Title: N-SULFONYL-α-AMINO-ACID DERIVATIVES

![Chemical Structure](image)

(54) Title: N-SULFONYL-α-AMINO-ACID DERIVATIVES

(57) Abstract: The invention relates to N-sulfonyl-α-amino-acetic acid derivatives of the general formula (I): including the optical isomers thereof and mixtures of such isomers, wherein R₁ and R₃ independently of each other stand for an optionally substituted aryl or heteroaryl group, R₂ and R₄ stand independently of each other for hydrogen, optionally substituted C₁-C₅ alkyl, optionally substituted C₂-C₅ alkenyl or optionally substituted C₂-C₅ cycloalkyl; R₅ designates hydrogen, optionally substituted C₁-C₅ alkyl, or optionally substituted C₂-C₅ cycloalkyl; R₆ is optionally substituted C₁-C₅ alkyl, optionally substituted C₂-C₅ alkenyl or optionally substituted C₂-C₅ cycloalkyl; R₇ and R₈ are independently of each other hydrogen or optionally substituted C₁-C₅ alkyl, optionally substituted C₂-C₅ alkenyl, or optionally substituted C₂-C₅ cycloalkyl; R₉ and R₁₀ are independently of each other hydrogen or optionally substituted C₁-C₅ alkyl, optionally substituted C₂-C₅ alkenyl, or optionally substituted C₂-C₅ cycloalkyl; W designates a bridge selected from -O-, -S-, -SO₂- or is an -NH- or -N(C₅H₄)₂- bridge; X designates a direct bond or a bridge selected from -O-, -S-, -SO₂- or is an -NH- or -N(C₅H₄)₂- bridge; Y designates -OR₆ or NR₆₂⁺; a and b independently of each other stand for a number 1, 2 or 3; and c stands for a number zero, 1 or 2; with R₉, R₁₀ and R₁₁ being defined according to the claims. These compounds possess useful plant protecting properties and may advantageously be employed in agricultural practice for controlling or preventing the infestation of plants by phytopathogenic microorganisms, especially fungi.
N-Sulfonyl-α-Amino-Acid Derivatives

The present invention relates to novel N-sulfonyl-α-amino-acid derivatives of formula I. It further encompasses the preparation of the novel active compounds and to agrochemical compositions comprising at least one of these novel compounds as active ingredient. The invention further relates to the preparation of the said compositions and to the use of the compounds or of the compositions for controlling or preventing the infestation of plants by phytopathogenic microorganisms, especially fungi.

The N-sulfonyl-α-amino-acid derivatives according to the present invention correspond to the general formula I

\[
\text{Ar}_1-X-\begin{array}{c}
\text{R}_1 \text{N}^{\text{II}} \\
\text{R}_2 \text{a} \\
\end{array}\begin{array}{c}
\text{O} \\
\text{S} \\
\text{N}^{\text{III}} \\
\text{R}_3 \text{a} \\
\end{array}\begin{array}{c}
\text{R}_4 \\
\text{b} \\
\end{array}\begin{array}{c}
\text{W} \\
\text{Y} \\
\text{R}_6 \text{c} \\
\end{array}\begin{array}{c}
\text{Ar}_2 \\
\text{R}_7 \\
\end{array}
\]

including the optical isomers thereof and mixtures of such isomers, wherein

- \(\text{Ar}_1\) and \(\text{Ar}_2\) independently of each other stand for an optionally substituted aryl or heteroaryl group,
- \(\text{R}_1\) and \(\text{R}_2\) stand independently of each other for hydrogen, optionally substituted \(\text{C}_1-\text{C}_8\)alkyl, optionally substituted \(\text{C}_2-\text{C}_8\)alkenyl, \(\text{C}_2-\text{C}_8\)alkynyl or optionally substituted \(\text{C}_3-\text{C}_6\)cycloalkyl;
- \(\text{R}_3\) designates hydrogen, \(\text{C}_3-\text{C}_6\)alkenyl, \(\text{C}_2-\text{C}_6\)alkynyl or optionally substituted \(\text{C}_1-\text{C}_6\)alkyl;
- \(\text{R}_4\) is optionally substituted \(\text{C}_1-\text{C}_6\)alkyl, optionally substituted \(\text{C}_2-\text{C}_6\)alkenyl, \(\text{C}_2-\text{C}_6\)alkynyl or optionally substituted \(\text{C}_3-\text{C}_6\)cycloalkyl;
- \(\text{R}_5\) and \(\text{R}_6\) are independently of each other hydrogen or optionally substituted \(\text{C}_1-\text{C}_6\)alkyl, optionally substituted \(\text{C}_2-\text{C}_6\)alkenyl, \(\text{C}_2-\text{C}_6\)alkynyl or optionally substituted \(\text{C}_3-\text{C}_6\)cycloalkyl;
- \(\text{R}_7\) and \(\text{R}_8\) are independently of each other hydrogen or optionally substituted \(\text{C}_1-\text{C}_6\)alkyl, optionally substituted \(\text{C}_2-\text{C}_6\)alkenyl, \(\text{C}_2-\text{C}_6\)alkynyl or optionally substituted \(\text{C}_3-\text{C}_6\)cycloalkyl;
- \(\text{W}\) designates a bridge selected from \(-\text{O}-\), \(-\text{S}-\), \(-\text{SO}_2-\) or is an \(-\text{NH}-\) or \(-\text{N}(\text{C}_1-\text{C}_6\text{alkyl})-\) bridge;
- \(\text{X}\) designates a direct bond or a bridge selected from \(-\text{O}-\), \(-\text{S}-\), \(-\text{SO}_2-\) or is an \(-\text{NH}-\) or \(-\text{N}(\text{C}_1-\text{C}_6\text{alkyl})-\) bridge;
- \(\text{Y}\) designates \(-\text{OR}_9\) or \(-\text{NR}_{10}\text{R}_{11}\);

a and b independently of each other stand for a number 1, 2 or 3; and

c stands for a number zero, 1 or 2;
R₉ designates hydrogen, optionally substituted C₁-C₈ alkyl, C₃-C₅ alkenyl, C₃-C₅ alkynyl, optionally substituted phenyl;
R₉₁₀ and R₁₁₁, independently of each other stand for hydrogen, C₁-C₈ alkyl optionally substituted by halogen, C₁-C₅ haloalkyl, C₁-C₅ alkoxy, C₁-C₅ alkylamino, di(C₁-C₅ alkyl)amino, or aryl which in turn is optionally substituted by halogen, C₁-C₅ alkyl, C₁-C₅ haloalkyl, C₁-C₅ alkoxy or -CN; or stand for C₃-C₅ alkenyl optionally substituted by halogen, C₁-C₅ haloalkyl, C₁-C₅ alkoxy, C₁-C₅ alkylamino, di(C₁-C₅ alkyl)amino, or aryl which in turn is optionally substituted by halogen, C₁-C₅ alkyl, C₁-C₅ haloalkyl, or aryl which in turn is optionally substituted by halogen, C₁-C₅ alkyl, C₁-C₅ haloalkyl, C₁-C₅ alkoxy or -CN; or stand for a group -NH-CH(R₁₂)CO-Z; or
R₁₃ and R₁₄ together form a 5-ring-membered non-aromatic carbocyclic ring; or together form a 6-ring-membered non-aromatic carbocyclic ring which is interrupted by -O-, -S- or -N(C₁-C₅ alkyl)-;
R₁₃ designates C₁-C₅ alkyl optionally substituted by halogen, C₁-C₅ haloalkyl or aryl which in turn is optionally substituted by halogen, C₁-C₅ alkyl, C₁-C₅ haloalkyl, C₁-C₅ alkoxy, hydroxy or -CN;
Z is -OR₉ or NR₁₀R₁₄;
R₁₃ and R₁₄ independently of each other stand for hydrogen; C₁-C₅ alkyl optionally substituted by halogen, C₁-C₅ haloalkyl, C₁-C₅ alkoxy, C₁-C₅ alkylamino, di(C₁-C₅ alkyl)amino, or aryl which in turn is optionally substituted by halogen, C₁-C₅ alkyl, C₁-C₅ haloalkyl, C₁-C₅ alkoxy, C₁-C₅ alkylamino, di(C₁-C₅ alkyl)amino, or aryl which in turn is optionally substituted by halogen, C₁-C₅ alkyl, C₁-C₅ haloalkyl, C₁-C₅ alkoxy, C₁-C₅ alkylamino, di(C₁-C₅ alkyl)amino, or aryl which in turn is optionally substituted by halogen, C₁-C₅ alkyl, C₁-C₅ haloalkyl, C₁-C₅ alkoxy, C₁-C₅ alkylamino, di(C₁-C₅ alkyl)amino, or aryl which in turn is optionally substituted by halogen, C₁-C₅ alkyl, C₁-C₅ haloalkyl, C₁-C₅ alkoxy, -CN; or stand for C₃-C₅ alkenyl optionally substituted by halogen, C₁-C₅ haloalkyl, C₁-C₅ alkoxy, C₁-C₅ alkylamino, di(C₁-C₅ alkyl)amino, or aryl which in turn is optionally substituted by halogen, C₁-C₅ alkyl, C₁-C₅ haloalkyl, C₁-C₅ alkoxy, -CN; or R₁₃ and R₁₄ together form a 5-ring-membered non-aromatic carbocyclic ring; or together form a 6-ring-membered non-aromatic carbocyclic ring which is interrupted by -O-, -S- or -N(C₁-C₅ alkyl)-.

More specifically the present invention refers to the N-sulfonyl-α-amino-acid derivatives of formula I wherein
Ar₁ stands for an aryl group which is optionally substituted with n radicals independently selected from R₁₅, R₁₅ stands for C₁-C₅ alkyl optionally substituted by halogen, C₁-C₅ alkoxy,
-NR_{18}R_{17}, -CO-R_{18} or the acyclic or cyclic ketals and acetals of -CO-R_{18}; or stands for a
-X-linked aryl which is optionally substituted by halogen, C_{1}-C_{2}alkyl, C_{1}-C_{2}haloalkyl,
C_{1}-C_{2}alkoxy, -CN, -NO_{2}, -NR_{18}R_{17}, -CO-R_{18} or the acyclic or cyclic ketals and acetals of
-CO-R_{18}; or for an -X-linked 5- or 6-ring-membered heteroaryl group optionally substituted
by halogen, C_{1}-C_{2}alkyl, C_{1}-C_{2}haloalkyl, C_{1}-C_{2}alkoxy, -CN, -NO_{2}, -NR_{18}R_{17}, -CO-R_{18} or the
acyclic or cyclic ketals and acetals of -CO-R_{18};
R_{16} and R_{17}, independently of each other, stand for hydrogen; C_{1}-C_{2}alkyl optionally substitu-
ted by halogen, C_{1}-C_{2}haloalkyl, C_{1}-C_{2}alkoxy, C_{1}-C_{2}alkylamino, di(C_{1}-C_{2}alkyl)amino, or aryl
which in turn is optionally substituted by halogen, C_{1}-C_{2}alkyl, C_{1}-C_{2}haloalkyl, C_{1}-C_{2}alkoxy or
-CN; or stand for C_{3}-C_{8}alkenyl optionally substituted by halogen, C_{1}-C_{2}haloalkyl, C_{1}-C_{4}alk-
oxoy, C_{1}-C_{5}alkylamino, di(C_{1}-C_{5}alkyl)amino, or aryl which in turn is optionally substituted by
halogen, C_{1}-C_{5}alkyl, C_{1}-C_{2}haloalkyl, C_{1}-C_{4}alkoxy or -CN; or stand for C_{2}-C_{5}alkynyl optionally substituted by halogen, C_{1}-C_{2}haloalkyl, C_{1}-C_{4}alkoxy,
C_{1}-C_{5}alkylamino, di(C_{1}-C_{5}alkyl)amino, or aryl which in turn is optionally substituted by
halogen, C_{1}-C_{5}alkyl, C_{1}-C_{2}haloalkyl, C_{1}-C_{4}alkoxy or -CN; or together form a 5-ring-
membered non-aromatic carbocyclic ring; or together form a 6-ring-membered non-aromatic
carbocyclic ring which is interrupted by -O- or -N(C_{1}-C_{2}alkyl)-;
R_{16} stands for C_{1}-C_{2}alkyl optionally substituted by halogen, C_{1}-C_{4}alkoxy, C_{1}-C_{5}alkylamino,
di(C_{1}-C_{5}alkyl)amino, or aryl which in turn is optionally substituted by halogen, C_{1}-C_{5}alkyl,
C_{1}-C_{2}haloalkyl, C_{1}-C_{4}alkoxy, -CN, -NO_{2}, C_{1}-C_{5}alkylamino, di(C_{1}-C_{5}alkyl)amino or
C_{1}-C_{2}alkylcarbonyl, C_{1}-C_{4}alkoxycarbonyl, C_{1}-C_{5}alkylaminocarbonyl or di(C_{1}-C_{5}alkyl)ami-
nocarbonyl; or by a 5- or 6-ring hetero-aromatic ring which in turn is optionally substituted
by halogen, C_{1}-C_{5}alkyl, C_{1}-C_{2}haloalkyl C_{1}-C_{4}alkoxy, -CN, -NO_{2}, C_{1}-C_{5}alkylamino,
di(C_{1}-C_{5}alkyl)amino, C_{1}-C_{3}alkylcarbonyl, C_{1}-C_{4}alkoxycarbonyl, C_{1}-C_{5}alkylaminocarbonyl or
di-(C_{1}-C_{5}alkyl)aminocarbonyl; or stands for C_{2}-C_{6}cycloalkyl optionally substituted by
halogen, hydroxy, =O, C_{1}-C_{4}alkoxy or C_{1}-C_{5}alkylamino, di(C_{1}-C_{5}alkyl)amino; or stands for
C_{1}-C_{2}alkoxy optionally substituted by halogen, C_{1}-C_{2}alkoxy; C_{1}-C_{5}alkylamino, di(C_{1}-
C_{5}alkyl)amino; or stands for phenyl which is optionally substituted by halogen, C_{1}-C_{5}alkyl,
C_{1}-C_{2}haloalkyl, C_{1}-C_{4}alkoxy, -CN, -NO_{2}, C_{1}-C_{5}alkylamino, di(C_{1}-C_{5}alkyl)amino, C_{1}-
C_{5}alkylcarbonyl, C_{1}-C_{4}alkoxycarbonyl, C_{1}-C_{5}alkylaminocarbonyl or di-(C_{1}-
C_{5}alkyl)aminocarbonyl; or stands for a 5- or 6-ring membered heteroaryl comprising
nitrogen, oxygen or sulfur as ring members and being optionally substituted by halogen,
C_{1}-C_{5}alkyl, C_{1}-C_{2}haloalkyl; C_{1}-C_{4}alkoxy, -CN, -NO_{2}, C_{1}-C_{5}alkylamino, di(C_{1}-C_{5}alkyl)amino,
C_{1}-C_{4}alkylcarbonyl, C_{1}-C_{4}alkoxycarbonyl, C_{1}-C_{5}alkylaminocarbonyl or
di-(C₈₋C₆alkyl)aminocarbonyl; or
R_{15} stands for C₃₋C₆cycloalkyl, optionally substituted by halogen, hydroxy, =O, C₁₋C₄alkoxy, NR₁₆R₁₇; or stands for C₁₋C₄alkoxy optionally substituted by halogen, C₁₋C₄alkoxy, by -X-aryl which is optionally substituted by halogen, C₁₋C₅alkyl, C₁₋C₅haloalkyl, C₁₋C₄alkoxy, -CN, -NO₂, -NR₁₆R₁₇, -CO-R₁₈ or the acyclic or cyclic ketals and acetals of -CO-R₁₈; by a X-linked-5- or 6-ring-membered heteroaryl group optionally substituted by halogen, C₁₋C₅alkyl, C₁₋C₅haloalkyl, C₁₋C₄alkoxy, -CN, -NO₂, -NR₁₆R₁₇, -CO-R₁₈ or the acyclic or cyclic ketals and acetals of -CO-R₁₈; or
stand for C₂₋C₅alkenyl optionally substituted by halogen or aryl; or
stand for C₂₋C₅alkynyl optionally substituted by halogen, tri-C₁₋C₅alkyl-silyl or aryl; or
stand for C₂₋C₅alkenyloxy optionally substituted by halogen or aryl; or
stand for C₂₋C₅alkynloxy optionally substituted by halogen, tri-C₁₋C₅alkyl-silyl or aryl; or
stand for C₃₋C₆cycloalkoxy optionally substituted by C₁₋C₅alkyl, halogen or C₁₋C₄alkoxy; or
stand for halogen; or
stand for -NR₁₆R₁₇, or
stand for -NR₂-CO-R₁₆; or
stand for -NR₂-CO-OR₁₆; or
stand for -NR₂-CO-NR₁₆R₁₇; or
stand for -NR₂-CO-SR₁₆; or
stand for -NR₂-CS-OR₁₆; or
stand for -NR₂-CS-NR₁₆R₁₇; or
stand for -NR₂-CS-SR₁₆; or
stand for -NR₂-C(=N-O-R₁₆)-S-OR₁₆; or
stand for -NR₂-C(=N-O-R₁₆)-NR₁₆R₁₇; or
stand for -NR₂-C(=N-O-R₁₆)-SR₁₆; or
stand for C₁₋C₅alkylthio, C₁₋C₅alkylsulfinyl or C₁₋C₅alkylsulfenyl, optionally substituted by halogen; or
stand for -NR₂-SO₂-NR₁₆R₁₇; or
stand for nitro, for cyano or for -CS-NH₂;
or Ar₁ stands for a 5-ring-membered heteroaryl group comprising as ring members 1 to 4 heteroatoms selected from nitrogen, oxygen or sulfur and in which each ring system may not contain more than one oxygen or sulfur atoms and being optionally substituted with n radicals independently selected from R₁₉, R₁₉ is hydrogen, halogen, C₁₋C₅alkyl, C₁₋C₅haloalkyl, C₁₋C₅alkoxy, -NR₁₆R₁₇, -NO₂, -CN, -CO-R₁₈ or the acyclic or cyclic ketals and
acetals of -CO-R_{18}; or Ar_1 stands for a 6-ring-membered heteroaryl group comprising as ring members 1 to 4 nitrogen atoms, and being optionally substituted with n radicals independently selected from R_{19};

Ar_2 stands for an aryl group which is optionally substituted with n radicals independently selected from R_{20}, wherein R_{20} is as defined as R_{15}, and from one radical R_{21}, R_{21} stands for hydrogen; or stands for -X-aryl which is optionally substituted by halogen, C_1-C_3alkyl, C_1-C_3haloalkyl, C_1-C_4alkoxy, -CN, -NO_2, -NR_{16}R_{17}, -CO-R_{18} or the acyclic or cyclic ketals and acetals of -CO-R_{18}; or stands for an X-linked 5-membered aromatic or non-aromatic heterocyclic ring comprising nitrogen, oxygen or sulfur as ring members and being optionally substituted by halogen, C_1-C_3alkyl, C_1-C_3haloalkyl, C_1-C_4alkoxy, -CN, -NO_2, -NR_{16}R_{17}, -CO-R_{18} or the acyclic or cyclic ketals and acetals of -CO-R_{18}; or stands for a X-linked 6-membered aromatic or non-aromatic heterocyclic ring comprising nitrogen, oxygen or sulfur as ring members and being optionally substituted by halogen, C_1-C_3alkyl, C_1-C_3haloalkyl, C_1-C_4alkoxy, -CN, -NO_2, -NR_{16}R_{17}, -CO-R_{18} or the acyclic or cyclic ketals and acetals of -CO-R_{18}; or stands for -CO-R_{18} or the acyclic or cyclic ketals and acetals of -CO-R_{18}; or stands for -O-CO-R_{18}; or stands for -C(=N-O-R_{18})-R_{18};

or R_{21} and one R_{20} together form a 3- or 4-membered non-aromatic bridge forming an annellated ring which may contain a carbonyl function or nitrogen, oxygen or sulfur as ring members and is optionally substituted by C_1-C_3alkyl;
or Ar_2 stands for a 5-ring-membered heteroaryl group comprising as ring members 1 to 4 heteroatoms selected from nitrogen, oxygen or sulfur and in which each ring system may not contain more than 1 oxygen or sulfur atoms and being optionally substituted with n radicals independently selected from R_{19}; or stands for a 6-ring- membered heteroaryl group comprising as ring members 1 to 4 nitrogen atoms, and being optionally substituted with n radicals independently selected from R_{19}; or stands for a fused bicyclic heteroaryl group comprising as ring members 1 to 4 heteroatoms selected from nitrogen, oxygen or sulfur, and being composed from the 5-ring- or 6-ring-membered heteroaryl groups as defined for Ar_2 with an annellated phenyl ring or with an annellated second 6-ring-membered heteroaryl, each ring and the bicyclic heteroaryl being optionally substituted with n radicals independently selected from R_{19}.
The number n independently selected is a number between zero and the number of the respective ring members minus the number of ring members and the number of further
substituents. Preferably, n is 1. If n is zero, eventually vacant valences of the respective ring are substituted with hydrogen.

R₁ and R₂ stand independently of each other for hydrogen or C₁-C₅ alkyl optionally substituted by halogen, C₁-C₅ alkoxy or -NR₁₆R₁₇; or stand for C₂-C₆ alkynyl optionally substituted by halogen or C₁-C₅ alkoxy; or stand for C₂-C₆ alkenyl; or stand for C₂-C₆ cycloalkyl optionally substituted by halogen, C₁-C₅ alkoxy; C₁-C₅ alkyl or -NR₁₆R₁₇; R₃ designates hydrogen, C₃-C₆ alkenyl, C₃-C₆ alkynyl or C₁-C₅ alkyl optionally substituted by C₁-C₅ alkoxy; C₃-C₆ alkenyloxy or C₃-C₆ alkenynoxy;

R₄ is C₁-C₅ alkyl optionally substituted by halogen, C₁-C₅ alkoxy or -NR₁₆R₁₇; or is C₂-C₆ alkenyl optionally substituted by halogen or C₁-C₅ alkoxy; or is C₂-C₆ alkynyl; or is C₃-C₆ cycloalkyl optionally substituted by halogen, C₁-C₅ alkoxy or C₁-C₅ alkyl; or

R₅ and R₆ are independently of each other hydrogen or C₁-C₅ alkyl optionally substituted by halogen, C₁-C₅ alkoxy or -NR₁₆R₁₇; or are C₂-C₆ alkenyl optionally substituted by halogen or C₁-C₅ alkoxy; or are C₂-C₆ alkynyl; or are C₃-C₆ cycloalkyl optionally substituted by halogen, C₁-C₅ alkoxy; C₁-C₅ alkyl or -NR₁₆R₁₇;

R₇ and R₈ are independently of each other hydrogen or C₁-C₅ alkyl optionally substituted by halogen, C₁-C₅ alkoxy or -NR₁₆R₁₇; or are C₂-C₆ alkenyl optionally substituted by halogen or C₁-C₅ alkoxy; or are C₂-C₆ alkynyl; or are C₃-C₆ cycloalkyl optionally substituted by halogen, C₁-C₅ alkoxy; C₁-C₅ alkyl or -NR₁₆R₁₇.

In the above definitions "halo" or "halogen" includes fluorine, chlorine, bromine and iodine. The alkyl, alkenyl and alkynyl radicals may be straight-chain or branched. This applies also to the alkoxy, alkenyl or alkynyl parts of other alkyl-, alkenyl- or alkynyl-containing groups, such as alkoxy, alkylthio, alkylamino and dialkylamino.

Depending upon the number of carbon atoms mentioned, alkyl on its own or as part of another substituent is to be understood as being, for example, methyl, ethyl, propyl, butyl, pentyl, hexyl, heptyl, octyl, nonyl, decyl, undecyl, dodecyl and the isomers thereof, for example isopropyl, isobutyl, tert-butyl or sec-butyl, isopentyl or tert-pentyl.

Cycloalkyl for example is, depending upon the number of carbon atoms mentioned, cyclopropyl, cyclobutyl, cyclopentyl, cyclohexyl, bicyclohexyl, cycloheptyl, bicycloheptyl, cyclooctyl or bicyclooctyl.

Depending upon the number of carbon atoms mentioned, alkenyl as a group or as a structural element of other groups is to be understood as being, for example, ethenyl, allyl, 1-propenyl, buten-2-yl, buten-3-yl, penten-1-yl, penten-3-yl, hexen-1-yl, 4-methyl-3-pentenyl
or 4-methyl-3-hexenyl.
Alkynyl as a group or as a structural element of other groups is, for example, ethynyl, propyn-1-yl, propyn-2-yl, butyn-1-yl, butyn-2-yl, 1-methyl-2-butynyl, hexyn-1-yl, 1-ethyl-2-butynyl or octyn-1-yl, depending on the number of carbon atoms present.
A haloalkyl, haloalkenyl, haloalkynyl or halocycloalkyl group may contain one or more (identical or different) halogen atoms, and for example may stand for CHCl₂, CH₂F, CCl₃, CH₂Cl, CHF₂, CF₃, CH₂CH₂Br, C₂Cl₆, CH₂Br, CHClBr, CF₃CH₂, CH₂CH₂Cl, CH₂CH₂F, CH₂CHF₂, CH₂-C=CHCl, CH≡CCL₂, CH≡CF₂, CH₂-C≡C-Cl, CH₂-C≡C-Br, chlorocyclohexyl, dichlorocyclohexyl, etc.
Alkoxy thus includes methoxy, ethoxy, proproxy, isoproxy, n-butyloxy, s-butyloxy, i-butyloxy or t-butyloxy.
Ar₁ and Ar₂ according to the present invention both present aromatic moieties, belonging to the chemical class of aromatic hydrocarbons or aromatic heterocycles, designated as aryl or heteroaryl.
The definition aryl includes aromatic hydrocarbon ring systems like phenyl, naphthyl, anthracenyl, phenanthrenyl and biphenyl like 1,3-biphenyl and 1,4-biphenyl, with phenyl being preferred. The same definition applies where aryl is part of arloxy.
Heteroaryl stands for monocyclic aromatic ring systems comprising 1 to 4 heteroatoms selected from N, O and S, where it is understood that for the reasons of complying with the aromatic character of the heteroaryl rings 1 to 4 nitrogen atoms may be present in one ring, but in general not more than one of them may be replaced by oxygen or sulfur. However for the purposes of defining Ar₂ heteroaryl includes bicyclic aromatic ring systems comprising an aromatic 5- to 6-membered ring heterocycle condensed with another aromatic 6-membered ring, either an heterocycle or a benzene ring. Where condensed ring systems of more than one ring is intended this is especially pointed out, for example by mentioning condensation, including annellation with benzene rings.
Typical examples for 5-rings, 6-rings and bicyclic condensed systems are furyl, thietyl, pyrrolyl, imidazolyl, pyrazolyl, thiazolyl, isothiazolyl, oxazolyl, isoxazolyl, oxadiazolyl, thia diazolyl, triazolyl, tetrazolyl, pyridyl, pyridazinyl, pyrimidinyl, pyrazinyl, triazinyl, tetrazinyl, indolyl, benzothienyl, benzofuranyl, isobenzothienyl, isobenzofuranyl, benzimidazolyl, benzopyrazolyl, indazolyl, benzotriazolyl, benzothiazolyl, benzisothiazolyl, benzoxazolyl, benzis oxazolyl, quinolinyl, isoquinolinyl, phthalazinyl, purinyl, naphthyridinyl, pteridinyl, quinoxalinyl, quina zolinyl and cinnolinyl. Preferred heterocycles are furyl, thietyl, pyrrolyl, imidazolyl, thia zolyl, oxazolyl, isoxazolyl, oxadiazolyl, thia diazolyl, triazolyl, pyridyl, pyridazinyl, pyrimidinyl,
pyrazinyl, indolyl, benzothienyl, benzofuryl, benzopyrazolyl, benzothiazolyl, benzoazolyl, benzosoxazolyl, quinolinyl, isoquinolinyl and quinazolinyl.

Depending on the position of the heteroaryl group, the heterocyclic ring may be linked to the basic molecular structure via a ring-carbon atom or via a nitrogen-ring atom.

The aryl and heteroaryl groups according to the invention may be unsubstituted or are optionally substituted. Where substituents are indicated according to this invention, the ring structures may carry one or more identical or different substituents. Normally not more than three substituents are present at the same time. Examples of substituents of aryl or heteroaryl groups are: alkyl, alkenyl, alkynyl, cycloalkyl, alkylamino, dialkylamino, cyano, nitro, amino, hydroxy, cycloalkyl-alkyl, aryl, arylalkyl, heteroaryl, heteroaryl-alkyl, phenyl and phenyl-alkyl, it being possible in turn for all of the preceding groups to carry one or more identical or different halogen atoms; alkoxy; alkenyloxy; alkynyloxy; alkoxylalkyl; haloalkoxy, alkylthio; haloalkylthio; alkylsulfonyl; formyl; alkanoyl; hydroxy; halogen; cyano; nitro; amino; hydroxy, alkylamino; dialkylamino; carboxyl; alkoxy carbonyl; alkenyloxycarbonyl; or alknyloxycarbonyl.

Typical examples include 1-naphthyl, 2,3-dichlorophenyl, 2,3-difluorophenyl, 2,4,6-trichlorophenyl, 2,4,6-trifluorophenyl, 2,4-dichlorophenyl, 2,4-difluorophenyl, 2,5-dichlorophenyl, 2,5-difluorophenyl, 2,6-dichlorophenyl, 2-chloro-4-ethoxyphenyl, 2-chloro-4-methoxyphenyl, 2-chlorophenyl, 2-ethoxyphenyl, 2-fluoro-4-chlorophenyl, 2-fluoro-4-ethoxyphenyl, 2-fluoro-4-methoxyphenyl, 2-hexylloxyphenyl, 2-methoxy-4-chlorophenyl, 2-methoxycyphenyl, 2-methyl-4-chlorophenyl, 2-naphthyl, 2-trifluoromethyl, 3,4,5-trichlorophenyl, 3,4-dibromophenyl, 3,4-dichlorophenyl, 3,4-difluorophenyl, 3,4-dimethoxyphenyl, 3,4-dimethyphenyl, 3,5-dimethyl-4-chlorophenyl, 3′,4′-dichloro-4-biphenylyl, 3-bromo-4-methylphenyl, 3-bromophenyl, 3-chloro-4-cyanophenyl, 3-chloro-4-ethoxyphenyl, 3-chloro-4-fluorophenyl, 3-chloro-4-methoxyphenyl, 3-chlorophenyl, 3-ethyl-4-chlorophenyl, 3-fluoro-4-ethoxyphenyl, 3-fluoro-4-methoxyphenyl, 3-fluoro-4-methoxyphenyl, 3-methoxy-4-chlorophenyl, 3-methylphenyl, 4-(1,3,4-oxadiazol-2-yl)phenyl, 4-(1-imidazolyl)-phenyl, 4-(1-methylmethoximinomethyl)-phenyl, 4-(2,6-dimethoxy-pyrimidin-2-thio)-phenyl, 4-(2-cyanopyrid-4-yl)-phenyl, 4-(3-methyl-1,2,4-thiadiazol-4-yl)phenyl, 4-(3-methyl-1,2,4-thiazol-5-yl)-phenyl, 4-(5-ethyl-1,3,4-oxadiazol-2-yl)phenyl, 4-(pyrid-2-yl)-phenyl, 4′-bromo-4-biphenylyl, 4′-chloro-4-biphenylyl, 4′-cyano-4-biphenylyl, 4′-methyl-4-biphenylyl, 4′-trifluoromethyl-4-biphenylyl, 4-aminocarboxylethoxy-phenyl, 4-aminocarboxymethylphenyl, 4-aminocarbonyl-phenyl, 4-biphenylyl, 4-bromo-3-chlorophenyl, 4-bromophenyl, 4-chloro-3-cyanophenyl, 4-chloro-3-fluorophenyl, 4-chloro-3-methylphenyl, 4-chloro-3-tri-
fluoromethyl-phenyl, 4-chlorophenyl, 4-cyanophenyl, 4-cyclohexylphenyl, 4-ethenylphenyl, 4-ethoxyphenyl, 4-ethylphenyl, 4-ethynloxyphenyl, 4-ethynylphenyl, 4-fluorophenyl, 4-hexyloxyphenyl, 4-isopropylcarboxyaminophenyl, 4-isopropylphenyl, 4-isopropropoxyphenyl, 4-methoxy-3-methylphenyl, 4-methoxycarboxyl-phenyl, 4-methoxyphenyl, 4-methylphenyl, 4-methylsulfonphenyl, 4-methylthiophenyl, 4-nitrophenyl, 4-N-morpholinocarboxylaminophenyl, 4-N-morpholinocarbonyloxythoxy-phenyl, 4-phenoxyphenyl, 4-propargyloxyphenyl, 4-propylphenyl, 4-tert.-butylcarboxylaminophenyl, 4-tert.-butylphenyl, 4-trifluoromethoxyphenyl, 4-trifluoromethylphenyl, 5-chlorothien-2-yl, 5-methylfur-2-yl, 5-methylthien-2-yl, 6-benzothienyl, 7-benzothienyl, etc.

Where R_{21} and R_{20} together form a bridge the bond is normally between vicinal carbon atom of Ar_{2}. Thus anellated ring structures are formed, which may be substituted with one or two lower alkyl groups, preferably methyl. The bridge includes -(CH_{2})_{2}^{-}, -(CH_{2})_{3}^{-}, -O-(CH_{2})_{3}^{-}, -CO-(CH_{2})_{3}^{-}, -S-(CH_{2})_{3}^{-}, -NH-(CH_{2})_{3}^{-}, -O-(CH_{2})_{2}^{-}, -O-(CH_{2})_{2}^{-}, -O-(CH_{2})_{2}^{-}, -O-CH_{2}-CH(CH_{3})-O^{-}, -O-CH_{2}-O^{-}, -CO-(CH_{2})_{2}^{-}, -S-(CH_{2})_{2}^{-}, -NH-(CH_{2})_{2}^{-}, -CH_{2}-O-CH_{2}^{-}, -CH_{2}-CO-CH_{2}^{-}, -CH_{2}-S-CH_{2}^{-}, -CH_{2}-NH-CH_{2}^{-}, -CO-O-(CH_{2})_{2}^{-}, -CO-NH-(CH_{2})_{2}^{-}, -NH-CO-(CH_{2})_{2}^{-}, -CH_{2}-CO-O-CH_{2}^{-}, -CO-S-(CH_{2})_{2}^{-}, -NH-CO-CH_{2}^{-}, -O-CO-(CH_{2})_{2}^{-}, -CH_{2}-CO-O^{-}, -CH_{2}-O-CO^{-}, -S-CO-(CH_{2})_{2}^{-}, -CO-NH-CH_{2}^{-} and -CH_{2}-CO-NH-CH_{2}^{-}, etc.

Where the acetals or ketals of -CO-R_{18} are intended the acetals and ketals may appear as -C(C_{1}-C_{4})_{2}^{-}-R_{18} or as cyclic structures wherein the former carbonyl carbon atom carries a dioxyalkylene bridge of the type -O-C_{1}-C_{4}alkylene-O- which optionally may be branched, including -O-CH_{2}-O^{-}, -O-CH(CH_{3})-O^{-}, -O-(CH_{2})_{2}^{-}O^{-}, -O-(CH_{2})_{3}^{-}O^{-}, -O-CH_{2}-CH(CH_{3})-O^{-}, and the like.

Where R_{16} and R_{17} together with the nitrogen binding the two radicals may form a non-aromatic carbcyclic ring this radical stands for pyrrolidine, piperidine, morpholine or thiomorpholine ring, which may be substituted by one or two methyl groups.

The presence of at least one asymmetric carbon atom in the compounds of formula I means that the compounds may occur in optically isomeric, diastereomeric and enantiomeric forms. As a result of the presence of a possible aliphatic C=C double bond, geometric isomerism may also occur. Formula I is intended to include all those possible isomeric forms and mixtures thereof. Where no specific isomer is specified the mixtures of diastereomers, enantiomers or the racemate are meant, as obtainable from the disclosed synthesis methods. The optical isomers, diastereomers and enantiomers of formula I may be obtained in pure form either by isolation from the mixture by suitable separation methods, which are
known in the art, or may be obtained by stereoselective synthesis methods.

In another embodiment of the invention, subgroups of compounds of formula I are those wherein

Ar₁ stands for optionally substituted aryl group; or
Ar₂ is optionally substituted phenyl; or
Ar₃ stands for optionally substituted aryl; or
Ar₄ is optionally substituted phenyl; or
Ar₁ and Ar₂ independently of each other stand for optionally substituted phenyl; or
the optional substituents R₁₅ of Ar₁ are preferably selected from the group comprising halogen, C₁-C₅alkyl, C₁-C₅haloalkyl, C₁-C₅alkoxy, C₁-C₅haloalkoxy, C₃-C₆cycloalkyl, -CN and -CO-R₁₆; or the optional substituents R₂₀ of Ar₂ are preferably selected from the group comprising halogen, C₁-C₅alkyl, C₁-C₅haloalkyl, C₁-C₅alkoxy, C₁-C₅haloalkoxy, C₃-C₆cycloalkyl, -CN, -CO-R₁₆, -NR₁₆R₁₇, -NR₂-CO-R₁₆, -NR₃-CO-OR₁₆, -NR₂-CO-NR₁₆R₁₇, -NR₂-CO-SR₁₆, -NR₂-CS-OR₁₆, -NR₂-CS-NR₁₆R₁₇, -NR₂-CS-SR₁₆, C₁-C₅alkythio, C₁-C₅alkylsulfanyl, C₁-C₅alkylsulfonyl, C₁-C₅haloalkythio, C₁-C₅haloalkylsulfanyl, C₁-C₅haloalkylsulfonyl, -NR₂-SO₂-NR₁₆R₁₇, nitro, cyano and -CS-NH₂; or the optional substituents R₁₅ and R₂₀ of Ar₁ and Ar₂ are selected from the group comprising C₁-C₅alkyl, C₁-C₅haloalkyl, C₁-C₅alkoxy, C₁-C₅haloalkoxy and C₃-C₆cycloalkyl; or the optional substituents R₁₅ and R₂₀ of Ar₁ and Ar₂ are selected from the group comprising bromo, chloro, fluoro, iodo, cyano, hydroxy, amino, nitro, methyl, ethyl, propyl, isopropyl, methoxy, ethoxy, propoxy, isopropoxy, allyloxy, propargyloxy, benzylxy, trifluoromethyl, trifluoromethoxy, 2-cyano-2-methyl-butyloxy, methylsulfonyl, methylsulfanyl, methylthio, cyclopentyl, cyclohexyl, aminocarbonylmethyl, methoximinoethyl, aminocarbonyl, butylcarbonylamino, tert-butylcarbonylamino, triazol-1-ylmethyl, 1,2,4-triazol-1-ylmethyl, N-morpholinocarbonylamino, aminocarbonyloxy-ethoxy, morpholinocarbonyloxyethoxy and cyanopyridyloxyethoxy; or the optional substituents R₁₅ and R₂₀ of Ar₁ and Ar₂ are selected from the group comprising bromo, chloro, fluoro, methyl, ethyl, methoxy, ethoxy, trifluoromethyl and trifluoromethoxy; or

the optional substituent R₂₁ on Ar₂ is selected from optionally substituted phenyl, optionally substituted imidazolyl, optionally substituted thiazoloyloxy, optionally substituted pyridyl, optionally substituted pyridinyl, optionally substituted pyrimidinyl and optionally substituted oxadiazolyl, optionally substituted triazolyl, optionally substituted pyrazolyl, optionally substituted oxadiazolyloxy, optionally substituted
triazolylkoxy and optionally substituted pyrazolylkoxy; or the optional substituent \( R_{21} \) on \( Ar_{2} \) is selected from halogen, \( C_{1}-C_{6} \)alkyl, \( C_{1}-C_{6} \)haloalkyl, \( C_{1}-C_{6} \)alkoxy, -CN, -\( NO_{2} \), -\( NR_{1}\)R\(_{17}\), -\( CO-R_{18}\) and the acyclic or cyclic ketals and acetals of -\( CO-R_{18}\); or the optional substituent \( R_{21} \) on \( Ar_{2} \) is selected from -\( CO-R_{18}\), -\( O-CO-R_{18}\), optionally substituted phenyl, optionally substituted phenoxy, optionally substituted imidazolyl, optionally substituted imidazolyloxy, optionally substituted thiazolyl, optionally substituted thiazolyl, optionally substituted thiazolyl, optionally substituted thiadiazolyl, optionally substituted thiadiazolyl, optionally substituted pyridyloxy, optionally substituted pyridyl, optionally substituted pyrimidinyloxy, optionally substituted pyrimidinyl, optionally substituted oxadiazolyl, optionally substituted oxadizyl, optionally substituted oxadizyl, optionally substituted triazolyl, optionally substituted pyrazolyl, optionally substituted triazolyloxy and optionally substituted pyrazolyl; or the optional substituent \( R_{21} \) on \( Ar_{2} \) is selected from -\( CO-C_{1}-C_{6} \)alkyl, -\( O-CO-C_{1}-C_{6} \)alkyl and -\( CO-C_{1}-C_{6} \)alkoxy; or the optional substituent \( R_{21} \) on \( Ar_{2} \) is selected from aminocarbonyl, dimethylaminocarbonyl, acetyl, propanoyl, acetoxy, methoxycarbonyl, ethoxycarbonyl, benzoyl, methoximinoethyl, 1-imidazolyl, 5-(3-methyl-1,2,4-thiadiazolyl), 2-pyridyl, 2-pyridyloxy, 4-pyrimidinyl, 2-(3,5-dichloropyridyloxy), 2-(4,6-dichloropyridyloxy), 2-(4,6-dimethoxypyrimidinylthio), 2-oxadiazolyl, 2-(5-methyl-oxadiazolyl), 2-(5-ethyl-oxadiazolyl), 1-triazolyl, 1-pyrazolyl, 1-(3,4-dimethylpyrazolyl), 4-(2-methylthiazolyl), 2-(1,3,4-oxadiazolyl), N-pyrrolidin-2-onyl, and 2-quinoxalinyl, or \( R_{1}, R_{2}, R_{5}, R_{6}, R_{7} \) and \( R_{8} \) independently of each other stand for hydrogen or methyl; or \( R_{1} \) and \( R_{5} \) are independently of each other \( C_{1}-C_{6} \)alkyl and \( R_{2} \) and \( R_{6} \) are hydrogen; or \( R_{3} \) is hydrogen or \( C_{1}-C_{6} \)alkyl optionally substituted with \( C_{1}-C_{6} \)alkoxy, \( C_{6}-C_{6} \)alkenlyloxy, or \( C_{3}-C_{3} \)alkynlyloxy; or \( R_{3} \) is hydrogen, \( C_{1}-C_{6} \)alkyl or \( C_{1}-C_{6} \)alkoxy-\( C_{1}-C_{6} \)alkyl; or \( R_{4} \) is hydrogen or \( C_{1}-C_{6} \)alkyl optionally substituted with halogen, \( C_{1}-C_{6} \)alkoxy, \( C_{1}-C_{6} \)alkylamino or \( di-C_{1}-C_{6} \)alkylamino; or \( R_{4} \) is hydrogen, \( C_{1}-C_{6} \)alkyl or \( C_{1}-C_{6} \)haloalkyl or \( R_{4} \) is \( C_{1}-C_{6} \)alkyl or \( C_{1}-C_{6} \)haloalkyl; or \( Y \) stands for \( O-R_{9} \), where \( R_{9} \) is hydrogen, substituted \( C_{1}-C_{6} \)alkyl; \( C_{6}-C_{6} \)alkenly, \( C_{3}-C_{3} \)alkynly, phenyl, 4-halogenophenyl; \( R_{10} \) and \( R_{11} \) independently of each other stand for hydrogen; \( C_{1}-C_{6} \)alkyl optionally substituted by halogen, \( C_{1}-C_{6} \)haloalkyl, \( C_{1}-C_{6} \)alkoxy, \( C_{1}-C_{6} \)alkylamino, \( di(C_{1}-C_{6} \)alkyl)amino, or ary which in turn is optionally substituted by halogen, \( C_{1}-C_{6} \)alkyl, \( C_{1}-C_{6} \)haloalkyl, \( C_{1}-C_{6} \)alkoxy or \( -CN \); or stand for \( C_{6}-C_{6} \)alkenly optionally substituted by halogen, \( C_{1}-C_{6} \)haloalkyl, \( C_{1}-C_{6} \)alkoxy, \( C_{1}-C_{6} \)alkylamino, \( di(C_{1}-C_{6} \)alkyl)amino, or aryl which in turn is optionally substituted by
halogen, C₁-C₅alkyl, C₁-C₅haloalkyl, C₁-C₅alkoxy or -CN; or
stand for C₃-C₆alkynyl optionally substituted by halogen, C₁-C₅haloalkyl, C₁-C₅alkoxy,
C₁-C₅alkylamino, di(C₁-C₅alkyl)amino, aryl which in turn is optionally substituted by
halogen, C₁-C₅alkyl, C₁-C₅haloalkyl, C₁-C₅alkoxy or -CN; or stand for a group
-NH-CH(R₁₂)CO-Z; or R₁₀ and R₁₁ together form a 5-ring-membered non-aromatic
carbocyclic ring; or together form a 6-ring-membered non-aromatic carbocyclic ring which is
interrupted by -O-, -S- or -N(C₁-C₅alkyl)-;
R₁₂ designates C₁-C₅alkyl optionally substituted by halogen, C₁-C₅haloalkyl or aryl which in
turn is optionally substituted by halogen, C₁-C₅alkyl, C₁-C₅haloalkyl, C₁-C₅alkoxy, hydroxyl or
-CN;
Z is -OR₆; NR₁₃R₂₀; R₁₃ and R₂₀ independently of each other stand for hydrogen; C₁-C₅alkyl
optionally substituted by halogen, C₁-C₅haloalkyl, C₁-C₅alkoxy, C₁-C₅alkylamino,
di(C₁-C₅alkyl)amino, or aryl which in turn is optionally substituted by halogen, C₁-C₅alkyl,
C₁-C₅haloalkyl, C₁-C₅alkoxy or -CN; or stand for C₃-C₅alkynyl optionally substituted by
halogen, C₁-C₅haloalkyl, C₁-C₅alkoxy, C₁-C₅alkylamino, di(C₁-C₅alkyl)amino, or aryl which in
turn is optionally substituted by halogen, C₁-C₅alkyl, C₁-C₅haloalkyl, C₁-C₅alkoxy or -CN; or
stand for C₃-C₅alkynyl optionally substituted by halogen, C₁-C₅haloalkyl, C₁-C₅alkoxy,
C₁-C₅alkylamino, di(C₁-C₅alkyl)amino, or aryl which in turn is optionally substituted by
halogen, C₁-C₅alkyl, C₁-C₅haloalkyl, C₁-C₅alkoxy or -CN; or R₁₃ and R₂₀ together form a
5-ring-membered non-aromatic carbocyclic ring; or together form a 6-ring-membered non-
aromatic carbocyclic ring which is interrupted by -O-, -S- or -N(C₁-C₅alkyl)-;
W is -O-; or
X is a direct bond; or
the suffixes (a) and (b) designate the number 1; or
the suffix (c) stands for the number zero.

In a further embodiment of the invention, the subgroup of formula I is wherein Ar₁ and Ar₂
independently of each other stand for optionally substituted phenyl; and the optional
substituents R₁₆ of Ar₁ are preferably selected from the group comprising halogen,
C₁-C₅alkyl, C₁-C₅haloalkyl, C₁-C₅alkoxy, C₁-C₅haloalkoxy, C₃-C₆cycloalkyl, -CN and -CO-R₁₆;
and the optional substituents R₂₀ of Ar₂ are preferably selected from the group comprising
halogen, C₁-C₅alkyl, C₁-C₅haloalkyl, C₁-C₅alkoxy, C₁-C₅haloalkoxy, C₃-C₆cycloalkyl, -CN,
-CO-R₁₈, -NR₁₆R₁₇, -NR₂²-CO-R₁₆, -NR₂³-CO-OR₁₆, -NR₂²-CO-NR₁₆R₁₇, -NR₂²-CO-SR₁₆,
-NR₂²-CS-OR₁₆, -NR₂²-CS-NR₁₆R₁₇, -NR₂²-CS-SR₁₆, C₁-C₅alkylthio, C₁-C₅alkylsulfinyl,
C₁-C₂alkylsulfonyl, C₁-C₂haloalkylthio, C₁-C₂haloalkylsulfanyl, C₁-C₂haloalkylsulfonyl, -NR₂-SO₂-NR₁₆R₁₇, nitro, cyano and -CS-NH₂; and the optional substituent R₂₁ on Ar₂ is selected from optionally substituted phenyl, optionally substituted imidazolyl, optionally substituted thiazolyl, optionally substituted pyridyl, optionally substituted pyrimidinyloxy, optionally substituted pyrimidinyl, optionally substituted oxadiazolyl, optionally substituted triazolyl, optionally substituted pyrazolyl, optionally substituted oxadiazolyl, optionally substituted triazolyl and optionally substituted pyrazolyl.

Further preferred subgroups are those wherein

A) Ar₁ and Ar₂ independently stand for optionally substituted aryl groups; and the optional substituents R₁₅ of Ar₁ are preferably selected from the group comprising halogen, C₁-C₅alkyl, C₁-C₅haloalkyl, C₁-C₅alkoxy, C₁-C₅haloalkoxy, C₃-C₆cycloalkyl, -CN and -CO-R₁₆; and the optional substituents R₂₀ of Ar₂ are preferably selected from the group comprising halogen, C₁-C₅alkyl, C₁-C₅haloalkyl, C₁-C₅alkoxy, C₁-C₅haloalkoxy, C₃-C₆cycloalkyl, -CN, -CO-R₁₈, -NR₁₆R₁₇, -NR₂-CO-R₁₆, -NR₃-CO-OR₁₆, -NR₂-CO-NR₁₆R₁₇, -NR₂-CO-SR₁₆, -NR₂-CS-OR₁₆, -NR₂-CS-NR₁₆R₁₇, -NR₂-CS-SR₁₆, C₁-C₅alkylthio, C₁-C₅alkylsulfanyl, C₁-C₅alkylsulfonyl, C₁-C₅haloalkylthio, C₁-C₅haloalkylsulfanyl, C₁-C₅haloalkylsulfonyl, -NR₂-SO₂-NR₁₆R₁₇, nitro, cyano and -CS-NH₂; and

the optional substituent R₂₁ on Ar₂ is selected from halogen, C₁-C₅alkyl, C₁-C₅haloalkyl, C₁-C₅alkoxy, -CN, -NO₂, -NR₁₆R₁₇, -CO-R₁₈ and the acyclic or cyclic ketals and acetals of -CO-R₁₈; -O-CO-R₁₈, optionally substituted phenyl, optionally substituted imidazolyl, optionally substituted thiazolyl, optionally substituted pyridyl, optionally substituted pyrimidinyloxy, optionally substituted pyrimidinyl, optionally substituted oxadiazolyl, optionally substituted triazolyl, optionally substituted pyrazolyl, optionally substituted oxadiazolyl, optionally substituted triazolyl and optionally substituted pyrazolyl; and

R₁, R₂, R₅, R₆, R₇ and R₈ independently of each other are hydrogen or methyl; and

R₉ is hydrogen or C₁-C₅alkyl optionally substituted with C₁-C₄alkoxy, C₃-C₄alkenyl, or C₂-C₅alkynyl; and

R₄ is hydrogen or C₁-C₅alkyl optionally substituted with halogen, C₁-C₅alkoxy, C₁-C₅alkylamino or di-C₁-C₅alkylamino; and

W is -O-; and

Y is OR₉, where R₉ is hydrogen, C₁-C₅alkyl; C₃-C₅alkenyl, C₃-C₅alkynyl, 4-halogenophenyl or
Y is NR_{10}R_{11} and R_{10} and R_{11} independently of each other, stand for hydrogen; C_{1}-C_{6}alkyl, or aryl which in turn is optionally substituted by halogen, C_{1}-C_{6}alkyl, C_{1}-C_{6}haloalkyl, C_{1}-C_{6}alkoxy or -CN; or stand for C_{3}-C_{6}alkenyl; or stand for C_{3}-C_{6}alkynyl; or stand for a group -NH-CH(R_{12})CO-Z; or R_{10} and R_{11} together form a 5-ring-membered non-aromatic carbocyclic ring; or together form a 6-ring-membered non-aromatic carbocyclic ring which is interrupted by -O-, -S- or -N(C_{1}-C_{6}alkyl)-;
R_{12} designates C_{1}-C_{6}alkyl;
Z is -OR_{9}, NR_{13}R_{14}, R_{13} and R_{14} independently of each other, stand for hydrogen; C_{1}-C_{6}alkyl, or aryl which in turn is optionally substituted by halogen, C_{1}-C_{6}alkyl, C_{1}-C_{6}haloalkyl, C_{1}-C_{6}alkoxy or -CN; or stand for C_{3}-C_{6}alkenyl; or stand for C_{3}-C_{6}alkynyl; or stand for a group -NH-CH(R_{12})CO-Y; or R_{13} and R_{14} together form a 5-ring-membered non-aromatic carbocyclic ring; or together form a 6-ring-membered non-aromatic carbocyclic ring which is interrupted by -O-, -S- or -N(C_{1}-C_{6}alkyl)-;
X is a direct bond; and
the suffixes (a) and (b) designate the number 1; and
the suffix (c) stands for the number zero; or wherein
B) Ar_{1} and Ar_{2} independently of each other stand for optionally substituted phenyl; and the optional substituents R_{15} and R_{30} of Ar_{1} and Ar_{2} are selected from the group comprising C_{1}-C_{6}alkyl, C_{1}-C_{6}haloalkyl, C_{1}-C_{6}alkoxy, C_{1}-C_{6}haloalkoxy and C_{3}-C_{6}cycloalkyl; and the optional substituent R_{21} on Ar_{2} is selected from -CO-C_{1}-C_{6}alkyl, -CO-C_{1}-C_{6}alkoxy, -O-CO-C_{1}-C_{6}alkyl, optionally substituted phenyl, optionally substituted phenoxy, optionally substituted imidazolyl, optionally substituted imidazolylxoxo, optionally substituted thiazolylxoxo, optionally substituted thiazoyl, optionally substituted thiazolyl, optionally substituted thiadiazolylxoxo, optionally substituted thiadiazoyl, optionally substituted pyridylxoxo, optionally substituted pyridyl, optionally substituted pyrimidinyloxo, optionally substituted pyrimidinylox, optionally substituted oxadiazoyl, optionally substituted oxadiazolyl, optionally substituted oxadiazolyl, optionally substituted triazolyl, optionally substituted pyrazolyl, optionally substituted triazolyl and optionally substituted pyrazoyl; and R_{1} and R_{5} are independently C_{1}-C_{6}alkyl and R_{2} and R_{6} are hydrogen; and
R_{3} is hydrogen, C_{1}-C_{6}alkyl or C_{1}-C_{6}alkoxy-C_{1}-C_{6}alkyl; and
R_{4} is C_{1}-C_{6}alkyl or C_{1}-C_{6}haloalkyl; and
W is -O-; and
Y is OR_{9}, where R_{9} is hydrogen, C_{1}-C_{6}alkyl; C_{3}-C_{6}alkenyl, C_{3}-C_{6}alkynyl, 4-halogenophenyl; X is a direct bond; and
the suffixes (a) and (b) designate the number 1; and
the suffix (c) stands for the number zero; or wherein

C) Ar₁ and Ar₂ independently of each other stand for optionally substituted phenyl; and
the optional substituents R₁₅ and R₂₀ of Ar₁ and Ar₂ are selected from the group comprising
bromo, chloro, fluoro, iodo, cyano, hydroxy, amino, nitro, methyl, ethyl, propyl, isopropyl,
methoxy, ethoxy, propoxy, isoproproxy, allyloxy, propargyloxy, benzylxy, trifluoromethyl,
trifluoromethoxy, 2-cyano-2-methyl-butyloxy, methylsulfonyl, methylsulfinyl, methylthio,
cyclopentyl, cyclohexyl, aminocarboxynylmethyl, methoximinoethyl, aminocarboxynyl,
butylcarboxyamino, tert-butylcarboxyamino, triazol-1-ylmethyl, 1,2,4-triazol-1-ylmethyl,
N-morpholinocarboxyamino, aminocarboxyloxy-ethoxy, morpholinocarboxyloxy-ethoxy and
cyanopyridoxyethoxy; and

the optional substituent R₂₁ on Ar₂ is selected from aminocarboxynyl, dimethylaminocarboxynl,
acetyl, propionyl, acetoxyl, methoxycarboxynl, ethoxycarboxynl, benzoyl, methoximinoethyl,
1-imidazolyl, 5-(3-methyl-1,2,4-thiadiazolyl), 2-pyridyl, 2-pyridyloxy, 4-pyrimidinyl,
2-(3,5-dichloropyridyloxy), 2-(4,6-dichloropyridyloxy), 2-(4,6-dimethoxypyrimidinythio),
2-oxadiazolyl, 2-(5-methyl-oxadiazolyl), 2-(5-ethyl-oxadiazolyl), 1-triazolyl, 1-pyrazolyl,
1-{3,4-dimethylpyrazolyl}, 4-{2-methylthiazolyl}, 2-{1,3,4-oxydiazolyl}, N-pyrrolidin-2-onyl,
and 2-quinoxalinyll, and

R₁ and R₅ are independently C₁-C₅ alkyl and R₂ and R₆ are hydrogen; and

R₃ is hydrogen, C₁-C₅ alkyl or C₁-C₅ alkoxy-C₁-C₅ alkyl; and

R₄ is C₁-C₅ alkyl or C₁-C₅ haloalkyl; and

W is –O–; and Y is OR₆, where R₆ is hydrogen, C₁-C₅ alkyl, C₂-C₅ alkenyl, C₃-C₅ alkynyl,
4-halogenophenyl;

X is a direct bond; and

the suffixes (a) and (b) designate the number 1; and

the suffix (c) stands for the number zero; or wherein

D) Ar₁ and Ar₂ independently of each other stand for optionally substituted phenyl; and
the optional substituents R₁₅ and R₂₀ of Ar₁ and Ar₂ are selected from the group comprising
bromo, chloro, fluoro, methyl, ethyl, methoxy, ethoxy, trifluoromethyl and trifluoromethoxy;
and the optional substituent R₂₁ on Ar₂ is selected from aminocarboxynyl, acetyl,
methoxycarboxynl, ethoxycarboxynl, 1-imidazolyl, 5-(3-methyl-1,2,4-thiadiazolyl), 2-pyridyl,
2-pyridyloxy, 4-pyrimidinyl, 2-(3,5-dichloropyridyloxy), 2-(4,6-dimethoxypyrimidinythio),
2-oxadiazolyl, 2-(5-methyl-oxadiazolyl), 2-(5-ethyl-oxadiazolyl), 1-{1,2,4-triazolyl},
1-pyrazolyl, 4-{2-methylthiazolyl}, 2-{1,3,4-oxydiazolyl}, and N-pyrrolidin-2-onyl, and
R₁ and R₅ are methyl and R₂ and R₆ are hydrogen; and
R₃ is hydrogen, methyl, ethyl, propyl, ethoxymethyl or methoxymethyl, and
R₄ is methyl, ethyl, propyl or fluoromethyl; and
W is -O-; and
Y is OR₉, where R₉ is hydrogen, C₁-C₆alkyl or halogenophenyl, or Y is NR₁₀R₁₁;
X is a direct bond; and
the suffixes (a) and (b) designate the number 1; and
the suffix (c) stands for the number zero.
In particular, R₉ is methyl, ethyl, propyl, isopropyl, n-butyl, iso-butyl, tert.-butyl,
4-chlorophenyl, or 2-methylprop-1-yl;
R₁₀ and R₁₁ are hydrogen, methyl, ethyl, methoxy, ethoxy, 4-methoxyphenyl,
4-methoxybenzyl, 4-chlorophenyl, propargyl, 1-phenyleth-1-yl, 2-(3,4-dimethoxy)eth-1-yl;
preferably, if R₁₀ and R₁₁ together form a 5- or 6-ring-membered ring, said ring is a
pyrroloidine ring, a morpholine ring or a piperidine ring.

In a further embodiment of the invention, the compound of formula I is a compound of
formula Ia

```
  \[ \left( R_{15} \right)_{n} \]
  \[ R_{1} \]
  \[ S \]
  \[ N \]
  \[ O \]
  \[ O \]
  \[ R_{21} \]
  \[ R_{20} \]
  \[ R_{3} \]
  \[ R_{4} \]
  \[ R_{5} \]
  \[ R_{6} \]
  \[ R_{7} \]
  \[ R_{8} \]
```

wherein
R₁, R₂, and R₈ are hydrogen or methyl;
R₃ is hydrogen, methyl, ethoxymethyl;
R₄ is methyl, ethyl, propyl, isopropyl, fluoromethyl;
R₅ is hydrogen, methyl or ethyl;
R₁₅ is hydrogen, fluoro, chloro, bromo, iodo, more specifically, 2-fluoro, 4-chloro or 4-fluoro;
R₂₀ is hydrogen, 3-methyl, 4-methyl, 4-isopropyl, 4-propen-1-yl, 4-propin-1-yl, 4-cyano,
4-hydroxy, 3-methoxy, 4-methoxy, 4-ethoxy, 4-methylthio, 4-methylsulfonyl, 4-trifluorome-thyl, 4-fluoro, 2-chloro, 3-chloro, 4-chloro, 4-bromo, 4-iodo, 2,3-dichloro, 3,4-dichloro or
2,4-dichloro;
R₂₁ is hydrogen, aminocarbonyl, dimethylaminocarbonyl, acetyl, propionyl, acetoxy,
methoxycarbonyl, ethoxycarbonyl, benzoyl, methoximinoethyl, 1-imidazolyl, 5-(3-methyl-1,2,4-thiadiazolyl), 2-pyridyl, 2-pyridyloxy, 4-pyrimidinyl, 4-(4-thiaimidazolyl),
2-(3,5-dichloropyridyloxy), 2-(4,6-dichloropyridyloxy), 2-(4,6-dimethoxyloxymethyl),
2-oxadiazolyl, 2-(5-methyl-oxadiazolyl), 2-(5-ethyl-oxadiazolyl), 1-triazolyl, 1-pyrazolyl, 1-(3,4-dimethylpyrazolyl), 1-(3,5-dimethylpyrazolyl), 4-(2-methylthiazolyl), 1-(4-trifluoromethylthiazolyl oxy), 2-(1,3,4-oxydiazolyl), N-pyrrolidin-2-onyl, and 2-quinoxalinyll; Y is hydrogen, hydroxy, methoxy, ethoxy, isopropoxy, 4-chlorophenoxy, amino, methylamino, ethylamino, n-butylamino, dimethylamino, methylmethoxyamino, propargylamino, 4-methoxyphenylamino, 4-chlorophenylamino, 1-phenylethylamino, morpholino, 4-methoxybenzylamino, 3,4-dimethoxyphenethylamino.

Preferred individual compounds are:
2,N-dimethyl-2-phenylmethanesulfonylamino-3-([1,2,4]triazol-1-yl-phenoxy)-propionamide, 2-methyl-2-phenylmethanesulfonylamino-3-([1,2,4]triazol-1-yl-phenoxy)-propionic acid methyl ester, 2-methyl-2-phenylmethanesulfonylamino-3-([1,2,4]triazol-1-yl-phenoxy)-propionamide, N-(4-chloro-phenyl)-2-methyl-2-phenylmethanesulfonylamino-3-([1,2,4]triazol-1-yl-phenoxy)-propionamide, N-(3-trifluoro-phenyl)-2-methyl-2-phenylmethanesulfonylamino-3-([1,2,4]triazol-1-yl-phenoxy)-propionamide, N-(1-phenyl-ethyl)-2-methyl-2-phenylmethanesulfonylamino-3-([1,2,4]triazol-1-yl-phenoxy)-propionamide, N-[2-(3,4-dimethoxy-phenyl)-ethyl]-2-methyl-2-phenylmethanesulfonylamino-3-([1,2,4]triazol-1-yl-phenoxy)-propionamide, 3-(4-ethoxy-phenoxy)-2,N-dimethyl-2-phenylmethanesulfonylamino-propionamide, 3-(4-thoxy-phenoxy)-2-methyl-N-(1-phenyl-ethyl)-2-phenylmethanesulfonylamino-propionamide, 3-(4-ethoxy-phenoxy)-2-methyl-N-(4-methoxy-benzyl)-2-phenylmethanesulfonylamino-propionamide, 2-(4-ethoxy-phenoxy)methyl]-2-phenylmethanesulfonylamino-butryamide, 3-(4-ethoxy-phenoxy)-2-methyl-N-[2-(3,4-dimethoxy-phenyl)-ethyl]-2-phenylmethanesulfonylamino-propionamide, 3-(4-ethoxy-phenoxy)-2,N,N-trimethyl-2-phenylmethanesulfonylamino-propionamide, 3-(4-ethoxy-phenoxy)-2-methyl-2-phenylmethanesulfonylamino-N-prop-2-ynyl-propionamide, 3-(4-ethoxyphenoxy)-2-methyl-2-phenylmethanesulfonylamino-1-morpholin-4-yl-propan-
one, 
3-(4-ethoxy-phenoxy)-N-methoxy-2,N-dimethyl-2-phenylmethanesulfonlamino-
propionamide, 
N-methoxy-2-methyl-2-phenylmethanesulfonlamino-3-(4-[1,2,4]triazol-1-yl-phenoxy) propionamide, 
N-(1-ethynyl-cyclohexyl)-2-methyl-2-phenylmethanesulfonlamino-3-(4-[1,2,4]triazol-1-yl-
phenoxy)-propionamide, and 
3-(4-ethoxy-phenoxy)-2-methyl-2-phenylmethanesulfonlamino- propionic acid methyl ester.

Surprisingly, with developing the compounds of formula I a new type of microbiocides has 
been provided which satisfies to a greater extend the need for an agent for controlling 
phytopathogenic microorganisms on crop plants having a high level of activity, paired with 
long lasting effective protection.

The compounds of formula I and the respective starting materials may be obtained 
according to the processes of Schemes 1 to 6.

Scheme 1:

\[
\begin{align*}
\text{Ar}_1 & \quad \text{X} \\
\text{R}_2 & \quad \text{a} \\
\text{II} & \\
\text{R}_1 & \quad \text{SO} \\
\text{O} & \quad \text{A} \\
\text{III} & \\
\text{R}_3 & \quad \text{N} \\
\text{R}_4 & \quad \text{R}_5 \\
\text{W} & \quad \text{Y} \\
\text{R}_6 & \quad \text{b} \\
\text{R}_7 & \quad \text{c} \\
\text{Ar}_2 & \quad \rightarrow \\
\text{l} & \\
\end{align*}
\]

wherein \(\text{Ar}_1, \text{Ar}_2, \text{a}, \text{b}, \text{c}, \text{W}, \text{Y}\) and \(\text{R}_1\) to \(\text{R}_8\), are defined as under formula I, and \(\text{A}\) stands 
for a leaving group like an anhydride, i.e. -O-SO_2-(CR_1R_2)_a-X-Ar_1 or -O-CO-C_1-C_alkyl, but 
preferably for halogen, especially bromine or more preferably chlorine.

The compounds of formula I may be prepared by sulfonylation of an \(\alpha\)-amino-acid derivative 
of formula III with a sulfonyl-halide / anhydride of formula II wherein \(\text{A}\) is a leaving group, 
Suitable solvents for this reaction include ketones, such as acetone and methylethylketone, 
halogenated hydrocarbons such as chloroform, carbontetrachloride, dichloromethane, 
dichloro-ethane, aromatic hydrocarbons such as toluene or xylene, ethers such as t-butyl-
ethyl-ether, di-ethyl-ether, tetrahydrofuran and dioxane. The reaction is performed preferen-
tially in the presence of a base and a catalyst. Typical bases include tertiary amines 
such as trimethylamine, triethylamine, diisopropylethylamine, dimethyl-aniline, diazabi-cyc-
looctane and N-methylmorpholine, aromatic amines such pyridine and quinoline as well as inorganic bases such as alkaline bicarbonates or -carbonates. Typical salts are for example sodium and potassium bicarbonate and sodium, potassium or cesium carbonate. Suitable catalysts such as N,N-dialkyl- or cyloalkyl-aminopyridines, like e.g. 4-N,N-dimethylaminopyridine, may improve the yield.

The substituents R₃ may be introduced into the final active ingredients when starting from the subgroup compounds of formula I wherein R₃ is hydrogen, by reacting them e.g. with an alkylating agent R₃-A wherein A' designates a leaving group, preferably a halogen atom, e.g. bromo or chloro. Suitable alkylating agents thus include suitably substituted alkylhalides or alkyl-O-sulfonates, e.g. or alkoxy-alkylhalides. On the other hand, when introducing R₃ with the starting compounds of formula III, alkylating of the compounds of the subgroup of formula III, wherein R₃ is hydrogen, may be achieved in a similar way by any commonly known alkylation method. Such alkylation prior to sulfonylation with a compound of formula II, as alternative to converting R₃ within the final products of formula I, allows to introduce a wide variety of radicals R₃ while leaving the choice to decide at which stage such optional conversion is preferably performed.

α-Amino-acid derivatives of formula III may easily be prepared by the so-called Strecker – Synthesis according to Scheme 2 as described e.g. generically in any textbook on organic chemistry, or in a procedure disclosed in the patent literature (EP-A-953565-A; Nihon Noyaku or US 3,529,019, Colgate-Palmolive) starting from the corresponding ketone of formula IV.

**Scheme 2**

![Scheme 2 Diagram](image)
Preparation of the ketones / intermediate aminonitriles are described in patent application nos. GB 0214116.6 and PCT/EP03/06482, which are incorporated by reference for all useful purposes.

Further methods to prepare sulfonylation agent of formula II are known to the artisan. General ways of preparing such compounds are e.g. described in Houben Weyl, Vol. E11, p 1067 ff (1985).

Another synthesis to prepare compounds of formula I is described in Scheme 3.

Scheme 3

\[
\begin{align*}
\text{Ar}_1^{-}X' & \quad + \quad \text{L} \quad \text{O} \quad \text{S} \quad \text{N} \quad \text{O} \quad \text{W} \quad \text{Y} \quad \text{Ar}_2 \\
\text{R}_1 & \quad \text{R}_2 & \quad \text{R}_3 & \quad \text{R}_4 & \quad \text{R}_5 & \quad \text{W} & \quad \text{R}_6 & \quad \text{R}_7 & \quad \text{Ar}_2
\end{align*}
\]

Compounds of formula (V) wherein \( \text{Ar}_2, a, b, c, W, Y \) and \( R_1 \) to \( R_8 \) are defined as under formula I and \( L \) is a leaving group such as e.g. halogen, preferably chlorine, bromine or iodine or a sulfonyloxy group such as e.g. methylsulfonyloxy-, tolylsulfonyloxy- or trifluoromethylsulfonyloxy-group, is coupled with a compound of formula \( \text{Ar}_1^{-}X' \) wherein \( X' \) is either an anionic radical species of \( X \) such as \( \text{O}^- \), \( \text{S}^- \), \( \text{SO}^- \), \( \text{SO}_2^- \) combined with an alkaline- or earthalkaline- metal cation as counterion or is defined as \( X^{-} \text{H} \) such as \( \text{OH}^{-}, \text{SH}^{-}, \text{NHR}_3^- \). In this case the reactions are generally carried out in the presence of a base such as alkaline-, earthalkaline-carbonates or hydrogenocarbonates such e.g. sodium or potassium-carbonate, sodium or potassium-hydrogen-carbonate, cesium-carbonate or an agent capable of scavenging the formed acid.

\( \alpha \)-Aminoacids of formula (III) wherein \( \text{Ar}_1, \text{Ar}_2, a, b, c, W, Y \) and \( R_1 \) to \( R_8 \), are defined as under formula I, may also be prepared by adaptation of methods developed by Seebach (Angew. Chem. Int. Ed. 1996, 35, 2708-2748) as described in Scheme 4. The methods described by Seebach allow both the preparation of racemic and of enantiomerically pure aminoacids of either absolute configuration.
Scheme 4:

Scope and limitations with respect of stereochemistry and the substituents are well known from the literature. The symbol T in formula (VI) designates a protecting group such as the t-butyloxy carbonyl- or benzyl oxy carbonyl- groups, often referred to as (BOC)- or (Z)-groups. L designates a leaving group as defined above. Consecutive alkylation of compounds (VI), which may be either racemic or a pure enantiomer of either configuration yields, following the rules elaborated by Seebach, through the intermediate compounds (IX) and (X) compounds (III) in racemic form or as pure enantiomers of either configuration.

Yet another way to prepare intermediate amino acid derivatives of formula (III) is described in Scheme 5. Alkylation of malonic-acid derivatives of formula (XI), where R stands for C1-C6-alkyl, preferably for methyl, with compounds (VIII), which themselves may be prepared as described e.g. in Acta Chemica Scandinavica, 53(1), 41-47 (1999) leads to compounds (XII) were Ar₂, R₅ - R₆,b,c and W are defined as above. Hydrolysis of compounds of formula (XII) by alkali- or earthalkali-bases in solvents like alcohols with addition of water gives the mono-ester derivatives of formula (XIII). In analogy to methods described in the literature (F. Björkling et al. Tetrahedron 1985, 41(7), 1347) enantiomerically pure compounds of formula (XIII) may be obtained by kinetic resolution using ester hydrolysing enzymes such as esterases or more specifically pig liver esterases. The racemic or enantiomerically pure intermediates of formula (XIII) are then transformed to the compounds of formula (XIV) or (XV) by a Curtius rearrangement as e.g. described by K. Ninomiya, T. Shiori, S. Yamada, Tetrahedron 1974, 30, 2151. By transformations well known in the field of amino-acid chemistry intermediate compounds XIV respectively XV lead to compounds (III).
Scheme 5:

Yet another way to prepare intermediate amino acid derivatives of formula (III) is described in Scheme 6:

Oxiranes of formula XVI where R₅, R₆ are lower alkyl, in particular C₁-C₅-alkyl, or hydrogen and R₄ is defined as above are in a racemic form prepared by methods described in the general literature. Enantiomerically pure oxiranes of formula XVI are e.g. prepared by methods described by Sharpless (asymmetric Sharpless epoxidation). Transformations to the compounds XVII, XVIII and XIX and the ring opening of the aziridines of formula XXI where W means OH, SH, NH₂ are achieved in analogy to procedures described e.g. Castro et al, Tetrahedron Asymmetry 13 (2002) 1321-1325 or e.g. Goodman et al. J. org. Chem. 1995, 60, 790-791 or e.g. Pritchard et al. Tetrahedron,52 (40), 13035-13050 (1996).
Enantiomeric mixtures of formula I may be separated into the enantiomers by chromatography on chiral stationary phase or by classical methods of fractionated crystallization of diastereomeric salts of a suitable precursor and subsequent conversion into the desired products. Enantiomers or diastereoisomers may also be prepared by enantioselective or diastereoselective synthesis methods.

The compounds of formula I are oils or solids at room temperature and are distinguished by valuable microbiocidal properties. They can be used in the agricultural sector or related fields preventatively and curatively in the control of plant-destructive microorganisms. The compounds of formula I according to the invention are distinguished at low rates of concentration not only by outstanding microbiocidal, especially fungicidal, activity but also by being especially well tolerated by plants.

Surprisingly, it has now been found that the compounds of formula I have for practical purposes a very advantageous microbiocidal spectrum in the control of phytopathogenic microorganisms, especially fungi. They possess very advantageous curative and preventive properties and are used in the protection of numerous crop plants. With the compounds of formula I it is possible to inhibit or destroy phytopathogenic microorganisms that occur on various crops of useful plants or on parts of such plants (fruit, blossom, leaves, stems, tubers, roots), while parts of the plants which grow later also remain protected, for example, against phytopathogenic fungi.

The novel compounds of formula I prove to be effective against specific genera of the fungus class Fungi imperfecti (e.g. Cercospora), Basidiomycetes (e.g. Puccinia) and Ascomycetes (e.g. Erysiphe and Venturia) and especially against Oomycetes (e.g. Plasmopara, Peronospora, Pythium and Phytophthora). They therefore represent in plant protection a valuable addition to the compositions for controlling phytopathogenic fungi. The compounds of formula I can also be used as dressings for protecting seed (fruit, tubers, grains) and plant cuttings from fungal infections and against phytopathogenic fungi that occur in the soil.

The invention relates also to compositions comprising compounds of formula I as active ingredient, especially plant-protecting compositions, and to the use thereof in the agricultural sector or related fields.
In addition, the present invention includes the preparation of those compositions, wherein the active ingredient is homogeneously mixed with one or more of the substances or groups of substances described herein. Also included is a method of treating plants which is distinguished by the application of the novel compounds of formula I or of the novel compositions.

Target crops to be protected within the scope of this invention comprise, for example, the following species of plants: cereals (wheat, barley, rye, oats, rice, maize, sorghum and related species); beet (sugar beet and fodder beet); pomes, stone fruit and soft fruit (apples, pears, plums, peaches, almonds, cherries, strawberries, raspberries and blackberries); leguminous plants (beans, lentils, peas, soybeans); oil plants (rape, mustard, poppy, olives, sunflowers, coconut, castor oil plants, cocoa beans, groundnuts); cucurbitaceae (marrows, cucumbers, melons); fibre plants (cotton, flax, hemp, jute); citrus fruit (oranges, lemons, grapefruit, mandarins); vegetables (spinach, lettuce, asparagus, cabbages, carrots, onions, tomatoes, potatoes, paprika); lauraceae (avocado, cinnamon, camphor) and plants such as tobacco, nuts, coffee, sugar cane, tea, pepper, vines, hops, bananas and natural rubber plants, and also ornamentals.

The compounds of formula I are normally used in the form of compositions and can be applied to the area or plant to be treated simultaneously or in succession with other active ingredients. Those other active ingredients may be fertilisers, micronutrient donors or other preparations that influence plant growth. It is also possible to use selective herbicides or insecticides, fungicides, bactericides, nematicides, molluscicides or mixtures of several of those preparations, if desired together with further carriers, surfactants or other application-promoting adjuvants customarily employed in formulation technology.

The compounds of formula I can be mixed with other fungicides, resulting in some cases in unexpected synergistic activities. Such mixtures are not limited to two active ingredients (one of formula I and one of the list of other fungicides), but to the contrary many comprise more than one active ingredient of the component of formula I and more than one other fungicide. Mixing components which are particularly suited for this purpose include e.g. Azoles, such as azaconazole, bitertanol, bromuconazole, cyproconazole, difenoconazole, diniconazole, epoxiconazole, fenbuconazole, fluquinconazole, flusilazole, flutriafol, hexaconazole, imazalil, S-imazalil, imibenconazole, ipconazole, metconazole, myclobutanil,
oxpoconazole, pefurazoate, penconazole, pyriflum, prochloraz, propiconazole, prothioconazole, simeconazole, tebuconazole, tetraconazole, triadimefon, triadimenol, triflumizole and triticonazole; pyrimidinyl carbinols, such as ancymidol, fenarimol and nufarium; 2-amino- pyrimidines, such as bupirimate, dimethirimol and ethirimol; morpholines, such as dodemorph, fenpropidione, fenpropimorph, spiroxamine and tridemorph; anilinopyrimidines, such as cyproconil, mepanipyrim and pyrimethanil; pyroles, such as fenpiclonil and fludioxonil; phenylamides, such as benalaxyl, furalaxyl, metalaxyl, R-metalaxyl, ofurace and oxadixyl; benzimidazoles, such as benomyl, carbendazim, debacarb, feberidazole and thiabendazole; dicarboximides, such as chlorzoline, dichlozoline, iprodione, myclobzoline, procymidone and vinclozoline; carboxamides, such as carboxin, fenfuram, flutolanil, furametpyr, mepronil, oxycarboxin and thifluazamide; guanidines, such as guazatine, dodine and iminoctadine; strobilurines, such as azoxystrobin, dimoxystrobin (SSF-129), fluoxastrobin, kresoxim-methyl, metominostrobin, orysastrobin, picoxystrobin, pyraclostrobin and trifloxystrobin; dithiocarbamates, such as ferbam, mancozeb, maneap, metiram, propineb, thiram, zineb and ziram; N-halomethylthiotetraphthalimidines, such as captan, captan, dichlofluanid, fluoromides, folpet and tolylfluanid; Copper-compounds, such as Bordeaux mixture, copper hydroxide, copper oxychloride, copper sulfate, cuprous oxide, manccopper and oxine-copper; nitrophenol-derivatives, such as dinocap and nitrothial-isopropyl; organo-P-derivatives, such as edifenphos, iprobenphos, isoprothiolane, phosdiphen, pyrazophos and tolclofos-methyl; various others, such as acibenzolar-S-methyl, anilazine, bentiavilcarb, blasticidin-D, boscalid, chinomethionate, chloroneb, chlorothalonil, IKF-916 (proposed name cyazofamid), cyflufenamid, cymoxanil, dichlone, diclomezine, dicloran, diethofencarb, dimethomorph, ethaboxam, fenoxanil, SYP-LI90 (proposed name: flumorph), dithianon, etridiazole, famoxadone, fenamidone, fentin, ferimzone, fluazinam, flusulfamide, fenhexamid, fosetyl-aluminium, hymexazol, iprovalicarb, kasugamycin, methasulfocarb, metrafenone, pencycuron, phthalide, picobenzamid, polyoxins, probenazole, propamocarb, pyroquilon, proquinazid, quinoxyfen, quintozene, silthiofam, sulfur, triazole, triadilin, tricyclazole, triforine, validamycin, or zoxamide.

In the above mentioned mixtures, the mixture ratio of the active ingredients is so selected that it reaches optimal control of the phytopathogenic microorganism on the host plants. This ratio is in general between 100:1 and 1:100, more preferably between 10:1 and 1:10 of a compound of formula I vis-a-vis the second fungicide. The mixtures may not only comprise one of the listed combinational active ingredients, but may comprise more than
one additional active ingredients selected from that specified group, thus forming for example 3-way- or even 4-way-mixtures.

Suitable carriers and surfactants may be solid or liquid and correspond to the substances ordinarily employed in formulation technology, such as e.g. natural or regenerated mineral substances, solvents, dispersants, wetting agents, tackifiers, thickeners, binders or fertilisers. Such carriers and additives are described, for example, in WO 95/30651.

A preferred method of applying a compound of formula I, or an agrochemical composition comprising at least one of those compounds, is application to the foliage (foliar application), the frequency and the rate of application depending upon the risk of infestation by the pathogen in question. The compounds of formula I may also be applied to seed grains (coating) either by impregnating the grains with a liquid formulation of the active ingredient or by coating them with a solid formulation.

The compounds of formula I are used in unmodified form or, preferably, together with the adjuvants conventionally employed in formulation technology, and are for that purpose advantageously formulated in known manner e.g. into emulsifiable concentrates, coatable pastes, directly sprayable or dilutable solutions, dilute emulsions, wettable powders, soluble powders, dusts, granules, and by encapsulation in e.g. polymer substances. As with the nature of the compositions, the methods of application, such as spraying, atomising, dusting, scattering, coating or pouring, are chosen in accordance with the intended objectives and the prevailing circumstances.

Advantageous rates of application are normally from 1 g to 2 kg of active ingredient (a.i.) per hectare (ha), preferably from 10 g to 1 kg a.i./ha, especially from 25 g to 750 g a.i./ha. When used as seed dressings, rates of from 0.001 g to 5.0 g of active ingredient per kg of seed are advantageously used.

The formulations, i.e. the compositions, preparations or mixtures comprising the compound(s) (active ingredient(s)) of formula I and, where appropriate, a solid or liquid adjuvant, are prepared in known manner, e.g. by homogeneously mixing and/or grinding the active ingredient with extenders, e.g. solvents, solid carriers and, where appropriate, surface-active compounds (surfactants).
Further surfactants customarily used in formulation technology will be known to the person skilled in the art or can be found in the relevant technical literature.

The agrochemical compositions usually comprise 0.01 to 99 % by weight, preferably 0.1 to 95 % by weight, of a compound of formula I, 99.99 to 1 % by weight, preferably 99.9 to 5 % by weight, of a solid or liquid adjuvant, and 0 to 25 % by weight, preferably 0.1 to 25 % by weight, of a surfactant.

Whereas commercial products will preferably be formulated as concentrates, the end user will normally employ dilute formulations.

The compositions may also comprise further ingredients, such as stabilisers, antifoams, viscosity regulators, binders and tackifiers, as well as fertilisers or other active ingredients for obtaining special effects.

The Examples which follow illustrate the invention described above, without limiting the scope thereof in any way. Temperatures are given in degrees Celsius. The compounds are numbered with the compound number of the table given below.

**Preparation Examples:**

Example P1: 2-Methyl-2-phenylmethanesulfonlamino-3-(4-[1,2,4]triazol-1-yl-phenoxy)-propionic acid (Tab. 100)

\[
\begin{array}{c}
\text{H} \quad \text{S} \quad \text{N} \quad \text{CH}_3 \quad \text{H} \\
\text{O} \quad \text{H} \quad \text{O} \\
\text{O} \quad \text{N} \quad \text{N} \\
\end{array}
\]

15.9 g 2-[(4-[1,2,4]triazol-1-yl-phenoxy)-methyl]-2-benzylsulfonlamino-butyronitrile are added to 100 ml conc. hydrogen chloride solution with stirring. The suspension is heated to +60 °C for 4 hours, cooled to room temperature the formed solid is filtered off and thoroughly washed with water and re-crystallized from i-propanol. Yield 9.83 g white crystals. M.p. 148-151 °C
Example P2: 2-Methyl-2-phenylmethanesulfonlamino-3-(4-[1,2,4]triazol-1-yl-phenoxy)-propionamide (Tab.: 101)

1.98 g 2-[(4-[1,2,4]Triazol-1-yl-phenoxy)-methyl]-2-benzylsulfonylamino-butyronitrile, 1.3 g potassium hydroxide, 4 drops of hydro-peroxide (30 %) in 10 ml water are stirred for 18 hours at room temperature. After addition of 60 ml water the solution is acidified to pH 2 by addition of a 2 N hydrogen chloride solution and extracted with ethyl acetate. After evaporation of the solvent the residue is subjected to flash chromatography (eluant: ethyl acetate) to give 0.160 g of the product as white crystals. M.p. 195-198 °C.

Example P3: 3-(4-Ethoxy-phenoxy)-2-methyl-2-phenylmethanesulfonlamino-propionic acid methyl ester. (Tab.: 082)

a) 1-Ethoxy-4-methylsulfanylmethoxy-benzene
45.0 g of 4-ethoxyphenol is added to a solution of 40.2 g of potassium t-butylate in 500 ml of tetrahydrofurane and stirred for 10 minutes. The solvent is thoroughly evaporated on the rotavap and the residue dissolved in 200 ml dimethylformamide. 40.9 g of chloromethylmethylsulfide are added drop wise over 1 h letting the reaction mixture warm up to +41°C. Stirring is continued for 3.5 hours at room temperature. The reaction mixture is poured into water and extracted with ethyl acetate, washed with brine and water, dried over sodium sulfate and the solvent evaporated. Flash chromatography (eluant: hexane/ ethyl acetate 98:2) yielded 36.3 g of yellow oil.

b) 1-Chlormethoxy-4-ethoxy-benzene
38 g of 1-ethoxy-4-methylsulfanylmethoxy-benzene are dissolved in 300 ml of dichloromethane and 26.2 g of sulfonyl chloride are added slowly (slightly exothermic). After 2 hours of stirring at room temperature the solvent is evaporated thoroughly to yield 36.2 of yellow-brown oil, which is used in the following reaction without further purification.

c) 2-(4-Ethoxy-phenoxy-methyl)-2-methyl-malonic acid dimethyl ester
11.5 g of sodium hydride (55 % in oil) are suspended in 150 ml of tetrahydrofurane under
nitrogen atmosphere. 29.6 g of methyl-malonic acid dimethyl ester are added during 20 minutes while maintaining the temperature at +25°C by cooling. Stirring is continued until the gas evolution ceased. 37.8 g of 1-Chloromethoxy-4-ethoxy-benzene are then added over a period of 20 minutes maintaining the temperature at around +30°C. After 1.5 hours the mixture is cooled to +5°C and 25 ml of ammonium chloride is added carefully, then poured into water and extracted with ethyl acetate. The organic phase is washed with brine and dried over sodium sulfate, filtered and the solvent evaporated. Flash chromatography (eluant: hexane/ethyl acetate 95:5) yielded 41.6 g of a slightly yellow powder.

d) 2-(4-Ethoxy-phenoxy-methyl)-2-methyl-malonic acid mono methyl ester
36.4 g of 2-(4-Ethoxy-phenoxy)-2-methyl-malonic acid dimethyl ester are dissolved in 450 ml methanol. A solution of 8.9 g potassium hydroxide pellets dissolved in 30 ml of water is added over a period of 20 minutes and stirring is continued for 20 hours at room temperature. Methanol is evaporated under reduced pressure and the residue dissolved in water and neutral residues extracted with t-butyl-methyl ether. The water phase is acidified to pH 3 and extracted with ethyl acetate, the organic extract washed with brine and dried over sodium sulfate. Evaporation of the solvent yielded 33.4 g of a slightly yellow powder pure enough for further reactions.

e) N-t-butoxycarbonyl-3-(4-ethoxy-phenoxy)-2-methyl-propionic acid methyl ester
32.8 g of 2-(4-Ethoxy-phenoxy)-2-methyl-malonic acid mono methyl ester are dissolved in dry toluene by slight warming followed by the addition of 12.9 g of triethylamine and 41.6 g diphenylphosphoryl azide (DPPA). The mixture is slowly heated to reflux. A vigorous evolution of gas started at a temperature of about +75 °C. After 2.5 hours refluxing 80 ml of dry t-butanol is slowly added and refluxing continued for 12 hours. The solvents of the reaction mixture are evaporated and the residue extracted with ethyl acetate. The organic phase is washed with citric acid solution (5 %), saturated potassium carbonate solution and brine, dried over sodium sulfate and evaporated to yield after flash chromatography (eluant: hexane/ethyl acetate 9:1) 14.8 g of a slightly yellow oil.

f) 2-Amino-3-(4-ethoxy-phenoxy)-2-methyl-propionic acid methyl ester
0.57 g N-t-Butoxycarbonyl-3-(4-ethoxy-phenoxy)-2-methyl-propionic acid methyl ester are dissolved in 20 ml 1N trifluoroacetic acid in dichloromethane. After 3.5 hours at room temperature the solvents are evaporated to yield 0.41g product.

g) 0.340 g 2-amino-3-(4-ethoxy-phenoxy)-2-methyl-propionic acid methyl ester are dissolved in 10 ml tetrahydrofuran followed by the addition of 0.310 g of 1,4-diazabicyclo[2,2,2]octane DABCO and 0.310 g of phenyl-methansulfo-chloride. After stirring for 20 hours at room
temperature the mixture was without further work-up procedure subjected to flash chromatography (eluant: hexane/ethyl acetate 3:1) to give 0.301 g 3-(4-ethoxy-phenoxy)-2-methyl-2-phenylmethanesulfonylamino- propionic acid methyl ester as resinous oil.

Example P4: 3-(4-Ethoxy-phenoxy)-N-methoxy-2,N-dimethyl-2-phenylmethanesulfonlamino- propionamide (Tab.: 083)

\[\text{Chemical Structure Image}\]

a) 14.8 g N-t-Butoxycarbonyl-3-(4-ethoxy-phenoxy)-2-methyl-propionic acid methyl ester are dissolved in 200 ml methanol and a solution of 5.5 g potassium hydroxide pellets dissolved in 10 ml of water added to it. After heating to reflux for 20 hours the solvents are evaporated, the residue treated with water and neutral organic matter removed by extraction with t-butyl-methylether The water phase is made acidic by addition of 2N hydrogen chloride solution and extracted with ethyl acetate. The ethyl acetate solution is washed with brine, dried over sodium sulfate, filtered and evaporated to yield 13.5 g N-t-butoxycarbonyl-3-(4-ethoxy-phenoxy)-2-methyl-propionic acid as a slightly brown resinous product which is used for further reactions without purification.

b) 1.0 g of N-t-Butoxycarbonyl-3-(4-ethoxy-phenoxy)-2-methyl-propionic acid, 0.316g methoxy-methyamine hydrochloride and 0.960 g tri-ethylamine are mixed in 20 ml dichloromethane. After addition of 0.825 g bis-(2-oxo-3-oxazolidinyl)phosphinic acid chloride (BOPP-Cl) the mixture is stirred for 18 hours at room temperature. The solvent is then evaporated and the residue, without further work-up procedure, subjected to flash to give 0.190 g N-t-butoxycarbonyl-3(4-ethoxy-phenoxy)-2-methyl-N-methyl-N-methoxy-propionamide.

c) 0.180 g N-t-Butoxycarbonyl-3-(4-ethoxy-phenoxy)-2-methyl-N-methyl-N-methoxy-propionamide dissolved in 6 ml of 1N trifluoro-acetic acid in dichloromethane are stirred at room temperature for 20 hours. The solvent is evaporated, water added and made basic to pH 8 by addition of 2 N sodium hydroxide. After extraction with ethyl acetate, washing of the organic phase with brine and drying it over sodium sulfate 0.100 g of 3-(4-ethoxy-phenoxy)-2-methyl-N-methyl-N-methoxy-propionamide are recovered and used in the next step without further purification.

d) 0.100 g 3-(4-ethoxy-phenoxy)-2-methyl-N-methyl-N-methoxy-propionamide and 0.081 g
DABCO are dissolved in 8 ml tetrahydrofuran. After addition of 0.081 phenylmethansulfochlorid the mixture is stirred for 20 hours at room temperature. This mixture is then subjected to flash chromatography without further work-up to yield 45 mg of a white solid. M.p.179-181°C.

Example P5: 3-(4-Ethoxy-phenoxy)-2-methyl-2-phenylmethanesulfonylamino-1-morpholin-4-yl-propan-1-one (Tab.: 092)

0.370 g 2-Amino-3-(4-ethoxy-phenoxy)-2methyl-1-morpholin-4-yl-propan-1-one and 0.276 g DABCO are dissolved in 8 ml tetrahydrofuran. After addition of 0.274 phenyl-methane sulfonyl chloride the mixture is stirred for 20 h at room temperature. This mixture is then subjected to flash chromatography without further work-up to yield 260 mg of a white solid. M.p.109-111°C.

Example P6: 3-(4-Ethoxy-phenoxy)-2-methyl-2-phenylmethanesulfonylamino-N-prop-2-ynyl-propionamide (Tab.: 087)

0.880 g 2-Amino-3-(4-ethoxy-phenoxy)-2methyl- N-prop-2-ynyl-propionamide and 0.233 g DABCO are dissolved in 8 ml tetrahydrofuran. After addition of 0.232 phenyl-methansulfonyl chloride the mixture is stirred for 20 hours. This mixture is then subjected to flash chromatography without further work-up to yield 320 mg of a white solid. M.p.155-156°C.
Example P7: (+)-3-(4-Chloro-phenoxy)-2-methyl-2-phenylmethanesulfonlamino-propionamide

300 ml Phosphate buffer are heated to 30 °C and 124 mg of pig liver esterase are added and left for 15 minutes 3 g of 2-(4-chloro-phenoxy-methyl)-2-methyl-malonic acid dimethyl ester in 10 ml of isopropanol the mixture is stirred at +30°C for 17 hours. The reaction mixture is extracted with ethylacetate to remove neutral organic matter, the remaining solution acidified to pH 2 with 2N hydrogenchlorid and extracted again with ethylacetate. The organic extract is dried over sodium sulfate, the solvent evaporated and the residue chromatographed (RP-18 column, eluant: acetonitril/ water 1:1). Yield 1.73 g, M.p. 93 °C [α] = +6,9° (c= 0.0109 g ml⁻¹ acetonitrile). 
b) (-)-N-t-butoxycarbonyl-3-(4-chloro-phenoxy)-2-methyl-propionic acid methyl ester is prepared as described above, [α] = -93.7 ° (c= 0.0099 g ml⁻¹ acetonitrile). 
c) (-)-N-t-butoxycarbonyl-3-(4-chloro-phenoxy)-2-methyl-propionic acid amide [α]= -3.7 ° (c= 0.0111 g ml⁻¹ acetonitrile). 
d) (+)-3-(4-Chloro-phenoxy)-2-methyl-2-phenylmethanesulfonlamino-propionamide, [α]= + 9.4 ° (c = 0.0101 g ml⁻¹ dimethylsulfoxide).

In analogous manner the compounds of following Table 1 are obtained.
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Formulations may be prepared analogously to those described in, for example, WO 95/30651.

**Biological Examples**

*Phytophthora infestans* (late blight of potato/tomato): Tomato leaf disks are placed on water agar in a multiwell plate (24-well format) and sprayed with test solutions. After drying, the leaf disks are inoculated with a spore suspension of the fungus. After appropriate incubation the activity of a compound is assessed 4 dpi (days after inoculation) as preventive fungicidal activity.

Within the tested dose range of 200 to 22 ppm the Compounds No. 078, 079, 080, 081, 082, 083, 084, 088, 099, 100, 102, 105, 107, 108 and 115 inhibited at least 80% of fungal growth.

*Plasmopara viticola* (downy mildew of grapevine): Grape vine leaf disks are placed on agar in a multiwell plate (24-well format) and sprayed with test solutions. After drying, the leaf disks are inoculated with a spore suspension of the fungus. After appropriate incubation the activity of a compound is assessed 7 dpi (days after inoculation) as preventive fungicidal activity.

Within the tested dose range of 200 to 22 ppm the Compounds No. 078, 079, 080, 081, 082, 083, 084, 088, 099, 100, 102, 105, 107, 108 and 115 inhibited at least 80% of fungal growth.

*Erysiphe graminis f.sp. hordei* (Barley powdery mildew): Barley leaf segments are placed on agar in a multiwell plate (24-well format) and sprayed with test solutions. After drying, the leaf disks are inoculated with a spore suspension of the fungus. After appropriate incubation the activity of a compound is assessed 4 dpi (days after inoculation) as preventive fungicidal activity.

Within the tested dose range of 200 to 22 ppm the Compounds No. 079, 092 and 108 inhibited at least 80% of fungal growth.

*Erysiphe graminis f.sp. tritici* (Wheat powdery mildew): Barley leaf segments are placed on agar in a multiwell plate (24-well format) and sprayed with test solutions. After drying, the leaf disks are inoculated with a spore suspension of the fungus. After appropriate incubation the activity of a compound is assessed 4 dpi (days after inoculation) as preventive fungicidal
activity.
Within the tested dose range of 200 to 22 ppm the Compounds No. 107 and 108 inhibited at least 80% of fungal growth.

*Pyrenophora teres* (Net blotch): Barley leaf segments are placed on agar in a multiwell plate (24-well format) and sprayed with test solutions. After drying, the leaf disks are inoculated with a spore suspension of the fungus. After appropriate incubation the activity of a compound is assessed 4 dpi (days after inoculation) as preventive fungicidal activity. Within the tested dose range of 200 to 22 ppm the Compound No. 079 inhibited at least 80% of fungal growth.

*Puccinia recondita* (Brown rust): Wheat leaf segments are placed on agar in a multiwell plate (24-well format) and sprayed with test solutions. After drying, the leaf disks are inoculated with a spore suspension of the fungus. After appropriate incubation the activity of a compound is assessed 9 dpi (days after inoculation) as preventive fungicidal activity. Within the tested dose range of 200 to 22 ppm the Compound No. 108 inhibited at least 80% of fungal growth.

*Septoria nodorum* (Glume blotch): Wheat leaf segments are placed on agar in a multiwell plate (24-well format) and sprayed with test solutions. After drying, the leaf disks are inoculated with a spore suspension of the fungus. After appropriate incubation the activity of a compound is assessed 4 dpi (days after inoculation) as preventive fungicidal activity. Within the tested dose range of 200 to 22 ppm the Compound No. 82 inhibited at least 80% of fungal growth.

*Pyricularia oryzae* (Rice blast): Rice leaf segments are placed on agar in a multiwell plate (24-well format) and sprayed with test solutions. After drying, the leaf disks are inoculated with a spore suspension of the fungus. After appropriate incubation the activity of a compound is assessed 4 dpi (days after inoculation) as preventive fungicidal activity. Within the tested dose range of 200 to 22 ppm the Compound No. 115 inhibited at least 80% of fungal growth.
Action against Plasmopara viticola on vines

a) Residual-protective action

Vine seedlings are sprayed at the 4- to 5-leaf stage with a spray mixture (0.02 % active ingredient) prepared from a wettable powder formulation of the test compound. After 24 hours, the treated plants are infected with a sporangia suspension of the fungus. Fungus infestation is evaluated after incubation for 6 days at 95-100 % relative humidity and +20°C.

b) Residual-curative action

Vine seedlings are infected at the 4- to 5-leaf stage with a sporangia suspension of the fungus. After incubation for 24 hours in a humidity chamber at 95-100 % relative humidity and +20°C, the infected plants are dried and sprayed with a spray mixture (0.02 % active ingredient) prepared from a wettable powder formulation of the test compound. After the spray coating has dried, the treated plants are placed in the humidity chamber again. Fungus infestation is evaluated 6 days after infection.

Compounds of Tables 1 exhibit a good fungicidal action against Plasmopara viticola on vines. Compounds No.: 080, 083, 087, 088, 091, 099, 100, 102 at 200 ppm inhibit fungal infestations in both tests D-1a) and D-1b) by 80 – 100 %. At the same time untreated plants showed pathogen attack of 60 – 100 %.

D-2: Action against Phytophthora on tomato plants

a) Residual-protective action

After a cultivation period of 3 weeks, tomato plants are sprayed with a spray mixture (0.02 % active ingredient) prepared from a wettable powder formulation of the test compound. After 48 hours, the treated plants are infected with a sporangia suspension of the fungus. Fungus infestation is evaluated after incubation of the infected plants for 5 days at 90-100 % relative humidity and +20°C.

b) Systemic action

After a cultivation period of 3 weeks, tomato plants are watered with a spray mixture (0.02 % active ingredient based on the volume of the soil) prepared from a wettable powder formulation of the test compound. Care is taken that the spray mixture does not come into contact with the parts of the plants that are above the ground. After 96 hours, the treated plants are infected with a sporangia suspension of the fungus. Fungus infestation is evaluated after incubation of the infected plants for 4 days at 90-100 % relative humidity and +20°C.

Compounds of Tables 1 exhibit a good fungicidal action against Plasmopara viticola on vines. Compounds No. 078, 080, 082, 083, 087, 088, 099, 100, 102, 108 and 115
at 200 ppm inhibit fungal infestations in both tests D-1a) and D-1b) by 80 – 100 %. At the same time untreated plants showed pathogen attack of 60 – 100 %.

D-3 : Action against Phytophthora on potato plants

a) Residual-protective action
2-3 week old potato plants (Bintje variety) are sprayed with a spray mixture (0.02 % active ingredient) prepared from a wettable powder formulation of the test compound. After 48 hours, the treated plants are infected with a sporangia suspension of the fungus. Fungus infestation is evaluated after incubation of the infected plants for 4 days at 90-100 % relative humidity and +20°C.

b) Systemic action
2-3 week old potato plants (Bintje variety) are watered with a spray mixture (0.02 % active ingredient based on the volume of the soil) prepared from a wettable powder formulation of the test compound. Care is taken that the spray mixture does not come into contact with the parts of the plants that are above the ground. After 48 hours, the treated plants are infected with a sporangia suspension of the fungus. Fungus infestation is evaluated after incubation of the infected plants for 4 days at 90-100 % relative humidity and +20°C. Fungal infestation is effectively controlled with compounds of Table 1.
Compounds No. 087, 088, 100, at 200 ppm inhibit fungal infestations in both tests D-3a) and D-3b) by 60 – 100 %. At the same time untreated plants showed a pathogen attack of 60 - 100 %.
What is claimed is:

1. A compound of the general formula I

\[
\text{Ar}_1\text{X}\text{SO}\text{N}\text{R}_3\text{R}_4\text{W}\text{Ar}_2
\]

including the optical isomers thereof and mixtures of such isomers, wherein

\(\text{Ar}_1\) and \(\text{Ar}_2\) independently of each other stand for an optionally substituted aryl or heteroaryl group,

\(\text{R}_1\) and \(\text{R}_2\) stand independently of each other for hydrogen, optionally substituted \(\text{C}_1-\text{C}_6\)alkyl, optionally substituted \(\text{C}_2-\text{C}_6\)alkenyl, \(\text{C}_2-\text{C}_6\)alkynyl, or optionally substituted \(\text{C}_3-\text{C}_6\)cycloalkyl;

\(\text{R}_3\) designates hydrogen, \(\text{C}_3-\text{C}_5\)alkenyl, \(\text{C}_3-\text{C}_5\)alkynyl, or optionally substituted \(\text{C}_1-\text{C}_5\)alkyl;

\(\text{R}_4\) is optionally substituted \(\text{C}_1-\text{C}_6\)alkyl, optionally substituted \(\text{C}_2-\text{C}_6\)alkenyl, \(\text{C}_2-\text{C}_6\)alkynyl or optionally substituted \(\text{C}_3-\text{C}_6\)cycloalkyl;

\(\text{R}_5\) and \(\text{R}_6\) are independently of each other hydrogen or optionally substituted \(\text{C}_1-\text{C}_6\)alkyl, optionally substituted \(\text{C}_2-\text{C}_6\)alkenyl, \(\text{C}_2-\text{C}_6\)alkynyl, or optionally substituted \(\text{C}_3-\text{C}_6\)cycloalkyl;

\(\text{W}\) designates a bridge selected from \(-\text{O}^{-}\), \(-\text{S}^{-}\), \(-\text{SO}^{-}\), \(-\text{SO}_2^{-}\) or is an \(-\text{NH}\)- or \(-\text{N}(\text{C}_1-\text{C}_6)\)- bridge;

\(\text{X}\) designates a direct bond or a bridge selected from \(-\text{O}^{-}\), \(-\text{S}^{-}\), \(-\text{SO}^{-}\), \(-\text{SO}_2^{-}\) or is an \(-\text{NH}\)- or \(-\text{N}(\text{C}_1-\text{C}_6)\)- bridge;

\(\text{Y}\) designates \(-\text{OR}_{\text{a}}\) or \(\text{NR}_{\text{10}}\text{R}_{\text{11}}\);

\(\text{a}\) and \(\text{b}\) independently of each other stand for a number 1, 2 or 3; and

\(\text{c}\) stands for a number zero, 1 or 2;

\(\text{R}_8\) designates hydrogen, optionally substituted \(\text{C}_1-\text{C}_6\)alkyl, \(\text{C}_3-\text{C}_5\)alkenyl, \(\text{C}_3-\text{C}_5\)alkynyl, optionally substituted phenyl;

\(\text{R}_{10}\) and \(\text{R}_{11}\) independently of each other stand for hydrogen, \(\text{C}_1-\text{C}_6\)alkyl optionally substituted by halogen, \(\text{C}_1-\text{C}_6\)haloalkyl, \(\text{C}_1-\text{C}_6\)alkoxy, \(\text{C}_1-\text{C}_6\)alkylamino, di(\(\text{C}_1-\text{C}_6\)alkyl)amino, or aryl which in turn is optionally substituted by halogen, \(\text{C}_1-\text{C}_6\)alkyl, \(\text{C}_1-\text{C}_6\)haloalkyl, \(\text{C}_1-\text{C}_6\)alkoxy or \(-\text{CN}\); or

stand for \(\text{C}_3-\text{C}_6\)alkenyl optionally substituted by halogen, \(\text{C}_1-\text{C}_6\)haloalkyl, \(\text{C}_1-\text{C}_6\)alkoxy, \(\text{C}_1-\text{C}_6\)alkylamino, di(\(\text{C}_1-\text{C}_6\)alkyl)amino, or aryl which in turn is optionally substituted by
halogen, C₁-C₅alkyl, C₁-C₅haloalkyl, C₁-C₅alkoxy or -CN; or stand for C₃−C₆alkynyl optionally substituted by halogen, C₁-C₅alkyl, C₁-C₅haloalkyl, C₁-C₅alkoxy, C₁-C₅alkylamino, di(C₁-C₅alkyl)amino, or aryl which in turn is optionally substituted by halogen, C₁-C₅alkyl, C₁-C₅haloalkyl, C₁-C₅alkoxy or -CN; or stand for a group -NH-CH(R₁₆)CO-Z; or 

R₁₀ and R₁₁ together form a 5-ring-membered non-aromatic carbocyclic ring; or together form a 6-ring-membered non-aromatic carbocyclic ring which is interrupted by -O-, -S- or -N(C₁-C₅alkyl)-;

R₁₂ designates C₁-C₅alkyl optionally substituted by halogen, C₁-C₅haloalkyl or aryl which in turn is optionally substituted by halogen, C₁-C₅alkyl, C₁-C₅haloalkyl, C₁-C₅alkoxy, hydroxy or -CN;

Z is -OR₉ or NR₁₃R₁₄; R₁₃ and R₁₄ independently of each other stand for hydrogen;

C₁-C₅alkyl optionally substituted by halogen, C₁-C₅haloalkyl, C₁-C₅alkoxy, C₁-C₅alkylamino, di(C₁-C₅alkyl)amino, or aryl which in turn is optionally substituted by halogen, C₁-C₅alkyl, C₁-C₅haloalkyl, C₁-C₅alkoxy or -CN; or stand for C₃−C₆alkenyl optionally substituted by halogen, C₁-C₅alkyl, C₁-C₅haloalkyl, C₁-C₅alkoxy, C₁-C₅alkylamino, di(C₁-C₅alkyl)amino, or aryl which in turn is optionally substituted by halogen, C₁-C₅alkyl, C₁-C₅haloalkyl, C₁-C₅alkoxy or -CN; or stand for C₃−C₆alkynyl optionally substituted by halogen, C₁-C₅alkyl, C₁-C₅haloalkyl, C₁-C₅alkoxy, C₁-C₅alkylamino, di(C₁-C₅alkyl)amino, or aryl which in turn is optionally substituted by halogen, C₁-C₅alkyl, C₁-C₅haloalkyl, C₁-C₅alkoxy or -CN; or R₁₃ and R₁₄ together form a 5-ring-membered non-aromatic carbocyclic ring; or together form a 6-ring-membered non-aromatic carbocyclic ring which is interrupted by -O-, -S- or -N(C₁-C₅alkyl)-.

2. A compound according to claim 1 wherein

Ar₁ stands for an aryl group which is optionally substituted with n radicals independently selected from R₁₅. R₁₅ stands for C₁-C₅alkyl optionally substituted by halogen, C₁-C₅alkoxy, -NR₁₆R₁₇, -CO-R₁₈ or the acyclic or cyclic ketals and acetals of -CO-R₁₈; or stands for a -X-linked aryl which is optionally substituted by halogen, C₁-C₅alkyl, C₁-C₅haloalkyl, C₁-C₅alkoxy, -CN, -NO₂, -NR₁₆R₁₇, -CO-R₁₈ or the acyclic or cyclic ketals and acetals of -CO-R₁₈; or for an -X-linked 5- or 6-ring-membered heteroaryl group optionally substituted by halogen, C₁-C₅alkyl, C₁-C₅haloalkyl, C₁-C₅alkoxy, -CN, -NO₂, -NR₁₆R₁₇, -CO-R₁₈ or the acyclic or cyclic ketals and acetals of -CO-R₁₈;

R₁₆ and R₁₇ independently of each other stand for hydrogen; C₁-C₅alkyl optionally substituted by halogen, C₁-C₅haloalkyl, C₁-C₅alkoxy, C₁-C₅alkylamino, di(C₁-C₅alkyl)amino, or aryl which in turn is optionally substituted by halogen, C₁-C₅alkyl, C₁-C₅haloalkyl,
C₁-C₆alkoxy or -CN; or stand for C₃-C₅alkenyl optionally substituted by halogen, C₁-C₅haloalkyl, C₁-C₆alkoxy, C₁-C₅alkylamino, di(C₁-C₅alkyl)amino, or aryl which in turn is optionally substituted by halogen, C₁-C₅alkyl, C₁-C₅haloalkyl, C₁-C₅alkoxy or -CN; or stand for C₃-C₅alkynyl optionally substituted by halogen, C₁-C₅haloalkyl, C₁-C₅alkoxy, C₁-C₅alkylamino, di(C₁-C₅alkyl)amino, or aryl which in turn is optionally substituted by halogen, C₁-C₅alkyl, C₁-C₅haloalkyl, C₁-C₅alkoxy or -CN; or together form a 5-ring-membered non-aromatic carbocyclic ring; or together form a 6-ring-membered non-aromatic carbocyclic ring which is interrupted by -O- or -N(C₁-C₅alkyl)-;

R₁₈ stands for C₁-C₅alkyl optionally substituted by halogen, C₁-C₆alkoxy, C₁-C₅alkylamino, di(C₁-C₅alkyl)amino; aryl which in turn is optionally substituted by halogen, C₁-C₅alkyl, C₁-C₅haloalkyl, C₁-C₄alkoxy, -CN, -NO₂, C₁-C₅alkylamino, di(C₁-C₅alkyl)amino or C₁-C₅alkylcarbonyl, C₁-C₅alkoxycarbonyl, C₁-C₅alkylaminocarbonyl or di(C₁-C₅alkyl)aminocarbonyl; or by a 5- or 6-ring hetero-aromatic ring which in turn is optionally substituted by halogen, C₁-C₅alkyl, C₁-C₅haloalkyl C₁-C₄alkoxy, -CN, -NO₂, C₁-C₅alkylamino, di(C₁-C₅alkyl)amino, C₁-C₅alkylcarbonyl, C₁-C₅alkoxycarbonyl, C₁-C₅alkylaminocarbonyl or di-(C₁-C₅alkyl)aminocarbonyl; or stands for C₅-C₆cycloalkyl optionally substituted by halogen, hydroxy, =O, C₁-C₆alkoxy or C₁-C₅alkylamino, di(C₁-C₅alkyl)amino; or stands for C₁-C₆alkoxy optionally substituted by halogen, C₁-C₆alkoxy; C₁-C₅alkylamino, di(C₁-C₅alkyl)amino; or stands for phenyl which is optionally substituted by halogen, C₁-C₅alkyl, C₁-C₅haloalkyl, C₁-C₆alkoxy, -CN, -NO₂, C₁-C₅alkylamino, di(C₁-C₅alkyl)amino, C₁-C₅alkylcarbonyl, C₁-C₅alkoxycarbonyl, C₁-C₅alkylaminocarbonyl or di-(C₁-C₅alkyl)aminocarbonyl; or stands for a 5- or 6-ring membered heteroaryl comprising nitrogen, oxygen or sulfur as ring members and being optionally substituted by halogen, C₁-C₅alkyl, C₁-C₅haloalkyl; C₁-C₄alkoxy, -CN, -NO₂, C₁-C₅alkylamino, di(C₁-C₅alkyl)amino, C₁-C₅alkylcarbonyl, C₁-C₅alkoxycarbonyl, C₁-C₅alkylaminocarbonyl or di-(C₁-C₅alkyl)aminocarbonyl; or

R₁₅ stands for C₅-C₆cycloalkyl, optionally substituted by halogen, hydroxy, =O, C₁-C₄alkoxy, NR₁₆R₁₇; or stands for C₁-C₄alkoxy optionally substituted by halogen, C₁-C₆alkoxy, by -X-aryl which is optionally substituted by halogen, C₁-C₅alkyl, C₁-C₅haloalkyl, C₁-C₄alkoxy, -CN, -NO₂, -NR₁₆R₁₇, -CO-R₁₈ or the acyclic or cyclic ketals and acetals of -CO-R₁₈; by a X-linked-5- or 6-ring-membered heteroaryl group optionally substituted by halogen, C₁-C₅alkyl, C₁-C₅haloalkyl, C₁-C₄alkoxy, -CN, -NO₂, -NR₁₆R₁₇, -CO-R₁₈ or the acyclic or cyclic ketals and acetals of -CO-R₁₆; or

stand for C₂-C₆alkenyl optionally substituted by halogen or aryl; or
stand for C₃₋₅alkynyl optionally substituted by halogen, tri-C₁₋₄alkyl-silyl or aryl; or
stand for C₂₋₅alkenyl optionally substituted by halogen or aryl; or
stand for C₂₋₅alkenyloxy optionally substituted by halogen, tri-C₁₋₄alkyl-silyl or aryl; or
stand for C₂₋₅alkenyloxy optionally substituted by halogen, tri-C₁₋₄alkyl-silyl or aryl; or
stand for C₃₋₅cycloalkyloxy optionally substituted by C₁₋₃alkyl, halogen or C₁₋₃alkoxy; or
stand for halogen; or
stand for -NR₁₆R₁₇ ; or
stand for -NR₂-CO-R₁₆ ; or
stand for -NR₂-CO-OR₁₆ ; or
stand for -NR₂-CO-NR₁₆R₁₇ ; or
stand for -NR₂-CO-SR₁₆ ; or
stand for -NR₂-CS-OR₁₆ ; or
stand for -NR₂-CS-NR₁₆R₁₇ ; or
stand for -NR₂-CS-SR₁₆ ; or
stand for -NR₂-C(=N-O-R₁₆)-S-OR₁₆ ; or
stand for -NR₂-C(=N-O-R₁₆)-NR₁₆R₁₇ ; or
stand for -NR₂-C(=N-O-R₁₆)-SR₁₆ ; or
stand for C₁₋₅alkylthio, C₁₋₅alkylsulfinyl or C₁₋₅alkylsulfonyl, optionally substituted by halogen; or
stand for -NR₂-SO₂-NR₁₆R₁₇ ; or
stand for nitro, for cyano or for -CS-NH₂;

or Ar₁ stands for a 5-ring-membered heteroaryl group comprising as ring members 1 to 4 heteroatoms selected from nitrogen, oxygen or sulfur and in which each ring system may not contain more than one oxygen or sulfur atoms and being optionally substituted with n radicals independently selected from R₁₉, R₁₉ is hydrogen, halogen, C₁₋₅alkyl,
C₁₋₅haloalkyl, C₁₋₅alkoxy, -NR₁₆R₁₇, -NO₂, -CN, -CO-R₁₆ or the acyclic or cyclic ketals and acetics of -CO-R₁₆; or Ar₁ stands for a 6-ring-membered heteroaryl group comprising as ring members 1 to 4 nitrogen atoms, and being optionally substituted with n radicals independently selected from R₁₉;

Ar₂ stands for an aryl group which is optionally substituted with n radicals independently selected from R₂₀, wherein R₂₀ is as defined as R₁₅, and from one radical R₂₁,
R₂₁ stands for hydrogen; or stands for -X-aryl which is optionally substituted by halogen,
C₁₋₅alkyl, C₁₋₅haloalkyl, C₁₋₅alkoxy, -CN, -NO₂, -NR₁₆R₁₇, -CO-R₁₆ or the acyclic or cyclic ketals and acetics of -CO-R₁₆; or stands for an -X-linked 5-membered aromatic or non-aromatic heterocyclic ring comprising nitrogen, oxygen or sulfur as ring members and being
optionally substituted by halogen, C₁₋₅alkyl, C₁₋₅haloalkyl, C₁₋₅alkoxy, -CN, -NO₂, 
-NR₁₈R₁₇, -CO-R₁₈ or the acyclic or cyclic ketals and acetals of -CO-R₁₈; or stands for a X-linked 6-membered aromatic or non-aromatic heterocyclic ring comprising nitrogen, oxygen or sulfur as ring members and being optionally substituted by halogen, C₁₋₅alkyl, C₁₋₅haloalkyl, C₁₋₅alkoxy, -CN, -NO₂, -NR₁₈R₁₇, -CO-R₁₈ or the acyclic or cyclic ketals and acetals of -CO-R₁₈; or stands for -CO-R₁₈ or the acyclic or cyclic ketals and acetals of -CO-R₁₈; or stands for -O-CO-R₁₈; or stands for -C(=N-O-R₁₈)-R₁₈; or R₁ and one R₃₀ together form a 3- or 4-membered non-aromatic bridge forming an annellated ring which may contain a carbonyl function or nitrogen, oxygen or sulfur as ring members and is optionally substituted by C₁₋₅alkyl; or Ar₂ stands for a 5-ring-membered heteroaryl group comprising as ring members 1 to 4 heteroatoms selected from nitrogen, oxygen or sulfur and in which each ring system may not contain more than 1 oxygen or sulfur atoms and being optionally substituted with n radicals independently selected from R₁₉; or stands for a 6-ring- membered heteroaryl group comprising as ring members 1 to 4 nitrogen atoms, and being optionally substituted with n radicals independently selected from R₁₉; or stands for a fused bicyclic heteroaryl group comprising as ring members 1 to 4 heteroatoms selected from nitrogen, oxygen or sulfur, and being composed from the 5-ring- or 6-ring-membered heteroaryl groups as defined for Ar₂ with an annellated phenyl ring or with an annellated second 6-ring-membered heteroaryl, each ring and the bicyclic heteroaryl being optionally substituted with n radicals independently selected from R₁₉. The number n independently selected is a number between zero and the number of the respective ring members minus the number of ring members and the number of further substituents. Preferably, n is 1. If n is zero, eventually vacant valences of the respective ring are substituted with hydrogen.

3. A compound according to claims 1 or 2, wherein Ar₁ and Ar₂ independently of each other stand for optionally substituted phenyl; or the optional substituents R₁₅ of Ar₁ are preferably selected from the group comprising halogen, C₁₋₅alkyl, C₁₋₅haloalkyl, C₁₋₅alkoxy, C₁₋₅haloalkoxy, C₃₋₅cycloalkyl, -CN and -CO-R₁₈; or the optional substituents R₂₀ of Ar₂ are preferably selected from the group comprising halogen, C₁₋₅alkyl, C₁₋₅haloalkyl, C₁₋₅alkoxy, C₁₋₅haloalkoxy,
C₃₋₆cycloalkyl, -CN, -CO-R₁₈, -NR₁₆R₁₇, -NR₂-CO-R₁₆, -NR₃-CO-OR₁₆, 
-NR₂-CO-NR₁₆R₁₇, -NR₂-CO-SR₁₆, -NR₂-CS-OR₁₆, -NR₂-CS-NR₁₆R₁₇, -NR₂-CS-SR₁₆, 
C₁₋₃alkythio, C₁₋₃alkylsulfinyl, C₁₋₃alkylsulfonyl, C₁₋₃haloalkythio, 
C₁₋₃haloalkylsulfinyl, C₁₋₃haloalkylsulfonyl, -NR₂-SO₂-NR₁₆R₁₇, nitro, cyano and 
-CS-NH₂; and

the optional substituent R₂₁ on Ar₂ is selected from optionally substituted phenyl, optionally 
substituted imidazolyl, optionally substituted thiazolyloxy, optionally substituted pyridloxy, 
optionally substituted pyridyl, optionally substituted pyrimidinloxy, optionally substituted 
pyrimidinyl, optionally substituted oxadiazolyl, optionally substituted triazolyl, optionally 
substituted pyrazolyl, optionally substituted oxadiazololyoxy, optionally substituted triazololxy 
and optionally substituted pyrazolyloxy; or the optional substituent R₂₁ on Ar₂ is selected 
from halogen, C₁₋₃alkyl, C₁₋₃haloalkyl, C₁₋₃alkoxy, -CN, -NO₂, -NR₁₆R₁₇, -CO-R₁₈ and 
the acyclic or cyclic ketals and acetals of -CO-R₁₆; or the optional substituent R₂₁ on Ar₂ is 
selected from -CO-R₁₈, -O-CO-R₁₈, optionally substituted phenyl, optionally substituted 
phenoxy, optionally substituted imidazolyl, optionally substituted imidazololyoxy, optionally 
substituted thiazolyloxy, optionally substituted thiazolyl, optionally substituted 
thiadiazololyoxy, optionally substituted thiadiazolyl, optionally substituted pyridlyoxy, 
optionally substituted pyridyl, optionally substituted pyrimidinloxy, optionally substituted 
pyrimidinyl, optionally substituted oxadiazolyl, optionally substituted oxadiazololyoxy, 
optionally substituted triazolyl, optionally substituted pyrazolyl, optionally substituted 
triazololyoxy and optionally substituted pyrazolyloxy; or the optional substituent R₂₁ on Ar₂ is 
selected from -CO-C₁₋₃alkyl, -O-CO-C₁₋₃alkyl and -CO-C₁₋₃alkoxy; or the optional 
substituent R₂₁ on Ar₂ is selected from aminocarbonyl, dimethylaminocarbonyl, acetyl, 
propionyl, acetooxy, methoxyacarbonyl, ethoxyacarbonyl, benzoyl, methoximinooethyl, 
1-imidazolyl, 5-(3-methyl-1,2,4-thiazolloyoxy), 2-pyridyl, 2-pyridylxyloxy, 4-pyrimidinyl, 
2-(3,5-dichloropyridlyoxy), 2-(4,6-dichloropyridlyoxy), 2-(4,6-dimethoxypridinloxythio), 
2-oxadiazolyl, 2-(5-methyl-oxadiazolyl), 2-(5-ethyl-oxadiazolyl), 1-triazolyl, 1-pyrazolyl, 
1-(3,4-dimethylpyrazolyl), 4-(2-methy lithiumzolyl), 2-(1,3,4-oxydiazolyl), N-pyrrolidin-2-onyl, and 
2-quinoxalinyl, and

R₁, R₂, R₅, R₆, R₇ and R₈ independently of each other stand for hydrogen or methyl; or 
R₁ and R₅ are independently of each other C₁₋₃alkyl and R₂ and R₆ are hydrogen; or 
R₈ is hydrogen or C₁₋₃alkyl optionally substituted with C₁₋₃alkoxy, C₃₋₄alkenyloxy, or 
C₃₋₅alkynloxy; or

R₈ is hydrogen, C₁₋₃alkyl or C₁₋₃alkoxy-C₁₋₃alkyl; or
R₄ is hydrogen or C₁₋₃alkyl optionally substituted with halogen, C₁₋₃alkoxy, C₁₋₃alkylamino or di-C₁₋₃alkylamino; or
R₄ is hydrogen, C₁₋₃alkyl or C₁₋₃haloalkyl or
R₄ is C₁₋₃alkyl or C₁₋₃haloalkyl; or
Y stands for O-R₉, where R₉ is hydrogen, substituted C₁₋₃alkyl; C₃₋₅alkenyl, C₃₋₅alkynyl, phenyl, 4-halogenophenyl;
R₁₀ and R₁₁ independently of each other stand for hydrogen; C₁₋₃alkyl optionally substituted by halogen, C₁₋₃haloalkyl, C₁₋₄alkoxy, C₁₋₃alkylamino, di(C₁₋₃alkyl)amino, or aryl which in turn is optionally substituted by halogen, C₁₋₃alkyl, C₁₋₃haloalkyl, C₁₋₄alkoxy or -CN; or stand for C₃₋₅alkenyl optionally substituted by halogen, C₁₋₃haloalkyl, C₁₋₄alkoxy, C₁₋₅alkylamino, di(C₁₋₃alkyl)amino, or aryl which in turn is optionally substituted by halogen, C₁₋₃alkyl, C₁₋₃haloalkyl, C₁₋₄alkoxy or -CN; or stand for C₃₋₅alkynyl optionally substituted by halogen, C₁₋₃haloalkyl, C₁₋₄alkoxy, C₁₋₅alkylamino, di(C₁₋₃alkyl)amino, or aryl which in turn is optionally substituted by halogen, C₁₋₃alkyl, C₁₋₃haloalkyl, C₁₋₃alkoxy or -CN; or stand for a group -NH-CH(R₁₂)CO-Z; or R₁₀ and R₁₁ together form a 5-ring-membered non-aromatic carbocyclic ring; or together form a 6-ring-membered non-aromatic carbocyclic ring which is interrupted by -O-, -S- or -N(C₁₋₃alkyl)-;
R₁₂ designates C₁₋₃alkyl optionally substituted by halogen, C₁₋₃haloalkyl or aryl which in turn is optionally substituted by halogen, C₁₋₃alkyl, C₁₋₃haloalkyl, C₁₋₃alkoxy, hydroxy or -CN;
Z is -OR₉; NR₁₃R₂₀; R₁₃ and R₂₀ independently of each other stand for hydrogen; C₁₋₃alkyl optionally substituted by halogen, C₁₋₃haloalkyl, C₁₋₄alkoxy, C₁₋₅alkylamino, di(C₁₋₅alkyl)amino, or aryl which in turn is optionally substituted by halogen, C₁₋₃alkyl, C₁₋₃haloalkyl, C₁₋₄alkoxy or -CN; or stand for C₃₋₅alkenyl optionally substituted by halogen, C₁₋₃haloalkyl, C₁₋₄alkoxy, C₁₋₅alkylamino, di(C₁₋₅alkyl)amino, or aryl which in turn is optionally substituted by halogen, C₁₋₃alkyl, C₁₋₃haloalkyl, C₁₋₄alkoxy or -CN; or stand for C₃₋₅alkynyl optionally substituted by halogen, C₁₋₃haloalkyl, C₁₋₄alkoxy, C₁₋₅alkylamino, di(C₁₋₅alkyl)amino, or aryl which in turn is optionally substituted by halogen, C₁₋₃alkyl, C₁₋₃haloalkyl, C₁₋₃alkoxy or -CN; or R₁₃ and R₂₀ together form a 5-ring-membered non-aromatic carbocyclic ring; or together form a 6-ring-membered non-aromatic carbocyclic ring which is interrupted by -O-, -S- or -N(C₁₋₃alkyl)-;
W is -O-; or
X is a direct bond; or
the suffixes (a) and (b) designate the number 1; or
the suffix (c) stands for the number zero.

4. A compound according to claims 2 or 3 wherein Ar₁ and Ar₂ independently of each
other stand for optionally substituted phenyl; and the optional substituents R₁₅ of Ar₁ are
preferably selected from the group comprising halogen, C₁₋₅alkyl, C₁₋₅haloalkyl,
C₁₋₅alkoxy, C₁₋₅haloalkoxy, C₃₋₅cycloalkyl, -CN and -CO-R₁₆; and the optional
substituents R₂₀ of Ar₂ are preferably selected from the group comprising halogen,
C₁₋₅alkyl, C₁₋₅haloalkyl, C₁₋₅alkoxy, C₁₋₅haloalkoxy, C₂₋₅cycloalkyl, -CN, -CO-R₁₆,
-NR₁₆R₁₇, -NR₂-CO-R₁₆, -NR₃-CO-OR₁₆, -NR₂-CO-NR₁₆R₁₇, -NR₂-CO-SR₁₆,
-NR₂-CS-OR₁₆, -NR₂-CS-NR₁₆R₁₇, -NR₂-CS-SR₁₆, C₁₋₃alkylthio, C₁₋₃alkylsulfinyl,
C₁₋₃alkylsulfanyl, C₁₋₃haloalkylthio, C₁₋₃haloalkylsulfinyl, C₁₋₃haloalkylsulfanyl,
-NR₂-SO₂-NR₁₆R₁₇, nitro, cyano and -CS-NH₂; and the optional substituent R₂₁ on Ar₂ is selected from optionally
substituted phenyl, optionally substituted imidazolyl, optionally substituted thiazolyl oxy,
optionally substituted pyridyloxy, optionally substituted pyridyl, optionally substituted
pyrimidinoxy, optionally substituted pyrimidinyl, optionally substituted oxadiazolyl,
optionally substituted triazolyl, optionally substituted pyrazolyl, optionally substituted
oxadiazolyl, optionally substituted triazolyl and optionally substituted pyrazolyl oxy.

5. A compound according to claim 1 wherein Ar₁ and Ar₂ independently stand for
optionally substituted aryl groups; and the optional substituents R₁₅ of Ar₁ are
preferably selected from the group comprising halogen, C₁₋₅alkyl, C₁₋₅haloalkyl, C₁₋₅alkoxy,
C₁₋₅haloalkoxy, C₃₋₅cycloalkyl, -CN and -CO-R₁₆; and the optional substituents R₂₀ of Ar₂
are preferably selected from the group comprising halogen, C₁₋₅alkyl, C₁₋₅haloalkyl,
C₁₋₅alkoxy, C₁₋₅haloalkoxy, C₃₋₅cycloalkyl, -CN, -CO-R₁₆, -NR₁₆R₁₇, -NR₂-CO-R₁₆,
-NR₂-CO-OR₁₆, -NR₂-CO-NR₁₆R₁₇, -NR₂-CO-SR₁₆, -NR₂-CS-OR₁₆, -NR₂-CS-NR₁₆R₁₇,
-NR₂-CS-SR₁₆, C₁₋₃alkylthio, C₁₋₃alkylsulfinyl, C₁₋₃alkylsulfanyl, C₁₋₃haloalkylthio,
C₁₋₃haloalkylsulfinyl, C₁₋₃haloalkylsulfanyl, -NR₂-SO₂-NR₁₆R₁₇, nitro, cyano and -CS-NH₂;
and the optional substituent R₂₁ on Ar₂ is selected from halogen, C₁₋₅alkyl, C₁₋₅haloalkyl,
C₁₋₅alkoxy, -CN, -NO₂, -NR₁₆R₁₇, -CO-R₁₆ and the acyclic or cyclic ketals and acetals of
-CO-R₁₆; -O-CO-R₁₆, optionally substituted phenyl, optionally substituted imidazolyl,
optionally substituted thiazolyl oxy, optionally substituted pyridyloxy, optionally substituted
pyridyl, optionally substituted pyrimidinoxy, optionally substituted pyrimidinyl, optionally
substituted oxadiazolyl, optionally substituted triazolyl, optionally substituted pyrazolyl,
optionally substituted oxadiazoloxo, optionally substituted triazoloxo and optionally substituted pyrazoloxo; and

R₁, R₂, R₆, R₅, R₇ and R₈ independently of each other are hydrogen or methyl; and

R₃ is hydrogen or C₃₋C₅alkyl optionally substituted with C₁₋C₅alkoxy, C₃₋C₅alkenoxo, or C₃₋C₅alkynoxo; and

R₄ is hydrogen or C₁₋C₅alkyl optionally substituted with halogen, C₁₋C₅alkoxy, C₃₋C₅alkylamino or di-C₁₋C₅alkylamino; and

W is =O-; and

Y is OR₉, where R₉ is hydrogen, C₁₋C₅alkyl; C₂₋C₅alkenyl, C₃₋C₅alkynyl, 4-halogenophenyl or C₅₋C₅methoxycarbonyl; or aryl which in turn is optionally substituted by halogen, C₁₋C₅alkyl, C₁₋C₅haloalkyl, C₁₋C₅alkoxy or -CN; or stand for C₃₋C₅alkenyl; or stand for C₃₋C₅alkynyl; or stand for a group –NH-CH(R₁₂)CO-Z; or R₁₀ and R₁₁ together form a 5-ring-membered non-aromatic carbocyclic ring; or together form a 6-ring-membered non-aromatic carbocyclic ring which is interrupted by =O-, -S- or –N(C₁₋C₅alkyl)-;

R₁₂ designates C₁₋C₅alkyl;

Z is =OR₉, NR₁₃R₁₄; R₁₃ and R₁₄ independently of each other, stand for hydrogen; C₁₋C₅alkyl, or aryl which in turn is optionally substituted by halogen, C₁₋C₅alkyl, C₁₋C₅haloalkyl, C₁₋C₅alkoxy or -CN; or stand for C₃₋C₅alkenyl; or stand for C₃₋C₅alkynyl; or stand for a group –NH-CH(R₁₂)CO-Y; or R₁₃ and R₁₄ together form a 5-ring-membered non-aromatic carbocyclic ring; or together form a 6-ring-membered non-aromatic carbocyclic ring which is interrupted by =O-, -S- or –N(C₁₋C₅alkyl)-;

X is a direct bond; and

the suffixes (a) and (b) designate the number 1; and

the suffix (c) stands for the number zero.

6. A compound of formula I according to claim 1 wherein Ar₁ and Ar₂ independently of each other stand for optionally substituted phenyl; and the optional substituents R₁₆ and R₂₀ of Ar₁ and Ar₂ are selected from the group comprising C₁₋C₅alkyl, C₁₋C₅haloalkyl, C₁₋C₅alkoxy, C₁₋C₅haloalkoxy and C₂₋C₅cycloalkyl; and the optional substituent R₂₁ on Ar₂ is selected from –CO-C₁₋C₅alkyl, –CO-C₁₋C₅alkoxy, -O-CO-C₁₋C₅alkyl, optionally substituted phenyl, optionally substituted phenoxy, optionally substituted imidazolyl, optionally substituted imidazoloxo, optionally substituted thiazoloxo, optionally substituted thiazolyl, optionally substituted thiadiazoloxo, optionally substituted thiadiazolyl, optionally
substituted pyridyloxy, optionally substituted pyridyl, optionally substituted pyrimidinyloxy, optionally substituted pyrimidinyl, optionally substituted oxadiazolyl, optionally substituted oxadiazolylxoxy, optionally substituted triazolyl, optionally substituted pyrazolyl, optionally substituted triazolylxoxy and optionally substituted pyrazolylxoxy; and

R₁ and R₅ are independently C₁-C₅alkyl and R₂ and R₆ are hydrogen; and

R₃ is hydrogen, C₁-C₅alkyl or C₁-C₅alkoxy-C₁-C₅alkyl; and

R₄ is C₁-C₅alkyl or C₁-C₅haloalkyl; and

W is –O--; and

Y is OR₉, where R₉ is hydrogen, C₁-C₅alkyl; C₉-C₁₂alkenyl, C₃-C₅alkynyl, 4-halogenophenyl; X is a direct bond; and

the suffixes (a) and (b) designate the number 1; and

the suffix (c) stands for the number zero.

7. A compound of formula I according to claim 1 wherein Ar₁ and Ar₂ independently of each other stand for optionally substituted phenyl; and

the optional substituents R₁₅ and R₂₀ of Ar₁ and Ar₂ are selected from the group comprising bromo, chloro, fluoro, iodo, cyano, hydroxy, amino, nitro, methyl, ethyl, propyl, isopropyl, methoxy, ethoxy, propoxy, isoproxy, allyloxy, propargyloxy, benzylxoxy, trifluoromethyl, trifluoromethoxy, 2-cyano-2-methyl-butyloxy, methylsulfonyl, methylsulfanyl, methylthio, cyclopentyl, cyclohexyl, aminocarbonylmethyl, methoximinoethyl, aminocarbonyl, butylcarbonylamino, tert-butylcarbonylamino, triazol-1-ylmethyl, 1,2,4-triazol-1-ylmethyl, N-morpholinocarbonylamino, aminocarbonyloxy-ethoxy, morpholinocarbonyloxyethoxy and cyanopyridyloxyethoxy; and

the optional substituent R₂₁ on Ar₂ is selected from aminocarbonyl, dimethylaminocarbonyl, acetyl, propionyl, acetoxyl, methoxycarbonyl, ethoxycarbonyl, benzoyl, methoximinoethyl, 1-imidazolyl, 5-(3-methyl-1,2,4-thiadiazolylxoxy), 2-pyridyl, 2-pyridyloxy, 4-pyrimidinyl, 2-(3,5-dichloropyridyloxy), 2-(4,6-dichloropyridyloxy), 2-(4,6-dimethoxypyrimidinythio), 2-oxadiazolyl, 2-(5-methyl-oxadiazolyl), 2-(5-ethyl-oxadiazolyl), 1-triazolyl, 1-pyrazolyl, 1-(3,4-dimethylpyrazolyl), 4-(2-methylthiazolyl), 2-(1,3,4-oxydiazolyl), N-pyrrolidin-2-onyl, and

2-quinoxalinyl, and

R₇ and R₈ are independently C₁-C₅alkyl and R₉ and R₁₀ are hydrogen; and

R₈ is hydrogen, C₁-C₅alkyl or C₁-C₅alkoxy-C₁-C₅alkyl; and

R₄ is C₁-C₅alkyl or C₁-C₅haloalkyl; and

W is –O--; and Y is OR₉, where R₉ is hydrogen, C₁-C₅alkyl; C₉-C₁₂alkenyl, C₃-C₅alkynyl, 4-
halogenophenyl;
X is a direct bond; and
the suffixes (a) and (b) designate the number 1; and
the suffix (c) stands for the number zero.

8. Ar₁ and Ar₂ independently of each other stand for optionally substituted phenyl; and
the optional substituents R₁₅ and R₂₀ of Ar₁ and Ar₂ are selected from the group comprising
bromo, chloro, fluoro, methyl, ethyl, methoxy, ethoxy, trifluoromethyl and trifluoromethoxy;
and the optional substituent R₂₁ on Ar₂ is selected from aminocarbonyl, acetyl,
methoxycarbonyl, ethoxycarbonyl, 1-imidazolyl, 5-(3-methyl-1,2,4-thiadiazolylxoxy), 2-pyridyl,
2-pyridyloxy, 4-pyrimidinyl, 2-(3,5-dichloropyridyloxy), 2-(4,6-dimethoxyprymidinylthio),
2-oxadiazolyl, 2-(5-methyl-oxadiazolyl), 2-(5-ethyl-oxadiazolyl), 1-(1,2,4-triazolyl),
1-pyrazolyl, 4-(2-methylthiazoxy), 2-(1,3,4-oxadiazolyl), and N-pyrrolidin-2-onyl, and
R₁ and R₅ are methyl and R₂ and R₆ are hydrogen; and
R₃ is hydrogen, methyl, ethyl, propyl, ethoxymethyl or methoxymethyl, and
R₄ is methyl, ethyl, propyl or fluoromethyl; and
W is –O–; and
Y is OR₉, where R₉ is hydrogen, C₁-C₅ alkyl or halogenophenyl, or Y is NR₁₀R₁₁;
X is a direct bond; and
the suffixes (a) and (b) designate the number 1; and
the suffix (c) stands for the number zero.

9. A compound of formula I according to claim 1 selected from the group comprising
2,N-Dimethyl-2-phenylmethanesulfonylamino-3-(4-[1,2,4]triazol-1-yl-phenoxo)-propionamide,
2-Methyl-2-phenylmethanesulfonylamino-3-(4-[1,2,4]triazol-1-yl-phenoxo)-propionamide
methyl ester,
2-Methyl-2-phenylmethanesulfonylamino-3-(4-[1,2,4]triazol-1-yl-phenoxo)-propionamide,
2-Methyl-2-phenylmethanesulfonylamino-3-(4-[1,2,4]triazol-1-yl-phenoxo)-propionic acid,
N-(4-Chloro-phenyl)-2-methyl-2-phenylmethanesulfonylamino-3-(4-[1,2,4]triazol-1-yl-phenoxo)-propionamide,
N-(3-Trifluoro-phenyl)-2-methyl-2-phenylmethanesulfonylamino-3-(4-[1,2,4]triazol-1-yl-phenoxo)-propionamide,
N-(1-Phenyl-ethyl)-2-methyl-2-phenylmethanesulfonylamino-3-(4-[1,2,4]triazol-1-yl-phenoxo)-propionamide,
N-[2-(3,4-Dimethoxy-phenyl)-ethyl]-2-methyl-2-phenylmethanesulfonlamino-3-(4-[1,2,4]triazol-1-yl-phenoxy)-propionamide,
3-(4-Ethoxy-phenoxy)-2,N-dimethyl-2-phenylmethanesulfonlamino-propionamide,
3-(4-Ethoxy-phenoxy)-2-methyl-N-(1-phenyl-ethyl)-2-phenylmethanesulfonlamino-propionamide,
3-(4-Ethoxy-phenoxy)-2-methyl-N-(4-methoxy-benzyl)-2-phenylmethanesulfonlamino-propionamide,
2-(4-Ethoxy-phenoxymethyl)-2-phenylmethanesulfonlamino-butyramide,
3-(4-Ethoxy-phenoxy)-2-methyl-N-[2-(3,4-dimethoxy-phenyl)-ethyl]-2-phenylmethanesulfonlamino-propionamide,
3-(4-Ethoxy-phenoxy)-2,N,N-trimethyl-2-phenylmethanesulfonlamino-propionamide,
3-(4-Ethoxy-phenoxy)-2-methyl-2-phenylmethanesulfonlamino-N-prop-2-ynyl-propionamide,
3-(4-Ethoxy-phenoxy)-2-methyl-2-phenylmethanesulfonlamino-1-morpholin-4-yl-propan-1-one,
3-(4-Ethoxy-phenoxy)-N-methoxy-2-N-dimethyl-2-phenylmethanesulfonlamino-propionamide,
N-Methoxy-2-methyl-2-phenylmethanesulfonlamino-3-(4-[1,2,4]triazol-1-yl-phenoxy)-propionamide,
N-(1-Ethynyl-cyclohexyl)-2-methyl-2-phenylmethanesulfonlamino-3-(4-[1,2,4]triazol-1-yl-phenoxy)-propionamide, and
3-(4-Ethoxy-phenoxy)-2-methyl-2-phenylmethanesulfonlamino-propionic acid methyl ester.

10. A process for the preparation of a compound of formula I according to claim 1, which comprises reacting
a) reacting the the sulfonylating agent of formula II

\[
\text{Ar}_1-X-\text{S}^\ominus-A
\]

(II)

wherein wherein \text{Ar}_1, a, X and \text{R}_1 to \text{R}_2, are defined as under formula I, and A stands for a
leaving group like an anhydride, of the structure -O-SO_{2\ominus}(\text{CR}_1\text{R}_2)_a-X-\text{Ar}_1 or -O-CO-C\text{R}_1\text{C}_3\text{alkyl},
but preferably for halogen, especially bromine or more preferably chlorine, with an amino-
acetonitrile of formula III.
b) reacting the compound of formula V

wherein Ar₂, a, b, c, W, Y and R₅ to R₈ are defined as under formula I and L is a leaving group such as e.g. halogen, preferably chlorine, bromine or iodine or a sulfonlloxy group such as e.g. methylsulfonlloxy-, tolylsulfonlloxy- or trifluoromethylsulfonlloxy- group, is coupled with a compound of formula

\[ \text{Ar}_1 \text{-} \text{X'} \]

wherein Ar₁ is defined as under formula I and X’ is either an anionic radical species of X such as O⁻, S⁻, SO⁻, SO₂⁻ combined with an alkaline- or earthalkaline- metal cation as counterion or is defined as X-H such as OH, SH, NH₃ if at the same time the reaction is generally carried out in the presence of a base such as alkaline-, earthalkaline-carbonates or hydrogencarbonates such e.g. sodium or potassium-carbonate, sodium or potassium – hydrogen-carbonate, cesium-carbonate or an agent capable of scavenging the formed acid.

11. A composition for controlling and protecting against phytopathogenic microorganisms, comprising a compound of formula I according to claim 1.

12. The use of a compound of formula I according to claim 1 in protecting plants against infestation by phytopathogenic microorganisms.

13. A method of controlling and preventing an infestation of crop plants by phytopathogenic microorganisms, which comprises the application of a compound of formula I according to claim 1 as active ingredient to the plant, to parts of plants or to the locus thereof.

14. A method according to claim 13, wherein the phytopathogenic microorganisms are fungal organisms.