 g, 7.02 mmol) and 5-methyl-2-methylsulfonylpyrimidine (1.49 g, 7.72 mmol) in N,N-dimethylformamide (9 mL) was added potassium carbonate (4.24 g, 17.5 mmol) and the reaction was allowed to stir at room temperature for 24 h. The reaction was diluted with water and toluene, the phases were separated and the organic solvent was removed under vacuum. To the resulting oil was added 8 mL of methanol and a tan slurry formed, after further dilution with a methanol/water solution (20 mL), the precipitate was filtered providing the title compound, a compound of the present invention (2.24 g).

[0378] ^{1}H NMR δ 8.45 (s, 2H) 7.54 (td, 1H) 7.19 (ddd, 1H) 7.14 (dt, 1H) 6.88 (dt, 1H) 6.61-6.85 (m, 1H).

Synthesis Example 10

Preparation of 5-chloro-2-[3-cyano-2-[4-(trifluoromethyl)-2-pyridinyl]phenoxy]pyrimidine (Compound 158)

[0379] A solution of 5-chloro-2-[2-[4-(trifluoromethyl)-2-pyridinyl]phenoxy]pyrimidine (i.e. the product of example 5, step B) (0.30 g, 0.853 mmoles) in 4.27 mL of N,N-dimethylformamide under a nitrogen atmosphere was treated with copper(II) bromide (0.19 g, 0.853 mmoles), palladium(II) acetate (9 mg, 0.0426 mmoles) and potassium ferricyanide (0.06 g, 0.17 mmoles). The mixture was heated at 130° C. for 18 hours. The mixture was then cooled, diluted with diethyl ether and water, filtered thru a celite pad and rinsed with ethyl acetate and water. The phases were separated and the aqueous phase was extracted twice with diethyl ether. The combined organic phases were washed twice with water and saturated aqueous sodium chloride, dried over magnesium sulfate, and concentrated to provide 0.21 g crude product. The crude product was purified with a 12 g Teledyne Isco silica gel column eluting with 10 to 30% EtOAc-Hexanes gradient to provide the title compound, a compound of the present invention as a solid (0.23 g).

[0380] ^{1}H NMR δ 8.86 (d, 1H), 8.40 (s, 2H), 7.78 (d&s, 2H), 7.62 (t, 1H), 7.52 (d, 1H), 7.50 (d, 1H).

Synthesis Example 11

Synthesis of 5-chloro-2-[2-[5-(trifluoromethyl)-2-pyridinyl]phenoxy]pyrimidine (Compound 27)

Step A: Synthesis of 2-[5-(trifluoromethyl)-2-pyridinyl]phenol

[0381] 2-Chloro-5-(trifluoromethyl)pyridine (1.0 g, 5.50 mmoles) and 2-(4,4,5,5-tetramethyl-1,3,2-dioxaborolan-2-yl)phenol (1.57 g, 7.16 mmoles) were combined in 16 mL of 1,2-dimethoxyethane and 1.8 mL of de-ionized water under a nitrogen atmosphere. Solid sodium carbonate (2.28 g, 16.5 mmoles) and then tetrakis(triphenylphosphine) palladium (0) (0.32 g, 0.27 mmoles) were added. The reaction was heated at reflux approximately ninety minutes. The reaction was cooled, diluted with dichloromethane and filtered thru a celite pad, rinsing with dichloromethane and then de-ionized water. The phases were separated. The aqueous phase was extracted twice with dichloromethane. The combined organic phases were washed with saturated aqueous sodium chloride, dried over magnesium sulfate, filtered and concentrated to give a solid. A solid was filtered from hexanes to give 34 mg. A second crop was obtained from the filtrate from hexanes to yield 506 mg of a light orange-brown solid of the title compound.

[0382] ^{1}H NMR δ 8.81 (s, 1H), 8.04 (m, 2H), 7.83 (d, 1H), 7.38 (t, 1H), 7.07 (d, 1H), 6.98 (t, 1H).

Step B: Synthesis of 5-chloro-2-[2-[5-(trifluoromethyl)-2-pyridinyl]phenoxy]-pyrimidine

[0383] A mixture of 2-[5-(trifluoromethyl)-2-pyridinyl]phenol (i.e. the product of step A) (0.20 g, 0.836 mmoles) and 2,5-dichloropyrimidine (0.14 g, 0.919 mmoles) in 2.0 mL of N,N-dimethylformamide was stirred under a nitrogen atmosphere. Powdered potassium carbonate (0.35 g, 2.51 mmoles) was added and the mixture was heated at 80° C. overnight. The reaction was cooled before diluting with de-ionized water and diethyl ether. The phases were separated. The aqueous phase was extracted twice with diethyl ether. The combined organic phases were washed three times with de-ionized water, dried over sodium sulfate, filtered and concentrated to 0.37 g of solid. A solid was filtered from hexanes and some diethyl ether to give 103 mg of the title compound, a compound of the present invention.

[0384] ^{1}H NMR δ 8.84 (s, 1H), 8.40 (s, 2H), 7.92 (d, 1H), 7.87 (s&d, 2H), 7.54 (t, 1H), 7.45 (t, 1H), 7.27 (d, 1H).

Synthesis Example 12

Preparation of 5-chloro-2-[2-[5-(trifluoromethyl)-2-pyridinyl]-3-chlorophenoxy]pyrimidine (Compound 160)

[0385] 5-Chloro-2-[2-[5-(trifluoromethyl)-2-pyridinyl]phenoxy]-pyrimidine (i.e. the product of example 11, step B) (0.14 g, 0.398 mmoles) was dissolved in 2 mL of acetic acid. Palladium acetate (0.01 g, 0.039 mmoles) and N-chlorosuccinimide (0.11 g, 0.796 mmoles) were added and the mixture was heated at 100° C. for three hours. The mixture was cooled to room temperature overnight and then diluted with toluene and ethyl acetate. The mixture was filtered thru a celite pad, rinsed with toluene and then ethyl acetate. The filtrate was washed twice with saturated aqueous sodium hydrogencarbonate, saturated aqueous sodium chloride, dried over magnesium sulfate and concentrated to a crude product. The crude product was purified with a 12 g Teledyne Isco silica gel column eluting with 10 to 30% EtOAc-Hexanes gradient to provide the title compound, a compound of the present invention as a solid (40 mg).

[0386] ^{1}H NMR δ 8.82 (s, 1H), 8.41 (s, 2H), 7.93 (d, 1H), 7.52 (d, 1H), 7.47 (m, 2H), 7.19 (m, 1H).

Synthesis Example 13

Synthesis of 5-bromo-2-[2-[5-(difluoromethyl)-3-isoxazolyl]phenoxy]pyrimidine (Compound 62)

Step A: Synthesis of 5-(difluoromethyl)-3-(2-methoxyphenyl)isoxazole

[0387] To a solution of acetophenone (3.0 g, 20 mmol) in methanol (15 mL) was added a 30% sodium methoxide in methanol solution (5.0 mL) and the reaction stirred for five minutes. Next ethyl difluoroacetate (2.97 g, 24 mmol) was

added and the reaction was heated to reflux for 18 h. The reaction was allowed to cool to room temperature and the solvent was removed under vacuum. To the residue was added 1M hydrochloric acid and ethyl acetate, the phases were separated, the organic phase was dried using magnesium sulfate and the solvent was removed under vacuum. Purification by chromatography on silica gel eluting with 0 to 100% ethyl acetate in hexanes afforded the desired product which was taken on directly. A solution of 4,4-difluoro-1-(2-methoxyphenyl)butane-1,3-dione from the previous step in ethanol (30 mL) was added dropwise to a solution of hydroxylamine hydrochloride (1.4 g, 20 mmol) in 1M sodium hydroxide (21 mL). The reaction was then heated to reflux for 2 h, followed by cooling to room temperature. The product was precipitated from solution by the addition of water and collected via vacuum filtration to afford the desired product which was taken on directly (AP+244, 1H NMR δ ppm 7.79 (d, 1H) 7.38-7.46 (m, 1H) 6.93-7.04 (m, 2H) 5.76-6.04 (m, 1H) 3.88 (s, 3H) 3.67-3.80 (m, 1H) 3.49-3.55 (m, 1H)). Next, a solution of 5-(difluoromethyl)-3-(2-methoxyphenyl)-4H-isoxazol-5-ol from the previous step was taken up in trifluoroacetic acid (20 mL) and heated to 70° C. for 18 h. The reaction was cooled to room temperature and the solvent was removed under vacuum. The resulting residue was dissolved in dichloromethane and washed with a saturated solution of sodium bicarbonate. The phases were separated, the organic phase was dried using magnesium sulfate and the solvent was removed under vacuum. Purification by chromatography on silica gel eluting with 0 to 100% ethyl acetate in hexanes afforded the title compound (2.0 g, AP+=226).

[0388] ^{1}H NMR 7.91 (dd, 1H) 7.42-7.50 (m, 1H) 6.98-7.12 (m, 3H) 6.66-6.93 (m, 1H) 3.92 (s, 3H).

Step B: Synthesis of 2-[5-(difluoromethyl)-3-isoxazolyl]phenol

[0389] To a solution of 5-(difluoromethyl)-3-(2-methoxyphenyl)isoxazole (i.e. the product of step A) (2.01 g, 8.92 mmol) in dichloromethane (50 mL) at 0° C. was added a 1M solution of boron tribromide in dichloromethane (13.3 mL, 13.3 mmol) and the reaction was allowed to warm to room temperature over three hours. The solvent was removed under vacuum and purified by chromatography on silica gel, eluting with 0 to 100% ethyl acetate in hexanes to afford the title compound (1.66 g, AP−=210).

[0390] ^{1}H NMR δ 9.14 (s, 1H) 7.51 (dd, 1H) 7.39 (ddd, 1H) 7.11 (dd, 1H) 6.97-7.04 (m, 2H) 6.70-6.95 (m, 1H).

Step C: Synthesis of 5-bromo-2-[2-[5-(difluoromethyl)-3-isoxazolyl]phenoxy]-pyrimidine

[0391] To a solution of 2-[5-(difluoromethyl)-3-isoxazolyl]phenol (i.e. the product of step B) (427 mg, 2.01 mmol) and 5-bromo-2-chloro-pyrimidine (468 mg, 2.42 mmol) in acetonitrile (10 mL) was added potassium carbonate (695 mg, 5.03 mmol) and the reaction was heated to 80° C. for 18 h. The solvent was removed under vacuum and purified by chromatography on silica gel, eluting with 0 to 100% ethyl acetate in hexanes to afford the title compound, a compound of the present invention, as a solid (555 mg, mp=88.9-92.8° C.).

[0392] ^{1}H NMR δ 8.53 (s, 2H) 7.98 (dd, 1H) 7.53-7.60 (m, 1H) 7.41 (td, 1H) 7.28 (dd, 1H) 6.97 (t, 1H) 6.59-6.84 (m, 1H).

Synthesis Example 14

Synthesis of 5-chloro-2-[2-[5-(trifluoromethyl)-3-isoxazolyl]-3-fluorophenoxy]pyrimidine (Compound 168)

Step A: Synthesis of 5-(difluoromethyl)-3-(2-methoxyphenyl)-4H-isoxazol-5-ol

[0393] To a solution of 2-fluoro-6-methoxyacetophenone (1.0 g, 5.9 mmol) in tetrahydrofuran (2 mL) was added a 30% sodium methoxide in methanol solution (1.4 mL). To this mixture was added dropwise a solution of ethyl trifluoroacetate (0.805 g, 6.49 mmol) in tetrahydrofuran (1 mL) and the reaction stirred at room temperature for 2 h. To the reaction was added 1M hydrochloric acid solution and ethyl acetate, the phases were separated and the aqueous phase was again washed with ethyl acetate. The combined organic phases were dried with magnesium sulfate and concentrated under vacuum to provide the desired product (AP−=263) which was taken onto the next step directly. Next, to a solution of 4,4,4-trifluoro-1-(2-fluoro-6-methoxyphenyl)butane-1,3-dione (from the previous step) in ethanol (14 mL) was added 1M sodium hydroxide solution (7 mL) followed by hydroxylamine hydrochloride (410 mg, 5.9 mmol) and the reaction stirred overnight at room temperature. The solvent was removed under vacuum and the residue was purified by chromatography on silica gel, eluting with 0 to 100% ethyl acetate in hexanes and 0 to 20% methanol in dichlromethane to afford the product (AP+=280, 1H NMR δ ppm 7.37 (td, 1H) 6.74-6.83 (m, 2H) 3.89 (s, 3H) 3.79 (d, 1H) 3.50 (dd, 1H)) which was taken onto the next step directly To a solution of 3-(2-fluoro-6-methoxy-phenyl)-5-(trifluoromethyl)-4H-isoxazol-5-ol (from the previous step) in dichloromethane (20 mL) at 0° C. was added a 1M solution of boron tribromide in dichloromethane (11.8 mL, 11.8 mmol) and the reaction was allowed to warm to room temperature over 2 h. The solvent was removed under vacuum. The residue was dissolved in dichloromethane and washed with a saturated solution of sodium bicarbonate, the aqueous phase was washed with dichloromethane. The combined organic phases were dried with magnesium sulfate, concentrated under vacuum and purified by chromatography on silica gel, eluting with 0 to 100% ethyl acetate in hexanes, providing the title compound (606 mg, AP−=264).

[0394] ^{1}H NMR δ 9.86 (s, 1H) 7.32 (td, 1H) 6.84-6.90 (m, 1H) 6.68 (ddd, 1H) 3.86-3.94 (m, 1H) 3.75 (dd, 1H) 3.56 (s, 1H).

Step B: Synthesis of 5-chloro-2-[2-[5-(trifluoromethyl)-3-isoxazolyl]-3-fluorophenoxy]pyrimidine

[0395] To a solution of 3-(2-fluoro-6-hydroxyphenyl)-5-(trifluoromethyl)-4H-isoxazol-5-ol (i.e. the product of step A) (606 mg, 2.29 mmol) in dimethylsulfoxide (15 mL) was added 5-chloro-2-methylsulfonyl-pyrimidine (527 mg, 2.74 mmol) followed by cesium carbonate (1.1 g, 3.43 mmol) and the reaction stirred for 18 h. The reaction was partitioned between water and ethyl acetate, the phases were separated and the aqueous layer was again washed with ethyl acetate. The combined organic phases were dried with magnesium sulfate and concentrated under vacuum. The residue was purified by chromatography on silica gel, eluting with 0 to 100% ethyl acetate, to afford the title compound, a compound of the present invention, (198 mg, AP+=360).

[0396] ^{1}H NMR δ 8.46 (s, 2H) 7.56 (td, 1H) 7.21 (ddd, 1H) 7.15 (dt, 1H) 7.02 (dd, 1H).

Synthesis Example 15

Synthesis of 5-chloro-2-[2-[3-(trifluoromethyl)-5-isoxazolyl)phenoxy]pyrimidine (Compound 63)

Step A: Synthesis of 2-(trifluoromethyl)-4H-1-benzopyran-4-one

[0397] 2-Hydroxyacetophenone (10 g, 66.7 mmol) was dissolved in trifluoroacetic anhydride (19 ml, 133.3 mmol) and pyridine (10.8 mL, 133.3 mmol). The reaction mixture was heated at 70° C. and stirred for 12 h. After cooling the reaction mixture was diluted with 1 M hydrochloric acid and methylene chloride and washed with water. The organic phase was dried with magnesium sulfate and concentrated under vacuum. Purification by chromatography on silica gel eluting with 0 to 5% ethyl acetate in hexanes afforded the title compound (10.5 g) as a pale yellow solid.

[0398] ^{1}H NMR δ 8.21 (m, 1H), 7.76 (m, 1H), 7.77 (d, 1H), 7.46 (m, 1H), 6.73 (s, 1H). MS (ESI$^+$)=215

Step B: Synthesis of 2-[3-(trifluoromethyl)-5-isoxazolyl]phenol

[0399] To a solution of 2-(trifluoromethyl)-4H-1-benzopyran-4-one (i.e. the product of step A) (10.5 g, 48.8 mmol) in ethanol (50 mL), hydroxylamine acetate (146 mmol) in water (50 mL) was added. The mixture was heated at 60° C. for 4 h. After cooling the reaction to ambient temperature 4,4,4-trifluoro-1-(2-hydroxyphenyl)-butane-1,3-dione 3-oxime was precipitated with the addition of water (200 mL).

[0400] ^{1}H NMR δ 9.30 (s, 1H), 7.37 (m, 1H), 7.19 (m, 1H), 7.06 (m, 1H), 6.94 (m, 1H), 3.87 (d, 1H), 3.69 (d, 1H).

[0401] This product was collected by filtration and suspended in acetic acid (30 mL) and 36% aqueous hydrochloric acid (10.8 mL) at room temperature. The mixture was stirred at 80° C. for 30 min to afford the title compound as a white solid (4.6 g).

[0402] ^{1}H NMR δ 7.88 (m, 1H), 7.37 (m, 1H), 7.08 (m, 1H), 7.01 (s, 1H), 6.95 (m, 1H). MS (ESI$^+$)=230

Step C: Synthesis of 5-chloro-2-[2-[3-(trifluoromethyl)-5-isoxazolyl)phenoxy]-pyrimidine

[0403] To a solution of 2-[3-(trifluoromethyl)-5-isoxazolyl]phenol (i.e. the product of step B) (2.2 g, 9.4 mmol) in anhydrous N,N-dimethylformamide (10 mL) was added 2,5-dichloropyrimidine (1.5 g, 10.3 mmol) and potassium carbonate (2.9 g, 20.6 mmol). The reaction was heated at 80° C. for 2 h. The solution was cooled to ambient temperature and diluted with water. The phases were separated and the aqueous phase was washed with additional ethyl acetate. The organic phases were combined, dried with magnesium sulfate and concentrated under vacuum. Purification by chromatography on silica gel eluting with 0 to 5% ethyl acetate in hexanes afforded the title compound, a compound of the present invention, as a solid (2.1 g).

[0404] ^{1}H NMR δ 8.49 (s, 2H), 8.08 (m, 1H), 7.58 (m, 1H), 7.45 (m, 1H), 7.32 (m, 1H), 6.91 (s, 1H). MS (ESI$^+$) =342. Melting Point: 114-115° C.

Synthesis Example 16

Synthesis of 5-bromo-2-[2-[3-(difluoromethyl)-5-isoxazolyl]-3-fluorophenoxy]pyrimidine (Compound 145)

Step A: Synthesis of 4,4-difluoro-1-(2-fluoro-6-methoxyphenyl)butane-1,3-dione

[0405] To a solution of 1-(2-fluoro-6-methoxyphenyl) ethanone (2.6 g, 15.5 mmol) and difluoroacetic acid ethyl ester (3.9 mL, 31.0 mmol) in anhydrous N,N-dimethylformamide at 0° C. was added sodium hydride (1.2 g, 31.0 mmol). The reaction mixture was heated at 80° C. for 1 h. The reaction was then cooled down to 0° C., diluted with ethyl acetate and acidified with 1 N aqueous hydrochloric acid. The phases were separated and the aqueous phase was washed with additional ethyl acetate. The organic phases were combined and dried with magnesium sulfate and concentrated under vacuum. Purification by chromatography on silica gel eluting with 0 to 15% ethyl acetate in hexanes afforded the title compound (2.5 g).

[0406] ^{1}H NMR δ 7.39 (m, 1H), 6.77 (m, 2H), 6.24 (s, 1H), 6.01 (t, 1H), 3.87 (s, 3H). MS (ESI$^+$)=247

Step B: Synthesis of 3-(difluoromethyl)-5-(2-fluoro-6-methoxyphenyl)isoxazole

[0407] A solution of 4,4-difluoro-1-(2-fluoro-6-methoxyphenyl)butane-1,3-dione (i.e. the product of step A) (2.5 g, 10 mmol) and hydroxylamine hydrochloride (2.1 g, 30 mmol) in ethanol (25 mL) was stirred at 80° C. After 1 h the solvent was removed under vacuum. The resulting residue was diluted with water and extracted with dichloromethane. The organic phase was dried with magnesium sulfate and concentrated under vacuum. Purification by chromatography on silica gel eluting with 0 to 15% ethyl acetate in hexanes afforded the title compound (1.5 g).

[0408] ^{1}H NMR δ 7.41 (m, 1H), 6.69-6.98 (m, 4H), 3.93 (s, 3H). MS (ESI+)=244

Step C: Synthesis of 2-[3-(difluoromethyl)-5-isoxazolyl]-3-fluorophenol

[0409] To a solution of 3-(difluoromethyl)-5-(2-fluoro-6-methoxyphenyl)isoxazole (i.e. the product of step B) (1.5 g, 6.2 mmol.) in dichloromethane (10 mL) at 0° C. was added a 1.0 M solution of boron tribromide in dichloromethane (31 mL, 31 mmol). The reaction mixture was warmed to ambient temperature and stirred for 6 h. The reaction was cooled to 0° C. and slowly treated with a saturated aqueous solution of sodium bicarbonate. The biphasic mixture was stirred at room temperature for 1 h. The phases were separated and the aqueous phase was extracted with dichloromethane. The combined organic phases were dried and concentrated under vacuum. The crude residue was purified by chromatography on silica gel, eluting with 0 to 10% ethyl acetate in hexanes, to afford the title compound (980 mg).

[0410] ^{1}H NMR δ 7.33 (m, 1H), 6.66-6.99 (m, 4H). MS (ESI+)=230

Step D: Synthesis of 5-bromo-2-[2-[3-(difluoromethyl)-5-isoxazolyl]-3-fluorophenoxy]pyrimidine

[0411] To a solution of 2-[3-(difluoromethyl)-5-isoxazolyl]-3-fluorophenol (i.e. the product of step C) (229 mg, 1 mmol) in anhydrous N,N-dimethylformamide (2.5 mL)

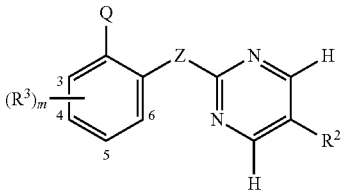
was added 5-bromo-2-chloropyrimidine (212 mg, 1.1 mmol) and potassium carbonate (304 mg, 2.2 mmol). The reaction was heated at 80° C. for 1 h. The solution was cooled to ambient temperature and diluted with water. The phases were separated and the aqueous layer was washed with additional ethyl acetate. The organic phases were combined, dried with magnesium sulfate and concentrated under vacuum. Purification by chromatography on silica gel eluting with 0 to 15% ethyl acetate in hexanes afforded the title compound, a compound of the present invention, as a solid (320 mg).

[0412] ^{1}H NMR δ 8.54 (s, 2H), 7.54 (m, 1H), 7.20 (m, 1H), 7.13 (m, 1H), 6.86 (m, 1H), 6.75 (t, 1H). MS (ESI$^+$) =387

[0413] By the procedures described herein together with methods known in the art, the following compounds of Tables 1 to 1584 can be prepared. The following abbreviations are used in the Tables which follow: t means tertiary, s means secondary, n means normal, i means iso, c means cyclo, Me means methyl, Et means ethyl, Pr means propyl, Bu means butyl, i-Pr means isopropyl, Bu means butyl, c-Pr cyclopropyl, c-Bu means cyclobutyl, Ph means phenyl, OMe means methoxy, OEt means ethoxy, SMe means methylthio, SEt means ethylthio, NHMe methylamino, —CN means cyano, Py means pyridinyl, —NO_2 means nitro, tzl meand triazol, pzl means pyrazol, izl means imidazole, odzl means oxadiazol, tdzl means thiadiazol and SO_2Me means methylsulfonyl.

TABLE 1

1

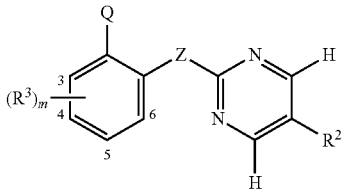


R^2 = Cl; Z = O; and R^3 = H (m = 0); and Q is:

Isoxazo1-5-yl	5-CHO-isoxazol-3-yl	4-I-isothiazol-5-yl
3-F-isoxazol-5-yl	5-CN-isoxazol-3-yl	4-Me-isothiazol-5-yl
3-Cl-isoxazol-5-yl	5-CH_2CN-isoxazol-3-yl	4-Et-isothiazol-5-yl
3-Br-isoxazol-5-yl	5-OMe-isoxazol-3-yl	4-CF_3-isothiazol-5-yl
3-I-isoxazol-5-yl	5-OCF_3-isoxazol-3-yl	4-CHF_2-isothiazol-5-yl
3-Me-isoxazol-5-yl	5-Ph-isoxazol-3-yl	4-CHO-isothiazol-5-yl
3-Et-isoxazol-5-yl	4-F-isoxazol-3-yl	4-CN-isothiazol-5-yl
3-CF_3-isoxazol-5-yl	4-Cl-isoxazol-3-yl	4-OMe-isothiazol-5-yl
3-CHF_2-isoxazol-5-yl	4-Br-isoxazol-3-yl	4-OCF_3-isothiazol-5-yl
3-CHO-isoxazol-5-yl	4-I-isoxazol-3-yl	4-Ph-isothiazol-5-yl
3-CN-isoxazol-5-yl	4-Me-isoxazol-3-yl	Isothiazo1-3-yl
3-OMe-isoxazol-5-yl	4-Et-isoxazol-3-yl	5-F-isothiazol-3-yl
3-OCF_3-isoxazol-5-yl	4-CF_3-isoxazol-3-yl	5-Cl-isothiazol-3-yl
3-Ph-isoxazol-5-yl	4-CHF_2-isoxazol-3-yl	5-Br-isothiazol-3-yl
4-F-isoxazol-5-yl	4-CHO-isoxazol-3-yl	5-I-isothiazol-3-yl
4-Cl-isoxazol-5-yl	4-CN-isoxazol-3-yl	5-Me-isothiazol-3-yl
4-Br-isoxazol-5-yl	4-OMe-isoxazol-3-yl	5-Et-isothiazol-3-yl
4-I-isoxazol-5-yl	4-OCF_3-isoxazol-3-yl	5-CF_3-isothiazol-3-yl
4-Me-isoxazol-5-yl	4-Ph-isoxazol-3-yl	5-CHF_2-isothiazol-3-yl
4-Et-isoxazol-5-yl	Isothiazo1-5-yl	5-CHO-isothiazol-3-yl
4-CF_3-isoxazol-5-yl	3-F-isothiazol-5-yl	5-CN-isothiazol-3-yl
4-CHF_2-isoxazol-5-yl	3-Cl-isothiazol-5-yl	5-CH_2CN-isothiazol-3-yl
4-CHO-isoxazol-5-yl	3-Br-isothiazol-5-yl	5-OMe-isothiazol-3-yl
4-CN-isoxazol-5-yl	3-I-isothiazol-5-yl	5-OCF_3-isothiazol-3-yl
4-OMe-isoxazol-5-yl	3-Me-isothiazol-5-yl	5-Ph-isothiazol-3-yl
4-OCF_3-isoxazol-5-yl	3-Et-isothiazol-5-yl	4-F-isothiazol-3-yl
4-Ph-isoxazol-5-yl	3-CF_3-isothiazol-5-yl	4-Cl-isothiazol-3-yl
isoxazol-3-yl	3-CHF_2-isothiazol-5-yl	4-Br-isothiazol-3-yl
5-F-isoxazol-3-yl	3-CHO-isothiazol-5-yl	4-I-isothiazol-3-yl
5-Cl-isoxazol-3-yl	3-CN-isothiazol-5-yl	4-Me-isothiazol-3-yl
5-Br-isoxazol-3-yl	3-OMe-isothiazol-5-yl	4-Et-isothiazol-3-yl
5-I-isoxazol-3-yl	3-OCF_3-isothiazol-5-yl	4-CF_3-isothiazol-3-yl
5-Me-isoxazol-3-yl	3-Ph-isothiazol-5-yl	4-CHF_2-isothiazol-3-yl
5-Et-isoxazol-3-yl	4-F-isothiazol-5-yl	4-CHO-isothiazol-3-yl
5-CF_3-isoxazol-3-yl	4-Cl-isothiazol-5-yl	4-CN-isothiazol-3-yl
5-CHF_2-isoxazol-3-yl	4-Br-isothiazol-5-yl	4-OMe-isothiazol-3-yl
4-OCF_3-isothiazol-3-yl	3-CHO-isothiazol-4-yl	4-Et-oxazol-2-yl
4-Ph-isothiazol-3-yl	3-CN-isothiazol-4-yl	4-CF_3-oxazol-2-yl
Isoxazo1-4-yl	3-OMe-isothiazol-4-yl	4-CHF_2-oxazol-2-yl
3-F-isoxazol-4-yl	3-OCF_3-isothiazol-4-yl	4-CHO-oxazol-2-yl
3-Cl-isoxazol-4-yl	3-Ph-isothiazol-4-yl	4-CN-oxazol-2-yl
3-Br-isoxazol-4-yl	5-F-isothiazol-4-yl	4-OMe-oxazol-2-yl
3-I-isoxazol-4-yl	5-Cl-isothiazol-4-yl	4-OCF_3-oxazol-2-yl
3-Me-isoxazol-4-yl	5-Br-isothiazol-4-yl	4-Ph-oxazol-2-yl
3-Et-isoxazol-4-yl	5-I-isothiazol-4-yl	Thiazol-2-yl

TABLE 1-continued

1

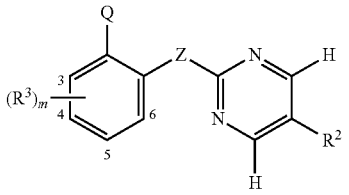


R^2 = Cl; Z = O; and R^3 = H (m = 0); and Q is:

3-CF_3-isoxazol-4-yl	5-Me-isothiazol-4-yl	5-F-thiazol-2-yl
3-CHF_2-isoxazol-4-yl	5-Et-isothiazol-4-yl	5-Cl-thiazol-2-yl
3-CHO-isoxazol-4-yl	5-CF_3-isothiazol-4-yl	5-Br-thiazol-2-yl
3-CN-isoxazol-4-yl	5-CHF_2-isothiazol-4-yl	5-I-thiazol-2-yl
3-OMe-isoxazol-4-yl	5-CHO-isothiazol-4-yl	5-Me-thiazol-2-yl
3-OCF_3-isoxazol-4-yl	5-CN-isothiazol-4-yl	5-Et-thiazol-2-yl
3-Ph-isoxazol-4-yl	5-OMe-isothiazol-4-yl	5-CF_3-thiazol-2-yl
5-F-isoxazol-4-yl	5-OCF_3-isothiazol-4-yl	5-CHF_2-thiazol-2-yl
5-Cl-isoxazol-4-yl	5-Ph-isothiazol-4-yl	5-CHO-thiazol-2-yl
5-Br-isoxazol-4-yl	oxazol-2-yl	5-CN-thiazol-2-yl
5-I-isoxazol-4-yl	5-F-oxazol-2-yl	5-CH_2CN-thiazol-2-yl
5-Me-isoxazol-4-yl	5-Cl-oxazol-2-yl	5-OMe-thiazol-2-yl
5-Et-isoxazol-4-yl	5-Br-oxazol-2-yl	5-OCF_3-thiazol-2-yl
5-CF_3-isoxazol-4-yl	5-I-oxazol-2-yl	5-Ph-thiazol-2-yl
5-CHF_2-isoxazol-4-yl	5-Me-oxazol-2-yl	4-F-thiazol-2-yl
5-CHO-isoxazol-4-yl	5-Et-oxazol-2-yl	4-Cl-thiazol-2-yl
5-CN-isoxazol-4-yl	5-CF_3-oxazol-2-yl	4-Br-thiazol-2-yl
5-OMe-isoxazol-4-yl	5-CHF_2-oxazol-2-yl	4-I-thiazol-2-yl
5-OCF_3-isoxazol-4-yl	5-CHO-oxazol-2-yl	4-Me-thiazol-2-yl
5-Ph-isoxazol-4-yl	5-CN-oxazol-2-yl	4-Et-thiazol-2-yl
Isothiazo1-4-yl	5-CH_2CN-oxazol-2-yl	4-CF_3-thiazol-2-yl
3-F-isothiazol-4-yl	5-OMe-oxazol-2-yl	4-CHF_2-thiazol-2-yl
3-Cl-isothiazol-4-yl	5-OCF_3-oxazol-2-yl	4-CHO-thiazol-2-yl
3-Br-isothiazol-4-yl	5-Ph-oxazol-2-yl	4-CN-thiazol-2-yl
3-I-isothiazol-4-yl	4-F-oxazol-2-yl	4-OMe-thiazol-2-yl
3-Me-isothiazol-4-yl	4-Cl-oxazol-2-yl	4-OCF_3-thiazol-2-yl
3-Et-isothiazol-4-yl	4-Br-oxazol-2-yl	4-Ph-thiazol-2-yl
3-CF_3-isothiazol-4-yl	4-I-oxazol-2-yl	Oxazol-5-yl
3-CHF_2-isothiazol-4-yl	4-Me-oxazol-2-yl	2-F-oxazol-5-yl
2-Cl-oxazol-5-yl	4-OCF_3-thiazol-5-yl	5-CF_3-thiazol-4-yl
2-Br-oxazol-5-yl	4-Ph-thiazol-5-yl	5-CHF_2-thiazol-4-yl
2-Me-oxazol-5-yl	Oxazol-4-yl	5-CN-thiazol-4-yl
2-CF_3-oxazol-5-yl	2-F-oxazol-4-yl	5-OMe-thiazol-4-yl
2-CHF_2-oxazol-5-yl	2-Cl-oxazol-4-yl	5-OCF_3-thiazol-4-yl
2-CN-oxazol-5-yl	2-Br-oxazol-4-yl	5-Ph-thiazol-4-yl
2-OMe-oxazol-5-yl	2-Me-oxazol-4-yl	1H-izl-2-yl
2-OCF_3-oxazol-5-yl	2-CF_3-oxazol-4-yl	1-Me-1H-izl-2-yl
2-Ph-oxazol-5-yl	2-CHF_2-oxazol-4-yl	4-F-1-Me-1H-izl-2-yl
4-F-oxazol-5-yl	2-CN-oxazol-4-yl	4-Cl-1-Me-1H-izl-2-yl
4-Cl-oxazol-5-yl	2-OMe-oxazol-4-yl	4-Br-1-Me-1H-izl-2-yl
4-Br-oxazol-5-yl	2-OCF_3-oxazol-4-yl	1,4-di-Me-1H-izl-2-yl
4-Me-oxazol-5-yl	2-Ph-oxazol-4-yl	4-CF_3-1-Me-1H-izl-2-yl
4-CF_3-oxazol-5-yl	5-F-oxazol-4-yl	4-CHF_2-1-Me-1H-izl-2-yl
4-CHF_2-oxazol-5-yl	5-Cl-oxazol-4-yl	4-CN-1-Me-1H-izl-2-yl
4-CN-oxazol-5-yl	5-Br-oxazol-4-yl	4-OMe-1-Me-1H-izl-2-yl
4-OMe-oxazol-5-yl	5-Me-oxazol-4-yl	4-OCF_3-1-Me-1H-izl-2-yl
4-OCF_3-oxazol-5-yl	5-CF_3-oxazol-4-yl	4-Ph-1-Me-1H-izl-2-yl
4-Ph-oxazol-5-yl	5-CHF_2-oxazol-4-yl	5-F-1-Me-1H-izl-2-yl
Thiazol-5-yl	5-CN-oxazol-4-yl	5-Cl-1-Me-1H-izl-2-yl
2-F-thiazol-5-yl	5-OMe-oxazol-4-yl	5-Br-1-Me-1H-izl-2-yl
2-Cl-thiazol-5-yl	5-OCF_3-oxazol-4-yl	1,5-di-Me-1H-izl-2-yl
2-Br-thiazol-5-yl	5-Ph-oxazol-4-yl	5-CF_3-1-Me-1H-izl-2-yl
2-Me-thiazol-5-yl	Thiazol-4-yl	5-CHF_2-1-Me-1H-izl-2-yl
2-CF_3-thiazol-5-yl	2-F-thiazol-4-yl	5-CN-1-Me-1H-izl-2-yl
2-CHF_2-thiazol-5-yl	2-Cl-thiazol-4-yl	5-OMe-1-Me-1H-izl-2-yl
2-CN-thiazol-5-yl	2-Br-thiazol-4-yl	5-OCF_3-1-Me-1H-izl-2-yl
2-OMe-thiazol-5-yl	2-Me-thiazol-4-yl	5-Ph-1-Me-1H-izl-2-yl
2-OCF_3-thiazol-5-yl	2-CF_3-thiazol-4-yl	1H-izl-4-yl
2-Ph-thiazol-5-yl	2-CHF_2-thiazol-4-yl	1-Me-1H-izl-4-yl
4-F-thiazol-5-yl	2-CN-thiazol-4-yl	2-F-1-Me-1H-izl-4-yl
4-Cl-thiazol-5-yl	2-OMe-thiazol-4-yl	2-Cl-1-Me-1H-izl-4-yl
4-Br-thiazol-5-yl	2-OCF_3-thiazol-4-yl	2-Br-1-Me-1H-izl-4-yl
4-Me-thiazol-5-yl	2-Ph-thiazol-4-yl	1,2-di-Me-1H-izl-4-yl

TABLE 1-continued

1

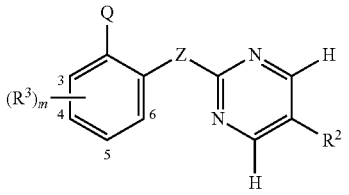


R^2 = Cl; Z = O; and R^3 = H (m = 0); and Q is:

4-CF_3-thiazol-5-yl	5-F-thiazol-4-yl	2-CF_3-1-Me-1H-izl-4-yl
4-CHF_2-thiazol-5-yl	5-Cl-thiazol-4-yl	2-CHF_2-1-Me-1H-izl-4-yl
4-CN-thiazol-5-yl	5-Br-thiazol-4-yl	2-CN-1-Me-1H-izl-4-yl
4-OMe-thiazol-5-yl	5-Me-thiazol-4-yl	2-OMe-1-Me-1H-izl-4-yl
2-OCF_3-1-Me-1H-izl-4-yl	4-Br-1-Me-1H-pzl-3-yl	5-OCF_3-1-Me-1H-pzl-4-yl
2-Ph-1-Me-1H-izl-4-yl	1,4-di-Me-1H-pzl-3-yl	5-Ph-1-Me-1H-pzl-4-yl
5-F-1-Me-1H-izl-4-yl	4-CF_3-1-Me-1H-pzl-3-yl	1H-pzl-5-yl
5-Cl-1-Me-1H-izl-4-yl	4-CHF_2-1-Me-1H-pzl-3-yl	1-Me-1H-pzl-5-yl
5-Br-1-Me-1H-izl-4-yl	4-CN-1-Me-1H-pzl-3-yl	3-F-1-Me-1H-pzl-5-yl
1,5-di-Me-1H-izl-4-yl	4-OMe-1-Me-1H-pzl-3-yl	3-Cl-1-Me-1H-pzl-5-yl
5-CF_3-1-Me-1H-izl-4-yl	4-OCF_3-1-Me-1H-pzl-3-yl	3-Br-1-Me-1H-pzl-5-yl
5-CHF_2-1-Me-1H-izl-4-yl	4-Ph-1-Me-1H-pzl-3-yl	1,3-di-Me-1H-pzl-5-yl
5-CN-1-Me-1H-izl-4-yl	5-F-1-Me-1H-pzl-3-yl	3-CF3-1-Me-1H-pzl-5-yl
5-OMe-1-Me-1H-izl-4-yl	5-Cl-1-Me-1H-pzl-3-yl	3-CHF_2-1-Me-1H-pzl-5-yl
5-OCF_3-1-Me-1H-izl-4-yl	5-Br-1-Me-1H-pzl-3-yl	3-CN-1-Me-1H-pzl-5-yl
5-Ph-1-Me-1H-izl-4-yl	1,5-di-Me-1H-pzl-3-yl	3-OMe-1-Me-1H-pzl-5-yl
1H-izl-5-yl	5-CF_3-1-Me-1H-pzl-3-yl	3-OCF_3-1-Me-1H-pzl-5-yl
1-Me-1H-izl-5-yl	5-CHF_2-1-Me-1H-pzl-3-yl	3-Ph-1-Me-1H-pzl-5-yl
2-F-1-Me-1H-izl-5-yl	5-CN-1-Me-1H-pzl-3-yl	4-F-1-Me-1H-pzl-5-yl
2-Cl-1-Me-1H-izl-5-yl	5-OMe-1-Me-1H-pzl-3-yl	4-Cl-1-Me-1H-pzl-5-yl
2-Br-1-Me-1H-izl-5-yl	5-OCF_3-1-Me-1H-pzl-3-yl	4-Br-1-Me-1H-pzl-5-yl
1,2-di-Me-1H-izl-5-yl	5-Ph-1-Me-1H-pzl-3-yl	1,4-di-Me-1H-pzl-5-yl
2-CF_3-1-Me-1H-izl-5-yl	1H-pzl-4-yl	4-CF_3-1-Me-1H-pzl-5-yl
2-CHF_2-1-Me-1H-izl-5-yl	1-Me-1H-pzl-4-yl	4-CHF2-1-Me-1H-pzl-5-yl
2-CN-1-Me-1H-izl-5-yl	3-F-1-Me-1H-pzl-4-yl	4-CN-1-Me-1H-pzl-5-yl
2-OMe-1-Me-1H-izl-5-yl	3-Cl-1-Me-1H-pzl-4-yl	4-OMe-1-Me-1H-pzl-5-yl
2-OCF_3-1-Me-1H-izl-5-yl	3-Br-1-Me-1H-pzl-4-yl	4-OCF_3-1-Me-1H-pzl-5-yl
2-Ph-1-Me-1H-izl-5-yl	1,3-di-Me-1H-pzl-4-yl	4-Ph-1-Me-1H-pzl-5-yl
4-F-1-Me-1H-izl-5-yl	3-CF_3-1-Me-1H-pzl-4-yl	Thiophene-2-yl
4-Cl-1-Me-1H-izl-5-yl	3-CHF2-1-Me-1H-pzl-4-yl	Thiophene-3-yl
4-Br-1-Me-1H-izl-5-yl	3-CN-1-Me-1H-pzl-4-yl	Furan-2-yl
1,4-di-Me-1H-izl-5-yl	3-OMe-1-Me-1H-pzl-4-yl	Furan-3-yl
4-CF3-1-Me-1H-izl-5-yl	3-OCF_3-1-Me-1H-pzl-4-yl	1H-pyrrol-2-yl
4-CHF_2-1-Me-1H-izl-5-yl	3-Ph-1-Me-1H-pzl-4-yl	1-Me-1H-pyrrol-2-yl
4-CN-1-Me-1H-izl-5-yl	5-F-1-Me-1H-pzl-4-yl	1H-pyrrol-3-yl
4-OMe-1-Me-1H-izl-5-yl	5-Cl-1-Me-1H-pzl-4-yl	1-Me-1H-pyrrol-3-yl
4-OCF_3-1-Me-1H-izl-5-yl	5-Br-1-Me-1H-pzl-4-yl	[1,3,4]odzl-2-yl
4-Ph-1-Me-1H-izl-5-yl	1,5-di-Me-1H-pzl-4-yl	2-F-[1,3,4]odzl-5-yl
1H-pzl-3-yl	5-CF3-1-Me-1H-pzl-4-yl	2-Cl-[1,3,4]odzl-5-yl
1-Me-1H-pzl-3-yl	5-CHF2-1-Me-1H-pzl-4-yl	2-Br-[1,3,4]odzl-5-yl
4-F-1-Me-1H-pzl-3-yl	5-CN-1-Me-1H-pzl-4-yl	2-Me[1,3,4]odzl-5-yl
4-Cl-1-Me-1H-pzl-3-yl	5-OMe-1-Me-1H-pzl-4-yl	2-CF_3[1,3,4]odzl-5-yl
2-CHF_2-[1,3,4]odzl-5-yl	5-CHF_2-1-Me-1H[1,2,4]tzl-3-yl	5-Br-[1,2,4]odzl-3-yl
2-CN-[1,3,4]odzl-5-yl		5-Me-[1,2,4]odzl-3-yl
2-OMe-[1,3,4]odzl-5-yl	5-CN-1-Me-1H-[1,2,4]tzl-3-yl	5-CF_3-[1,2,4]odzl-3-yl
2-OCF_3-[1,3,4]odzl-5-yl	5-OMe-1-Me-1H-[1,2,4]tzl-3-yl	5-CHF_2-[1,2,4]odzl-3-yl
[1,3,4]tdzl-2-yl		5-CN-[1,2,4]odzl-3-yl
2-F-[1,3,4]tdzl-5-yl	5-OCF_3-1-Me-1H-[1,2,4]tzl-3-yl	5-OMe-[1,2,4]odzl-3-yl
2-Cl-[1,3,4]tdzl-5-yl		5-OCF_3-[1,2,4]odzl-3-yl
2-Br-[1,3,4]tdzl-5-yl	5-Ph-1-Me-1H-[1,2,4]tzl-3-yl	5-Ph-[1,2,4]odzl-3-yl
2-Me-[1,3,4]tdzl-5-yl	1H-[1,2,4]tzl-5-yl	[1,2,4]tdzl-5-yl
2-CF_3-[1,3,4]tdzl-5-yl	1-Me-1H-[1,2,4]tzl-5-yl	3-F-[1,2,4]tdzl-5-yl
2-CHF_2-[1,3,4]tdzl-5-yl	3-F-1-Me-1H-[1,2,4]tzl-5-yl	3-Cl-[1,2,4]tdzl-5-yl
2-CN-[1,3,4]tdzl-5-yl	3-Cl-1-Me-1H-[1,2,4]tzl-5-yl	3-Br-[1,2,4]tdzl-5-yl
2-OMe-[1,3,4]tdzl-5-yl	3-Br-1-Me-1H-[1,2,4]tzl-5-yl	3-Me-[1,2,4]tdzl-5-yl
2-OCF_3-[1,3,4]tdzl-5-yl	1,3-di-Me-1H-[1,2,4]tzl-5-yl	3-CF_3-[1,2,4]tdzl-5-yl
4H-[1,2,4]tzl-3-yl	3-CF3-1-Me-1H-[1,2,4]tzl-5-yl	3-CHF_2-[1,2,4]tdzl-5-yl
4-Me-4H-[1,2,4]tzl-3-yl		3-CN-[1,2,4]tdzl-5-yl
3-F-4-Me-4H-[1,2,4]tzl-5-yl	3-CHF_2-1-Me-1H-[1,2,4]tzl-5-yl	3-OMe-[1,2,4]tdzl-5-yl
3-Cl-4-Me-4H-[1,2,4]tzl-5-yl		3-OCF_3-[1,2,4]tdzl-5-yl
3-Br-4-Me-4H11,2,41tzl-5-yl	3-CN-1-Me-1H-[1,2,4]tzl-5-yl	3-Ph-[1,2,4]tdzl-5-yl
3,4-di-Me-4H-[1,2,4]tzl-5-yl	3-OMe-1-Me-1H-[1,2,4]tzl-5-	[1,2,4]tdzl-3-yl

TABLE 1-continued

1

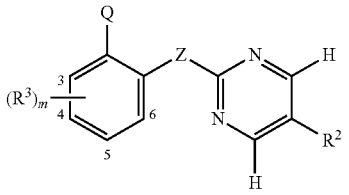


R^2 = Cl; Z = O; and R^3 = H (m = 0); and Q is:

3-CF_3-4-Me-4H-[1,2,4]tzl-5-yl	yl	5-F-[1,2,4]tdzl-3-yl
3-CHF_2-4-Me-4H-[1,2,4]tzl-5-yl	3-OCF3-1-Me-1H-[1,2,4]tzl-5-yl	5-Cl-[1,2,4]tdzl-3-yl
3-CN-4-Me-4H-[1,2,4]tzl-5-yl	3-Ph-1-Me-1H-[1,2,4]tzl-5-yl	5-Br-[1,2,4]tdzl-3-yl
3-OMe-4-Me-4H-[1,2,4]tzl-5-yl	[1,2,4]odzl-5-yl	5-Me-[1,2,4]tdzl-3-yl
3-OCF_3-4-Me-4H-[1,2,4]tzl-5-yl	3-F-[1,2,4]odzl-5-yl	5-CF_3-[1,2,4]tdzl-3-yl
3-Ph-4-Me-4H-[1,2,4]tzl-5-yl	3-Cl-[1,2,4]odzl-5-yl	5-CHF_2-[1,2,4]tdzl-3-yl
1H-[1,2,4]tzl-3-yl	3-Br-[1,2,4]odzl-5-yl	5-CN-[1,2,4]tdzl-3-yl
1-Me-1H-[1,2,4]tzl-3-yl	3-Me-[1,2,4]odzl-5-yl	5-OMe-[1,2,4]tdzl-3-yl
5-F-1-Me-1H-[1,2,4]tzl-3-yl	3-CF_3-[1,2,4]odzl-5-yl	5-OCF_3-[1,2,4]tdzl-3-yl
5-Cl-1-Me-1H-[1,2,4]tzl-3-yl	3-CHF_2-[1,2,4]odzl-5-yl	5-Ph-[1,2,4]tdzl-3-yl
5-Br-1-Me-1H-[1,2,4]tzl-3-yl	3-CN-[1,2,4]odzl-5-yl	[1,2,3]odzl-5-yl
1,5-di-Me-1H-[1,2,4]tzl-3-yl	3-OMe-[1,2,4]odzl-5-yl	4-F-[1,2,3]odzl-5-yl
5-CF_3-1-Me-1H-[1,2,4]tzl-3-yl	3-OCF_3-[1,2,4]odzl-5-yl	4-Cl-[1,2,3]odzl-5-yl
4-OMe-[1,2,3]odzl-5-yl	3-Ph-[1,2,4]odzl-5-yl	4-Br-[1,2,3]odzl-5-yl
4-OCF_3-[1,2,3]odzl-5-yl	[1,2,4]odzl-3-yl	4-Me-[1,2,3]odzl-5-yl
4-Ph-[1,2,3]odzl-5-yl	5-F-[1,2,4]odzl-3-yl	4-CF_3-[1,2,3]odzl-5-yl
[1,2,3]odzl-4-yl	5-Cl-[1,2,4]odzl-3-yl	4-CHF_2-[1,2,3]odzl-5-yl
5-F-[1,2,3]odzl-4-yl	5-Cl-3H-[1,2,4]tzl-3-yl	4-CN-[1,2,3]odzl-5-yl
5-Cl-[1,2,3]odzl-4-yl	5-Br-3H-[1,2,4]tzl-3-yl	4-CN-1H-[1,2,3]tzl-5-yl
5-Br-[1,2,3]odzl-4-yl	5-Me-3H-[1,2,4]tzl-3-yl	4-OMe-1H-[1,2,3]tzl-5-yl
5-Me-[1,2,3]odzl-4-yl	5-CF_3-3H-[1,2,4]tzl-3-yl	4-OCF_3-1H-[1,2,3]tzl-5-yl
5-CF_3-[1,2,3]odzl-4-yl	5-CHF_2-3H-[1,2,4]tzl-3-yl	4-Ph-1H-[1,2,3]tzl-5-yl
5-CHF_2-[1,2,3]odzl-4-yl	5-CN-3H-[1,2,4]tzl-3-yl	5-F-pyridin-2-yl
5-CN-[1,2,3]odzl-4-yl	5-OMe-3H-[1,2,4]tzl-3-yl	5-Cl-pyridin-2-yl
5-OMe-[1,2,3]odzl-4-yl	5-OCF_3-3H-[1,2,4]tzl-3-yl	5-Br-pyridin-2-yl
5-OCF_3-[1,2,3]odzl-4-yl	5-Ph-3H-[1,2,4]tzl-3-yl	5-I-pyridin-2-yl
5-Ph-[1,2,3]odzl-4-yl	1H-[1,2,3]tzl-4-yl	5-Me-pyridin-2-yl
[1,2,3]tdzl-5-yl	5-F-1H-[1,2,3]tzl-4-yl	5-Et-pyridin-2-yl
4-F-[1,2,3]tdzl-5-yl	5-Cl-1H-[1,2,3]tzl-4-yl	5-CF_3-pyridin-2-yl
4-Cl-[1,2,3]tdzl-5-yl	5-Br-1H-[1,2,3]tzl-4-yl	5-CHF_2-pyridin-2-yl
4-Br-[1,2,3]tdzl-5-yl	5-Me-1H-[1,2,3]tzl-4-yl	5-CHO-pyridin-2-yl
4-Me-[1,2,3]tdzl-5-yl	5-CF_3-1H-[1,2,3]tzl-4-yl	5-CN-pyridin-2-yl
4-CF_3-[1,2,3]tdzl-5-yl	5-CHF_2-1H-[1,2,3]tzl-4-yl	5-OMe-pyridin-2-yl
4-CHF_2-[1,2,3]tdzl-5-yl	5-CN-1H-[1,2,3]tzl-4-yl	5-OCF_3-pyridin-2-yl
4-CN-[1,2,3]tdzl-5-yl	5-OMe-1H-[1,2,3]tzl-4-yl	5-$N(Me)_2$-pyridin-2-yl
4-OMe-[1,2,3]tdzl-5-yl	5-OCF_3-1H-[1,2,3]tzl-4-yl	5-Ph-pyridin-2-yl
4-OCF_3-[1,2,3]tdzl-5-yl	5-Ph-1H-[1,2,3]tzl-4-yl	3,5-di-Cl-pyridin-2-yl
4-Ph-[1,2,3]tdzl-5-yl	2H-[1,2,3]tzl-4-yl	3-Me-5-Cl-pyridin-2-yl
[1,2,3]tdzl-4-yl	4-F-2H-[1,2,3]tzl-5-yl	3-CN-5-Cl-pyridin-2-yl
5-F-[1,2,3]tdzl-4-yl	4-Cl-2H-[1,2,3]tzl-5-yl	6-F-pyridin-2-yl
5-Cl-[1,2,3]tdzl-4-yl	4-Br-2H-[1,2,3]tzl-5-yl	6-Cl-pyridin-2-yl
5-Br-[1,2,3]tdzl-4-yl	4-Me-2H-[1,2,3]tzl-5-yl	6-Br-pyridin-2-yl
5-Me-[1,2,3]tdzl-4-yl	4-CF_3-2H-[1,2,3]tzl-5-yl	6-I-pyridin-2-yl
5-CF_3-[1,2,3]tdzl-4-yl	4-CHF_2-2H-[1,2,3]tzl-5-yl	6-Me-pyridin-2-yl
5-CHF_2-[1,2,3]tdzl-4-yl	4-CN-2H-[1,2,3]tzl-5-yl	6-Et-pyridin-2-yl
5-CN-[1,2,3]tdzl-4-yl	4-OMe-2H-[1,2,3]tzl-5-yl	6-CF_3-pyridin-2-yl
5-OMe-[1,2,3]tdzl-4-yl	4-OCF_3-2H-[1,2,3]tzl-5-yl	6-CHF_2-pyridin-2-yl
5-OCF_3-[1,2,3]tdzl-4-yl	4-Ph-2H-[1,2,3]tzl-5-yl	6-CHO-pyridin-2-yl
5-Ph-[1,2,3]tdzl-4-yl	1H-[1,2,3]tzl-5-yl	6-CN-pyridin-2-yl
3H-[1,2,4]-tzl-3-yl	4-F-1H-[1,2,3]tzl-5-yl	6-OMe-pyridin-2-yl
5-F-3H-[1,2,4]-tzl-3-yl	4-Cl-1H-[1,2,3]tzl-5-yl	6-OCF_3-pyridin-2-yl
3-I-pyridin-2-yl	4-Br-1H-[1,2,3]tzl-5-yl	6-$N(Me)_2$-pyridin-2-yl
3-Me-pyridin-2-yl	4-Me-1H-[1,2,3]tzl-5-yl	6-Ph-pyridin-2-yl
3-Et-pyridin-2-yl	4-CF_3-1H-[1,2,3]tzl-5-yl	3-F-pyridin-2-yl
3-CF_3-pyridin-2-yl	4-CHF_2-1H-[1,2,3]tzl-5-yl	3-Cl-pyridin-2-yl
3-CHF_2-pyridin-2-yl	3-OMe-pyridin-4-yl	3-Br-pyridin-2-yl
3-CHO-pyridin-2-yl	3-OCF_3-pyridin-4-yl	5-F-pyridazin-2-yl
3-CN-pyridin-2-yl	3-$N(Me)_2$-pyridin-4-yl	5-Cl-pyridazin-2-yl
	3-Ph-pyridin-4-yl	5-Br-pyridazin-2-yl
	3,5-di-Me-pyridin-4-yl	5-I-pyridazin-2-yl
	3,5-di-Cl-pyridin-4-yl	5-Me-pyridazin-2-yl
	6-F-pyridazin-3-yl	5-Et-pyridazin-2-yl
		5-CF_3-pyridazin-2-yl

TABLE 1-continued

1



R^2 = Cl; Z = O; and R^3 = H (m = 0); and Q is:

3-OMe-pyridin-2-yl	6-Cl-pyridazin-3-yl	5-CHF_2-pyridazin-2-yl
3-OCF_3-pyridin-2-yl	6-Br-pyridazin-3-yl	5-CHO-pyridazin-2-yl
3-$N(Me)_2$-pyridin-2-yl	6-I-pyridazin-3-yl	5-CN-pyridazin-2-yl
3-Ph-pyridin-2-yl	6-Me-pyridazin-3-yl	5-OMe-pyridazin-2-yl
5,6-di-Cl-pyridin-2-yl	6-Et-pyridazin-3-yl	5-OCF_3-pyridazin-2-yl
6-F-pyridin-3-yl	6-CF_3-pyridazin-3-yl	5-$N(Me)_2$-pyridazin-2-yl
6-Cl-pyridin-3-yl	6-CHF_2-pyridazin-3-yl	5-Ph-pyridazin-2-yl
6-Br-pyridin-3-yl	6-CHO-pyridazin-3-yl	5-F-pyrimidin-4-yl
6-I-pyridin-3-yl	6-CN-pyridazin-3-yl	5-Cl-pyrimidin-4-yl
6-Me-pyridin-3-yl	6-OMe-pyridazin-3-yl	5-Br-pyrimidin-4-yl
6-Et-pyridin-3-yl	6-OCF_3-pyridazin-3-yl	5-I-pyrimidin-4-yl
6-CF_3-pyridin-3-yl	6-$N(Me)_2$-pyridazin-3-yl	5-Me-pyrimidin-4-yl
6-CHF_2-pyridin-3-yl	6-Ph-pyridazin-3-yl	5-Et-pyrimidin-4-yl
6-CHO-pyridin-3-yl	4-Cl-pyridazin-3-yl	5-CF_3-pyrimidin-4-yl
6-CN-pyridin-3-yl	4-CN-pyridazin-3-yl	5-CHF_2-pyrimidin-4-yl
6-OMe-pyridin-3-yl	6-F-pyridazin-4-yl	5-CHO-pyrimidin-4-yl
6-OCF_3-pyridin-3-yl	6-Cl-pyridazin-4-yl	5-CN-pyrimidin-4-yl
6-$N(Me)_2$-pyridin-3-yl	6-Br-pyridazin-4-yl	5-OMe-pyrimidin-4-yl
6-Ph-pyridin-3-yl	6-I-pyridazin-4-yl	5-OCF_3-pyrimidin-4-yl
4,6-di-Cl-pyridin-3-yl	6-Me-pyridazin-4-yl	5-$N(Me)_2$-pyrimidin-4-yl
4-CN-6-Cl-pyridin-3-yl	6-Et-pyridazin-4-yl	5-Ph-pyrimidin-4-yl
3-F-pyridin-4-yl	6-CF_3-pyridazin-4-yl	2-F-pyrimidin-5-yl
3-Cl-pyridin-4-yl	6-CHF_2-pyridazin-4-yl	2-Cl-pyrimidin-5-yl
3-Br-pyridin-4-yl	6-CHO-pyridazin-4-yl	2-Br-pyrimidin-5-yl
3-I-pyridin-4-yl	6-CN-pyridazin-4-yl	2-I-pyrimidin-5-yl
3-Me-pyridin-4-yl	6-OMe-pyridazin-4-yl	2-Me-pyrimidin-5-yl
3-Et-pyridin-4-yl	6-OCF_3-pyridazin-4-yl	2-Et-pyrimidin-5-yl
3-CF_3-pyridin-4-yl	6-$N(Me)_2$-pyridazin-4-yl	2-CF_3-pyrimidin-5-yl
3-CHF_2-pyridin-4-yl	6-Ph-pyridazin-4-yl	2-CHF_2-pyrimidin-5-yl
3-CHO-pyridin-4-yl	4-Cl-pyridazin-4-yl	2-CHO-pyrimidin-5-yl
3-CN-pyridin-4-yl	4-CN-pyridazin-4-yl	2-CN-pyrimidin-5-yl
2-OMe-pyrimidin-5-yl	3-OMe-[1,2,4]triazin-6-yl	6-CN-[1,2,4]triazin-3-yl
2-OCF_3-pyrimidin-5-yl	3-CF_3-[1,2,4]-triazin-6-yl	4-Cl-[1,3,5]triazin-2-yl
2-$N(Me)_2$-pyrimidin-5-yl	6-Cl-[1,2,4]triazin-5-yl	4-CF_3-phenyl
2-Ph-pyrimidin-5-yl	6-Me-[1,2,4]triazin-5-yl	4-OCF_3-phenyl
3-Cl-pyrazin-2-yl	6-OMe-[1,2,4]triazin-5-yl	3-OCF_3-phenyl
3-CN-pyrazin-2-yl	6-CN-[1,2,4]triazin-5-yl	3,5-di-OCF_3-phenyl
3-OMe-pyrazin-2-yl	6-Cl-[1,2,4]triazin-3-yl	3,5-di-Cl-phenyl
3-Cl-[1,2,4]triazin-6-yl	6-Me-[1,2,4]triazin-3-yl	
3-CN-[1,2,4]triazin-6-yl	6-OMe-[1,2,4]triazin-3-yl	

[0414] The present disclosure also includes Tables 2 through 1584. Each Table is constructed in the the same manner as Table 1 above, except that the row heading in Table 1 (i.e. "R^2=Cl; Z=O; and R^3=H (m=0)") is replaced with the respective row heading shown below. For example, the first entry in Table 2 is a compound of Formula 1 wherein R^1 is H, R^2 is Cl, Z is O, R^3 is H (m=0), and Q is isoxazol-5-yl (i.e. unsubstituted isoxazole attached to the remainder of Formula 1 at the 5-position). The remainder of Table 2 is constructed in the same way, and hence the remainder of Tables 3 through 1584 is constructed the same way.

Table	Header Row
2	R^2 = F, Z = O, R^3 = H (m = 0)
3	R^2 = F, Z = O, R^3 = 3-F

-continued

Table	Header Row
4	R^2 = F, Z = O, R^3 = 3-Cl
5	R^2 = F, Z = O, R^3 = 3-Br
6	R^2 = F, Z = O, R^3 = 3-I
7	R^2 = F, Z = O, R^3 = 3-CN
8	R^2 = F, Z = O, R^3 = 3-NO_2
9	R^2 = F, Z = O, R^3 = 3-OMe
10	R^2 = F, Z = O, R^3 = 3-OCF_3
11	R^2 = F, Z = O, R^3 = 3-CF_3
12	R^2 = F, Z = O, R^3 = 3-CHF_2
13	R^2 = F, Z = O, R^3 = 3-CH_2F
14	R^2 = F, Z = O, R^3 = 3-CHO
15	R^2 = F, Z = O, R^3 = 3-Me
16	R^2 = F, Z = O, R^3 = 3-Et
17	R^2 = F, Z = O, R^3 = 3-Ethynyl

-continued

Table	Header Row
18	R^2 = F, Z = O, R^3 = 3-Ethenyl
19	R^2 = F, Z = O, R^3 = 3-SO_2Me
20	R^2 = F, Z = O, R^3 = 3-OAc
21	R^2 = F, Z = O, R^3 = 3-c-Pr
22	R^2 = F, Z = O, R^3 = 3-i-Pr
23	R^2 = F, Z = O, R^3 = 3-Ph
24	R^2 = F, Z = S, R^3 = 3-F
25	R^2 = F, Z = S, R^3 = 3-Cl
26	R^2 = F, Z = S, R^3 = 3-Br
27	R^2 = F, Z = S, R^3 = 3-I
28	R^2 = F, Z = S, R^3 = 3-CN
29	R^2 = F, Z = S, R^3 = 3-NO_2
30	R^2 = F, Z = S, R^3 = 3-OMe
31	R^2 = F, Z = S, R^3 = 3-OCF_3
32	R^2 = F, Z = S, R^3 = 3-CF_3
33	R^2 = F, Z = S, R^3 = 3-CHF_2
34	R^2 = F, Z = S, R^3 = 3-CH_2F
35	R^2 = F, Z = S, R^3 = 3-CHO
36	R^2 = F, Z = S, R^3 = 3-Me
37	R^2 = F, Z = S, R^3 = 3-Et
38	R^2 = F, Z = S, R^3 = 3-Ethynyl
39	R^2 = F, Z = S, R^3 = 3-Ethenyl
40	R^2 = F, Z = S, R^3 = 3-SO_2Me
41	R^2 = F, Z = S, R^3 = 3-OAc
42	R^2 = F, Z = S, R^3 = 3-c-Pr
43	R^2 = F, Z = S, R^3 = 3-i-Pr
44	R^2 = F, Z = S, R^3 = 3-Ph
45	R^2 = F, Z = O, R^3 = 4-F
46	R^2 = F, Z = O, R^3 = 4-Cl
47	R^2 = F, Z = O, R^3 = 4-Br
48	R^2 = F, Z = O, R^3 = 4-I
49	R^2 = F, Z = O, R^3 = 4-CN
50	R^2 = F, Z = O, R^3 = 4-NO_2
51	R^2 = F, Z = O, R^3 = 4-OMe
52	R^2 = F, Z = O, R^3 = 4-OCF_3
53	R^2 = F, Z = O, R^3 = 4-CF_3
54	R^2 = F, Z = O, R^3 = 4-CHF_2
55	R^2 = F, Z = O, R^3 = 4-CH_2F
56	R^2 = F, Z = O, R^3 = 4-CHO
57	R^2 = F, Z = O, R^3 = 4-Me
58	R^2 = F, Z = O, R^3 = 4-Et
59	R^2 = F, Z = O, R^3 = 4-Ethynyl
60	R^2 = F, Z = O, R^3 = 4-Ethenyl
61	R^2 = F, Z = O, R^3 = 4-SO_2Me
62	R^2 = F, Z = O, R^3 = 4-OAc
63	R^2 = F, Z = O, R^3 = 4-c-Pr
64	R^2 = F, Z = O, R^3 = 4-i-Pr
65	R^2 = F, Z = O, R^3 = 4-Ph
66	R^2 = F, Z = O, R^3 = 5-F
67	R^2 = F, Z = O, R^3 = 5-Cl
68	R^2 = F, Z = O, R^3 = 5-Br
69	R^2 = F, Z = O, R^3 = 5-I
70	R^2 = F, Z = O, R^3 = 5-CN
71	R^2 = F, Z = O, R^3 = 5-NO_2
72	R^2 = F, Z = O, R^3 = 5-OMe
73	R^2 = F, Z = O, R^3 = 5-OCF_3
74	R^2 = F, Z = O, R^3 = 5-CF_3
75	R^2 = F, Z = O, R^3 = 5-CHF_2
76	R^2 = F, Z = O, R^3 = 5-CH_2F
77	R^2 = F, Z = O, R^3 = 5-CHO
78	R^2 = F, Z = O, R^3 = 5-Me
79	R^2 = F, Z = O, R^3 = 5-Et
80	R^2 = F, Z = O, R^3 = 5-Ethynyl
81	R^2 = F, Z = O, R^3 = 5-Ethenyl
82	R^2 = F, Z = O, R^3 = 5-SO_2Me
83	R^2 = F, Z = O, R^3 = 5-OAc
84	R^2 = F, Z = O, R^3 = 5-c-Pr
85	R^2 = F, Z = O, R^3 = 5-i-Pr
86	R^2 = F, Z = O, R^3 = 5-Ph
87	R^2 = F, Z = O, R^3 = 6-F
88	R^2 = F, Z = O, R^3 = 6-Cl
89	R^2 = F, Z = O, R^3 = 6-Br
90	R^2 = F, Z = O, R^3 = 6-I
91	R^2 = F, Z = O, R^3 = 6-CN

-continued

Table	Header Row
92	R^2 = F, Z = O, R^3 = 6-NO_2
93	R^2 = F, Z = O, R^3 = 6-OMe
94	R^2 = F, Z = O, R^3 = 6-OCF_3
95	R^2 = F, Z = O, R^3 = 6-CF_3
96	R^2 = F, Z = O, R^3 = 6-CHF_2
97	R^2 = F, Z = O, R^3 = 6-CH_2F
98	R^2 = F, Z = O, R^3 = 6-CHO
99	R^2 = F, Z = O, R^3 = 6-Me
100	R^2 = F, Z = O, R^3 = 6-Et
101	R^2 = F, Z = O, R^3 = 6-Ethynyl
102	R^2 = F, Z = O, R^3 = 6-Ethenyl
103	R^2 = F, Z = O, R^3 = 6-SO_2Me
104	R^2 = F, Z = O, R^3 = 6-OAc
105	R^2 = F, Z = O, R^3 = 6-c-Pr
106	R^2 = F, Z = O, R^3 = 6-i-Pr
107	R^2 = F, Z = O, R^3 = 6-Ph
108	R^2 = F, Z = O, R^3 = 3,4-di-F
109	R^2 = F, Z = O, R^3 = 3,5-di-F
110	R^2 = F, Z = O, R^3 = 3,6-di-F
111	R^2 = F, Z = O, R^3 = 4,5-di-F
112	R^2 = F, Z = O, R^3 = 3,4-di-Cl
113	R^2 = F, Z = O, R^3 = 3,5-di-Cl
114	R^2 = F, Z = O, R^3 = 3,6-di-Cl
115	R^2 = F, Z = O, R^3 = 4,5-di-Cl
116	R^2 = F, Z = O, R^3 = 3,4-di-Br
117	R^2 = F, Z = O, R^3 = 3,5-di-Br
118	R^2 = F, Z = O, R^3 = 3,6-di-Br
119	R^2 = F, Z = O, R^3 = 4,5-di-Br
120	R^2 = F, Z = O, R^3 = 3,4-di-CN
121	R^2 = F, Z = O, R^3 = 3,5-di-CN
122	R^2 = F, Z = O, R^3 = 3,6-di-CN
123	R^2 = F, Z = O, R^3 = 4,5-di-CN
124	R^2 = F, Z = O, R^3 = 3,4-di-Me
125	R^2 = F, Z = O, R^3 = 3,5-di-Me
126	R^2 = F, Z = O, R^3 = 3,6-di-Me
127	R^2 = F, Z = O, R^3 = 4,5-di-Me
128	R^2 = F, Z = O, R^3 = 3,4-di-OMe
129	R^2 = F, Z = O, R^3 = 3,5-di-OMe
130	R^2 = F, Z = O, R^3 = 3,6-di-OMe
131	R^2 = F, Z = O, R^3 = 4,5-di-OMe
132	R^2 = F, Z = O, R^3 = 3,4-di-CF_3
133	R^2 = F, Z = O, R^3 = 3,5-di-CF_3
134	R^2 = F, Z = O, R^3 = 3,6-di-CF_3
135	R^2 = F, Z = O, R^3 = 4,5-di-CF_3
136	R^2 = F, Z = O, R^3 = 3-CN, 4-Me
137	R^2 = F, Z = O, R^3 = 3-CN, 4-F
138	R^2 = F, Z = O, R^3 = 3-CN, 4-Br
139	R^2 = F, Z = O, R^3 = 3-CN, 4-OMe
140	R^2 = F, Z = O, R^3 = 3-CN, 4-CF_3
141	R^2 = F, Z = O, R^3 = 3-CN, 6-Me
142	R^2 = F, Z = O, R^3 = 3-CN, 6-F
143	R^2 = F, Z = O, R^3 = 3-CN, 6-Br
144	R^2 = F, Z = O, R^3 = 3-CN, 6-OMe
145	R^2 = F, Z = O, R^3 = 3-CN, 6-CF_3
146	R^2 = Br, Z = O, R^3 = H (m = 0)
147	R^2 = Br, Z = O, R^3 = 3-F
148	R^2 = Br, Z = O, R^3 = 3-Cl
149	R^2 = Br, Z = O, R^3 = 3-Br
150	R^2 = Br, Z = O, R^3 = 3-I
151	R^2 = Br, Z = O, R^3 = 3-CN
152	R^2 = Br, Z = O, R^3 = 3-NO_2
153	R^2 = Br, Z = O, R^3 = 3-OMe
154	R^2 = Br, Z = O, R^3 = 3-OCF_3
155	R^2 = Br, Z = O, R^3 = 3-CF_3
156	R^2 = Br, Z = O, R^3 = 3-CHF_2
157	R^2 = Br, Z = O, R^3 = 3-CH_2F
158	R^2 = Br, Z = O, R^3 = 3-CHO
159	R^2 = Br, Z = O, R^3 = 3-Me
160	R^2 = Br, Z = O, R^3 = 3-Et
161	R^2 = Br, Z = O, R^3 = 3-Ethynyl
162	R^2 = Br, Z = O, R^3 = 3-Ethenyl
163	R^2 = Br, Z = O, R^3 = 3-SO_2Me
164	R^2 = Br, Z = O, R^3 = 3-OAc
165	R^2 = Br, Z = O, R^3 = 3-c-Pr

-continued

Table	Header Row
166	R^2 = Br, Z = O, R^3 = 3-i-Pr
167	R^2 = Br, Z = O, R^3 = 3-Ph
168	R^2 = Br, Z = S, R^3 = 3-F
169	R^2 = Br, Z = S, R^3 = 3-Cl
170	R^2 = Br, Z = S, R^3 = 3-Br
171	R^2 = Br, Z = S, R^3 = 3-I
172	R^2 = Br, Z = S, R^3 = 3-CN
173	R^2 = Br, Z = S, R^3 = 3-NO_2
174	R^2 = Br, Z = S, R^3 = 3-OMe
175	R^2 = Br, Z = S, R^3 = 3-OCF_3
176	R^2 = Br, Z = S, R^3 = 3-CF_3
177	R^2 = Br, Z = S, R^3 = 3-CHF_2
178	R^2 = Br, Z = S, R^3 = 3-CH_2F
179	R^2 = Br, Z = S, R^3 = 3-CHO
180	R^2 = Br, Z = S, R^3 = 3-Me
181	R^2 = Br, Z = S, R^3 = 3-Et
182	R^2 = Br, Z = S, R^3 = 3-Ethynyl
183	R^2 = Br, Z = S, R^3 = 3-Ethenyl
184	R^2 = Br, Z = S, R^3 = 3-SO_2Me
185	R^2 = Br, Z = S, R^3 = 3-OAc
186	R^2 = Br, Z = S, R^3 = 3-c-Pr
187	R^2 = Br, Z = S, R^3 = 3-i-Pr
188	R^2 = Br, Z = S, R^3 = 3-Ph
189	R^2 = Br, Z = O, R^3 = 4-F
190	R^2 = Br, Z = O, R^3 = 4-Cl
191	R^2 = Br, Z = O, R^3 = 4-Br
192	R^2 = Br, Z = O, R^3 = 4-I
193	R^2 = Br, Z = O, R^3 = 4-CN
194	R^2 = Br, Z = O, R^3 = 4-NO_2
195	R^2 = Br, Z = O, R^3 = 4-OMe
196	R^2 = Br, Z = O, R^3 = 4-OCF_3
197	R^2 = Br, Z = O, R^3 = 4-CF_3
198	R^2 = Br, Z = O, R^3 = 4-CHF_2
199	R^2 = Br, Z = O, R^3 = 4-CH_2F
200	R^2 = Br, Z = O, R^3 = 4-CHO
201	R^2 = Br, Z = O, R^3 = 4-Me
202	R^2 = Br, Z = O, R^3 = 4-Et
203	R^2 = Br, Z = O, R^3 = 4-Ethynyl
204	R^2 = Br, Z = O, R^3 = 4-Ethenyl
205	R^2 = Br, Z = O, R^3 = 4-SO_2Me
206	R^2 = Br, Z = O, R^3 = 4-OAc
207	R^2 = Br, Z = O, R^3 = 4-c-Pr
208	R^2 = Br, Z = O, R^3 = 4-i-Pr
209	R^2 = Br, Z = O, R^3 = 4-Ph
210	R^2 = Br, Z = O, R^3 = 5-F
211	R^2 = Br, Z = O, R^3 = 5-Cl
212	R^2 = Br, Z = O, R^3 = 5-Br
213	R^2 = Br, Z = O, R^3 = 5-I
214	R^2 = Br, Z = O, R^3 = 5-CN
215	R^2 = Br, Z = O, R^3 = 5-NO_2
216	R^2 = Br, Z = O, R^3 = 5-OMe
217	R^2 = Br, Z = O, R^3 = 5-OCF_3
218	R^2 = Br, Z = O, R^3 = 5-CF_3
219	R^2 = Br, Z = O, R^3 = 5-CHF_2
220	R^2 = Br, Z = O, R^3 = 5-CH_2F
221	R^2 = Br, Z = O, R^3 = 5-CHO
222	R^2 = Br, Z = O, R^3 = 5-Me
223	R^2 = Br, Z = O, R^3 = 5-Et
224	R^2 = Br, Z = O, R^3 = 5-Ethynyl
225	R^2 = Br, Z = O, R^3 = 5-Ethenyl
226	R^2 = Br, Z = O, R^3 = 5-SO_2Me
227	R^2 = Br, Z = O, R^3 = 5-OAc
228	R^2 = Br, Z = O, R^3 = 5-c-Pr
229	R^2 = Br, Z = O, R^3 = 5-i-Pr
230	R^2 = Br, Z = O, R^3 = 5-Ph
231	R^2 = Br, Z = O, R^3 = 6-F
232	R^2 = Br, Z = O, R^3 = 6-Cl
233	R^2 = Br, Z = O, R^3 = 6-Br
234	R^2 = Br, Z = O, R^3 = 6-I
235	R^2 = Br, Z = O, R^3 = 6-CN
236	R^2 = Br, Z = O, R^3 = 6-NO_2
237	R^2 = Br, Z = O, R^3 = 6-OMe
238	R^2 = Br, Z = O, R^3 = 6-OCF_3
239	R^2 = Br, Z = O, R^3 = 6-CF_3

-continued

Table	Header Row
240	R^2 = Br, Z = O, R^3 = 6-CHF_2
241	R^2 = Br, Z = O, R^3 = 6-CH_2F
242	R^2 = Br, Z = O, R^3 = 6-CHO
243	R^2 = Br, Z = O, R^3 = 6-Me
244	R^2 = Br, Z = O, R^3 = 6-Et
245	R^2 = Br, Z = O, R^3 = 6-Ethynyl
246	R^2 = Br, Z = O, R^3 = 6-Ethenyl
247	R^2 = Br, Z = O, R^3 = 6-SO_2Me
248	R^2 = Br, Z = O, R^3 = 6-OAc
249	R^2 = Br, Z = O, R^3 = 6-c-Pr
250	R^2 = Br, Z = O, R^3 = 6-i-Pr
251	R^2 = Br, Z = O, R^3 = 6-Ph
252	R^2 = Br, Z = O, R^3 = 3,4-di-F
253	R^2 = Br, Z = O, R^3 = 3,5-di-F
254	R^2 = Br, Z = O, R^3 = 3,6-di-F
255	R^2 = Br, Z = O, R^3 = 4,5-di-F
256	R^2 = Br, Z = O, R^3 = 3,4-di-Cl
257	R^2 = Br, Z = O, R^3 = 3,5-di-Cl
258	R^2 = Br, Z = O, R^3 = 3,6-di-Cl
259	R^2 = Br, Z = O, R^3 = 4,5-di-Cl
260	R^2 = Br, Z = O, R^3 = 3,4-di-Br
261	R^2 = Br, Z = O, R^3 = 3,5-di-Br
262	R^2 = Br, Z = O, R^3 = 3,6-di-Br
263	R^2 = Br, Z = O, R^3 = 4,5-di-Br
264	R^2 = Br, Z = O, R^3 = 3,4-di-CN
265	R^2 = Br, Z = O, R^3 = 3,5-di-CN
266	R^2 = Br, Z = O, R^3 = 3,6-di-CN
267	R^2 = Br, Z = O, R^3 = 4,5-di-CN
268	R^2 = Br, Z = O, R^3 = 3,4-di-Me
269	R^2 = Br, Z = O, R^3 = 3,5-di-Me
270	R^2 = Br, Z = O, R^3 = 3,6-di-Me
271	R^2 = Br, Z = O, R^3 = 4,5-di-Me
272	R^2 = Br, Z = O, R^3 = 3,4-di-OMe
273	R^2 = Br, Z = O, R^3 = 3,5-di-OMe
274	R^2 = Br, Z = O, R^3 = 3,6-di-OMe
275	R^2 = Br, Z = O, R^3 = 4,5-di-OMe
276	R^2 = Br, Z = O, R^3 = 3,4-di-CF_3
277	R^2 = Br, Z = O, R^3 = 3,5-di-CF_3
278	R^2 = Br, Z = O, R^3 = 3,6-di-CF_3
279	R^2 = Br, Z = O, R^3 = 4,5-di-CF_3
280	R^2 = Br, Z = O, R^3 = 3-CN, 4-Me
281	R^2 = Br, Z = O, R^3 = 3-CN, 4-F
282	R^2 = Br, Z = O, R^3 = 3-CN, 4-Br
283	R^2 = Br, Z = O, R^3 = 3-CN, 4-OMe
284	R^2 = Br, Z = O, R^3 = 3-CN, 4-CF_3
285	R^2 = Br, Z = O, R^3 = 3-CN, 6-Me
286	R^2 = Br, Z = O, R^3 = 3-CN, 6-F
287	R^2 = Br, Z = O, R^3 = 3-CN, 6-Br
288	R^2 = Br, Z = O, R^3 = 3-CN, 6-OMe
289	R^2 = Br, Z = O, R^3 = 3-CN, 6-CF_3
290	R^2 = Cl, Z = O, R^3 = H (m = 0)
291	R^2 = Cl, Z = O, R^3 = 3-F
292	R^2 = Cl, Z = O, R^3 = 3-Cl
293	R^2 = Cl, Z = O, R^3 = 3-Br
294	R^2 = Cl, Z = O, R^3 = 3-I
295	R^2 = Cl, Z = O, R^3 = 3-CN
296	R^2 = Cl, Z = O, R^3 = 3-NO_2
297	R^2 = Cl, Z = O, R^3 = 3-OMe
298	R^2 = Cl, Z = O, R^3 = 3-OCF_3
299	R^2 = Cl, Z = O, R^3 = 3-CF_3
300	R^2 = Cl, Z = O, R^3 = 3-CHF_2
301	R^2 = Cl, Z = O, R^3 = 3-CH_2F
302	R^2 = Cl, Z = O, R^3 = 3-CHO
303	R^2 = Cl, Z = O, R^3 = 3-Me
304	R^2 = Cl, Z = O, R^3 = 3-Et
305	R^2 = Cl, Z = O, R^3 = 3-Ethynyl
306	R^2 = Cl, Z = O, R^3 = 3-Ethenyl
307	R^2 = Cl, Z = O, R^3 = 3-SO_2Me
308	R^2 = Cl, Z = O, R^3 = 3-OAc
309	R^2 = Cl, Z = O, R^3 = 3-c-Pr
310	R^2 = Cl, Z = O, R^3 = 3-i-Pr
311	R^2 = Cl, Z = O, R^3 = 3-Ph
312	R^2 = Cl, Z = S, R^3 = 3-F
313	R^2 = Cl, Z = S, R^3 = 3-Cl

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Table	Header Row
314	R^2 = Cl, Z = S, R^3 = 3-Br
315	R^2 = Cl, Z = S, R^3 = 3-I
316	R^2 = Cl, Z = S, R^3 = 3-CN
317	R^2 = Cl, Z = S, R^3 = 3-NO_2
318	R^2 = Cl, Z = S, R^3 = 3-OMe
319	R^2 = Cl, Z = S, R^3 = 3-OCF_3
320	R^2 = Cl, Z = S, R^3 = 3-CF_3
321	R^2 = Cl, Z = S, R^3 = 3-CHF_2
322	R^2 = Cl, Z = S, R^3 = 3-CH_2F
323	R^2 = Cl, Z = S, R^3 = 3-CHO
324	R^2 = Cl, Z = S, R^3 = 3-Me
325	R^2 = Cl, Z = S, R^3 = 3-Et
326	R^2 = Cl, Z = S, R^3 = 3-Ethynyl
327	R^2 = Cl, Z = S, R^3 = 3-Ethenyl
328	R^2 = Cl, Z = S, R^3 = 3-SO_2Me
329	R^2 = Cl, Z = S, R^3 = 3-OAc
330	R^2 = Cl, Z = S, R^3 = 3-c-Pr
331	R^2 = Cl, Z = S, R^3 = 3-i-Pr
332	R^2 = Cl, Z = S, R^3 = 3-Ph
333	R^2 = Cl, Z = O, R^3 = 4-F
334	R^2 = Cl, Z = O, R^3 = 4-Cl
335	R^2 = Cl, Z = O, R^3 = 4-Br
336	R^2 = Cl, Z = O, R^3 = 4-I
337	R^2 = Cl, Z = O, R^3 = 4-CN
338	R^2 = Cl, Z = O, R^3 = 4-NO_2
339	R^2 = Cl, Z = O, R^3 = 4-OMe
340	R^2 = Cl, Z = O, R^3 = 4-OCF_3
341	R^2 = Cl, Z = O, R^3 = 4-CF_3
342	R^2 = Cl, Z = O, R^3 = 4-CHF_2
343	R^2 = Cl, Z = O, R^3 = 4-CH_2F
344	R^2 = Cl, Z = O, R^3 = 4-CHO
345	R^2 = Cl, Z = O, R^3 = 4-Me
346	R^2 = Cl, Z = O, R^3 = 4-Et
347	R^2 = Cl, Z = O, R^3 = 4-Ethynyl
348	R^2 = Cl, Z = O, R^3 = 4-Ethenyl
349	R^2 = Cl, Z = O, R^3 = 4-SO_2Me
350	R^2 = Cl, Z = O, R^3 = 4-OAc
351	R^2 = Cl, Z = O, R^3 = 4-c-Pr
352	R^2 = Cl, Z = O, R^3 = 4-i-Pr
353	R^2 = Cl, Z = O, R^3 = 4-Ph
354	R^2 = Cl, Z = O, R^3 = 5-F
355	R^2 = Cl, Z = O, R^3 = 5-Cl
356	R^2 = Cl, Z = O, R^3 = 5-Br
357	R^2 = Cl, Z = O, R^3 = 5-I
358	R^2 = Cl, Z = O, R^3 = 5-CN
359	R^2 = Cl, Z = O, R^3 = 5-NO_2
360	R^2 = Cl, Z = O, R^3 = 5-OMe
361	R^2 = Cl, Z = O, R^3 = 5-OCF_3
362	R^2 = Cl, Z = O, R^3 = 5-CF_3
363	R^2 = Cl, Z = O, R^3 = 5-CHF_2
364	R^2 = Cl, Z = O, R^3 = 5-CH_2F
365	R^2 = Cl, Z = O, R^3 = 5-CHO
366	R^2 = Cl, Z = O, R^3 = 5-Me
367	R^2 = Cl, Z = O, R^3 = 5-Et
368	R^2 = Cl, Z = O, R^3 = 5-Ethynyl
369	R^2 = Cl, Z = O, R^3 = 5-Ethenyl
370	R^2 = Cl, Z = O, R^3 = 5-SO_2Me
371	R^2 = Cl, Z = O, R^3 = 5-OAc
372	R^2 = Cl, Z = O, R^3 = 5-c-Pr
373	R^2 = Cl, Z = O, R^3 = 5-i-Pr
374	R^2 = Cl, Z = O, R^3 = 5-Ph
375	R^2 = Cl, Z = O, R^3 = 6-F
376	R^2 = Cl, Z = O, R^3 = 6-Cl
377	R^2 = Cl, Z = O, R^3 = 6-Br
378	R^2 = Cl, Z = O, R^3 = 6-I
379	R^2 = Cl, Z = O, R^3 = 6-CN
380	R^2 = Cl, Z = O, R^3 = 6-NO_2
381	R^2 = Cl, Z = O, R^3 = 6-OMe
382	R^2 = Cl, Z = O, R^3 = 6-OCF_3
383	R^2 = Cl, Z = O, R^3 = 6-CF_3
384	R^2 = Cl, Z = O, R^3 = 6-CHF_2
385	R^2 = Cl, Z = O, R^3 = 6-CH_2F
386	R^2 = Cl, Z = O, R^3 = 6-CHO
387	R^2 = Cl, Z = O, R^3 = 6-Me

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Table	Header Row
388	R^2 = Cl, Z = O, R^3 = 6-Et
389	R^2 = Cl, Z = O, R^3 = 6-Ethynyl
390	R^2 = Cl, Z = O, R^3 = 6-Ethenyl
391	R^2 = Cl, Z = O, R^3 = 6-SO_2Me
392	R^2 = Cl, Z = O, R^3 = 6-OAc
393	R^2 = Cl, Z = O, R^3 = 6-c-Pr
394	R^2 = Cl, Z = O, R^3 = 6-i-Pr
395	R^2 = Cl, Z = O, R^3 = 6-Ph
396	R^2 = Cl, Z = O, R^3 = 3,4-di-F
397	R^2 = Cl, Z = O, R^3 = 3,5-di-F
398	R^2 = Cl, Z = O, R^3 = 3,6-di-F
399	R^2 = Cl, Z = O, R^3 = 4,5-di-F
400	R^2 = Cl, Z = O, R^3 = 3,4-di-Cl
401	R^2 = Cl, Z = O, R^3 = 3,5-di-Cl
402	R^2 = Cl, Z = O, R^3 = 3,6-di-Cl
403	R^2 = Cl, Z = O, R^3 = 4,5-di-Cl
404	R^2 = Cl, Z = O, R^3 = 3,4-di-Br
405	R^2 = Cl, Z = O, R^3 = 3,5-di-Br
406	R^2 = Cl, Z = O, R^3 = 3,6-di-Br
407	R^2 = Cl, Z = O, R^3 = 4,5-di-Br
408	R^2 = Cl, Z = O, R^3 = 3,4-di-CN
409	R^2 = Cl, Z = O, R^3 = 3,5-di-CN
410	R^2 = Cl, Z = O, R^3 = 3,6-di-CN
411	R^2 = Cl, Z = O, R^3 = 4,5-di-CN
412	R^2 = Cl, Z = O, R^3 = 3,4-di-Me
413	R^2 = Cl, Z = O, R^3 = 3,5-di-Me
414	R^2 = Cl, Z = O, R^3 = 3,6-di-Me
415	R^2 = Cl, Z = O, R^3 = 4,5-di-Me
416	R^2 = Cl, Z = O, R^3 = 3,4-di-OMe
417	R^2 = Cl, Z = O, R^3 = 3,5-di-OMe
418	R^2 = Cl, Z = O, R^3 = 3,6-di-OMe
419	R^2 = Cl, Z = O, R^3 = 4,5-di-OMe
420	R^2 = Cl, Z = O, R^3 = 3,4-di-CF_3
421	R^2 = Cl, Z = O, R^3 = 3,5-di-CF_3
422	R^2 = Cl, Z = O, R^3 = 3,6-di-CF_3
423	R^2 = Cl, Z = O, R^3 = 4,5-di-CF_3
424	R^2 = Cl, Z = O, R^3 = 3-CN, 4-Me
425	R^2 = Cl, Z = O, R^3 = 3-CN, 4-F
426	R^2 = Cl, Z = O, R^3 = 3-CN, 4-Br
427	R^2 = Cl, Z = O, R^3 = 3-CN, 4-OMe
428	R^2 = Cl, Z = O, R^3 = 3-CN, 4-CF_3
429	R^2 = Cl, Z = O, R^3 = 3-CN, 6-Me
430	R^2 = Cl, Z = O, R^3 = 3-CN, 6-F
431	R^2 = Cl, Z = O, R^3 = 3-CN, 6-Br
432	R^2 = Cl, Z = O, R^3 = 3-CN, 6-OMe
433	R^2 = Cl, Z = O, R^3 = 3-CN, 6-CF_3
434	R^2 = I, Z = O, R^3 = H (m = 0)
435	R^2 = I, Z = O, R^3 = 3-F
436	R^2 = I, Z = O, R^3 = 3-Cl
437	R^2 = I, Z = O, R^3 = 3-Br
438	R^2 = I, Z = O, R^3 = 3-I
439	R^2 = I, Z = O, R^3 = 3-CN
440	R^2 = I, Z = O, R^3 = 3-NO_2
441	R^2 = I, Z = O, R^3 = 3-OMe
442	R^2 = I, Z = O, R^3 = 3-OCF_3
443	R^2 = I, Z = O, R^3 = 3-CF_3
444	R^2 = I, Z = O, R^3 = 3-CHF_2
445	R^2 = I, Z = O, R^3 = 3-CH_2F
446	R^2 = I, Z = O, R^3 = 3-CHO
447	R^2 = I, Z = O, R^3 = 3-Me
448	R^2 = I, Z = O, R^3 = 3-Et
449	R^2 = I, Z = O, R^3 = 3-Ethynyl
450	R^2 = I, Z = O, R^3 = 3-Ethenyl
451	R^2 = I, Z = O, R^3 = 3-SO_2Me
452	R^2 = I, Z = O, R^3 = 3-OAc
453	R^2 = I, Z = O, R^3 = 3-c-Pr
454	R^2 = I, Z = O, R^3 = 3-i-Pr
455	R^2 = I, Z = O, R^3 = 3-Ph
456	R^2 = I, Z = S, R^3 = 3-F
457	R^2 = I, Z = S, R^3 = 3-Cl
458	R^2 = I, Z = S, R^3 = 3-Br
459	R^2 = I, Z = S, R^3 = 3-I
460	R^2 = I, Z = S, R^3 = 3-CN
461	R^2 = I, Z = S, R^3 = 3-NO_2

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Table	Header Row
462	R^2 = I, Z = S, R^3 = 3-OMe
463	R^2 = I, Z = S, R^3 = 3-OCF_3
464	R^2 = I, Z = S, R^3 = 3-CF_3
465	R^2 = I, Z = S, R^3 = 3-CHF_2
466	R^2 = I, Z = S, R^3 = 3-CH_2F
467	R^2 = I, Z = S, R^3 = 3-CHO
468	R^2 = I, Z = S, R^3 = 3-Me
469	R^2 = I, Z = S, R^3 = 3-Et
470	R^2 = I, Z = S, R^3 = 3-Ethynyl
471	R^2 = I, Z = S, R^3 = 3-Ethenyl
472	R^2 = I, Z = S, R^3 = 3-SO_2Me
473	R^2 = I, Z = S, R^3 = 3-OAc
474	R^2 = I, Z = S, R^3 = 3-c-Pr
475	R^2 = I, Z = S, R^3 = 3-i-Pr
476	R^2 = I, Z = S, R^3 = 3-Ph
477	R^2 = I, Z = O, R^3 = 4-F
478	R^2 = I, Z = O, R^3 = 4-Cl
479	R^2 = I, Z = O, R^3 = 4-Br
480	R^2 = I, Z = O, R^3 = 4-I
481	R^2 = I, Z = O, R^3 = 4-CN
482	R^2 = I, Z = O, R^3 = 4-NO_2
483	R^2 = I, Z = O, R^3 = 4-OMe
484	R^2 = I, Z = O, R^3 = 4-OCF_3
485	R^2 = I, Z = O, R^3 = 4-CF_3
486	R^2 = I, Z = O, R^3 = 4-CHF_2
487	R^2 = I, Z = O, R^3 = 4-CH_2F
488	R^2 = I, Z = O, R^3 = 4-CHO
489	R^2 = I, Z = O, R^3 = 4-Me
490	R^2 = I, Z = O, R^3 = 4-Et
491	R^2 = I, Z = O, R^3 = 4-Ethynyl
492	R^2 = I, Z = O, R^3 = 4-Ethenyl
493	R^2 = I, Z = O, R^3 = 4-SO_2Me
494	R^2 = I, Z = O, R^3 = 4-OAc
495	R^2 = I, Z = O, R^3 = 4-c-Pr
496	R^2 = I, Z = O, R^3 = 4-i-Pr
497	R^2 = I, Z = O, R^3 = 4-Ph
498	R^2 = I, Z = O, R^3 = 5-F
499	R^2 = I, Z = O, R^3 = 5-Cl
500	R^2 = I, Z = O, R^3 = 5-Br
501	R^2 = I, Z = O, R^3 = 5-I
502	R^2 = I, Z = O, R^3 = 5-CN
503	R^2 = I, Z = O, R^3 = 5-NO_2
504	R^2 = I, Z = O, R^3 = 5-OMe
505	R^2 = I, Z = O, R^3 = 5-OCF_3
506	R^2 = I, Z = O, R^3 = 5-CF_3
507	R^2 = I, Z = O, R^3 = 5-CHF_2
508	R^2 = I, Z = O, R^3 = 5-CH_2F
509	R^2 = I, Z = O, R^3 = 5-CHO
510	R^2 = I, Z = O, R^3 = 5-Me
511	R^2 = I, Z = O, R^3 = 5-Et
512	R^2 = I, Z = O, R^3 = 5-Ethynyl
513	R^2 = I, Z = O, R^3 = 5-Ethenyl
514	R^2 = I, Z = O, R^3 = 5-SO_2Me
515	R^2 = I, Z = O, R^3 = 5-OAc
516	R^2 = I, Z = O, R^3 = 5-c-Pr
517	R^2 = I, Z = O, R^3 = 5-i-Pr
518	R^2 = I, Z = O, R^3 = 5-Ph
519	R^2 = I, Z = O, R^3 = 6-F
520	R^2 = I, Z = O, R^3 = 6-Cl
521	R^2 = I, Z = O, R^3 = 6-Br
522	R^2 = I, Z = O, R^3 = 6-I
523	R^2 = I, Z = O, R^3 = 6-CN
524	R^2 = I, Z = O, R^3 = 6-NO_2
525	R^2 = I, Z = O, R^3 = 6-OMe
526	R^2 = I, Z = O, R^3 = 6-OCF_3
527	R^2 = I, Z = O, R^3 = 6-CF_3
528	R^2 = I, Z = O, R^3 = 6-CHF_2
529	R^2 = I, Z = O, R^3 = 6-CH_2F
530	R^2 = I, Z = O, R^3 = 6-CHO
531	R^2 = I, Z = O, R^3 = 6-Me
532	R^2 = I, Z = O, R^3 = 6-Et
533	R^2 = I, Z = O, R^3 = 6-Ethynyl
534	R^2 = I, Z = O, R^3 = 6-Ethenyl
535	R^2 = I, Z = O, R^3 = 6-SO_2Me

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Table	Header Row
536	R^2 = I, Z = O, R^3 = 6-OAc
537	R^2 = I, Z = O, R^3 = 6-c-Pr
538	R^2 = I, Z = O, R^3 = 6-i-Pr
539	R^2 = I, Z = O, R^3 = 6-Ph
540	R^2 = I, Z = O, R^3 = 3,4-di-F
541	R^2 = I, Z = O, R^3 = 3,5-di-F
542	R^2 = I, Z = O, R^3 = 3,6-di-F
543	R^2 = I, Z = O, R^3 = 4,5-di-F
544	R^2 = I, Z = O, R^3 = 3,4-di-Cl
545	R^2 = I, Z = O, R^3 = 3,5-di-Cl
546	R^2 = I, Z = O, R^3 = 3,6-di-Cl
547	R^2 = I, Z = O, R^3 = 4,5-di-Cl
548	R^2 = I, Z = O, R^3 = 3,4-di-Br
549	R^2 = I, Z = O, R^3 = 3,5-di-Br
550	R^2 = I, Z = O, R^3 = 3,6-di-Br
551	R^2 = I, Z = O, R^3 = 4,5-di-Br
552	R^2 = I, Z = O, R^3 = 3,4-di-CN
553	R^2 = I, Z = O, R^3 = 3,5-di-CN
554	R^2 = I, Z = O, R^3 = 3,6-di-CN
555	R^2 = I, Z = O, R^3 = 4,5-di-CN
556	R^2 = I, Z = O, R^3 = 3,4-di-Me
557	R^2 = I, Z = O, R^3 = 3,5-di-Me
558	R^2 = I, Z = O, R^3 = 3,6-di-Me
559	R^2 = I, Z = O, R^3 = 4,5-di-Me
560	R^2 = I, Z = O, R^3 = 3,4-di-OMe
561	R^2 = I, Z = O, R^3 = 3,5-di-OMe
562	R^2 = I, Z = O, R^3 = 3,6-di-OMe
563	R^2 = I, Z = O, R^3 = 4,5-di-OMe
564	R^2 = I, Z = O, R^3 = 3,4-di-CF_3
565	R^2 = I, Z = O, R^3 = 3,5-di-CF_3
566	R^2 = I, Z = O, R^3 = 3,6-di-CF_3
567	R^2 = I, Z = O, R^3 = 4,5-di-CF_3
568	R^2 = I, Z = O, R^3 = 3-CN, 4-Me
569	R^2 = I, Z = O, R^3 = 3-CN, 4-F
570	R^2 = I, Z = O, R^3 = 3-CN, 4-Br
571	R^2 = I, Z = O, R^3 = 3-CN, 4-OMe
572	R^2 = I, Z = O, R^3 = 3-CN, 4-CF_3
573	R^2 = I, Z = O, R^3 = 3-CN, 6-Me
574	R^2 = I, Z = O, R^3 = 3-CN, 6-F
575	R^2 = I, Z = O, R^3 = 3-CN, 6-Br
576	R^2 = I, Z = O, R^3 = 3-CN, 6-OMe
577	R^2 = I, Z = O, R^3 = 3-CN, 6-CF_3
578	R^2 = Me, Z = O, R^3 = H (m = 0)
579	R^2 = Me, Z = O, R^3 = 3-F
580	R^2 = Me, Z = O, R^3 = 3-Cl
581	R^2 = Me, Z = O, R^3 = 3-Br
582	R^2 = Me, Z = O, R^3 = 3-I
583	R^2 = Me, Z = O, R^3 = 3-CN
584	R^2 = Me, Z = O, R^3 = 3-NO_2
585	R^2 = Me, Z = O, R^3 = 3-OMe
586	R^2 = Me, Z = O, R^3 = 3-OCF_3
587	R^2 = Me, Z = O, R^3 = 3-CF_3
588	R^2 = Me, Z = O, R^3 = 3-CHF_2
589	R^2 = Me, Z = O, R^3 = 3-CH_2F
590	R^2 = Me, Z = O, R^3 = 3-CHO
591	R^2 = Me, Z = O, R^3 = 3-Me
592	R^2 = Me, Z = O, R^3 = 3-Et
593	R^2 = Me, Z = O, R^3 = 3-Ethynyl
594	R^2 = Me, Z = O, R^3 = 3-Ethenyl
595	R^2 = Me, Z = O, R^3 = 3-SO_2Me
596	R^2 = Me, Z = O, R^3 = 3-OAc
597	R^2 = Me, Z = O, R^3 = 3-c-Pr
598	R^2 = Me, Z = O, R^3 = 3-i-Pr
599	R^2 = Me, Z = O, R^3 = 3-Ph
600	R^2 = Me, Z = S, R^3 = 3-F
601	R^2 = Me, Z = S, R^3 = 3-Cl
602	R^2 = Me, Z = S, R^3 = 3-Br
603	R^2 = Me, Z = S, R^3 = 3-I
604	R^2 = Me, Z = S, R^3 = 3-CN
605	R^2 = Me, Z = S, R^3 = 3-NO_2
606	R^2 = Me, Z = S, R^3 = 3-OMe
607	R^2 = Me, Z = S, R^3 = 3-OCF_3
608	R^2 = Me, Z = S, R^3 = 3-CF_3
609	R^2 = Me, Z = S, R^3 = 3-CHF_2

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Table	Header Row
610	R^2 = Me, Z = S, R^3 = 3-CH_2F
611	R^2 = Me, Z = S, R^3 = 3-CHO
612	R^2 = Me, Z = S, R^3 = 3-Me
613	R^2 = Me, Z = S, R^3 = 3-Et
614	R^2 = Me, Z = S, R^3 = 3-Ethynyl
615	R^2 = Me, Z = S, R^3 = 3-Ethenyl
616	R^2 = Me, Z = S, R^3 = 3-SO_2Me
617	R^2 = Me, Z = S, R^3 = 3-OAc
618	R^2 = Me, Z = S, R^3 = 3-c-Pr
619	R^2 = Me, Z = S, R^3 = 3-i-Pr
620	R^2 = Me, Z = S, R^3 = 3-Ph
621	R^2 = Me, Z = O, R^3 = 4-F
622	R^2 = Me, Z = O, R^3 = 4-Cl
623	R^2 = Me, Z = O, R^3 = 4-Br
624	R^2 = Me, Z = O, R^3 = 4-I
625	R^2 = Me, Z = O, R^3 = 4-CN
626	R^2 = Me, Z = O, R^3 = 4-NO_2
627	R^2 = Me, Z = O, R^3 = 4-OMe
628	R^2 = Me, Z = O, R^3 = 4-OCF_3
629	R^2 = Me, Z = O, R^3 = 4-CF_3
630	R^2 = Me, Z = O, R^3 = 4-CHF_2
631	R^2 = Me, Z = O, R^3 = 4-CH_2F
632	R^2 = Me, Z = O, R^3 = 4-CHO
633	R^2 = Me, Z = O, R^3 = 4-Me
634	R^2 = Me, Z = O, R^3 = 4-Et
635	R^2 = Me, Z = O, R^3 = 4-Ethynyl
636	R^2 = Me, Z = O, R^3 = 4-Ethenyl
637	R^2 = Me, Z = O, R^3 = 4-SO_2Me
638	R^2 = Me, Z = O, R^3 = 4-OAc
639	R^2 = Me, Z = O, R^3 = 4-c-Pr
640	R^2 = Me, Z = O, R^3 = 4-i-Pr
641	R^2 = Me, Z = O, R^3 = 4-Ph
642	R^2 = Me, Z = O, R^3 = 5-F
643	R^2 = Me, Z = O, R^3 = 5-Cl
644	R^2 = Me, Z = O, R^3 = 5-Br
645	R^2 = Me, Z = O, R^3 = 5-I
646	R^2 = Me, Z = O, R^3 = 5-CN
647	R^2 = Me, Z = O, R^3 = 5-NO_2
648	R^2 = Me, Z = O, R^3 = 5-OMe
649	R^2 = Me, Z = O, R^3 = 5-OCF_3
650	R^2 = Me, Z = O, R^3 = 5-CF_3
651	R^2 = Me, Z = O, R^3 = 5-CHF_2
652	R^2 = Me, Z = O, R^3 = 5-CH_2F
653	R^2 = Me, Z = O, R^3 = 5-CHO
654	R^2 = Me, Z = O, R^3 = 5-Me
655	R^2 = Me, Z = O, R^3 = 5-Et
656	R^2 = Me, Z = O, R^3 = 5-Ethynyl
657	R^2 = Me, Z = O, R^3 = 5-Ethenyl
658	R^2 = Me, Z = O, R^3 = 5-SO_2Me
659	R^2 = Me, Z = O, R^3 = 5-OAc
660	R^2 = Me, Z = O, R^3 = 5-c-Pr
661	R^2 = Me, Z = O, R^3 = 5-i-Pr
662	R^2 = Me, Z = O, R^3 = 5-Ph
663	R^2 = Me, Z = O, R^3 = 6-F
664	R^2 = Me, Z = O, R^3 = 6-Cl
665	R^2 = Me, Z = O, R^3 = 6-Br
666	R^2 = Me, Z = O, R^3 = 6-I
667	R^2 = Me, Z = O, R^3 = 6-CN
668	R^2 = Me, Z = O, R^3 = 6-NO_2
669	R^2 = Me, Z = O, R^3 = 6-OMe
670	R^2 = Me, Z = O, R^3 = 6-OCF_3
671	R^2 = Me, Z = O, R^3 = 6-CF_3
672	R^2 = Me, Z = O, R^3 = 6-CHF_2
673	R^2 = Me, Z = O, R^3 = 6-CH_2F
674	R^2 = Me, Z = O, R^3 = 6-CHO
675	R^2 = Me, Z = O, R^3 = 6-Me
676	R^2 = Me, Z = O, R^3 = 6-Et
677	R^2 = Me, Z = O, R^3 = 6-Ethynyl
678	R^2 = Me, Z = O, R^3 = 6-Ethenyl
679	R^2 = Me, Z = O, R^3 = 6-SO_2Me
680	R^2 = Me, Z = O, R^3 = 6-OAc
681	R^2 = Me, Z = O, R^3 = 6-c-Pr
682	R^2 = Me, Z = O, R^3 = 6-i-Pr
683	R^2 = Me, Z = O, R^3 = 6-Ph

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Table	Header Row
684	R^2 = Me, Z = O, R^3 = 3,4-di-F
685	R^2 = Me, Z = O, R^3 = 3,5-di-F
686	R^2 = Me, Z = O, R^3 = 3,6-di-F
687	R^2 = Me, Z = O, R^3 = 4,5-di-F
688	R^2 = Me, Z = O, R^3 = 3,4-di-Cl
689	R^2 = Me, Z = O, R^3 = 3,5-di-Cl
690	R^2 = Me, Z = O, R^3 = 3,6-di-Cl
691	R^2 = Me, Z = O, R^3 = 4,5-di-Cl
692	R^2 = Me, Z = O, R^3 = 3,4-di-Br
693	R^2 = Me, Z = O, R^3 = 3,5-di-Br
694	R^2 = Me, Z = O, R^3 = 3,6-di-Br
695	R^2 = Me, Z = O, R^3 = 4,5-di-Br
696	R^2 = Me, Z = O, R^3 = 3,4-di-CN
697	R^2 = Me, Z = O, R^3 = 3,5-di-CN
698	R^2 = Me, Z = O, R^3 = 3,6-di-CN
699	R^2 = Me, Z = O, R^3 = 4,5-di-CN
700	R^2 = Me, Z = O, R^3 = 3,4-di-Me
701	R^2 = Me, Z = O, R^3 = 3,5-di-Me
702	R^2 = Me, Z = O, R^3 = 3,6-di-Me
703	R^2 = Me, Z = O, R^3 = 4,5-di-Me
704	R^2 = Me, Z = O, R^3 = 3,4-di-OMe
705	R^2 = Me, Z = O, R^3 = 3,5-di-OMe
706	R^2 = Me, Z = O, R^3 = 3,6-di-OMe
707	R^2 = Me, Z = O, R^3 = 4,5-di-OMe
708	R^2 = Me, Z = O, R^3 = 3,4-di-CF_3
709	R^2 = Me, Z = O, R^3 = 3,5-di-CF_3
710	R^2 = Me, Z = O, R^3 = 3,6-di-CF_3
711	R^2 = Me, Z = O, R^3 = 4,5-di-CF_3
712	R^2 = Me, Z = O, R^3 = 3-CN, 4-Me
713	R^2 = Me, Z = O, R^3 = 3-CN, 4-F
714	R^2 = Me, Z = O, R^3 = 3-CN, 4-Br
715	R^2 = Me, Z = O, R^3 = 3-CN, 4-OMe
716	R^2 = Me, Z = O, R^3 = 3-CN, 4-CF_3
717	R^2 = Me, Z = O, R^3 = 3-CN, 6-Me
718	R^2 = Me, Z = O, R^3 = 3-CN, 6-F
719	R^2 = Me, Z = O, R^3 = 3-CN, 6-Br
720	R^2 = Me, Z = O, R^3 = 3-CN, 6-OMe
721	R^2 = Me, Z = O, R^3 = 3-CN, 6-CF_3
722	R^2 = CN, Z = O, R^3 = H (m = 0)
723	R^2 = CN, Z = O, R^3 = 3-F
724	R^2 = CN, Z = O, R^3 = 3-Cl
725	R^2 = CN, Z = O, R^3 = 3-Br
726	R^2 = CN, Z = O, R^3 = 3-I
727	R^2 = CN, Z = O, R^3 = 3-CN
728	R^2 = CN, Z = O, R^3 = 3-NO_2
729	R^2 = CN, Z = O, R^3 = 3-OMe
730	R^2 = CN, Z = O, R^3 = 3-OCF_3
731	R^2 = CN, Z = O, R^3 = 3-CF_3
732	R^2 = CN, Z = O, R^3 = 3-CHF_2
733	R^2 = CN, Z = O, R^3 = 3-CH_2F
734	R^2 = CN, Z = O, R^3 = 3-CHO
735	R^2 = CN, Z = O, R^3 = 3-Me
736	R^2 = CN, Z = O, R^3 = 3-Et
737	R^2 = CN, Z = O, R^3 = 3-Ethynyl
738	R^2 = CN, Z = O, R^3 = 3-Ethenyl
739	R^2 = CN, Z = O, R^3 = 3-SO_2Me
740	R^2 = CN, Z = O, R^3 = 3-OAc
741	R^2 = CN, Z = O, R^3 = 3-c-Pr
742	R^2 = CN, Z = O, R^3 = 3-i-Pr
743	R^2 = CN, Z = O, R^3 = 3-Ph
744	R^2 = CN, Z = S, R^3 = 3-F
745	R^2 = CN, Z = S, R^3 = 3-Cl
746	R^2 = CN, Z = S, R^3 = 3-Br
747	R^2 = CN, Z = S, R^3 = 3-I
748	R^2 = CN, Z = S, R^3 = 3-CN
749	R^2 = CN, Z = S, R^3 = 3-NO_2
750	R^2 = CN, Z = S, R^3 = 3-OMe
751	R^2 = CN, Z = S, R^3 = 3-OCF_3
752	R^2 = CN, Z = S, R^3 = 3-CF_3
753	R^2 = CN, Z = S, R^3 = 3-CHF_2
754	R^2 = CN, Z = S, R^3 = 3-CH_2F
755	R^2 = CN, Z = S, R^3 = 3-CHO
756	R^2 = CN, Z = S, R^3 = 3-Me
757	R^2 = CN, Z = S, R^3 = 3-Et

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Table	Header Row
758	R^2 = CN, Z = S, R^3 = 3-Ethynyl
759	R^2 = CN, Z = S, R^3 = 3-Ethenyl
760	R^2 = CN, Z = S, R^3 = 3-SO_2Me
761	R^2 = CN, Z = S, R^3 = 3-OAc
762	R^2 = CN, Z = S, R^3 = 3-c-Pr
763	R^2 = CN, Z = S, R^3 = 3-i-Pr
764	R^2 = CN, Z = S, R^3 = 3-Ph
765	R^2 = CN, Z = O, R^3 = 4-F
766	R^2 = CN, Z = O, R^3 = 4-Cl
767	R^2 = CN, Z = O, R^3 = 4-Br
768	R^2 = CN, Z = O, R^3 = 4-I
769	R^2 = CN, Z = O, R^3 = 4-CN
770	R^2 = CN, Z = O, R^3 = 4-NO_2
771	R^2 = CN, Z = O, R^3 = 4-OMe
772	R^2 = CN, Z = O, R^3 = 4-OCF_3
773	R^2 = CN, Z = O, R^3 = 4-CF_3
774	R^2 = CN, Z = O, R^3 = 4-CHF_2
775	R^2 = CN, Z = O, R^3 = 4-CH_2F
776	R^2 = CN, Z = O, R^3 = 4-CHO
777	R^2 = CN, Z = O, R^3 = 4-Me
778	R^2 = CN, Z = O, R^3 = 4-Et
779	R^2 = CN, Z = O, R^3 = 4-Ethynyl
780	R^2 = CN, Z = O, R^3 = 4-Ethenyl
781	R^2 = CN, Z = O, R^3 = 4-SO_2Me
782	R^2 = CN, Z = O, R^3 = 4-OAc
783	R^2 = CN, Z = O, R^3 = 4-c-Pr
784	R^2 = CN, Z = O, R^3 = 4-i-Pr
785	R^2 = CN, Z = O, R^3 = 4-Ph
786	R^2 = CN, Z = O, R^3 = 5-F
787	R^2 = CN, Z = O, R^3 = 5-Cl
788	R^2 = CN, Z = O, R^3 = 5-Br
789	R^2 = CN, Z = O, R^3 = 5-I
790	R^2 = CN, Z = O, R^3 = 5-CN
791	R^2 = CN, Z = O, R^3 = 5-NO_2
792	R^2 = CN, Z = O, R^3 = 5-OMe
793	R^2 = CN, Z = O, R^3 = 5-OCF_3
794	R^2 = CN, Z = O, R^3 = 5-CF_3
795	R^2 = CN, Z = O, R^3 = 5-CHF_2
796	R^2 = CN, Z = O, R^3 = 5-CH_2F
797	R^2 = CN, Z = O, R^3 = 5-CHO
798	R^2 = CN, Z = O, R^3 = 5-Me
799	R^2 = CN, Z = O, R^3 = 5-Et
800	R^2 = CN, Z = O, R^3 = 5-Ethynyl
801	R^2 = CN, Z = O, R^3 = 5-Ethenyl
802	R^2 = CN, Z = O, R^3 = 5-SO_2Me
803	R^2 = CN, Z = O, R^3 = 5-OAc
804	R^2 = CN, Z = O, R^3 = 5-c-Pr
805	R^2 = CN, Z = O, R^3 = 5-i-Pr
806	R^2 = CN, Z = O, R^3 = 5-Ph
807	R^2 = CN, Z = O, R^3 = 6-F
808	R^2 = CN, Z = O, R^3 = 6-Cl
809	R^2 = CN, Z = O, R^3 = 6-Br
810	R^2 = CN, Z = O, R^3 = 6-I
811	R^2 = CN, Z = O, R^3 = 6-CN
812	R^2 = CN, Z = O, R^3 = 6-NO_2
813	R^2 = CN, Z = O, R^3 = 6-OMe
814	R^2 = CN, Z = O, R^3 = 6-OCF_3
815	R^2 = CN, Z = O, R^3 = 6-CF_3
816	R^2 = CN, Z = O, R^3 = 6-CHF_2
817	R^2 = CN, Z = O, R^3 = 6-CH_2F
818	R^2 = CN, Z = O, R^3 = 6-CHO
819	R^2 = CN, Z = O, R^3 = 6-Me
820	R^2 = CN, Z = O, R^3 = 6-Et
821	R^2 = CN, Z = O, R^3 = 6-Ethynyl
822	R^2 = CN, Z = O, R^3 = 6-Ethenyl
823	R^2 = CN, Z = O, R^3 = 6-SO_2Me
824	R^2 = CN, Z = O, R^3 = 6-OAc
825	R^2 = CN, Z = O, R^3 = 6-c-Pr
826	R^2 = CN, Z = O, R^3 = 6-i-Pr
827	R^2 = CN, Z = O, R^3 = 6-Ph
828	R^2 = CN, Z = O, R^3 = 3,4-di-F
829	R^2 = CN, Z = O, R^3 = 3,5-di-F
830	R^2 = CN, Z = O, R^3 = 3,6-di-F
831	R^2 = CN, Z = O, R^3 = 4,5-di-F

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Table	Header Row
832	R^2 = CN, Z = O, R^3 = 3,4-di-Cl
833	R^2 = CN, Z = O, R^3 = 3,5-di-Cl
834	R^2 = CN, Z = O, R^3 = 3,6-di-Cl
835	R^2 = CN, Z = O, R^3 = 4,5-di-Cl
836	R^2 = CN, Z = O, R^3 = 3,4-di-Br
837	R^2 = CN, Z = O, R^3 = 3,5-di-Br
838	R^2 = CN, Z = O, R^3 = 3,6-di-Br
839	R^2 = CN, Z = O, R^3 = 4,5-di-Br
840	R^2 = CN, Z = O, R^3 = 3,4-di-CN
841	R^2 = CN, Z = O, R^3 = 3,5-di-CN
842	R^2 = CN, Z = O, R^3 = 3,6-di-CN
843	R^2 = CN, Z = O, R^3 = 4,5-di-CN
844	R^2 = CN, Z = O, R^3 = 3,4-di-Me
845	R^2 = CN, Z = O, R^3 = 3,5-di-Me
846	R^2 = CN, Z = O, R^3 = 3,6-di-Me
847	R^2 = CN, Z = O, R^3 = 4,5-di-Me
848	R^2 = CN, Z = O, R^3 = 3,4-di-OMe
849	R^2 = CN, Z = O, R^3 = 3,5-di-OMe
850	R^2 = CN, Z = O, R^3 = 3,6-di-OMe
851	R^2 = CN, Z = O, R^3 = 4,5-di-OMe
852	R^2 = CN, Z = O, R^3 = 3,4-di-CF_3
853	R^2 = CN, Z = O, R^3 = 3,5-di-CF_3
854	R^2 = CN, Z = O, R^3 = 3,6-di-CF_3
855	R^2 = CN, Z = O, R^3 = 4,5-di-CF_3
856	R^2 = CN, Z = O, R^3 = 3-CN, 4-Me
857	R^2 = CN, Z = O, R^3 = 3-CN, 4-F
858	R^2 = CN, Z = O, R^3 = 3-CN, 4-Br
859	R^2 = CN, Z = O, R^3 = 3-CN, 4-OMe
860	R^2 = CN, Z = O, R^3 = 3-CN, 4-CF_3
861	R^2 = CN, Z = O, R^3 = 3-CN, 6-Me
862	R^2 = CN, Z = O, R^3 = 3-CN, 6-F
863	R^2 = CN, Z = O, R^3 = 3-CN, 6-Br
864	R^2 = CN, Z = O, R^3 = 3-CN, 6-OMe
865	R^2 = CN, Z = O, R^3 = 3-CN, 6-CF_3
866	R^2 = NO_2, Z = O, R^3 = H (m = 0)
867	R^2 = NO_2, Z = O, R^3 = 3-F
868	R^2 = NO_2, Z = O, R^3 = 3-Cl
869	R^2 = NO_2, Z = O, R^3 = 3-Br
870	R^2 = NO_2, Z = O, R^3 = 3-I
871	R^2 = NO_2, Z = O, R^3 = 3-CN
872	R^2 = NO_2, Z = O, R^3 = 3-NO_2
873	R^2 = NO_2, Z = O, R^3 = 3-OMe
874	R^2 = NO_2, Z = O, R^3 = 3-OCF_3
875	R^2 = NO_2, Z = O, R^3 = 3-CF_3
876	R^2 = NO_2, Z = O, R^3 = 3-CHF_2
877	R^2 = NO_2, Z = O, R^3 = 3-CH_2F
878	R^2 = NO_2, Z = O, R^3 = 3-CHO
879	R^2 = NO_2, Z = O, R^3 = 3-Me
880	R^2 = NO_2, Z = O, R^3 = 3-Et
881	R^2 = NO_2, Z = O, R^3 = 3-Ethynyl
882	R^2 = NO_2, Z = O, R^3 = 3-Ethenyl
883	R^2 = NO_2, Z = O, R^3 = 3-SO_2Me
884	R^2 = NO_2, Z = O, R^3 = 3-OAc
885	R^2 = NO_2, Z = O, R^3 = 3-c-Pr
886	R^2 = NO_2, Z = O, R^3 = 3-i-Pr
887	R^2 = NO_2, Z = O, R^3 = 3-Ph
888	R^2 = NO_2, Z = S, R^3 = 3-F
889	R^2 = NO_2, Z = S, R^3 = 3-Cl
890	R^2 = NO_2, Z = S, R^3 = 3-Br
891	R^2 = NO_2, Z = S, R^3 = 3-I
892	R^2 = NO_2, Z = S, R^3 = 3-CN
893	R^2 = NO_2, Z = S, R^3 = 3-NO_2
894	R^2 = NO_2, Z = S, R^3 = 3-OMe
895	R^2 = NO_2, Z = S, R^3 = 3-OCF_3
896	R^2 = NO_2, Z = S, R^3 = 3-CF_3
897	R^2 = NO_2, Z = S, R^3 = 3-CHF_2
898	R^2 = NO_2, Z = S, R^3 = 3-CH_2F
899	R^2 = NO_2, Z = S, R^3 = 3-CHO
900	R^2 = NO_2, Z = S, R^3 = 3-Me
901	R^2 = NO_2, Z = S, R^3 = 3-Et
902	R^2 = NO_2, Z = S, R^3 = 3-Ethynyl
903	R^2 = NO_2, Z = S, R^3 = 3-Ethenyl
904	R^2 = NO_2, Z = S, R^3 = 3-SO_2Me
905	R^2 = NO_2, Z = S, R^3 = 3-OAc

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Table	Header Row
906	$R^2 = NO_2$, Z = S, R^3 = 3-c-Pr
907	$R^2 = NO_2$, Z = S, R^3 = 3-i-Pr
908	$R^2 = NO_2$, Z = S, R^3 = 3-Ph
909	$R^2 = NO_2$, Z = O, R^3 = 4-F
910	$R^2 = NO_2$, Z = O, R^3 = 4-Cl
911	$R^2 = NO_2$, Z = O, R^3 = 4-Br
912	$R^2 = NO_2$, Z = O, R^3 = 4-I
913	$R^2 = NO_2$, Z = O, R^3 = 4-CN
914	$R^2 = NO_2$, Z = O, R^3 = 4-NO_2
915	$R^2 = NO_2$, Z = O, R^3 = 4-OMe
916	$R^2 = NO_2$, Z = O, R^3 = 4-OCF_3
917	$R^2 = NO_2$, Z = O, R^3 = 4-CF_3
918	$R^2 = NO_2$, Z = O, R^3 = 4-CHF_2
919	$R^2 = NO_2$, Z = O, R^3 = 4-CH_2F
920	$R^2 = NO_2$, Z = O, R^3 = 4-CHO
921	$R^2 = NO_2$, Z = O, R^3 = 4-Me
922	$R^2 = NO_2$, Z = O, R^3 = 4-Et
923	$R^2 = NO_2$, Z = O, R^3 = 4-Ethynyl
924	$R^2 = NO_2$, Z = O, R^3 = 4-Ethenyl
925	$R^2 = NO_2$, Z = O, R^3 = 4-SO_2Me
926	$R^2 = NO_2$, Z = O, R^3 = 4-OAc
927	$R^2 = NO_2$, Z = O, R^3 = 4-c-Pr
928	$R^2 = NO_2$, Z = O, R^3 = 4-i-Pr
929	$R^2 = NO_2$, Z = O, R^3 = 4-Ph
930	$R^2 = NO_2$, Z = O, R^3 = 5-F
931	$R^2 = NO_2$, Z = O, R^3 = 5-Cl
932	$R^2 = NO_2$, Z = O, R^3 = 5-Br
933	$R^2 = NO_2$, Z = O, R^3 = 5-I
934	$R^2 = NO_2$, Z = O, R^3 = 5-CN
935	$R^2 = NO_2$, Z = O, R^3 = 5-NO_2
936	$R^2 = NO_2$, Z = O, R^3 = 5-OMe
937	$R^2 = NO_2$, Z = O, R^3 = 5-OCF_3
938	$R^2 = NO_2$, Z = O, R^3 = 5-CF_3
939	$R^2 = NO_2$, Z = O, R^3 = 5-CHF_2
940	$R^2 = NO_2$, Z = O, R^3 = 5-CH_2F
941	$R^2 = NO_2$, Z = O, R^3 = 5-CHO
942	$R^2 = NO_2$, Z = O, R^3 = 5-Me
943	$R^2 = NO_2$, Z = O, R^3 = 5-Et
944	$R^2 = NO_2$, Z = O, R^3 = 5-Ethynyl
945	$R^2 = NO_2$, Z = O, R^3 = 5-Ethenyl
946	$R^2 = NO_2$, Z = O, R^3 = 5-SO_2Me
947	$R^2 = NO_2$, Z = O, R^3 = 5-OAc
948	$R^2 = NO_2$, Z = O, R^3 = 5-c-Pr
949	$R^2 = NO_2$, Z = O, R^3 = 5-i-Pr
950	$R^2 = NO_2$, Z = O, R^3 = 5-Ph
951	$R^2 = NO_2$, Z = O, R^3 = 6-F
952	$R^2 = NO_2$, Z = O, R^3 = 6-Cl
953	$R^2 = NO_2$, Z = O, R^3 = 6-Br
954	$R^2 = NO_2$, Z = O, R^3 = 6-I
955	$R^2 = NO_2$, Z = O, R^3 = 6-CN
956	$R^2 = NO_2$, Z = O, R^3 = 6-NO_2
957	$R^2 = NO_2$, Z = O, R^3 = 6-OMe
958	$R^2 = NO_2$, Z = O, R^3 = 6-OCF_3
959	$R^2 = NO_2$, Z = O, R^3 = 6-CF_3
960	$R^2 = NO_2$, Z = O, R^3 = 6-CHF_2
961	$R^2 = NO_2$, Z = O, R^3 = 6-CH_2F
962	$R^2 = NO_2$, Z = O, R^3 = 6-CHO
963	$R^2 = NO_2$, Z = O, R^3 = 6-Me
964	$R^2 = NO_2$, Z = O, R^3 = 6-Et
965	$R^2 = NO_2$, Z = O, R^3 = 6-Ethynyl
966	$R^2 = NO_2$, Z = O, R^3 = 6-Ethenyl
967	$R^2 = NO_2$, Z = O, R^3 = 6-SO_2Me
968	$R^2 = NO_2$, Z = O, R^3 = 6-OAc
969	$R^2 = NO_2$, Z = O, R^3 = 6-c-Pr
970	$R^2 = NO_2$, Z = O, R^3 = 6-i-Pr
971	$R^2 = NO_2$, Z = O, R^3 = 6-Ph
972	$R^2 = NO_2$, Z = O, R^3 = 3,4-di-F
973	$R^2 = NO_2$, Z = O, R^3 = 3,5-di-F
974	$R^2 = NO_2$, Z = O, R^3 = 3,6-di-F
975	$R^2 = NO_2$, Z = O, R^3 = 4,5-di-F
976	$R^2 = NO_2$, Z = O, R^3 = 3,4-di-Cl
977	$R^2 = NO_2$, Z = O, R^3 = 3,5-di-Cl
978	$R^2 = NO_2$, Z = O, R^3 = 3,6-di-Cl
979	$R^2 = NO_2$, Z = O, R^3 = 4,5-di-Cl

-continued

Table	Header Row
980	$R^2 = NO_2$, Z = O, R^3 = 3,4-di-Br
981	$R^2 = NO_2$, Z = O, R^3 = 3,5-di-Br
982	$R^2 = NO_2$, Z = O, R^3 = 3,6-di-Br
983	$R^2 = NO_2$, Z = O, R^3 = 4,5-di-Br
984	$R^2 = NO_2$, Z = O, R^3 = 3,4-di-CN
985	$R^2 = NO_2$, Z = O, R^3 = 3,5-di-CN
986	$R^2 = NO_2$, Z = O, R^3 = 3,6-di-CN
987	$R^2 = NO_2$, Z = O, R^3 = 4,5-di-CN
988	$R^2 = NO_2$, Z = O, R^3 = 3,4-di-Me
989	$R^2 = NO_2$, Z = O, R^3 = 3,5-di-Me
990	$R^2 = NO_2$, Z = O, R^3 = 3,6-di-Me
991	$R^2 = NO_2$, Z = O, R^3 = 4,5-di-Me
992	$R^2 = NO_2$, Z = O, R^3 = 3,4-di-OMe
993	$R^2 = NO_2$, Z = O, R^3 = 3,5-di-OMe
994	$R^2 = NO_2$, Z = O, R^3 = 3,6-di-OMe
995	$R^2 = NO_2$, Z = O, R^3 = 4,5-di-OMe
996	$R^2 = NO_2$, Z = O, R^3 = 3,4-di-CF_3
997	$R^2 = NO_2$, Z = O, R^3 = 3,5-di-CF_3
998	$R^2 = NO_2$, Z = O, R^3 = 3,6-di-CF_3
999	$R^2 = NO_2$, Z = O, R^3 = 4,5-di-CF_3
1000	$R^2 = NO_2$, Z = O, R^3 = 3-CN, 4-Me
1001	$R^2 = NO_2$, Z = O, R^3 = 3-CN, 4-F
1002	$R^2 = NO_2$, Z = O, R^3 = 3-CN, 4-Br
1003	$R^2 = NO_2$, Z = O, R^3 = 3-CN, 4-OMe
1004	$R^2 = NO_2$, Z = O, R^3 = 3-CN, 4-CF_3
1005	$R^2 = NO_2$, Z = O, R^3 = 3-CN, 6-Me
1006	$R^2 = NO_2$, Z = O, R^3 = 3-CN, 6-F
1007	$R^2 = NO_2$, Z = O, R^3 = 3-CN, 6-Br
1008	$R^2 = NO_2$, Z = O, R^3 = 3-CN, 6-OMe
1009	$R^2 = NO_2$, Z = O, R^3 = 3-CN, 6-CF_3
1010	R^2 = OMe, Z = O, R^3 = H (m = 0)
1011	R^2 = OMe, Z = O, R^3 = 3-F
1012	R^2 = OMe, Z = O, R^3 = 3-Cl
1013	R^2 = OMe, Z = O, R^3 = 3-Br
1014	R^2 = OMe, Z = O, R^3 = 3-I
1015	R^2 = OMe, Z = O, R^3 = 3-CN
1016	R^2 = OMe, Z = O, R^3 = 3-NO_2
1017	R^2 = OMe, Z = O, R^3 = 3-OMe
1018	R^2 = OMe, Z = O, R^3 = 3-OCF_3
1019	R^2 = OMe, Z = O, R^3 = 3-CF_3
1020	R^2 = OMe, Z = O, R^3 = 3-CHF_2
1021	R^2 = OMe, Z = O, R^3 = 3-CH_2F
1022	R^2 = OMe, Z = O, R^3 = 3-CHO
1023	R^2 = OMe, Z = O, R^3 = 3-Me
1024	R^2 = OMe, Z = O, R^3 = 3-Et
1025	R^2 = OMe, Z = O, R^3 = 3-Ethynyl
1026	R^2 = OMe, Z = O, R^3 = 3-Ethenyl
1027	R^2 = OMe, Z = O, R^3 = 3-SO_2Me
1028	R^2 = OMe, Z = O, R^3 = 3-OAc
1029	R^2 = OMe, Z = O, R^3 = 3-c-Pr
1030	R^2 = OMe, Z = O, R^3 = 3-i-Pr
1031	R^2 = OMe, Z = O, R^3 = 3-Ph
1032	R^2 = OMe, Z = S, R^3 = 3-F
1033	R^2 = OMe, Z = S, R^3 = 3-Cl
1034	R^2 = OMe, Z = S, R^3 = 3-Br
1035	R^2 = OMe, Z = S, R^3 = 3-I
1036	R^2 = OMe, Z = S, R^3 = 3-CN
1037	R^2 = OMe, Z = S, R^3 = 3-NO_2
1038	R^2 = OMe, Z = S, R^3 = 3-OMe
1039	R^2 = OMe, Z = S, R^3 = 3-OCF_3
1040	R^2 = OMe, Z = S, R^3 = 3-CF_3
1041	R^2 = OMe, Z = S, R^3 = 3-CHF_2
1042	R^2 = OMe, Z = S, R^3 = 3-CH_2F
1043	R^2 = OMe, Z = S, R^3 = 3-CHO
1044	R^2 = OMe, Z = S, R^3 = 3-Me
1045	R^2 = OMe, Z = S, R^3 = 3-Et
1046	R^2 = OMe, Z = S, R^3 = 3-Ethynyl
1047	R^2 = OMe, Z = S, R^3 = 3-Ethenyl
1048	R^2 = OMe, Z = S, R^3 = 3-SO_2Me
1049	R^2 = OMe, Z = S, R^3 = 3-OAc
1050	R^2 = OMe, Z = S, R^3 = 3-c-Pr
1051	R^2 = OMe, Z = S, R^3 = 3-i-Pr
1052	R^2 = OMe, Z = S, R^3 = 3-Ph
1053	R^2 = OMe, Z = O, R^3 = 4-F

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Table	Header Row
1054	R^2 = OMe, Z = O, R^3 = 4-Cl
1055	R^2 = OMe, Z = O, R^3 = 4-Br
1056	R^2 = OMe, Z = O, R^3 = 4-I
1057	R^2 = OMe, Z = O, R^3 = 4-CN
1058	R^2 = OMe, Z = O, R^3 = 4-NO_2
1059	R^2 = OMe, Z = O, R^3 = 4-OMe
1060	R^2 = OMe, Z = O, R^3 = 4-OCF_3
1061	R^2 = OMe, Z = O, R^3 = 4-CF_3
1062	R^2 = OMe, Z = O, R^3 = 4-CHF_2
1063	R^2 = OMe, Z = O, R^3 = 4-CH_2F
1064	R^2 = OMe, Z = O, R^3 = 4-CHO
1065	R^2 = OMe, Z = O, R^3 = 4-Me
1066	R^2 = OMe, Z = O, R^3 = 4-Et
1067	R^2 = OMe, Z = O, R^3 = 4-Ethynyl
1068	R^2 = OMe, Z = O, R^3 = 4-Ethenyl
1069	R^2 = OMe, Z = O, R^3 = 4-SO_2Me
1070	R^2 = OMe, Z = O, R^3 = 4-OAc
1071	R^2 = OMe, Z = O, R^3 = 4-c-Pr
1072	R^2 = OMe, Z = O, R^3 = 4-i-Pr
1073	R^2 = OMe, Z = O, R^3 = 4-Ph
1074	R^2 = OMe, Z = O, R^3 = 5-F
1075	R^2 = OMe, Z = O, R^3 = 5-Cl
1076	R^2 = OMe, Z = O, R^3 = 5-Br
1077	R^2 = OMe, Z = O, R^3 = 5-I
1078	R^2 = OMe, Z = O, R^3 = 5-CN
1079	R^2 = OMe, Z = O, R^3 = 5-NO_2
1080	R^2 = OMe, Z = O, R^3 = 5-OMe
1081	R^2 = OMe, Z = O, R^3 = 5-OCF_3
1082	R^2 = OMe, Z = O, R^3 = 5-CF_3
1083	R^2 = OMe, Z = O, R^3 = 5-CHF_2
1084	R^2 = OMe, Z = O, R^3 = 5-CH_2F
1085	R^2 = OMe, Z = O, R^3 = 5-CHO
1086	R^2 = OMe, Z = O, R^3 = 5-Me
1087	R^2 = OMe, Z = O, R^3 = 5-Et
1088	R^2 = OMe, Z = O, R^3 = 5-Ethynyl
1089	R^2 = OMe, Z = O, R^3 = 5-Ethenyl
1090	R^2 = OMe, Z = O, R^3 = 5-SO_2Me
1091	R^2 = OMe, Z = O, R^3 = 5-OAc
1092	R^2 = OMe, Z = O, R^3 = 5-c-Pr
1093	R^2 = OMe, Z = O, R^3 = 5-i-Pr
1094	R^2 = OMe, Z = O, R^3 = 5-Ph
1095	R^2 = OMe, Z = O, R^3 = 6-F
1096	R^2 = OMe, Z = O, R^3 = 6-Cl
1097	R^2 = OMe, Z = O, R^3 = 6-Br
1098	R^2 = OMe, Z = O, R^3 = 6-I
1099	R^2 = OMe, Z = O, R^3 = 6-CN
1100	R^2 = OMe, Z = O, R^3 = 6-NO_2
1101	R^2 = OMe, Z = O, R^3 = 6-OMe
1102	R^2 = OMe, Z = O, R^3 = 6-OCF_3
1103	R^2 = OMe, Z = O, R^3 = 6-CF_3
1104	R^2 = OMe, Z = O, R^3 = 6-CHF_2
1105	R^2 = OMe, Z = O, R^3 = 6-CH_2F
1106	R^2 = OMe, Z = O, R^3 = 6-CHO
1107	R^2 = OMe, Z = O, R^3 = 6-Me
1108	R^2 = OMe, Z = O, R^3 = 6-Et
1109	R^2 = OMe, Z = O, R^3 = 6-Ethynyl
1110	R^2 = OMe, Z = O, R^3 = 6-Ethenyl
1111	R^2 = OMe, Z = O, R^3 = 6-SO_2Me
1112	R^2 = OMe, Z = O, R^3 = 6-OAc
1113	R^2 = OMe, Z = O, R^3 = 6-c-Pr
1114	R^2 = OMe, Z = O, R^3 = 6-i-Pr
1115	R^2 = OMe, Z = O, R^3 = 6-Ph
1116	R^2 = OMe, Z = O, R^3 = 3,4-di-F
1117	R^2 = OMe, Z = O, R^3 = 3,5-di-F
1118	R^2 = OMe, Z = O, R^3 = 3,6-di-F
1119	R^2 = OMe, Z = O, R^3 = 4,5-di-F
1120	R^2 = OMe, Z = O, R^3 = 3,4-di-Cl
1121	R^2 = OMe, Z = O, R^3 = 3,5-di-Cl
1122	R^2 = OMe, Z = O, R^3 = 3,6-di-Cl
1123	R^2 = OMe, Z = O, R^3 = 4,5-di-Cl
1124	R^2 = OMe, Z = O, R^3 = 3,4-di-Br
1125	R^2 = OMe, Z = O, R^3 = 3,5-di-Br
1126	R^2 = OMe, Z = O, R^3 = 3,6-di-Br
1127	R^2 = OMe, Z = O, R^3 = 4,5-di-Br

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Table	Header Row
1128	R^2 = OMe, Z = O, R^3 = 3,4-di-CN
1129	R^2 = OMe, Z = O, R^3 = 3,5-di-CN
1130	R^2 = OMe, Z = O, R^3 = 3,6-di-CN
1131	R^2 = OMe, Z = O, R^3 = 4,5-di-CN
1132	R^2 = OMe, Z = O, R^3 = 3,4-di-Me
1133	R^2 = OMe, Z = O, R^3 = 3,5-di-Me
1134	R^2 = OMe, Z = O, R^3 = 3,6-di-Me
1135	R^2 = OMe, Z = O, R^3 = 4,5-di-Me
1136	R^2 = OMe, Z = O, R^3 = 3,4-di-OMe
1137	R^2 = OMe, Z = O, R^3 = 3,5-di-OMe
1138	R^2 = OMe, Z = O, R^3 = 3,6-di-OMe
1139	R^2 = OMe, Z = O, R^3 = 4,5-di-OMe
1140	R^2 = OMe, Z = O, R^3 = 3,4-di-CF_3
1141	R^2 = OMe, Z = O, R^3 = 3,5-di-CF_3
1142	R^2 = OMe, Z = O, R^3 = 3,6-di-CF_3
1143	R^2 = OMe, Z = O, R^3 = 4,5-di-CF_3
1144	R^2 = OMe, Z = O, R^3 = 3-CN, 4-Me
1145	R^2 = OMe, Z = O, R^3 = 3-CN, 4-F
1146	R^2 = OMe, Z = O, R^3 = 3-CN, 4-Br
1147	R^2 = OMe, Z = O, R^3 = 3-CN, 4-OMe
1148	R^2 = OMe, Z = O, R^3 = 3-CN, 4-CF_3
1149	R^2 = OMe, Z = O, R^3 = 3-CN, 6-Me
1150	R^2 = OMe, Z = O, R^3 = 3-CN, 6-F
1151	R^2 = OMe, Z = O, R^3 = 3-CN, 6-Br
1152	R^2 = OMe, Z = O, R^3 = 3-CN, 6-OMe
1153	R^2 = OMe, Z = O, R^3 = 3-CN, 6-CF_3
1154	R^2 = CF_3, Z = O, R^3 = H (m = 0)
1155	R^2 = CF_3, Z = O, R^3 = 3-F
1156	R^2 = CF_3, Z = O, R^3 = 3-Cl
1157	R^2 = CF_3, Z = O, R^3 = 3-Br
1158	R^2 = CF_3, Z = O, R^3 = 3-I
1159	R^2 = CF_3, Z = O, R^3 = 3-CN
1160	R^2 = CF_3, Z = O, R^3 = 3-NO_2
1161	R^2 = CF_3, Z = O, R^3 = 3-OMe
1162	R^2 = CF_3, Z = O, R^3 = 3-OCF_3
1163	R^2 = CF_3, Z = O, R^3 = 3-CF_3
1164	R^2 = CF_3, Z = O, R^3 = 3-CHF_2
1165	R^2 = CF_3, Z = O, R^3 = 3-CH_2F
1166	R^2 = CF_3, Z = O, R^3 = 3-CHO
1167	R^2 = CF_3, Z = O, R^3 = 3-Me
1168	R^2 = CF_3, Z = O, R^3 = 3-Et
1169	R^2 = CF_3, Z = O, R^3 = 3-Ethynyl
1170	R^2 = CF_3, Z = O, R^3 = 3-Ethenyl
1171	R^2 = CF_3, Z = O, R^3 = 3-SO_2Me
1172	R^2 = CF_3, Z = O, R^3 = 3-OAc
1173	R^2 = CF_3, Z = O, R^3 = 3-c-Pr
1174	R^2 = CF_3, Z = O, R^3 = 3-i-Pr
1175	R^2 = CF_3, Z = O, R^3 = 3-Ph
1176	R^2 = CF_3, Z = S, R^3 = 3-F
1177	R^2 = CF_3, Z = S, R^3 = 3-Cl
1178	R^2 = CF_3, Z = S, R^3 = 3-Br
1179	R^2 = CF_3, Z = S, R^3 = 3-I
1180	R^2 = CF_3, Z = S, R^3 = 3-CN
1181	R^2 = CF_3, Z = S, R^3 = 3-NO_2
1182	R^2 = CF_3, Z = S, R^3 = 3-OMe
1183	R^2 = CF_3, Z = S, R^3 = 3-OCF_3
1184	R^2 = CF_3, Z = S, R^3 = 3-CF_3
1185	R^2 = CF_3, Z = S, R^3 = 3-CHF_2
1186	R^2 = CF_3, Z = S, R^3 = 3-CH_2F
1187	R^2 = CF_3, Z = S, R^3 = 3-CHO
1188	R^2 = CF_3, Z = S, R^3 = 3-Me
1189	R^2 = CF_3, Z = S, R^3 = 3-Et
1190	R^2 = CF_3, Z = S, R^3 = 3-Ethynyl
1191	R^2 = CF_3, Z = S, R^3 = 3-Ethenyl
1192	R^2 = CF_3, Z = S, R^3 = 3-SO_2Me
1193	R^2 = CF_3, Z = S, R^3 = 3-OAc
1194	R^2 = CF_3, Z = S, R^3 = 3-c-Pr
1195	R^2 = CF_3, Z = S, R^3 = 3-i-Pr
1196	R^2 = CF_3, Z = S, R^3 = 3-Ph
1197	R^2 = CF_3, Z = O, R^3 = 4-F
1198	R^2 = CF_3, Z = O, R^3 = 4-Cl
1199	R^2 = CF_3, Z = O, R^3 = 4-Br
1200	R^2 = CF_3, Z = O, R^3 = 4-I
1201	R^2 = CF_3, Z = O, R^3 = 4-CN

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Table	Header Row
1202	$R^2 = CF_3$, Z = O, R^3 = 4-NO_2
1203	$R^2 = CF_3$, Z = O, R^3 = 4-OMe
1204	$R^2 = CF_3$, Z = O, R^3 = 4-OCF_3
1205	$R^2 = CF_3$, Z = O, R^3 = 4-CF_3
1206	$R^2 = CF_3$, Z = O, R^3 = 4-CHF_2
1207	$R^2 = CF_3$, Z = O, R^3 = 4-CH_2F
1208	$R^2 = CF_3$, Z = O, R^3 = 4-CHO
1209	$R^2 = CF_3$, Z = O, R^3 = 4-Me
1210	$R^2 = CF_3$, Z = O, R^3 = 4-Et
1211	$R^2 = CF_3$, Z = O, R^3 = 4-Ethynyl
1212	$R^2 = CF_3$, Z = O, R^3 = 4-Ethenyl
1213	$R^2 = CF_3$, Z = O, R^3 = 4-SO_2Me
1214	$R^2 = CF_3$, Z = O, R^3 = 4-OAc
1215	$R^2 = CF_3$, Z = O, R^3 = 4-c-Pr
1216	$R^2 = CF_3$, Z = O, R^3 = 4-i-Pr
1217	$R^2 = CF_3$, Z = O, R^3 = 4-Ph
1218	$R^2 = CF_3$, Z = O, R^3 = 5-F
1219	$R^2 = CF_3$, Z = O, R^3 = 5-Cl
1220	$R^2 = CF_3$, Z = O, R^3 = 5-Br
1221	$R^2 = CF_3$, Z = O, R^3 = 5-I
1222	$R^2 = CF_3$, Z = O, R^3 = 5-CN
1223	$R^2 = CF_3$, Z = O, R^3 = 5-NO_2
1224	$R^2 = CF_3$, Z = O, R^3 = 5-OMe
1225	$R^2 = CF_3$, Z = O, R^3 = 5-OCF_3
1226	$R^2 = CF_3$, Z = O, R^3 = 5-CF_3
1227	$R^2 = CF_3$, Z = O, R^3 = 5-CHF_2
1228	$R^2 = CF_3$, Z = O, R^3 = 5-CH_2F
1229	$R^2 = CF_3$, Z = O, R^3 = 5-CHO
1230	$R^2 = CF_3$, Z = O, R^3 = 5-Me
1231	$R^2 = CF_3$, Z = O, R^3 = 5-Et
1232	$R^2 = CF_3$, Z = O, R^3 = 5-Ethynyl
1233	$R^2 = CF_3$, Z = O, R^3 = 5-Ethenyl
1234	$R^2 = CF_3$, Z = O, R^3 = 5-SO_2Me
1235	$R^2 = CF_3$, Z = O, R^3 = 5-OAc
1236	$R^2 = CF_3$, Z = O, R^3 = 5-c-Pr
1237	$R^2 = CF_3$, Z = O, R^3 = 5-i-Pr
1238	$R^2 = CF_3$, Z = O, R^3 = 5-Ph
1239	$R^2 = CF_3$, Z = O, R^3 = 6-F
1240	$R^2 = CF_3$, Z = O, R^3 = 6-Cl
1241	$R^2 = CF_3$, Z = O, R^3 = 6-Br
1242	$R^2 = CF_3$, Z = O, R^3 = 6-I
1243	$R^2 = CF_3$, Z = O, R^3 = 6-CN
1244	$R^2 = CF_3$, Z = O, R^3 = 6-NO_2
1245	$R^2 = CF_3$, Z = O, R^3 = 6-OMe
1246	$R^2 = CF_3$, Z = O, R^3 = 6-OCF_3
1247	$R^2 = CF_3$, Z = O, R^3 = 6-CF_3
1248	$R^2 = CF_3$, Z = O, R^3 = 6-CHF_2
1249	$R^2 = CF_3$, Z = O, R^3 = 6-CH_2F
1250	$R^2 = CF_3$, Z = O, R^3 = 6-CHO
1251	$R^2 = CF_3$, Z = O, R^3 = 6-Me
1252	$R^2 = CF_3$, Z = O, R^3 = 6-Et
1253	$R^2 = CF_3$, Z = O, R^3 = 6-Ethynyl
1254	$R^2 = CF_3$, Z = O, R^3 = 6-Ethenyl
1255	$R^2 = CF_3$, Z = O, R^3 = 6-SO_2Me
1256	$R^2 = CF_3$, Z = O, R^3 = 6-OAc
1257	$R^2 = CF_3$, Z = O, R^3 = 6-c-Pr
1258	$R^2 = CF_3$, Z = O, R^3 = 6-i-Pr
1259	$R^2 = CF_3$, Z = O, R^3 = 6-Ph
1260	$R^2 = CF_3$, Z = O, R^3 = 3,4-di-F
1261	$R^2 = CF_3$, Z = O, R^3 = 3,5-di-F
1262	$R^2 = CF_3$, Z = O, R^3 = 3,6-di-F
1263	$R^2 = CF_3$, Z = O, R^3 = 4,5-di-F
1264	$R^2 = CF_3$, Z = O, R^3 = 3,4-di-Cl
1265	$R^2 = CF_3$, Z = O, R^3 = 3,5-di-Cl
1266	$R^2 = CF_3$, Z = O, R^3 = 3,6-di-Cl
1267	$R^2 = CF_3$, Z = O, R^3 = 4,5-di-Cl
1268	$R^2 = CF_3$, Z = O, R^3 = 3,4-di-Br
1269	$R^2 = CF_3$, Z = O, R^3 = 3,5-di-Br
1270	$R^2 = CF_3$, Z = O, R^3 = 3,6-di-Br
1271	$R^2 = CF_3$, Z = O, R^3 = 4,5-di-Br
1272	$R^2 = CF_3$, Z = O, R^3 = 3,4-di-CN
1273	$R^2 = CF_3$, Z = O, R^3 = 3,5-di-CN
1274	$R^2 = CF_3$, Z = O, R^3 = 3,6-di-CN
1275	$R^2 = CF_3$, Z = O, R^3 = 4,5-di-CN

-continued

Table	Header Row
1276	$R^2 = CF_3$, Z = O, R^3 = 3,4-di-Me
1277	$R^2 = CF_3$, Z = O, R^3 = 3,5-di-Me
1278	$R^2 = CF_3$, Z = O, R^3 = 3,6-di-Me
1279	$R^2 = CF_3$, Z = O, R^3 = 4,5-di-Me
1280	$R^2 = CF_3$, Z = O, R^3 = 3,4-di-OMe
1281	$R^2 = CF_3$, Z = O, R^3 = 3,5-di-OMe
1282	$R^2 = CF_3$, Z = O, R^3 = 3,6-di-OMe
1283	$R^2 = CF_3$, Z = O, R^3 = 4,5-di-OMe
1284	$R^2 = CF_3$, Z = O, R^3 = 3,4-di-CF_3
1285	$R^2 = CF_3$, Z = O, R^3 = 3,5-di-CF_3
1286	$R^2 = CF_3$, Z = O, R^3 = 3,6-di-CF_3
1287	$R^2 = CF_3$, Z = O, R^3 = 4,5-di-CF_3
1288	$R^2 = CF_3$, Z = O, R^3 = 3-CN, 4-Me
1289	$R^2 = CF_3$, Z = O, R^3 = 3-CN, 4-F
1290	$R^2 = CF_3$, Z = O, R^3 = 3-CN, 4-Br
1291	$R^2 = CF_3$, Z = O, R^3 = 3-CN, 4-OMe
1292	$R^2 = CF_3$, Z = O, R^3 = 3-CN, 4-CF_3
1293	$R^2 = CF_3$, Z = O, R^3 = 3-CN, 6-Me
1294	$R^2 = CF_3$, Z = O, R^3 = 3-CN, 6-F
1295	$R^2 = CF_3$, Z = O, R^3 = 3-CN, 6-Br
1296	$R^2 = CF_3$, Z = O, R^3 = 3-CN, 6-OMe
1297	$R^2 = CF_3$, Z = O, R^3 = 3-CN, 6-CF_3
1298	$R^2 = CHF_2$, Z = O, R^3 = H (m = 0)
1299	$R^2 = CHF_2$, Z = O, R^3 = 3-F
1300	$R^2 = CHF_2$, Z = O, R^3 = 3-Cl
1301	$R^2 = CHF_2$, Z = O, R^3 = 3-Br
1302	$R^2 = CHF_2$, Z = O, R^3 = 3-I
1303	$R^2 = CHF_2$, Z = O, R^3 = 3-CN
1304	$R^2 = CHF_2$, Z = O, R^3 = 3-NO_2
1305	$R^2 = CHF_2$, Z = O, R^3 = 3-OMe
1306	$R^2 = CHF_2$, Z = O, R^3 = 3-OCF_3
1307	$R^2 = CHF_2$, Z = O, R^3 = 3-CF_3
1308	$R^2 = CHF_2$, Z = O, R^3 = 3-CHF_2
1309	$R^2 = CHF_2$, Z = O, R^3 = 3-CH_2F
1310	$R^2 = CHF_2$, Z = O, R^3 = 3-CHO
1311	$R^2 = CHF_2$, Z = O, R^3 = 3-Me
1312	$R^2 = CHF_2$, Z = O, R^3 = 3-Et
1313	$R^2 = CHF_2$, Z = O, R^3 = 3-Ethynyl
1314	$R^2 = CHF_2$, Z = O, R^3 = 3-Ethenyl
1315	$R^2 = CHF_2$, Z = O, R^3 = 3-SO_2Me
1316	$R^2 = CHF_2$, Z = O, R^3 = 3-OAc
1317	$R^2 = CHF_2$, Z = O, R^3 = 3-c-Pr
1318	$R^2 = CHF_2$, Z = O, R^3 = 3-i-Pr
1319	$R^2 = CHF_2$, Z = O, R^3 = 3-Ph
1320	$R^2 = CHF_2$, Z = S, R^3 = 3-F
1321	$R^2 = CHF_2$, Z = S, R^3 = 3-Cl
1322	$R^2 = CHF_2$, Z = S, R^3 = 3-Br
1323	$R^2 = CHF_2$, Z = S, R^3 = 3-I
1324	$R^2 = CHF_2$, Z = S, R^3 = 3-CN
1325	$R^2 = CHF_2$, Z = S, R^3 = 3-NO_2
1326	$R^2 = CHF_2$, Z = S, R^3 = 3-OMe
1327	$R^2 = CHF_2$, Z = S, R^3 = 3-OCF_3
1328	$R^2 = CHF_2$, Z = S, R^3 = 3-CHF_2
1329	$R^2 = CHF_2$, Z = S, R^3 = 3-CH_2F
1330	$R^2 = CHF_2$, Z = S, R^3 = 3-CHO
1331	$R^2 = CHF_2$, Z = S, R^3 = 3-Me
1332	$R^2 = CHF_2$, Z = S, R^3 = 3-Et
1333	$R^2 = CHF_2$, Z = S, R^3 = 3-Ethynyl
1334	$R^2 = CHF_2$, Z = S, R^3 = 3-Ethenyl
1335	$R^2 = CHF_2$, Z = S, R^3 = 3-SO_2Me
1336	$R^2 = CHF_2$, Z = S, R^3 = 3-OAc
1337	$R^2 = CHF_2$, Z = S, R^3 = 3-c-Pr
1338	$R^2 = CHF_2$, Z = S, R^3 = 3-i-Pr
1339	$R^2 = CHF_2$, Z = S, R^3 = 3-Ph
1340	$R^2 = CHF_2$, Z = O, R^3 = 4-F
1341	$R^2 = CHF_2$, Z = O, R^3 = 4-Cl
1342	$R^2 = CHF_2$, Z = O, R^3 = 4-Br
1343	$R^2 = CHF_2$, Z = O, R^3 = 4-I
1344	$R^2 = CHF_2$, Z = O, R^3 = 4-CN
1345	$R^2 = CHF_2$, Z = O, R^3 = 4-NO_2
1346	$R^2 = CHF_2$, Z = O, R^3 = 4-OMe
1347	$R^2 = CHF_2$, Z = O, R^3 = 4-OCF_3
1348	$R^2 = CHF_2$, Z = O, R^3 = 4-CF_3
1349	$R^2 = CHF_2$, Z = O, R^3 = 4-CHF_2

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Table	Header Row
1350	R^2 = CHF_2, Z = O, R^3 = 4-CH_2F
1351	R^2 = CHF_2, Z = O, R^3 = 4-CHO
1352	R^2 = CHF_2, Z = O, R^3 = 4-Me
1353	R^2 = CHF_2, Z = O, R^3 = 4-Et
1354	R^2 = CHF_2, Z = O, R^3 = 4-Ethynyl
1355	R^2 = CHF_2, Z = O, R^3 = 4-Ethenyl
1356	R^2 = CHF_2, Z = O, R^3 = 4-SO_2Me
1357	R^2 = CHF_2, Z = O, R^3 = 4-OAc
1358	R^2 = CHF_2, Z = O, R^3 = 4-c-Pr
1359	R^2 = CHF_2, Z = O, R^3 = 4-i-Pr
1360	R^2 = CHF_2, Z = O, R^3 = 4-Ph
1361	R^2 = CHF_2, Z = O, R^3 = 5-F
1362	R^2 = CHF_2, Z = O, R^3 = 5-Cl
1363	R^2 = CHF_2, Z = O, R^3 = 5-Br
1364	R^2 = CHF_2, Z = O, R^3 = 5-I
1365	R^2 = CHF_2, Z = O, R^3 = 5-CN
1366	R^2 = CHF_2, Z = O, R^3 = 5-NO_2
1367	R^2 = CHF_2, Z = O, R^3 = 5-OMe
1368	R^2 = CHF_2, Z = O, R^3 = 5-OCF_3
1369	R^2 = CHF_2, Z = O, R^3 = 5-CF_3
1370	R^2 = CHF_2, Z = O, R^3 = 5-CHF_2
1371	R^2 = CHF_2, Z = O, R^3 = 5-CH_2F
1372	R^2 = CHF_2, Z = O, R^3 = 5-CHO
1373	R^2 = CHF_2, Z = O, R^3 = 5-Me
1374	R^2 = CHF_2, Z = O, R^3 = 5-Et
1375	R^2 = CHF_2, Z = O, R^3 = 5-Ethynyl
1376	R^2 = CHF_2, Z = O, R^3 = 5-Ethenyl
1377	R^2 = CHF_2, Z = O, R^3 = 5-SO_2Me
1378	R^2 = CHF_2, Z = O, R^3 = 5-OAc
1379	R^2 = CHF_2, Z = O, R^3 = 5-c-Pr
1380	R^2 = CHF_2, Z = O, R^3 = 5-i-Pr
1381	R^2 = CHF_2, Z = O, R^3 = 5-Ph
1382	R^2 = CHF_2, Z = O, R^3 = 6-F
1383	R^2 = CHF_2, Z = O, R^3 = 6-Cl
1384	R^2 = CHF_2, Z = O, R^3 = 6-Br
1385	R^2 = CHF_2, Z = O, R^3 = 6-I
1386	R^2 = CHF_2, Z = O, R^3 = 6-CN
1387	R^2 = CHF_2, Z = O, R^3 = 6-NO_2
1388	R^2 = CHF_2, Z = O, R^3 = 6-OMe
1389	R^2 = CHF_2, Z = O, R^3 = 6-OCF_3
1390	R^2 = CHF_2, Z = O, R^3 = 6-CF_3
1391	R^2 = CHF_2, Z = O, R^3 = 6-CHF_2
1392	R^2 = CHF_2, Z = O, R^3 = 6-CH_2F
1393	R^2 = CHF_2, Z = O, R^3 = 6-CHO
1394	R^2 = CHF_2, Z = O, R^3 = 6-Me
1395	R^2 = CHF_2, Z = O, R^3 = 6-Et
1396	R^2 = CHF_2, Z = O, R^3 = 6-Ethynyl
1397	R^2 = CHF_2, Z = O, R^3 = 6-Ethenyl
1398	R^2 = CHF_2, Z = O, R^3 = 6-SO_2Me
1399	R^2 = CHF_2, Z = O, R^3 = 6-OAc
1400	R^2 = CHF_2, Z = O, R^3 = 6-c-Pr
1401	R^2 = CHF_2, Z = O, R^3 = 6-i-Pr
1402	R^2 = CHF_2, Z = O, R^3 = 6-Ph
1403	R^2 = CHF_2, Z = O, R^3 = 3,4-di-F
1404	R^2 = CHF_2, Z = O, R^3 = 3,5-di-F
1405	R^2 = CHF_2, Z = O, R^3 = 3,6-di-F
1406	R^2 = CHF_2, Z = O, R^3 = 4,5-di-F
1407	R^2 = CHF_2, Z = O, R^3 = 3,4-di-Cl
1408	R^2 = CHF_2, Z = O, R^3 = 3,5-di-Cl
1409	R^2 = CHF_2, Z = O, R^3 = 3,6-di-Cl
1410	R^2 = CHF_2, Z = O, R^3 = 4,5-di-Cl
1411	R^2 = CHF_2, Z = O, R^3 = 3,4-di-Br
1412	R^2 = CHF_2, Z = O, R^3 = 3,5-di-Br
1413	R^2 = CHF_2, Z = O, R^3 = 3,6-di-Br
1414	R^2 = CHF_2, Z = O, R^3 = 4,5-di-Br
1415	R^2 = CHF_2, Z = O, R^3 = 3,4-di-CN
1416	R^2 = CHF_2, Z = O, R^3 = 3,5-di-CN
1417	R^2 = CHF_2, Z = O, R^3 = 3,6-di-CN
1418	R^2 = CHF_2, Z = O, R^3 = 4,5-di-CN
1419	R^2 = CHF_2, Z = O, R^3 = 3,4-di-Me
1420	R^2 = CHF_2, Z = O, R^3 = 3,5-di-Me
1421	R^2 = CHF_2, Z = O, R^3 = 3,6-di-Me
1422	R^2 = CHF_2, Z = O, R^3 = 4,5-di-Me
1423	R^2 = CHF_2, Z = O, R^3 = 3,4-di-OMe

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Table	Header Row
1424	R^2 = CHF_2, Z = O, R^3 = 3,5-di-OMe
1425	R^2 = CHF_2, Z = O, R^3 = 3,6-di-OMe
1426	R^2 = CHF_2, Z = O, R^3 = 4,5-di-OMe
1427	R^2 = CHF_2, Z = O, R^3 = 3,4-di-CF_3
1428	R^2 = CHF_2, Z = O, R^3 = 3,5-di-CF_3
1429	R^2 = CHF_2, Z = O, R^3 = 3,6-di-CF_3
1430	R^2 = CHF_2, Z = O, R^3 = 4,5-di-CF_3
1431	R^2 = CHF_2, Z = O, R^3 = 3-CN, 4-Me
1432	R^2 = CHF_2, Z = O, R^3 = 3-CN, 4-F
1433	R^2 = CHF_2, Z = O, R^3 = 3-CN, 4-Br
1434	R^2 = CHF_2, Z = O, R^3 = 3-CN, 4-OMe
1435	R^2 = CHF_2, Z = O, R^3 = 3-CN, 4-CF_3
1436	R^2 = CHF_2, Z = O, R^3 = 3-CN, 6-Me
1437	R^2 = CHF_2, Z = O, R^3 = 3-CN, 6-F
1438	R^2 = CHF_2, Z = O, R^3 = 3-CN, 6-Br
1439	R^2 = CHF_2, Z = O, R^3 = 3-CN, 6-OMe
1440	R^2 = CHF_2, Z = O, R^3 = 3-CN, 6-CF_3
1441	R^2 = SO_2Me, Z = O, R^3 = H (m = 0)
1442	R^2 = SO_2Me, Z = O, R^3 = 3-F
1443	R^2 = SO_2Me, Z = O, R^3 = 3-Cl
1444	R^2 = SO_2Me, Z = O, R^3 = 3-Br
1445	R^2 = SO_2Me, Z = O, R^3 = 3-I
1446	R^2 = SO_2Me, Z = O, R^3 = 3-CN
1447	R^2 = SO_2Me, Z = O, R^3 = 3-NO_2
1448	R^2 = SO_2Me, Z = O, R^3 = 3-OMe
1449	R^2 = SO_2Me, Z = O, R^3 = 3-OCF_3
1450	R^2 = SO_2Me, Z = O, R^3 = 3-CF_3
1451	R^2 = SO_2Me, Z = O, R^3 = 3-CHF_2
1452	R^2 = SO_2Me, Z = O, R^3 = 3-CH_2F
1453	R^2 = SO_2Me, Z = O, R^3 = 3-CHO
1454	R^2 = SO_2Me, Z = O, R^3 = 3-Me
1455	R^2 = SO_2Me, Z = O, R^3 = 3-Et
1456	R^2 = SO_2Me, Z = O, R^3 = 3-Ethynyl
1457	R^2 = SO_2Me, Z = O, R^3 = 3-Ethenyl
1458	R^2 = SO_2Me, Z = O, R^3 = 3-SO_2Me
1459	R^2 = SO_2Me, Z = O, R^3 = 3-OAc
1460	R^2 = SO_2Me, Z = O, R^3 = 3-c-Pr
1461	R^2 = SO_2Me, Z = O, R^3 = 3-i-Pr
1462	R^2 = SO_2Me, Z = O, R^3 = 3-Ph
1463	R^2 = SO_2Me, Z = S, R^3 = 3-F
1464	R^2 = SO_2Me, Z = S, R^3 = 3-Cl
1465	R^2 = SO_2Me, Z = S, R^3 = 3-Br
1466	R^2 = SO_2Me, Z = S, R^3 = 3-I
1467	R^2 = SO_2Me, Z = S, R^3 = 3-CN
1468	R^2 = SO_2Me, Z = S, R^3 = 3-NO_2
1469	R^2 = SO_2Me, Z = S, R^3 = 3-OMe
1470	R^2 = SO_2Me, Z = S, R^3 = 3-OCF_3
1471	R^2 = SO_2Me, Z = S, R^3 = 3-CF_3
1472	R^2 = SO_2Me, Z = S, R^3 = 3-CHF_2
1473	R^2 = SO_2Me, Z = S, R^3 = 3-CH_2F
1474	R^2 = SO_2Me, Z = S, R^3 = 3-CHO
1475	R^2 = SO_2Me, Z = S, R^3 = 3-Me
1476	R^2 = SO_2Me, Z = S, R^3 = 3-Et
1477	R^2 = SO_2Me, Z = S, R^3 = 3-Ethynyl
1478	R^2 = SO_2Me, Z = S, R^3 = 3-Ethenyl
1479	R^2 = SO_2Me, Z = S, R^3 = 3-SO_2Me
1480	R^2 = SO_2Me, Z = S, R^3 = 3-OAc
1481	R^2 = SO_2Me, Z = S, R^3 = 3-c-Pr
1482	R^2 = SO_2Me, Z = S, R^3 = 3-i-Pr
1483	R^2 = SO_2Me, Z = S, R^3 = 3-Ph
1484	R^2 = SO_2Me, Z = O, R^3 = 4-F
1485	R^2 = SO_2Me, Z = O, R^3 = 4-Cl
1486	R^2 = SO_2Me, Z = O, R^3 = 4-Br
1487	R^2 = SO_2Me, Z = O, R^3 = 4-I
1488	R^2 = SO_2Me, Z = O, R^3 = 4-CN
1489	R^2 = SO_2Me, Z = O, R^3 = 4-NO_2
1490	R^2 = SO_2Me, Z = O, R^3 = 4-OMe
1491	R^2 = SO_2Me, Z = O, R^3 = 4-OCF_3
1492	R^2 = SO_2Me, Z = O, R^3 = 4-CF_3
1493	R^2 = SO_2Me, Z = O, R^3 = 4-CHF_2
1494	R^2 = SO_2Me, Z = O, R^3 = 4-CH_2F
1495	R^2 = SO_2Me, Z = O, R^3 = 4-CHO
1496	R^2 = SO_2Me, Z = O, R^3 = 4-Me
1497	R^2 = SO_2Me, Z = O, R^3 = 4-Et

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Table	Header Row
1498	R^2 = SO_2Me, Z = O, R^3 = 4-Ethynyl
1499	R^2 = SO_2Me, Z = O, R^3 = 4-Ethenyl
1500	R^2 = SO_2Me, Z = O, R^3 = 4-SO_2Me
1501	R^2 = SO_2Me, Z = O, R^3 = 4-OAc
1502	R^2 = SO_2Me, Z = O, R^3 = 4-c-Pr
1503	R^2 = SO_2Me, Z = O, R^3 = 4-i-Pr
1504	R^2 = SO_2Me, Z = O, R^3 = 4-Ph
1505	R^2 = SO_2Me, Z = O, R^3 = 5-F
1506	R^2 = SO_2Me, Z = O, R^3 = 5-Cl
1507	R^2 = SO_2Me, Z = O, R^3 = 5-Br
1508	R^2 = SO_2Me, Z = O, R^3 = 5-I
1509	R^2 = SO_2Me, Z = O, R^3 = 5-CN
1510	R^2 = SO_2Me, Z = O, R^3 = 5-NO_2
1511	R^2 = SO_2Me, Z = O, R^3 = 5-OMe
1512	R^2 = SO_2Me, Z = O, R^3 = 5-OCF_3
1513	R^2 = SO_2Me, Z = O, R^3 = 5-CF_3
1514	R^2 = SO_2Me, Z = O, R^3 = 5-CHF_2
1515	R^2 = SO_2Me, Z = O, R^3 = 5-CH_2F
1516	R^2 = SO_2Me, Z = O, R^3 = 5-CHO
1517	R^2 = SO_2Me, Z = O, R^3 = 5-Me
1518	R^2 = SO_2Me, Z = O, R^3 = 5-Et
1519	R^2 = SO_2Me, Z = O, R^3 = 5-Ethynyl
1520	R^2 = SO_2Me, Z = O, R^3 = 5-Ethenyl
1521	R^2 = SO_2Me, Z = O, R^3 = 5-SO_2Me
1522	R^2 = SO_2Me, Z = O, R^3 = 5-OAc
1523	R^2 = SO_2Me, Z = O, R^3 = 5-c-Pr
1524	R^2 = SO_2Me, Z = O, R^3 = 5-i-Pr
1525	R^2 = SO_2Me, Z = O, R^3 = 5-Ph
1526	R^2 = SO_2Me, Z = O, R^3 = 6-F
1527	R^2 = SO_2Me, Z = O, R^3 = 6-Cl
1528	R^2 = SO_2Me, Z = O, R^3 = 6-Br
1529	R^2 = SO_2Me, Z = O, R^3 = 6-I
1530	R^2 = SO_2Me, Z = O, R^3 = 6-CN
1531	R^2 = SO_2Me, Z = O, R^3 = 6-NO_2
1532	R^2 = SO_2Me, Z = O, R^3 = 6-OMe
1533	R^2 = SO_2Me, Z = O, R^3 = 6-OCF_3
1534	R^2 = SO_2Me, Z = O, R^3 = 6-CF_3
1535	R^2 = SO_2Me, Z = O, R^3 = 6-CHF_2
1536	R^2 = SO_2Me, Z = O, R^3 = 6-CH_2F
1537	R^2 = SO_2Me, Z = O, R^3 = 6-CHO
1538	R^2 = SO_2Me, Z = O, R^3 = 6-Me
1539	R^2 = SO_2Me, Z = O, R^3 = 6-Et
1540	R^2 = SO_2Me, Z = O, R^3 = 6-Ethynyl
1541	R^2 = SO_2Me, Z = O, R^3 = 6-Ethenyl
1542	R^2 = SO_2Me, Z = O, R^3 = 6-SO_2Me
1543	R^2 = SO_2Me, Z = O, R^3 = 6-OAc
1544	R^2 = SO_2Me, Z = O, R^3 = 6-c-Pr
1545	R^2 = SO_2Me, Z = O, R^3 = 6-i-Pr
1546	R^2 = SO_2Me, Z = O, R^3 = 6-Ph
1547	R^2 = SO_2Me, Z = O, R^3 = 3,4-di-F
1548	R^2 = SO_2Me, Z = O, R^3 = 3,5-di-F
1549	R^2 = SO_2Me, Z = O, R^3 = 3,6-di-F
1550	R^2 = SO_2Me, Z = O, R^3 = 4,5-di-F
1551	R^2 = SO_2Me, Z = O, R^3 = 3,4-di-Cl
1552	R^2 = SO_2Me, Z = O, R^3 = 3,5-di-Cl
1553	R^2 = SO_2Me, Z = O, R^3 = 3,6-di-Cl
1554	R^2 = SO_2Me, Z = O, R^3 = 4,5-di-Cl
1555	R^2 = SO_2Me, Z = O, R^3 = 3,4-di-Br
1556	R^2 = SO_2Me, Z = O, R^3 = 3,5-di-Br
1557	R^2 = SO_2Me, Z = O, R^3 = 3,6-di-Br
1558	R^2 = SO_2Me, Z = O, R^3 = 4,5-di-Br
1559	R^2 = SO_2Me, Z = O, R^3 = 3,4-di-CN
1560	R^2 = SO_2Me, Z = O, R^3 = 3,5-di-CN
1561	R^2 = SO_2Me, Z = O, R^3 = 3,6-di-CN
1562	R^2 = SO_2Me, Z = O, R^3 = 4,5-di-CN
1563	R^2 = SO_2Me, Z = O, R^3 = 3,4-di-Me
1564	R^2 = SO_2Me, Z = O, R^3 = 3,5-di-Me
1565	R^2 = SO_2Me, Z = O, R^3 = 3,6-di-Me
1566	R^2 = SO_2Me, Z = O, R^3 = 4,5-di-Me
1567	R^2 = SO_2Me, Z = O, R^3 = 3,4-di-OMe
1568	R^2 = SO_2Me, Z = O, R^3 = 3,5-di-OMe
1569	R^2 = SO_2Me, Z = O, R^3 = 3,6-di-OMe
1570	R^2 = SO_2Me, Z = O, R^3 = 4,5-di-OMe
1571	R^2 = SO_2Me, Z = O, R^3 = 3,4-di-CF_3

-continued

Table	Header Row
1572	R^2 = SO_2Me, Z = O, R^3 = 3,5-di-CF_3
1573	R^2 = SO_2Me, Z = O, R^3 = 3,6-di-CF_3
1574	R^2 = SO_2Me, Z = O, R^3 = 4,5-di-CF_3
1575	R^2 = SO_2Me, Z = O, R^3 = 3-CN, 4-Me
1576	R^2 = SO_2Me, Z = O, R^3 = 3-CN, 4-F
1577	R^2 = SO_2Me, Z = O, R^3 = 3-CN, 4-Br
1578	R^2 = SO_2Me, Z = O, R^3 = 3-CN, 4-OMe
1579	R^2 = SO_2Me, Z = O, R^3 = 3-CN, 4-CF_3
1580	R^2 = SO_2Me, Z = O, R^3 = 3-CN, 6-Me
1581	R^2 = SO_2Me, Z = O, R^3 = 3-CN, 6-F
1582	R^2 = SO_2Me, Z = O, R^3 = 3-CN, 6-Br
1583	R^2 = SO_2Me, Z = O, R^3 = 3-CN, 6-OMe
1584	R^2 = SO_2Me, Z = O, R^3 = 3-CN, 6-CF_3

[0415] A compound of this invention will generally be used as a herbicidal active ingredient in a composition, i.e. formulation, with at least one additional component selected from the group consisting of surfactants, solid diluents and liquid diluents, which serves as a carrier. The formulation or composition ingredients are selected to be consistent with the physical properties of the active ingredient, mode of application and environmental factors such as soil type, moisture and temperature.

[0416] Useful formulations include both liquid and solid compositions. Liquid compositions include solutions (including emulsifiable concentrates), suspensions, emulsions (including microemulsions, oil-in-water emulsions, flowable concentrates and/or suspoemulsions) and the like, which optionally can be thickened into gels. The general types of aqueous liquid compositions are soluble concentrate, suspension concentrate, capsule suspension, concentrated emulsion, microemulsion, oil-in-water emulsion, flowable concentrate and suspo-emulsion. The general types of nonaqueous liquid compositions are emulsifiable concentrate, microemulsifiable concentrate, dispersible concentrate and oil dispersion.

[0417] The general types of solid compositions are dusts, powders, granules, pellets, prills, pastilles, tablets, filled films (including seed coatings) and the like, which can be water-dispersible ("wettable") or water-soluble. Films and coatings formed from film-forming solutions or flowable suspensions are particularly useful for seed treatment. Active ingredient can be (micro)encapsulated and further formed into a suspension or solid formulation; alternatively the entire formulation of active ingredient can be encapsulated (or "overcoated"). Encapsulation can control or delay release of the active ingredient. An emulsifiable granule combines the advantages of both an emulsifiable concentrate formulation and a dry granular formulation. High-strength compositions are primarily used as intermediates for further formulation.

[0418] Sprayable formulations are typically extended in a suitable medium before spraying. Such liquid and solid formulations are formulated to be readily diluted in the spray medium, usually water, but occasionally another suitable medium like an aromatic or paraffinic hydrocarbon or vegetable oil. Spray volumes can range from about from about one to several thousand liters per hectare, but more typically are in the range from about ten to several hundred liters per hectare. Sprayable formulations can be tank mixed with water or another suitable medium for foliar treatment by aerial or ground application, or for application to the grow-

ing medium of the plant. Liquid and dry formulations can be metered directly into drip irrigation systems or metered into the furrow during planting.

[0419] The formulations will typically contain effective amounts of active ingredient, diluent and surfactant within the following approximate ranges which add up to 100 percent by weight.

	Weight Percent		
	Active Ingredient	Diluent	Surfactant
Water-Dispersible and Water-soluble Granules, Tablets and Powders	0.001-90	0-99.999	0-15
Oil Dispersions, Suspensions, Emulsions, Solutions (including Emulsifiable Concentrates)	1-50	40-99	0-50
Dusts	1-25	70-99	0-5
Granules and Pellets	0.001-99	5-99.999	0-15
High Strength Compositions	90-99	0-10	0-2

[0420] Solid diluents include, for example, clays such as bentonite, montmorillonite, attapulgite and kaolin, gypsum, cellulose, titanium dioxide, zinc oxide, starch, dextrin, sugars (e.g., lactose, sucrose), silica, talc, mica, diatomaceous earth, urea, calcium carbonate, sodium carbonate and bicarbonate, and sodium sulfate. Typical solid diluents are described in Watkins et al., *Handbook of Insecticide Dust Diluents and Carriers,* 2nd Ed., Dorland Books, Caldwell, N.J.

[0421] Liquid diluents include, for example, water, N,N-dimethylalkanamides (e.g., N,N-dimethylformamide), limonene, dimethyl sulfoxide, N-alkylpyrrolidones (e.g., N-methylpyrrolidinone), alkyl phosphates (e.g., triethyl phosphate), ethylene glycol, triethylene glycol, propylene glycol, dipropylene glycol, polypropylene glycol, propylene carbonate, butylene carbonate, paraffins (e.g., white mineral oils, normal paraffins, isoparaffins), alkylbenzenes, alkylnaphthalenes, glycerine, glycerol triacetate, sorbitol, aromatic hydrocarbons, dearomatized aliphatics, alkylbenzenes, alkylnaphthalenes, ketones such as cyclohexanone, 2-heptanone, isophorone and 4-hydroxy-4-methyl-2-pentanone, acetates such as isoamyl acetate, hexyl acetate, heptyl acetate, octyl acetate, nonyl acetate, tridecyl acetate and isobornyl acetate, other esters such as alkylated lactate esters, dibasic esters, alkyl and aryl benzoates and γ-butyrolactone, and alcohols, which can be linear, branched, saturated or unsaturated, such as methanol, ethanol, n-propanol, isopropyl alcohol, n-butanol, isobutyl alcohol, n-hexanol, 2-ethylhexanol, n-octanol, decanol, isodecyl alcohol, isooctadecanol, cetyl alcohol, lauryl alcohol, tridecyl alcohol, oleyl alcohol, cyclohexanol, tetrahydrofurfuryl alcohol, diacetone alcohol, cresol and benzyl alcohol. Liquid diluents also include glycerol esters of saturated and unsaturated fatty acids (typically C_6-C_{22}), such as plant seed and fruit oils (e.g., oils of olive, castor, linseed, sesame, corn (maize), peanut, sunflower, grapeseed, safflower, cottonseed, soybean, rapeseed, coconut and palm kernel), animal-sourced fats (e.g., beef tallow, pork tallow, lard, cod liver oil, fish oil), and mixtures thereof. Liquid diluents also include alkylated fatty acids (e.g., methylated, ethylated, butylated) wherein the fatty acids may be obtained by hydrolysis of glycerol esters from plant and animal sources, and can be purified by distillation. Typical liquid diluents are described in Marsden, *Solvents Guide,* 2nd Ed., Interscience, New York, 1950.

[0422] The solid and liquid compositions of the present invention often include one or more surfactants. When added to a liquid, surfactants (also known as "surface-active agents") generally modify, most often reduce, the surface tension of the liquid. Depending on the nature of the hydrophilic and lipophilic groups in a surfactant molecule, surfactants can be useful as wetting agents, dispersants, emulsifiers or defoaming agents.

[0423] Surfactants can be classified as nonionic, anionic or cationic. Nonionic surfactants useful for the present compositions include, but are not limited to: alcohol alkoxylates such as alcohol alkoxylates based on natural and synthetic alcohols (which may be branched or linear) and prepared from the alcohols and ethylene oxide, propylene oxide, butylene oxide or mixtures thereof; amine ethoxylates, alkanolamides and ethoxylated alkanolamides; alkoxylated triglycerides such as ethoxylated soybean, castor and rapeseed oils; alkylphenol alkoxylates such as octylphenol ethoxylates, nonylphenol ethoxylates, dinonyl phenol ethoxylates and dodecyl phenol ethoxylates (prepared from the phenols and ethylene oxide, propylene oxide, butylene oxide or mixtures thereof); block polymers prepared from ethylene oxide or propylene oxide and reverse block polymers where the terminal blocks are prepared from propylene oxide; ethoxylated fatty acids; ethoxylated fatty esters and oils; ethoxylated methyl esters; ethoxylated tristyrylphenol (including those prepared from ethylene oxide, propylene oxide, butylene oxide or mixtures thereof); fatty acid esters, glycerol esters, lanolin-based derivatives, polyethoxylate esters such as polyethoxylated sorbitan fatty acid esters, polyethoxylated sorbitol fatty acid esters and polyethoxylated glycerol fatty acid esters; other sorbitan derivatives such as sorbitan esters; polymeric surfactants such as random copolymers, block copolymers, alkyd peg (polyethylene glycol) resins, graft or comb polymers and star polymers; polyethylene glycols (pegs); polyethylene glycol fatty acid esters; silicone-based surfactants; and sugar-derivatives such as sucrose esters, alkyl polyglycosides and alkyl polysaccharides.

[0424] Useful anionic surfactants include, but are not limited to: alkylaryl sulfonic acids and their salts; carboxylated alcohol or alkylphenol ethoxylates; diphenyl sulfonate derivatives; lignin and lignin derivatives such as lignosulfonates; maleic or succinic acids or their anhydrides; olefin sulfonates; phosphate esters such as phosphate esters of alcohol alkoxylates, phosphate esters of alkylphenol alkoxylates and phosphate esters of styryl phenol ethoxylates; protein-based surfactants; sarcosine derivatives; styryl phenol ether sulfate; sulfates and sulfonates of oils and fatty acids; sulfates and sulfonates of ethoxylated alkylphenols; sulfates of alcohols; sulfates of ethoxylated alcohols; sulfonates of amines and amides such as N,N-alkyltaurates; sulfonates of benzene, cumene, toluene, xylene, and dodecyl and tridecylbenzenes; sulfonates of condensed naphthalenes; sulfonates of naphthalene and alkyl naphthalene; sulfonates of fractionated petroleum; sulfosuccinamates; and sulfosuccinates and their derivatives such as dialkyl sulfosuccinate salts.

[0425] Useful cationic surfactants include, but are not limited to: amides and ethoxylated amides; amines such as N-alkyl propanediamines, tripropylenetriamines and dipro-

pylenetetramines, and ethoxylated amines, ethoxylated diamines and propoxylated amines (prepared from the amines and ethylene oxide, propylene oxide, butylene oxide or mixtures thereof); amine salts such as amine acetates and diamine salts; quaternary ammonium salts such as quaternary salts, ethoxylated quaternary salts and diquaternary salts; and amine oxides such as alkyldimethylamine oxides and bis-(2-hydroxyethyl)-alkylamine oxides.

[0426] Also useful for the present compositions are mixtures of nonionic and anionic surfactants or mixtures of nonionic and cationic surfactants. Nonionic, anionic and cationic surfactants and their recommended uses are disclosed in a variety of published references including *McCutcheon's Emulsifiers and Detergents*, annual American and International Editions published by McCutcheon's Division, The Manufacturing Confectioner Publishing Co.; Sisely and Wood, *Encyclopedia of Surface Active Agents*, Chemical Publ. Co., Inc., New York, 1964; and A. S. Davidson and B. Milwidsky, *Synthetic Detergents*, Seventh Edition, John Wiley and Sons, New York, 1987.

[0427] Compositions of this invention may also contain formulation auxiliaries and additives, known to those skilled in the art as formulation aids (some of which may be considered to also function as solid diluents, liquid diluents or surfactants). Such formulation auxiliaries and additives may control: pH (buffers), foaming during processing (antifoams such polyorganosiloxanes), sedimentation of active ingredients (suspending agents), viscosity (thixotropic thickeners), in-container microbial growth (antimicrobials), product freezing (antifreezes), color (dyes/pigment dispersions), wash-off (film formers or stickers), evaporation (evaporation retardants), and other formulation attributes. Film formers include, for example, polyvinyl acetates, polyvinyl acetate copolymers, polyvinylpyrrolidone-vinyl acetate copolymer, polyvinyl alcohols, polyvinyl alcohol copolymers and waxes. Examples of formulation auxiliaries and additives include those listed in *McCutcheon's Volume 2: Functional Materials*, annual International and North American editions published by McCutcheon's Division, The Manufacturing Confectioner Publishing Co.; and PCT Publication WO 03/024222.

[0428] The compound of Formula 1 and any other active ingredients are typically incorporated into the present compositions by dissolving the active ingredient in a solvent or by grinding in a liquid or dry diluent. Solutions, including emulsifiable concentrates, can be prepared by simply mixing the ingredients. If the solvent of a liquid composition intended for use as an emulsifiable concentrate is water-immiscible, an emulsifier is typically added to emulsify the active-containing solvent upon dilution with water. Active ingredient slurries, with particle diameters of up to 2,000 μm can be wet milled using media mills to obtain particles with average diameters below 3 μm. Aqueous slurries can be made into finished suspension concentrates (see, for example, U.S. Pat. No. 3,060,084) or further processed by spray drying to form water-dispersible granules. Dry formulations usually require dry milling processes, which produce average particle diameters in the 2 to 10 μm range. Dusts and powders can be prepared by blending and usually grinding (such as with a hammer mill or fluid-energy mill). Granules and pellets can be prepared by spraying the active material upon preformed granular carriers or by agglomeration techniques. See Browning, "Agglomeration", *Chemical Engineering*, Dec. 4, 1967, pp 147-48, *Perry's Chemical Engineer's Handbook*, 4th Ed., McGraw-Hill, New York, 1963, pages 8-57 and following, and WO 91/13546. Pellets can be prepared as described in U.S. Pat. No. 4,172,714. Water-dispersible and water-soluble granules can be prepared as taught in U.S. Pat. Nos. 4,144,050, 3,920,442 and DE 3,246,493. Tablets can be prepared as taught in U.S. Pat. Nos. 5,180,587, 5,232,701 and 5,208,030. Films can be prepared as taught in GB 2,095,558 and U.S. Pat. No. 3,299,566.

[0429] For further information regarding the art of formulation, see T. S. Woods, "The Formulator's Toolbox—Product Forms for Modern Agriculture" in *Pesticide Chemistry and Bioscience, The Food-Environment Challenge*, T. Brooks and T. R. Roberts, Eds., Proceedings of the 9th International Congress on Pesticide Chemistry, The Royal Society of Chemistry, Cambridge, 1999, pp. 120-133. See also U.S. Pat. No. 3,235,361, Col. 6, line 16 through Col. 7, line 19 and Examples 10-41; U.S. Pat. No. 3,309,192, Col. 5, line 43 through Col. 7, line 62 and Examples 8, 12, 15, 39, 41, 52, 53, 58, 132, 138-140, 162-164, 166, 167 and 169-182; U.S. Pat. No. 2,891,855, Col. 3, line 66 through Col. 5, line 17 and Examples 1-4; Klingman, *Weed Control as a Science*, John Wiley and Sons, Inc., New York, 1961, pp 81-96; Hance et al., *Weed Control Handbook*, 8th Ed., Blackwell Scientific Publications, Oxford, 1989; and *Developments in formulation technology*, PJB Publications, Richmond, U K, 2000.

[0430] In the following Examples, all percentages are by weight and all formulations are prepared in conventional ways. Compound numbers refer to compounds in Index Table A. Without further elaboration, it is believed that one skilled in the art using the preceding description can utilize the present invention to its fullest extent. The following Examples are, therefore, to be construed as merely illustrative, and not limiting of the disclosure in any way whatsoever. Percentages are by weight except where otherwise indicated.

Example A

[0431] High Strength Concentrate

Compound 1	98.5%
silica aerogel	0.5%
synthetic amorphous fine silica	1.0%

Example B

[0432] Wettable Powder

Compound 12	65.0%
dodecylphenol polyethylene glycol ether	2.0%
sodium ligninsulfonate	4.0%
sodium silicoaluminate	6.0%
montmorillonite (calcined)	23.0%

Example C

[0433] Granule

Compound 15	10.0%
attapulgite granules (low volatile matter, 0.71/0.30 mm; U.S.S. No. 25-50 sieves)	90.0%

Example D

[0434] Extruded Pellet

Compound 21	25.0%
anhydrous sodium sulfate	10.0%
crude calcium ligninsulfonate	5.0%
sodium alkylnaphthalenesulfonate	1.0%
calcium/magnesium bentonite	59.0%

Example E

[0435] Emulsifiable Concentrate

Compound 23	10.0%
polyoxyethylene sorbitol hexoleate	20.0%
C_6-C_{10} fatty acid methyl ester	70.0%

Example F

[0436] Microemulsion

Compound 24	5.0%
polyvinylpyrrolidone-vinyl acetate copolymer	30.0%
alkylpolyglycoside	30.0%
glyceryl monooleate	15.0%
water	20.0%

Example G

[0437] Suspension Concentrate

Compound 27	35%
butyl polyoxyethylene/polypropylene block copolymer	4.0%
stearic acid/polyethylene glycol copolymer	1.0%
styrene acrylic polymer	1.0%
xanthan gum	0.1%
propylene glycol	5.0%
silicone based defoamer	0.1%
1,2-benzisothiazolin-3-one	0.1%
water	53.7%

Example H

[0438] Emulsion in Water

Compound 32	10.0%
butyl polyoxyethylene/polypropylene block copolymer	4.0%
stearic acid/polyethylene glycol copolymer	1.0%
styrene acrylic polymer	1.0%
xanthan gum	0.1%
propylene glycol	5.0%
silicone based defoamer	0.1%
1,2-benzisothiazolin-3-one	0.1%
aromatic petroleum based hydrocarbon	20.0
water	58.7%

Example I

[0439] Oil Dispersion

Compound 42	25%
polyoxyethylene sorbitol hexaoleate	15%
organically modified bentonite clay	2.5%
fatty acid methyl ester	57.5%

Example J

[0440] Suspoemulsion

Compound 1	10.0%
imidacloprid	5.0%
butyl polyoxyethylene/polypropylene block copolymer	4.0%
stearic acid/polyethylene glycol copolymer	1.0%
styrene acrylic polymer	1.0%
xanthan gum	0.1%
propylene glycol	5.0%
silicone based defoamer	0.1%
1,2-benzisothiazolin-3-one	0.1%
aromatic petroleum based hydrocarbon	20.0%
water	53.7%

[0441] Test results indicate that the compounds of the present invention are highly active preemergent and/or postemergent herbicides and/or plant growth regulants. The compounds of the invention generally show highest activity for postemergence weed control (i.e. applied after weed seedlings emerge from the soil) and preemergence weed control (i.e. applied before weed seedlings emerge from the soil). Many of them have utility for broad-spectrum pre- and/or postemergence weed control in areas where complete control of all vegetation is desired such as around fuel storage tanks, industrial storage areas, parking lots, drive-in theaters, air fields, river banks, irrigation and other waterways, around billboards and highway and railroad structures. Many of the compounds of this invention, by virtue of selective metabolism in crops versus weeds, or by selective activity at the locus of physiological inhibition in crops and weeds, or by selective placement on or within the environment of a mixture of crops and weeds, are useful for the selective control of grass and broadleaf weeds within a crop/weed mixture. One skilled in the art will recognize that the preferred combination of these selectivity factors within a compound or group of compounds can readily be determined by performing routine biological and/or biochemical assays. Compounds of this invention may show tolerance to important agronomic crops including, but is not limited to, alfalfa, barley, cotton, wheat, rape, sugar beets, corn (maize), *sorghum*, soybeans, rice, oats, peanuts, vegetables, tomato, potato, perennial plantation crops including coffee, cocoa, oil palm, rubber, sugarcane, citrus, grapes, fruit trees, nut trees, banana, plantain, pineapple, hops, tea and forests such as *eucalyptus* and conifers (e.g., loblolly pine), and turf species (e.g., Kentucky bluegrass, St. Augustine grass, Kentucky fescue and Bermuda grass). Compounds of this invention can be used in crops genetically transformed or bred to incorporate resistance to herbicides, express proteins toxic to invertebrate pests (such as *Bacillus thuringiensis* toxin), and/or express other useful traits. Those skilled in the art will appreciate that not all compounds are equally effective

against all weeds. Alternatively, the subject compounds are useful to modify plant growth.

[0442] As the compounds of the invention have both preemergent and postemergent herbicidal activity, to control undesired vegetation by killing or injuring the vegetation or reducing its growth, the compounds can be usefully applied by a variety of methods involving contacting a herbicidally effective amount of a compound of the invention, or a composition comprising said compound and at least one of a surfactant, a solid diluent or a liquid diluent, to the foliage or other part of the undesired vegetation or to the environment of the undesired vegetation such as the soil or water in which the undesired vegetation is growing or which surrounds the seed or other propagule of the undesired vegetation.

[0443] A herbicidally effective amount of the compounds of this invention is determined by a number of factors. These factors include: formulation selected, method of application, amount and type of vegetation present, growing conditions, etc. In general, a herbicidally effective amount of compounds of this invention is about 0.001 to 20 kg/ha with a preferred range of about 0.004 to 1 kg/ha. One skilled in the art can easily determine the herbicidally effective amount necessary for the desired level of weed control.

[0444] Compounds of the invention are useful in treating all plants and plant parts. Plant varieties and cultivars can be obtained by conventional propagation and breeding methods or by genetic engineering methods. Genetically modified plants (transgenic plants) are those in which a heterologous gene (transgene) has been stably integrated into the plant's genome. A transgene that is defined by its particular location in the plant genome is called a transformation or transgenic event.

[0445] Genetically modified plant cultivars which can be treated according to the invention include those that are resistant against one or more biotic stresses (pests such as nematodes, insects, mites, fungi, etc.) or abiotic stresses (drought, cold temperature, soil salinity, etc.), or that contain other desirable characteristics. Plants can be genetically modified to exhibit traits of, for example, herbicide tolerance, insect-resistance, modified oil profiles or drought tolerance. Useful genetically modified plants containing single gene transformation events or combinations of transformation events are listed in Exhibit C. Additional information for the genetic modifications listed in Exhibit C can be obtained from publicly available databases maintained, for example, by the U.S. Department of Agriculture.

[0446] The following abbreviations, 1 through 37, are used in Exhibit C for traits. A "-" means the entry is not available.

Trait	Description
1	Glyphosate tolerance
2	High lauric acid oil
3	Glufosinate tolerance
4	Phytate breakdown
5	Oxynil tolerance
6	Disease resistance
7	Insect resistance
9	Modified flower color
11	ALS Herbicide Tol.
12	Dicamba Tolerance
13	Anti-allergy
14	Salt tolerance
15	Cold tolerance
16	Imidazolinone herb. tol.
17	Modified alpha-amylase
18	Pollination control
19	2,4-D tolerance
20	Increased lysine
21	Drought tolerance
22	Delayed ripening/senescence
23	Modified product quality
24	High cellulose
25	Modified starch/carbohydrate
26	Insect & disease resist.
27	High tryptophan
28	Erect leaves semidwarf
29	Semidwarf
30	Low iron tolerance
31	Modified oil/fatty acid
32	HPPD tolerance
33	High oil
34	Aryloxyalkanoate tol.
35	Mesotrione tolerance
36	Reduced nicotine
37	Modified product

Exhibit C

[0447]

Crop	Event Name	Event Code	Trait(s)	Gene(s)
Alfalfa	J101	MON-00101-8	1	cp4 epsps (aroA:CP4)
Alfalfa	J163	MON-ØØ163-7	1	cp4 epsps (aroA:CP4)
Canola*	23-18-17 (Event 18)	CGN-89465-2	2	te
Canola*	23-198 (Event 23)	CGN-89465-2	2	te
Canola*	61061	DP-Ø61Ø61-7	1	gat4621
Canola*	73496	DP-Ø73496-4	1	gat4621
Canola*	GT200 (RT200)	MON-89249-2	1	cp4 epsps (aroA:CP4); goxv247
Canola*	GT73 (RT73)	MON-ØØØ73-7	1	cp4 epsps (aroA:CP4); goxv247
Canola*	HCN10 (Topas 19/2)	—	3	bar
Canola*	HCN28 (T45)	ACS-BNØØ8-2	3	pat (syn)
Canola*	HCN92 (Topas 19/2)	ACS-BNØØ7-1	3	bar
Canola*	MON88302	MON-883Ø2-9	1	cp4 epsps (aroA:CP4)
Canola*	MPS961	—	4	phyA
Canola*	MPS962	—	4	phyA
Canola*	MPS963	—	4	phyA
Canola*	MPS964	—	4	phyA
Canola*	MPS965	—	4	phyA
Canola*	MS1 (B91-4)	ACS-BNØØ4-7	3	bar
Canola*	MS8	ACS-BNØØ5-8	3	bar

-continued

Crop	Event Name	Event Code	Trait(s)	Gene(s)
Canola*	OXY-235	ACS-BNØ11-5	5	bxn
Canola*	PHY14	—	3	bar
Canola*	PHY23	—	3	bar
Canola*	PHY35	—	3	bar
Canola*	PHY36	—	3	bar
Canola*	RF1 (B93-101)	ACS-BNØØ1-4	3	bar
Canola*	RF2 (B94-2)	ACS-BNØØ2-5	3	bar
Canola*	RF3	ACS-BNØØ3-6	3	bar
Bean	EMBRAPA 5.1	EMB-PV051-1	6	ac1 (sense and antisense)
Brinjal#	EE-1	—	7	cry1Ac
Cotton	19-51a	DD-Ø1951A-7	11	S4-HrA
Cotton	281-24-236	DAS-24236-5	3, 7	pat (syn); cry1F
Cotton	3006-210-23	DAS-21Ø23-5	3, 7	pat (syn); cry1Ac
Cotton	31707	—	5, 7	bxn; cry1Ac
Cotton	31803	—	5, 7	bxn; cry1Ac
Cotton	31807	—	5, 7	bxn; cry1Ac
Cotton	31808	—	5, 7	bxn; cry1Ac
Cotton	42317	—	5, 7	bxn; cry1Ac
Cotton	BNLA-601	—	7	cry1Ac
Cotton	BXN10211	BXN10211-9	5	bxn; cry1Ac
Cotton	BXN10215	BXN10215-4	5	bxn; cry1Ac
Cotton	BXN10222	BXN10222-2	5	bxn; cry1Ac
Cotton	BXN10224	BXN10224-4	5	bxn; cry1Ac
Cotton	COT102	SYN-IR102-7	7	vip3A(a)
Cotton	COT67B	SYN-IR67B-1	7	cry1Ab
Cotton	COT202	—	7	vip3A
Cotton	Event 1	—	7	cry1Ac
Cotton	GMF Cry1A	GTL-GMF311-7	7	cry1Ab-Ac
Cotton	GHB119	BCS-GH005-8	7	cry2Ae
Cotton	GHB614	BCS-GH002-5	1	2mepsps
Cotton	GK12	—	7	cry1Ab-Ac
Cotton	LLCotton25	ACS-GH001-3	3	bar
Cotton	MLS 9124	—	7	cry1C
Cotton	MON1076	MON-89924-2	7	cry1Ac
Cotton	MON1445	MON-01445-2	1	cp4 epsps (aroA:CP4)
Cotton	MON15985	MON-15985-7	7	cry1Ac; cry2Ab2
Cotton	MON1698	MON-89383-1	7	cp4 epsps (aroA:CP4)
Cotton	MON531	MON-00531-6	7	cry1Ac
Cotton	MON757	MON-00757-7	7	cry1Ac
Cotton	MON88913	MON-88913-8	1	cp4 epsps (aroA:CP4)
Cotton	Nqwe Chi6 Bt	—	7	—
Cotton	SKG321	—	7	cry1A; CpTI
Cotton	T303-3	BCS-GH003-6	3, 7	cry1Ab; bar
Cotton	T304-40	BCS-GH004-7	3, 7	cry1Ab; bar
Cotton	CE43-67B	—	7	cry1Ab
Cotton	CE46-02A	—	7	cry1Ab
Cotton	CE44-69D	—	7	cry1Ab
Cotton	1143-14A	—	7	cry1Ab
Cotton	1143-51B	—	7	cry1Ab
Cotton	T342-142	—	7	cry1Ab
Cotton	PV-GHGT07 (1445)	—	1	cp4 epsps (aroA:CP4)
Cotton	EE-GH3	—	1	mepsps
Cotton	EE-GH5	—	7	cry1Ab
Cotton	MON88701	MON-88701-3	3, 12	Modified dmo; bar
Cotton	OsCr11	—	13	Modified Cry j
Flax	FP967	CDC-FL001-2	11	als
Lentil	RH44	—	16	als
Maize	3272	SYN-E3272-5	17	amy797E
Maize	5307	SYN-05307-1	7	ecry3.1Ab
Maize	59122	DAS-59122-7	3, 7	cry34Ab1; cry35Ab1; pat
Maize	676	PH-000676-7	3, 18	pat; dam
Maize	678	PH-000678-9	3, 18	pat; dam
Maize	680	PH-000680-2	3, 18	pat; dam
Maize	98140	DP-098140-6	1, 11	gat4621; zm-hra
Maize	Bt10	—	3, 7	cry1Ab; pat
Maize	Bt176 (176)	SYN-EV176-9	3, 7	cry1Ab; bar
Maize	BVLA430101	—	4	phyA2
Maize	CBH-351	ACS-ZM004-3	3, 7	cry9C; bar
Maize	DAS40278-9	DAS40278-9	19	aad-1
Maize	DBT418	DKB-89614-9	3, 7	cry1Ac; pinII; bar
Maize	DLL25 (B16)	DKB-89790-5	3	bar
Maize	GA21	MON-00021-9	1	mepsps
Maize	GG25	—	1	mepsps
Maize	GJ11	—	1	mepsps

-continued

Crop	Event Name	Event Code	Trait(s)	Gene(s)
Maize	Fl117	—	1	mepsps
Maize	GAT-ZM1	—	3	pat
Maize	LY038	REN-00038-3	20	cordapA
Maize	MIR162	SYN-IR162-4	7	vip3Aa20
Maize	MIR604	SYN-IR604-5	7	mcry3A
Maize	MON801 (MON80100)	MON801	1, 7	cry1Ab; cp4 epsps (aroA:CP4); goxv247
Maize	MON802	MON-80200-7	1, 7	cry1Ab; cp4 epsps (aroA:CP4); goxv247
Maize	MON809	PH-MON-809-2	1, 7	cry1Ab; cp4 epsps (aroA:CP4); goxv247
Maize	MON810	MON-00810-6	1, 7	cry1Ab; cp4 epsps (aroA:CP4); goxv247
Maize	MON832	—	1	cp4 epsps (aroA:CP4); goxv247
Maize	MON863	MON-00863-5	7	cry3Bb1
Maize	MON87427	MON-87427-7	1	cp4 epsps (aroA:CP4)
Maize	MON87460	MON-87460-4	21	cspB
Maize	MON88017	MON-88017-3	1, 7	cry3Bb1; cp4 epsps (aroA:CP4)
Maize	MON89034	MON-89034-3	7	cry2Ab2; cry1A.105
Maize	MS3	ACS-ZM001-9	3, 18	bar; barnase
Maize	MS6	ACS-ZM005-4	3, 18	bar; barnase
Maize	NK603	MON-00603-6	1	cp4 epsps (aroA:CP4)
Maize	T14	ACS-ZM002-1	3	pat (syn)
Maize	T25	ACS-ZM003-2	3	pat (syn)
Maize	TC1507	DAS-01507-1	3, 7	cry1Fa2; pat
Maize	TC6275	DAS-06275-8	3, 7	mocry1F; bar
Maize	VIP1034	—	3, 7	vip3A; pat
Maize	43A47	DP-043A47-3	3, 7	cry1F; cry34Ab1; cry35Ab1; pat
Maize	40416	DP-040416-8	3, 7	cry1F; cry34Ab1; cry35Ab1; pat
Maize	32316	DP-032316-8	3, 7	cry1F; cry34Ab1; cry35Ab1; pat
Maize	4114	DP-004114-3	3, 7	cry1F; cry34Ab1; cry35Ab1; pat
Melon	Melon A	—	22	sam-k
Melon	Melon B	—	22	sam-k
Papaya	55-1	CUH-CP551-8	6	prsv cp
Papaya	63-1	CUH-CP631-7	6	prsv cp
Papaya	Huanong No. 1	—	6	prsv rep
Papaya	X17-2	UFL-X17CP-6	6	prsv cp
Plum	C-5	ARS-PLMC5-6	6	ppv cp
Canola**	ZSR500	—	1	cp4 epsps (aroA:CP4); goxv247
Canola**	ZSR502	—	1	cp4 epsps (aroA:CP4); goxv247
Canola**	ZSR503	—	1	cp4 epsps (aroA:CP4); goxv247
Rice	7Crp#242-95-7	—	13	7crp
Rice	7Crp#10	—	13	7crp
Rice	GM Shanyou 63	—	7	cry1Ab; cry1Ac
Rice	Huahui-1/TT51-1	—	7	cry1Ab; cry1Ac
Rice	LLRICE06	ACS-OS001-4	3	bar
Rice	LLRICE601	BCS-OS003-7	3	bar
Rice	LLRICE62	ACS-OS002-5	3	bar
Rice	Tarom molaii + cry1Ab	—	7	cry1Ab (truncated)
Rice	GAT-OS2	—	3	bar
Rice	GAT-OS3	—	3	bar
Rice	PE-7	—	7	Cry1Ac
Rice	7Crp#10	—	13	7crp
Rice	KPD627-8	—	27	OASA1D
Rice	KPD722-4	—	27	OASA1D
Rice	KA317	—	27	OASA1D
Rice	HW5	—	27	OASA1D
Rice	HW1	—	27	OASA1D
Rice	B-4-1-18	—	28	Δ OsBRI1
Rice	G-3-3-22	—	29	OSGA2ox1
Rice	AD77	—	6	DEF
Rice	AD51	—	6	DEF
Rice	AD48	—	6	DEF
Rice	AD41	—	6	DEF
Rice	13pNasNa800725atAprt1	—	30	HvNAS1; HvNAAT-A; APRT
Rice	13pAprt1	—	30	APRT
Rice	gHvNAS1-gHvNAAT-1	—	30	HvNAS1; HvNAAT-A; HvNAAT-B
Rice	gHvIDS3-1	—	30	HvIDS3
Rice	gHvNAAT1	—	30	HvNAAT-A; HvNAAT-B
Rice	gHvNAS1-1	—	30	HvNAS1
Rice	NIA-OS006-4	—	6	WRKY45
Rice	NIA-OS005-3	—	6	WRKY45
Rice	NIA-OS004-2	—	6	WRKY45
Rice	NIA-OS003-1	—	6	WRKY45

-continued

Crop	Event Name	Event Code	Trait(s)	Gene(s)
Rice	NIA-OS002-9	—	6	WRKY45
Rice	NIA-OS001-8	—	6	WRKY45
Rice	OsCr11	—	13	Modified Cry j
Rice	17053	—	1	cp4 epsps (aroA:CP4)
Rice	17314	—	1	cp4 epsps (aroA:CP4)
Rose	WKS82/130-4-1	IFD-52401-4	9	5AT; bp40 (f3'5'h)
Rose	WKS92/130-9-1	IFD-52901-9	9	5AT; bp40 (f3'5'h)
Soybean	260-05 (G94-1, G94-19, G168)	—	9	gm-fad2-1 (silencing locus)
Soybean	A2704-12	ACS-GM005-3	3	pat
Soybean	A2704-21	ACS-GM004-2	3	pat
Soybean	A5547-127	ACS-GM006-4	3	pat
Soybean	A5547-35	ACS-GM008-6	3	pat
Soybean	CV127	BPS-CV127-9	16	csr1-2
Soybean	DAS68416-4	DAS68416-4	3	pat
Soybean	DP305423	DP-305423-1	11, 31	gm-fad2-1 (silencing locus); gm-hra
Soybean	DP356043	DP-356043-5	1, 31	gm-fad2-1 (silencing locus); gat4601
Soybean	FG72	MST-FG072-3	32, 1	2mepsps; hppdPF W336
Soybean	GTS 40-3-2 (40-3-2)	MON-04032-6	1	cp4 epsps (aroA:CP4)
Soybean	GU262	ACS-GM003-1	3	pat
Soybean	MON87701	MON-87701-2	7	cry1Ac
Soybean	MON87705	MON-87705-6	1, 31	fatb1-A (sense & antisense); fad2-1A (sense & antisense); cp4 epsps (aroA:CP4)
Soybean	MON87708	MON-87708-9	1, 12	dmo; cp4 epsps (aroA:CP4)
Soybean	MON87769	MON-87769-7	1, 31	Pj.D6D; Nc.Fad3; cp4 epsps (aroA:CP4)
Soybean	MON89788	MON-89788-1	1	cp4 epsps (aroA:CP4)
Soybean	W62	ACS-GM002-9	3	bar
Soybean	W98	ACS-GM001-8	3	bar
Soybean	MON87754	MON-87754-1	33	dgat2A
Soybean	DAS21606	DAS-21606	34, 3	Modified aad-12; pat
Soybean	DAS44406	DAS-44406-6	1, 3, 34	Modified aad-12; 2mepsps; pat
Soybean	SYHT04R	SYN-0004R-8	35	Modified avhppd
Soybean	9582.814.19.1	—	3, 7	cry1Ac; cry1F; pat
Squash	CZW3	SEM-ØCZW3-2	6	cmv cp; zymv cp; wmv cp
Squash	ZW20	SEM-0ZW20-7	6	zymv cp; wmv cp
Sugar Beet	GTSB77 (T9100152)	SY-GTSB77-8	1	cp4 epsps (aroA:CP4); goxv247
Sugar Beet	H7-1	KM-000H71-4	1	cp4 epsps (aroA:CP4)
Sugar Beet	T120-7	ACS-BV001-3	3	pat
Sugar Beet	T227-1	—	1	cp4 epsps (aroA:CP4)
Sugarcane	NXI-1T	—	21	EcbetA
Sunflower	X81359	—	16	als
Pepper	PK-SP01	—	6	cmv cp
Tobacco	C/F/93/08-02	—	5	bxn
Tobacco	Vector 21-41	—	36	NtQPT1 (antisense)
Wheat	MON71800	MON-718ØØ-3	1	cp4 epsps (aroA:CP4)

*Argentine (*Brassica napus*),
**Polish (*B. rapa*),
#Eggplant

[0448] Treatment of genetically modified plants with compounds of the invention may result in super-additive or synergistic effects. For example, reduction in application rates, broadening of the activity spectrum, increased tolerance to biotic/abiotic stresses or enhanced storage stability may be greater than expected from just simple additive effects of the application of compounds of the invention on genetically modified plants.

[0449] Compounds of this invention can also be mixed with one or more other biologically active compounds or agents including herbicides, herbicide safeners, fungicides, insecticides, nematocides, bactericides, acaricides, growth regulators such as insect molting inhibitors and rooting stimulants, chemosterilants, semiochemicals, repellents, attractants, pheromones, feeding stimulants, plant nutrients, other biologically active compounds or entomopathogenic bacteria, virus or fungi to form a multi-component pesticide giving an even broader spectrum of agricultural protection. Mixtures of the compounds of the invention with other herbicides can broaden the spectrum of activity against additional weed species, and suppress the proliferation of any resistant biotypes. Thus the present invention also pertains to a composition comprising a compound of Formula 1 (in a herbicidally effective amount) and at least one additional biologically active compound or agent (in a biologically effective amount) and can further comprise at least one of a surfactant, a solid diluent or a liquid diluent. The other biologically active compounds or agents can be formulated in compositions comprising at least one of a surfactant, solid or liquid diluent. For mixtures of the present invention, one or more other biologically active compounds or agents can be formulated together with a compound of Formula 1, to form a premix, or one or more other biologically active compounds or agents can be formulated sepa-

rately from the compound of Formula 1, and the formulations combined together before application (e.g., in a spray tank) or, alternatively, applied in succession.

[0450] A mixture of one or more of the following herbicides with a compound of this invention may be particularly useful for weed control: acetochlor, acifluorfen and its sodium salt, aclonifen, acrolein (2-propenal), alachlor, alloxydim, ametryn, amicarbazone, amidosulfuron, aminocyclopyrachlor and its esters (e.g., methyl, ethyl) and salts (e.g., sodium, potassium), aminopyralid, amitrole, ammonium sulfamate, anilofos, asulam, atrazine, azimsulfuron, beflubutamid, benazolin, benazolin-ethyl, bencarbazone, benfluralin, benfuresate, bensulfuron-methyl, bensulide, bentazone, benzobicyclon, benzofenap, bicyclopyrone, bifenox, bilanafos, bispyribac and its sodium salt, bromacil, bromobutide, bromofenoxim, bromoxynil, bromoxynil octanoate, butachlor, butafenacil, butamifos, butralin, butroxydim, butylate, cafenstrole, carbetamide, carfentrazone-ethyl, catechin, chlomethoxyfen, chloramben, chlorbromuron, chlorflurenol-methyl, chloridazon, chlorimuron-ethyl, chlorotoluron, chlorpropham, chlorsulfuron, chlorthal-dimethyl, chlorthiamid, cinidon-ethyl, cinmethylin, cinosulfuron, clacyfos, clefoxydim, clethodim, clodinafop-propargyl, clomazone, clomeprop, clopyralid, clopyralid-olamine, cloransulam-methyl, cumyluron, cyanazine, cycloate, cyclopyrimorate, cyclosulfamuron, cycloxydim, cyhalofop-butyl, 2,4-D and its butotyl, butyl, isoctyl and isopropyl esters and its dimethylammonium, diolamine and trolamine salts, daimuron, dalapon, dalapon-sodium, dazomet, 2,4-DB and its dimethylammonium, potassium and sodium salts, desmedipham, desmetryn, dicamba and its diglycolammonium, dimethylammonium, potassium and sodium salts, dichlobenil, dichlorprop, diclofop-methyl, diclosulam, difenzoquat metilsulfate, diflufenican, diflufenzopyr, dimefuron, dimepiperate, dimethachlor, dimethametryn, dimethenamid, dimethenamid-P, dimethipin, dimethylarsinic acid and its sodium salt, dinitramine, dinoterb, diphenamid, diquat dibromide, dithiopyr, diuron, DNOC, endothal, EPTC, esprocarb, ethalfluralin, ethametsulfuron-methyl, ethiozin, ethofumesate, ethoxyfen, ethoxysulfuron, etobenzanid, fenoxaprop-ethyl, fenoxaprop-P-ethyl, fenoxasulfone, fenquinotrione, fentrazamide, fenuron, fenuron-TCA, flamprop-methyl, flamprop-M-isopropyl, flamprop-M-methyl, flazasulfuron, florasulam, fluazifop-butyl, fluazifop-P-butyl, fluazolate, flucarbazone, flucetosulfuron, fluchloralin, flufenacet, flufenpyr, flufenpyr-ethyl, flumetsulam, flumiclorac-pentyl, flumioxazin, fluometuron, fluoroglycofen-ethyl, flupoxam, flupyrsulfuron-methyl and its sodium salt, flurenol, flurenol-butyl, fluridone, flurochloridone, fluroxypyr, flurtamone, fluthiacet-methyl, fomesafen, foramsulfuron, fosamine-ammonium, glufosinate, glufosinate-ammonium, glufosinate-P, glyphosate and its salts such as ammonium, isopropylammonium, potassium, sodium (including sesquisodium) and trimesium (alternatively named sulfosate), halauxifen, halauxifen-methyl, halosulfuron-methyl, haloxyfop-etotyl, haloxyfop-methyl, hexazinone, imazamethabenz-methyl, imazamox, imazapic, imazapyr, imazaquin, imazaquin-ammonium, imazethapyr, imazethapyr-ammonium, imazosulfuron, indanofan, indaziflam, iofensulfuron, iodosulfuron-methyl, ioxynil, ioxynil octanoate, ioxynil-sodium, ipfencarbazone, isoproturon, isouron, isoxaben, isoxaflutole, isoxachlortole, lactofen, lenacil, linuron, maleic hydrazide, MCPA and its salts (e.g., MCPA-dimethylammonium, MCPA-potassium and MCPA-sodium, esters (e.g., MCPA-2-ethylhexyl, MCPA-butotyl) and thioesters (e.g., MCPA-thioethyl), MCPB and its salts (e.g., MCPB-sodium) and esters (e.g., MCPB-ethyl), mecoprop, mecoprop-P, mefenacet, mefluidide, mesosulfuron-methyl, mesotrione, metam-sodium, metamifop, metamitron, metazachlor, metazosulfuron, methabenzthiazuron, methylarsonic acid and its calcium, monoammonium, monosodium and disodium salts, methyldymron, metobenzuron, metobromuron, metolachlor, S-metolachlor, metosulam, metoxuron, metribuzin, metsulfuron-methyl, molinate, monolinuron, naproanilide, napropamide, napropamide-M, naptalam, neburon, nicosulfuron, norflurazon, orbencarb, orthosulfamuron, oryzalin, oxadiargyl, oxadiazon, oxasulfuron, oxaziclomefone, oxyfluorfen, paraquat dichloride, pebulate, pelargonic acid, pendimethalin, penoxsulam, pentanochlor, pentoxazone, perfluidone, pethoxamid, pethoxyamid, phenmedipham, picloram, picloram-potassium, picolinafen, pinoxaden, piperophos, pretilachlor, primisulfuron-methyl, prodiamine, profoxydim, prometon, prometryn, propachlor, propanil, propaquizafop, propazine, propham, propisochlor, propoxycarbazone, propyrisulfuron, propyzamide, prosulfocarb, prosulfuron, pyraclonil, pyraflufen-ethyl, pyrasulfotole, pyrazogyl, pyrazolynate, pyrazoxyfen, pyrazosulfuron-ethyl, pyribenzoxim, pyributicarb, pyridate, pyriftalid, pyriminobac-methyl, pyrimisulfan, pyrithiobac, pyrithiobac-sodium, pyroxasulfone, pyroxsulam, quinclorac, quinmerac, quinoclamine, quizalofop-ethyl, quizalofop-P-ethyl, quizalofop-P-tefuryl, rimsulfuron, saflufenacil, sethoxydim, siduron, simazine, simetryn, sulcotrione, sulfentrazone, sulfometuron-methyl, sulfosulfuron, 2,3,6-TBA, TCA, TCA-sodium, tebutam, tebuthiuron, tefuryltrione, tembotrione, tepraloxydim, terbacil, terbumeton, terbuthylazine, terbutryn, thenylchlor, thiazopyr, thiencarbazone, thifensulfuron-methyl, thiobencarb, tiafenacil, tiocarbazil, topramezone, tralkoxydim, tri-allate, triafamone, triasulfuron, triaziflam, tribenuron-methyl, triclopyr, triclopyr-butotyl, triclopyr-triethylammonium, tridiphane, trietazine, trifloxysulfuron, trifluralin, triflusulfuron-methyl, tritosulfuron, vernolate, 3-(2-chloro-3,6-difluorophenyl)-4-hydroxy-1-methyl-1,5-naphthyridin-2(1H)-one, 5-chloro-3-[(2-hydroxy-6-oxo-1-cyclohexen-1-yl)carbonyl]-1-(4-methoxyphenyl)-2(1H)-quinoxalinone, 2-chloro-N-(1-methyl-1H-tetrazol-5-yl)-6-(trifluoromethyl)-3-pyridinecarboxamide, 7-(3,5-dichloro-4-pyridinyl)-5-(2,2-difluoroethyl)-8-hydroxypyrido[2,3-b]pyrazin-6(5H)-one), 4-(2,6-diethyl-4-methylphenyl)-5-hydroxy-2,6-dimethyl-3(2H)-pyridazinone), 5-[[(2,6-difluorophenyl)methoxy]methyl]-4,5-dihydro-5-methyl-3-(3-methyl-2-thienyl)isoxazole (previously methioxolin), 3-[7-fluoro-3,4-dihydro-3-oxo-4-(2-propyn-1-yl)-2H-1,4-benzoxazin-6-yl]dihydro-1,5-dimethyl-6-thioxo-1,3,5-triazine-2,4(1H,3H)-dione, 4-(4-fluorophenyl)-6-[(2-hydroxy-6-oxo-1-cyclohexen-1-yl)carbonyl]-2-methyl-1,2,4-triazine-3,5(2H,4H)-dione, methyl 4-amino-3-chloro-6-(4-chloro-2-fluoro-3-methoxyphenyl)-5-fluoro-2-pyridinecarboxylate, 2-methyl-3-(methylsulfonyl)-N-(1-methyl-1H-tetrazol-5-yl)-4-(trifluoromethyl)benzamide and 2-methyl-N-(4-methyl-1,2,5-oxadiazol-3-yl)-3-(methylsulfinyl)-4-(trifluoromethyl) benzamide. Other herbicides also include bioherbicides such as *Alternaria destruens* Simmons, *Colletotrichum gloeosporiodes* (Penz.) Penz. & Sacc., *Drechsiera monoceras* (MTB-951), *Myrothecium verrucaria* (Albertini & Schweinitz) Ditmar: Fries, *Phytophthora palmivora* (Butl.) Butl. and *Puccinia thlaspeos* Schub.

[0451] Compounds of this invention can also be used in combination with plant growth regulators such as aviglycine, N-(phenylmethyl)-1H-purin-6-amine, epocholeone, gibberellic acid, gibberellin A_4 and A_7, harpin protein, mepiquat chloride, prohexadione calcium, prohydrojasmon, sodium nitrophenolate and trinexapac-methyl, and plant growth modifying organisms such as *Bacillus cereus* strain BP01.

[0452] General references for agricultural protectants (i.e. herbicides, herbicide safeners, insecticides, fungicides, nematocides, acaricides and biological agents) include *The Pesticide Manual, 13th Edition*, C. D. S. Tomlin, Ed., British Crop Protection Council, Farnham, Surrey, U. K., 2003 and *The BioPesticide Manual, 2nd Edition*, L. G. Copping, Ed., British Crop Protection Council, Farnham, Surrey, U. K., 2001.

[0453] For embodiments where one or more of these various mixing partners are used, the weight ratio of these various mixing partners (in total) to the compound of Formula 1 is typically between about 1:3000 and about 3000:1. Of note are weight ratios between about 1:300 and about 300:1 (for example ratios between about 1:30 and about 30:1). One skilled in the art can easily determine through simple experimentation the biologically effective amounts of active ingredients necessary for the desired spectrum of biological activity. It will be evident that including these additional components may expand the spectrum of weeds controlled beyond the spectrum controlled by the compound of Formula 1 alone.

[0454] In certain instances, combinations of a compound of this invention with other biologically active (particularly herbicidal) compounds or agents (i.e. active ingredients) can result in a greater-than-additive (i.e. synergistic) effect on weeds and/or a less-than-additive effect (i.e. safening) on crops or other desirable plants. Reducing the quantity of active ingredients released in the environment while ensuring effective pest control is always desirable. Ability to use greater amounts of active ingredients to provide more effective weed control without excessive crop injury is also desirable. When synergism of herbicidal active ingredients occurs on weeds at application rates giving agronomically satisfactory levels of weed control, such combinations can be advantageous for reducing crop production cost and decreasing environmental load. When safening of herbicidal active ingredients occurs on crops, such combinations can be advantageous for increasing crop protection by reducing weed competition.

[0455] Of note is a combination of a compound of the invention with at least one other herbicidal active ingredient. Of particular note is such a combination where the other herbicidal active ingredient has different site of action from the compound of the invention. In certain instances, a combination with at least one other herbicidal active ingredient having a similar spectrum of control but a different site of action will be particularly advantageous for resistance management. Thus, a composition of the present invention can further comprise (in a herbicidally effective amount) at least one additional herbicidal active ingredient having a similar spectrum of control but a different site of action.

[0456] Compounds of this invention can also be used in combination with herbicide safeners such as allidochlor, benoxacor, cloquintocet-mexyl, cumyluron, cyometrinil, cyprosulfonamide, daimuron, dichlormid, dicyclonon, dietholate, dimepiperate, fenchlorazole-ethyl, fenclorim, flurazole, fluxofenim, furilazole, isoxadifen-ethyl, mefenpyr-diethyl, mephenate, methoxyphenone naphthalic anhydride (1,8-naphthalic anhydride), oxabetrinil, N-(aminocarbonyl)-2-methylbenzenesulfonamide, N-(aminocarbonyl)-2-fluorobenzenesulfonamide, 1-bromo-4-Rchloromethyl) sulfonyllbenzene (BCS), 4-(dichloroacetyl)-1-oxa-4-azospiro[4.5]decane (MON 4660), 2-(dichloromethyl)-2-methyl-1,3-dioxolane (MG 191), ethyl 1,6-dihydro-1-(2-methoxyphenyl)-6-oxo-2-phenyl-5-pyrimidinecarboxylate, 2-hydroxy-N,N-dimethyl-6-(trifluoromethyl)pyridine-3-carboxamide, and 3-oxo-1-cyclohexen-1-yl 1-(3,4-dimethylphenyl)-1,6-dihydro-6-oxo-2-phenyl-5-pyrimidinecarboxylate to increase safety to certain crops. Antidotally effective amounts of the herbicide safeners can be applied at the same time as the compounds of this invention, or applied as seed treatments. Therefore an aspect of the present invention relates to a herbicidal mixture comprising a compound of this invention and an antidotally effective amount of a herbicide safener. Seed treatment is particularly useful for selective weed control, because it physically restricts antidoting to the crop plants. Therefore a particularly useful embodiment of the present invention is a method for selectively controlling the growth of undesired vegetation in a crop comprising contacting the locus of the crop with a herbicidally effective amount of a compound of this invention wherein seed from which the crop is grown is treated with an antidotally effective amount of safener. Antidotally effective amounts of safeners can be easily determined by one skilled in the art through simple experimentation.

[0457] Of note is a composition comprising a compound of the invention (in a herbicidally effective amount), at least one additional active ingredient selected from the group consisting of other herbicides and herbicide safeners (in an effective amount), and at least one component selected from the group consisting of surfactants, solid diluents and liquid diluents.

[0458] Table A1 lists specific combinations of a Component (a) with Component (b) illustrative of the mixtures, compositions and methods of the present invention. Compound 1 in the Component (a) column is identified in Index Table A. The second column of Table A1 lists the specific Component (b) compound (e.g., "2,4-D" in the first line). The third, fourth and fifth columns of Table A1 lists ranges of weight ratios for rates at which the Component (a) compound is typically applied to a field-grown crop relative to Component (b) (i.e. (a):(b)). Thus, for example, the first line of Table A1 specifically discloses the combination of Component (a) (i.e. Compound 1 in Index Table A) with 2,4-D is typically applied in a weight ratio between 1:168-6:1. The remaining lines of Table A1 are to be construed similarly.

TABLE A1

Component (a) (Compound #)	Component (b)	Typical Weight Ratio	More Typical Weight Ratio	Most Typical Weight Ratio
1	2,4-D	1:168 to 6:1	1:56 to 2:1	1:16 to 1:2
1	Acetochlor	1:672 to 2:1	1:224 to 1:3	1:67 to 1:8

TABLE A1-continued

Component (a) (Compound #)	Component (b)	Typical Weight Ratio	More Typical Weight Ratio	Most Typical Weight Ratio
1	Acifluorfen	1:84 to 11:1	1:28 to 4:1	1:8 to 2:1
1	Aclonifen	1:750 to 2:1	1:250 to 1:3	1:75 to 1:9
1	Alachlor	1:672 to 2:1	1:224 to 1:3	1:67 to 1:8
1	Ametryn	1:336 to 3:1	1:112 to 1:2	1:33 to 1:4
1	Amicarbazone	1:168 to 6:1	1:56 to 2:1	1:16 to 1:2
1	Amidosulfuron	1:6 to 150:1	1:2 to 50:1	1:1 to 15:1
1	Aminocyclopyrachlor	1:42 to 22:1	1:14 to 8:1	1:4 to 3:1
1	Aminopyralid	1:18 to 50:1	1:6 to 17:1	1:1 to 5:1
1	Amitrole	1:672 to 2:1	1:224 to 1:3	1:67 to 1:8
1	Anilofos	1:84 to 11:1	1:28 to 4:1	1:8 to 2:1
1	Asulam	1:840 to 2:1	1:280 to 1:3	1:84 to 1:10
1	Atrazine	1:168 to 6:1	1:56 to 2:1	1:16 to 1:2
1	Azimsulfuron	1:6 to 150:1	1:2 to 50:1	1:1 to 15:1
1	Beflubutamid	1:300 to 3:1	1:100 to 1:1	1:30 to 1:4
1	Benfuresate	1:540 to 2:1	1:180 to 1:2	1:54 to 1:6
1	Bensulfuron-methyl	1:22 to 40:1	1:7 to 14:1	1:2 to 4:1
1	Bentazon	1:168 to 6:1	1:56 to 2:1	1:16 to 1:2
1	Benzobicyclon	1:75 to 12:1	1:25 to 4:1	1:7 to 2:1
1	Benzofenap	1:225 to 4:1	1:75 to 2:1	1:22 to 1:3
1	Bicyclopyrone	1:37 to 24:1	1:12 to 8:1	1:3 to 3:1
1	Bifenox	1:225 to 4:1	1:75 to 2:1	1:22 to 1:3
1	Bispyribac-sodium	1:9 to 100:1	1:3 to 34:1	1:1 to 10:1
1	Bromacil	1:336 to 3:1	1:112 to 1:2	1:33 to 1:4
1	Bromobutide	1:336 to 3:1	1:112 to 1:2	1:33 to 1:4
1	Bromoxynil	1:84 to 11:1	1:28 to 4:1	1:8 to 2:1
1	Butachlor	1:672 to 2:1	1:224 to 1:3	1:67 to 1:8
1	Butafenacil	1:37 to 24:1	1:12 to 8:1	1:3 to 3:1
1	Butylate	1:1350 to 1:2	1:450 to 1:5	1:135 to 1:15
1	Carfenstrole	1:168 to 6:1	1:56 to 2:1	1:16 to 1:2
1	Carfentrazone-ethyl	1:112 to 8:1	1:37 to 3:1	1:11 to 1:2
1	Chlorimuron-ethyl	1:7 to 120:1	1:2 to 40:1	1:1 to 12:1
1	Chlorotoluron	1:672 to 2:1	1:224 to 1:3	1:67 to 1:8
1	Chlorsulfuron	1:6 to 150:1	1:2 to 50:1	1:1 to 15:1
1	Cincosulfuron	1:15 to 60:1	1:5 to 20:1	1:1 to 6:1
1	Cinidon-ethyl	1:336 to 3:1	1:112 to 1:2	1:33 to 1:4
1	Cinmethylin	1:30 to 30:1	1:10 to 10:1	1:3 to 3:1
1	Clacyfos	1:84 to 6:1	1:28 to 2:1	1:16 to 1:2
1	Clethodim	1:42 to 22:1	1:14 to 8:1	1:4 to 3:1
1	Clodinafop-propargyl	1:18 to 50:1	1:6 to 17:1	1:1 to 5:1
1	Clomazone	1:336 to 3:1	1:112 to 1:2	1:33 to 1:4
1	Clomeprop	1:150 to 6:1	1:50 to 2:1	1:15 to 1:2
1	Clopyralid	1:168 to 6:1	1:56 to 2:1	1:16 to 1:2
1	Cloransulam-methyl	1:10 to 86:1	1:3 to 29:1	1:1 to 9:1
1	Cumyluron	1:336 to 3:1	1:112 to 1:2	1:33 to 1:4
1	Cyanazine	1:336 to 3:1	1:112 to 1:2	1:33 to 1:4
1	Cyclopyrimorate	1:15 to 60:1	1:5 to 20:1	1:1 to 6:1
1	Cyclosulfamuron	1:15 to 60:1	1:5 to 20:1	1:1 to 6:1
1	Cycloxydim	1:84 to 11:1	1:28 to 4:1	1:8 to 2:1
1	Cyhalofop	1:22 to 40:1	1:7 to 14:1	1:2 to 4:1
1	Daimuron	1:168 to 6:1	1:56 to 2:1	1:16 to 1:2
1	Desmedipham	1:282 to 4:1	1:94 to 2:1	1:28 to 1:4
1	Dicamba	1:168 to 6:1	1:56 to 2:1	1:16 to 1:2
1	Dichlobenil	1:1200 to 1:2	1:400 to 1:4	1:120 to 1:14
1	Dichlorprop	1:810 to 2:1	1:270 to 1:3	1:81 to 1:9
1	Diclofop-methyl	1:336 to 3:1	1:112 to 1:2	1:33 to 1:4
1	Diclosulam	1:9 to 100:1	1:3 to 34:1	1:1 to 10:1
1	Difenzoquat	1:252 to 4:1	1:84 to 2:1	1:25 to 1:3
1	Diflufenican	1:750 to 2:1	1:250 to 1:3	1:75 to 1:9
1	Diflufenzopyr	1:10 to 86:1	1:3 to 29:1	1:1 to 9:1
1	Dimethachlor	1:672 to 2:1	1:224 to 1:3	1:67 to 1:8
1	Dimethametryn	1:168 to 6:1	1:56 to 2:1	1:16 to 1:2
1	Dimethenamid-p	1:336 to 3:1	1:112 to 1:2	1:33 to 1:4
1	Dithiopyr	1:168 to 6:1	1:56 to 2:1	1:16 to 1:2
1	Diuron	1:336 to 3:1	1:112 to 1:2	1:33 to 1:4
1	EPTC	1:672 to 2:1	1:224 to 1:3	1:67 to 1:8
1	Esprocarb	1:1200 to 1:2	1:400 to 1:4	1:120 to 1:14
1	Ethalfluralin	1:336 to 3:1	1:112 to 1:2	1:33 to 1:4
1	Ethametsulfuron-methyl	1:15 to 60:1	1:5 to 20:1	1:1 to 6:1
1	Ethoxyfen	1:7 to 120:1	1:2 to 40:1	1:1 to 12:1
1	Ethoxysulfuron	1:18 to 50:1	1:6 to 17:1	1:1 to 5:1
1	Etobenzanid	1:225 to 4:1	1:75 to 2:1	1:22 to 1:3
1	Fenoxaprop-ethyl	1:105 to 9:1	1:35 to 3:1	1:10 to 1:2
1	Fenoxasulfone	1:75 to 12:1	1:25 to 4:1	1:7 to 2:1
1	Fenquinotrione	1:15 to 60:1	1:5 to 20:1	1:1 to 6:1

TABLE A1-continued

Component (a) (Compound #)	Component (b)	Typical Weight Ratio	More Typical Weight Ratio	Most Typical Weight Ratio
1	Fentrazamide	1:15 to 60:1	1:5 to 20:1	1:1 to 6:1
1	Flazasulfuron	1:15 to 60:1	1:5 to 20:1	1:1 to 6:1
1	Florasulam	1:2 to 375:1	1:1 to 125:1	4:1 to 38:1
1	Fluazifop-butyl	1:168 to 6:1	1:56 to 2:1	1:16 to 1:2
1	Flucarbazone	1:7 to 120:1	1:2 to 40:1	1:1 to 12:1
1	Flucetosulfuron	1:7 to 120:1	1:2 to 40:1	1:1 to 12:1
1	Flufenacet	1:225 to 4:1	1:75 to 2:1	1:22 to 1:3
1	Flumetsulam	1:21 to 43:1	1:7 to 15:1	1:2 to 5:1
1	Flumiclorac-pentyl	1:9 to 100:1	1:3 to 34:1	1:1 to 10:1
1	Flumioxazin	1:22 to 40:1	1:7 to 14:1	1:2 to 4:1
1	Fluometuron	1:336 to 3:1	1:112 to 1:2	1:33 to 1:4
1	Flupyrsulfuron-methyl	1:3 to 300:1	1:1 to 100:1	3:1 to 30:1
1	Fluridone	1:336 to 3:1	1:112 to 1:2	1:33 to 1:4
1	Fluroxypyr-meptyl	1:84 to 11:1	1:28 to 4:1	1:8 to 2:1
1	Flurtamone	1:750 to 2:1	1:250 to 1:3	1:75 to 1:9
1	Fluthiacet-methyl	1:42 to 38:1	1:14 to 13:1	1:2 to 5:1
1	Fomesafen	1:84 to 11:1	1:28 to 4:1	1:8 to 2:1
1	Foramsulfuron	1:12 to 75:1	1:4 to 25:1	1:1 to 8:1
1	Glufosinate	1:252 to 4:1	1:84 to 2:1	1:25 to 1:3
1	Glyphosate	1:252 to 4:1	1:84 to 2:1	1:25 to 1:3
1	Halauxifen	1:18 to 50:1	1:6 to 17:1	1:1 to 5:1
1	Halauxifen-methyl	1:18 to 50:1	1:6 to 17:1	1:1 to 5:1
1	Halosulfuron-methyl	1:15 to 60:1	1:5 to 20:1	1:1 to 6:1
1	Haloxyfop-methyl	1:30 to 30:1	1:10 to 10:1	1:3 to 3:1
1	Hexazinone	1:168 to 6:1	1:56 to 2:1	1:16 to 1:2
1	Imazamox	1:12 to 75:1	1:4 to 25:1	1:1 to 8:1
1	Imazapic	1:18 to 50:1	1:6 to 17:1	1:1 to 5:1
1	Imazapyr	1:75 to 12:1	1:25 to 4:1	1:7 to 2:1
1	Imazaquin	1:30 to 30:1	1:10 to 10:1	1:3 to 3:1
1	Imazethabenz-methyl	1:150 to 6:1	1:50 to 2:1	1:15 to 1:2
1	Imazethapyr	1:21 to 43:1	1:7 to 15:1	1:2 to 5:1
1	Imazosulfuron	1:24 to 38:1	1:8 to 13:1	1:2 to 4:1
1	Indanofan	1:300 to 3:1	1:100 to 1:1	1:30 to 1:4
1	Indaziflam	1:22 to 40:1	1:7 to 14:1	1:2 to 4:1
1	Iodosulfuron-methyl	1:3 to 300:1	1:1 to 100:1	3:1 to 30:1
1	Ioxynil	1:168 to 6:1	1:56 to 2:1	1:16 to 1:2
1	Ipfencarbazone	1:75 to 12:1	1:25 to 4:1	1:7 to 2:1
1	Isoproturon	1:336 to 3:1	1:112 to 1:2	1:33 to 1:4
1	Isoxaben	1:252 to 4:1	1:84 to 2:1	1:25 to 1:3
1	Isoxaflutole	1:52 to 18:1	1:17 to 6:1	1:5 to 2:1
1	Lactofen	1:37 to 24:1	1:12 to 8:1	1:3 to 3:1
1	Lenacil	1:336 to 3:1	1:112 to 1:2	1:33 to 1:4
1	Linuron	1:336 to 3:1	1:112 to 1:2	1:33 to 1:4
1	MCPA	1:168 to 6:1	1:56 to 2:1	1:16 to 1:2
1	MCPB	1:252 to 4:1	1:84 to 2:1	1:25 to 1:3
1	Mecoprop	1:672 to 2:1	1:224 to 1:3	1:67 to 1:8
1	Mefenacet	1:336 to 3:1	1:112 to 1:2	1:33 to 1:4
1	Mefluidide	1:168 to 6:1	1:56 to 2:1	1:16 to 1:2
1	Mesosulfuron-methyl	1:4 to 200:1	1:1 to 67:1	2:1 to 20:1
1	Mesotrione	1:37 to 24:1	1:12 to 8:1	1:3 to 3:1
1	Metamifop	1:37 to 24:1	1:12 to 8:1	1:3 to 3:1
1	Metazachlor	1:336 to 3:1	1:112 to 1:2	1:33 to 1:4
1	Metazosulfuron	1:22 to 40:1	1:7 to 14:1	1:2 to 4:1
1	Methabenzthiazuron	1:672 to 2:1	1:224 to 1:3	1:67 to 1:8
1	Metolachlor	1:672 to 2:1	1:224 to 1:3	1:67 to 1:8
1	Metosulam	1:7 to 120:1	1:2 to 40:1	1:1 to 12:1
1	Metribuzin	1:168 to 6:1	1:56 to 2:1	1:16 to 1:2
1	Metsulfuron-methyl	1:1 to 500:1	1:1 to 167:1	5:1 to 50:1
1	Molinate	1:900 to 1:1	1:300 to 1:3	1:90 to 1:10
1	Napropamide	1:336 to 3:1	1:112 to 1:2	1:33 to 1:4
1	Napropamide-M	1:168 to 6:1	1:56 to 2:1	1:16 to 1:2
1	Naptalam	1:168 to 6:1	1:56 to 2:1	1:16 to 1:2
1	Nicosulfuron	1:10 to 86:1	1:3 to 29:1	1:1 to 9:1
1	Norflurazon	1:1008 to 1:2	1:336 to 1:4	1:100 to 1:12
1	Orbencarb	1:1200 to 1:2	1:400 to 1:4	1:120 to 1:14
1	Orthosulfamuron	1:18 to 50:1	1:6 to 17:1	1:1 to 5:1
1	Oryzalin	1:450 to 2:1	1:150 to 1:2	1:45 to 1:5
1	Oxadiargyl	1:336 to 3:1	1:112 to 1:2	1:33 to 1:4
1	Oxadiazon	1:480 to 2:1	1:160 to 1:2	1:48 to 1:6
1	Oxasulfuron	1:24 to 38:1	1:8 to 13:1	1:2 to 4:1
1	Oxaziclomefone	1:37 to 24:1	1:12 to 8:1	1:3 to 3:1
1	Oxyfluorfen	1:336 to 3:1	1:112 to 1:2	1:33 to 1:4
1	Paraquat	1:168 to 6:1	1:56 to 2:1	1:16 to 1:2
1	Pendimethalin	1:336 to 3:1	1:112 to 1:2	1:33 to 1:4

TABLE A1-continued

Component (a) (Compound #)	Component (b)	Typical Weight Ratio	More Typical Weight Ratio	Most Typical Weight Ratio
1	Penoxsulam	1:9 to 100:1	1:3 to 34:1	1:1 to 10:1
1	Penthoxamid	1:336 to 3:1	1:112 to 1:2	1:33 to 1:4
1	Pentoxazone	1:90 to 10:1	1:30 to 4:1	1:9 to 1:1
1	Phenmedipham	1:90 to 10:1	1:30 to 4:1	1:9 to 1:1
1	Picloram	1:84 to 11:1	1:28 to 4:1	1:8 to 2:1
1	Picolinafen	1:30 to 30:1	1:10 to 10:1	1:3 to 3:1
1	Pinoxaden	1:22 to 40:1	1:7 to 14:1	1:2 to 4:1
1	Pretilachlor	1:168 to 6:1	1:56 to 2:1	1:16 to 1:2
1	Primisulfuron-methyl	1:7 to 120:1	1:2 to 40:1	1:1 to 12:1
1	Prodiamine	1:336 to 3:1	1:112 to 1:2	1:33 to 1:4
1	Profoxydim	1:37 to 24:1	1:12 to 8:1	1:3 to 3:1
1	Prometryn	1:336 to 3:1	1:112 to 1:2	1:33 to 1:4
1	Propachlor	1:1008 to 1:2	1:336 to 1:4	1:100 to 1:12
1	Propanil	1:336 to 3:1	1:112 to 1:2	1:33 to 1:4
1	Propaquizafop	1:42 to 22:1	1:14 to 8:1	1:4 to 3:1
1	Propoxycarbazone	1:15 to 60:1	1:5 to 20:1	1:1 to 6:1
1	Propyrisulfuron	1:15 to 60:1	1:5 to 20:1	1:1 to 6:1
1	Propyzamide	1:336 to 3:1	1:112 to 1:2	1:33 to 1:4
1	Prosulfocarb	1:1050 to 1:2	1:350 to 1:4	1:105 to 1:12
1	Prosulfuron	1:6 to 150:1	1:2 to 50:1	1:1 to 15:1
1	Pyraclonil	1:37 to 24:1	1:12 to 8:1	1:3 to 3:1
1	Pyraflufen-ethyl	1:4 to 200:1	1:1 to 67:1	2:1 to 20:1
1	Pyrasulfotole	1:12 to 75:1	1:4 to 25:1	1:1 to 8:1
1	Pyrazolynate	1:750 to 2:1	1:250 to 1:3	1:75 to 1:9
1	Pyrazosulfuron-ethyl	1:9 to 100:1	1:3 to 34:1	1:1 to 10:1
1	Pyrazoxyfen	1:4 to 200:1	1:1 to 67:1	2:1 to 20:1
1	Pyribenzoxim	1:9 to 100:1	1:3 to 34:1	1:1 to 10:1
1	Pyributicarb	1:336 to 3:1	1:112 to 1:2	1:33 to 1:4
1	Pyridate	1:252 to 4:1	1:84 to 2:1	1:25 to 1:3
1	Pyriftalid	1:9 to 100:1	1:3 to 34:1	1:1 to 10:1
1	Pyriminobac-methyl	1:18 to 50:1	1:6 to 17:1	1:1 to 5:1
1	Pyrimisulfan	1:15 to 60:1	1:5 to 20:1	1:1 to 6:1
1	Pyrithiobac	1:21 to 43:1	1:7 to 15:1	1:2 to 5:1
1	Pyroxasulfone	1:75 to 12:1	1:25 to 4:1	1:7 to 2:1
1	Pyroxsulam	1:4 to 200:1	1:1 to 67:1	2:1 to 20:1
1	Quinclorac	1:168 to 6:1	1:56 to 2:1	1:16 to 1:2
1	Quizalofop-ethyl	1:37 to 24:1	1:12 to 8:1	1:3 to 3:1
1	Rimsulfuron	1:12 to 75:1	1:4 to 25:1	1:1 to 8:1
1	Saflufenacil	1:22 to 40:1	1:7 to 14:1	1:2 to 4:1
1	Sethoxydim	1:84 to 11:1	1:28 to 4:1	1:8 to 2:1
1	Simazine	1:336 to 3:1	1:112 to 1:2	1:33 to 1:4
1	Sulcotrione	1:105 to 9:1	1:35 to 3:1	1:10 to 1:2
1	Sulfentrazone	1:129 to 7:1	1:43 to 3:1	1:12 to 1:2
1	Sulfometuron-methyl	1:30 to 30:1	1:10 to 10:1	1:3 to 3:1
1	Sulfosulfuron	1:7 to 120:1	1:2 to 40:1	1:1 to 12:1
1	Tebuthiuron	1:336 to 3:1	1:112 to 1:2	1:33 to 1:4
1	Tefuryltrione	1:37 to 24:1	1:12 to 8:1	1:3 to 3:1
1	Tembotrione	1:27 to 33:1	1:9 to 11:1	1:2 to 4:1
1	Tepraloxydim	1:22 to 40:1	1:7 to 14:1	1:2 to 4:1
1	Terbacil	1:252 to 4:1	1:84 to 2:1	1:25 to 1:3
1	Terbuthylatrazine	1:750 to 2:1	1:250 to 1:3	1:75 to 1:9
1	Terbutryn	1:168 to 6:1	1:56 to 2:1	1:16 to 1:2
1	Thenylchlor	1:75 to 12:1	1:25 to 4:1	1:7 to 2:1
1	Thiazopyr	1:336 to 3:1	1:112 to 1:2	1:33 to 1:4
1	Thiencarbazone	1:3 to 300:1	1:1 to 100:1	3:1 to 30:1
1	Thifensulfuron-methyl	1:4 to 200:1	1:1 to 67:1	2:1 to 20:1
1	Thiobencath	1:672 to 2:1	1:224 to 1:3	1:67 to 1:8
1	Topramazone	1:6 to 150:1	1:2 to 50:1	1:1 to 15:1
1	Tralkoxydim	1:60 to 15:1	1:20 to 5:1	1:6 to 2:1
1	Triafamone	1:3 to 38:1	1:1 to 13:1	1:1 to 8:1
1	Triallate	1:672 to 2:1	1:224 to 1:3	1:67 to 1:8
1	Triasulfuron	1:4 to 200:1	1:1 to 67:1	2:1 to 20:1
1	Triaziflam	1:150 to 6:1	1:50 to 2:1	1:15 to 1:2
1	Tribenuron-methyl	1:3 to 300:1	1:1 to 100:1	3:1 to 30:1
1	Triclopyr	1:168 to 6:1	1:56 to 2:1	1:16 to 1:2
1	Trifloxysulfuron	1:2 to 375:1	1:1 to 125:1	4:1 to 38:1
1	Trifluralin	1:252 to 4:1	1:84 to 2:1	1:25 to 1:3
1	Triflusulfuron-methyl	1:15 to 60:1	1:5 to 20:1	1:1 to 6:1
1	Tritosulfuron	1:12 to 75:1	1:4 to 25:1	1:1 to 8:1

[0459] Table A2 is constructed the same as Table A1 above except that entries below the "Component (a)" column heading are replaced with the respective Component (a) Column Entry shown below. Compound 1 in the Component (a) column is identified in Index Table A. Thus, for example, in Table A2 the entries below the "Component (a)" column heading all recite "Compound 12" (i.e. Compound 12 identified in Index Table A), and the first line below the column headings in Table A2 specifically discloses a mixture of Compound 12 with 2,4-D. Tables A3 through A9 are constructed similarly.

Table Number	Component (a) Column Entries
A2	Compound 12
A3	Compound 15
A4	Compound 21
A5	Compound 23
A6	Compound 24
A7	Compound 27
A8	Compound 32
A9	Compound 42
A10	Compound 35
A11	Compound 53
A12	Compound 55
A13	Compound 62
A14	Compound 63
A15	Compound 144
A16	Compound 145
A17	Compound 168
A18	Compound 200

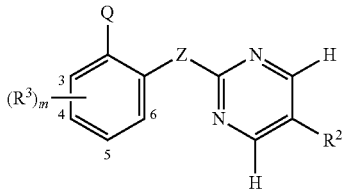
[0460] Preferred for better control of undesired vegetation (e.g., lower use rate such as from synergism, broader spectrum of weeds controlled, or enhanced crop safety) or for preventing the development of resistant weeds are mixtures of a compound of this invention with a herbicide selected from the group consisting of chlorimuron-ethyl, nicosulfuron, diuron, hexazinoe, thifensulfuron-methyl and S-metolachlor.

[0461] The compounds of the present invention are useful for the control of weed species that are resistant to herbicides with the AHAS-inhibitor or (b2) [chemical compound that inhibits acetohydroxy acid synthase (AHAS), also known as acetolactate synthase (ALS)] mode of action.

[0462] The following Tests demonstrate the control efficacy of the compounds of this invention against specific weeds. The weed control afforded by the compounds is not limited, however, to these species. See Index Table A for compound descriptions. Mass spectra are reported as the molecular weight of the highest isotopic abundance parent ion (M+1) formed by addition of H^+ (molecular weight of 1) to the molecule, observed by mass spectrometry using atmospheric pressure chemical ionization (AP^+) or electrospray ionization (ESI). The following abbreviations are used in the Index Table A which follow: Ph is phenyl, pyridyl is pyridinyl, OEt is ethoxy, CN is cyano, CHO is formyl, t-Bu is tertiary-butyl, i-Pr is iso-propyl, c-Pr is cyclopropyl, Me is methyl, Et is ethyl and $C(=O)CH_3$ is acyl. The abbreviation "Ex." stands for "Example" and is followed by a number indicating in which example the compound is prepared.

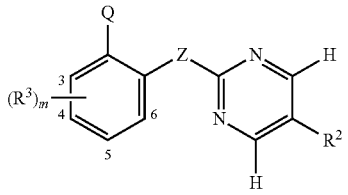
INDEX TABLE A

1



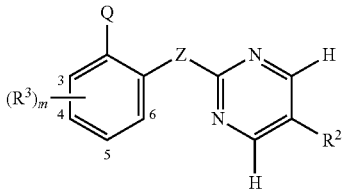
No.	Q	R^2	$(R^3)_m$	M. S. (AP+) or m.p.
1	5-Cl-2-pyridyl	Cl	m = 0	*
2	6-$N(CH_3)_2$-3-pyridyl	Cl	m = 0	327[a]
3	5-Cl-2-pyrimidinyl	Cl	m = 0	320[a]
4	3-pyridyl	Cl	m = 0	285[a]
5	1,3,4-oxadiazol-2-yl	Br	m = 0	319
6	1,3,4-oxadiazol-2-yl	Cl	m = 0	275
7	5-oxazolyl	Cl	m = 0	274[a]
8	4-thiazolyl	Cl	m = 0	290
9	5-thiazolyl	Cl	m = 0	290
10	1-CH_3-1H-pyrazol-3-yl	Cl	m = 0	*
11	1-CH_3-1H-pyrazol-4-yl	Cl	m = 0	*
12	3-Br-5-isoxazolyl	Cl	m = 0	352
13	5-thiazolyl	CF_3	m = 0	324
14	4-thiazolyl	CF_3	m = 0	324
15	2-Br-5-thiazolyl	CF_3	m = 0	402
16	6-Cl-2-pyridyl	Cl	m = 0	319[a] *
17	6-Cl-2-pyridyl	Br	m = 0	363[a] *
18	4-Cl-2-pyrimidinyl	Cl	m = 0	320[a] *
19	6-CF_3-2-pyridyl	Cl	m = 0	352[a] *
20	2-CF_3-4-pyrmidinyl	Cl	m = 0	353[a] *
21	2-CF_3-4-pyrmidinyl	Br	m = 0	398[a] *
22	6-CF_3-3-pyridyl	Cl	4-CH_3	366[a]
23	5-Cl-2-pyidyl	Cl	3-Cl	*
24	2-CF_3-4-pyridyl	Cl	4-CH_3	366
25	4-CF_3-2-pyridyl	Cl	m = 0	352
26	4-CF_3-2-pyridyl	Br	m = 0	397
27	5-CF_3-2-pyridyl	Cl	m = 0	352
28	5-CF_3-2-pyridyl	Br	m = 0	397
29	1-CH_3-3-CF_3-1H-pyrazol-5-yl	Cl	m = 0	355
30	1-CH_3-3-CF_3-1H-pyrazol-5-yl	Br	m = 0	399
31	5-CH_2OH-3-isoxazolyl	Cl	m = 0	304
32	5-CH_2F-3-isoxazolyl	Cl	m = 0	306
33	5-CHO-3-isoxazolyl	Cl	m = 0	302
34	5-CH_2Cl-3-isoxazolyl	Cl	m = 0	322
35	5-CF_2H-3-isoxazolyl	Cl	m = 0	324
36	5-CH_2CN-3-isoxazolyl	Cl	m = 0	311[b]
37	5-CH═NOH-3-isoxazolyl	Cl	m = 0	317
38	5-CN-3-isoxazolyl	Cl	m = 0	299[a]
39	3-CF_3-Ph	Cl	4-CH_3	365
40	3-OCF_3-Ph	Cl	m = 0	367[a] *
41	3,5-di-Cl-Ph	Cl	m = 0	352[a]
42	4-OCF_3-Ph	Cl	m = 0	367[a]
43	4-CF_3-Ph	Cl	m = 0	351[a]
44	3-OCF_3-Ph	Cl	4-CH_3	381[a] *
45	3-OCF_3-Ph	Cl	6-OCF_3	397[a]
46	3-OCF_3-Ph	Cl	3-F	385[a] *
47	1-methyl-1H-tetrazol-5-yl	Cl	m = 0	289
48	2-methyl-2H-tetrazol-5-yl	Cl	m = 0	289
49	1-methyl-1H-tetrazol-5-yl	Br	m = 0	334
50	2-methyl-2H-tetrazol-5-yl	Br	m = 0	334
51	1-methyl-1H-1,2,3-triazol-4-yl	Cl	m = 0	288
52	1-methyl-1H-1,2,3-triazol-5-yl	Cl	m = 0	288
53	3-CHF_2-5-isoxazolyl	Cl	m = 0	324
54	6-CF_3-4-pyrimidinyl	Cl	m = 0	*
55	5-CHF_2-3-isoxazolyl	Cl	3-F	96-98
56	5-CHO-3-isoxazolyl	Cl	3-F	137-139
57	5-CH_2F-3-isoxazolyl	Cl	3-F	324
58	3-CH_3-5-isoxazolyl	Cl	m = 0	288
59	5-(t-Bu)-3-isoxazolyl	Cl	m = 0	330
60	5-CH_3-3-isoxazolyl	Cl	m = 0	288
61	2-oxazolyl	Cl	m = 0	274
62	5-CHF_2-3-isoxazolyl	Br	m = 0	89-93

INDEX TABLE A-continued



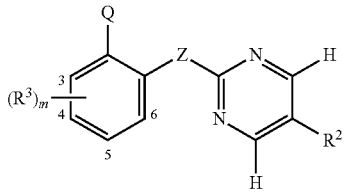
No.	Q	R^2	$(R^3)_m$	M. S. (AP+) or m.p.
63	3-CF_3-5-isoxazolyl	Cl	m = 0	342
64	3-CF_3-5-isoxazolyl	Br	m = 0	388
65	3-CHF_2-5-isoxazolyl	Cl	5-F	342
66	3-CHF_2-5-isoxazolyl	Br	5-F	387
67	3-$CClF_2$-5-isoxazolyl	Cl	m = 0	359
68	3-CHF_2-5-isoxazolyl	Cl	6-F	342
69	3-CHF_2-5-isoxazolyl	Br	6-F	387
70	2-CH_3-4-oxazolyl	Cl	m = 0	288
71	2-CF_3-4-pyridinyl	Cl	m = 0	352
72	2-CF_3-4-pyridinyl	Br	m = 0	396
73	1-(i-Pr)-1H-1,2,4-triazol-3-yl	Cl	m = 0	316
74	3-(c-Pr)-5-isoxazolyl	Cl	m = 0	314
75	3-CHF_2-5-isoxazolyl	Cl	4-F	342
76	3-CHF_2-5-isoxazolyl	Br	4-F	387
77	3,5-di-Me-4-isoxazolyl	Cl	3-F	320
78	3,5-di-Me-4-isoxazolyl	Cl	m = 0	302
79	2-CH_2CF_3-2H-1,2,4-triazol-3-yl	Cl	m = 0	102-106
80	2-CF_3-4-pyridinyl	F	m = 0	336
81	2-CF_3-4-pyridinyl	Cl	3-F	370
82	2-CF_3-4-pyridinyl	Br	3-F	414
83	2-CF_3-4-pyridinyl	CH_3	3-F	350
84	3-CF_3-5-isoxazolyl	Cl	4-F	360
85	3-CF_3-5-isoxazolyl	Br	4-F	405
86	5-(C≡CH)-3-isoxazo1yl	Cl	m = 0	156-160
87	2-CF_3-4-pyridinyl	F	3-F	354
88	5-(OCH_2CF_2H)-3-isoxazolyl	Cl	m = 0	352
89	1-Et-3-CF_3-1H-pyrazol-5-yl	Cl	3-CN	394
90	1-(i-Pr)-3-CF_3-1H-pyrazol-5-yl	Cl	3-CN	408
91	5-($CH=CF_2$)-3-isoxazolyl	Cl	3-F	354
92	3-(c-Pr)-5-isoxazolyl	Br	m = 0	359
93	1-CH_2CF_3-1H-1,2,4-triazol-3-yl	Cl	m = 0	155-158
94	5-(OCH_2CF_3)-3-isoxazolyl	Cl	m = 0	85-89
95	3-CHF_2-5-isoxazolyl	CF_3	3-F	376
96	5-CHF_2-3-isoxazolyl	Cl	3-Cl, 4-F	376
97	5-$CHCl_2$-3-isoxazolyl	Cl	m = 0	88-91
98	3-CHF_2-5-isoxazolyl	CF_3	m = 0	358
99	5-($C≡CCF_3$)-3-isoxazolyl	Cl	m = 0	63-65
100	3-CHF_2-1,2,4-oxadiazol-5-yl	Cl	m = 0	107-109
101	3-CHF_2-5-isoxazolyl	Cl	3-CH_3	338
102	3-CHF_2-5-isoxazolyl	Br	3-CH_3	383
103	3-CHF_2-5-isoxazolyl	Cl	3-OMe	354
104	3-CF_3-5-isoxazolyl	Cl	3-OMe	372
105	5-CF_3-3-isoxazolyl	Cl	3-OMe	372
106	5-CH_3-1,3,4-oxadiazol-2-yl	Cl	m = 0	289
107	3-CHF_2-5-isoxazolyl	Cl	3,5-di-F	358
108	3-$CH(OEt)_2$-5-isoxazolyl	Cl	m = 0	398[e]
109	5-CHF_2-3-isoxazolyl	Cl	3-OMe	354
110	3-CH_3-5-isoxazolyl	Cl	3-OMe	318
111	3-CH_3-5-isoxazolyl	F	3-OMe	302
112	3-thienyl	Cl	3-CN	103-105
113	5-CHF_2-3-isoxazolyl	Cl	3,4-di-F	102-105
114	5-CHF_2-3-isoxazolyl	Cl	3-Br, 4-F	420
115	1-CH_3-1H-1,2,4-triazol-3-yl	Cl	m = 0	119-122
116	5-CHClF-3-isoxazolyl	Cl	m = 0	108-112
117	1-CH_3-1H-1,2,4-triazol-5-yl	Cl	m = 0	134-138
118	5-CHF_2-3-isoxazolyl	Br	3-F	386
119	3-Br-5-isoxazolyl	Br	m = 0	398
120	3-CHF_2-5-isoxazolyl	Cl	3-Cl	359
121	3-CHF_2-5-isoxazolyl	Br	3-Cl	403
122	5-(c-Pr)-1,3,4-oxadiazol-2-yl	Cl	m = 0	315
123	1-(i-Pr)-1H-1,2,4-triazol-5-yl	Cl	m = 0	316
124	3-CF_3-5-isoxazolyl	Cl	5-F	360

INDEX TABLE A-continued



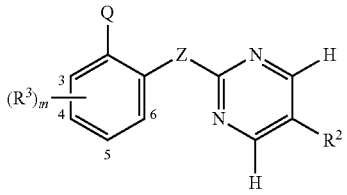
No.	Q	R^2	$(R^3)_m$	M. S. (AP+) or m.p.
125	3-CF_3-5-isoxazolyl	Br	5-F	405
126	3-CF_3-5-isoxazolyl	Cl	3-Cl	377
127	3-CF_3-5-isoxazolyl	Br	3-Cl	421
128	3-($CH_2OCH_2CF_3$)-5-isoxazolyl	Cl	m = 0	386
129	3-($CH_2OCH_2CF_3$)-5-isoxazolyl	Br	m = 0	430[a]
130	5-(c-Pr)-3-isoxazolyl	Cl	3-F	332
131	5-CHF_2-3-isoxazolyl	Cl	3-$OCHF_2$	390
132	3-CHF_2-5-isoxazolyl	Cl	3-$OCHF_2$	390
133	5-$CHFCF_3$-3-isoxazolyl	Cl	m = 0	374
134	3,5-di-Me-4-isoxazolyl	Cl	3-CN	*
135	5-Cl-2-pyridinyl	Cl	3-Br	*
136	2-Me-5-CF_3-2H-pyrazol-3-yl	Cl	3-CN	380
137	4-CF_3-2-thiazolyl	Cl	m = 0	358
138	4-CF_3-2-thiazolyl	I	m = 0	450
139	4-CF_3-2-thiazolyl	Br	m = 0	403
140	5-CHO-3-furanyl	Cl	m = 0	*
141	5-CHF_2-3-furanyl	Cl	m = 0	*
142	5-CF_2CF_3-3-isoxazolyl	Cl	m = 0	392
143	5-CF_2Cl-3-isoxazolyl	Cl	m = 0	358
144	3-CHF_2-5-isoxazolyl	Cl	3-F	342
145	3-CHF_2-5-isoxazolyl	Br	3-F	387
146	1-Me-5-CF_3-1H-pyrazol-3-yl	Cl	3-CN	380
147	1-Me-5-CF_3-1H-pyrazol-3-yl	Cl	3-Br	434
148	5-CO_2Et-3-isoxazolyl	Cl	m = 0	346
149	5-CF_2CH_3-3-isoxazolyl	Br	m = 0	*
150	5-C(=O)CH_3-3-isoxazolyl	Br	m = 0	360
151	1-Me-1H-imidazol-2-yl	Cl	m = 0	287
152	1-Me-1H-imidazol-2-yl	Br	m = 0	332
153	5-CH_3-3-isoxazolyl	Cl	m = 0	288
154	5-isoxazolyl	Cl	m = 0	274
155	5-isoxazolyl	Br	m = 0	319
156	5-CF_3-3-isoxazolyl	Cl	3-I	*
157	5-CF_3-3-isoxazolyl	Cl	3-CN	367
158	4-CF_3-2-pyridinyl	Cl	3-CN	377
159	4-CF_3-2-pyridinyl	Cl	3-Cl	386
160	5-CF_3-2-pyridinyl	Cl	3-Cl	386
161	1-CH_2CF_3-1H-imidazol-4-yl	Cl	m = 0	*
162	5-$CBrF_2$-3-isoxazolyl	Cl	m = 0	402
163	2-pyrazinyl	Cl	m = 0	79-82
164	2-pyrazinyl	F	m = 0	95-97
165	2-pyrazinyl	Cl	3-F	303
166	2-pyrazinyl	F	3-F	287
167	4-Me-5-CF_3-3-isoxazolyl	Cl	m = 0	356
168	5-CF_3-3-isoxazolyl	Cl	3-F	360
169	5-CF_3-3-isoxazolyl	Cl	3-Cl	376
170	5-CF_3-3-isoxazolyl	Cl	3-Br	420
171	3-CH_3-5-isothiazolyl	Cl	m = 0	304
172	1,2,4-thiadiazol-5-yl	Cl	m = 0	132-135
173	5-CF_2CH_3-3-isoxazolyl	CH_3	m = 0	*
174	4-Cl-2-pyridinyl	Cl	m = 0	319
175	4-F-2-pyridinyl	Cl	m = 0	302
176	3-(OCH_2CF_3)-5-isoxazolyl	Cl	m = 0	372
177	3-Et-5-isoxazolyl	Cl	m = 0	318
178	3-CF_2CH_3-5-isoxazolyl	Cl	m = 0	338
179	5-CHF_2-3-isoxazolyl	Cl	3-Cl	358
180	5-CHF_2-3-isoxazolyl	Cl	3-CN	349
181	5-Br-2-thienyl	Cl	m = 0	368
182	2-thienyl	Cl	m = 0	290
183	5-(c-Pr)-3-isoxazolyl	Cl	m = 0	314
184	6-CHF_2-4-pyrimidinyl	Cl	m = 0	334
185	3-isoxazolyl	Cl	m = 0	274
186	6-Cl-3-pyridazinyl	Cl	m = 0	319

INDEX TABLE A-continued



No.	Q	R^2	$(R^3)_m$	M. S. (AP+) or m.p.
187	4-Me-2-pyridinyl	Cl	m = 0	298
188	4-CN-2-pyridinyl	Cl	m = 0	309
189	5-Cl-3-pyridazinyl	Cl	m = 0	320
190	6-Cl-4-pyrimidinyl	Cl	m = 0	320
191	5-CH_2F-3-isoxazolyl	Cl	3-Br	384
192	5-Cl-3-isothiazolyl	Cl	m = 0	86-88
193	5-Cl-3-isothiazolyl	F	m = 0	100-102
194	5-Cl-3-isothiazolyl	CH_3	m = 0	78-82
195	5-CHO-3-isoxazolyl	Cl	3-Br	379
196	3-C(CH_3)=CH_2-5-isoxazolyl	Cl	m = 0	314
197	3-C(CH_3)=CH_2-5-isoxazolyl	Br	m = 0	359
198	5-$CFCl_2$-3-isoxazolyl	Cl	m = 0	374
199	2-thiazolyl	Cl	m = 0	290
200	5-CF_3-3-isoxazolyl	Cl	m = 0	342
201	3-NO_2,5-Cl-2-pyridinyl	Cl	m = 0	363[a]
202	5-Cl-2-pyridinyl	Cl	3-CN	344
203	5-Cl-2-pyridinyl	Cl	5-Br	398
204	5-Cl-2-pyridinyl	Br	3-CN	388
205	5-Cl-2-pyridinyl	Cl	3-I	445
206	5-CF_3-3-isoxazolyl	F	m = 0	326
207	5-Cl-2-pyridinyl	F	3-CN	327
208	5-Cl-2-pyridinyl	Cl	3-&	464
209	4-Br-1H-pyrazol-1-yl	Cl	6-CN	377
210	3-CHF_2-5-isoxazolyl	F	m = 0	308
211	3-CHF_2-5-isoxazolyl	CH_3	m = 0	304
212	3-CHF_2-5-isoxazolyl	Br	m = 0	369
213	3-CHF_2-5-isoxazolyl	OMe	m = 0	320
214	4-oxazolyl	Cl	m = 0	274
215	5-C(=O)CH_3-3-isoxazolyl	Cl	m = 0	316
216	4-CH_3-2-thienyl	Cl	m = 0	303

INDEX TABLE A-continued



No.	Q	R^2	$(R^3)_m$	M. S. (AP+) or m.p.
217	1-CH_2CF_3-1H-imidazol-4-yl	Cl	3-F	373
218	3-C(=O)CH_3-5-isoxazolyl	Cl	m = 0	316
219	4-OMe-2-pyridinyl	Cl	m = 0	314
220	5-CF_2CH_3-3-isoxazolyl	Cl	m = 0	338
221	5-$CFCl_2$-3-isoxazolyl	Cl	4-F	129-132
222	5-CN-3-isoxazolyl	Cl	3-F	317
223	3-CN-5-isoxazolyl	Cl	m = 0	297
224	3-CH_2F-5-isoxazolyl	Cl	m = 0	306
225	3-CO_2Et-5-isoxazolyl	Cl	m = 0	346
226	5-CFH_2-3-isoxazolyl	Cl	m = 0	320
227	6-OCH_2CF_3-4-pyrimidinyl	Cl	m = 0	383
228	3-CF_3-5-isoxazolyl	Cl	3-F	360
229	3-CH_3-5-isoxazolyl	Cl	3-F	306
230	3-CH_3-5-isoxazolyl	Br	3-F	351
231	3-thienyl	Cl	m = 0	289
232	3-thienyl	Br	m = 0	334
233	5-isothiazolyl	Cl	m = 0	290
234	5-isothiazolyl	Br	m = 0	335
235	5-CO_2Me-3-isoxazolyl	Cl	m = 0	332
236	5-$CF(CH_3)_2$-3-isoxazolyl	Cl	m = 0	334
237	1-Me-5-CF_3-1H-pyrazol-3-yl	Cl	m = 0	355
238	4-CH_3-2-thienyl	Cl	3-CN	328
239	5-CHF_2-2-furanyl	Cl	m = 0	323

[a]ES+,
[b]AP–,
[c]M + Na.
* See Index Table B for ^{1}H NMR data.
& 4-Br-1H-pyrazol-1-yl

INDEX TABLE B

Cmpd	^{1}H NMR ($CDCl_3$ solution unless indicated otherwise)[Z]
1	8.54 (d, 1H), 8.39 (s, 2H), 7.87 (d, 1H), 7.69 (d, 1H), 7.60 (m, 1H), 7.50 (m, 1H), 7.42 (m, 1H), 7.24 (d, 1H)
10	8.43 (s, 2H), 8.03 (m, 2H), 7.36 (m, 2H), 7.26 (m, 1H), 7.19 (m, 1H), 6.56 (s, 1H), 3.85 (s, 3H)
11	8.45 (s, 2H), 7.77 (s, 1H), 7.72 (s, 1H), 7.62 (m, 1H), 7.32 (m, 2H), 7.18 (m, 1H), 3.86 (s, 3H)
16	8.41 (s, 2H), 7.88 (m, 1H), 7.64 (m, 1H), 7.59 (m, 1H), 7.50 (m, 1H), 7.40 (m, 1H), 7.24 (m, 1H), 7.18 (m, 1H)
17	8.49 (s, 2H), 7.88 (m, 1H), 7.64 (m, 1H), 7.58 (m, 1H), 7.50 (m, 1H), 7.41 (m, 1H), 7.25 (m, 1H), 7.17 (m, 1H)
18	8.55 (m, 1H), 8.43 (s, 2H), 8.05 (m, 1H), 7.75 (m, 1H), 7.58 (m, 1H), 7.45 (m, 1H), 7.26 (m, 1H)
19	8.41 (s, 2H), 7.89 (m, 2H), 7.82 (m, 1H), 7.54 (m, 2H), 7.43 (m, 1H), 7.26 (m, 1H)
20	8.82 (m, 1H), 8.52 (s, 2H), 8.06 (m, 1H), 7.96 (m, 1H), 7.61 (m, 1H), 7.48 (m, 1H), 7.30 (m, 1H)
21	8.83 (d, 1H), 8.52 (s, 2H), 8.08 (m, 1H), 7.97 (d, 1H), 7.62 (m, 1H), 7.47 (m, 1H), 7.30 (m, 1H)
23	8.52 (m, 1H), 8.40 (s, 2H), 7.66 (m, 1H), 7.43 (m, 2H), 7.33 (m, 1H), 7.18 (m, 1H)
40	8.26 (s, 2H), 7.39 (m, 2H), 7.32 (m, 2H), 7.27 (m, 1H), 7.24 (s, 1H), 7.17 (m, 1H), 7.02 (d, 1H)
44	8.33 (s, 2H), 7.39 (s, 1H), 7.28-7.34 (m, 2H), 7.25 (m, 2H), 7.12 (d, 1H), 7.07 (m, 1H), 2.43 (s, 3H)
46	(300 MHz) 8.33 (S, 2H), 7.43 (m, 1H), 7.34 (m, 2H), 7.22 (s, 1H), 7.10 (m, 3H)
54	9.42 (s, 1H), 8.43 (s, 2H), 8.12 (s, 1H), 8.05 (d, 1H), 7.72 (m, 1H), 7.53 (m, 1H), 7.32 (m, 1H)
134	8.36 (s, 2 H), 7.74 (m, 1 H), 7.62 (m, 1 H), 7.48-7.56 (m, 1 H), 2.33 (s, 3 H), 2.22 (s, 3 H)
135	7.22 (m, 1H), 7.31 (m, 1H), 7.36 (m, 1H), 7.65 (m, 2H), 8.40 (s, 2H), 8.52 (m, 1H)
140	9.60 (s, 1H), 8.44 (s, 2H), 8.05 (s, 1H), 7.59 (d, 1H), 7.54 (s, 1H), 7.43 (t, 1H), 7.37 (t, 1H), 7.23 (d, 1H)
141	8.43 (s, 2H), 7.86 (s, 1H), 7.57 (d, 1H), 7.37 (t, 1H), 7.34 (t, 1H), 7.22 (d, 1H), 6.98 (s, 1H), 6.57 (t, 1H)
149	8.54 (2, 2H), 7.96 (dd, 1H), 7.49-7.63 (m, 1H), 7.42 (t, 1H), 7.26-7.29 (m, 1H), 6.86 (t, 1H), 2.00 (t, 3H)

INDEX TABLE B-continued

Cmpd	^{1}H NMR ($CDCl_3$ solution unless indicated otherwise)[Z]
156	7.06-7.08 (m, 1 H) 7.18 (s, 1 H) 7.93 (s, 1 H) 8.01-8.06 (m, 1 H) 8.46 (s, 2 H)
161	8.34 (s, 2H), 6.59 (s, 1H), 6.56 (t, 1H), 6.40-6.48 (m, 2H), 7.28 (d, 1H), 6.92 (s, 1H), 6.55 (q, 2H)
173	8.34 (s, 2H), 7.99 (dd, 1H), 7.51-7.59 (m, 1H), 7.38 (dt, 1H), 7.26-7.31 (m, 1H), 6.90 (t, 1H), 2.25 (s, 3H), 1.99 (t, 3H)

[Z]^{1}H NMR data are in ppm downfield from tetramethylsilane at 500 MHz unless otherwise indicated. Couplings are designated by (s)—singlet, (d)—doublet and (m)—multiplet.

Biological Examples of the Invention

Test A

[0463] Seeds of plant species selected from downy bromegrass (*Bromus tectorum*), cocklebur (common cocklebur, *Xanthium strumarium*), wild oat (*Avena fatua*), barnyardgrass (*Echinochloa crus-galli*), large (Lg) crabgrass (*Digitaria sanguinalis*), giant foxtail (*Setaria faberii*), morningglory (*Ipomoea* spp.), velvetleaf (*Abutilon theophrasti*), and *sorghum* (*Sorghum vulgare*) were planted into a sandy loam soil and treated preemergence by soil drench using test a chemical formulated in a non-phytotoxic solvent mixture which included a surfactant. At the same time these species were also treated postemergence sprayed to runoff using a test chemical formulated in the same manner.

[0464] Plants ranged in height from 2 to 18 cm and were in the one- to two-leaf stage for the postemergence treatment. Treated plants and untreated controls were maintained in a greenhouse for approximately 11 days, after which time all treated plants were compared to untreated controls and visually evaluated for injury. Plant response ratings, summarized in Table A, are based on a 0 to 100 scale where 0 is no effect and 100 is complete control. A dash (-) response means no test result.

TABLE A

1000 g ai/ha	Compound 39	2000 g ai/ha	Compound 39
Post Sprayed to Runoff		Pre Soil Drench	
Barnyardgrass	50	Barnyardgrass	90
Bromegrass, Downy	20	Bromegrass, Downy	70
Cocklebur	40	Cocklebur	0
Crabgrass, Large	50	Crabgrass, Large	90
Foxtail, Giant	30	Foxtail, Giant	100

TABLE A-continued

1000 g ai/ha	Compound 39	2000 g ai/ha	Compound 39
Morningglory	30	Morningglory	0
Oat, Wild	20	Oat, Wild	90
Sorghum	30	*Sorghum*	50
Velvetleaf	60	Velvetleaf	70

Test B

[0465] Seeds of plant species selected from barnyardgrass (*Echinochloa crus-galli*), *kochia* (*Kochia scoparia*), ragweed (common ragweed, *Ambrosia* elation), Italian ryegrass (*Lolium multiflorum*), large (Lg) crabgrass (*Digitaria sanguinalis*), giant foxtail (*Setaria faberii*), morningglory (*Ipomoea* spp.), pigweed (*Amaranthus retroflexus*), velvetleaf (*Abutilon theophrasti*), wheat (*Triticum aestivum*), and corn (*Zea mays*) were planted into a blend of loam soil and sand and treated preemergence with a directed soil spray using test chemicals formulated in a non-phytotoxic solvent mixture which included a surfactant.

[0466] At the same time, plants selected from these crop and weed species and also blackgrass (*Alopecurus myosuroides*), and *galium* (catchweed bedstraw, *Galium aparine*) were planted in pots containing the same blend of loam soil and sand and treated with postemergence applications of test chemicals formulated in the same manner. Plants ranged in height from 2 to 10 cm and were in the one- to two-leaf stage for the postemergence treatment. Treated plants and untreated controls were maintained in a greenhouse for approximately 10 days, after which time all treated plants were compared to untreated controls and visually evaluated for injury. Plant response ratings, summarized in Table B, are based on a 0 to 100 scale where 0 is no effect and 100 is complete control. A dash (-) response means no test result.

TABLE B

	Compounds													
1000 g ai/ha	1	2	3	5	6	7	8	9	10	12	23	31	33	34
Postemergence														
Barnyardgrass	70	0	50	20	0	10	0	10	10	40	50	10	0	0
Blackgrass	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Corn	10	0	10	0	0	10	0	10	0	0	20	0	0	0
Crabgrass, Large	70	0	10	0	20	20	10	50	10	30	60	50	10	10
Foxtail, Giant	80	0	20	0	0	20	0	20	10	40	70	30	10	0
Galium	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Kochia	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Morningglory	60	40	60	20	20	40	10	50	10	30	70	30	10	0
Pigweed	100	70	70	70	70	20	70	60	50	100	100	30	10	40
Ragweed	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ryegrass, Italian	—	—	—	—	—	—	—	—	—	—	—	—	—	—

TABLE B-continued

Velvetleaf	100	50	100	30	30	10	30	40	20	90	70	30	0	20
Wheat	0	0	10	0	0	10	0	10	0	10	0	0	0	0

	Compounds													
1000 g ai/ha	35	36	40	46	55	57	61	148	171	172	186	191	192	193
	Postemergence													
Barnyardgrass	100	90	30	90	100	100	10	10	30	10	0	100	100	90
Blackgrass	—	—	—	—	100	90	—	10	80	0	20	100	90	90
Corn	90	50	20	20	100	90	0	0	10	10	0	60	30	10
Crabgrass, Large	100	80	50	100	—	—	0	—	—	—	—	—	—	—
Foxtail, Giant	90	90	50	100	100	100	0	10	100	10	30	100	90	90
Galium	—	—	—	—	100	90	—	0	100	10	20	100	100	100
Kochia	—	—	—	—	100	90	—	0	100	30	30	100	100	100
Morningglory	100	20	100	70	—	—	10	—	—	—	—	—	—	—
Pigweed	100	90	100	100	100	100	60	0	100	80	20	100	100	100
Ragweed	—	—	—	—	100	100	—	0	30	10	50	90	60	90
Ryegrass, Italian	—	—	—	—	100	80	—	0	10	0	0	100	50	30
Velvetleaf	100	100	100	100	—	—	70	—	—	—	—	—	—	—
Wheat	80	50	10	20	100	90	0	0	30	0	0	30	30	20

	Compounds		
1000 g ai/ha	194	195	235
	Postemergence		
Barnyardgrass	100	10	0
Blackgrass	90	0	0
Corn	60	10	0
Crabgrass, Large	—	—	—
Foxtail, Giant	90	10	0
Galium	100	10	0
Kochia	100	10	0
Morningglory	—	—	—
Pigweed	90	50	0
Ragweed	80	10	0
Ryegrass, Italian	50	10	0
Velvetleaf	—	—	—
Wheat	20	0	0

	Compounds													
500 g ai/ha	4	10	11	13	14	16	17	18	19	20	21	22	23	24
	Postemergence													
Barnyardgrass	10	0	10	0	0	0	0	0	0	0	60	0	50	60
Blackgrass	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Corn	—	0	0	10	30	0	0	0	0	0	40	0	20	40
Crabgrass, Large	50	0	10	10	10	0	0	0	0	20	30	10	50	90
Foxtail, Giant	30	0	0	0	10	0	0	0	0	20	60	0	70	90
Galium	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Kochia	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Morningglory	30	30	20	10	0	—	—	0	0	50	90	10	40	100
Pigweed	100	20	20	40	50	30	10	0	0	90	100	0	100	40
Ragweed	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ryegrass, Italian	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Velvetleaf	60	20	20	60	30	20	20	0	0	30	40	60	70	70
Wheat	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Compounds													
500 g ai/ha	25	26	27	28	29	30	32	37	41	42	43	44	45	47
	Postemergence													
Barnyardgrass	30	20	50	50	0	0	90	0	20	30	20	20	20	0
Blackgrass	—	—	—	—	—	—	—	0	—	—	—	—	—	0
Corn	30	20	30	20	0	0	50	0	10	20	10	20	10	0
Crabgrass, Large	50	30	90	40	10	10	90	—	20	50	20	20	40	—
Foxtail, Giant	60	30	70	40	0	10	90	10	20	30	20	10	20	50
Galium	—	—	—	—	—	—	—	0	—	—	—	—	—	60
Kochia	—	—	—	—	—	—	—	0	—	—	—	—	—	80
Morningglory	70	50	50	30	0	10	90	—	10	60	20	30	30	—

TABLE B-continued

Pigweed	90	80	100	100	10	10	100	20	70	80	70	50	60	70
Ragweed	—	—	—	—	—	—	—	0	—	—	—	—	—	30
Ryegrass, Italian	—	—	—	—	—	—	—	0	—	—	—	—	—	0
Velvetleaf	80	80	100	100	0	30	100	—	30	100	70	70	60	—
Wheat	10	10	0	0	0	0	60	0	0	0	0	0	0	10

	Compounds													
500 g ai/ha	48	49	50	51	52	53	54	58	59	60	62	63	64	123
	Postemergence													
Barnyardgrass	0	10	0	0	10	100	100	90	10	100	100	100	100	0
Blackgrass	60	10	60	50	10	100	80	90	40	100	—	—	—	0
Corn	10	10	0	0	10	70	0	50	10	90	50	20	30	0
Crabgrass, Large	—	—	—	—	—	—	—	—	—	—	90	90	90	—
Foxtail, Giant	40	10	10	50	0	100	100	90	50	100	90	80	80	0
Galium	100	60	100	90	50	100	100	100	90	100	—	—	—	0
Kochia	100	30	80	100	50	100	100	100	20	100	—	—	—	0
Morningglory	—	—	—	—	—	—	—	—	—	—	100	100	100	—
Pigweed	100	30	100	80	60	100	100	100	50	100	100	100	100	0
Ragweed	70	30	60	60	20	90	60	100	0	90	—	—	—	0
Ryegrass, Italian	0	0	50	0	0	100	60	80	0	80	—	—	—	0
Velvetleaf	—	—	—	—	—	—	—	—	—	—	100	100	100	—
Wheat	0	20	20	10	20	80	0	50	10	90	30	50	10	0

	Compounds													
500 g ai/ha	134	135	136	137	138	139	151	152	153	156	157	158	159	160
	Postemergence													
Barnyardgrass	90	40	90	10	0	0	0	0	70	20	60	100	20	80
Blackgrass	—	—	—	0	0	0	0	0	90	40	90	90	30	90
Corn	80	30	70	20	0	0	0	0	40	40	40	90	30	90
Crabgrass, Large	100	50	90	—	—	—	—	—	—	—	—	—	—	—
Foxtail, Giant	90	60	80	20	0	0	0	0	90	90	80	100	70	100
Galium	—	—	—	20	0	0	0	0	100	100	100	100	100	100
Kochia	—	—	—	60	0	0	0	0	90	90	100	90	80	90
Morningglory	90	50	90	—	—	—	—	—	—	—	—	—	—	—
Pigweed	100	100	100	90	0	0	0	0	100	100	100	100	100	100
Ragweed	—	—	—	0	0	0	0	0	100	40	50	30	0	30
Ryegrass, Italian	—	—	—	0	0	0	0	0	60	70	100	70	0	90
Velvetleaf	90	80	100	—	—	—	—	—	—	—	—	—	—	—
Wheat	30	10	40	0	0	0	0	0	50	30	70	70	20	80

	Compounds													
500 g ai/ha	161	167	168	169	170	179	180	181	182	183	184	185	190	199
	Postemergence													
Barnyardgrass	0	10	100	30	20	80	90	20	10	70	50	40	0	0
Blackgrass	0	10	90	90	60	100	90	10	10	90	60	50	0	—
Corn	0	20	100	20	20	40	70	10	20	30	20	10	0	0
Crabgrass, Large	—	—	—	—	—	—	—	—	—	—	—	—	—	10
Foxtail, Giant	0	10	100	60	50	80	100	20	50	80	70	70	0	0
Galium	0	60	100	100	100	100	100	50	50	100	100	70	10	—
Kochia	0	60	90	90	100	100	100	50	80	100	100	100	0	—
Morningglory	—	—	—	—	—	—	—	—	—	—	—	—	—	10
Pigweed	0	70	100	100	100	100	100	90	80	100	100	100	20	30
Ragweed	0	0	90	30	50	30	70	10	10	30	40	100	10	—
Ryegrass, Italian	0	0	90	50	20	100	100	0	0	70	20	0	0	—
Velvetleaf	—	—	—	—	—	—	—	—	—	—	—	—	—	10
Wheat	0	20	100	0	30	90	90	0	0	60	10	0	0	0

	Compounds											
500 g ai/ha	200	201	202	203	204	205	206	207	208	209	215	217
	Postemergence											
Barnyardgrass	100	0	40	0	10	10	10	70	20	0	90	0
Blackgrass	—	—	—	—	—	—	—	—	—	—	40	0
Corn	90	0	30	0	0	10	0	0	0	0	40	0
Crabgrass, Large	100	0	70	0	40	20	20	30	0	30	—	—
Foxtail, Giant	100	0	80	0	30	20	20	30	0	30	80	0

TABLE B-continued

Galium	—	—	—	—	—	—	—	—	—	—	70	30
Kochia	—	—	—	—	—	—	—	—	—	—	10	30
Morningglory	100	0	40	0	10	10	30	30	0	30	—	—
Pigweed	100	0	100	0	90	90	70	100	60	100	100	60
Ragweed	—	—	—	—	—	—	—	—	—	—	20	30
Ryegrass, Italian	—	—	—	—	—	—	—	—	—	—	50	0
Velvetleaf	100	0	30	0	10	10	60	60	30	30	—	—
Wheat	100	0	0	0	0	0	0	0	0	0	20	0

	Compounds													
125 g ai/ha	4	10	11	13	14	15	16	17	18	19	20	21	22	23
Postemergence														
Barnyardgrass	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Blackgrass	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Corn	—	0	0	0	0	0	0	0	0	0	0	0	0	10
Crabgrass, Large	20	0	10	0	0	10	0	0	0	0	0	0	0	10
Foxtail, Giant	0	0	0	0	0	0	0	0	0	0	0	0	0	10
Galium	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Kochia	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Morningglory	0	20	10	0	0	10	—	—	0	0	0	20	0	20
Pigweed	30	0	10	0	0	70	0	0	0	0	40	80	0	70
Ragweed	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ryegrass, Italian	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Velvetleaf	30	0	10	30	20	0	0	0	0	0	0	20	50	40
Wheat	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Compounds													
125 g ai/ha	24	25	26	27	28	29	30	32	38	41	42	43	44	45
Postemergence														
Barnyardgrass	0	0	0	20	0	0	0	70	0	0	20	0	10	0
Blackgrass	—	—	—	—	—	—	—	—	0	—	—	—	—	—
Corn	0	10	10	0	0	0	0	10	0	0	20	0	0	0
Crabgrass, Large	80	10	10	20	20	0	0	60	—	10	30	0	10	10
Foxtail, Giant	30	0	0	20	20	0	0	70	0	10	10	0	0	10
Galium	—	—	—	—	—	—	—	—	30	—	—	—	—	—
Kochia	—	—	—	—	—	—	—	—	30	—	—	—	—	—
Morningglory	50	10	10	10	0	0	0	70	—	0	20	0	20	30
Pigweed	20	30	30	50	30	0	0	100	20	40	60	30	20	10
Ragweed	—	—	—	—	—	—	—	—	0	—	—	—	—	—
Ryegrass, Italian	—	—	—	—	—	—	—	—	0	—	—	—	—	—
Velvetleaf	40	20	10	70	40	0	10	90	—	10	100	20	30	50
Wheat	0	0	0	0	0	0	0	30	0	0	0	0	0	0

	Compounds													
125 g ai/ha	47	48	49	50	51	52	53	54	58	59	60	62	63	64
Postemergence														
Barnyardgrass	0	0	0	0	0	0	100	20	70	10	50	90	80	90
Blackgrass	0	40	0	40	0	0	100	70	70	0	50	—	—	—
Corn	0	0	0	0	0	0	10	0	0	0	30	10	20	20
Crabgrass, Large	—	—	—	—	—	—	—	—	—	—	—	70	80	60
Foxtail, Giant	0	0	0	0	10	0	100	80	70	10	50	80	70	60
Galium	30	70	20	90	60	40	100	100	100	40	100	—	—	—
Kochia	60	50	30	60	70	20	100	100	100	0	90	—	—	—
Morningglory	—	—	—	—	—	—	—	—	—	—	—	90	100	70
Pigweed	50	70	10	70	70	30	100	100	100	40	100	100	100	100
Ragweed	20	50	30	20	20	20	60	50	100	0	60	—	—	—
Ryegrass, Italian	0	0	0	0	0	0	80	30	20	0	0	—	—	—
Velvetleaf	—	—	—	—	—	—	—	—	—	—	—	100	100	100
Wheat	0	0	10	0	0	0	40	0	0	0	30	0	0	0

	Compounds													
125 g ai/ha	70	73	89	90	91	96	97	103	104	105	106	107	108	109
Postemergence														
Barnyardgrass	0	0	30	0	0	30	20	40	60	70	0	0	0	90
Blackgrass	0	0	20	0	0	70	0	90	100	100	0	0	0	90

TABLE B-continued

Corn	0	0	30	0	0	20	20	30	30	20	0	0	10	60
Crabgrass, Large	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Foxtail, Giant	0	0	40	0	0	50	30	70	80	80	0	0	0	90
Galium	0	10	50	30	0	100	50	100	100	100	0	0	50	100
Kochia	0	0	70	10	0	100	90	30	80	70	0	0	0	30
Morningglory	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pigweed	20	10	90	10	0	100	90	80	90	100	0	0	0	100
Ragweed	0	0	10	0	0	60	50	60	10	30	0	0	0	90
Ryegrass, Italian	0	0	0	0	0	60	0	10	30	10	0	0	0	50
Velvetleaf	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Wheat	0	0	0	0	0	0	0	0	10	10	0	0	0	10

	Compounds													
125 g ai/ha	110	111	112	113	114	115	116	117	118	119	120	121	122	123
Postemergence														
Barnyardgrass	50	10	30	90	20	0	30	0	100	0	90	90	0	0
Blackgrass	40	40	20	90	40	0	30	0	100	0	90	80	0	0
Corn	10	10	20	30	50	0	40	0	100	0	40	40	0	0
Crabgrass, Large	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Foxtail, Giant	70	60	60	90	60	0	90	0	100	10	90	90	0	0
Galium	70	20	50	100	100	0	70	0	100	60	100	100	20	0
Kochia	50	30	70	100	90	0	90	0	100	30	90	90	20	0
Morningglory	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pigweed	30	20	30	100	100	0	100	0	100	80	100	100	20	0
Ragweed	40	20	30	80	20	0	40	0	50	10	70	60	10	0
Ryegrass, Italian	0	0	0	70	60	0	30	0	80	0	90	70	0	0
Velvetleaf	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Wheat	0	0	0	10	20	0	20	0	60	0	40	30	20	0

	Compounds													
125 g ai/ha	124	125	126	127	128	129	130	131	132	133	134	135	137	138
Postemergence														
Barnyardgrass	20	30	100	100	10	10	100	90	50	60	20	10	0	0
Blackgrass	30	30	90	90	20	0	80	80	50	70	—	—	0	0
Corn	10	10	70	50	10	10	40	40	30	30	10	10	0	0
Crabgrass, Large	—	—	—	—	—	—	—	—	—	—	10	10	—	—
Foxtail, Giant	20	20	90	90	10	10	80	90	70	50	10	10		0
Galium	100	100	100	100	30	10	90	90	90	100	—	—	0	0
Kochia	80	80	90	90	50	10	90	70	60	90	—	—	0	0
Morningglory	—	—	—	—	—	—	—	—	—	—	10	20	—	—
Pigweed	90	90	100	100	60	30	100	100	100	100	60	100	30	0
Ragweed	20	20	40	50	10	0	60	70	30	30	—	—	0	0
Ryegrass, Italian	0	10	100	90	0	0	60	70	40	30	—	—	0	0
Velvetleaf	—	—	—	—	—	—	—	—	—	—	40	40	—	—
Wheat	0	0	40	20	0	0	40	30	10	10	10	0	0	0

	Compounds													
125 g ai/ha	139	140	141	142	143	144	145	146	147	149	150	151	152	153
Postemergence														
Barnyardgrass	0	0	0	0	90	100	100	20	0	40	20	0	0	0
Blackgrass	0	0	0	0	60	90	90	30	0	60	10	0	0	40
Corn	0	0	30	20	30	90	70	0	0	20	10	0	0	30
Crabgrass, Large	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Foxtail, Giant	0	0	0	0	80	100	90	20	0	60	10	0	0	20
Galium	0	0	0	10	100	100	100	50	0	90	10	0	0	90
Kochia	0	0	0	20	100	100	100	60	0	100	0	0	0	90
Morningglory	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pigweed	0	0	20	20	100	100	100	60	0	100	20	0	0	100
Ragweed	0	0	0	0	20	60	50	0	0	20	0	0	0	20
Ryegrass, Italian	0	0	0	0	50	100	80	0	0	20	0	0	0	30
Velvetleaf	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Wheat	0	0	0	0	30	90	70	0	0	10	0	0	0	30

TABLE B-continued

	Compounds													
125 g ai/ha	154	155	156	157	158	159	160	161	162	163	164	165	166	167
	Postemergence													
Barnyardgrass	0	0	0	20	60	0	0	0	90	0	0	20	0	0
Blackgrass	0	0	20	70	30	0	50	0	30	20	0	30	0	0
Corn	0	0	20	0	30	20	30	0	40	10	0	0	10	0
Crabgrass, Large	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Foxtail, Giant	0	0	20	70	50	0	30	0	90	10	0	20	0	0
Galium	0	0	90	100	30	70	70	0	90	30	30	40	30	10
Kochia	0	0	90	90	70	20	40	0	100	50	0	40	0	10
Morningglory	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pigweed	0	0	90	100	80	90	90	0	100	30	30	50	30	10
Ragweed	0	0	20	10	0	0	0	0	40	30	30	60	30	0
Ryegrass, Italian	0	0	30	90	0	0	0	0	50	0	0	0	0	0
Velvetleaf	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Wheat	0	0	20	50	20	20	20	0	30	0	0	0	0	10

	Compounds													
125 g ai/ha	168	169	170	173	174	175	176	177	178	179	180	181	182	183
	Postemergence													
Barnyardgrass	100	10	0	70	10	10	30	30	40	10	50	10	0	40
Blackgrass	90	50	50	70	50	0	30	30	40	80	90	0	0	80
Corn	100	10	20	40	0	0	30	10	20	10	20	10	10	10
Crabgrass, Large	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Foxtail, Giant	100	30	30	90	0	0	50	40	60	40	80	0	0	60
Galium	100	100	80	90	70	40	90	100	100	100	100	10	30	100
Kochia	90	90	70	100	70	30	100	70	100	90	100	30	30	100
Morningglory	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pigweed	100	100	100	80	50	60	100	100	100	100	100	50	40	100
Ragweed	90	20	10	60	30	30	20	20	10	10	50	10	0	20
Ryegrass, Italian	90	20	0	20	0	0	10	0	30	90	100	0	0	40
Velvetleaf	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Wheat	100	0	0	0	0	0	0	0	10	40	60	0	0	10

	Compounds													
125 g ai/ha	184	185	187	188	189	190	196	197	198	199	200	201	202	203
	Postemergence													
Barnyardgrass	0	10	0	20	0	0	10	0	50	0	90	0	10	0
Blackgrass	10	0	0	20	0	0	0	0	40	—	—	—	—	—
Corn	10	0	0	30	0	0	0	0	20	0	50	0	0	0
Crabgrass, Large	—	—	—	—	—	—	—	—	—	0	100	0	10	0
Foxtail, Giant	10	10	0	20	0	0	10	0	90	0	100	0	30	0
Galium	70	40	0	50	0	0	100	50	100	—	—	—	—	—
Kochia	70	90	0	90	0	0	40	0	80	—	—	—	—	—
Morningglory	—	—	—	—	—	—	—	—	—	0	90	0	10	0
Pigweed	90	90	0	60	0	0	60	10	100	10	100	0	90	0
Ragweed	20	70	0	20	0	10	20	0	20	—	—	—	—	—
Ryegrass, Italian	0	0	0	0	0	0	0	0	50	—	—	—	—	—
Velvetleaf	—	—	—	—	—	—	—	—	—	0	100	0	10	0
Wheat	0	0	0	20	0	0	0	0	10	0	60	0	0	0

	Compounds													
125 g ai/ha	204	205	206	207	208	209	210	211	212	213	214	215	216	217
	Postemergence													
Barnyardgrass	0	0	0	0	0	0	0	10	30	0	0	20	10	0
Blackgrass	—	—	—	—	—	—	30	50	50	10	0	0	10	0
Corn	0	0	0	0	0	0	10	10	20	10	0	20	10	0
Crabgrass, Large	10	10	10	0	0	10	—	—	—	—	—	—	—	—
Foxtail, Giant	0	0	0	0	0	0	40	50	70	20	0	20	0	0
Galium	—	—	—	—	—	—	90	100	100	80	10	20	50	10
Kochia	—	—	—	—	—	—	80	90	100	100	0	0	20	10
Morningglory	0	0	20	10	0	30	—	—	—	—	—	—	—	—
Pigweed	50	60	40	70	20	90	80	50	100	80	10	20	30	10
Ragweed	—	—	—	—	—	—	30	30	60	60	0	0	0	10
Ryegrass, Italian	—	—	—	—	—	—	0	0	20	0	0	0	0	0

TABLE B-continued

Velvetleaf	0	0	30	10	20	30	—	—	—	—	—	—	—	—
Wheat	0	0	0	0	0	0	20	0	10	10	0	0	0	0

	Compounds													
125 g ai/ha	218	219	220	221	222	223	224	225	226	227	228	229	230	231
Postemergence														
Barnyardgrass	0	0	40	90	0	10	50	0	70	60	70	70	60	10
Blackgrass	0	0	90	60	10	0	70	0	70	70	100	80	70	0
Corn	0	0	20	50	30	0	20	0	30	20	30	30	10	0
Crabgrass, Large	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Foxtail, Giant	0	0	80	90	0	10	50	0	70	60	90	80	70	10
Galium	10	30	100	100	90	50	100	0	100	80	100	100	100	20
Kochia	0	0	100	100	30	10	100	0	100	80	100	100	100	40
Morningglory	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pigweed	40	10	100	90	100	60	100	0	100	90	100	100	90	40
Ragweed	0	30	10	50	20	10	100	0	40	30	40	100	100	0
Ryegrass, Italian	0	0	40	40	0	0	0	0	50	30	90	20	0	0
Velvetleaf	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Wheat	0	0	50	30	20	0	0	0	50	20	50	40	10	0

	Compounds						
125 g ai/ha	232	233	234	236	237	238	239
Postemergence							
Barnyardgrass	0	10	0	30	0	30	0
Blackgrass	0	10	10	40	0	0	0
Corn	0	10	10	30	0	20	20
Crabgrass, Large	—	—	—	—	—	—	—
Foxtail, Giant	0	0	0	30	0	10	0
Galium	0	0	0	100	0	40	0
Kochia	0	0	0	90	0	80	0
Morningglory	—	—	—	—	—	—	—
Pigweed	40	20	20	70	0	20	20
Ragweed	0	0	10	20	0	0	0
Ryegrass, Italian	0	0	0	20	0	0	0
Velvetleaf	—	—	—	—	—	—	—
Wheat	0	0	0	20	0	0	0

	Compounds													
31 g ai/ha	15	38	70	73	89	90	91	96	97	103	104	105	106	107
Postemergence														
Barnyardgrass	0	0	0	0	10	0	0	10	0	0	10	10	0	0
Blackgrass	—	0	0	0	10	0	0	10	0	30	70	70	0	0
Corn	0	0	0	0	10	0	0	0	0	0	10	10	0	0
Crabgrass, Large	0	—	—	—	—	—	—	—	—	—	—	—	—	—
Foxtail, Giant	0	0	0	0	10	0	0	0	0	40	20	40	0	0
Galium	—	20	0	0	10	0	0	100	10	90	90	70	0	0
Kochia	—	0	0	0	50	0	0	70	60	0	50	30	0	0
Morningglory	0	—	—	—	—	—	—	—	—	—	—	—	—	—
Pigweed	60	0	10	0	60	0	0	100	60	30	90	90	0	0
Ragweed	—	0	0	0	10	0	0	50	20	20	10	10	0	0
Ryegrass, Italian	—	0	0	0	0	0	0	30	0	0	0	0	0	0
Velvetleaf	0	—	—	—	—	—	—	—	—	—	—	—	—	—
Wheat	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Compounds													
31 g ai/ha	108	109	110	111	112	113	114	115	116	117	118	119	120	121
Postemergence														
Barnyardgrass	0	60	0	0	10	60	10	0	10	0	70	0	50	50
Blackgrass	0	50	0	0	0	60	10	0	20	0	60	0	70	50
Corn	0	10	0	0	10	10	30	0	20	0	50	0	30	20
Crabgrass, Large	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Foxtail, Giant	0	60	0	0	10	60	20	0	20	0	90	0	40	70
Galium	30	50	20	10	30	90	70	0	60	0	100	30	100	100
Kochia	0	0	10	20	60	100	70	0	90	0	100	0	90	90
Morningglory	—	—	—	—	—	—	—	—	—	—	—	—	—	—

TABLE B-continued

Pigweed	0	80	10	0	30	100	100	0	100	0	100	40	100	100
Ragweed	0	60	30	10	20	50	0	0	20	0	30	10	40	50
Ryegrass, Italian	0	10	0	0	0	20	10	0	0	0	20	0	30	50
Velvetleaf	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Wheat	0	0	0	0	0	0	10	0	10	0	20	0	0	0

	Compounds													
31 g ai/ha	122	124	125	126	127	128	129	130	131	132	133	140	141	142
	Postemergence													
Barnyardgrass	0	0	10	80	30	0	0	40	50	20	20	0	0	0
Blackgrass	0	0	10	60	30	0	0	50	50	20	30	0	0	0
Corn	0	0	0	20	20	0	0	20	20	10	10	0	0	0
Crabgrass, Large	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Foxtail, Giant	0	0	0	60	50	0	0	50	50	30	20	0	0	0
Galium	10	60	50	90	80	10	10	80	80	80	70	0	0	0
Kochia	10	40	60	90	90	20	0	90	60	30	90	0	0	0
Morningglory	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pigweed	20	70	70	100	100	20	10	90	100	70	90	0	0	10
Ragweed	0	10	0	30	20	0	0	40	40	20	20	0	0	0
Ryegrass, Italian	0	0	0	40	30	0	0	30	40	10	10	0	0	0
Velvetleaf	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Wheat	0	0	0	10	10	0	0	30	0	0	0	0	0	0

	Compounds													
31 g ai/ha	143	144	145	146	147	149	150	154	155	162	163	164	165	166
	Postemergence													
Barnyardgrass	10	30	40	0	0	10	0	0	0	10	0	0	0	0
Blackgrass	30	80	70	0	0	10	0	0	0	30	20	0	20	0
Corn	40	30	30	0	0	10	0	0	0	20	0	0	0	0
Crabgrass, Large	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Foxtail, Giant	10	80	70	0	0	10	0	0	0	10	0	0	10	0
Galium	50	100	100	30	0	90	0	0	0	90	20	10	20	20
Kochia	100	100	100	50	0	90	0	0	0	90	10	0	20	0
Morningglory	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pigweed	90	100	100	30	0	90	10	0	0	100	20	0	30	20
Ragweed	0	20	20	0	0	10	0	0	0	0	30	20	30	10
Ryegrass, Italian	0	20	20	0	0	0	0	0	0	0	0	0	0	0
Velvetleaf	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Wheat	20	30	20	0	0	0	0	0	0	20	0	0	0	0

	Compounds													
31 g ai/ha	173	174	175	176	177	178	187	188	189	196	197	198	210	211
	Postemergence													
Barnyardgrass	30	0	0	10	10	0	0	0	0	0	0	10	0	0
Blackgrass	30	40	0	0	0	10	0	0	0	0	0	10	10	10
Corn	10	0	0	10	0	0	0	0	0	0	0	10	0	0
Crabgrass, Large	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Foxtail, Giant	30	0	0	20	10	10	0	0	0	0	0	30	0	10
Galium	50	60	20	30	50	80	0	0	0	60	10	100	50	60
Kochia	70	60	0	30	30	80	0	0	0	0	0	80	50	40
Morningglory	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pigweed	60	50	50	90	50	100	0	0	0	20	10	100	50	20
Ragweed	40	20	20	10	10	10	0	0	0	10	0	10	10	0
Ryegrass, Italian	0	0	0	0	0	0	0	0	0	0	0	10	0	0
Velvetleaf	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Wheat	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Compounds													
31 g ai/ha	212	213	214	216	218	219	220	221	222	223	224	225	226	227
	Postemergence													
Barnyardgrass	0	0	0	10	0	0	10	10	0	0	30	0	10	10
Blackgrass	10	0	0	0	0	0	60	30	0	0	40	0	10	10
Corn	10	0	0	0	0	0	10	20	0	0	0	0	20	10
Crabgrass, Large	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Foxtail, Giant	10	0	0	0	0	0	30	10	0	0	20	0	10	10

TABLE B-continued

Galium	60	50	0	20	0	20	90	90	30	30	80	0	60	70
Kochia	90	60	0	10	0	0	90	80	20	0	70	0	100	40
Morningglory	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pigweed	90	30	0	10	0	10	100	90	30	20	70	0	50	60
Ragweed	20	10	0	0	0	20	0	10	0	0	50	0	10	10
Ryegrass, Italian	0	0	0	0	0	0	0	0	0	0	0	0	10	0
Velvetleaf	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Wheat	0	0	0	0	0	0	10	20	0	0	0	0	0	0

	Compounds										
31 g ai/ha	228	229	230	231	232	233	234	236	237	238	239
	Postemergence										
Barnyardgrass	30	20	0	0	0	0	0	0	0	0	0
Blackgrass	60	30	20	0	0	0	0	20	0	0	0
Corn	20	0	0	0	0	0	0	0	0	0	0
Crabgrass, Large	—	—	—	—	—	—	—	—	—	—	—
Foxtail, Giant	40	50	0	0	0	0	0	0	0	0	0
Galium	100	80	80	0	0	0	0	30	0	0	0
Kochia	100	90	80	20	0	0	0	20	0	20	0
Morningglory	—	—	—	—	—	—	—	—	—	—	—
Pigweed	100	70	60	20	10	0	0	30	0	10	0
Ragweed	30	100	70	0	0	0	0	0	0	0	0
Ryegrass, Italian	20	0	0	0	0	0	0	0	0	0	0
Velvetleaf	—	—	—	—	—	—	—	—	—	—	—
Wheat	0	0	0	0	0	0	0	0	0	0	0

	Compounds													
1000 g ai/ha	1	2	3	5	6	7	8	9	10	12	23	31	33	34
	Preemergence													
Barnyardgrass	80	0	60	0	0	10	30	20	0	20	40	0	0	0
Corn	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crabgrass, Large	100	10	40	0	0	40	80	70	10	80	100	80	80	10
Foxtail, Giant	100	10	70	0	0	20	60	60	0	90	100	30	10	10
Kochia	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Morningglory	20	0	0	0	0	0	0	0	0	0	0	0	0	0
Pigweed	100	100	50	90	70	40	100	90	10	90	100	0	40	100
Ragweed	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ryegrass, Italian	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Velvetleaf	80	20	90	20	20	10	30	10	0	70	80	0	0	10
Wheat	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Compounds													
1000 g ai/ha	35	36	40	46	55	57	61	148	171	172	186	191	192	193
	Preemergence													
Barnyardgrass	100	30	50	80	100	100	20	0	70	0	20	100	100	100
Corn	30	0	0	0	—	—	0	—	—	—	—	—	—	—
Crabgrass, Large	100	100	70	100	—	—	50	—	—	—	—	—	—	—
Foxtail, Giant	100	90	100	100	100	100	40	0	100	30	100	100	100	100
Kochia	—	—	—	—	100	100	—	0	90	20	100	100	100	100
Morningglory	90	10	0	10	—	—	0	—	—	—	—	—	—	—
Pigweed	10	100	100	100	100	90	90	0	100	90	100	100	100	100
Ragweed	—	—	—	—	100	90	—	—	0	0	70	90	20	80
Ryegrass, Italian	—	—	—	—	100	80	—	0	10	0	0	90	50	0
Velvetleaf	100	—	90	20	—	—	50	—	—	—	—	—	—	—
Wheat	60	0	0	10	—	—	0	—	—	—	—	—	—	—

	Compounds		
1000 g ai/ha	194	195	235
	Preemergence		
Barnyardgrass	100	40	0
Corn	—	—	—
Crabgrass, Large	—	—	—
Foxtail, Giant	100	30	0
Kochia	100	0	0
Morningglory	—	—	—

TABLE B-continued

Pigweed	100	60	0
Ragweed	30	10	0
Ryegrass, Italian	50	0	0
Velvetleaf	—	—	—
Wheat	—	—	—

	Compounds													
500 g ai/ha	4	10	11	13	14	16	17	18	19	20	21	22	23	24
Preemergence														
Barnyardgrass	0	0	0	0	0	0	0	0	0	0	50	0	30	80
Corn	0	0	0	0	0	0	0	0	0	0	0	0	0	40
Crabgrass, Large	80	0	0	10	20	10	10	20	50	70	100	0	80	100
Foxtail, Giant	50	0	0	10	30	10	0	10	70	60	100	0	70	90
Kochia	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Morningglory	0	0	—	0	0	—	—	0	0	0	0	0	0	0
Pigweed	70	30	30	80	100	20	0	30	20	20	90	0	90	40
Ragweed	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ryegrass, Italian	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Velvetleaf	30	0	10	10	20	20	10	0	0	20	20	0	50	0
Wheat	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Compounds													
500 g ai/ha	25	26	27	28	29	30	32	37	41	42	43	44	45	47
Preemergence														
Barnyardgrass	70	30	80	60	0	0	90	0	0	70	20	10	0	0
Corn	0	0	0	0	0	0	0	—	0	0	0	0	0	—
Crabgrass, Large	100	100	100	100	30	20	100	—	10	90	30	70	20	—
Foxtail, Giant	90	90	90	90	10	10	100	0	20	100	70	10	20	30
Kochia	—	—	—	—	—	—	—	0	—	—	—	—	—	70
Morningglory	10	0	0	0	0	0	30	—	0	0	10	0	0	—
Pigweed	100	100	100	80	50	30	100	40	0	90	0	10	0	60
Ragweed	—	—	—	—	—	—	—	0	—	—	—	—	—	60
Ryegrass, Italian	—	—	—	—	—	—	—	0	—	—	—	—	—	0
Velvetleaf	100	80	60	60	0	0	100	—	0	70	10	20	0	—
Wheat	0	0	0	0	0	0	10	—	0	0	0	0	0	—

	Compounds													
500 g ai/ha	48	49	50	51	52	53	54	58	59	60	62	63	64	123
Preemergence														
Barnyardgrass	40	0	10	10	0	100	100	100	10	100	100	100	100	0
Corn	—	—	—	—	—	—	—	—	—	—	20	30	20	—
Crabgrass, Large	—	—	—	—	—	—	—	—	—	—	100	100	100	—
Foxtail, Giant	50	20	50	60	0	100	100	100	60	100	100	100	100	0
Kochia	80	70	60	70	30	100	100	100	0	100	—	—	—	0
Morningglory	—	—	—	—	—	—	—	—	—	—	90	60	60	—
Pigweed	100	30	100	100	50	100	100	100	30	100	100	100	100	0
Ragweed	60	0	50	50	0	50	70	80	0	50	—	—	—	0
Ryegrass, Italian	50	0	50	0	0	40	60	20	0	30	—	—	—	0
Velvetleaf	—	—	—	—	—	—	—	—	—	—	100	90	90	—
Wheat	—	—	—	—	—	—	—	—	—	—	30	40	30	—

	Compounds													
500 g ai/ha	134	135	136	137	138	139	151	152	153	156	157	158	159	160
Preemergence														
Barnyardgrass	90	60	100	10	0	0	0	0	100	20	80	100	60	80
Corn	60	0	40	—	—	—	—	—	—	—	—	—	—	—
Crabgrass, Large	100	100	100	—	—	—	—	—	—	—	—	—	—	—
Foxtail, Giant	100	100	100	0	0	0	0	0	100	80	100	100	90	100
Kochia	—	—	—	10	0	0	0	0	100	40	100	100	30	90
Morningglory	80	10	90	—	—	—	—	—	—	—	—	—	—	—
Pigweed	100	100	100	20	0	0	0	0	100	100	100	100	100	100

TABLE B-continued

Ragweed	—	—	—	0	0	0	0	0	40	0	70	20	0	0
Ryegrass, Italian	—	—	—	0	0	0	0	0	20	0	90	20	0	0
Velvetleaf	100	60	100	—	—	—	—	—	—	—	—	—	—	—
Wheat	20	0	30	—	—	—	—	—	—	—	—	—	—	—

	Compounds													
500 g ai/ha	161	167	168	169	170	179	180	181	182	183	184	185	190	199
	Preemergence													
Barnyardgrass	0	10	100	30	20	90	80	10	20	80	90	70	0	0
Corn	—	—	—	—	—	—	—	—	—	—	—	—	—	0
Crabgrass, Large	—	—	—	—	—	—	—	—	—	—	—	—	—	10
Foxtail, Giant	0	30	100	90	90	100	100	40	40	90	90	90	10	0
Kochia	0	30	100	90	80	100	100	0	30	100	100	100	0	—
Morningglory	—	—	—	—	—	—	—	—	—	—	—	—	—	0
Pigweed	0	20	100	100	100	100	100	80	40	100	100	100	10	30
Ragweed	0	10	80	20	60	40	70	0	10	60	50	90	0	—
Ryegrass, Italian	0	0	100	20	20	40	70	0	10	40	10	0	0	—
Velvetleaf	—	—	—	—	—	—	—	—	—	—	—	—	—	10
Wheat	—	—	—	—	—	—	—	—	—	—	—	—	—	0

	Compounds											
500 g ai/ha	200	201	202	203	204	205	206	207	208	209	215	217
	Preemergence											
Barnyardgrass	100	0	80	0	30	10	30	90	0	10	90	10
Corn	100	0	0	0	0	0	0	0	0	0	—	—
Crabgrass, Large	100	0	100	0	100	70	60	100	0	100	—	—
Foxtail, Giant	100	0	100	0	100	70	60	100	0	100	90	30
Kochia	—	—	—	—	—	—	—	—	—	—	0	0
Morningglory	100	0	20	0	10	0	0	30	0	0	—	—
Pigweed	100	0	100	0	100	90	80	100	90	100	90	70
Ragweed	—	—	—	—	—	—	—	—	—	—	0	0
Ryegrass, Italian	—	—	—	—	—	—	—	—	—	—	0	10
Velvetleaf	90	0	60	0	60	0	40	30	10	0	—	—
Wheat	90	0	20	0	0	0	0	0	0	0	—	—

	Compounds													
125 g ai/ha	4	10	11	13	14	15	16	17	18	19	20	21	22	23
	Preemergence													
Barnyardgrass	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Corn	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Crabgrass, Large	10	0	0	0	0	0	0	0	0	0	10	60	0	40
Foxtail, Giant	10	0	0	0	0	0	0	0	0	0	10	70	0	20
Kochia	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Morningglory	0	0	0	0	0	0	—	—	0	0	0	0	0	0
Pigweed	30	0	0	0	0	0	0	0	0	0	0	30	0	50
Ragweed	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ryegrass, Italian	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Velvetleaf	0	0	10	0	0	0	0	0	0	0	0	0	0	10
Wheat	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Compounds													
125 g ai/ha	24	25	26	27	28	29	30	32	38	41	42	43	44	45
	Preemergence													
Barnyardgrass	10	10	0	10	0	0	0	90	0	0	20	0	0	0
Corn	0	0	0	0	0	0	0	0	—	0	0	0	0	0
Crabgrass, Large	100	50	10	80	40	10	0	100	—	0	50	0	10	0
Foxtail, Giant	20	40	0	60	30	0	0	90	0	0	70	0	0	0
Kochia	—	—	—	—	—	—	—	—	0	—	—	—	—	—
Morningglory	0	0	0	0	0	0	0	0	—	0	0	0	0	0
Pigweed	0	60	0	80	40	20	0	100	40	0	50	0	0	0
Ragweed	—	—	—	—	—	—	—	—	0	—	—	—	—	—
Ryegrass, Italian	—	—	—	—	—	—	—	—	0	—	—	—	—	—
Velvetleaf	0	10	10	20	0	0	0	90	—	0	50	0	0	0
Wheat	0	0	0	0	0	0	0	0	—	0	0	0	0	0

TABLE B-continued

	Compounds													
125 g ai/ha	47	48	49	50	51	52	53	54	58	59	60	62	63	64
Preemergence														
Barnyardgrass	0	0	0	0	0	0	90	60	60	0	80	80	90	60
Corn	—	—	—	—	—	—	—	—	—	—	—	0	10	0
Crabgrass, Large	—	—	—	—	—	—	—	—	—	—	—	100	100	100
Foxtail, Giant	10	10	0	0	10	0	90	100	90	10	80	100	100	90
Kochia	60	60	0	10	10	0	100	80	80	0	90	—	—	—
Morningglory	—	—	—	—	—	—	—	—	—	—	—	60	30	0
Pigweed	30	80	20	60	50	40	100	100	100	0	100	100	100	100
Ragweed	10	50	0	0	50	0	10	60	70	0	20	—	—	—
Ryegrass, Italian	0	40	0	20	0	0	10	30	0	0	0	—	—	—
Velvetleaf	—	—	—	—	—	—	—	—	—	—	—	90	70	80
Wheat	—	—	—	—	—	—	—	—	—	—	—	20	20	0

	Compounds													
125 g ai/ha	70	73	89	90	91	96	97	103	104	105	106	107	108	109
Preemergence														
Barnyardgrass	0	0	70	0	0	20	0	50	80	90	0	0	0	100
Corn	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Crabgrass, Large	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Foxtail, Giant	0	0	90	0	0	40	30	90	100	100	0	0	0	100
Kochia	0	0	0	0	0	70	30	10	10	10	0	0	0	30
Morningglory	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pigweed	0	0	100	20	0	100	50	100	100	100	0	0	0	100
Ragweed	0	0	0	0	0	0	0	10	0	0	0	0	0	70
Ryegrass, Italian	0	0	0	0	0	0	0	0	10	20	0	0	0	10
Velvetleaf	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Wheat	—	—	—	—	—	—	—	—	—	—	—	—	—	—

	Compounds													
125 g ai/ha	110	111	112	113	114	115	116	117	118	119	120	121	122	123
Preemergence														
Barnyardgrass	40	20	30	100	20	0	30	0	100	0	100	90	0	0
Corn	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Crabgrass, Large	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Foxtail, Giant	70	50	70	100	30	0	90	0	100	50	100	100	0	0
Kochia	0	10	50	100	20	0	60	0	100	10	90	100	10	0
Morningglory	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pigweed	70	80	70	100	80	0	100	0	100	50	100	100	50	0
Ragweed	0	10	0	70	20	0	20	0	30	0	30	20	0	0
Ryegrass, Italian	0	0	10	60	20	0	20	0	80	0	90	80	0	0
Velvetleaf	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Wheat	—	—	—	—	—	—	—	—	—	—	—	—	—	—

	Compounds													
125 g ai/ha	124	125	126	127	128	129	130	131	132	133	134	135	137	138
Preemergence														
Barnyardgrass	30	50	100	90	0	0	90	100	60	70	70	10	0	0
Corn	—	—	—	—	—	—	—	—	—	—	20	0	—	—
Crabgrass, Large	—	—	—	—	—	—	—	—	—	—	100	80	—	—
Foxtail, Giant	100	90	100	100	10	0	100	100	90	90	90	60	0	0
Kochia	60	40	90	90	0	0	70	10	0	90	—	—	0	0
Morningglory	—	—	—	—	—	—	—	—	—	—	10	0	—	—
Pigweed	100	80	100	100	40	0	100	100	100	100	100	90	0	0
Ragweed	10	0	10	30	0	0	20	60	40	10	—	—	0	0
Ryegrass, Italian	10	10	100	90	0	0	50	90	30	50	—	—	0	0
Velvetleaf	—	—	—	—	—	—	—	—	—	—	40	20	—	—
Wheat	—	—	—	—	—	—	—	—	—	—	20	0	—	—

TABLE B-continued

	Compounds													
125 g ai/ha	139	140	141	142	143	144	145	146	147	149	150	151	152	153
	Preemergence													
Barnyardgrass	0	0	0	0	90	100	100	30	0	70	20	0	0	0
Corn	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Crabgrass, Large	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Foxtail, Giant	0	0	0	20	100	100	100	20	0	100	20	0	0	30
Kochia	0	0	0	0	90	100	100	0	0	80	0	0	0	20
Morningglory	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pigweed	0	0	0	0	100	100	100	70	0	100	20	0	0	100
Ragweed	0	0	0	0	30	50	20	0	0	0	0	0	0	0
Ryegrass, Italian	0	0	0	0	60	90	40	0	0	10	0	0	0	0
Velvetleaf	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Wheat	—	—	—	—	—	—	—	—	—	—	—	—	—	—

	Compounds													
125 g ai/ha	154	155	156	157	158	159	160	161	162	163	164	165	166	167
	Preemergence													
Barnyardgrass	0	0	0	20	90	0	0	0	100	0	0	10	0	0
Corn	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Crabgrass, Large	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Foxtail, Giant	0	0	20	80	90	20	50	0	100	0	0	10	0	0
Kochia	0	0	20	100	100	0	30	0	70	0	0	60	0	0
Morningglory	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pigweed	0	0	80	100	90	40	90	0	100	30	30	80	60	0
Ragweed	0	0	0	20	0	0	0	0	20	40	0	50	20	0
Ryegrass, Italian	0	0	0	20	0	0	0	0	40	0	0	0	0	0
Velvetleaf	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Wheat	—	—	—	—	—	—	—	—	—	—	—	—	—	—

	Compounds													
125 g ai/ha	168	169	170	173	174	175	176	177	178	179	180	181	182	183
	Preemergence													
Barnyardgrass	100	20	0	90	0	0	50	50	70	10	20	0	0	30
Corn	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Crabgrass, Large	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Foxtail, Giant	100	50	60	100	40	0	90	70	90	80	90	0	0	80
Kochia	100	70	30	100	0	0	20	20	20	100	100	0	0	80
Morningglory	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pigweed	100	100	100	100	80	70	90	90	100	100	100	10	0	90
Ragweed	70	10	20	70	0	0	0	0	0	10	50	0	0	0
Ryegrass, Italian	80	0	0	20	0	0	10	0	10	20	20	0	0	20
Velvetleaf	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Wheat	—	—	—	—	—	—	—	—	—	—	—	—	—	—

	Compounds													
125 g ai/ha	184	185	187	188	189	190	196	197	198	199	200	201	202	203
	Preemergence													
Barnyardgrass	10	20	0	20	0	0	10	0	40	0	100	0	10	0
Corn	—	—	—	—	—	—	—	—	—	0	20	0	0	0
Crabgrass, Large	—	—	—	—	—	—	—	—	—	0	100	0	90	0
Foxtail, Giant	20	30	0	40	0	0	20	0	90	0	100	0	70	0
Kochia	20	40	0	30	0	0	0	0	30	—	—	—	—	—
Morningglory	—	—	—	—	—	—	—	—	—	0	20	0	0	0
Pigweed	80	90	0	100	0	0	10	0	100	0	100	0	100	0
Ragweed	0	10	0	0	0	0	0	0	10	—	—	—	—	—
Ryegrass, Italian	0	0	0	0	0	0	0	0	20	—	—	—	—	—
Velvetleaf	—	—	—	—	—	—	—	—	—	0	80	0	0	0
Wheat	—	—	—	—	—	—	—	—	—	0	20	0	0	0

TABLE B-continued

	Compounds													
125 g ai/ha	204	205	206	207	208	209	210	211	212	213	214	215	216	217
Preemergence														
Barnyardgrass	0	0	0	10	0	0	80	50	60	40	0	40	10	0
Corn	0	0	0	0	0	0	—	—	—	—	—	—	—	—
Crabgrass, Large	90	30	10	100	0	70	—	—	—	—	—	—	—	—
Foxtail, Giant	60	20	10	70	0	30	90	100	100	80	0	20	0	0
Kochia	—	—	—	—	—	—	90	80	90	50	0	0	0	0
Morningglory	0	0	0	0	0	0	—	—	—	—	—	—	—	—
Pigweed	100	10	50	90	0	90	100	100	100	100	0	20	0	10
Ragweed	—	—	—	—	—	—	20	30	40	0	0	0	0	0
Ryegrass, Italian	—	—	—	—	—	—	10	0	40	0	0	0	0	0
Velvetleaf	0	0	30	0	0	0	—	—	—	—	—	—	—	—
Wheat	0	0	0	0	0	0	—	—	—	—	—	—	—	—

	Compounds													
125 g ai/ha	218	219	220	221	222	223	224	225	226	227	228	229	230	231
Preemergence														
Barnyardgrass	50	0	100	90	0	0	50	0	100	50	100	90	70	10
Corn	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Crabgrass, Large	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Foxtail, Giant	60	0	100	90	0	0	90	0	100	90	100	90	90	10
Kochia	0	0	90	70	0	0	90	0	90	50	100	100	100	0
Morningglory	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pigweed	90	0	100	100	90	10	100	0	100	80	100	100	100	20
Ragweed	0	0	10	0	0	0	—	0	20	0	30	90	80	0
Ryegrass, Italian	0	0	30	40	0	0	0	0	20	10	70	30	0	0
Velvetleaf	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Wheat	—	—	—	—	—	—	—	—	—	—	—	—	—	—

	Compounds						
125 g ai/ha	232	233	234	236	237	238	239
Preemergence							
Barnyardgrass	20	0	0	80	0	40	0
Corn	—	—	—	—	—	—	—
Crabgrass, Large	—	—	—	—	—	—	—
Foxtail, Giant	10	0	0	90	0	20	0
Kochia	0	0	0	100	0	0	0
Morningglory	—	—	—	—	—	—	—
Pigweed	30	0	0	100	0	10	0
Ragweed	0	0	—	0	0	0	0
Ryegrass, Italian	0	0	0	30	0	0	0
Velvetleaf	—	—	—	—	—	—	—
Wheat	—	—	—	—	—	—	—

	Compounds													
31 g ai/ha	15	38	70	73	89	90	91	96	97	103	104	105	106	107
Preemergence														
Barnyardgrass	0	0	0	0	10	0	0	0	0	0	20	20	0	0
Corn	0	—	—	—	—	—	—	—	—	—	—	—	—	—
Crabgrass, Large	0	—	—	—	—	—	—	—	—	—	—	—	—	—
Foxtail, Giant	0	0	0	0	40	0	0	10	10	50	40	70	0	0
Kochia	—	0	0	0	0	0	0	50	0	0	0	0	0	0
Morningglory	0	—	—	—	—	—	—	—	—	—	—	—	—	—
Pigweed	0	0	0	0	100	0	0	90	20	100	80	100	0	0
Ragweed	—	0	0	0	0	0	0	0	0	0	0	0	0	0
Ryegrass, Italian	—	0	0	0	0	0	0	0	0	0	0	0	0	0
Velvetleaf	0	—	—	—	—	—	—	—	—	—	—	—	—	—
Wheat	0	—	—	—	—	—	—	—	—	—	—	—	—	—

TABLE B-continued

	Compounds													
31 g ai/ha	108	109	110	111	112	113	114	115	116	117	118	119	120	121
	Preemergence													
Barnyardgrass	0	40	0	0	10	70	0	0	0	0	70	0	90	70
Corn	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Crabgrass, Large	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Foxtail, Giant	0	80	0	0	10	90	10	0	40	0	100	0	100	100
Kochia	0	0	0	0	0	100	20	0	60	0	80	0	80	60
Morningglory	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pigweed	0	90	10	10	30	100	70	0	70	0	100	0	100	100
Ragweed	0	20	0	0	0	30	0	0	0	0	20	0	10	10
Ryegrass, Italian	0	0	0	0	0	10	0	0	0	0	20	0	40	30
Velvetleaf	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Wheat	—	—	—	—	—	—	—	—	—	—	—	—	—	—

	Compounds													
31 g ai/ha	122	124	125	126	127	128	129	130	131	132	133	140	141	142
	Preemergence													
Barnyardgrass	0	0	0	90	70	0	0	50	80	20	30	0	0	0
Corn	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Crabgrass, Large	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Foxtail, Giant	0	20	10	100	100	0	0	90	100	60	70	0	0	0
Kochia	0	10	0	80	80	0	0	50	0	0	50	0	0	0
Morningglory	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pigweed	10	40	0	100	100	0	0	100	100	90	90	0	0	0
Ragweed	0	0	0	10	10	0	0	10	20	0	0	0	0	0
Ryegrass, Italian	0	0	0	40	30	0	0	20	20	0	0	0	0	0
Velvetleaf	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Wheat	—	—	—	—	—	—	—	—	—	—	—	—	—	—

	Compounds													
31 g ai/ha	143	144	145	146	147	149	150	154	155	162	163	164	165	166
	Preemergence													
Barnyardgrass	20	80	70	0	0	10	0	0	0	20	0	0	0	0
Corn	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Crabgrass, Large	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Foxtail, Giant	70	100	90	0	0	70	0	0	0	90	0	0	0	0
Kochia	30	90	90	0	0	20	0	0	0	70	0	0	0	0
Morningglory	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pigweed	90	100	100	0	0	80	0	0	0	80	0	0	30	40
Ragweed	0	0	0	0	0	0	0	0	0	0	0	0	20	0
Ryegrass, Italian	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Velvetleaf	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Wheat	—	—	—	—	—	—	—	—	—	—	—	—	—	—

	Compounds													
31 g ai/ha	173	174	175	176	177	178	187	188	189	196	197	198	210	211
	Preemergence													
Barnyardgrass	60	0	0	10	0	20	0	0	0	0	0	10	10	10
Corn	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Crabgrass, Large	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Foxtail, Giant	50	0	0	60	10	60	0	0	0	0	0	70	40	10
Kochia	70	—	0	0	0	10	0	0	0	0	0	0	50	20
Morningglory	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pigweed	80	60	0	30	50	90	0	0	0	0	0	30	100	100
Ragweed	10	0	0	0	0	0	0	0	0	0	0	0	0	0
Ryegrass, Italian	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Velvetleaf	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Wheat	—	—	—	—	—	—	—	—	—	—	—	—	—	—

TABLE B-continued

31 g ai/ha	Compounds 212	213	214	216	218	219	220	221	222	223	224	225	226	227
Preemergence														
Barnyardgrass	10	0	0	0	0	0	10	20	0	0	10	0	30	10
Corn	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Crabgrass, Large	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Foxtail, Giant	60	0	0	0	0	0	70	50	0	0	40	0	60	40
Kochia	40	10	0	0	0	0	50	50	0	0	60	0	70	0
Morningglory	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pigweed	100	80	0	0	0	0	100	100	20	0	90	0	100	40
Ragweed	0	0	0	0	0	0	0	0	0	0	—	0	0	0
Ryegrass, Italian	0	0	0	0	0	0	0	20	0	0	0	0	0	0
Velvetleaf	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Wheat	—	—	—	—	—	—	—	—	—	—	—	—	—	—

31 g ai/ha	Compounds 228	229	230	231	232	233	234	236	237	238	239
Preemergence											
Barnyardgrass	50	50	10	0	0	0	0	10	0	0	0
Corn	—	—	—	—	—	—	—	—	—	—	—
Crabgrass, Large	—	—	—	—	—	—	—	—	—	—	—
Foxtail, Giant	90	90	60	0	0	0	0	10	0	0	0
Kochia	70	80	60	0	0	0	0	30	0	0	0
Morningglory	—	—	—	—	—	—	—	—	—	—	—
Pigweed	100	100	90	0	20	0	0	60	0	0	0
Ragweed	0	70	20	0	0	0	0	0	0	0	0
Ryegrass, Italian	30	0	0	0	0	0	0	0	0	0	0
Velvetleaf	—	—	—	—	—	—	—	—	—	—	—
Wheat	—	—	—	—	—	—	—	—	—	—	—

Test C

[0467] Plant species in the flooded paddy test selected from rice (*Oryza sativa*), small-flower umbrella sedge (*Cyperus difformis*), ducksalad (*Heteranthera limosa*), and barnyardgrass (*Echinochloa crus-galli*) were grown to the 2-leaf stage for testing. At time of treatment, test pots were flooded to 3 cm above the soil surface, treated by application of test compounds directly to the paddy water, and then maintained at that water depth for the duration of the test.

[0468] Treated plants and controls were maintained in a greenhouse for 13 to 15 days, after which time all species were compared to controls and visually evaluated. Plant response ratings, summarized in Table C, are based on a scale of 0 to 100 where 0 is no effect and 100 is complete control. A dash (-) response means no test result.

TABLE C

250 g ai/ha	Compounds 4	10	11	12	13	14	16	17	18	19	20	21	22	23
Flood														
Barnyardgrass	0	0	0	10	0	0	0	0	0	0	0	0	0	0
Ducksalad	0	0	0	40	40	40	0	0	0	0	0	0	0	60
Rice	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sedge, Umbrella	0	0	0	0	0	0	0	0	0	0	0	0	0	40

250 g ai/ha	Compounds 24	25	26	27	28	29	30	32	35	38	41	42	43	44
Flood														
Barnyardgrass	0	0	0	0	0	0	0	0	65	0	0	0	0	0
Ducksalad	0	30	0	30	0	0	0	90	100	60	0	0	0	0
Rice	0	0	0	0	0	0	0	20	80	0	0	0	0	0
Sedge, Umbrella	40	20	0	40	0	0	0	85	100	30	0	0	0	0

250 g ai/ha	Compounds 45	46	47	48	49	50	51	52	53	54	55	57	58	59
Flood														
Barnyardgrass	0	20	0	0	0	0	0	0	20	0	25	0	0	0
Ducksalad	0	60	0	0	0	30	30	0	80	60	100	90	80	0
Rice	0	35	0	0	0	0	0	0	20	0	25	0	0	0
Sedge, Umbrella	0	50	0	0	0	0	0	0	75	0	90	75	40	0

TABLE C-continued

250 g ai/ha	Compounds													
Flood	60	62	63	64	70	73	89	90	96	97	103	104	105	106
Barnyardgrass	20	35	60	35	0	0	0	0	15	0	60	20	45	0
Ducksalad	80	100	100	95	0	0	30	0	90	0	40	75	40	0
Rice	30	40	25	0	0	0	0	0	30	0	30	0	35	0
Sedge, Umbrella	50	90	85	80	0	0	80	0	100	50	80	80	70	0

250 g ai/ha	Compounds													
Flood	107	108	109	110	111	112	113	114	115	116	117	118	119	120
Barnyardgrass	0	0	30	0	0	0	0	0	0	0	0	50	0	90
Ducksalad	0	0	85	30	0	30	95	75	0	95	0	100	40	100
Rice	0	0	35	0	0	0	15	15	0	30	0	45	0	90
Sedge, Umbrella	0	0	80	60	0	95	95	75	0	90	0	100	40	95

250 g ai/ha	Compounds													
Flood	121	122	123	124	125	126	127	128	129	130	131	132	133	134
Barnyardgrass	60	0	0	0	0	95	50	0	0	65	75	30	40	0
Ducksalad	90	0	0	80	80	100	100	0	0	90	95	40	80	40
Rice	45	0	0	0	0	75	60	0	0	30	60	20	40	0
Sedge, Umbrella	90	0	30	85	90	100	100	0	0	90	95	75	80	75

250 g ai/ha	Compounds													
Flood	135	136	137	138	139	140	141	142	143	144	145	146	147	149
Barnyardgrass	0	0	0	0	0	0	0	0	30	98	45	0	0	0
Ducksalad	0	40	20	20	30	0	30	0	85	90	90	0	0	80
Rice	0	0	0	0	20	0	0	0	35	40	35	0	0	0
Sedge, Umbrella	0	40	0	0	0	0	0	0	100	85	95	0	0	65

250 g ai/ha	Compounds													
Flood	150	151	152	153	154	155	156	157	158	159	160	161	162	163
Barnyardgrass	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ducksalad	0	0	0	0	0	0	0	40	50	0	0	0	0	0
Rice	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sedge, Umbrella	0	0	0	0	0	0	0	40	0	0	0	0	0	0

250 g ai/ha	Compounds													
Flood	164	165	166	167	168	169	170	171	173	174	175	176	177	178
Barnyardgrass	0	0	0	0	90	0	0	0	0	0	0	0	0	40
Ducksalad	0	0	0	0	90	0	0	0	80	0	0	75	60	90
Rice	0	0	0	0	40	0	0	0	0	0	0	0	20	0
Sedge, Umbrella	0	0	0	0	90	0	0	0	60	0	0	30	40	85

250 g ai/ha	Compounds													
Flood	179	180	181	182	183	184	185	186	187	188	189	190	191	192
Barnyardgrass	0	0	0	0	0	0	0	0	0	0	0	0	20	0
Ducksalad	80	90	0	0	85	0	0	0	50	30	0	0	80	60
Rice	40	0	0	0	0	0	0	0	0	0	0	0	0	0
Sedge, Umbrella	80	80	0	0	75	0	0	0	0	0	0	0	85	40

250 g ai/ha	Compounds													
Flood	193	194	196	197	198	199	200	201	202	203	204	205	206	207
Barnyardgrass	0	0	30	20	40	0	90	0	0	0	0	0	0	0
Ducksalad	65	80	55	0	85	0	100	0	80	0	0	0	70	30
Rice	0	0	0	0	25	0	35	0	0	0	0	0	0	0
Sedge, Umbrella	0	0	70	0	100	80	100	0	80	0	0	0	70	30

TABLE C-continued

250 g ai/ha	Compounds													
Flood	208	209	210	211	212	213	214	215	216	217	218	219	220	221
Barnyardgrass	0	0	0	0	0	0	0	0	0	20	0	0	20	0
Ducksalad	0	0	85	70	75	75	0	0	0	40	0	0	80	100
Rice	0	0	0	0	20	0	0	0	0	0	0	0	0	0
Sedge, Umbrella	0	0	40	20	75	0	0	0	0	0	0	0	75	95

250 g ai/ha	Compounds													
Flood	222	223	224	225	226	227	228	229	230	231	232	233	234	236
Barnyardgrass	0	0	0	0	20	0	40	55	40	0	0	0	0	0
Ducksalad	30	65	70	0	85	98	85	90	85	65	0	0	0	75
Rice	0	0	0	0	20	0	0	15	20	0	0	0	0	0
Sedge, Umbrella	0	70	65	0	65	85	90	90	85	70	0	0	0	40

250 g ai/ha	Compounds		
Flood	237	238	239
Barnyardgrass	0	20	0
Ducksalad	0	45	0
Rice	0	15	0
Sedge, Umbrella	0	65	0

Test D

[0469] Seeds of plant species selected from blackgrass (*Alopecurus myosuroides*), Italian ryegrass (*Lolium multiflorum*), winter wheat (*Triticum aestivum*), *galium* (catchweed bedstraw, *Galium aparine*), corn (*Zea mays*), large (Lg) crabgrass (*Digitaria sanguinalis*), giant foxtail (*Setaria faberii*), johnsongrass (*Sorghum halepense*), lambsquarters (*Chenopodium album*), morningglory (*Ipomoea coccinea*), yellow nutsedge (*Cyperus esculentus*), pigweed (*Amaranthus retroflexus*), ragweed (common ragweed, *Ambrosia elation*), soybean (*Glycine max*), barnyardgrass (*Echinochloa crus-galli*), oilseed rape (*Brassica napus*), waterhemp (common waterhemp, *Amaranthus rudis*), and velvetleaf (*Abutilon theophrasti*) were planted into a blend of loam soil and sand and treated preemergence with test chemicals formulated in a non-phytotoxic solvent mixture which included a surfactant.

[0470] At the same time, plants selected from these crop and weed species and also *kochia* (*Kochia scoparia*), wild oat (*Avena fatua*), and chickweed (common chickweed, *Stellaria media*) were planted in pots containing Redi-Earth® planting medium (Scotts Company, 14111 Scottslawn Road, Marysville, Ohio 43041) comprising spaghnum peat moss, vermiculite, wetting agent and starter nutrients and treated with postemergence applications of test chemicals formulated in the same manner. Plants ranged in height from 2 to 18 cm (1- to 4-leaf stage) for postemergence treatments.

[0471] Plant species in the flooded paddy test consisted of rice (*Oryza sativa*), small-flower umbrella sedge (*Cyperus difformis*), ducksalad (*Heteranthera limosa*), and barnyardgrass (*Echinochloa crus-galli*) grown to the 2-leaf stage for testing. At time of treatment, test pots were flooded to 3 cm above the soil surface, treated by application of test compounds directly to the paddy water, and then maintained at that water depth for the duration of the test.

[0472] Treated plants and controls were maintained in a greenhouse for 13 to 15 days, after which time all species were compared to controls and visually evaluated. Plant response ratings, summarized in Table D, are based on a scale of 0 to 100 where 0 is no effect and 100 is complete control. A dash (-) response means no test result.

TABLE D

250 g ai/ha Postemergence	Compound 62
Barnyardgrass	95
Blackgrass	60
Chickweed	100
Corn	10
Crabgrass, Large	65
Foxtail, Giant	55
Galium	100
Johnsongrass	85
Kochia	100
Lambsquarters	100
Morningglory	98
Nutsedge, Yellow	10
Oat, Wild	60
Oilseed Rape	100
Pigweed	100

TABLE D-continued

Ragweed	85
Ryegrass, Italian	40
Soybean	98
Velvetleaf	85
Waterhemp	100
Wheat	40

125 g ai/ha	Compounds													
Postemergence	50	53	54	55	57	58	60	62	63	96	113	116	118	120
Barnyardgrass	0	35	10	15	10	5	10	30	10	5	25	30	30	40
Blackgrass	0	30	5	50	15	5	20	40	25	20	40	35	35	55
Chickweed	5	90	5	100	75	30	75	98	100	98	95	90	98	100
Corn	5	0	5	20	10	5	5	15	10	5	25	10	15	15
Crabgrass, Large	5	30	5	15	10	5	5	50	35	10	25	40	20	65
Foxtail, Giant	35	30	50	75	20	30	10	20	20	10	10	60	20	25
Galium	60	90	75	90	95	55	65	100	70	98	90	90	98	100
Johnsongrass	0	5	5	15	5	5	5	75	45	10	10	—	45	85
Kochia	15	100	80	100	100	80	90	100	100	100	100	100	100	100
Lambsquarters	5	100	70	98	80	90	75	100	90	95	90	100	95	100
Morningglory	20	55	85	85	65	65	40	95	70	30	80	30	80	100
Nutsedge, Yellow	—	—	—	5	5	0	5	5	5	5	15	25	10	15
Oat, Wild	0	20	5	40	15	0	5	50	35	20	25	15	50	60
Oilseed Rape	30	85	60	100	90	75	90	98	100	65	90	70	95	95
Pigweed	30	100	60	100	75	75	70	100	95	98	100	90	98	100
Ragweed	15	55	35	90	98	60	70	65	55	40	90	75	85	85
Ryegrass, Italian	0	5	0	15	0	0	0	30	30	10	5	10	5	50
Soybean	40	98	80	95	90	75	95	98	98	35	75	95	90	95
Velvetleaf	40	100	40	85	80	85	80	75	40	35	70	75	85	100
Waterhemp	40	100	75	100	98	75	70	98	98	100	90	100	98	100
Wheat	5	0	5	35	20	10	20	10	5	10	5	5	5	0

125 g ai/ha	Compounds													
Postemergence	121	130	131	143	144	145	149	153	162	168	169	170	178	179
Barnyardgrass	45	25	20	65	15	30	10	5	15	75	5	5	20	5
Blackgrass	50	30	30	30	75	80	30	0	45	20	25	5	15	20
Chickweed	100	95	100	80	95	100	60	25	85	100	80	100	80	95
Corn	25	10	25	10	5	10	5	5	5	20	10	5	10	15
Crabgrass, Large	55	25	20	35	20	20	15	10	20	40	10	10	15	5
Foxtail, Giant	40	25	15	50	25	20	30	5	20	60	55	40	25	30
Galium	95	100	95	100	95	90	95	80	80	100	75	80	85	75
Johnsongrass	60	10	45	30	50	40	10	10	20	20	5	5	10	5
Kochia	100	100	100	100	100	100	100	60	100	100	95	100	100	100
Lambsquarters	100	100	100	100	95	95	85	50	95	90	80	80	90	100
Morningglory	98	85	95	100	—	80	80	25	75	85	65	98	90	90
Nutsedge, Yellow	20	25	10	5	5	10	5	5	10	15	5	10	5	5
Oat, Wild	70	60	35	5	10	15	5	0	10	30	10	10	5	20
Oilseed Rape	95	95	85	65	—	—	85	85	—	100	60	25	95	100
Pigweed	100	98	100	100	100	98	90	70	100	98	98	98	90	98
Ragweed	98	40	75	30	75	65	45	55	50	55	35	10	35	60
Ryegrass, Italian	55	15	25	15	10	10	0	0	5	15	15	5	5	20
Soybean	95	95	65	60	—	75	65	90	50	90	25	35	45	70
Velvetleaf	85	100	85	65	98	80	65	50	—	90	30	25	75	70
Waterhemp	100	98	98	100	100	100	100	65	100	98	90	85	90	98
Wheat	0	35	0	5	10	10	10	10	5	35	10	15	10	35

125 g ai/ha	Compounds												
Postemergence	180	183	185	191	192	198	200	212	221	224	228	229	230
Barnyardgrass	5	5	5	10	5	35	15	25	10	15	35	10	5
Blackgrass	5	20	0	5	5	15	90	10	40	0	35	10	10
Chickweed	95	70	5	90	55	95	100	80	100	80	100	85	80
Corn	15	20	5	10	10	15	15	15	10	5	10	5	15
Crabgrass, Large	5	10	10	20	10	30	35	15	30	10	45	5	10
Foxtail, Giant	45	5	5	5	15	25	15	10	35	40	40	15	10
Galium	100	95	5	85	50	98	100	80	100	60	100	80	95
Johnsongrass	5	10	5	5	5	35	40	20	15	5	60	25	5
Kochia	100	100	30	90	95	100	100	100	100	100	100	98	100
Lambsquarters	98	75	20	85	75	75	98	98	98	85	95	85	70
Morningglory	90	90	65	85	45	85	98	98	85	80	75	35	70
Nutsedge, Yellow	15	5	30	10	5	10	15	5	10	5	10	10	5
Oat, Wild	30	25	5	5	5	10	55	10	35	0	55	10	10
Oilseed Rape	90	100	0	90	50	90	100	35	90	98	98	80	75

TABLE D-continued

Pigweed	98	95	50	60	55	100	98	100	100	90	98	80	85
Ragweed	65	65	25	65	45	60	40	60	75	70	60	60	55
Ryegrass, Italian	20	10	0	5	0	10	35	5	10	0	25	5	5
Soybean	85	90	45	95	85	60	98	90	90	75	80	70	85
Velvetleaf	55	55	25	50	55	55	75	90	100	60	80	70	65
Waterhemp	98	98	30	65	70	98	100	100	100	85	100	85	80
Wheat	30	30	0	0	5	5	20	15	0	15	10	10	15

62 g ai/ha	Compounds													
Postemergence	35	50	53	54	55	57	58	60	62	63	96	113	116	118
Barnyardgrass	20	0	25	5	15	5	0	10	35	10	5	20	20	20
Blackgrass	60	0	20	5	30	0	0	5	25	20	10	10	5	15
Chickweed	100	5	80	5	98	55	15	60	95	98	90	90	30	90
Corn	20	0	0	5	10	5	5	5	10	5	5	20	5	15
Crabgrass, Large	10	0	15	5	10	10	5	5	35	10	5	25	25	15
Foxtail, Giant	15	5	25	10	40	20	15	5	25	10	10	10	10	10
Galium	85	5	95	55	90	65	60	50	85	70	80	90	70	90
Johnsongrass	35	0	5	5	10	5	0	0	25	25	5	5	20	10
Kochia	100	5	100	80	100	95	60	55	100	98	85	100	100	95
Lambsquarters	95	50	100	5	98	70	60	55	98	85	90	95	80	90
Morningglory	98	10	85	75	80	45	45	25	95	98	40	85	10	85
Nutsedge, Yellow	5	—	—	—	5	5	0	0	5	5	5	5	10	10
Oat, Wild	45	0	30	5	40	5	0	0	40	25	20	10	10	15
Oilseed Rape	98	10	95	50	100	75	60	65	90	98	65	90	55	60
Pigweed	95	5	90	80	98	55	40	55	100	90	98	95	90	95
Ragweed	75	5	55	5	65	60	65	40	60	55	10	90	60	55
Ryegrass, Italian	20	0	5	0	10	0	0	0	5	5	10	5	5	5
Soybean	95	20	95	50	90	85	60	95	95	55	55	65	30	60
Velvetleaf	65	0	70	40	75	70	60	65	70	40	35	70	70	70
Waterhemp	98	0	90	80	98	75	55	50	98	98	98	85	90	95
Wheat	10	5	0	0	30	15	10	5	20	5	0	5	5	0

62 g ai/ha	Compounds													
Postemergence	120	121	130	131	143	144	145	149	153	156	162	168	169	170
Barnyardgrass	25	25	10	10	10	10	10	5	5	5	15	10	5	5
Blackgrass	60	30	20	5	20	15	25	0	0	5	30	15	0	5
Chickweed	100	100	80	98	60	95	95	30	20	70	60	100	70	90
Corn	10	20	10	10	5	10	5	5	5	5	5	10	10	5
Crabgrass, Large	35	40	20	10	15	15	10	10	5	10	10	15	10	5
Foxtail, Giant	15	15	10	15	10	25	20	10	5	35	10	40	25	40
Galium	100	100	95	95	70	90	80	70	70	70	60	95	70	65
Johnsongrass	40	60	5	25	30	10	5	15	5	10	10	5	0	0
Kochia	100	100	100	95	100	100	100	100	40	45	100	100	90	85
Lambsquarters	100	100	100	98	98	90	85	80	30	40	75	85	35	40
Morningglory	80	90	85	75	90	85	85	70	15	65	75	85	55	70
Nutsedge, Yellow	10	5	20	5	5	5	5	5	5	5	5	10	0	5
Oat, Wild	55	70	35	20	5	5	15	0	0	0	5	20	5	5
Oilseed Rape	90	95	75	80	60	95	—	60	60	45	40	100	10	40
Pigweed	100	100	98	98	100	100	98	95	40	75	100	95	80	98
Ragweed	70	75	75	65	10	70	50	30	25	15	40	55	25	10
Ryegrass, Italian	10	40	10	5	0	10	10	0	0	0	5	5	5	5
Soybean	70	90	98	75	60	95	75	65	70	30	40	40	15	10
Velvetleaf	100	80	75	80	50	75	75	40	60	25	75	45	20	25
Waterhemp	100	100	98	90	100	100	100	95	35	90	100	98	90	100
Wheat	0	0	30	0	5	10	5	0	5	10	5	30	10	10

62 g ai/ha	Compounds													
Postemergence	178	179	180	183	185	191	192	198	200	212	221	224	228	229
Barnyardgrass	10	5	5	5	0	5	5	20	10	15	5	10	20	5
Blackgrass	10	15	5	5	0	0	0	10	40	0	5	5	25	15
Chickweed	60	95	85	65	5	70	50	60	100	30	80	40	98	80
Corn	5	10	10	15	5	10	5	15	10	10	5	5	10	5
Crabgrass, Large	20	5	5	5	10	10	10	20	25	10	25	10	35	5
Foxtail, Giant	5	40	30	5	5	5	25	15	10	15	5	5	20	5
Galium	98	70	100	95	5	85	50	98	100	65	100	60	98	65
Johnsongrass	15	5	5	5	5	5	5	35	45	20	15	5	25	0
Kochia	100	100	100	100	5	85	90	100	100	100	100	95	100	98
Lambsquarters	75	75	98	65	15	70	40	70	85	98	95	80	90	70
Morningglory	100	85	90	90	10	60	10	80	85	75	80	35	80	25
Nutsedge, Yellow	10	5	10	5	0	5	0	15	5	10	5	5	5	10
Oat, Wild	5	15	5	10	0	5	0	10	30	5	10	0	40	10

TABLE D-continued

Oilseed Rape	80	85	80	100	0	60	5	60	100	20	90	50	80	60
Pigweed	85	98	75	85	35	30	55	90	85	100	98	85	95	70
Ragweed	20	50	35	60	15	60	15	55	60	55	45	55	60	70
Ryegrass, Italian	5	5	5	5	0	0	0	10	35	0	20	0	15	0
Soybean	35	70	70	75	35	75	55	30	90	85	85	65	80	45
Velvetleaf	60	30	35	55	10	30	30	55	70	60	80	30	65	45
Waterhemp	85	95	90	75	25	70	55	95	98	100	100	85	95	80
Wheat	5	30	15	30	0	0	5	5	25	5	5	0	10	5

62 g ai/ha Postemergence	Compound 230
Barnyardgrass	10
Blackgrass	10
Chickweed	75
Corn	0
Crabgrass, Large	5
Foxtail, Giant	10
Galium	85
Johnsongrass	5
Kochia	100
Lambsquarters	80
Morningglory	5
Nutsedge, Yellow	5
Oat, Wild	5
Oilseed Rape	75
Pigweed	70
Ragweed	55
Ryegrass, Italian	5
Soybean	65
Velvetleaf	55
Waterhemp	75
Wheat	5

31 g ai/ha	Compounds													
Postemergence	35	50	53	54	55	57	58	60	62	63	96	113	116	118
Barnyardgrass	20	0	10	5	10	5	0	0	50	10	0	15	5	20
Blackgrass	40	0	40	5	10	0	0	0	20	10	10	15	5	10
Chickweed	85	0	80	5	75	50	10	50	70	65	85	85	15	70
Corn	10	0	0	0	10	5	0	0	10	5	15	10	10	10
Crabgrass, Large	10	0	20	5	10	5	5	5	55	5	5	20	5	10
Foxtail, Giant	10	0	20	30	50	10	0	5	25	5	5	5	5	15
Galium	75	15	85	55	90	50	45	40	85	70	90	80	60	90
Johnsongrass	5	0	0	0	5	0	0	0	25	5	0	5	20	5
Kochia	100	0	100	55	100	90	50	50	98	95	60	100	100	95
Lambsquarters	85	5	80	5	85	40	75	20	98	70	65	85	60	85
Morningglory	85	0	80	75	70	45	45	40	85	50	40	75	10	85
Nutsedge, Yellow	5	—	—	—	5	5	0	0	5	0	5	5	5	5
Oat, Wild	40	0	10	0	15	0	0	0	30	20	20	15	5	10
Oilseed Rape	80	5	80	20	95	55	10	50	80	90	45	50	10	30
Pigweed	90	5	90	80	85	55	25	35	98	85	95	90	75	95
Ragweed	85	5	50	0	40	50	45	30	65	40	10	60	35	45
Ryegrass, Italian	5	0	5	0	5	0	0	0	5	0	5	5	0	0
Soybean	80	5	90	10	75	70	40	65	80	45	50	55	55	60
Velvetleaf	55	0	60	5	50	50	35	50	60	25	35	60	65	75
Waterhemp	95	0	90	60	90	55	40	30	98	85	95	80	90	90
Wheat	5	0	0	0	25	5	5	5	30	0	0	0	0	0

31 g ai/ha	Compounds													
Postemergence	120	121	130	131	143	144	145	149	153	156	157	162	168	169
Barnyardgrass	15	25	10	10	5	5	5	5	5	0	5	10	5	5
Blackgrass	35	25	5	5	10	15	20	0	0	5	5	30	15	0
Chickweed	100	100	80	80	50	80	80	30	20	45	75	60	98	40
Corn	15	20	25	5	5	5	5	5	0	5	5	5	5	5
Crabgrass, Large	25	10	20	5	10	10	10	5	5	5	5	5	5	5
Foxtail, Giant	10	10	5	10	10	10	10	10	0	10	20	10	35	5
Galium	98	90	90	85	70	85	80	60	70	60	70	60	95	70
Johnsongrass	30	35	5	5	5	10	5	10	0	5	0	5	5	0
Kochia	100	100	95	90	100	100	100	90	50	30	90	100	100	60
Lambsquarters	100	100	100	98	80	80	85	70	35	35	55	65	85	40
Morningglory	98	75	80	75	—	85	85	60	5	15	35	65	85	15
Nutsedge, Yellow	10	10	5	0	5	5	5	0	0	5	10	0	5	0
Oat, Wild	40	45	15	15	0	0	10	0	0	0	10	5	10	5

TABLE D-continued

Oilseed Rape	85	80	80	45	50	80	70	30	40	40	25	5	100	5
Pigweed	100	98	95	98	90	98	95	85	20	60	65	90	85	80
Ragweed	55	65	60	45	5	60	50	30	10	10	25	30	50	5
Ryegrass, Italian	5	10	5	5	0	5	0	0	0	0	5	0	5	0
Soybean	70	60	55	15	30	80	60	40	40	25	35	10	75	5
Velvetleaf	85	80	80	65	30	55	70	30	20	15	40	40	40	10
Waterhemp	100	95	85	90	100	85	90	80	10	70	75	98	90	90
Wheat	0	0	5	0	5	10	5	0	0	5	0	0	10	5

31 g ai/ha	Compounds													
Postemergence	170	178	179	180	183	185	191	192	198	200	212	221	224	228
Barnyardgrass	0	15	0	0	5	0	5	5	10	10	5	5	5	20
Blackgrass	0	5	5	0	5	0	0	0	5	30	0	10	0	15
Chickweed	65	50	80	60	60	0	55	50	60	95	30	85	15	85
Corn	5	5	10	5	15	0	5	0	10	5	5	0	5	10
Crabgrass, Large	5	10	5	5	5	0	10	5	15	10	10	10	5	20
Foxtail, Giant	30	5	5	50	5	5	5	25	15	20	10	5	5	10
Galium	50	80	80	75	65	0	70	50	75	100	60	80	50	98
Johnsongrass	0	10	5	0	5	0	5	5	20	20	5	5	5	10
Kochia	60	95	100	90	95	0	80	80	95	100	100	100	70	100
Lambsquarters	40	70	75	80	65	10	70	50	55	80	80	95	75	85
Morningglory	30	100	65	55	75	25	65	0	55	50	98	65	35	65
Nutsedge, Yellow	5	5	5	0	5	0	5	5	5	5	5	5	0	5
Oat, Wild	5	0	5	5	5	0	0	0	5	30	0	10	0	20
Oilseed Rape	5	80	75	60	85	0	40	0	50	85	—	70	10	85
Pigweed	90	85	90	75	85	35	30	20	98	85	100	95	85	95
Ragweed	5	5	25	40	35	20	40	5	55	55	40	50	55	35
Ryegrass, Italian	0	0	5	0	0	0	0	0	0	25	0	5	0	5
Soybean	10	35	45	60	55	30	65	30	25	85	70	25	40	55
Velvetleaf	5	40	20	40	55	10	30	20	45	60	50	65	25	40
Waterhemp	80	80	90	75	80	25	60	40	85	90	98	85	75	95
Wheat	20	5	10	5	20	0	0	0	0	10	5	0	0	5

31 g ai/ha	Compounds	
Postemergence	229	230
Barnyardgrass	5	5
Blackgrass	10	10
Chickweed	60	65
Corn	20	0
Crabgrass, Large	0	5
Foxtail, Giant	5	5
Galium	70	85
Johnsongrass	0	0
Kochia	90	85
Lambsquarters	70	70
Morningglory	25	5
Nutsedge, Yellow	0	0
Oat, Wild	10	0
Oilseed Rape	70	60
Pigweed	60	65
Ragweed	50	40
Ryegrass, Italian	0	0
Soybean	40	55
Velvetleaf	60	40
Waterhemp	70	70
Wheat	10	5

16 g ai/ha	Compounds													
Postemergence	35	50	53	54	55	57	58	60	63	96	113	116	118	120
Barnyardgrass	15	0	5	0	5	0	0	0	5	0	10	5	10	10
Blackgrass	35	0	5	0	5	0	0	0	5	0	5	0	5	20
Chickweed	85	0	50	5	70	30	5	45	60	60	70	5	75	95
Corn	5	0	0	0	10	0	0	0	5	5	5	5	5	15
Crabgrass, Large	10	0	10	5	5	5	5	5	5	5	10	5	10	30
Foxtail, Giant	5	0	40	0	40	0	0	0	0	0	5	5	5	10
Galium	70	30	60	50	80	40	40	30	60	70	80	60	85	98
Johnsongrass	10	0	0	0	5	0	0	0	5	0	5	10	5	5
Kochia	100	0	90	50	98	75	35	50	90	25	90	100	95	98
Lambsquarters	80	0	70	0	75	60	10	20	10	65	70	40	75	100
Morningglory	60	0	50	5	70	5	20	0	50	85	85	15	85	85
Nutsedge, Yellow	5	—	—	—	0	0	0	0	0	0	5	5	5	5

TABLE D-continued

Oat, Wild	10	0	5	0	5	0	0	5	0	15	10	5	5	35
Oilseed Rape	45	5	70	5	95	30	5	60	60	40	80	50	5	80
Pigweed	80	0	85	60	85	30	20	20	85	98	90	75	80	98
Ragweed	45	5	50	0	25	20	20	15	10	0	80	40	80	40
Ryegrass, Italian	0	0	0	0	0	0	0	0	0	0	5	0	0	5
Soybean	65	5	60	15	65	40	55	65	35	15	80	40	75	90
Velvetleaf	50	0	55	0	35	10	60	40	10	20	60	55	65	70
Waterhemp	75	0	80	45	85	60	35	15	85	85	85	70	85	90
Wheat	0	0	0	0	5	0	0	0	0	0	0	70	0	0

16 g ai/ha	Compounds													
Postemergence	121	130	131	143	144	145	149	153	156	157	162	168	169	170
Barnyardgrass	20	10	10	5	5	5	5	5	0	5	5	5	5	0
Blackgrass	5	0	5	10	5	15	0	0	0	5	0	10	0	0
Chickweed	95	80	65	45	70	70	5	20	5	50	50	65	5	30
Corn	10	10	5	5	5	5	0	0	5	5	5	5	0	5
Crabgrass, Large	15	10	5	10	5	5	5	0	5	5	5	5	5	5
Foxtail, Giant	10	5	10	5	5	5	5	0	5	40	10	35	0	5
Galium	80	65	80	50	80	80	60	70	20	60	60	70	55	50
Johnsongrass	35	0	5	0	5	5	5	0	0	0	5	5	0	0
Kochia	98	90	85	100	100	100	90	50	10	80	100	100	40	5
Lambsquarters	98	85	95	80	85	70	55	15	25	25	50	55	5	10
Morningglory	65	55	70	95	85	85	25	5	5	20	45	40	15	30
Nutsedge, Yellow	5	0	0	0	5	5	0	0	0	5	0	5	0	0
Oat, Wild	25	5	10	0	0	5	0	0	0	0	5	10	0	0
Oilseed Rape	70	60	60	50	25	60	20	50	5	5	5	85	0	5
Pigweed	98	85	85	75	85	90	85	20	65	65	75	60	75	60
Ragweed	20	70	30	0	25	10	5	10	5	20	20	20	5	5
Ryegrass, Italian	0	0	0	0	0	0	0	0	0	0	0	5	0	0
Soybean	55	50	30	30	60	50	30	35	15	10	25	45	5	10
Velvetleaf	75	80	45	30	35	60	10	5	10	10	20	40	10	5
Waterhemp	95	75	85	85	85	85	80	5	35	75	95	80	55	65
Wheat	0	5	0	0	5	5	0	0	0	0	0	10	0	0

16 g ai/ha	Compounds													
Postemergence	178	179	180	183	185	191	192	198	200	212	220	221	224	228
Barnyardgrass	10	0	0	5	0	5	5	10	5	5	10	0	5	15
Blackgrass	0	5	0	0	0	0	0	5	30	0	5	5	0	15
Chickweed	50	70	60	30	0	50	0	5	60	10	40	75	10	85
Corn	0	5	5	10	0	5	0	5	5	5	5	0	0	5
Crabgrass, Large	5	5	5	5	0	5	5	10	10	5	15	10	5	15
Foxtail, Giant	0	5	60	5	35	5	10	10	5	10	5	35	0	10
Galium	75	70	65	65	0	40	35	70	75	60	60	80	40	85
Johnsongrass	10	0	0	0	0	5	0	5	15	5	5	0	5	10
Kochia	90	90	85	90	0	50	50	60	95	90	100	98	35	100
Lambsquarters	25	70	70	35	10	50	35	10	70	40	70	85	55	85
Morningglory	70	30	40	65	0	65	0	55	55	75	75	65	15	65
Nutsedge, Yellow	5	5	0	5	0	0	0	5	5	10	5	5	0	5
Oat, Wild	0	0	0	0	0	0	0	5	20	0	5	5	0	10
Oilseed Rape	35	40	5	5	0	0	0	30	70	10	10	70	0	65
Pigweed	80	80	70	55	10	35	15	85	90	100	85	95	85	85
Ragweed	5	30	30	15	10	30	0	30	30	35	25	35	30	20
Ryegrass, Italian	0	0	0	0	0	0	0	0	20	0	0	5	0	0
Soybean	15	25	45	65	15	45	10	10	60	60	10	35	35	60
Velvetleaf	60	15	45	30	5	15	20	50	30	20	25	70	10	35
Waterhemp	70	60	40	80	5	25	20	85	80	80	80	70	70	90
Wheat	0	5	5	5	0	0	0	0	5	0	0	0	0	0

16 g ai/ha	Compounds	
Postemergence	229	230
Barnyardgrass	5	5
Blackgrass	0	0
Chickweed	60	65
Corn	5	0
Crabgrass, Large	0	0
Foxtail, Giant	0	5
Galium	70	80
Johnsongrass	0	0
Kochia	85	65
Lambsquarters	60	55
Morningglory	40	5

TABLE D-continued

Nutsedge, Yellow	0	0
Oat, Wild	0	0
Oilseed Rape	45	50
Pigweed	55	60
Ragweed	35	30
Ryegrass, Italian	0	0
Soybean	20	50
Velvetleaf	15	25
Waterhemp	60	65
Wheat	0	5

8 g ai/ha	Compounds			
Postemergence	35	156	157	220
Barnyardgrass	10	0	0	10
Blackgrass	30	0	0	0
Chickweed	50	5	10	40
Corn	5	0	0	5
Crabgrass, Large	5	0	5	5
Foxtail, Giant	5	0	20	5
Galium	80	20	50	55
Johnsongrass	0	0	0	0
Kochia	95	0	20	100
Lambsquarters	75	10	25	35
Morningglory	25	5	5	25
Nutsedge, Yellow	5	0	5	0
Oat, Wild	5	0	0	0
Oilseed Rape	5	5	5	5
Pigweed	80	15	70	80
Ragweed	40	0	15	15
Ryegrass, Italian	0	0	0	0
Soybean	40	5	10	10
Velvetleaf	30	0	5	10
Waterhemp	75	5	55	70
Wheat	0	0	0	0

4 g ai/ha	Compounds	
Postemergence	157	220
Barnyardgrass	0	5
Blackgrass	0	0
Chickweed	5	10
Corn	0	5
Crabgrass, Large	0	5
Foxtail, Giant	0	5
Galium	10	50
Johnsongrass	0	0
Kochia	0	50
Lambsquarters	20	45
Morningglory	0	15
Nutsedge, Yellow	0	0
Oat, Wild	0	0
Oilseed Rape	0	5
Pigweed	35	75
Ragweed	50	15
Ryegrass, Italian	0	0
Soybean	5	10
Velvetleaf	5	15
Waterhemp	20	60
Wheat	0	0

2 g ai/ha Postemergence	Compound 220
Barnyardgrass	5
Blackgrass	0
Chickweed	5
Corn	0
Crabgrass, Large	5
Foxtail, Giant	0
Galium	50
Johnsongrass	0
Kochia	20
Lambsquarters	55
Morningglory	35

TABLE D-continued

Nutsedge, Yellow	0
Oat, Wild	0
Oilseed Rape	0
Pigweed	70
Ragweed	5
Ryegrass, Italian	0
Soybean	15
Velvetleaf	5
Waterhemp	15
Wheat	0

250 g ai/ha Preemergence	Compound 62
Barnyardgrass	100
Blackgrass	90
Corn	70
Crabgrass, Large	100
Foxtail, Giant	100
Galium	100
Johnsongrass	98
Lambsquarters	100
Morningglory	100
Nutsedge, Yellow	60
Oilseed Rape	100
Pigweed	100
Ragweed	85
Ryegrass, Italian	95
Soybean	95
Velvetleaf	100
Waterhemp	100
Wheat	50

125 g ai/ha	Compounds													
Preemergence	53	54	55	57	58	60	62	63	104	113	118	120	131	144
Barnyardgrass	95	95	100	85	80	75	100	100	70	100	100	100	100	100
Blackgrass	95	70	90	60	95	70	90	90	30	80	90	90	95	95
Corn	5	0	80	30	20	5	60	15	0	40	30	75	65	65
Crabgrass, Large	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Foxtail, Giant	100	95	100	100	98	95	100	100	100	100	100	100	100	100
Galium	98	85	100	90	100	98	100	98	70	90	95	90	90	98
Johnsongrass	55	40	100	80	50	45	90	85	65	100	100	98	85	100
Lambsquarters	100	85	98	100	100	100	98	95	90	98	98	100	98	100
Morningglory	40	15	100	45	45	20	98	60	25	95	90	75	85	100
Nutsedge, Yellow	5	15	70	20	15	5	10	5	0	60	65	45	70	85
Oilseed Rape	100	100	100	100	100	100	100	98	50	100	100	100	95	100
Pigweed	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Ragweed	85	35	95	100	100	90	75	70	60	90	85	100	25	100
Ryegrass, Italian	60	30	95	50	5	30	90	90	5	70	60	90	90	98
Soybean	80	20	98	95	85	95	85	60	25	80	95	50	85	95
Velvetleaf	100	100	100	100	100	100	100	100	65	100	100	100	98	100
Waterhemp	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Wheat	5	0	60	5	0	0	40	45	5	20	5	5	5	25

125 g ai/ha	Compounds							
Preemergence	145	158	168	179	180	183	200	229
Barnyardgrass	100	20	100	35	80	90	100	100
Blackgrass	95	90	90	80	70	50	90	85
Corn	45	15	55	5	30	5	20	40
Crabgrass, Large	100	100	100	100	100	100	100	100
Foxtail, Giant	100	100	100	85	100	100	100	98
Galium	100	100	100	98	98	95	95	98
Johnsongrass	95	40	100	65	90	45	100	70
Lambsquarters	100	80	98	100	90	100	100	95
Morningglory	100	70	100	15	100	40	90	45
Nutsedge, Yellow	45	5	45	25	30	5	15	45
Oilseed Rape	100	98	100	100	100	100	100	100
Pigweed	100	100	100	100	100	100	100	100

TABLE D-continued

Ragweed	100	50	100	60	55	10	80	95
Ryegrass, Italian	85	20	95	80	65	50	90	60
Soybean	90	95	85	45	80	80	85	95
Velvetleaf	100	70	100	100	100	100	100	100
Waterhemp	100	100	100	100	100	100	100	98
Wheat	10	0	85	35	30	0	40	15

62 g ai/ha	Compounds													
Preemergence	32	35	53	54	55	57	58	60	62	63	104	113	118	120
Barnyardgrass	98	100	40	10	100	75	65	30	98	98	25	98	100	90
Blackgrass	35	90	90	40	90	50	80	10	90	90	0	70	60	90
Corn	0	15	100	0	35	5	10	0	30	15	0	25	30	25
Crabgrass, Large	100	100	98	90	100	100	100	100	100	98	98	100	100	100
Foxtail, Giant	95	100	98	95	100	100	85	40	100	98	90	100	100	98
Galium	75	100	100	60	100	90	100	100	100	98	75	98	95	90
Johnsongrass	85	98	35	10	85	40	20	15	75	70	15	90	85	95
Lambsquarters	100	100	100	85	100	100	100	85	95	90	90	98	95	90
Morningglory	0	90	45	5	100	35	0	10	55	25	25	85	85	60
Nutsedge, Yellow	25	5	0	0	55	20	0	0	5	0	0	15	15	35
Oilseed Rape	100	100	100	100	100	100	100	90	98	98	30	100	100	95
Pigweed	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Ragweed	70	80	55	10	90	100	75	65	65	55	55	85	70	25
Ryegrass, Italian	10	80	15	5	85	5	0	0	60	80	0	60	65	90
Soybean	65	85	55	20	95	95	80	65	70	45	25	90	80	60
Velvetleaf	85	100	100	85	100	100	100	100	100	100	70	100	100	100
Waterhemp	98	100	100	100	100	100	100	100	100	100	100	100	100	100
Wheat	5	15	0	0	25	0	0	0	10	10	5	10	0	5

62 g ai/ha	Compounds									
Preemergence	131	143	144	145	158	168	179	180	183	200	229
Barnyardgrass	85	98	100	85	35	100	15	35	30	100	65
Blackgrass	90	90	95	95	50	90	45	60	0	90	70
Corn	60	100	15	10	5	25	0	5	0	10	5
Crabgrass, Large	100	100	100	100	85	100	75	100	98	100	100
Foxtail, Giant	100	100	100	100	85	100	85	85	80	100	90
Galium	90	80	98	100	100	100	90	98	95	100	98
Johnsongrass	80	80	100	90	10	85	20	60	20	85	45
Lambsquarters	85	85	100	100	100	100	100	100	90	95	80
Morningglory	35	55	100	90	15	80	0	5	5	70	35
Nutsedge, Yellow	5	5	50	30	5	15	0	0	0	0	10
Oilseed Rape	85	95	100	100	90	100	—	100	100	100	100
Pigweed	100	100	100	100	100	100	100	100	100	100	100
Ragweed	0	40	100	75	70	100	40	15	0	70	55
Ryegrass, Italian	35	70	80	70	0	95	15	50	15	85	20
Soybean	50	25	90	75	45	55	30	60	35	40	60
Velvetleaf	80	85	100	100	40	100	85	90	90	100	100
Waterhemp	100	100	100	100	100	100	90	95	95	100	98
Wheat	0	0	25	5	0	45	0	0	0	20	0

31 g ai/ha	Compounds													
Preemergence	32	35	53	54	55	57	58	60	62	63	104	113	118	120
Barnyardgrass	55	75	5	5	85	20	5	5	50	65	10	95	60	75
Blackgrass	30	90	25	5	90	5	5	5	5	85	0	40	10	60
Corn	0	0	10	0	20	0	20	0	35	5	0	0	5	35
Crabgrass, Large	98	100	95	75	100	85	90	55	95	98	85	100	100	100
Foxtail, Giant	85	98	85	10	100	90	15	5	95	80	80	100	100	98
Galium	65	100	95	85	100	70	98	85	100	98	80	90	98	98
Johnsongrass	75	60	0	0	75	10	10	0	30	35	20	70	70	55
Lambsquarters	98	98	100	60	100	100	100	80	100	90	80	98	90	95
Morningglory	5	55	0	0	50	20	25	0	25	0	5	35	5	30
Nutsedge, Yellow	0	5	0	0	10	10	0	0	0	0	0	10	0	5
Oilseed Rape	100	100	100	85	100	100	98	98	100	98	0	100	98	90
Pigweed	98	100	100	100	100	85	100	100	100	100	100	100	100	100
Ragweed	75	75	40	40	75	35	35	55	0	20	25	55	20	0
Ryegrass, Italian	0	30	10	5	35	0	0	0	40	40	0	10	5	35
Soybean	25	60	25	10	35	65	35	55	60	15	20	40	75	10
Velvetleaf	55	85	100	70	100	100	100	100	90	100	50	85	70	75
Waterhemp	100	100	100	85	100	90	100	100	100	100	100	100	100	100
Wheat	0	5	0	0	0	0	0	0	0	0	0	5	0	0

TABLE D-continued

31 g ai/ha	Compounds											
Preemergence	131	143	144	145	157	158	168	179	180	183	200	229
Barnyardgrass	75	70	80	85	5	5	75	5	0	5	95	55
Blackgrass	80	15	95	90	5	15	90	30	0	0	90	15
Corn	10	5	5	5	0	0	15	0	0	0	0	5
Crabgrass, Large	100	100	98	100	40	90	100	65	75	70	100	85
Foxtail, Giant	100	100	100	100	20	55	100	30	60	35	100	70
Galium	30	80	98	98	85	50	100	90	80	50	98	80
Johnsongrass	30	60	75	75	5	0	95	0	10	5	60	10
Lambsquarters	80	85	100	100	100	100	100	100	100	85	98	80
Morningglory	40	35	75	55	10	15	70	0	0	0	45	0
Nutsedge, Yellow	5	0	30	0	0	0	5	0	0	0	0	0
Oilseed Rape	50	85	100	100	100	50	100	95	95	100	100	100
Pigweed	100	100	100	100	100	75	100	100	98	60	100	100
Ragweed	0	30	85	60	0	60	45	30	5	0	5	50
Ryegrass, Italian	20	5	60	35	5	0	95	5	0	0	80	20
Soybean	10	10	75	60	50	25	30	0	25	10	10	35
Velvetleaf	65	75	100	100	75	25	100	65	85	80	100	90
Waterhemp	100	98	100	100	100	100	100	90	95	100	100	100
Wheat	0	0	5	0	5	0	5	0	0	0	5	0

16 g ai/ha	Compounds													
Preemergence	32	35	53	54	55	57	58	60	63	104	113	118	120	131
Barnyardgrass	5	65	0	0	25	5	5	0	30	0	30	10	25	30
Blackgrass	0	70	5	5	15	5	0	0	30	0	10	0	70	5
Corn	0	0	5	0	5	0	5	0	0	0	0	0	0	0
Crabgrass, Large	90	100	65	10	100	75	25	5	65	65	98	100	98	98
Foxtail, Giant	35	90	10	0	100	50	0	0	30	30	85	98	95	80
Galium	25	100	85	50	100	80	0	98	75	90	90	60	90	95
Johnsongrass	45	10	0	0	30	0	10	0	5	5	10	10	50	0
Lambsquarters	95	100	100	5	100	80	25	10	95	65	85	90	70	75
Morningglory	0	0	0	0	10	10	10	0	0	5	20	30	0	0
Nutsedge, Yellow	65	0	20	0	0	0	0	0	0	0	0	0	0	0
Oilseed Rape	80	98	80	60	100	100	60	80	70	0	98	85	50	10
Pigweed	100	100	95	5	100	75	50	75	95	100	100	100	100	100
Ragweed	60	40	0	10	70	25	100	15	75	40	40	85	0	0
Ryegrass, Italian	0	0	0	0	15	0	0	0	0	0	5	0	5	0
Soybean	15	30	0	0	25	—	30	35	5	10	35	80	75	5
Velvetleaf	40	85	100	15	90	100	85	60	40	25	70	80	50	20
Waterhemp	100	100	100	25	100	100	100	80	90	100	100	100	100	100
Wheat	0	0	0	0	0	0	0	0	0	0	0	0	0	0

16 g ai/ha	Compounds										
Preemergence	143	144	145	157	158	168	179	180	183	200	229
Barnyardgrass	20	70	65	0	0	35	0	0	5	35	15
Blackgrass	10	55	15	0	0	85	0	0	0	85	15
Corn	0	0	0	5	0	0	0	0	0	0	0
Crabgrass, Large	98	90	85	5	25	100	10	30	5	98	75
Foxtail, Giant	85	100	85	0	5	100	5	5	5	95	5
Galium	10	95	90	80	0	100	90	75	50	85	40
Johnsongrass	15	20	10	0	0	35	0	0	0	25	10
Lambsquarters	70	100	100	100	75	90	75	95	80	75	35
Morningglory	10	20	15	0	5	5	0	0	0	5	0
Nutsedge, Yellow	0	15	0	0	0	5	0	0	0	0	0
Oilseed Rape	0	98	40	40	40	95	30	70	50	85	90
Pigweed	100	100	100	100	70	85	30	80	50	100	100
Ragweed	0	75	25	0	80	35	25	0	0	0	35
Ryegrass, Italian	5	5	0	0	0	70	0	0	0	30	0
Soybean	5	35	10	0	0	5	0	5	0	100	5
Velvetleaf	30	100	90	45	35	85	15	75	40	100	70
Waterhemp	100	100	100	100	100	100	75	40	10	98	95
Wheat	0	0	0	0	0	0	0	0	0	0	0

8 g ai/ha	Compounds			
Preemergence	32	35	143	157
Barnyardgrass	0	5	5	0
Blackgrass	0	70	0	0
Corn	0	0	0	0
Crabgrass, Large	100	80	60	0

TABLE D-continued

Foxtail, Giant	0	70	40	0
Galium	0	85	10	80
Johnsongrass	0	0	35	0
Lambsquarters	95	100	25	25
Morningglory	0	0	0	0
Nutsedge, Yellow	60	0	0	0
Oilseed Rape	50	85	0	0
Pigweed	100	100	90	100
Ragweed	75	55	0	0
Ryegrass, Italian	0	0	0	0
Soybean	10	10	0	0
Velvetleaf	5	65	35	5
Waterhemp	100	100	95	70
Wheat	0	0	0	0

4 g ai/ha Preemergence	Compound 157
Barnyardgrass	0
Blackgrass	0
Corn	0
Crabgrass, Large	0
Foxtail, Giant	0
Galium	70
Johnsongrass	0
Lambsquarters	0
Morningglory	0
Nutsedge, Yellow	0
Oilseed Rape	0
Pigweed	20
Ragweed	0
Ryegrass, Italian	0
Soybean	0
Velvetleaf	0
Waterhemp	0
Wheat	0

250 g ai/ha	Compounds									
Flood	1	32	40	53	55	144	145	178	180	221
Barnyardgrass	0	20	0	0	30	35	35	0	10	60
Ducksalad	0	95	40	80	90	100	95	70	75	90
Rice	0	15	0	0	0	40	35	0	0	40
Sedge, Umbrella	0	90	50	75	100	95	90	75	80	95

125 g ai/ha	Compounds								
Flood	1	32	40	53	55	144	145	178	180
Barnyardgrass	0	10	0	0	10	15	0	0	10
Ducksalad	0	65	20	80	85	90	95	70	75
Rice	0	0	0	0	0	25	15	0	0
Sedge, Umbrella	0	65	30	70	85	95	90	60	75

62 g ai/ha	Compounds									
Flood	1	32	40	53	55	144	145	178	180	221
Barnyardgrass	0	0	0	0	0	0	0	0	0	40
Ducksalad	0	60	0	50	80	85	85	65	0	80
Rice	0	0	0	0	0	15	15	0	0	15
Sedge, Umbrella	0	40	0	0	75	80	75	60	50	80

31 g ai/ha	Compounds								
Flood	1	32	40	53	55	144	145	178	180
Barnyardgrass	0	0	0	0	0	0	0	0	0
Ducksalad	0	0	0	40	75	75	80	40	0
Rice	0	0	0	0	0	0	0	0	0
Sedge, Umbrella	0	0	0	0	75	65	60	30	0

Test E

[0473] Seeds of plant species selected from bluegrass (annual bluegrass, *Poa annua*), blackgrass (*Alopecurus myosuroides*), canarygrass (*Phalaris minor*), chickweed (common chickweed, *Stellaria media*), *galium* (catchweed bedstraw, *Galium aparine*), downy bromegrass (*Bromus tectorum*), field poppy (*Papaver rhoeas*), field violet (*Viola arvensis*), green foxtail (*Setaria viridis*), deadnettle (henbit deadnettle, *Lamium amplexicaule*), Italian ryegrass (*Lolium multiflorum*), *kochia* (*Kochia scoparia*), lambsquarters (*Chenopodium album*), oilseed rape (*Brassica napus*), pigweed (*Amaranthus retroflexus*), Russian thistle (*Salsola iberica*), chamomile (scentless chamomile, *Matricaria inodora*), speedwell (bird's-eye speedwell, *Veronica persica*), spring barley (*Hordeum vulgare*), spring wheat (*Triticum aestivum*), wild buckwheat (*Polygonum convolvulus*), wild mustard (*Sinapis arvensis*), wild oat (*Avena fatua*), wild radish (*Raphanus raphanistrum*), windgrass (*Apera spica-venti*), winter barley (*Hordeum vulgare*), and winter wheat (*Triticum aestivum*) were planted into a silt loam soil and treated preemergence with test chemicals formulated in a non-phytotoxic solvent mixture which included a surfactant. At the same time, these species were planted in pots containing Redi-Earth® planting medium (Scotts Company, 14111 Scottslawn Road, Marysville, Ohio 43041) comprising spaghnum peat moss, vermiculite, wetting agent and starter nutrients and treated with postemergence applications of the test chemicals formulated in the same manner. Plants ranged in height from 2 to 18 cm (1- to 4-leaf stage).

[0474] Treated plants and controls were maintained in a controlled growth environment for 7 to 21 days after which time all species were compared to controls and visually evaluated. Plant response ratings, summarized in Table E, are based on a scale of 0 to 100 where 0 is no effect and 100 is complete control. A dash (-) response means no test result.

TABLE E

125 g ai/ha	Compounds							
Postemergence	35	53	55	62	144	145	168	200
Barley, Spring	25	10	20	25	45	30	25	35
Barley, Winter	30	10	10	35	45	40	15	25
Blackgrass	60	25	40	75	85	80	60	75
Bluegrass	60	5	25	60	65	70	15	70
Bromegrass, Downy	30	5	10	40	75	55	35	35
Buckwheat, Wild	95	95	95	100	100	100	100	100
Canarygrass	60	40	30	55	85	65	55	60
Chamomile	10	0	5	10	95	30	10	15
Chickweed	100	65	70	90	100	95	90	100
Deadnettle	80	65	80	70	—	100	80	90
Field Poppy	100	80	95	75	100	100	100	100
Field Violet	75	70	90	85	100	100	95	95
Foxtail, Green	55	25	60	65	100	98	75	55
Galium	85	75	85	90	100	100	85	90
Kochia	90	80	85	95	100	100	85	90
Lambsquarters	90	75	90	95	100	95	95	95
Mustard, Wild	100	95	95	100	100	100	95	100
Oat, Wild	60	25	50	60	90	80	65	35
Oilseed Rape	100	80	95	100	100	100	100	100
Pigweed	90	90	95	95	100	100	95	90
Radish, Wild	95	90	80	100	100	100	85	95
Russian Thistle	—	—	—	—	98	100	—	—
Ryegrass, Italian	60	5	20	35	65	40	25	40
Speedwell	100	100	100	100	100	100	100	100
Wheat, Spring	40	35	45	40	75	55	40	35
Wheat, Winter	40	35	40	35	70	55	35	25
Windgrass	40	20	40	65	55	60	40	45

62 g ai/ha	Compounds							
Postemergence	35	53	55	62	144	145	168	200
Barley, Spring	10	10	15	20	35	20	15	25
Barley, Winter	5	5	5	20	35	30	10	20
Blackgrass	55	10	20	40	60	65	35	55
Bluegrass	40	5	15	55	55	65	10	55
Bromegrass, Downy	15	5	10	20	40	55	25	25
Buckwheat, Wild	90	90	95	95	100	100	95	95
Canarygrass	55	25	30	45	65	40	25	45
Chamomile	5	5	5	5	80	30	10	10
Chickweed	75	60	70	80	100	100	70	100
Deadnettle	70	60	70	65	—	100	75	80
Field Poppy	80	80	100	70	100	100	100	100
Field Violet	75	70	85	70	100	90	90	75
Foxtail, Green	55	10	50	25	80	40	60	45
Galium	75	75	80	75	100	98	80	75
Kochia	80	70	85	90	100	100	85	85
Lambsquarters	85	65	85	95	98	95	90	90
Mustard, Wild	85	95	95	100	100	100	95	100
Oat, Wild	35	10	40	35	65	40	40	30

TABLE E-continued

Oilseed Rape	95	80	90	80	100	100	95	100
Pigweed	90	90	95	95	100	100	95	90
Radish, Wild	85	90	80	90	100	100	80	85
Russian Thistle	—	—	—	—	95	90	—	—
Ryegrass, Italian	25	5	15	30	40	25	20	25
Speedwell	100	95	100	100	100	100	90	100
Wheat, Spring	25	20	25	25	45	45	25	20
Wheat, Winter	25	15	30	30	35	35	25	15
Windgrass	30	10	25	30	25	20	25	35

31 g ai/ha	Compounds							
Postemergence	35	53	55	62	144	145	168	200
Barley, Spring	5	5	10	15	25	15	15	15
Barley, Winter	0	5	0	10	20	15	10	10
Blackgrass	35	5	10	30	50	35	25	35
Bluegrass	20	0	0	35	45	60	5	35
Bromegrass, Downy	5	0	0	15	35	35	15	10
Buckwheat, Wild	85	65	95	80	95	100	95	70
Canarygrass	25	10	20	35	60	25	15	35
Chamomile	5	5	5	5	75	30	5	10
Chickweed	75	50	55	70	100	85	45	75
Deadnettle	60	30	50	35	—	100	55	60
Field Poppy	75	65	90	55	100	100	85	80
Field Violet	65	50	70	65	90	100	75	80
Foxtail, Green	35	10	45	20	50	30	60	35
Galium	80	75	85	70	95	95	75	75
Kochia	75	55	70	75	100	100	80	85
Lambsquarters	80	70	80	95	95	90	85	85
Mustard, Wild	85	75	85	100	100	100	95	95
Oat, Wild	15	5	15	25	25	30	10	20
Oilseed Rape	80	75	75	80	100	100	85	85
Pigweed	90	85	90	90	100	100	80	90
Radish, Wild	75	60	70	70	100	100	75	80
Russian Thistle	—	—	—	—	90	85	—	—
Ryegrass, Italian	5	0	20	20	15	10	10	10
Speedwell	100	60	80	95	100	100	75	100
Wheat, Spring	10	10	15	20	35	35	20	10
Wheat, Winter	15	5	15	20	30	20	10	5
Windgrass	25	5	10	20	20	10	15	20

16 g ai/ha	Compounds							
Postemergence	35	53	55	62	144	145	168	200
Barley, Spring	5	5	10	10	15	15	10	10
Barley, Winter	0	5	0	5	30	15	5	5
Blackgrass	20	0	5	15	25	25	15	15
Bluegrass	15	0	0	10	25	15	10	20
Bromegrass, Downy	5	0	5	10	25	25	5	5
Buckwheat, Wild	75	70	65	75	100	100	65	65
Canarygrass	10	5	10	25	35	15	15	10
Chamomile	5	5	5	0	80	20	5	5
Chickweed	65	30	55	65	85	80	50	65
Deadnettle	40	20	20	35	—	100	20	50
Field Poppy	70	60	85	40	100	100	55	75
Field Violet	60	25	65	60	95	65	75	70
Foxtail, Green	20	10	30	15	40	15	20	25
Galium	70	75	70	70	80	95	75	70
Kochia	75	50	65	65	100	98	80	70
Lambsquarters	80	65	75	75	80	90	75	75
Mustard, Wild	90	65	70	75	100	100	75	75
Oat, Wild	10	5	10	15	20	15	5	10
Oilseed Rape	70	70	75	65	100	70	70	75
Pigweed	85	85	85	90	98	100	90	85
Radish, Wild	65	60	75	65	100	95	70	65
Russian Thistle	—	—	—	—	85	80	—	—
Ryegrass, Italian	0	0	20	10	5	5	5	5
Speedwell	75	60	75	70	100	100	80	70
Wheat, Spring	0	10	5	5	25	30	10	5
Wheat, Winter	5	5	0	10	20	15	5	0
Windgrass	10	5	5	10	10	5	10	10

TABLE E-continued

125 g ai/ha	Compounds							
Preemergence	35	53	55	62	144	145	168	200
Barley, Spring	—	35	50	0	65	80	35	—
Barley, Winter	—	25	35	5	55	85	40	—
Blackgrass	95	30	100	65	100	75	100	100
Bluegrass	70	25	100	75	85	90	100	100
Bromegrass, Downy	25	15	55	20	55	60	40	80
Buckwheat, Wild	100	100	100	100	100	100	100	100
Canarygrass	100	95	100	90	100	100	100	100
Chamomile	70	—	—	65	100	100	—	75
Chickweed	100	100	100	100	100	100	100	100
Deadnettle	95	65	0	100	100	100	100	100
Field Poppy	90	100	100	100	100	100	100	95
Field Violet	100	100	100	100	100	100	100	100
Foxtail, Green	100	55	100	85	100	100	100	100
Galium	100	100	100	100	100	100	100	100
Kochia	100	100	100	100	100	100	100	100
Lambsquarters	100	100	100	100	100	100	100	100
Mustard, Wild	95	100	100	100	100	100	100	100
Oat, Wild	35	25	45	20	75	85	50	75
Oilseed Rape	100	100	100	100	100	100	100	100
Pigweed	100	100	100	100	100	100	100	100
Radish, Wild	100	90	100	100	100	100	100	95
Russian Thistle	—	—	—	—	100	100	—	—
Ryegrass, Italian	75	25	50	25	100	70	75	85
Speedwell	100	100	100	100	100	100	100	100
Wheat, Spring	—	10	35	10	55	70	30	—
Wheat, Winter	—	30	20	5	35	75	30	—
Windgrass	100	50	100	50	100	98	100	100

62 g ai/ha	Compounds							
Preemergence	35	53	55	62	144	145	168	200
Barley, Spring	—	35	45	0	45	45	30	—
Barley, Winter	—	30	10	5	55	30	25	—
Blackgrass	65	25	60	15	98	60	100	90
Bluegrass	35	20	10	10	40	10	80	95
Bromegrass, Downy	35	15	55	10	35	35	10	45
Buckwheat, Wild	90	100	100	80	100	85	100	100
Canarygrass	95	65	100	50	100	100	100	100
Chamomile	70	—	—	60	100	100	—	60
Chickweed	95	100	100	100	100	100	100	100
Deadnettle	95	50	0	40	100	100	80	100
Field Poppy	90	100	100	100	100	100	100	95
Field Violet	90	60	100	35	100	100	100	—
Foxtail, Green	90	20	100	65	95	55	100	100
Galium	100	60	70	65	100	100	100	55
Kochia	100	55	100	85	100	100	100	100
Lambsquarters	90	100	100	95	100	100	100	100
Mustard, Wild	95	100	100	95	100	100	95	85
Oat, Wild	45	10	35	15	65	30	35	30
Oilseed Rape	100	100	100	65	100	100	65	100
Pigweed	100	100	100	100	100	100	100	100
Radish, Wild	100	100	100	95	100	85	100	95
Russian Thistle	—	—	—	—	100	60	—	—
Ryegrass, Italian	35	25	50	15	70	50	30	30
Speedwell	100	100	100	95	100	100	100	100
Wheat, Spring	—	10	15	0	40	20	20	—
Wheat, Winter	—	25	10	0	25	25	10	—
Windgrass	85	35	100	50	100	75	100	100

31 g ai/ha	Compounds							
Preemergence	35	53	55	62	144	145	168	200
Barley, Spring	—	35	10	0	25	25	15	—
Barley, Winter	—	10	10	0	35	15	5	—
Blackgrass	60	10	15	15	75	50	35	75
Bluegrass	35	10	10	5	15	0	10	70
Bromegrass, Downy	35	15	20	0	10	20	10	35
Buckwheat, Wild	75	100	100	35	100	100	65	75
Canarygrass	55	20	20	0	80	75	15	55
Chamomile	10	—	—	65	20	100	—	25
Chickweed	100	100	100	75	100	100	80	90

TABLE E-continued

Deadnettle	80	10	0	20	100	100	50	90
Field Poppy	80	100	100	75	100	100	100	90
Field Violet	70	25	80	10	100	100	100	50
Foxtail, Green	90	10	25	40	35	45	100	25
Galium	55	30	100	60	70	100	60	25
Kochia	65	15	100	5	100	100	100	100
Lambsquarters	85	75	100	85	100	100	100	85
Mustard, Wild	60	100	100	80	100	100	80	95
Oat, Wild	0	0	15	10	30	30	10	0
Oilseed Rape	95	75	100	25	80	100	40	100
Pigweed	95	20	100	100	100	100	100	100
Radish, Wild	95	70	100	40	80	15	45	70
Russian Thistle	—	—	—	—	65	10	—	—
Ryegrass, Italian	25	10	0	0	25	20	0	25
Speedwell	100	70	100	95	100	100	100	100
Wheat, Spring	—	5	15	0	15	15	15	—
Wheat, Winter	—	15	10	0	15	20	10	—
Windgrass	80	15	25	15	75	25	15	55

16 g ai/ha	Compounds							
Preemergence	35	53	55	62	144	145	168	200
Barley, Spring	—	35	10	0	10	15	0	—
Barley, Winter	—	15	5	0	30	10	0	—
Blackgrass	30	10	0	5	15	10	10	25
Bluegrass	0	10	0	0	10	0	0	20
Bromegrass, Downy	0	0	20	0	10	10	0	10
Buckwheat, Wild	60	65	65	25	85	100	0	65
Canarygrass	40	10	10	0	35	40	15	10
Chamomile	5	—	—	0	15	5	—	25
Chickweed	55	100	65	65	100	100	100	70
Deadnettle	35	10	0	15	90	0	10	60
Field Poppy	75	100	100	65	100	100	80	80
Field Violet	15	50	70	0	95	100	85	—
Foxtail, Green	5	10	10	20	20	0	10	—
Galium	25	25	10	5	20	25	60	15
Kochia	25	10	55	0	98	60	35	70
Lambsquarters	65	60	95	35	100	100	45	10
Mustard, Wild	20	90	80	25	90	95	80	85
Oat, Wild	0	0	0	0	35	25	10	0
Oilseed Rape	60	50	20	10	35	50	10	60
Pigweed	90	30	75	95	100	100	55	100
Radish, Wild	100	50	70	25	80	15	0	80
Russian Thistle	—	—	—	—	15	0	—	—
Ryegrass, Italian	0	10	0	0	10	10	0	0
Speedwell	100	100	100	95	100	95	100	100
Wheat, Spring	—	5	15	0	5	15	15	—
Wheat, Winter	—	15	5	0	0	0	5	—
Windgrass	35	0	5	0	10	10	0	15

Test F

[0475] Seeds of plant species selected from corn (*Zea mays*), soybean (*Glycine max*), velvetleaf (*Abutilon theophrasti*), lambsquarters (*Chenopodium album*), wild poinsettia (*Euphorbia heterophylla*), palmer pigweed (*Amaranthus palmeri*), waterhemp (common waterhemp, *Amaranthus rudis*), surinam grass (*Brachiaria decumbens*), large (Lg) crabgrass (*Digitaria sanguinalis*), Brazilian crabgrass (*Digitaria horizontalis*), fall *panicum* (*Panicum dichotomiflorum*), giant foxtail (*Setaria faberii*), green foxtail (*Setaria viridis*), goosegrass (*Eleusine indica*), johnsongrass (*Sorghum halepense*), ragweed (common ragweed, *Ambrosia elation*), barnyardgrass (*Echinochloa crus-galli*), sandbur (southern sandbur, *Cenchrus echinatus*), arrowleaf *sida* (*Sida rhombifolia*), Italian ryegrass (*Lolium multiflorum*), dayflower (Virginia (VA) dayflower, *Commelina virginica*), field bindweed (*Convolvulus arvensis*), cocklebur (common cocklebur, *Xanthium strumarium*), morningglory (*Ipomoea coccinea*), nightshade (eastern black nightshade, *Solanum ptycanthum*), *kochia* (*Kochia scoparia*), yellow nutsedge (*Cyperus esculentus*), and hairy beggarticks (*Bidens pilosa*), were planted into a silt loam soil and treated preemergence with test chemicals formulated in a non-phytotoxic solvent mixture which included a surfactant.

[0476] At the same time, plants from these crop and weed species and also waterhemp_RES1, (ALS & Triazine resistant common waterhemp, *Amaranthus rudis*), and waterhemp_RES2, (ALS & HPPD resistant common waterhemp, *Amaranthus rudis*) were treated with postemergence applications of test chemicals formulated in the same manner. Plants ranged in height from 2 to 18 cm for postemergence treatments (1- to 4-leaf stage).

[0477] Treated plants and controls were maintained in a greenhouse for 14 to 21 days, after which time all species were compared to controls and visually evaluated. Plant response ratings, summarized in Table F, are based on a scale of 0 to 100 where 0 is no effect and 100 is complete control. A dash (-) response means no test result.

TABLE F

125 g ai/ha	Compounds											
Postemergence	35	53	58	62	96	144	145	149	179	200	212	221
Arrowleaf Sida	98	98	90	98	95	100	95	98	100	95	100	98
Barnyardgrass	20	10	5	20	20	75	70	10	0	25	10	70
Beggarticks	70	60	65	80	40	75	70	50	50	10	40	70
Corn	20	10	5	10	10	10	20	15	15	25	0	20
Crabgrass, Brazil	40	20	10	10	25	55	50	25	30	20	35	75
Dayflower, VA	80	60	10	65	70	85	85	50	—	35	50	80
Field Bindweed	70	60	50	75	50	90	90	75	50	35	70	80
Horseweed	—	—	—	—	10	25	40	20	10	—	10	30
Kochia	—	98	75	—	95	95	100	95	95	—	100	100
Panicum, Fall	50	60	15	60	25	60	80	40	10	15	10	60
Pigweed, Palmer	100	100	60	100	90	100	100	100	85	100	98	100
Poinsettia, Wild	80	70	60	50	50	65	80	70	35	80	60	80
Ragweed	—	—	—	—	40	90	70	35	50	—	50	80
Ryegrass, Italian	0	0	0	10	10	40	15	5	0	20	0	5
Sandbur	0	10	10	0	0	20	15	10	10	5	10	0
Soybean	98	95	95	85	80	95	95	90	90	90	95	95
Waterhemp	100	100	90	100	95	100	100	98	100	100	100	100
Waterhemp_RES1	100	100	75	100	95	100	100	100	100	98	98	98
Waterhemp_RES2	100	100	80	100	95	100	100	100	100	98	100	100

62 g ai/ha	Compounds												
Postemergence	35	53	55	58	62	96	144	145	149	179	200	212	221
Arrowleaf Sida	98	100	100	75	98	90	100	98	95	85	95	85	98
Barnyardgrass	10	0	35	0	20	20	50	50	10	0	15	0	30
Beggarticks	65	50	70	50	50	40	70	65	40	40	10	40	70
Corn	15	0	20	5	5	10	10	20	10	10	20	0	10
Crabgrass, Brazil	35	20	30	10	15	20	40	40	20	20	20	30	45
Dayflower, VA	50	50	—	20	25	70	60	75	40	—	15	40	80
Field Bindweed	50	50	70	30	50	20	80	80	50	35	35	60	—
Horseweed	—	—	20	—	—	0	10	20	10	10	—	15	10
Kochia	—	95	98	60	—	75	95	95	90	90	—	100	100
Panicum, Fall	50	15	30	10	10	10	35	50	20	15	5	10	40
Pigweed, Palmer	100	100	98	70	100	95	100	100	98	85	100	100	100
Poinsettia, Wild	50	70	45	50	50	60	70	80	60	20	60	50	70
Ragweed	—	—	55	—	—	20	85	60	30	40	—	30	70
Ryegrass, Italian	0	5	10	0	10	0	20	10	10	0	15	0	0
Sandbur	0	5	15	0	0	0	20	5	15	5	0	0	0
Soybean	95	95	95	90	65	40	98	95	90	75	65	75	98
Waterhemp	100	100	100	80	100	100	100	100	95	95	98	95	95
Waterhemp_RES1	100	95	100	70	100	95	100	100	90	100	95	95	100
Waterhemp_RES2	100	100	100	75	100	90	100	100	100	100	98	98	95

31 g ai/ha	Compounds												
Postemergence	35	53	55	58	62	96	144	145	149	179	200	212	221
Arrowleaf Sida	95	98	95	60	95	80	100	95	85	80	85	70	90
Barnyardgrass	0	0	50	0	20	10	30	25	5	0	0	0	25
Beggarticks	60	40	55	50	10	30	60	50	30	50	5	40	60
Corn	15	0	15	0	0	5	5	10	10	0	10	0	10
Crabgrass, Brazil	30	15	40	5	10	5	50	20	20	20	15	30	25
Dayflower, VA	40	30	70	10	5	40	50	60	20	—	25	20	70
Field Bindweed	35	50	25	20	35	10	75	75	50	25	35	40	75
Horseweed	—	—	15	—	—	0	0	20	20	0	—	0	5
Kochia	—	80	95	30	—	75	95	100	80	75	—	90	98
Panicum, Fall	40	20	40	0	5	15	30	10	20	10	5	0	15
Pigweed, Palmer	95	90	98	50	95	80	100	100	95	90	98	75	90
Poinsettia, Wild	50	60	35	60	40	30	50	75	40	15	40	40	75
Ragweed	—	—	55	—	—	20	50	50	40	40	—	20	60
Ryegrass, Italian	0	0	0	0	0	0	20	5	10	0	0	0	0
Sandbur	0	0	25	0	0	0	15	5	5	0	0	0	0
Soybean	85	95	70	70	40	—	95	95	85	50	40	50	95
Waterhemp	90	98	90	65	100	90	100	98	95	95	95	90	98
Waterhemp_RES1	90	90	100	65	100	90	95	98	85	90	90	80	95
Waterhemp_RES2	95	90	100	70	100	90	100	90	95	100	95	95	98

TABLE F-continued

16 g ai/ha	Compounds											
Postemergence	35	53	58	62	96	144	145	149	179	200	212	221
Arrowleaf Sida	80	90	70	80	70	100	95	75	70	75	75	80
Barnyardgrass	0	0	0	15	0	10	10	0	0	0	0	15
Beggarticks	50	30	40	5	0	70	55	5	20	0	25	50
Corn	10	0	0	0	0	10	5	0	5	0	0	5
Crabgrass, Brazil	20	10	5	0	0	40	20	20	10	10	20	20
Dayflower, VA	40	40	5	0	20	50	50	10	—	0	30	60
Field Bindweed	30	55	10	40	5	70	70	60	15	20	30	70
Horseweed	—	—	—	—	0	0	0	0	0	—	0	0
Kochia	—	60	40	—	65	95	98	60	65	—	50	95
Panicum, Fall	40	5	0	0	0	25	10	10	15	5	0	10
Pigweed, Palmer	75	65	50	70	70	90	95	65	70	95	30	85
Poinsettia, Wild	40	50	30	35	0	50	70	50	15	50	35	65
Ragweed	—	—	—	—	15	50	30	10	45	—	20	50
Ryegrass, Italian	0	0	0	0	0	10	10	0	0	0	0	0
Sandbur	0	0	0	0	0	10	5	0	0	0	0	0
Soybean	80	80	50	20	40	65	95	50	60	20	50	60
Waterhemp	85	95	60	90	75	100	95	85	70	80	90	90
Waterhemp_RES1	80	85	20	85	85	90	95	80	90	75	70	85
Waterhemp_RES2	90	80	60	80	85	98	95	95	95	95	70	90

8 g ai/ha	Compounds				
Postemergence	35	53	58	62	200
Arrowleaf Sida	60	70	50	65	65
Barnyardgrass	0	0	0	10	0
Beggarticks	50	15	40	5	0
Corn	10	0	0	0	0
Crabgrass, Brazil	10	0	5	0	10
Dayflower, VA	10	30	5	0	0
Field Bindweed	20	30	10	40	20
Kochia	—	50	30	—	—
Panicum, Fall	30	0	15	0	5
Pigweed, Palmer	60	70	50	90	85
Poinsettia, Wild	30	50	30	25	35
Ryegrass, Italian	0	0	0	0	0
Sandbur	0	0	0	0	0
Soybean	70	40	50	10	15
Waterhemp	70	80	65	80	75
Waterhemp_RES1	90	70	10	80	70
Waterhemp_RES2	90	70	65	80	75

125 g ai/ha	Compounds										
Preemergence	35	53	58	62	96	144	145	149	168	179	200
Arrowleaf Sida	100	100	98	100	90	100	98	100	100	90	100
Barnyardgrass	65	50	15	25	0	100	75	35	100	5	60
Beggarticks	50	20	20	0	20	0	25	0	0	0	0
Cocklebur	0	—	—	—	—	—	—	—	—	—	—
Corn	20	15	0	0	0	35	60	0	35	40	0
Crabgrass, Brazil	100	90	75	100	5	100	100	85	100	25	100
Crabgrass, Large	100	98	80	98	95	100	100	85	100	60	100
Dayflower, VA	95	95	80	80	20	95	70	40	90	85	90
Field Bindweed	50	0	0	0	40	70	95	25	70	0	30
Foxtail, Giant	100	95	40	75	20	100	100	85	100	20	100
Foxtail, Green	98	90	25	90	25	100	100	50	100	15	100
Goosegrass	95	60	75	75	60	100	95	60	100	0	98
Johnsongrass	65	5	20	40	98	70	85	15	100	10	90
Kochia	100	100	30	95	90	100	100	90	100	98	100
Lambsquarters	100	98	100	100	100	100	100	100	100	100	100
Morningglory	65	0	10	50	25	95	35	10	75	25	15
Nightshade	100	98	98	100	90	100	98	100	98	100	98
Nutsedge, Yellow	35	20	0	0	0	0	0	15	20	0	35
Panicum, Fall	100	98	100	100	70	100	100	100	100	75	100
Pigweed, Palmer	—	100	35	100	100	100	100	100	100	65	100
Poinsettia, Wild	40	0	20	35	25	35	65	35	90	0	70
Ragweed	70	40	75	35	35	85	80	20	98	0	40
Ryegrass, Italian	70	0	0	40	30	100	90	40	70	10	40

TABLE F-continued

Sandbur	65	0	0	35	30	95	95	10	90	0	75
Soybean	90	35	75	40	0	75	40	30	40	35	50
Surinam Grass	35	0	0	10	0	80	25	15	100	0	35
Velvetleaf	100	100	100	100	80	100	100	100	100	100	100
Waterhemp	100	100	100	100	100	100	100	100	100	100	100

62 g ai/ha	Compounds											
Preemergence	35	53	55	58	62	96	144	145	149	168	179	200
Arrowleaf Sida	100	100	100	75	95	80	100	98	65	100	80	100
Barnyardgrass	10	20	85	0	0	0	70	30	15	80	0	30
Beggarticks	20	30	0	10	0	0	0	30	0	0	0	0
Corn	0	0	40	0	0	0	40	40	0	40	0	0
Crabgrass, Brazil	100	85	100	35	100	0	98	95	35	100	15	100
Crabgrass, Large	75	80	100	65	70	65	100	98	70	98	35	95
Dayflower, VA	90	50	40	—	30	0	85	35	5	70	35	70
Field Bindweed	50	0	10	0	0	60	65	65	35	50	0	30
Foxtail, Giant	70	70	98	0	65	0	95	85	40	100	30	100
Foxtail, Green	75	20	70	0	40	35	98	100	50	100	0	100
Goosegrass	75	10	50	5	5	40	95	80	40	98	0	95
Johnsongrass	35	0	90	0	35	50	30	100	0	35	10	35
Kochia	100	50	100	0	35	65	100	100	75	100	70	80
Lambsquarters	100	95	100	90	95	100	100	100	100	100	100	98
Morningglory	30	0	98	10	0	35	65	15	0	15	35	0
Nightshade	98	98	98	90	98	65	100	98	98	98	100	98
Nutsedge, Yellow	10	0	0	0	0	0	0	0	0	0	0	10
Panicum, Fall	100	95	100	90	95	50	100	95	98	100	50	98
Pigweed, Palmer	—	100	100	35	100	100	100	100	100	100	35	100
Poinsettia, Wild	70	0	30	20	25	0	20	65	0	50	0	60
Ragweed	40	30	50	25	40	50	95	65	35	65	0	35
Ryegrass, Italian	65	0	30	0	0	30	40	40	20	65	0	20
Sandbur	40	0	0	0	0	40	50	25	0	65	0	40
Soybean	70	0	50	35	10	0	40	15	0	20	0	30
Surinam Grass	20	0	10	0	15	0	75	0	15	70	0	10
Velvetleaf	100	100	100	100	100	80	100	100	85	100	90	100
Waterhemp	100	100	100	90	100	100	100	100	100	100	100	100

31 g ai/ha	Compounds											
Preemergence	35	53	55	58	62	96	144	145	149	168	179	200
Arrowleaf Sida	100	65	98	35	70	70	100	90	35	100	80	100
Barnyardgrass	20	0	10	0	0	0	20	5	0	25	0	0
Beggarticks	20	0	0	0	0	0	0	35	0	0	0	0
Cocklebur	0	—	—	—	—	—	—	—	—	—	—	—
Corn	30	0	0	0	0	0	0	0	0	0	0	0
Crabgrass, Brazil	98	5	75	0	75	0	95	80	15	100	0	98
Crabgrass, Large	75	15	98	50	25	30	100	95	0	95	0	85
Dayflower, VA	65	0	60	0	0	0	30	0	0	10	0	50
Field Bindweed	50	0	0	0	0	0	60	50	50	60	0	30
Foxtail, Giant	70	20	90	0	35	0	90	65	20	98	0	65
Foxtail, Green	30	0	20	0	10	30	95	40	0	100	0	98
Goosegrass	60	0	5	5	0	40	60	70	0	95	0	80
Johnsongrass	0	0	20	0	20	60	0	20	0	30	0	5
Kochia	85	20	100	0	20	0	100	98	0	100	0	50
Lambsquarters	100	95	100	65	95	100	100	100	0	100	100	98
Morningglory	0	0	30	10	0	35	0	10	0	0	0	0
Nightshade	98	90	98	80	70	0	98	80	80	98	65	60
Nutsedge, Yellow	0	0	0	0	0	0	0	0	0	0	0	0
Panicum, Fall	100	0	90	65	0	40	100	80	80	95	0	35
Pigweed, Palmer	—	90	75	0	75	98	100	100	90	100	0	100
Poinsettia, Wild	35	0	0	20	30	0	0	0	0	0	0	20
Ragweed	0	0	40	0	25	20	0	70	25	35	0	10
Ryegrass, Italian	15	0	0	0	0	0	0	20	0	30	0	0
Sandbur	10	0	0	0	0	10	10	35	0	30	0	5
Soybean	40	0	40	20	0	0	10	0	0	0	0	20
Surinam Grass	0	0	0	0	15	0	75	0	0	65	0	0
Velvetleaf	70	90	100	100	75	60	100	98	70	75	65	80
Waterhemp	100	95	100	75	98	100	100	100	100	100	95	100

16 g ai/ha	Compounds										
Preemergence	35	53	58	62	96	144	145	149	168	179	200
Arrowleaf Sida	80	20	0	20	50	95	65	0	95	0	65
Barnyardgrass	0	0	0	0	0	0	0	0	0	0	0

TABLE F-continued

Beggarticks	0	0	0	0	0	0	0	0	0	0	0
Corn	0	0	0	0	0	0	0	0	0	0	0
Crabgrass, Brazil	95	0	0	0	0	75	5	0	65	0	90
Crabgrass, Large	60	0	20	0	0	80	10	0	65	0	50
Dayflower, VA	25	0	0	0	0	0	0	0	5	0	15
Field Bindweed	35	0	0	0	0	40	0	0	40	0	0
Foxtail, Giant	10	0	0	15	0	15	0	0	65	0	35
Foxtail, Green	0	0	0	0	25	25	5	0	70	0	10
Goosegrass	0	0	0	0	50	75	0	0	80	0	70
Johnsongrass	0	0	0	0	20	0	0	0	0	0	0
Kochia	40	0	0	—	0	98	75	0	95	0	25
Lambsquarters	98	65	0	90	5	100	100	—	100	98	0
Morningglory	0	0	0	0	35	0	0	0	0	0	0
Nightshade	95	35	65	0	0	98	90	0	5	—	35
Nutsedge, Yellow	0	0	0	0	0	0	0	0	0	0	0
Panicum, Fall	35	0	35	0	—	95	65	0	35	0	70
Pigweed, Palmer	—	0	0	80	80	100	100	25	98	0	85
Poinsettia, Wild	30	0	0	0	0	0	0	0	0	0	0
Ragweed	0	0	0	20	0	0	0	20	10	0	0
Ryegrass, Italian	0	0	0	0	0	0	25	0	15	0	0
Sandbur	10	0	0	0	0	0	0	0	10	0	5
Soybean	35	0	10	0	0	—	0	0	0	0	0
Surinam Grass	0	0	0	0	0	0	0	0	50	0	0
Velvetleaf	70	65	70	35	0	80	35	10	35	15	25
Waterhemp	100	0	75	85	40	98	100	35	100	95	98

8 g ai/ha	Compounds				
Preemergence	35	53	58	62	200
Arrowleaf Sida	50	0	20	0	0
Barnyardgrass	0	0	0	0	0
Beggarticks	0	0	0	0	0
Corn	0	0	0	0	0
Crabgrass, Brazil	0	0	0	0	0
Crabgrass, Large	0	0	0	0	0
Dayflower, VA	0	0	0	0	0
Field Bindweed	0	0	0	0	0
Foxtail, Giant	0	0	0	0	0
Foxtail, Green	0	0	0	0	0
Goosegrass	0	0	0	0	10
Johnsongrass	0	0	0	0	0
Kochia	0	0	0	10	20
Lambsquarters	90	65	—	70	0
Morningglory	0	0	0	0	0
Nightshade	75	—	0	0	0
Nutsedge, Yellow	0	0	0	0	0
Panicum, Fall	0	0	0	0	0
Pigweed, Palmer	—	0	0	10	0
Poinsettia, Wild	20	0	0	0	0
Ragweed	0	0	0	0	0
Ryegrass, Italian	0	0	0	0	0
Sandbur	0	0	0	0	0
Soybean	0	0	0	0	0
Surinam Grass	0	0	0	0	0
Velvetleaf	40	0	20	0	0
Waterhemp	100	0	20	80	70

Test G

[0478] Three plastic pots (ca. 16-cm diameter) per rate were partially filled with sterilized Tama silt loam soil comprising a 35:50:15 ratio of sand, silt and clay and 2.6% organic matter. Separate plantings for each of the three pots were as follows. Seeds from the U.S. of *monochoria* (*Monochorea vaginalis*), small-flower umbrella sedge (*Cyperus difformis*), hardstem bulrush (*Scirpus juncoides*), and redstem (purple redstem, *Ammannia coccinea*), were planted into one 16-cm pot for each rate. Seeds from the U.S. of rice flatsedge (*Cyperus iria*), bearded sprangletop (*Leptochloa fascicularis*), one stand of 9 or 10 water seeded rice seedlings (Indica rice, *Oryza sativa*), and two stands of 3 or 4 transplanted rice seedlings (*Oryza sativa* cv. 'Japonica-M202') were planted into one 16-cm pot for each rate. Seeds from the U.S. of barnyardgrass (*Echinochloa crus-galli*), and late watergrass (*Echinochloa oryzicola*) were planted into one 16-cm pot for each rate. Plantings were sequential so that crop and weed species were at the 2.0 to 2.5-leaf stage at time of treatment.

[0479] Potted plants were grown in a greenhouse with day/night temperature settings of 30/27° C., and supplemental balanced lighting was provided to maintain a 16-hour photoperiod. Test pots were maintained in the greenhouse until test completion.

[0480] At time of treatment, test pots were flooded to 3 cm above the soil surface, treated by application of test compounds directly to the paddy water, and then maintained at

that water depth for the duration of the test. Effects of treatments on rice and weeds were visually evaluated by comparison to untreated controls after 21 days. Plant response ratings, summarized in Table G, are based on a scale of 0 to 100 where 0 is no effect and 100 is complete control. A dash (-) response means no test result.

TABLE G

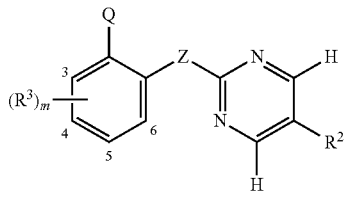
	Compounds			Compounds	
250 g ai/ha	35	55	125 g ai/ha	35	55
Flood					
Barnyardgrass	100	100	Barnyardgrass	100	100
Bulrush, Hardstem	100	100	Bulrush, Hardstem	100	100
Flatsedge, Rice	100	100	Flatsedge, Rice	100	100
Monochoria	100	100	*Monochoria*	100	100
Redstem	100	100	Redstem	90	100
Rice, Transplanted	100	100	Rice, Transplanted	45	80
Rice, Water Seeded	100	100	Rice, Water Seeded	100	100
Sedge, Umbrella	100	100	Sedge, Umbrella	100	100
Sprangletop, Brdd.	100	100	Sprangletop, Brdd.	100	100
Watergrass, Late	100	100	Watergrass, Late	40	75

	Compounds			Compounds	
64 g ai/ha	35	55	32 g ai/ha	35	55
Flood					
Barnyardgrass	45	75	Barnyardgrass	30	0
Bulrush, Hardstem	95	100	Bulrush, Hardstem	0	80
Flatsedge, Rice	100	100	Flatsedge, Rice	100	85
Monochoria	100	100	*Monochoria*	98	100
Redstem	85	95	Redstem	0	85
Rice, Transplanted	30	60	Rice, Transplanted	15	20
Rice, Water Seeded	70	100	Rice, Water Seeded	60	45
Sedge, Umbrella	98	100	Sedge, Umbrella	0	98
Sprangletop, Brdd.	100	80	Sprangletop, Brdd.	60	45
Watergrass, Late	30	0	Watergrass, Late	0	0

What is claimed is:

1. A compound selected from Formula 1, N-oxides and salts thereof,

1



Q is a 5- or 6-membered aromatic heterocylic ring, bound to the remainder of Formula 1 through a carbon atom, and optionally substituted with 1 to 4 R^1;

Z is O or S;

each R^1 is independently halogen, cyano, nitro, SF_5, CHO, $C(=O)NH_2$, $C(=S)NH_2$, SO_2NH_2, C_1-C_4 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, C_1-C_4 haloalkyl, C_2-C_4 haloalkenyl, C_2-C_4 haloalkynyl, C_3-C_6 cycloalkyl, C_3-C_6 halocycloalkyl, C_4-C_8 alkylcycloalkyl, C_4-C_8 cycloalkylalkyl, C_2-C_6 alkylcarbonyl, C_2-C_6 haloalkylcarbonyl, C_2-C_6 alkoxycarbonyl, C_3-C_7 cycloalkylcarbonyl, C_2-C_8 alkylaminocarbonyl, C_3-C_{10} dialkylaminocarbonyl, C_1-C_4 alkoxy, C_3-C_4 alkenyloxy, C_3-C_4 alkynyloxy, C_1-C_4 haloalkoxy, C_3-C_4 haloalkenyloxy, C_3-C_4 haloalkynyloxy, C_3-C_6 cycloalkoxy, C_3-C_6 halocycloalkoxy, C_4-C_8 cycloalkylalkoxy, C_2-C_6 alkoxyalkyl, C_2-C_6 haloalkoxyalkyl, C_2-C_6 alkoxyhaloalkyl, C_2-C_6 alkoxyalkoxy, C_2-C_4 alkylcarbonyloxy, C_2-C_6 cyanoalkyl, C_2-C_6 cyanoalkoxy, C_1-C_4 hydroxyalkyl, C_2-C_4 alkylthioalkyl, SO_nR^{1A}, $Si(CH_3)_3$ or $B(—OC(R^{1B})_2C(R^{1B})_2O—)$; or a phenyl ring optionally substituted with up to 5 substituents independently selected from R^{1C}; or a 5- or 6-membered heteroaromatic ring containing ring members selected from carbon atoms and up to 4 heteroatoms independently selected from up to 2 O, up to 2 S and up to 4 N atoms, each ring optionally substituted with up to 3 substituents independently selected from R^{1C} on carbon atom ring members and R^{1D} on nitrogen atom ring members;

R^2 is halogen, cyano, nitro, C_1-C_4 alkoxy, C_1-C_4 alkyl, C_2-C_6 alkenyl, C_2-C_6 alkynyl, SO_nR^{2A}, C_1-C_4 haloalkyl or C_3-C_6 cycloalkyl;

each R^3 is independently halogen, cyano, hydroxy, nitro, amino, CHO, $C(=O)NH_2$, $C(=S)NH_2$, SO_2NH_2, C_1-C_4 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, C_1-C_4 haloalkyl, C_2-C_4 haloalkenyl, C_2-C_4 haloalkynyl, C_3-C_6 cycloalkyl, C_3-C_6 halocycloalkyl, C_4-C_8 alkylcycloalkyl, C_4-C_8 cycloalkylalkyl, C_2-C_6 alkylcarbonyl, C_2-C_6 haloalkylcarbonyl, C_2-C_6 alkoxycarbonyl, C_3-C_7 cycloalkylcarbonyl, C_1-C_4 alkoxy, C_3-C_4 alkenyloxy, C_3-C_4 alkynyloxy, C_1-C_4 haloalkoxy, C_3-C_4 haloalkenyloxy, C_3-C_4 haloalkynyloxy, C_3-C_6 cycloalkoxy, C_3-C_6 halocycloalkoxy, C_4-C_8 cycloalkylalkoxy, C_2-C_6 alkoxyalkyl, C_2-C_6 haloalkoxyalkyl, C_2-C_6 alkoxyhaloalkyl, C_2-C_6 alkoxyalkoxy, C_2-C_4 alkylcarbonyloxy, C_2-C_6 cyanoalkyl, C_2-C_6 cyanoalkoxy, C_2-C_4 alkylthioalkyl, $Si(CH_3)_3$, $C{\equiv}CSi(CH_3)_3$, $C(=O)N(R^{3A})(R^{3B})$, $C(=NOR^{3C})H$, $C(=NR^{3D})H$, SO_nR^{3E}; or a phenyl ring optionally substituted with up to 5 substituents independently selected from R^{3F}; or a 5- or 6-membered heteroaromatic ring containing ring members selected from carbon atoms and up to 4 heteroatoms independently selected from up to 2 O, up to 2 S and up to 4 N atoms, each ring optionally substituted with up to 3 substituents independently selected from R^{3F} on carbon atom ring members and R^{3G} on nitrogen atom ring members; or pyrimidinyloxy;

m is 0, 1, 2 or 3;

each n is independently 0, 1 or 2;

each R^{1A}, R^{2A} and R^{3E} is independently C_1-C_4 alkyl, C_1-C_4 haloalkyl, C_1-C_4, alkylamino or C_2-C_6 dialkylamino;

each R^{1B} is independently H or C_1-C_4 alkyl;

each R^{1C} is independently hydroxy, halogen, cyano, nitro, C_1-C_6 alkyl, C_1-C_6 haloalkyl, C_1-C_6 alkoxy or C_1-C_6 haloalkoxy;

each R^{1D} is independently cyano, C_1-C_6 alkyl, C_1-C_6 haloalkyl, C_1-C_6 alkoxy or C_2-C_6 alkylcarbonyl;

each R^{3A} is independently C_1-C_4 alkyl or C_1-C_4 haloalkyl;

each R^{3B} is independently H, C_1-C_4 alkyl or C_1-C_4 haloalkyl;

each R^{3C} is independently H or C_1-C_4 alkyl;

each R^{3D} is independently H, amino, C_1-C_4 alkyl or C_1-C_4 alkylamino;

each R^{3F} is independently hydroxy, halogen, cyano, nitro, C_1-C_6 alkyl, C_1-C_6 haloalkyl, C_1-C_6 alkoxy or C_1-C_6 haloalkoxy; and

each R^{3G} is independently cyano, C_1-C_6 alkyl, C_1-C_6 haloalkyl, C_1-C_6 alkoxy or C_2-C_6 alkylcarbonyl;

2. A compound of claim **1** wherein

Q is selected from Q-1 through Q-55 wherein r is 0, 1, 2 or 3; and s is 0 or 1;

each R^1 is independently halogen, cyano, SF_5, CHO, C_1-C_4 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, C_1-C_4 haloalkyl, C_2-C_4 haloalkenyl, C_2-C_4 haloalkynyl, C_2-C_6 alkylcarbonyl, C_2-C_6 haloalkylcarbonyl, C_2-C_6 alkoxycarbonyl, C_1-C_4 alkoxy, C_3-C_4 alkenyloxy, C_3-C_4 alkynyloxy, C_1-C_4 haloalkoxy, C_3-C_4 haloalkenyloxy, C_3-C_4 haloalkynyloxy, C_2-C_6 alkoxyalkyl, C_2-C_6 haloalkoxyalkyl, C_2-C_6 cyanoalkyl, C_1-C_4 hydroxyalkyl, C_2-C_4 alkylthioalkyl or SO_nR^{1A};

R^3 is independently halogen, cyano, CHO, C_1-C_4 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, C_1-C_4 haloalkyl, C_2-C_4 haloalkenyl, C_2-C_4 haloalkynyl, C_3-C_6 cycloalkyl, C_3-C_6 halocycloalkyl, C_4-C_8 alkylcycloalkyl, C_2-C_6 alkylcarbonyl, C_2-C_6 haloalkylcarbonyl, C_2-C_6 alkoxycarbonyl, C_1-C_4 alkoxy, C_3-C_4 alkenyloxy, C_3-C_4 alkynyloxy, C_1-C_4 haloalkoxy, C_3-C_4 haloalkenyloxy, C_3-C_4 haloalkynyloxy, C_3-C_6 cycloalkoxy, C_3-C_6 halocycloalkoxy, C_2-C_6 alkoxyalkyl, C_2-C_6 haloalkoxyalkyl, C_2-C_4 alkylcarbonyloxy, C_2-C_6 cyanoalkyl, $C(=O)N(R^{3A})(R^{3B})$, $C(=NOR^{3C})H$, SO_nR^{3E}; or a phenyl ring optionally substituted with up to 5 substituents independently selected from R^{3F}; or a 5- or 6-membered heteroaromatic ring containing ring members selected from carbon atoms and up to 4 heteroatoms independently selected from up to 2 O, up to 2 S and up to 4 N atoms, each ring optionally substituted with up to 3 substituents independently selected from R^{3F} on carbon atom ring members and R^{3G} on nitrogen atom ring members;

Z is O; and

m is 0, 1 or 2.

3. A compound of claim **2** wherein

each R^1 is independently halogen, cyano, CHO, C_1-C_4 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, C_1-C_4 haloalkyl, C_2-C_4 haloalkenyl, C_2-C_4 haloalkynyl, C_1-C_4 alkoxy, C_3-C_4 alkenyloxy, C_3-C_4 alkynyloxy, C_1-C_4 haloalkoxy, C_3-C_4 haloalkenyloxy, C_3-C_4 haloalkynyloxy, C_2-C_6 alkoxyalkyl, C_2-C_6 haloalkoxyalkyl, C_1-C_4 hydroxyalkyl, C_2-C_4 alkylthioalkyl or SO_nR^{1A};

R^2 is halogen, C_1-C_4 alkyl or C_1-C_4 haloalkyl;

each R^3 is independently halogen, cyano, CHO, C_1-C_4 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, C_1-C_4 haloalkyl, C_2-C_4 haloalkenyl, C_2-C_4 haloalkynyl, C_3-C_6 cycloalkyl, C_3-C_6 halocycloalkyl, C_2-C_6 alkylcarbonyl, C_2-C_6 haloalkylcarbonyl, C_2-C_6 alkoxycarbonyl, C_1-C_4 alkoxy, C_1-C_4 haloalkoxy, C_2-C_6 alkoxyalkyl, C_2-C_6 haloalkoxyalkyl, C_2-C_6 cyanoalkyl, SO_nR^{3E}; or a 5- or 6-membered heteroaromatic ring containing ring members selected from carbon atoms and up to 4 heteroatoms independently selected from up to 2 O, up to 2 S and up to 4 N atoms, each ring optionally substituted with up to 3 substituents independently selected from R^{3F} on carbon atom ring members and R^{3G} on nitrogen atom ring members; and

m is 0 or 1.

4. A compound of claim **3** wherein

Q is selected from Q-7 through Q-24;

each R^1 is independently halogen, cyano, C_1-C_4 alkyl, C_1-C_4 haloalkyl, C_1-C_4 alkoxy, C_1-C_4 haloalkoxy or SO_nR^{1A};

R^2 is halogen or C_1-C_4 alkyl;

each R^3 is independently halogen, cyano, C_1-C_4 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, C_1-C_4 haloalkyl, C_2-C_6 alkylcarbonyl, C_2-C_6 haloalkylcarbonyl, C_2-C_6 alkoxycarbonyl, C_1-C_4 alkoxy, C_1-C_4 haloalkoxy, C_2-C_6 alkoxyalkyl or C_2-C_6 haloalkoxyalkyl; and

each R^{1A} is independently C_1-C_4 alkyl or C_1-C_4 haloalkyl.

5. A compound of claim **4** wherein

Q is selected from Q-16 and Q-18;

each R^1 is independently halogen, C_1-C_4 alkyl, C_1-C_4 haloalkyl or C_1-C_4 haloalkoxy;

R^2 is halogen or CH_3; and

each R^3 is independently halogen, cyano, C_1-C_4 alkyl or C_1-C_4 haloalkyl.

6. A compound of claim **3** wherein

Q is selected from Q-43, Q-44, Q-45, Q-48, Q-49 and Q-50;

each R^1 is independently halogen, cyano, C_1-C_4 alkyl, C_1-C_4 haloalkyl, C_1-C_4 alkoxy, C_1-C_4 haloalkoxy or SO_nR^{1A};

R^2 is halogen or C_1-C_4 alkyl;

each R^3 is independently halogen, cyano, C_1-C_4 alkyl, C_2-C_4 alkenyl, C_2-C_4 alkynyl, C_1-C_4 haloalkyl, C_2-C_6 alkylcarbonyl, C_2-C_6 haloalkylcarbonyl, C_2-C_6 alkoxycarbonyl, C_1-C_4 alkoxy, C_1-C_4 haloalkoxy, C_2-C_6 alkoxyalkyl or C_2-C_6 haloalkoxyalkyl; and

each R^{1A} is independently C_1-C_4 alkyl or C_1-C_4 haloalkyl.

7. A compound of claim **6** wherein

Q is selected from Q-43, Q-44 and Q-45;

each R^1 is independently halogen, C_1-C_4 alkyl, C_1-C_4 haloalkyl or C_1-C_4 haloalkoxy;

R^2 is halogen or CH_3; and

each R^3 is independently halogen, cyano, C_1-C_4 alkyl or C_1-C_4 haloalkyl.

8. A compound of claim **1** selected from the group consisting of

5-chloro-2-[2-(5-chloro-2-pyridinyl)phenoxy]pyrimidine,

5-chloro-2-[2-[5-(fluoromethyl)-3-isoxazolyl]phenoxy]pyrimidine,

2-[2-(3-bromo-5-isoxazolyl)phenoxy]-5-chloropyrimidine,

5-chloro-2-[2-[5-(trifluoromethyl)-2-pyridinyl]phenoxy]pyrimidine,

5-chloro-2-[3-chloro-2-(5-chloro-2-pyridinyl)phenoxy]pyrimidine,

4-[2-[(5-bromo-2-pyrimidinyl)oxy]phenyl]-2-(trifluoromethyl)pyrimidine,

2-[2-(2-bromo-5-thiazolyl)phenoxy]-5-(trifluoromethyl)pyrimidine,

5-chloro-2-[4-methyl-2-[2-(trifluoromethyl)-4-pyridinyl]phenoxy]pyrimidine,

5-chloro-2-[2-[5-(difluoromethyl)-3-isoxazolyl]phenoxy]pyrimidine,

5-chloro-2-[2-[3-(difluoromethyl)-5-isoxazolyl]phenoxy]pyrimidine,

5-chloro-2-[2-[5-(difluoromethyl)-3-isoxazolyl]-3-fluorophenoxy]pyrimidine,

5-bromo-2-[2-[5-(difluoromethyl)-3-isoxazolyl]phenoxy]pyrimidine,

5-chloro-2-[2-[3-(trifluoromethyl)-5-isoxazolyl]phenoxy]pyrimidine,
5-chloro-2-[2-[3-(difluoromethyl)-5-isoxazolyl]-3-fluorophenoxy]pyrimidine,
5-bromo-2-[2-[3-(difluoromethyl)-5-isoxazolyl]-3-fluorophenoxy]pyrimidine,
5-chloro-2-[2-[5-(trifluoromethyl)-3-isoxazolyl]-3-fluorophenoxy]pyrimidine and
5-chloro-2-[2-[5-(trifluoromethyl)-3-isoxazolyl]phenoxy]pyrimidine.

9. A herbicidal composition comprising a compound of claim **1** and at least one component selected from the group consisting of surfactants, solid diluents and liquid diluents.

10. A herbicidal composition comprising a compound of claim **1**, at least one additional active ingredient selected from the group consisting of other herbicides and herbicide safeners, and at least one component selected from the group consisting of surfactants, solid diluents and liquid diluents.

11. A herbicidal mixture comprising (a) a compound of claim **1**, and (b) at least one additional active ingredient selected from (b1) through (b16) and salts of compounds of (b1) through (b16).

12. A method for controlling the growth of undesired vegetation comprising contacting the vegetation or its environment with a herbicidally effective amount of a compound of claim **1**.

* * * * *