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(54) Title: PESTICIDAL AND HERBICIDAL COMPOUNDS AND METHODS OF USE THEREOF

(57) Abstract: The present invention relates to novel pesticidally and/or herbicidally active compounds, agrochemical composition thereof, methods of preparation thereof, and uses thereof for controlling the growth of undesirable plants (e.g., weeds), for example in crop fields.



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## INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER  
 IPC - A01N 43/56; A01N 43/90; A01N 43/40 (2022.01)  
 CPC - A01N 43/40; A01N 43/56; A01N 43/90

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

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
 See Search History document

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

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

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,371,061 A (BISSINGER et al.) 6 December 1994 (06.12.1994), especially: col 12, ln 55-68, 2-(2-chloro-4'-pyridyloxy)-pyridine-6-carboxylic acid.	1-3
Y	MCCLEAN et al. "A Review of 29 Incidents Involving 4-Aminopyridine in Non-target Species Reported to the ASPCA Animal Poison Control Center", J. Med. Toxicol. 2013. 9: pp 418-421, especially: abstract; pg 418, col 2, para 1.	1-3
A	PubChem-SID-150053728, Modify Date: 2 June 2019 (02.06.2019), pg 2, figure, this is a purchasable chemical.	1-3
A	US 6,200,933 B1 (KANNO et al.) 13 March 2001 (13.03.2001), entire document.	1-3

Further documents are listed in the continuation of Box C.

See patent family annex.

\* Special categories of cited documents:

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

"D" document cited by the applicant in the international application

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

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

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

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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

"&" document member of the same patent family

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## INTERNATIONAL SEARCH REPORT

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**Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)**

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

1.  Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2.  Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
  
3.  Claims Nos.: 4-11, 15-26, 31-44 and 46-55  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows:  
(see extra sheet)

1.  As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2.  As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3.  As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
  
4.  No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:  
1-3

**Remark on Protest**

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.

## --BOX III - LACK OF UNITY--

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be searched, the appropriate additional search fees must be paid.

Group I+: Claims 1-3 and 14, directed to a compound represented by the structure of formula I(d); or its agrochemically acceptable salt, zwitterion (inner salt), stereoisomer, tautomer, hydrate, N-oxide, reverse amide analog, isotopic variant (e.g., deuterated analog), or any combination thereof; or its agrochemically acceptable salt, zwitterion (inner salt), hydrate, N-oxide, isotopic variant or any combination thereof, or a compound selected from the Table in claim 14. The compound of Formula I(d) will be searched to the extent that it encompasses the first species of claim 1, wherein B ring is a substituted heteroaromatic ring system; R1 is H; R2 and R3 are joined to form ring B as described above; R4 is H; R6 and R60 are H; X3, X4 and X5 are C; X6 is O; G=X is C=O; and k is 1; wherein the compound is not: 6-(2-aminopropoxy)picolinic; 6-(2-aminopropoxy)pyrazine-2-carboxylic acid, 2-(2-aminopropoxy)pyrimidine-4-carboxylic acid; 6-(2-aminopropoxy)-3-fluoropicolinic acid; 6-(2-aminopropoxy)-4-fluoropicolinic acid; 6-(2-aminobutoxy)picolinic acid; 6-((2-aminocyclopentyl)oxy)picolinic acid; methyl 6-(2-aminopropoxy)picolinate; or ethyl 6-(2-aminopropoxy)picolinate. It is believed that claims 1-3 encompass this first named invention, and thus these claims will be searched without fee to the extent that they encompass the first species of claim 1. Applicant is invited to elect additional compounds of Formula I(d), wherein each additional compound elected will require one additional invention fee. Applicants must specify the claims that encompass any additionally elected compound. Applicants must further indicate, if applicable, the claims which encompass the first named invention, if different than what was indicated above for this group. Failure to clearly identify how any paid additional invention fees are to be applied to the "+" group(s) will result in only the first claimed invention to be searched. Additionally, an exemplary election wherein different actual variables are selected is suggested. An exemplary election would be a compound of claim 1, wherein B ring is a substituted heteroaromatic ring system; R1 is H; R2 and R3 are joined to form ring B as described above; R4 is H; R6 and R60 are H; X3, X4 and X5 are C; X6 is NH; G=X is C=O; and k is 1; wherein the compound is not: 6-(2-aminopropoxy)picolinic; 6-(2-aminopropoxy)pyrazine-2-carboxylic acid, 2-(2-aminopropoxy)pyrimidine-4-carboxylic acid; 6-(2-aminopropoxy)-3-fluoropicolinic acid; 6-(2-aminopropoxy)-4-fluoropicolinic acid; 6-(2-aminobutoxy)picolinic acid; 6-((2-aminocyclopentyl)oxy)picolinic acid; methyl 6-(2-aminopropoxy)picolinate; or ethyl 6-(2-aminopropoxy)picolinate (i.e. claims 1-3).

Group II: Claims 12-13, directed to a compound represented by the structure of formula I(e); or its agrochemically acceptable salt, zwitterion (inner salt), stereoisomer, tautomer, hydrate, N-oxide, reverse amide analog, isotopic variant (e.g., deuterated analog), or any combination thereof; or its agrochemically acceptable salt, zwitterion (inner salt), hydrate, N-oxide, isotopic variant or any combination thereof.

Group III: Claims 27-30 and 45, directed to a method for controlling the growth of undesired plants, comprising applying a compound or an agrochemical composition thereof, to a crop field, wherein the compound is represented by the structure of formula I; or its agrochemically acceptable salt, zwitterion (inner salt), stereoisomer, tautomer, hydrate, N-oxide, reverse amide analog, isotopic variant (e.g., deuterated analog), or any combination thereof; or its agrochemically acceptable salt, zwitterion (inner salt), hydrate, N-oxide, isotopic variant or any combination thereof.

The groups of inventions listed above do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

## Special Technical Features:

Group I+ includes the technical feature of a unique compound of Formula I(d), which is not required by any other invention of Group I+.

## Common technical features:

The inventions of Groups I+ share the technical feature of a compound represented by the structure of formula I(d); or its agrochemically acceptable salt, zwitterion (inner salt), stereoisomer, tautomer, hydrate, N-oxide, reverse amide analog, isotopic variant (e.g., deuterated analog), or any combination thereof; or its agrochemically acceptable salt, zwitterion (inner salt), hydrate, N-oxide, isotopic variant or any combination thereof, or a compound selected from the Table in claim 14.

The inventions of Group I+ and Group II share the core structure of formula I(d) wherein a ring sits between the oxygen atom and the G=X moiety.

The inventions of Group I+ and Group III share the technical feature of a compound represented by the structure of formula I(d); or its agrochemically acceptable salt, zwitterion (inner salt), stereoisomer, tautomer, hydrate, N-oxide, reverse amide analog, isotopic variant (e.g., deuterated analog), or any combination thereof; or its agrochemically acceptable salt, zwitterion (inner salt), hydrate, N-oxide, isotopic variant or any combination thereof.

These shared technical features, however, do not provide a contribution over the prior art, as being anticipated by the document entitled PubChem-SID-150053728 (hereinafter 'PubChem-728').

PubChem-728 teaches a compound represented by the structure of formula I(d); wherein B ring is absent; R1 is H; R2 is H; R3 is H; R4 is H; R6 and R60 are H; X3, X4 and X5 are C; X6 is NH; G=X is C=O; and k is 2; wherein the compound is not: 6-(2-aminopropoxy)picolinic; 6-(2-aminopropoxy)pyrazine-2-carboxylic acid, 2-(2-aminopropoxy)pyrimidine-4-carboxylic acid; 6-(2-aminopropoxy)-3-fluoropicolinic acid; 6-(2-aminopropoxy)-4-fluoropicolinic acid; 6-(2-aminobutoxy)picolinic acid; 6-((2-aminocyclopentyl)oxy)picolinic acid; methyl 6-(2-aminopropoxy)picolinate; or ethyl 6-(2-aminopropoxy)picolinate (pg 2, figure, this is a purchasable chemical).

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As said compound was known in the art at the time of the invention, this cannot be considered a special technical feature that would otherwise unify the inventions of Group I+, Group II and Group III.

The inventions of Group I+, Group II and Group III thus lack unity under PCT Rule 13.

Note item 4: Claims 4-11, 15-26, 31-44 and 46-55 are unsearchable because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a). These claims are therefore, not included in the above analysis.