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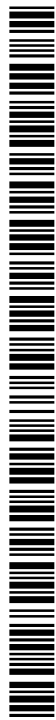
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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: MATERIALS AND METHODS FOR IMPROVED SWEET CORN

(57) Abstract: The subject invention pertains to materials and methods for producing improved sweet corn. Sweet corn produced according to the present invention exhibits increased sweetness without a reduction in germination or seedling vigor. One aspect of the invention pertains to a dominant loss-of-function *sh2* allele. Another aspect of the invention pertains to a mixture of corn seed that provides for corn plants that produce improved sweet corn. A further aspect of the invention concerns methods for producing corn plants with increased sucrose content in their kernels.



WO 2005/042722 A3

INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US04/36266

| <p>A. CLASSIFICATION OF SUBJECT MATTER<br/>                 IPC(7) : A01H 5/00,5/10,1/00,1/02,1/06; C12P 19/00<br/>                 US CL : 800/263,270,274,275,284,303,320.1<br/>                 According to International Patent Classification (IPC) or to both national classification and IPC</p>   |  |  |   |   |  |   |  |  |  |  |   |  |      |   |   |      |   |  |      |
|--|--|--|---|---|--|---|--|--|--|--|---|--|------|---|---|------|---|--|------|
| <p>B. FIELDS SEARCHED</p> <p>Minimum documentation searched (classification system followed by classification symbols)<br/>                 U.S. : 800/263,270,274,275,284,303,320.1</p> <p>Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched</p> <p>Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)</p>  |  |  |   |   |  |   |  |  |  |  |   |  |      |   |   |      |   |  |      |
| <p>C. DOCUMENTS CONSIDERED TO BE RELEVANT</p> <table border="1"> <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 6,184,438 B1 (HANNAH) 06 February 2001 (06.02.2001), column 2, line 61 through column 3; column 8, lines 30-50).</td> <td>1-17</td> </tr> <tr> <td>Y</td> <td>US 6,274,792 B1 (CHANG et al) 14 August 2001 (14.08.2001), column 2, lines 7-39; column 4, lines 23-35; column 5, lines 17-23; column 6, lines 1-14 and 39-43; column 7, lines 49-62; column 19, line 15 through column 20; column 21 through column 22, line 8; Figures 4a-4d).</td> <td>1-17</td> </tr> <tr> <td>Y</td> <td>US 5,955,330 A (VASIL et al) 21 September 1999 (21.09.1999), column 2, lines 52-59; column 7, lines 35-66; column 9, lines 1-5; column 10, lines 38-67; claims 1, 18-21 and 23-25.</td> <td>1-17</td> </tr> <tr> <td>Y</td> <td>US 6,288,311 B1 (MARSHALL et al) 11 September 2001 (11.09.2001), column 1, line 65 through column 2, line 8).</td> <td>1-17</td> </tr> <tr> <td>Y</td> <td>US 5,004,864 A (ROBERTSON et al) 02 April 1991 (02.04.1991), column 1, line 62 through column 2, line 9; column 2, lines 23-29 and 61-67; column 5, lines 26-29 and 49-55; column 9, lines 24-32).</td> <td>1-17</td> </tr> </tbody> </table>  |  | Category *   | Citation of document, with indication, where appropriate, of the relevant passages  | Relevant to claim No.   | Y  | US 6,184,438 B1 (HANNAH) 06 February 2001 (06.02.2001), column 2, line 61 through column 3; column 8, lines 30-50).   | 1-17   | Y  | US 6,274,792 B1 (CHANG et al) 14 August 2001 (14.08.2001), column 2, lines 7-39; column 4, lines 23-35; column 5, lines 17-23; column 6, lines 1-14 and 39-43; column 7, lines 49-62; column 19, line 15 through column 20; column 21 through column 22, line 8; Figures 4a-4d). | 1-17   | Y | US 5,955,330 A (VASIL et al) 21 September 1999 (21.09.1999), column 2, lines 52-59; column 7, lines 35-66; column 9, lines 1-5; column 10, lines 38-67; claims 1, 18-21 and 23-25. | 1-17 | Y | US 6,288,311 B1 (MARSHALL et al) 11 September 2001 (11.09.2001), column 1, line 65 through column 2, line 8). | 1-17 | Y | US 5,004,864 A (ROBERTSON et al) 02 April 1991 (02.04.1991), column 1, line 62 through column 2, line 9; column 2, lines 23-29 and 61-67; column 5, lines 26-29 and 49-55; column 9, lines 24-32). | 1-17 |
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| <p><input type="checkbox"/> Further documents are listed in the continuation of Box C.      <input type="checkbox"/> See patent family annex.</p>  |  |  |   |   |  |   |  |  |  |  |   |  |      |   |   |      |   |  |      |
| <p>* Special categories of cited documents:</p> <table border="0"> <tr> <td>"A" document defining the general state of the art which is not considered to be of particular relevance</td> <td>"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</td> </tr> <tr> <td>"E" earlier application or patent published on or after the international filing date</td> <td>"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</td> </tr> <tr> <td>"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)</td> <td>"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</td> </tr> <tr> <td>"O" document referring to an oral disclosure, use, exhibition or other means</td> <td>"&amp;" document member of the same patent family</td> </tr> <tr> <td>"P" document published prior to the international filing date but later than the priority date claimed</td> <td></td> </tr> </table> |  | "A" document defining the general state of the art which is not considered to be of particular relevance | "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 | "E" earlier application or patent published on or after the international filing date | "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 | "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) | "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 | "O" document referring to an oral disclosure, use, exhibition or other means | "&" document member of the same patent family  | "P" document published prior to the international filing date but later than the priority date claimed |   |  |      |   |   |      |   |  |      |
| "A" document defining the general state of the art which is not considered to be of particular relevance   | "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  |  |   |   |  |   |  |  |  |  |   |  |      |   |   |      |   |  |      |
| "E" earlier application or patent published on or after the international filing date  | "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   |  |   |   |  |   |  |  |  |  |   |  |      |   |   |      |   |  |      |
| "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)  | "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                                 |  |   |   |  |   |  |  |  |  |   |  |      |   |   |      |   |  |      |
| "O" document referring to an oral disclosure, use, exhibition or other means   | "&" document member of the same patent family  |  |   |   |  |   |  |  |  |  |   |  |      |   |   |      |   |  |      |
| "P" document published prior to the international filing date but later than the priority date claimed   |  |  |   |   |  |   |  |  |  |  |   |  |      |   |   |      |   |  |      |
| <p>Date of the actual completion of the international search<br/>01 August 2005 (01.08.2005)</p>   | <p>Date of mailing of the international search report<br/>26 AUG 2005</p>  |  |   |   |  |   |  |  |  |  |   |  |      |   |   |      |   |  |      |
| <p>Name and mailing address of the ISA/US<br/>                 Mail Stop PCT, Attn: ISA/US<br/>                 Commissioner for Patents<br/>                 P.O. Box 1450<br/>                 Alexandria, Virginia 22313-1450<br/>                 Facsimile No. (703) 305-3230</p>   | <p>Authorized officer<br/>                 David T. Fox<br/>                 Telephone No. 571-272-1600</p>  |  |   |   |  |   |  |  |  |  |   |  |      |   |   |      |   |  |      |

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US04/36266

## 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:  
Please See Continuation 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 an additional fee, this Authority did not invite payment of any additional fee.
  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.: 1-17
- Remark on Protest  The additional search fees were accompanied by the applicant's protest.  
 No protest accompanied the payment of additional search fees.

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US04/36266

### BOX III. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING

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, claim(s) 1-17, drawn to a mixture of corn seeds comprising first corn seeds with an sh2 mutation and second corn seeds with wild-type Sh2 gene and male sterility genes, and a method of its use.

Group II, claim(s) 18-26, drawn to a corn plant comprising a mutant sh2 allele and additionally comprising mutations conferring heat stability or increased yield.

Group III, claim(s) 27-30, drawn to a transformation-mediated method of making a corn plant comprising a silenced Sh2 gene, and the resultant transformed plant.

The inventions listed as Groups I-III 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 claims are linked by the technical feature of corn plants comprising an sh2 mutation which confers increased sweetness. However, this feature is not special because it does not constitute an advance over the prior art. US Patent 6,184,438 B1 to Hannah, issued 06 February 2001, teaches corn plants comprising a mutant sh2 allele which confers increased sweetness (see, e.g., claims 1-7).

Furthermore, each Group requires physiologically and biochemically divergent starting materials and process steps not required by the other, which therefore do not link the inventions of each group. Group I, a first product and method of using it, involves seed blends and male sterility genes, each not required by any other group. Group II, a second product, involves additional mutations conferring heat stability and increased seed protein, each not required by any other group. Group III, a third product and method of making it, involves gene fragments, gene silencing constructs, plant transformation techniques, and plant tissue culture techniques, each not required by any other group.