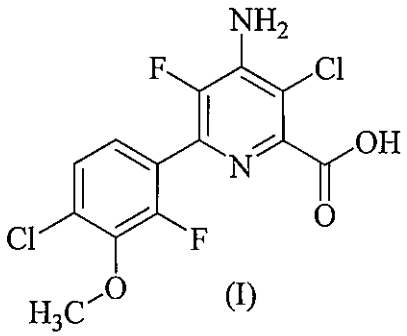


(I)

or an agriculturally acceptable salt or ester thereof, and (b) a synthetic auxin herbicide.

A second embodiment includes the mixture of the first embodiment in which ~~of~~ formula (I)~~,~~ is present in ~~the form of~~ at least one of the following forms: a carboxylic acid, a carboxylate salt, an aralkyl, an alkyl ester, an unsubstituted benzyl, a substituted benzyl, a C_{1-4} alkyl, and/or an n-butyl ester.

A third embodiment includes the mixture according to either the first or second embodiments wherein the (b) at least one synthetic auxin herbicide is at least one compound selected from the group consisting of: 2,4-D, 2,4-D EHE, 2,4-DMA, 2,4-D choline, aminocyclopyrachlor, aminopyralid, aminopyralid TIPA, clomeprop-P, clopyralid, clopyralid MEA, dicamba, dicamba DMA, diclorprop-P, fluroxypyr, fluroxypyr MHE, MCPA, MCPA EHE, MCPB, MCPB-ethyl ester, mecoprop-P, picloram, picloram K^+ salt, quinclorac, triclopyr, triclopyr TEA, triclopyr choline, triclopyr BEE, halauxifen-methyl, halauxifen-methyl (methyl 4-amino-3-chloro-6-(4-chloro-2-fluoro-3-methoxyphenyl)picolinate) or its carboxylate potassium salt, or an agriculturally acceptable salt, ester, or carboxylate salt thereof of at least one of the aforementioned synthetic auxin herbicide.

A fourth embodiment includes the mixtures according to any of the first, second, or third embodiments in which the synthetic auxin herbicide in the mixture is 2,4-D, 2,4-D EHE, 2,4-DMA, or 2,4-D choline wherein the weight ratio of the compound of formula (I) to 2,4-D, 2,4-D EHE, 2,4-DMA, or 2,4-D choline given in units of gae/ha to gai/ha or gae/ha to gae/ha is selected from the group of ranges of ratios and ratios consisting of 1:128 to about 0.67:1, 1:14 to about 14:1, 1:2, 1:3.5, 1:4, 1:6, 1:7, 1:8, 1:11, 1:12, 1:14, 1:16, 1:17, 1:23, 1:24, 1:28, 1:32, 1:45, 1:48, 1:55, 1:56, 1:64, 1:96, 1:110, from 1:16 to 1:64, from 1:3.5 to 1:28, from 1:8 to 1:64, from 1:2, to 1:16, from 1:11 to 1:45, from 1:6 to 1:96, from 1:4 to 1:64, from 1:4 to 1:32, from 1:7 to 1:55, from 1:7 to 1:28, from 1:14 to 1:110, from 1:28 to 1:56, from 1:2 to 1:110, or within any range defined between any pair of the foregoing values.

A fifth embodiment includes the mixtures according to any of the first, second, or third embodiments in which the synthetic auxin herbicide in the mixture is aminocyclopyrachlor wherein the weight ratio of the compound of formula (I) to aminocyclopyrachlor given in units of gae/ha to gai/ha or gae/ha to gae/ha is selected from the group of ranges of ratios and ratios consisting of: 1:4 to about 2:1, 1:2 to about 1:1, 1:1, 1:2, 1:4, from 1:1 to 1:4, or within any range defined between any pair of the foregoing values.

A sixth embodiment includes the mixtures according to any of the first, second, or third embodiments in which the synthetic auxin herbicide in the mixture is aminopyralid or aminopyralid TIPA wherein the weight ratio of the compound of formula (I) to aminopyralid or aminopyralid TIPA given in units of gae/ha to gai/ha or gae/ha to gae/ha is selected from the group of ranges of ratios and ratios consisting of: 1:8 to about 6:1, from about 1.5:1 to 1:2, 1:1, 1:2, 1:4, 1:8, 3:1, from 1:1 to 1:8, or within any range defined between any pair of the foregoing values.

A seventh embodiment includes the mixtures according to any of the first, second, or third embodiments in which the synthetic auxin herbicide in the mixture is clomeprop-P having a weight ratio of the compound of formula (I) or salt or ester thereof to clomeprop-P or salt or ester thereof is within the range of from 1:159 to about 1:1 or about 1:200 to about 6:1.

An eighth embodiment includes the mixtures according to any of the first, second, or third embodiments in which the synthetic auxin herbicide in the mixture is clopyralid or clopyralid MEA wherein the weight ratio of the compound of formula (I) to clopyralid or clopyralid MEA given in units of gae/ha to gai/ha or gae/ha to gae/ha is selected from the group of ranges of ratios and ratios consisting of: from about 1:23 to about 1:4, from about 1:16 to about 1:6, 1:4, 1:5.7, 1:8, 1:16, from 1:4 to 1:16, or within any range defined between any pair of the foregoing values.

A ninth embodiment includes the mixtures according to any of the first, second, or third embodiments in which the synthetic auxin herbicide in the mixture is dicamba or dicamba DMA wherein the weight ratio of the compound of formula (I) to dicamba or dicamba DMA given in units of gae/ha to gai/ha or gae/ha to gae/ha is selected from the group of ranges of ratios and ratios consisting of: from about 1:255 to about 1.2:1, from about 1:31 to about 1:7, 1:3.3, 1:4, 1:6.6, 1:8, 1:11, 1:16, 1:26, 1:45, 1:53, 1:64, from 1:26 to 1:53,

from 1:8 to 1:64, from 1:3.3 to 1:26, from 1:11 to 1:45, from 1:3.3 to 1:64, or within any range defined between any pair of the foregoing values.

A tenth embodiment includes the mixtures according to any of the first, second, or third embodiments in which the synthetic auxin herbicide in the mixture is diclorprop-P wherein the weight ratio of the compound of formula (I) to diclorprop-P given in units of gae/ha to gai/ha or gae/ha to gae/ha is selected from the group of ranges of ratios and ratios consisting of: 1:16, from about 1:4 to about 1:64, 1:32..

An eleventh embodiment includes the mixtures according to any of the first, second, or third embodiments in which the synthetic auxin herbicide in the mixture is fluroxypyr or fluroxypyr MHE wherein the weight ratio of the compound of formula (I) to fluroxypyr or fluroxypyr MHE given in units of gae/ha to gai/ha or gae/ha to gae/ha is selected from the group of ranges of ratios and ratios consisting of: from about 1:127 to about 2:1, from 1:16 to about 1:4.38, 1:2, 1:3.6, 1:4, 1:8, 1:9, 1:14, 1:16, 1:18, 1:32, 1:35, from 1:2 to 1:32, from 1:2 to 1:16, from 1:4 to 1:35, from 1:36 to 1:64, from 1:8 to 1:32, from 1:4.4 to 1:64, from 1:2 to 1:35, or within any range defined between any pair of the foregoing values.

A twelfth embodiment includes the mixtures according to any of the first, second, or third embodiments in which the synthetic auxin herbicide in the mixture is MCPA or MCPA EHE wherein the weight ratio of the compound of formula (I) to MCPA or MCPA EHE given in units of gae/ha to gai/ha or gae/ha to gae/ha is selected from the group of ranges of ratios and ratios consisting of: from about 1:64 to about 0.6:1, from about 1:16 to about 1:7, 1:2, 1:2.2~~,~~ 1:4, 1:4.4, 1:6.6, 1:8, 1:8.8, 1:11, 1:16, 1:17.5, 1:32, 1:35, from 1:2 to 1:16, from 1:5.7 to 1:32, from 1:8 to 1:32, from 1:2.2 to 1:35, from 1:2 to 1:35, or within any range defined between any pair of the foregoing values.

A thirteenth embodiment includes the mixtures according to any of the first, second, or third embodiments in which the synthetic auxin herbicide in the mixture is MCPB or salt or ester wherein the weight ratio of the compound of formula (I) to MCPB given in units of gae/ha to gai/ha or gae/ha to gae/ha is selected from the group of ranges of ratios and ratios consisting of: from about 1:250 to about 3:1, from about 1:150 to about 0.75:1 or within any range defined between any pair of the foregoing values.

A fourteenth embodiment includes the mixtures according to any of the first, second, or third embodiments in which the synthetic auxin herbicide in the mixture is mecoprop-P wherein the weight ratio of the compound of formula (I) to mecoprop-P given in units of

gae/ha to gai/ha or gae/ha to gae/ha is selected from the group of ranges of ratios and ratios consisting of: 1:23 from ~~a~~ about 1:20 to about 1:60, from about 1:40 to about 1;100.

A fiftheenth embodiment includes the mixtures according to any of the first, second, or third embodiments in which the synthetic auxin herbicide in the mixture is picloram or picloram K^+ salt wherein the weight ratio of the compound of formula (I) to picloram or picloram K^+ salt given in units of gae/ha to gai/ha or gae/ha to gae/ha is selected from the group of ranges of ratios and ratios consisting of: from about 1:16 to about 1.75:1, from about 0.44:1 to about 1:4, 1:1.1, 1:2, 1:4, 1:8, 1:16, from 1:2 to 1:16, from 1:1.1 to 1:16, or within any range defined between any pair of the foregoing values.

A sixteenth embodiment includes the mixtures according to any of the first, second, or third embodiments in which the synthetic auxin herbicide in the mixture is quinclorac wherein the weight ratio of the compound of formula (I) to quinclorac given in units of gae/ha to gai/ha or gae/ha to gae/ha is selected from the group of ranges of ratios and ratios consisting of: from about 1:128 to about 1.2:1, from about 1:16 to about 1:6.5, 1:1.7, 1:2, 1:3, 1:4, 1:7, 1:13, 1:16, 1:18, 1:26, 1:32, 1:35, 1:64, 1:70, 1:128, from 1:9 to 1:70, from 1:3 to 1:128, from 1:16 to 1:64, from 1:7 to 1:13, from 1:7 to 1:64, from 1:8 to 1:64, from 1:4 to 1:16, from 1:2 to 1:128, from 1:1.7 to 1:32, from 1:1.7 to 1:16, or within any range defined between any pair of the foregoing values.

A seventeenth embodiment includes the mixtures according to any of the first, second, or third embodiments in which the synthetic auxin herbicide in the mixture is triclopyr, triclopyr TEA, triclopyr choline or triclopyr BEE wherein the weight ratio of the compound of formula (I) to triclopyr, triclopyr TEA, triclopyr choline or triclopyr BEE given in units of gae/ha to gai/ha or gae/ha to gae/ha is selected from the group of ranges of ratios and ratios consisting of: from about 1:64 to about 1.2:1, from about 1:8 to about 1:6.6, 1:1.7, 1:2, 1:3.3, 1:4, 1:5, 1:5.6, 1:6.6, 1:8, 1:11, 1:13, 1:14, 1:16, 1:22, 1:17.5, 1:22, 1:26, 1:32, 1:45, from 1:5 to 1:45, from 1:11 to 1:45, from 1:2 to 1:16, from 1:2 to 1:32, from 1:4 to 1:32, from 1:1.7 to 1:26, from 1:1.7 to 1:13, from 1:7 to 1:45, or within any range defined between any pair of the foregoing values.

An eighteenth embodiment includes the mixtures according to any of the first, second, or third embodiments in which the synthetic auxin herbicide in the mixture is halauxifen-methyl (methyl 4-amino-3-chloro-6-(4-chloro-2-fluoro-3-methoxyphenyl)picolinate) or its carboxylate potassium salt wherein the weight ratio of the compound of formula (I) to

halauxifen-methyl (methyl 4-amino-3-chloro-6-(4-chloro-2-fluoro-3-methoxyphenyl)picolinate) or its carboxylate potassium salt given in units of gae/ha to gai/ha or gae/ha to gae/ha is selected from the group of ranges of ratios and ratios consisting of: from about 1:2 to about 20:1, from about 2:1 to about 5:1, 1:4, 1:2, 1.2:1, 1:1, 2:1, 2.4:1, 4:1, 5:1, 8:1, 10:1 from 1:2 to 4:1, from 1:1 to 8:1, from 1.2:1 to 10:1, from 1:4 to 4:1, from 1:4 to 10:1, or within any range defined between any pair of the foregoing values.

An nineteenth embodiment includes any composition according to any of the first through the seventeenth embodiments wherein the mixture further comprises at least one an agriculturally acceptable agent selected from the group consisting of an adjuvant, a carrier, or a safener.

A twentieth embodiment includes methods of controlling undesirable vegetation comprising the step of applying or otherwise contacting vegetation and/or soil, and/ or water with a herbicidally effective amount of at least one mixture according to any of the first through the eighteenth embodiments.

A twenty-first embodiment includes methods according to the twentieth embodiment wherein of the method is practiced in at least one member of the group consisting of direct-seeded, water-seeded, and/or transplanted rice, cereals, wheat, barley, oats, rye, sorghum, corn/maize, sugarcane, sunflower, oilseed rape, canola, sugar beet, soybean, cotton, pineapple, pastures, grasslands, rangelands, fallowland, turf, tree and vine orchards, aquatics, plantation crops, vegetables, industrial vegetation management (IVM), or rights-of-way (ROW).

A twenty-second embodiment includes methods according to either of the twentieth and twenty-first embodiments wherein a herbicidally effective amount of the mixture is applied either pre- or ~~post~~post-emergently to at least one of the following: a crop, a field, a ROW, or a rice paddy.

A twenty-third embodiment includes methods according to any of the twentieth through the twenty-second embodiments wherein the undesirable vegetation may be controlled in: glyphosate-, 5-enolpyruvylshikimate-3-phosphate (EPSP) synthase inhibitor-, glufosinate-, glutamine synthetase inhibitor-, dicamba-, phenoxy auxin-, pyridyloxy auxin-, synthetic auxin-, auxin transport inhibitor-, aryloxyphenoxypropionate-, cyclohexanedione-, phenylpyrazoline-, acetyl CoA carboxylase (ACCase) inhibitor-, imidazolinone-, sulfonylurea-, pyrimidinylthiobenzoate-, triazolopyrimidine-sulfonamide,

sulfonylaminocarbonyltriazolinone-, acetolactate synthase (ALS) or acetohydroxy acid synthase (AHAS) iinhibitor-, 4-hydroxyphenyl-pyruvate dioxygenase (HPPD) inhibitor-, phytoene desaturase inhibitor-, carotenoid biosynthesis inhibitor-, protoporphyrinogen oxidase (PPO) inhibitor-, cellulose biosynthesis inhibitor-, mitosis inhibitor-, microtubule inhibitor-, very long chain fatty acid inhibitor-, fatty acid and lipid biosynthesis inhibitor-, photosystem I inhibitor-, photosystem II inhibitor-, protoporphyrinogen oxidase (PPO) inhibitor-, triazine-, or bromoxynil-tolerant crops.

A twenty-fourth embodiment includes at least one method according to any of the twentieth through twenty-third embodiments wherein a plant that is resistant or tolerant to at least one herbicide is treated, and where the resistant or tolerant crop possesses multiple or stacked traits conferring tolerance to multiple herbicides or inhibitors of multiple modes of action, in some embodiments the treated plant that expresses resistance or tolerance to a herbicide is itself undesirable vegetation.

A twenty-fifth embodiment includes methods according to the twenty-fourth embodiment, wherein the resistant or tolerant weed is a biotype with resistance or tolerance to multiple herbicides, multiple chemical classes, inhibitors of multiple herbicide modes-of-action, or via multiple resistance mechanisms.

A twenty-sixth embodiment includes at least one of the methods according to either the twenty-fourth or twenty-fifth embodiments, wherein the resistant or tolerant undesirable plant is a biotype resistant or tolerant to at least on agent selected from the groups consisting of: acetolactate synthase (ALS) inhibitors or acetohydroxy acid synthase (AHAS), photosystem II inhibitors, acetyl CoA carboxylase (ACCase) inhibitors, synthetic auxins, auxin transport inhibitors, photosystem I inhibitors, 5-enolpyruvylshikimate-3-phosphate (EPSP) synthase inhibitors, microtubule assembly inhibitors, fatty acid and lipid synthesis inhibitors, protoporphyrinogen oxidase (PPO) inhibitors, carotenoid biosynthesis inhibitors, very long chain fatty acid (VLCFA) inhibitors, phytoene desaturase (PDS) inhibitors, glutamine synthetase inhibitors, 4-hydroxyphenyl-pyruvate-dioxygenase (HPPD) inhibitors, mitosis inhibitors, cellulose biosynthesis inhibitors, herbicides with multiple modes-of-action, quinclorac, arylaminopropionic acids, difenzoquat, endothall, or organoarsenicals.

A twenty-seventh embodiment includes methods of controlling undesirable vegetation comprising the step of applying a herbicidally effective amount of at least one mixture according to the fourth embodiment wherein the amount of the mixture is applied at a rate,

A fifty-fifth embodiment includes compositions according to any of the first through third embodiments, wherein (b) is aminopyralid or aminopyralid TIPA.

A fifty-sixth embodiment includes compositions according to any of the first through third embodiments, wherein (b) is clomeprop-P.

A fifty-seventh embodiment includes compositions according to any of the first through third embodiments, wherein (b) is clopyralid or clopyralid MEA.

A fifty-eighth embodiment includes compositions according to any of the first through third embodiments, wherein (b) is dicamba or dicamba DMA.

A fifty-ninth embodiment includes compositions according to any of the first through third embodiments, wherein (b) is dicloprop-P.

A sixtieth embodiment includes compositions according to any of the first through third embodiments, wherein (b) is fluroxypyr or fluroxypyr MHE.

A sixty-first embodiment includes compositions according to any of the first through third embodiments, wherein (b) is MCPA or MCPA EHE.

A sixty-second embodiment includes compositions according to any of the first through third embodiments, wherein (b) is MCPB or MCPB ethyl ester.

A sixty-third embodiment includes compositions according to any of the first through third embodiments, wherein (b) is mecoprop-P.

A sixty-fourth embodiment includes compositions according to any of the first through third embodiments, wherein (b) is picloram or picloram K^+ salt.

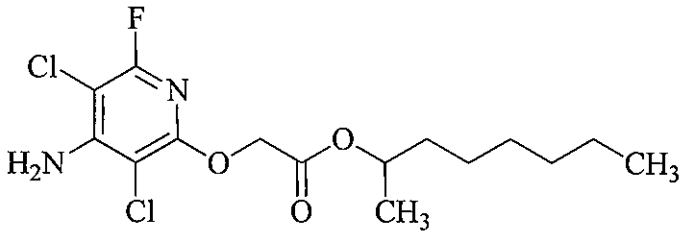
A sixty-fifth embodiment includes compositions according to any of the first through third embodiments, wherein (b) is quinclorac.

A sixty-sixth embodiment includes compositions according to any of the first through third embodiments, wherein (b) is triclopyr, triclopyr TEA, triclopyr choline, or triclopyr BEE.

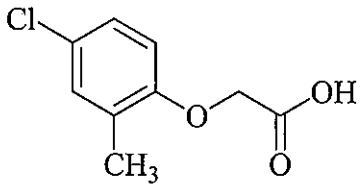
A sixty-seventh embodiment includes compositions according to any of the first through third embodiments, wherein (b) is halauxifen-methyl (methyl 4-amino-3-chloro-6-(4-chloro-2-fluoro-3-methoxyphenyl)picolinate) or its carboxylate potassium salt.

A sixty-eighth embodiment includes methods according to any of the twentieth to fifty-third embodiments, wherein the undesirable vegetation is immature.

Exemplary uses of fluroxypyr is described in *The Pesticide Manual*, Fifteenth Edition, 2009. Exemplary uses of fluroxypyr include its use for post-emergence foliar application to control broadleaf weeds, *e.g.*, in small grain crops, control *Rumex* spp. and *Urtilca dioica* in pastures, and control *Trifolium repens* in amenity grassland. Other exemplary uses include its use to control herbaceous and woody broadleaf weeds, *e.g.*, in orchards and plantation crops, and broadleaf brush, *e.g.*, in conifer forests. Exemplary chemical forms of fluroxypyr include, for example, fluroxypyr MHE, which is 1-methylheptyl 2-[(4-amino-3,5-dichloro-6-fluoro-2-pyridinyl)oxy]acetate and possesses the following structure:



As used herein, MCPA is 2-(4-chloro-2-methylphenoxy)acetic acid and possesses the following structure:



Exemplary uses of MCPA is described in *The Pesticide Manual*, Fifteenth Edition, 2009. Exemplary uses of MCPA include its use for post-emergence control of annual and perennial broadleaf weeds, *e.g.*, in cereals, herbage seed crops, flax, rice vines, peas, potatoes, ~~asparagas~~asparagus, grassland, turf, under fruit trees, and roadside verges and embankments. Other exemplary uses include its use to control broadleaf and woody weeds, *e.g.*, in forestry, as well as aquatic broadleaf weeds. Exemplary chemical forms of MCPA include, for example, MCPA EHE is 2-ethylhexyl 2-(4-chloro-2-methylphenoxy)acetate and possesses the following structure:

