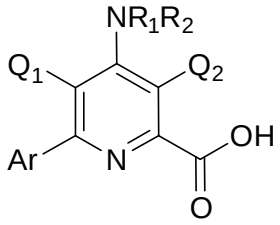
CLAIMS

1. A method for controlling aquatic weeds in a body of water which comprises providing in the body of water a composition comprising a herbicidally effective amount of a compound of formula I



I

wherein

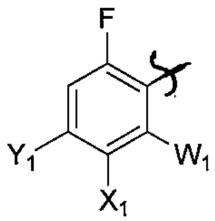
Q_1 represents H or F;

Q_2 represents a halogen with the proviso that when Q_1 is H then Q_2 is Cl or Br;

R_1 and R_2 independently represent H, C_1-C_6 alkyl, C_3-C_6 alkenyl, C_3-C_6 alkynyl, hydroxy, C_1-C_6 alkoxy, amino, C_1-C_6 acyl, C_1-C_6 carboalkoxy, C_1-C_6 alkylcarbamyl, C_1-C_6 alkylsulfonyl, C_1-C_6 trialkylsilyl or C_1-C_6 dialkyl phosphonyl or R_1 and R_2 taken together with N represent a 5- or 6-membered saturated ring; and

Ar represents a polysubstituted aryl group selected from the group consisting of

a)



wherein

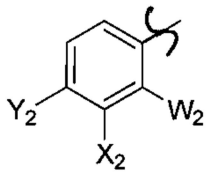
W_1 represents halogen;

X_1 represents F, Cl, C_1-C_4 alkyl, C_1-C_4 alkoxy, C_1-C_4 alkylthio, C_1-C_4 alkylsulfinyl, C_1-C_4 alkylsulfonyl, C_1-C_4 haloalkyl, C_1-C_4 haloalkoxy, C_1-C_4 alkoxy-substituted C_1-C_4 alkyl, C_1-C_4 alkoxy-substituted C_1-C_4 alkoxy, –CN, $–NR_3R_4$ or fluorinated acetyl or propionyl;

Y_1 represents C_1-C_4 alkyl, C_1-C_4 haloalkyl, halogen or –CN, or, when X_1 and Y_1 are taken together, represents $–O(CH_2)_nO–$ wherein n = 1 or 2; and

R_3 and R_4 independently represent H or C_1-C_4 alkyl;

b)



wherein

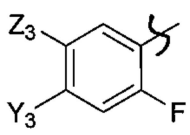
W_2 represents F or Cl;

X_2 represents F, Cl, –CN, $–NO_2$, C_1-C_4 alkyl, C_1-C_4 alkoxy, C_1-C_4 alkylthio, C_1-C_4 alkylsulfinyl, C_1-C_4 alkylsulfonyl, C_1-C_4 haloalkyl, C_1-C_4 haloalkoxy, C_1-C_4 alkoxy-substituted C_1-C_4 alkyl, C_1-C_4 alkoxy-substituted C_1-C_4 alkoxy, $–NR_3R_4$ or fluorinated acetyl or propionyl;

Y_2 represents halogen, C_1-C_4 alkyl, C_1-C_4 haloalkyl or –CN, or, when W_2 represents F, X_2 and Y_2 taken together represent $–O(CH_2)_nO–$ wherein n = 1 or 2; and

R_3 and R_4 independently represent H or C_1-C_6 alkyl; and

c)



wherein

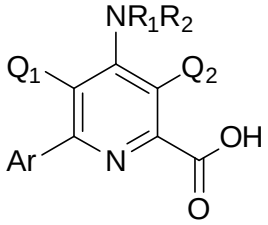
Y_3 represents halogen, –CN or $–CF_3$;

Z_3 represents F, Cl, –CN, $–NO_2$, C_1-C_4 alkyl, C_1-C_4 alkoxy, C_1-C_4 alkylthio, C_1-C_4 alkylsulfinyl, C_1-C_4 alkylsulfonyl, C_1-C_4 haloalkyl, C_1-C_4 haloalkoxy, C_1-C_4 alkoxy-substituted C_1-C_4 alkyl, C_1-C_4 alkoxy-substituted C_1-C_4 alkoxy, $–NR_3R_4$ or fluorinated acetyl or propionyl; and

R_3 and R_4 independently represent H, or C_1-C_6 alkyl;

and agriculturally acceptable derivatives of the carboxylic acid group, and wherein the aquatic weeds include hydrilla, curlyleaf pondweed or Eurasian watermilfoil.

2. The method of claim 1, wherein the compound of formula I



I

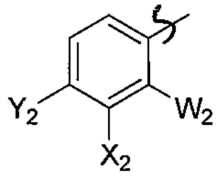
wherein

Q_1 represents H or F;

Q_2 represents a halogen with the proviso that when Q_1 is H then Q_2 is Cl or Br;

R_1 and R_2 independently represent H, C_1-C_6 alkyl, C_3-C_6 alkenyl, C_3-C_6 alkynyl, hydroxy, C_1-C_6 alkoxy, amino, C_1-C_6 acyl, C_1-C_6 carboalkoxy, C_1-C_6 alkylcarbamyl, C_1-C_6 alkylsulfonyl, C_1-C_6 trialkylsilyl or C_1-C_6 dialkyl phosphonyl or R_1 and R_2 taken together with N represent a 5- or 6-membered saturated ring; and

Ar represents a polysubstituted aryl group



wherein

W_2 represents F or Cl;

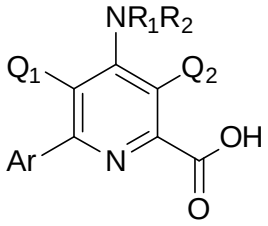
X_2 represents F, Cl, –CN, $–NO_2$, C_1-C_4 alkyl, C_1-C_4 alkoxy, C_1-C_4 alkylthio, C_1-C_4 alkylsulfinyl, C_1-C_4 alkylsulfonyl, C_1-C_4 haloalkyl, C_1-C_4 haloalkoxy, C_1-C_4 alkoxy-substituted C_1-C_4 alkyl, C_1-C_4 alkoxy-substituted C_1-C_4 alkoxy, $–NR_3R_4$ or fluorinated acetyl or propionyl;

Y_2 represents halogen, C_1-C_4 alkyl, C_1-C_4 haloalkyl or –CN, or, when W_2 represents F, X_2 and Y_2 taken together represent $–O(CH_2)_nO–$ wherein n = 1 or 2; and

R_3 and R_4 independently represent H or C_1-C_6 alkyl;

and agriculturally acceptable derivatives of the carboxylic acid group.

3. The method of claim 1, wherein the compound of formula I



I

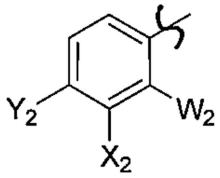
wherein

Q_1 represents H or F;

Q_2 represents Cl;

R_1 and R_2 represent H; and

Ar represents a polysubstituted aryl group



wherein

W_2 represents F;

X_2 represents C_1-C_4 alkoxy;

Y_2 represents Cl;

and agriculturally acceptable derivatives of the carboxylic acid group.

4. The method of any of claims 1-3, wherein the compound of formula I is methyl 4-amino-3-chloro-6-(4-chloro-2-fluoro-3-methoxyphenyl)pyridine-2-carboxylate (halauxifen-methyl).

5. The method of any of claims 1-3, wherein the compound of formula I is benzyl 4-amino-3-chloro-5-fluoro-6-(4-chloro-2-fluoro-3-methoxyphenyl)pyridine-2-carboxylate.

6. The method of any of claims 1-5, wherein the final dilution level of the compound of formula I in the body of water is from about 5 parts-per-billion (ppb) to about 2000 ppb, preferablyfrom about 5 parts-per-billion (ppb) to about 200 ppb.

7. The method of any of claims 1-5, wherein the final dilution level of the compound of formula I in the body of water is less than about 1000 parts-per-billion (ppb), preferably less than about 200 ppb.

8. The method of any of claims 1-7, wherein the compound of formula I is applied in conjunction with one or more other herbicides to control a wider variety of undesirable vegetation.

9. The method of claim 8, wherein the additional herbicide includes one or more herbicides selected from the group consisting of diquat dibromide, copper salts, endothal, flumioxazin, carfentrazone-ethyl, fluridone, topramezone, 2,4-D, 2,4-D choline salt, triclopyr, triclopyr choline salt, penoxsulam, imazamox, bispyribac-sodium, and agriculturally acceptable salts or esters thereof.

10. The method of any of claims 1-9, wherein the aquatic weeds comprise a herbicide resistant or tolerant weed.

11. The method of claim 10, wherein the resistant or tolerant weed is a biotype with resistance or tolerance to single or multiple herbicides or single or multiple chemical classes, or inhibitors of single or multiple herbicide modes-of-action.

12. The method of claim 10 or claim 11, wherein the resistant or tolerant weed is a biotype resistant or tolerant to acetolactate synthase (ALS) or acetohydroxy acid synthase (AHAS) inhibitors, photosystem II inhibitors, acetyl CoA carboxylase (ACCase) inhibitors, photosystem I inhibitors, 5-enolpyruvyl-shikimate-3-phosphate (EPSP) synthase inhibitors, microtubule assembly inhibitors, lipid synthesis inhibitors, protoporphyrinogen oxidase (PPO) inhibitors, carotenoid biosynthesis inhibitors, bleachers, 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.