Abstract: Solvent systems for the formulation of alkyl thiophosphoric triamide urease inhibitors, that provide stable dispersion of alkyl thiophosphoric triamides and/or dicyandiamide for even distribution (in low or high concentrations) onto fertilizers containing urea in liquid or solid form.
**INTERNATIONAL SEARCH REPORT**

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(8) - A61K 8/55; C05B 15/00; C05C 9/00 (2013.01)

USPC - 7/1/29, 30

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)

IPC(8): A61K 8/55; C05B 15/00; C05C 9/00 (2013.01)

USPC: 7/1/27, 29, 30

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

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


**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y</td>
<td>US 5,364,438 A (WESTON, CW et al.) 15 November 1994; abstract; column 1, lines 40-45; column 4, lines 25-27; claim 17</td>
<td>1.6/1, 7/1, 8/1, 9/1, 10/1, 11/7/1, 12/7/1, 13/7/1, 14/7/1, 15/7/1, 16/7/1, 17/7/1, 18/7/1, 19/1, 20/19/1, 21/7/1, 22/7/1, 23/7/1, 24/1, 25/24/1, 26/24/1</td>
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<tr>
<td>Y</td>
<td>US 4,745,200 A (MOELLER, H) 17 May 1988; formula n. column 1, lines 56-57; column 2, lines 1-8</td>
<td>1.6/1, 7/1, 8/1, 9/1, 10/1, 11/7/1, 12/7/1, 13/7/1, 14/7/1, 15/7/1, 16/7/1, 17/7/1, 18/7/1, 19/1, 20/19/1, 21/7/1, 22/7/1, 23/7/1, 24/1, 25/24/1, 26/24/1</td>
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<tr>
<td>Y</td>
<td>US 5,883,297 A (SULZER, GM et al.) 16 March 1999; column 3, line 38; column 4, lines 34, 44-47</td>
<td>1.6/1, 7/1, 8/1, 9/1, 10/1, 11/7/1, 12/7/1, 13/7/1, 14/7/1, 15/7/1, 16/7/1, 17/7/1, 18/7/1, 19/1, 20/19/1, 21/7/1, 22/7/1, 23/7/1, 24/1, 25/24/1, 26/24/1</td>
</tr>
</tbody>
</table>

Further documents are listed in the continuation of box C.

- Special categories of cited documents:
  - "A": 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
  - "E": 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
  - "L": 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
  - "P": document published prior to the international filing date but later than the priority date claimed

**Date of the actual completion of the international search**

20 December 2013 (20.12.2013)

**Date of mailing of the international search report**

7 JAN 2014

**Name and mailing address of the ISA/US**

Mail Stop PCT, Attn: ISA/US, Commissioner for Patents
P.O. Box 1450, Alexandria, Virginia 22313-1450
Facsimile No. 571-273-3201

**Authorized officer:**

Shane Thomas

PCT Helpdesk: 571-272-4300
PCT OSP: 571-272-7774
<table>
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<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
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<tbody>
<tr>
<td>Y</td>
<td>US 8,222,194 B2 (TRIVEDI, S et al.) 17 July 2012; abstract</td>
<td>7/1, 13/7/1, 14/7/1, 15/7/1, 16/7/1, 18/7/1, 23/7/1</td>
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<tr>
<td>Y</td>
<td>US 201/0233474 A1 (CIGLER, P) 29 September 2011; abstract; paragraphs [0029], [0041]-[0042]</td>
<td>16/7/1, 18/7/1</td>
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<tr>
<td>Y</td>
<td>US 6,451,746 B1 (MOORE, RG et al.) 17 September 2002; abstract</td>
<td>7/1, 17/7/1</td>
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<td>Y</td>
<td>GB 932,741 A (BARNESLEY, GE et al.) 31 July 1963; page 2, column 1, lines 59-61</td>
<td>7/1, 21/7/1</td>
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<tr>
<td>Y</td>
<td>WO 2012/069514 A1 (MERTOGLU, M et al.) 31 May 2012; page 14, line 22</td>
<td>7/1, 22/7/1</td>
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**INTERNATIONAL SEARCH REPORT**

**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.:
   - 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:

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 examined, the appropriate additional examination fees must be paid.

- **Group I**: Claims 1, 6/1, 7/1, 8/1, 9/1, 10/1, 11/7/1, 12/7/1, 13/7/1, 14/7/1, 15/7/1, 16/7/1, 17/7/1, 18/7/1, 19/1, 20/19/1, 21/7/1, 22/7/1, 23/7/1, 24/1, 25/24/1, 26/24/1
- **Group III**: Claims 4, 6/4, 7/4, 8/4, 9/4, 10/4, 11/7/4, 12/7/4, 13/7/4, 14/7/4, 15/7/4, 16/7/4, 17/7/4, 18/7/4, 19/4, 20/19/4, 21/7/4, 22/7/4, 23/7/4, 24/4, 25/24/4, 26/24/4

---Continued Within the Next Supplemental Box---

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, 6/1, 7/1, 8/1, 9/1, 10/1, 11/7/1, 12/7/1, 13/7/1, 14/7/1, 15/7/1, 16/7/1, 17/7/1, 18/7/1, 19/1, 20/19/1, 21/7/1, 22/7/1, 23/7/1, 24/1, 25/24/1, 26/24/1

**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.

Form PCT/ISA/2 10 (continuation of first sheet (2)) (July 2009)
"-Continued from Box No. Ill: Observations where unity of invention is lacking--"-

Group IV: Claims 5, 6/5, 7/5, 8/5, 9/5, 10/5, 11/7/5, 12/7/5, 13/7/5, 14/7/5, 15/7/5, 16/7/5, 17/7/5, 18/7/5, 19/5, 20/19/5, 21/7/5, 22/7/5, 23/7/5, 24/5, 25/24/5, 26/24/5 are directed toward a composition for use in an agricultural application comprising at least one alkyl dimethylamide.

The inventions listed as Groups I-IV 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: the special technical features of Group I include a composition for use in an agricultural application comprising a solvent comprising at least one dioxolane compound of formula (I); wherein R6 and R7 individually comprises a hydrogen, an alkyl group, an alkyl group, or a phenyl group, wherein n is an integer of from 1 to 10, which are not present in Groups II-IV; the special technical features of Group II include a composition for use in an agricultural application comprising a blend of dibasic esters comprising: (i) a first dibasic ester of formula (II); and (ii) optionally, a third dibasic ester of formula (III); wherein R1 and R2 individually comprise a C1-C8 alkyl group; (i) a first dibasic ester of formula (IV); (ii) a second dibasic ester of formula (IV); and (iii) optionally, a third dibasic ester of formula (III); wherein R1 and R2 individually comprise a C1-C8 alkyl group; which are not present in Groups I and III-IV; the special technical features of Group III include a composition for use in an agricultural application comprising at least one compound of formula (Ma): R300C-A-COR4R5, wherein R3 comprises a C1-C36 alkyl group; wherein R4 and R5 individually comprise a C1-C36 alkyl group, wherein R4 and R5 can optionally together form a ring; and wherein A is a linear or a branched divalent C2-C6 alkyl group, which are not present in Groups I-III; the special technical features of Group IV include a composition for use in an agricultural application comprising at least one alkyl dimethylamide, which are not present in Groups I-III.

The common technical features of Groups I-IV are a composition for use in an agricultural application comprising: at least one of an alkyl thiophosphoric triamide or a dicyandiamide and a solvent.

These common technical features are disclosed by US 5,364,438 A to Weston, et al. (hereinafter "Weston"). Weston discloses a composition for use in an agricultural application (improved fluid urea-containing fertilizer composition; abstract) comprising: at least one of an alkyl thiophosphoric triamide or a dicyandiamide (aqueous solution of urea, ammonium nitrate, N-(n-butyl) thiophosphoric triamide (NBPT), dicyandiamide (DDD); abstract) and a solvent (a solvent selected from the group consisting of liquid amides such as an N-alkyl pyrrolidone; abstract).

Since the common technical features are previously disclosed by Weston, these common features are not special and so Groups I-IV lack unity.