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(54) Title: COATED PLANT SEEDS AND A METHOD FOR COATING SEEDS

(57) Abstract: A coated plant seed comprising a seed which is coated with polymer composition comprising a water-soluble or water swellable polymer, which polymer composition is in the form of a reverse phase emulsion or a reverse phase dispersion. A method of coating plant seeds is also provided by contacting a seed by the polymer composition. Preferably a coating also contains plant nutrients. Significant improvements are obtained in retaining moisture and nutrient retention in the zone of the seed and seedling after germination.
Coated Plant Seeds and a Method for Coating Seeds

The present invention concerns coated plant seeds which seeds have been coated by a composition containing a water-soluble or water swellable polymer. The invention also relates to a process for providing the coated seeds.

Anionic linear polymers have been used to reduce leaching of water and nutrients in leaching substrates, for instance coarse textured sands. The effect of water-soluble anionic polyacrylamides on the saturated hydraulic conductivity and water retention values of a range of textured soils is described in the paper by DJ Horne and RE Sojka, Soil and Water Conservation Society 2002 Conference Abstracts. The polymers referred to in this article have been applied to irrigation water and the upper region of the soil substrate. A problem with techniques in which polymers are applied to irrigation water, is that the amounts of polymer required are quite high in order to achieve any useful effect.

Acrylic polymers have been used as binders in seed coating applications to achieve adhesion of a variety of materials to seeds. An example of this is in Russian patent 2183394 which describes the application of polyacrylamide to adhere selenium to seeds.

Acrylic polymers have also been used as part of a film forming coating in order to protect seeds. Polish patent 146138 describes a seed dressing containing pesticides, nutrients and growth regulators that been a obtained by the addition of polymers such as polyacrylamide or hydrolyzed polyacrylamide and lignosulfonates, molasses or brown coal dust film and formaldehyde, epoxides or Ca salts. The dressing is applied by spraying and forms a strong film that has low phytotoxicity and is designed to protect the seed.

It is known to apply polymers, typically cross-linked hydro gels, to improve germination of seeds. Such polymers can be applied directly to the seed or are added directly to the soil adjacent to the seeds. Australian patent 589380
describes adherent seed coating compositions for improving germination prepared from cross-linked acrylamide polymers and a cellulose ester as a binder.

GB 2207140 describes the preparation of water absorbent polymers by reverse phase suspension polymerisation for by the recovery of the polymer beads thus formed. There is no disclosure of preparing step polymers by reverse phase emulsion or dispersion polymerisation. The polymer is said to be useful for a variety of applications including seed coating agent.

Australian patent application 2000 053638 describes using a linear polymer of sodium acrylate to produce a protective coating for hulled rice which protective coating is said to improve the germination of the seed. A gelling agent, usually a calcium or barium based compound, is required in order to produce the gel forming layer that is used coated seeds.

WO 85/01736 describes a hygroscopic or water absorbent coating for seeds for facilitating seed germination prepared using finely divided polyacrylamide and polyacrylate. The polymer is usually applied as a particulate composition together with other particulate material such as finely divided graphite.

Chinese patent 1297682 describes a polyacrylate used with a mix of nutrients and other additives in order to maintain moisture in the root zone and improve drought resistance.

South African patent 85/01925 reveals an alkali swellable aqueous emulsion that is diluted in water and the polymer is activated by adjustment of the pH to 8.5. The resulting solution thinned by the addition of acid, and then applied to the seeds. The objective is to improve the germination of the seed.
U.S. published patent application 2004 069031 concerns water-soluble polyacrylamide soil conditioners that are applied to a solid carrier such as fertilizers or mulches.

Despite all the previous developments in improving seed germination, flow (leaching) of water and nutrients away from the seed in soils can still occur. This undesirable leaching of water and nutrients is most severe where the soil has an open structure, especially where open structured sands are farmed (leaching sands). None of the aforementioned techniques are sufficiently able to overcome significant losses of water and nutrients from the zone of the seed and seedling after germination.

We have found that these problems can be overcome by providing the seed with a particular coating containing water soluble or water swellable polymers.

Thus according to the invention we provide a coated plant seed comprising a seed which is coated with polymer composition comprising a water-soluble or water swellable polymer, which polymer composition is in the form of a reverse phase emulsion or a reverse phase dispersion.

We have found that the application of water-soluble or water swellable polymers in the form of a reverse phase emulsion or a reverse phase dispersion directly to the seed significantly reduces leaching of water and nutrients from the seed and/or from the soil in the vicinity of the seed. The germination of seeds is greatly improved by applying the coating of the present invention.

Without being limited to theory, it is believed that the polymer migrates within the soil structure and prevents leaching of the soil solution (containing nutrients) by entering into the interstitial spaces and capillaries within the soil/sand. This has been found to reduce the vertical flow of the water or nutrient solution under gravity, which helps to maintain moisture in the root zone.
The emulsion or dispersion polymer coated on the seed allow soil moisture and/or nutrients to be retained in the zone of the plant seed or seedling which improves nutrient transport and uptake and can reduce the susceptibility to disease. This reduces variation in plant growth, nutrition distribution, crop quality and crop yield.

The water-soluble or water swellable polymer may be any suitable hydrophilic polymer that can be provided in the form of a reverse phase emulsion or a reverse phase dispersion. The polymer may be a natural polymer, for instance polysaccharides such as starches, starch derivatives, hydroxy ethyl cellulose, carboxy methyl cellulose, etc. Preferably the polymer is synthetic and suitably is a vinyl addition polymer. Preferred water-soluble or water swellable polymers are formed from water-soluble ethylenically unsaturated monomer or blend of water-soluble ethylenically unsaturated monomers. By water soluble we mean that the water soluble monomer or water soluble monomer blend has a solubility in water of at least 5g in 100 ml of water at 25 °C.

Preferably the polymers are of relatively high molecular weight for instance exhibiting molecular weights of at least 500,000 and generally at least one million and usually 3 or 4 million up to 20 or 30 million or more. Preferably the polymer is a water-soluble polymer exhibiting an intrinsic viscosity of at least 3 dl/g (measured using at 25°C in 1M buffered salt solution). Water-soluble polymers desirably exhibit a solubility in water of at least 5 g in 100 ml of water at 25 °C. Preferably IV is at least 5 or 6 dl/g, more preferably at least 8 or 9 dl/g. It may be up to for instance 25 or 30 dl/g but generally it is found that the optimum performance is given by polymers having IV not more than about 20 or 22 dl/g. Usually the IV is not more than 20, and generally in the range of 5 to 20 dl/g, especially around 15 dl/g.
Intrinsic viscosity of polymers may be determined by preparing an aqueous solution of the polymer (0.5-1% w/w) based on the active content of the polymer. 2 g of this 0.5-1% polymer solution is diluted to 100 ml in a volumetric flask with 50 ml of 2M sodium chloride solution that is buffered to pH 7.0 (using 1.56 g sodium dihydrogen phosphate and 32.26 g disodium hydrogen phosphate per litre of deionised water) and the whole is diluted to the 100 ml mark with deionised water. The intrinsic viscosity of the polymers are measured using a Number 1 suspended level viscometer at 25°C in 1M buffered salt solution.

The water-soluble or water swellable polymers of the present invention may be prepared as reverse phase emulsions or reverse phase dispersions by any conventional technique. Desirably the water-soluble or water swellable polymer may be prepared by reverse phase emulsion polymerisation, optionally followed by dehydration under reduced pressure and temperature and often referred to as azeotropic dehydration to form a dispersion of polymer particles in oil. The polymers may be produced as a water-in-oil emulsion or dispersion by water-in-oil emulsion polymerisation, for example according to a process defined by EP-A-150933, EP-A-102760, EP-A-126528, US3624019, US3734873, or US4052353. Alternatively a reverse phase dispersion can be prepared by slurring finely divided polymer into a non aqueous liquid, for instance a hydrocarbon, typically employing a suitable surfactant or dispersion stabilizer. A suitable technique is described in US4374216. Other prior art references relating to dispersions of water-soluble polymers in oil include US 328-2874, US3691124, US3826771, US3849361, US3888945, US4021399, US4024097, US4029622, US4090992, US4125508, US4176107 and US4299755.

The polymer may be water swellable for example as a cross-linked hydrophilic polymer. It may be water-soluble and branched but in general it is substantially linear and is not cross-linked.
The polymers may be cationic, nonionic, amphoteric but preferably they are anionic.

Cationic polymers may be formed from one or more ethylenically unsaturated cationic monomers optionally with for instance a nonionic monomer, preferably acrylamide. The cationic monomers include dialkylamino alkyl (meth) acrylates, dialkylamino alkyl (meth) acrylamides, including acid addition and quaternary ammonium salts thereof, diallyl dimethyl ammonium chloride. Preferred cationic monomers include the methyl chloride quaternary ammonium salts of dimethylamino ethyl acrylate and dimethyl aminoethyl methacrylate.

Amphoteric polymers include at least one cationic monomer (for example as defined above) and at least one anionic monomer (for example as defined above) optionally with a nonionic monomer, especially acrylamide.

Non-ionic polymers include polymers of any suitable non-ionic monomers, for instance, acrylamide, methacrylamide, N-vinylpyrrolidone and 2-hydroxyethyl acrylate. Preferred non-ionic polymers comprise acrylamide especially acrylamide homopolymers.

Anionic polymers may be formed from one or more ethylenically unsaturated anionic monomers or a blend of one or more anionic monomers with for instance a nonionic monomer, preferably acrylamide. The anionic monomers include acrylic acid, methacrylic acid, maleic acid, crotonic acid, itaconic acid, vinylsulphonic acid, allyl sulphonic acid, 2-acrylamido-2-methylpropane sulphonic acid and salts thereof. A preferred anionic polymer is the copolymer of sodium acrylate with acrylamide.

The anionic content i.e. the proportion of anionic monomer in the monomer blend used to form the polymer, is variable from 0% up to 100 wt. %, but is preferably not more than 80 wt. %, more preferably not more than 70 wt. %.
Typically these preferred anionic polymers when exhibit and intrinsic viscosity between 5 and 20 dl/g. Particularly preferred polymers have anionic content in the range 20 to 60 wt. %, more preferably in the range 30 to 50 wt. %, especially around 35 to 45 wt. %. A particularly suitable polymer includes the copolymer of acrylamide with sodium acrylate (around 60/40 wt./wt.) exhibiting and intrinsic viscosity around 15 dl/g reverse phase emulsion containing 35% by weight active polymer.

Preferably the coated seed has a coating that comprises a plant nutrient. The plant nutrient may be any suitable compound that will provide essential nutrition required for the germination of the seed and growth of the seedling plant. Typical nutrients include copper, manganese, calcium, and zinc compounds, for instance as complexes with suitable sequestrants/chelating agents. Suitable chelating agents include ethylene diamine tetra acetic acid (EDTA), diethylene triamine pentaacetate (DTPA), Nitrilotriacetic acid (NTA), Ethylene diamine- N,N'-bis (o-hydroxyphenyl)acetic acid (EDDHA). Preferred nutrients include either copper or zinc complexes with ethylene diamine tetra acetic acid (EDTA) or salts thereof. Another group of preferred nutrients are selected from MnEDTA, CaEDTA and FeEDDHA.

Accordingly a further aspect of the invention we provide a method of coating a plant seed comprising contacting the seed with a polymer composition comprising a water-soluble or water swellable polymer, which polymer composition is in the form of a reverse phase emulsion or a reverse phase dispersion and allowing the emulsion or dispersion to dry.

The reverse phase emulsion or dispersion polymer can be coated onto the seeds by any conventional technique. The emulsion or dispersion can for instance a sprayed directly onto the seeds. The emulsion or dispersion and seeds can for instance be mixed together using conventional mixing techniques. Preferably, the seeds are placed into a suitable container, for instance a drum,
which is rotated and the emulsion or dispersion is injected in sufficient quantities to provide a coating to the seeds. The coating on the seeds may be partial but preferably a substantially complete, usually covering at least 90% of the surface of the seed. It is not usually necessary for the seeds to be dried after coating however where this is desired it can be achieved by moving the seeds from the drum or other container onto a flat surface. Desirably the seeds are substantially separated from each other in order to prevent them sticking together. The coating on the seeds can be allowed to dry naturally or alternatively dried by any suitable conventional techniques that do not impart harsh conditions, such as excessive temperatures, that could damage the seed. The coatings on the seeds can be for instance air dried by passing a current of air over the seeds. The air current may be heated slightly to for instance at temperatures up to 40 °C.

Preferably the seeds are also contacted by a plant nutrient. The polymer emulsion or dispersion and nutrient can be applied to the seeds simultaneously or sequentially in either order. Preferably the seeds are placed in the mixing vessel and the nutrient component is added to the seeds and allowed to fully disperse through the seeds prior to addition of the polymer emulsion or dispersion. After addition of the polymer the seeds are preferably tumbled for a period of 5 –10 minutes to facilitate drying and prevent the seeds from sticking together. Alternatively the seeds may for instance the coated by the polymer composition (emulsion or dispersion) and subsequently contacted by a nutrient.

The following examples are a demonstration of the invention without them anyway intending to be limiting.
Example 1
Wheat seeds are treated by blending in a feed mixer with polymer and trace elements. The seed is added first into the mixer flowed by addition of the trace element. The polymer emulsion is then added to the seeds and the mixture is allowed to tumble for a period of 10 minutes. Seed treatments of the following mixtures are prepared:

Treatment

A. Control (no polymer or trace element added)
B. 1% w/w Polymer emulsion (i.e. 10g of emulsion/kg seeds)
C. 2% w/w Polymer emulsion
D. 1% w/w Polymer and 3g/kg seed Librel Zinc
E. 1% w/w Polymer and 3g/kg seed Librel Copper
F. 1% w/w Polymer and 1.5g/kg seed Librel Zinc and 1.5g/kg seed Librel Copper

In all examples of the polymer is a copolymer of acrylamide with sodium acrylate (around 60/40 wt./wt.) exhibiting and intrinsic viscosity around 15 dl/g reverse phase emulsion containing 35% by weight active polymer.

Librel Zinc is a solid grade micronutrient containing 14% Zn fully chelated with EDTA.
Librel Copper is a solid grade micronutrient containing 14% Cu fully chelated with EDTA.

Example 2
Samples of the treatments A to F are tested by sowing the wheat under trial conditions. Seed is sown at a depth of 1 ½ cm and worked twice before sowing to an approximate depth of 5cm. Pre-sowing the site is sprayed with glyphosate at 500mls/ha + 300mls 2,4D ester.
Harvest is undertaken using a John Deere 36' 9650 STS combine.

Tissue analysis is conducted to determine the levels of nutrient in the tissue of the harvested crop. The yield and tissue analysis results are shown in table 1.

Table 1

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Yield (tonnes/ha)</th>
<th>Increase Compared to Control</th>
<th>Mn (mg/kg)</th>
<th>Increase Compared to Control</th>
<th>Ca (%)</th>
<th>Increase Compared to Control</th>
<th>K (%)</th>
<th>Increase Compared to Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>1.9</td>
<td>-</td>
<td>41</td>
<td>-</td>
<td>0.15</td>
<td>-</td>
<td>2.3</td>
<td>-</td>
</tr>
<tr>
<td>B</td>
<td>2.21</td>
<td>16.13%</td>
<td>55</td>
<td>34.15%</td>
<td>0.21</td>
<td>40.00%</td>
<td>2.6</td>
<td>13.04%</td>
</tr>
<tr>
<td>C</td>
<td>2.08</td>
<td>9.39%</td>
<td>61</td>
<td>48.78%</td>
<td>0.27</td>
<td>80.00%</td>
<td>2.8</td>
<td>21.74%</td>
</tr>
<tr>
<td>D</td>
<td>2.07</td>
<td>9.00%</td>
<td>50</td>
<td>21.95%</td>
<td>0.17</td>
<td>13.33%</td>
<td>2.6</td>
<td>13.04%</td>
</tr>
<tr>
<td>E</td>
<td>2.11</td>
<td>10.96%</td>
<td>43</td>
<td>4.88%</td>
<td>0.19</td>
<td>26.67%</td>
<td>2.7</td>
<td>17.39%</td>
</tr>
<tr>
<td>F</td>
<td>2.14</td>
<td>12.82%</td>
<td>42</td>
<td>2.44%</td>
<td>0.15</td>
<td>0.00%</td>
<td>2.4</td>
<td>4.35%</td>
</tr>
</tbody>
</table>

All the polymer coated seed treatments gave rise to an increase in yield and an increase in the amount of beneficial nutrients present in the leaf tissue.

Example 3

Samples of triticale seeds are treated with the following compositions:

A. Control (no polymer or trace element added)
B. 1% w/w Polymer
C. 2% w/w Polymer
D. 1% w/w Polymer and 1.5g/kg seed Librel Zinc and 1.5g/kg seed Librel Copper
G. 1% w/w Polymer and 3g/kg seed Librel Zinc and 3g/kg seed Librel Copper
H. 1% w/w Polymer and 5g/kg seed Librel Zinc and 5g/kg seed Librel Copper
I. 1% w/w Polymer and 8g/kg seed Librel Zinc and 8g/kg seed Librel Copper

Tissue analysis is conducted to determine the levels of nutrient in the tissue of the harvested crop. The tissue analysis results are shown in table 2.

Table 2

<table>
<thead>
<tr>
<th>Treatment</th>
<th>N%</th>
<th>P%</th>
<th>K%</th>
<th>Zn mg/kg</th>
<th>Mn mg/kg</th>
<th>Fe mg/kg</th>
<th>Cu mg/kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>4.6</td>
<td>0.59</td>
<td>3.6</td>
<td>25</td>
<td>49</td>
<td>154</td>
<td>7.9</td>
</tr>
<tr>
<td>B</td>
<td>4.6</td>
<td>0.62</td>
<td>3.7</td>
<td>29</td>
<td>60</td>
<td>223</td>
<td>8</td>
</tr>
<tr>
<td>C</td>
<td>5.2</td>
<td>0.64</td>
<td>3.9</td>
<td>29</td>
<td>57</td>
<td>279</td>
<td>8.5</td>
</tr>
<tr>
<td>F</td>
<td>5</td>
<td>0.62</td>
<td>3.8</td>
<td>31</td>
<td>52</td>
<td>223</td>
<td>8.1</td>
</tr>
<tr>
<td>G</td>
<td>4.9</td>
<td>0.65</td>
<td>4</td>
<td>31</td>
<td>58</td>
<td>290</td>
<td>8.8</td>
</tr>
<tr>
<td>H</td>
<td>4.9</td>
<td>0.69</td>
<td>4</td>
<td>31</td>
<td>64</td>
<td>259</td>
<td>8.5</td>
</tr>
<tr>
<td>I</td>
<td>4.8</td>
<td>0.62</td>
<td>4</td>
<td>34</td>
<td>58</td>
<td>259</td>
<td>8.4</td>
</tr>
</tbody>
</table>

The amount of nutrient present in comparison to the control treatment is given in table 3.

Table 3

<table>
<thead>
<tr>
<th>Treatment</th>
<th>N%</th>
<th>P%</th>
<th>K%</th>
<th>Zn mg/kg</th>
<th>Mn mg/kg</th>
<th>Fe mg/kg</th>
<th>Cu mg/kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>100%</td>
<td>105%</td>
<td>103%</td>
<td>116%</td>
<td>122%</td>
<td>145%</td>
<td>101%</td>
</tr>
<tr>
<td>C</td>
<td>113%</td>
<td>108%</td>
<td>108%</td>
<td>116%</td>
<td>116%</td>
<td>181%</td>
<td>108%</td>
</tr>
<tr>
<td>F</td>
<td>109%</td>
<td>105%</td>
<td>106%</td>
<td>124%</td>
<td>106%</td>
<td>145%</td>
<td>103%</td>
</tr>
<tr>
<td>G</td>
<td>107%</td>
<td>110%</td>
<td>111%</td>
<td>124%</td>
<td>118%</td>
<td>188%</td>
<td>111%</td>
</tr>
<tr>
<td>H</td>
<td>107%</td>
<td>117%</td>
<td>111%</td>
<td>124%</td>
<td>131%</td>
<td>168%</td>
<td>108%</td>
</tr>
<tr>
<td>I</td>
<td>104%</td>
<td>105%</td>
<td>111%</td>
<td>136%</td>
<td>118%</td>
<td>168%</td>
<td>106%</td>
</tr>
</tbody>
</table>
All the polymer coated seed treatments gave rise to an increase in the amount of beneficial nutrients present in the leaf tissue.
Claims

1. A coated plant seed comprising a seed which is coated with polymer composition comprising a water-soluble or water swellable polymer, which polymer composition is in the form of a reverse phase emulsion or a reverse phase dispersion.

2. A coated seed according to claim 1 in which the polymer has been formed from a water-soluble ethylenically unsaturated monomer or a blend of water-soluble ethylenically unsaturated monomers.

3. A coated seed according to claim 1 or claim 2 in which the polymer is a water-soluble polymer exhibiting and intrinsic viscosity of at least 3 dl/g (measured using at 25°C in 1M buffered salt solution).

4. A coated seed according to any of claims 1 to 3 in which polymer is an anionic.

5. A coated seed according to any of claims 1 to 4 in which the polymer is a water-soluble copolymer of acrylamide with sodium acrylate and exhibits and intrinsic viscosity of at least 5 dl/g (measured using at 25°C in 1M buffered salt solution).

6. A coated seed according to any of claims 1 to 5 in which the seed has a coating comprising plant nutrient.

7. A coated seed according to claim 6 in which the nutrient includes either copper or zinc complexed with ethylene diamine tetra acetic acid (EDTA) or salts thereof.

8. A coat seed according to claims 6 in which the nutrient is selected from MnEDTA, CaEDTA and FeEDDHA.

9. A method of coating a plant seed comprising contacting the seed with a polymer composition comprising a water-soluble or water swellable polymer, which polymer composition is in the form of a reverse phase emulsion or a reverse phase dispersion and allowing the emulsion or dispersion to dry.

10. A method according to claim 9 in which the polymer includes any of the features defined in claims 2 to 5.
11. A method according to claim 9 or claim 10 in which the seed is also contacted by a plant nutrient.

12. A method according to claim 11 in which the nutrient includes either copper or zinc complexed with ethylene diamine tetra acetic acid (EDTA) or salts thereof.

13. A method according to claim 11 in which the nutrient is selected from MnEDTA, CaEDTA and FeEDDHA.

14. A method according to any of claims 11 to 13 in which the seed is contacted with a nutrient subsequent to coating by the polymer composition.
### INTERNATIONAL SEARCH REPORT

**International application No**

PCT/EP2006/004967

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**A. CLASSIFICATION OF SUBJECT MATTER**

INV. C08F2/32 A01G1/06

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**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

A01C C08F

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

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

EPO-Internal, PAJ, WPI Data

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**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>
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</table>
| X        | US 5 055 501 A (MORIYA ET AL)  
8 October 1991 (1991-10-08)  
abstract  
column 3, lines 3-16  
column 5, line 62 - line 65  
column 6, line 60 - line 68  
column 7, line 9 - line 16  
claims | 1-5, 9, 10 |
| Y        | GB 734 728 A (MONSANTO CHEMICAL COMPANY)  
3 August 1955 (1955-08-03)  
pages 1, line 68 - line 89  
page 2, line 1 - line 55  
page 3, line 7 - line 28  
claims | 6-8, 11-14 |

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Further documents are listed in the continuation of Box C. See patent family annex.

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* Special categories of cited documents:

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

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**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

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**Y** 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.

**S** document member of the same patent family

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Date of the actual completion of the International search

8 August 2006

Date of mailing of the International search report

17/08/2006

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Name and mailing address of the ISA

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Authorised officer

Oltra García, R
<table>
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