Abstract: The present invention is directed to new uses of the herbicidal active compound 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I) as foliar herbicide. Furthermore, the present invention is directed to combinations comprising active compound 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I) and to a method for controlling undesired weeds by applying the herbicidal active compound 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I) or combinations comprising compound I to weeds or to the area in which the weeds grow after emergence of the crop.
**New uses of 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone as foliar herbicide**

The present invention is directed to new uses of the herbicidal active compound 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I) as foliar herbicide. Furthermore, the present invention is directed to combinations comprising active compound 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I) and to a method for controlling undesired weeds by applying the herbicidal active compound 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I) or combinations comprising compound I to weeds or to the area in which the weeds grow after emergence of the crop.

It is already known that certain 3-isoxazolidinones, including also the compound of the present invention show a selective herbicidal activity against grass or brassica crops (WO 2012/148689), however only in the form of pre-emergence application of these crops. There is still a need to broaden the applicability of herbicides such as 3-isoxazolidinones, especially for the control of difficult weeds or weeds showing herbicide resistance.

The present invention addresses such need. Surprisingly and unforeseen, it has been found that compound I according to the invention can also be applied as post-emergence application allowing not only root activity but also foliar activity. The present invention therefore provides a new method for controlling undesired weeds or plants by applying compound I as post-emergence application directly to the plants or to the area in which the plants grow. Thus, the present invention is directed to a new use of 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone as foliar herbicide.

Further, it has been found that control of undesired weeds is even more enhanced by adding one or more herbicidal active ingredients as mixing partners to compound I. Thus, the present invention is also directed to a new use and a method for controlling undesired weeds by applying a combination of compound I with at least one further herbicidal active ingredient as post emergence application. This has been found to be especially beneficial for the control of difficult weeds.

Further, spectrum of applicability of compound I or combinations comprising compound I for the control of undesired weeds can even be extended by adding a safener. This has been found to be especially beneficial for the control of difficult weeds by avoiding or, if at all, considerably reducing phytotoxicity to the crops to be protected. Thus, the present invention is directed to new uses of compound I or combinations comprising compound I and at least one safener as foliar herbicide for cereals, corn and rice crops.

The combinations according to the invention comprise 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I) and at least one further herbicidal active ingredient of group IIA: aclonifen, bromoxynil, bromoxynil-butyrate, potassium, heptanoate, and octanoate, benzofenap, butachlor, 2,4-D, 2,4-D-butotyl, butyl, dimethylammonium, diolamino, ethyl, 2-ethylhexyl, isobutyl, isooctyl,

A further aspect of the invention are combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I) and at least one further herbicidal active ingredient of group lib: pendimethalin, propoxycarbazone, halaxifen-methyl, 2-methyl-4-chlorophenoxyacetic acid (MCPA).

A further aspect of the invention are combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I) and at least one further herbicidal active ingredient of group IIa or lib and at least one safener of group III: isoxadifen-ethyl, cyprosulfamide, cloquintocet-mexyl and mefenpyr-diethyl.

A further aspect of the invention are combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I) and at least one safener of group III: isoxadifen-ethyl, cyprosulfamide, cloquintocet-mexyl, and mefenpyr-diethyl.

Herbicidal active ingredients of group IIa/IIb or safeners of group III are known active compounds as they are described in, for example, Weed Research 26, 441-445 (1986), or "The Pesticide Manual", 16th edition, The British Crop Protection Council and the Royal Soc. of Chemistry, 2006, and the literature cited therein.

Definitions

Herbicidal active ingredient (group IIa):

aclonifen, bromoxynil, bromoxynil-butrate, -potassium, -heptanoate, and -octanoate, benzofenap, butachlor, 2,4-D, 2,4-D-butotyl, -butyl, -dimethlammonium, -diolamin, -ethyl, -2-ethylhexyl, -isobutyl, -isoctyl, -isopropylammonium, -potassium, -triisopropanolammonium, and -trolamine, diflufenican, dimethenamid, ethoxysulfuron, fenoxaprop, fenoxaprop-P, fenoxaprop-ethyl, fenoxaprop-P-ethyl, fenquinotrine, fentrazamide, florasulam, flufenacet, fluroxypyr, fluroxypyr-meptyl, foramsulfuron, iodosulfuron, iodosulfuron-methyl-sodium, isoproturon, isoxaflutole, mfenacet, mesosulfuron, mesosulfuron-methyl, metolachlor, S-metolachlor, metribuzin, metosulam, nicosulfuron, oxadiargyl, oxadiazon, pethoxamid, prosulfocarb, pyrasulfotole, pyroxsulam, tefuryltrione, tembotrione, thiencarbazone, thiencarbazone-methyl, and triafoxamone.

Herbicidal active ingredient (group lib):
pendimethalin, propoxycarbazone, halauxifen-methyl, 2-methyl-4-chlorophenoxyacetic acid (MCPA).

Safeners:

51) Compounds of the group of heterocyclic carboxylic acid derivatives:

S1a) Compounds of the type of dichlorophenylpyrazoline-3-carboxylic acid (S1a), preferably compounds such as 1-(2,4-dichlorophenyl)-5-(ethoxycarbonyl)-5-methyl-2-pyrazoline-3-carboxylic acid, ethyl 1-(2,4-dichlorophenyl)-5-(ethoxycarbonyl)-5-methyl-2-pyrazoline-3-carboxylate (S1-1) ("mefenpyr(-diethyl)"), and related compounds, as described in WO-A-91/07874;

S1b) Derivatives of dichlorophenylpyrazolecarboxylic acid (S1b), preferably compounds such as ethyl 1-(2,4-dichlorophenyl)-5-methylpyrazole-3-carboxylate (S1-2), ethyl 1-(2,4-dichlorophenyl)-5-isopropylpyrazole-3-carboxylate (S1-3), ethyl 1-(2,4-dichlorophenyl)-5-(1,1-dimethylethyl)pyrazole-3-carboxylate (S1-4) and related compounds, as described, for example, in EP-A-333 131 and EP-A-269 806;

S1c) Derivatives of 1,5-diphenylpyrazole-3-carboxylic acid (S1c), preferably compounds such as ethyl 1-(2,4-dichlorophenyl)-5-phenylpyrazole-3-carboxylate (S1-5), methyl 1-(2-chlorophenyl)-5-phenylpyrazole-3-carboxylate (S1-6) and related compounds, as described, for example, in EP-A-268554;

S1d) Compounds of the type of triazolocarboxylic acids (S1d), preferably compounds such as fenchlorazole(ethyl), i.e. ethyl 1-(2,4-dichlorophenyl)-5-trichloromethyl-(1H)-1,2,4-triazole-3-carboxylate (S1-7), and related compounds, as described in EP-A-174 562 and EP-A-346 620;

S1e) Compounds of the type of 5-benzyl- or 5-phenyl-2-isoxazoline-3-carboxylic acid or 5,5-diphenyl-2-isoxazoline-3-carboxylic acid (S1e), preferably compounds such as ethyl 5-(2,4-dichlorobenzyl)-2-isoxazoline-3-carboxylate (S1-8) or ethyl 5-phenyl-2-isoxazoline-3-carboxylate (S1-9) and related compounds, as described in WO-A-91/08202, or 5,5-diphenyl-2-isoxazolinecarboxylic acid (S1-10) or ethyl 5,5-diphenyl-2-isoxazolinecarboxylate (S1-11) ("isoxadifen-ethyl") or n-propyl 5,5-diphenyl-2-isoxazolinecarboxylate (S1-12) or ethyl 5-(4-fluorophenyl)-5-phenyl-2-isoxazoline-3-carboxylate (S1-13), as described in the patent application WO-A-95/07897.

52) Compounds of the group of 8-quinolinoxy derivatives (S2):

S2a) Compounds of the type of 8-quinolinoxyacetic acid (S2a), preferably 1-methylhexyl (5-chloro-8-quinolinoxy)acetate (common name "cloquintocet-mexyl" (S2-1), 1,3-dimethyl-but-1-yl (5-chloro-8-quinolinoxy)acetate (S2-2), 4-allyloxybutyl (5-chloro-8-quinolinoxy)acetate (S2-3),
1-allyloxyprop-2-yl (5-chloro-8-quinolinoxy)acetate (S2-4),
ethyl (5-chloro-8-quinolinoxy)acetate (S2-5),
methyl (5-chloro-8-quinolinoxy)acetate (S2-6),
allyl (5-chloro-8-quinolinoxy)acetate (S2-7),
2-(2-propylideneiminoxy)-1-ethyl (5-chloro-8-quinolinoxy)acetate (S2-8),
2-oxo-prop-1-yl (5-chloro-8-quinolinoxy)acetate (S2-9) and related compounds, as described in

Compounds of the type of (5-chloro-8-quinolinoxy)malonic acid (S2b), preferably compounds such as diethyl (5-chloro-8-quinolinoxy)malonate, diallyl (5-chloro-8-quinolinoxy)malonate, methyl ethyl (5-chloro-8-quinolinoxy)malonate and related compounds, as described in EP-A-0 582 198.

Active compounds of the type of dichloroacetamides (S3) which are frequently used as pre-emergence safeners (soil-acting safeners), such as, for example,
"dichlormid" (N,N-diallyl-2,2-dichloroacetamide) (S3-1),
"R-29148" (3-dichloroacetyl-2,2,5-trimethyl-1,3-oxazolidine) (S3-2),
"R-28725" (3-dichloroacetyl-2,2-dimethyl-1,3-oxazolidine) (S3-3),
"benoxacor" (4-dichloroacetyl-3,4-dihydro-3-methyl-2H-1,4-benzoazine) (S3-4),
"PPG-1292" (N-allyl-N-[(1,3-dioxolan-2-yl)methyl]dichloroacetamide) (S3 5),
"DKA-24" (N-allyl-N-[(allyaminocarbonyl)methyl]dichloroacetamide) (S3-6),
"AD-67" or "MON 4660" (3-dichloroacetyl-1-oxa-3-aza-spiro[4,5]decane) (S3-7),
"TI-35" (1-dichloroacetylazepane) (S3-8)
"diclolon" (dicyclonon) (S3-9)
((RS)-1-dichloroacetyl-3,3,8a-trimethylperhydropyrrole [1,2-a]pyrimidin-6-one),
furilazole or "MON 13900" ((RS)-3-dichloroacetyl-5-(2-furyl)-2,2-dimethyloxazolidine) (S3-10), and also its (R)-isomer (S3-11).

Compounds of the class of acylsulphonamides (S4):

N-acylsulphonamides of the formula (S4a) and salts thereof, as described in WO-A-97/45016

in which
RA1 is (C6-C6)-alkyl, (C3-C6)-cycloalkyl, where the two last-mentioned radicals are substituted by V substituents from the group consisting of halogen, (C4-C6)-alkoxy, halo-(C6-C6)-alkoxy and (C3-C6)-alkylthio and, in the case of cyclic radicals, also (C4-C6)-alkyl and (C6-C6)-haloalkyl;

RA2 is halogen, (C6-C4)-alkyl, (C6-C4)-alkoxy, CF3;

MA is 1 or 2;

VD is 0, 1, 2 or 3;

S4b) Compounds of the type of 4-(benzoylsulphamoyl)benzamides of the formula (S4b) and salts thereof, as described in WO-A-99/16744,

\[
\text{(S4b)}
\]

in which

RB1, RB2 independently of one another are hydrogen, (C6-C6)-alkyl, (C3-C6)-cycloalkyl, (C3-C6)-alkenyl, (C3-C6)-alkynyl,

RB3 is halogen, (C6-C4)-alkyl, (C6-C4)-haloalkyl or (C4)-alkoxy,

mB is 1 or 2;

for example those in which

RB1 = cyclopropyl, RB2 = hydrogen and (RB3) = 2-OMe ("cyprosulfamide", S4-1),

RB1 = cyclopropyl, RB2 = hydrogen and (RB3) = 5-Cl-2-OMe (S4-2),

RB1 = ethyl, RB2 = hydrogen and (RB3) = 2-OMe (S4-3),

RB1 = isopropyl, RB2 = hydrogen and (RB3) = 5-Cl-2-OMe (S4-4) and

RB1 = isopropyl, RB2 = hydrogen and (RB3) = 2-OMe (S4-5);

S4c) Compounds of the class of benzoylsulphamoylphenylureas of the formula (S4c) as described in EP-A-365484,
in which

\[ \text{Rc}^1, \text{Rc}^2 \text{ independently of one another are hydrogen, (Ci-C}_8\text{-alkyl, (C}_3\text{-C}_8\text{-cycloalkyl, (C}_3\text{C}_0\text{-alkenyl, (C}_3\text{C}_6\text{-alkynyl,} \]

\[ \text{Rc}^3 \text{ is halogen, (Ci-C}_4\text{-alkyl, (Ci-C}_4\text{-alkoxy, CF}_3, \]

nic \text{ is 1 or 2;}

for example

1-[4-(N-2-methoxybenzoylsulphamoyl)phenyl]-3-methylurea,
1-[4-(N-2-methoxybenzoylsulphamoyl)phenyl]-3,3-dimethylurea,

1-4-(N-4,5-dimethylbenzoylsulphamoyl)phenyl] -3-methylurea ;

S4\text{)} Compounds of the type of N-phenylsulphonylterephthalamides of the formula (S4\text{)} and salts thereof, which are known, for example, from CN 101838227,

in which

\[ \text{Rd}^4 \text{ is halogen, (Ci-C}_4\text{-alkyl, (Ci-C}_4\text{-alkoxy, CF}_3; \]

mD \text{ is 1 or 2;}

\[ \text{Rd}^5 \text{ is hydrogen, (Ci-C}_6\text{-alkyl, (C}_3\text{-C}_6\text{-cycloalkyl, (C}_2\text{C}_6\text{-alkenyl, (C}_2\text{C}_6\text{-alkynyl, (C}_5\text{-c}_0\text{-cycloalkenyl.} \]

S5) Active compounds from the class of hydroxyaromatics and aromatic-aliphatic carboxylic acid derivatives (S5), for example ethyl 3,4,5-triacetoxybenzoate, 3,5-dimethoxy-4-hydroxybenzoic acid, 3,5-dihydroxybenzoic acid, 4-hydroxysalicylic acid, 4-fluorosalicyclic acid, 2-hydroxycinnamic acid, 2,4-dichlorocinnamic acid, as described in WO-A-2004/08463 1, WO-A-2005/015994, WO-A-2005/016001.
56) Active compounds from the class of 1,2-dihydroquinoxalin-2-ones (S6), for example 1-methyl-3-(2-thienyl)-1,2-dihydroquinoxalin-2-one, 1-methyl-3-(2-thienyl)-1,2-dihydroquinoxaline-2-thione, 1-(2-aminoethyl)-3-(2-thienyl)-1,2-dihydroquinoxalin-2-one hydrochloride, 1-(2-methylsulphonylaminoethyl)-3-(2-thienyl)-1,2-dihydroquinoxalin-2-one, as described in WO-A-2005/112630.

57) Compounds from the class of diphenylmethoxyacetic acid derivatives (S7), for example methyl diphenylmethoxyacetate (CAS-Reg.Nr. 41858-19-9) (S7-1), ethyl diphenylmethoxy acetate, or diphenylmethoxyacetic acid, as described in WO-A-98/38856.

S8) Compounds of the formula (S8), as described in WO-A-98/27049,

\[
(R_D^1)_n D
\]

where the symbols and indices have the following meanings:

- \( R_D^1 \) is halogen, (Ci-C₅)-alkyl, (Ci-C₅)-haloalkyl, (Ci-C₅)-alkoxy, (Ci-C₅)-haloalkoxy,
- \( R_D^2 \) is hydrogen or (Ci-C₅)-alkyl,
- \( R_D^3 \) is hydrogen, (Ci-Cs)-alkyl, (C₂-C₄)-alkenyl, (C₂-C₄)-alkynyl or aryl, where each of the carbon-containing radicals mentioned above is unsubstituted or substituted by one or more, preferably by up to three, identical or different radicals from the group consisting of halogen and alkoxy; or salts thereof.

\( n_D \) is an integer from 0 to 2.

S9) Active compounds from the class of 3-(5-tetrazolylcarbonyl)-2-quinolones (S9), for example 1,2-dihydro-4-hydroxy-1-ethyl-3-(5-tetrazolylcarbonyl)-2-quinolone (CAS Reg. No.: 219479-18-2), 1,2-dihydro-4-hydroxy-1-methyl-3-(5-tetrazolylcarbonyl)-2-quinolone (CAS Reg. No.: 95855-00-8), as described in WO-A-1999/00020.

in which

\[
R_{E1} \text{ is halogen, } (Ci-G_i)-\text{alkyl, methoxy, nitro, cyano, CF}_3, \text{OCF}_3 \\
Y_E, Z_E \text{ independently of one another are O or S,} \\
n_E \text{ is an integer from 0 to 4,} \\
R_{E2} \text{ is } (Ci-Ci6)-\text{alkyl, } (C2-Ce)-\text{alkenyl, } (C3-C6)-\text{cycloalkyl, aryl; benzyl, halobenzyl,} \\
R_{E3} \text{ is hydrogen or } (Ci-C6)-\text{alkyl.}
\]

511) Active compounds of the type of oxyimino compounds (S1 1), which are known as seed dressings, such as, for example, "oxabetrinil" ((Z)-1,3-dioxolan-2-ylmethoxyimino-(phenyl)acetonitrile) (S1 1-1), which is known as seed dressing safener for millet against metolachlor damage,

"fluxofenim" (1-(4-chlorophenyl)-2,2,2-trifluoro-1-ethanone 0-(1,3-dioxolan-2-ylmethyl)oxime) (S1 1-2), which is known as seed dressing safener for millet against metolachlor damage, and

"cyometrinil" or "CGA-43089" ((Z)-cyanomethoxyimino(phenyl)acetonitrile) (S1 1-3), which is known as seed dressing safener for millet against metolachlor damage.

512) Active compounds from the class of isothiochromanones (S12), such as, for example, methyl [(3-oxo-lH-2-benzothiopyran-4(3H)-ylidene)methoxy]acetate (CAS Reg. No.: 205121-04-6) (S12-1) and related compounds from WO-A-1998/13361.

513) One or more compounds from group (S1 3):

"naphthalic anhydrid" (1,8-naphthalenedicarboxylic anhydride) (S13-1), which is known as seed dressing safener for corn against thiocarbamate herbicide damage,

"fenclorim" (4,6-dichloro-2-phenylpyrimidine) (S13-2), which is known as safener for pretilachlor in sown rice,
"flurazole" (benzyl 2-chloro-4-trifluoromethyl-1,3-thiazole-5-carboxylate) (S13-3), which is known as seed dressing safener for millet against alachlor and metolachlor damage,

"CL 304415" (CAS Reg. No.: 31541-57-8) (4-carboxy-3,4-dihydro-2H-1-benzopyran-4-acetic acid) (SI 3-4) from American Cyanamid, which is known as safener for corn against imidazolinone damage,

"MG 191" (CAS Reg. No.: 96420-72-3) (2-dichloromethyl-2-methyl-1,3-dioxolane) (S13-5) which is known as safener for corn,

"MG 838" (CAS Reg. No.: 133993-74-5) (2-propenyl 1-oxa-4-azaspiro[4.5]decane-4-carbodithioate) (S13-6),

"disulphoton" (0,0-diethyl S-2-ethythioethyl phosphorodithioate) (SI 3-7),

"dietholate" (O,O-diethyl O-phenyl phosphorothioate) (S13-8),

"mephenate" (4-chlorophenyl methylcarbamate) (SI 3-9).

Active compounds which, besides a herbicidal effect against harmful plants, also have a safener effect on crop plants such as rice, such as, for example, "dimepiperate" or "MY 93" (5-1-methyl-1-phenylethyl piperidine-1-carbothioate), which is known as safener for rice against molinate herbicide damage,

"daimuron" or "SK 23" (1-(1-methyl-1-phenylethyl)-3-p-tolylurea), which is known as safener for rice against imazosulphuron herbicide damage,

"cumyluron" = "JC 940" (3-(2-chlorophenylmethyl)-1-(1-methyl-1-phenylethyl)urea, see JP-A-60087254), which is known as safener for rice against some herbicide damage,

"methoxyphenone" or "NK 049" (3,3'-dimethyl-4-methoxybenzophenone), which is known as safener for rice against some herbicide damage,

"CSB" (1-bromo-4-(chloromethylsulphonyl)benzene) from Kumiai (CAS Reg. No. 54091-06-4), which is known as safener against some herbicide damage in rice.

Compounds of the formula (SI 5) or its tautomers,
as described in WO-A-2008/131861 and WO-A-2008/131860,

in which

\[ R_{II}^1 \] is \((\text{Ci-C}_6)\)-haloalkyl,

\[ R_{II}^2 \] is hydrogen or halogen,

5 \[ R_{II}^3, R_{II}^4 \] independently of one another are hydrogen, \((\text{Ci-Ci6})\)-alkyl, \((\text{C}_2\text{-Ci6})\)-alkenyl or \((\text{C}_2\text{-C}_{16})\)-alkynyl,

where each of the 3 last-mentioned radicals is unsubstituted or substituted by one or more radicals from the group consisting of halogen, hydroxy, cyano, \((\text{Ci-C}_4)\)-alkoxy, \((\text{Ci-C}_4)\)-haloalkoxy, \((\text{Ci-C}_4)\)-alkylthio, \((\text{Ci-C}_4)\)-alkylamino, \(\text{di-[(Ci-C4)-alkyl]-amino}\), \(\text{[(Ci-C4)-alkoxy]-carbonyl}\), \(\text{[(Ci-C4)-haloalkoxy]-carbonyl}\), unsubstituted or substituted \((\text{C}_3\text{-C}_6)\)-cycloalkyl, unsubstituted or substituted phenyl, and unsubstituted or substituted heterocyclyl;

or \((\text{C}_3\text{-C}_6)\)-cycloalkynyl, \((\text{C}_4\text{-C}_6)\)-cycloalkenyl, \((\text{C}_3\text{-C}_6)\)-cycloalkyl which is at one site of the ring condensed with a 4 to 6-membered saturated or unsaturated carbocyclic ring, or \((\text{C}_4\text{-C}_6)\)-cycloalkenyl which is at one site of the ring condensed with a 4 to 6-membered saturated or unsaturated carbocyclic ring,

where each of the 4 last-mentioned radicals is unsubstituted or substituted by one or more radicals from the group consisting of halogen, hydroxy, cyano, \((\text{Ci-C4})\)-alkyl, \((\text{Ci-C}_4)\)-haloalkyl, \((\text{Ci-C}_4)\)-alkoxy, \((\text{Ci-C}_4)\)-haloalkoxy, \((\text{Ci-C}_4)\)-alkylthio, \((\text{Ci-C}_4)\)-alkylamino, \(\text{di-(Ci-C4)-alkyl]-amino}\), \(\text{[(Ci-C4)-alkoxy]-carbonyl}\), \(\text{[(Ci-C4)-haloalkoxy]-carbonyl}\), unsubstituted or substituted \((\text{C}_3\text{-C}_6)\)-cycloalkyl, unsubstituted or substituted phenyl, and unsubstituted or substituted heterocyclyl; or

\[ R_{II}^3 \] is \((\text{Ci-C4})\)-alkoxy, \((\text{C}_2\text{-C}_4)\)-alkenyl, \((\text{C}_2\text{-Ce})\)-alkynyl or \((\text{C}_2\text{-C}_4)\)-haloalkoxy, and

\[ R_{II}^4 \] is hydrogen or \((\text{Ci-C4})\)-alkyl, or

25 \[ R_{II}^3 \text{ and } R_{II}^4 \text{ together with the directly bound N-atom are a 4 to 8-membered heterocyclic ring, which can contain further hetero ring atoms besides the N-atom, preferably up to two further hetero ring atoms from the group consisting of } \text{N, O and S}, \text{ and which is unsubstituted or substituted by one or more radicals from the group consisting of halogen, cyano, nitro, } \text{(Ci-C4)-alkyl}, \text{(Ci-C}_4)\)-haloalkyl, \text{(Ci-C}_4)\)-alkoxy, \text{(Ci-C}_4)\)-haloalkoxy, \text{and } \text{(Ci-C}_4)\)-alkylthio.\]
Safeners (group III):

Isoxadifen-ethyl, cyprosulfamide, mefenpyr-diethyl and cloquintocet-mexyl including its hydrates and salts, for example its lithium, sodium, potassium, calcium, magnesium, aluminium, iron, ammonium, quaternary ammonium, sulphonium or phosphonium salts.

Preference is also given to the use as post-emergence application of combinations comprising compound (I) and optionally one further active ingredient of group Ilia and one safener of group III whereas the safener is Mefenpyr-diethyl.

Preference is also given to the use as post-emergence application of combinations comprising compound (I) and optionally one further active ingredient of group Ilia and one safener of group III whereas the safener is Isoxadifen-ethyl.

Preference is also given to the use as post-emergence application of combinations comprising compound (I) and optionally one further active ingredient of group Ilia and one safener of group III whereas the safener is Cyprosulfamide.

Further preference is given to the use as post-emergence application of combinations according to the invention comprising compound (I) and at least one further herbicidal active ingredient of group Iliaa: aclonifen, bromoxynil, bromoxynil-butylrate, -potassium, -heptanoate, and -octanoate, butachlor, diflufenican, dimethenamid, ethoxysulfuron, fenoxaprop, fenoxaprop-P, fenoxaprop-ethyl, fenoxaprop-P-ethyl, fenquinotrione, fentrazamide, florasulam, flufenacet, fluroxypyr, fluroxypr-mephtl, foramsulfuron, iodosulfuron, iodosulfuron-methyl-sodium, isoproturon, isozaflotole, mesosulfuron, mesosulfuron-methyl, metolachlor, S-metolachlor, metribuzin, metosulam, nicosulfuron, pethoxamid, prosulfocarb, pyrasulfotole, pyroxsulam, tefurylitrione, tembotrine, thiencarbazone, thiencarbazone-methyl, and triafamone.

Even further preference is given to the use as post-emergence application of combinations according to the invention comprising compound (I) and at least one further herbicidal active ingredient of group Iliaaa: aclonifen, bromoxynil, bromoxynil-butylrate, -potassium, -heptanoate, and -octanoate, diflufenican, ethoxysulfuron, fenoxaprop, fenoxaprop-P, fenoxaprop-ethyl, fenoxaprop-P-ethyl, florasulam, fluroxypyr, fluroxypr-mephtl, foramsulfuron, iodosulfuron, iodosulfuron-methyl-sodium, mesosulfuron, mesosulfuron-methyl, metribuzin, metosulam, nicosulfuron, tefurylitrione, tembotrine, thiencarbazone, thiencarbazone-methyl, and triafamone.
mesosulfuron, mesosulfuron-methyl, metribuzin, metosulam, nicosulfuron, tefuryltrione, tembotrione,
thiencarbazone, thiencarbazone-methyl, triafamone and one safener of group III: Isoxadifen-ethyl, Cyprosulfamide, Mefenpyr-diethyl and cloquintocet-mexyl.

Preferred are combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone
(compound I) and Mefenpyr-diethyl.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone
(compound I) and flufenacet.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone
(compound I) and prosulfocarb.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone
(compound I) and pendimethalin.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone
(compound I) and diflufenican.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone
(compound I) and aclonifen.

Preferred is also a combination comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone
(compound I) and metribuzin.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone
(compound I) and propoxycarbazone.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone
(compound I) and thiencarbazone-methyl.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone
(compound I) and fenoxaprop.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone
(compound I) and bromoxynil.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone
(compound I) and halaxifen-methyl.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone
(compound I) and 2,4-D.
Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I) and 2-methyl-4-chlorophenoxyacetic acid.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), flufenacet and at least one safener of group III.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), proslufocarb and at least one safener of group III.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), pendimethalin and at least one safener of group III.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), diflufenican and at least one safener of group III.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), aclonifen and at least one safener of group III.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), metribuzin and at least one safener of group III.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), propoxycarbazone and at least one safener of group III.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), thiencarbazone-methyl and at least one safener of group III.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), fenoxaprop and at least one safener of group III.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), bromoxynil and at least one safener of group III.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), halaxifen-methyl and at least one safener of group III.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), 2,4-D and at least one safener of group III.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), 2-methyl-4-chlorophenoxyacetic acid and at least one safener of group III.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), flufenacet and pethoxamid.
Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), flufenacet and aclonifen.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), flufenacet and diflufenican.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), aclonifen and diflufenican.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), flufenacet and metribuzin.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), flufenacet and halaxifen-methyl.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), prosulfocarb and diflufenican.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), prosulfocarb and aclonifen.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), prosulfocarb and metribuzin.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), prosulfocarb and flufenacet.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), prosulfocarb and halaxifen-methyl.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), pendimethalin and diflufenican.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), pendimethalin and aclonifen.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), pendimethalin and metribuzin.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), pendimethalin and halaxifen-methyl.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), metribuzin and diflufenican.
Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), halaxifien-methyl and diflufenican.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), metribuzin and aclonifen.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), flufenacet and a at least one safener of group III.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), aclonifen and diflufenican and at least one safener of group III.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), aclonifen and at least one safener of group III.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), flufenacet, aclonifen and at least one safener of group III.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), flufenacet, metribuzin and at least one safener of group III.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), prosulfocarb, diflufenican and at least one safener of group III.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), prosulfocarb, aclonifen and at least one safener of group III.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), prosulfocarb, metribuzin and at least one safener of group III.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), prosulfocarb, flufenacet and at least one safener of group III.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), pendimethalin, diflufenican and at least one safener of group III.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), pendimethalin, aclonifen and at least one safener of group III.
Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), pendimethalin, metribuzin and at least one safener of group III.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), pendimethalin, halaxifen-methyl and at least one safener of group III.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), metribuzin, diflufenican and at least one safener of group III.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), halaxifen-methyl, diflufenican and at least one safener of group III.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), metribuzin, aclonifen and at least one safener of group III.

Preferred are also combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), halaxifen-methyl, aclonifen and at least one safener of group III.

The use of compound I or of the combinations according to the invention provides for excellent herbicidal effectiveness against a broad spectrum of economically important mono- and dicotyledonous annual weeds. Difficult-to-control perennial weeds which produce shoots from rhizomes, root stocks or other perennial organs are also well controlled by compound I or the combinations according to the invention.

The present invention therefore provides a method for controlling undesired plants or for regulating the growth of plants, preferably in plant crops, in which the compound I or the combinations according to the invention are applied to the plants (e.g. mono- or dicotyledonous weeds or undesired crop plants) or the area on which the plants grow. The compound I or the combinations according to the invention can be applied at different growth stages (GS) of the emerging plant allowing broadening of the applicability of the compound I or the combinations according to the invention, and providing for an efficient method of controlling undesired weeds or plants at different growth stages. The compound I or the combinations according to the invention can also be applied to the seed material (e.g. grains, seeds or vegetative propagation organs such as tubers or shoot parts with buds), e.g. in the pre-sowing method (optionally also through incorporation into the soil), or the area on which the plants grow (e.g. the area under cultivation), also as pre-emergence method. The present invention extends the applicability of compound I or the combinations according to the invention to post-emergence methods, naming without limitation early-post-emergence and mid- to late-post-emergence-periods.

Specifically, examples which may be mentioned are some of the representatives of mono- and dicotyledonous weed flora which can be controlled by the compound I or the combinations according to the invention, without a limitation to certain species being intended through the naming.


If the compound I or the combinations according to the invention are applied to the soil’s surface prior to germination, then either the weed seedlings are prevented completely from emerging, or the weeds grow until they have reached the seed-leaf stage, but then their growth stops and finally, after three to four weeks have elapsed, they die completely.

For the new use as post-emergence application of the compound I or the combinations according to the invention to the green parts of the plants, growth likewise stops following treatment and the harmful plants remain at the growth stage at the time of application, or they die completely after a certain time, so that in this manner competition by the weeds, which is harmful to the crop plants, is eliminated very early on and in a lasting manner.

The compound I or combinations according to the invention can thus effectively be applied as post-emergence application for controlling undesired weed plant growth, preferably in crops such as cereals, maize, and rice. Combinations according to the invention comprising the safener Isoxadifen-ethyl can preferably be applied as post-emergence application in maize and rice; combinations according to the invention comprising the safener Mefenpyr-diethyl can preferably be applied as post-emergence application in cereals, naming without limitation wheat, rye, triticale, barley; and combinations according to the invention comprising the safener Cyprosulfamide or Isoxadifen-ethyl can preferably be applied as post-emergence application in maize.

Combinations according to the invention not only can beneficially be applied as post-emergence application, they surprisingly show also synergistic effects towards unwanted weed plants.

Moreover, compound I or the combinations according to the invention, depending on their particular structure and the application rate applied, have excellent growth regulatory properties in respect of crop plants. They intervene in a plant's metabolism in a regulatory fashion and can thus be used for the targeted influencing of plant ingredients and for facilitating harvesting, such as, for example, by
triggering desiccation and stunted growth. Moreover, they are also suitable for generally controlling and inhibiting unwanted vegetative growth without destroying the plants in the process. Inhibiting the vegetative growth plays a large role in many monocotyledonous and dicotyledonous crops, allowing lodging to be reduced or prevented completely.

On account of their herbicidal and plant growth regulatory properties, the compound I or the combinations according to the invention can also be used for controlling harmful weeds in crops of genetically modified plants or in crops of plants being modified by conventional mutagenesis. As a rule, the transgenic plants are distinguished by particularly advantageous properties, for example by resistances to certain pesticides, primarily certain herbicides, resistances to plant diseases/pathogens or insects or microorganisms such as fungi, bacteria or viruses. Other particular properties relate, for example, to the harvested material with respect to quantity, quality, storability, composition and specific ingredients. Preference is given to using the compound I or the combinations according to the invention as post-emergence application in economically important crops of useful plants, for example of cereals such as wheat, barley, rye, oats, millet, rice, and maize.

Preferably, compound I or the combinations according to the invention can be used as herbicides in crops of useful plants which are resistant to, or have been rendered genetically resistant to, the phytotoxic effects of the herbicides.

Combinations or compositions according to the invention may comprise or else be used together with further components, examples being active crop protection ingredients of other kinds and/or adjuvants customary in crop protection and/or formulating auxiliaries. Combinations or compositions according to the invention can be produced by known methods, for example as mixed formulations of the individual components, optionally with further active ingredients, adjuvants and/or customary formulation assistants.

In the combinations or compositions of the invention, the application rate of compound I is customarily 10 to 500 g of active ingredient (a. i.) per hectare, preferably 25 to 250 g a. i./ha, especially preferably 50 to 200 g a. i./ha. The application rate of the further active ingredient of group Ila is customarily 2.5 to 2400 g of active ingredient per hectare, preferably 5 to 1000 g a. i./ha, especially preferably 5 to 500 g a. i./ha. At certain concentration ratios, the synergistic effect of the herbicidal compositions of the invention is particularly pronounced. However, the weight ratios of individual components can be varied within relatively wide ranges. Generally speaking, there are 1:240 to 200:1 parts by weight, preferably 1:40 to 50:1 parts by weight, especially preferably 1:10 to 40:1 of component I per part by weight of component of group Ila.

The application rate of a safener of group III is customarily 5 to 2500 g of active ingredient per hectare, preferably 5 to 1000 g a. i./ha, especially preferably 10 to 200 g a. i./ha. At certain concentration ratios, the antagonistic effect (safening) of the herbicide/safener compositions of the invention related to the
crops is particularly pronounced. However, the weight ratios of individual components can be varied within relatively wide ranges. Generally speaking, there are 1:250 to 100:1 parts by weight, preferably 1:40 to 50:1 parts by weight, especially preferably 1:4 to 20:1 of component I per part by weight of the safener of group III.

In the combinations or compositions of the invention, the application rate of compound I is customarily 10 to 500 g of active ingredient (a. i.) per hectare, preferably 25 to 350 g a. i./ha, especially preferably 50 to 300 g a. i./ha. The application rate of the further active ingredient of group IIa/IIb is customarily 2 to 2400 g of active ingredient per hectare, preferably 3 to 2000 g a. i./ha, especially preferably 3 to 1500 g a. i./ha. At certain concentration ratios, the synergistic effect of the herbicidal compositions of the invention is particularly pronounced. However, the weight ratios of individual components can be varied within relatively wide ranges. Generally speaking, there are 1:240 to 200:1 parts by weight, preferably 1:40 to 50:1 parts by weight, especially preferably 1:10 to 40:1 of component I per part by weight of component of group IIa/IIb.

The application rate of a safener of group III is customarily 5 to 2500 g of active ingredient per hectare, preferably 5 to 1000 g a. i./ha, especially preferably 10 to 400 g a. i./ha. At certain concentration ratios, the antagonistic effect (= safening) of the herbicide/safener compositions of the invention related to the crops is particularly pronounced. However, the weight ratios of individual components can be varied within relatively wide ranges. Generally speaking, there are 1:250 to 100:1 parts by weight, preferably 1:40 to 50:1 parts by weight, especially preferably 1:4 to 20:1 of component I per part by weight of the safener of group III.
Examples

Herbicidal Effect and Crop Plant Compatibility Post-Emergence

The experiments were conducted as post applied field trials with plot sizes of 11.25-15 qm, an application volume of 250-300 liter water per hectare and two to three repetitions. Seeds of different crops and various monocot and dicot weeds were either sown or the monocot and dicot weeds were grown naturally and established under common field conditions. The application rates of the herbicidal active ingredients when used alone or in combinations are given in the tables below. Applications were done at different growth stages (GS) as indicated in the tables below. The evaluation 13-46 days after application was assessed visually. Treated plants were compared to untreated plants (0-100% scale). The results (as a mean of 2 to 3 replicates) are reported in the tables below. In the tables below, GS (growth stage) corresponds to BBCH-code (see for reference Lancashire, P.D.; H. Bleiholder; P. Langeluddecke; R. Stauss; T. van den Boom; E. Weber; A. Witzen-Berger (1991). "A uniform decimal code for growth stages of crops and weeds"; Ann. Appl. Biol. 119 (3): 561-601; or Witzenberger, A.; H. Hack; T. van den Boom (1989): "Erlauterungen zum BBCH-Decimal-Code für die Entwicklungsstadien des Getreides - mit Abbildungen". Gesunde Pflanzen 41: 384-388; or Zadoks, J.C., Chang, T. T. & Konzak, C. F. (1974): A decimal code for the growth stages of cereals. Weed Research 14, 415421)

The generated values from applications alone and in combination were used to evaluate the combinatorial effects according to S.R. Colby, Weeds 15, pages 20 to 22 (1967).

The abbreviations have the following meaning:

\[ \begin{align*}
\text{a.i.} & \quad = \text{active ingredient} \\
E & \quad = \text{Observed combination effect value} \\
EC & \quad = \text{Calculated combination effect value according to Colby (EC} = \text{A+B} - \text{AXB/100}) \\
\text{Diff:} & \quad = \text{Difference (\%) between observed and expected combination effect value (\%)} \\
& \quad \quad \quad \text{(observed minus expected value)}
\end{align*} \]

Evaluation of effects:

\[ \begin{align*}
- E > EC: & \quad \rightarrow \text{Synergism (+ Diff.)} \\
- E = EC: & \quad \rightarrow \text{Additive effect} \\
- E < EC: & \quad \rightarrow \text{Antagonism (- Diff.)}
\end{align*} \]

The results are given in the following tables.
Table 1: Post emergence application GS30, field trial

<table>
<thead>
<tr>
<th>Compound</th>
<th>Dosage [g a.i./ha]</th>
<th>Efficacy/selectivity [%] against Triticum aestivum</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMPOUND I</td>
<td>200</td>
<td>30</td>
</tr>
<tr>
<td>COMPOUND I + mefenpyr-diethyl</td>
<td>200 + 13,5</td>
<td>10  (Ec = 30 , Diff. = -20)</td>
</tr>
</tbody>
</table>

Table 2: Post emergence application GS29, field trial

<table>
<thead>
<tr>
<th>Compound</th>
<th>Dosage [g a.i./ha]</th>
<th>Efficacy/selectivity [%] against Hordeum vulgare</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMPOUND I</td>
<td>200</td>
<td>32</td>
</tr>
<tr>
<td>COMPOUND I + mefenpyr-diethyl</td>
<td>200 + 13,5</td>
<td>12  (Ec = 32 , Diff. = -20)</td>
</tr>
</tbody>
</table>

Table 3: Post emergence application GS29, field trial

<table>
<thead>
<tr>
<th>Compound</th>
<th>Dosage [g a.i./ha]</th>
<th>Efficacy/selectivity [%] against Triticum aestivum</th>
</tr>
</thead>
<tbody>
<tr>
<td>mesosulfuron-methyl + mefenpyr-diethyl</td>
<td>7,5+22,5</td>
<td>0</td>
</tr>
<tr>
<td>COMPOUND I + mesosulfuron-methyl + mefenpyr-diethyl</td>
<td>200 + 7,5+22,5</td>
<td>9  (Ec = 18 , Diff. = -9)</td>
</tr>
</tbody>
</table>

Table 4: Post emergence application GS23, field trial

<table>
<thead>
<tr>
<th>Compound</th>
<th>Dosage [g a.i./ha]</th>
<th>Efficacy [%] against Galium aparine</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMPOUND I</td>
<td>100</td>
<td>25</td>
</tr>
</tbody>
</table>
### Table 5: Post emergence application GS18, field trial

<table>
<thead>
<tr>
<th>Compound</th>
<th>Dosage [g a.i. /ha]</th>
<th>Efficacy [%] against Centaurea cyanus</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMPOUND 1</td>
<td>50</td>
<td>25</td>
</tr>
<tr>
<td>fluroxypyr</td>
<td>150</td>
<td>30</td>
</tr>
<tr>
<td>COMPOUND 1 + fluroxypyr</td>
<td>50 + 150</td>
<td>70 (Ec = 48 , Diff. = +22)</td>
</tr>
</tbody>
</table>

### Table 6: Post emergence application GS18, field trial

<table>
<thead>
<tr>
<th>Compound</th>
<th>Dosage [g a.i. /ha]</th>
<th>Efficacy [%] against Centaurea cyanus</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMPOUND 1</td>
<td>50</td>
<td>25</td>
</tr>
<tr>
<td>diflufenican</td>
<td>75</td>
<td>0</td>
</tr>
<tr>
<td>COMPOUND 1 + diflufenican</td>
<td>50 + 75</td>
<td>78 (Ec = 25 , Diff. = +53)</td>
</tr>
</tbody>
</table>

### Table 7: Post emergence application GS23, field trial

<table>
<thead>
<tr>
<th>Compound</th>
<th>Dosage [g a.i. /ha]</th>
<th>Efficacy [%] against Galium aparine</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMPOUND 1</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>bromoxynil AS octanoate</td>
<td>175</td>
<td>10</td>
</tr>
<tr>
<td>COMPOUND 1 + bromoxynil AS octanoate</td>
<td>100 + 13,5</td>
<td>50 (Ec = 10, Diff. = +40)</td>
</tr>
</tbody>
</table>
### Table 8: Post emergence application GS18, field trial

<table>
<thead>
<tr>
<th>Compound</th>
<th>Dosage [g a.i. /ha]</th>
<th>Efficacy [%] against Papaver rhoeas</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMPOUND I</td>
<td>50</td>
<td>0</td>
</tr>
<tr>
<td>metribuzin</td>
<td>50</td>
<td>0</td>
</tr>
<tr>
<td>COMPOUND I + metribuzin</td>
<td>50 + 50</td>
<td>50 (Ec = 0, Diff. = +50)</td>
</tr>
</tbody>
</table>

### Table 9: Post emergence application GS18, field trial

<table>
<thead>
<tr>
<th>Compound</th>
<th>Dosage [g a.i. /ha]</th>
<th>Efficacy [%] against Centaurea cyanus</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMPOUND I</td>
<td>100</td>
<td>75</td>
</tr>
<tr>
<td>aclonifen</td>
<td>450</td>
<td>0</td>
</tr>
<tr>
<td>COMPOUND I + aclonifen</td>
<td>100 + 450</td>
<td>97 (Ec = 75, Diff. = +22)</td>
</tr>
</tbody>
</table>
Claims

1. Use of the herbicidal active compound 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I) as foliar herbicide.

2. Use of a combination comprising compound 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I) and at least one further herbicidal active ingredient of group Ila: aclonifen, bromoxynil, bromoxynil-butrate, -potassium, -heptanoate, and -octanoate, benzonap, butachlor, 2,4-D, 2,4-D-butotyl, -butyl, -dimethylammonium, -diolamin, -ethyl, -2-ethylhexyl, -isobutyryl, -isooctyl, -isopropylammonium, -potassium, -triisopropanolammonium, and -trolamine, diflufenican, dimethenamid, ethoxysulfuron, fenoxaprop, fenoxaprop-P, fenoxaprop-ethyl, fenoxaprop-P-ethyl, fenquinotrine, fentrazamide, florasulam, fluatenacet, fluoxyprpyr, fluoxoxypr-megtvl, foramsulfuron, iodosulfuron, iodosulfuron-methyl-sodium, isoproturon, isoxaflutole, mfenacet, mesosulfuron, mesosulfuron-methyl, metolachlor, S-metolachlor, metribuzin, metosulam, nicosulfuron, oxadiargyl, oxadiazon, pethoxamid, prosulfocarb, pyrasulfotole, pyroxmsulam tefurytrionme, tembotrione, thiencarbazone, thiencarbazone-methyl, and triafamone, wherein the combination is used as foliar herbicide.

3. Use of a combination according to claim 2, wherein the further herbicidal active ingredient/s is/are selected from group Ilaa: aclonifen, bromoxynil, bromoxynil-butrate, -potassium, -heptanoate, and -octanoate, diflufenican, ethoxysulfuron, fenoxaprop, fenoxaprop-P, fenoxaprop-ethyl, fenoxaprop-P-ethyl, florasulam, fluoxyprpyr, fluoxoxypr-megtvl, foramsulfuron, iodosulfuron, iodosulfuron-methyl-sodium, mesosulfuron, mesosulfuron-methyl, metribuzin, metosulam, nicosulfuron, oxadiargyl, oxadiazon, pethoxamid, prosulfocarb, pyrasulfotole, pyroxmsulam tefurytrionme, tembotrione, thiencarbazone, thiencarbazone-methyl, and triafamone.

4. Use of a combination comprising compound 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I) and at least one further herbicidal active ingredient of group lib: pendimethalin, metribuzin propoxycarbazone, halaxifen-methyl, 2-methyl-4-chlorophenoxyacetic acid (MCPA), wherein the combination is used as foliar herbicide.

5. Use of compound 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I) or a combination comprising compound 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I) according to claims 2 or 4, wherein at least one safener of group III: isoxadifen-ethyl, cyprosulfamide, cloquintocet-mexyl and mefenpyr-diethyl is added.

6. Use of compound 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I) or a combination comprising compound 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I) according to claims 2 or 4, wherein isoxadifen-ethyl is added as safener.
7. Use of compound 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I) or a combination comprising compound 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I) according to claims 2 or 4, wherein cyprosulfamide is added as safener.

8. Use of compound 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I) or a combination comprising compound 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I) according to claims 2 or 4, wherein cloquintocet-mexyl is added as safener.

9. Use of compound 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I) or a combination comprising compound 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I) according to claims 2 or 4, wherein mefenpyr-diethyl is added as safener.

10. Combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I) and mefenpyr-diethyl.

11. Combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), flufenacet and diflufenican.

12. Combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), aclonifen and diflufenican.

13. Combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), flufenacet and diflufenican and at least one safener of group III.

14. Combinations comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I), aclonifen and diflufenican and at least one safener of group III.

15. Method for controlling undesired plants in agricultural crops by applying the herbicidal active compound 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I) or a combination comprising compound 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I) according to claims 2, 4, 5 or 10 to plants or the area in which the plants grow, after emergence of the plant.

16. Method for controlling undesired plants in agricultural crops by applying the herbicidal active compound 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I) in combination with a safener to plants or the area in which the plants grow, after emergence of the plant.

17. Method according to claim 11, wherein the compound I or the combination comprising compound I according to claims 2, 4, 5 or 10 is applied at different growth stages of the plant.
18. Method according to any of claims 15 to 17, for controlling undesired plants in crops such as cereals, maize or rice.

19. Method according to any of claims 15 to 17 wherein the application rate of compound I is 10 to 500 g of active ingredient (a.i.) per hectare, and wherein the application rate of the further active ingredient of group Ila is 2.5 to 2400 g of active ingredient per hectare.

20. Method according to any of claims 15 to 17 wherein the application rate of compound I is 10 to 500 g of active ingredient (a.i.) per hectare, and wherein the application rate of the further active ingredient/s of group Ila/Iib is 2 to 2400 g of active ingredient per hectare.
INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2016/068598

A. CLASSIFICATION OF SUBJECT MATTER

INV. A01N25/32 A01N33/22 A01N37/40 A01N43/40 A01N43/56
A01N43/707 A01N43/80 A01N47/36 A01P13/00 A01N33/18
A01N39/04 A01N47/38

According to International Patent Classification (IPC) and to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A01N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal , CHEM ABS Data, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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<td>wo 2015/127259 AI (FMC CORP [US]) 27 August 2015 (2015-08-27) page 1, paragraph 1 page 2, paragraph 4 - page 3, paragraph 3 page 4, paragraph 2 page 16, paragraph 3 page 17, paragraph 2 page 29, paragraphs 2, 3 examples 2, 10, 12, 13, 14, 17, 20, 29, 35, 36, 41</td>
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Further documents are listed in the continuation of Box C. See patent family annex.

*X* Special categories of cited documents :

*"A"* document defining the general state of the art which is not considered to be of particular relevance

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*"P"* document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

*A" document member of the same patent family

Date of the actual completion of the international search

30 November 2016

Date of mailing of the international search report

06/12/2016

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Zanobi ni, Al essandra

Form PCT/ISA/210 (second sheet) (April 2005)
## INTERNATIONAL SEARCH REPORT

**PCT/EP2016/068598**

### DOCUMENTS CONSIDERED TO BE RELEVANT

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| A         | **US 5 527 761 A (ENSMINGER MICHAEL P [US])**  
            18 June 1996 (1996-06-18)  
            col umn 1, line 10 - line 15  
            col umn 2, line 12 - col umn 3, line 8  
            exampl es 1, 2 | 1,5-9 ,  
            15, 17, 18 |
| X         | **WO 01/50858 A2 (FMC CORP [US]; KEI FER DAVID [US])**  
            19 July 2001 (2001-07-19)  
            page 2, line 20 - page 3, line 12  
            page 8, line 19 - page 10, line 5  
            page 16, line 25 - line 30  
            page 17 - page 19 | 10, 16 |
| A         | **EP 0 958 742 A1 (RHONE POULENC AGROCHIMIE [FR])**  
            24 November 1999 (1999-11-24)  
            15, 17, 18 |
| Y         | **WO 2009/135492 A2 (CHEMIN0VA AS [DK]; REFARDT MATTHIAS [DK]; CHRISTENSEN CASPER REINHARD)**  
            12 November 2009 (2009-11-12)  
            page 1, line 4 - line 10  
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| A         | **WO 03/028460 A2 (SYNGENTA PARTICIPATIONS AG [CH]; HOFER URS [CH])**  
            10 April 2003 (2003-04-10)  
            page 1, paragraph 5  
            page 2, paragraph 2 - paragraph 4  
            exampl e b2 | 1,5-9 ,  
            15, 17, 18 |
| A         | **WO 2014/018400 A1 (DOW AGROSCIENCES LLC [US])**  
            page 1, line 10 - line 15  
            page 1, line 25 - page 5, line 5  
            exampl e 1 | 1,5-9 ,  
            15, 17, 18 |
            exampl e 20 | 2,9 ,  
            11-15 ,  
            17-20 |
### Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. **Claims Nos.:**
   - because they relate to subject matter not required to be searched by this Authority, namely:

2. **Claims Nos.:**
   - because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

3. **Claims Nos.:**
   - because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

### Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

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see additional sheet
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1. **X** As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. **□** As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

3. **□** As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. **□** No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.
This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1 (completely) ; 5-9, 15, 17, 18 (partially)

The use of the herbicidal active compound 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I) as foliar herbicide; method for controlling undesired plants in agricultural crops by applying the herbicidal active compound (I) to plants or the area in which the plants grow, after emergence of the plant.

2. claims: 2-4, 11, 12, 19, 20 (completely) ; 5-9, 13-15, 17, 18 (partially)

A combination of compound (I) and diflufenican and flufenacet and a combination of compound (I), diflufenican and aclonifen; the use of the herbicidal active compound 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I) and at least one further herbicidal active ingredient of group 11a, laaa or lib, wherein the combination is used as a foliar herbicide; method for controlling undesired plants in agricultural crops by applying the herbicidal active compound (I) in a combination with the herbicides of groups 11a, laaa, lib to plants or the area in which the plants grow, after emergence of the plant.

3. claims: 10, 16 (completely) ; 5-9, 13-15, 17, 18 (partially)

A combination comprising 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I) and a safener as mefenpyr-diethyl; the use of the herbicidal active compound 2-(2,4-dichlorophenyl)methyl-4,4-dimethyl-3-isoxazolidone (compound I) as foliar herbicide wherein at least one safener of group III: isoxadiquin-ethyl, cyprosul famide, clomoxycocet-mexyl and mefenpyr-diethyl is added; method for controlling undesired plants in agricultural crops by applying the herbicidal active compound (I) and a safener to plants or the area in which the plants grow, after emergence of the plant.
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