

152 patents have been applied for on rice. These patents cover 584 genes or partial gene sequences. Here are a few of them.

Rice gene patent claims, by company.

|     | <b>Company</b>             | Number of Patents | % of total |
|-----|----------------------------|-------------------|------------|
| 1.  | Du Pont                    | 46                | 30         |
| 2.  | Japan Tobacco              | 9                 | 6          |
| 3.  | Mitsui Gyosai              | 8                 | 5          |
| 4.  | Mitsui Toatsu              | 8                 | 5          |
| 5.  | Norinsuisans               | 6                 | 4          |
| 6.  | Hokko                      | 4                 | 2.6        |
| 7.  | Mitsubishi                 | 4                 | 2.6        |
| 8.  | Purdue Research Foundation | 4                 | 2.6        |
| 9.  | University of California   | 4                 | 2.6        |
| 10. | Iwake Ken                  | 3                 | 2          |
| 11. | Mitsui Chemical            | 3                 | 2          |
| 12. | Novartis                   | 3                 | 2          |
|     |                            |                   | 66.4%      |

Patent details

|    | <b>Patent Number</b> | <b>Patent holder</b>           | <b>Granted yet y/n?</b> | <b>Date filed</b> | <b>Gene</b>  | <b>Function/Use</b>  |
|----|----------------------|--------------------------------|-------------------------|-------------------|--|--|
| 1. | WO 0036116           | Du Pont                        | N                       | 15/12/99          | Sucrose non-fermenting 4 protein                     | To control carbon and nitrogen partitioning in growth and development and alter plant composition. |
| 2. | WO 0032792           | Du Pont                        | N                       | 02/12/99          | 1-deoxy-D-xylulose 5-phosphate synthase              | Involved in isoprenoid synthesis and used to create GM plants with altered levels.                 |
| 3. | WO 0031142           | Du Pont                        | N                       | 18/11/99          | SYR2 homologue                                       | Creation of plants with sphingomycin resistance.   |
| 4. | WO 0028052           | Plant Biotechnologie GMBH      | N                       | 05/11/99          | Starch granule bound protein                         | Involved in starch production for use in GM plants with improved nutritional value.                |
| 5. | WO 0020611           | Novartis                       | N                       | 29/09/99          | Primer for amplification of Ospt fragment 7          | Used in production of plants with modified cellular organelles.                                    |
| 6. | EP 997536            | Marine Biotechnology Institute | N                       | 24/09/99          | Type II topoisomerase                                | For studies on genetic relatedness.  |
| 7. | EP 997536            | Monsanto                       | N                       | 18/08/99          | Terminator and leader sequences of beta tubulin gene | Used in production of GM disease resistant plants.   |
| 8. | WO 0008162           | Du Pont                        | N                       | 03/08/99          | Pi-ta disease resistance gene fragments              | To produce varieties resistant to rice blight fungus and other fungal diseases.                    |
| 9. | WO 0006749           | Du Pont                        | N                       | 27/07/99          | Sulphite oxidase                                     | Involved in sulphur metabolism for use in plant breeding or development of GM plants.              |

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|-----|---------------|-----------------------|---|----------|--|---|
| 10. | WO<br>0006755 | Du Pont               | N | 26/07/99 | Starch synthetase                        | To produce GM plants with altered starch composition.   |
| 11. | WO<br>0006755 | Du Pont               | N | 21/07/99 | Transcription co-activator PC4           | Alters transcription of genes for use in GM plants.   |
| 12. | WO<br>0005386 | Du Pont               | N | 20/07/99 | DAPH synthetase                          | Control of relative composition of aromatic and non aromatic amino acids.                       |
| 13. | WO<br>0005353 | DU Pont               | N | 20/07/99 | Chorismate synthase                      | Control of relative composition of aromatic and non aromatic amino acids.                       |
| 14. | WO<br>0005387 | Du Pont               | N | 20/07/99 | 3-dehydroquinate synthase gene           | Involved in production of aromatic amino acids and to map related genes and use in GM plants    |
| 15. | WO<br>0004155 | Purdue Res Foundation | N | 16/07/99 | R5-4, disease resistance gene            | To produce disease resistant crops.   |
| 16. | WO<br>0004163 | Du Pont               | N | 14/07/99 | 5,10-methylenetetrahydrofolate reductase | Plays a role in methionine synthesis. To aid development of new herbicides.                     |
| 17. | WO<br>0004166 | Du Pont               | N | 13/07/99 | Cellulose synthase                       | To develop plants with altered levels of fibre.   |
| 18. | WO<br>0004177 | Du Pont               | N | 13/07/99 | Deacyetylase gene 1 (HD1)                | Controlling of gene regulation in plants.   |
| 19. | WO<br>0004154 | Du Pont               | N | 13/07/99 | Sulphate permease                        | In plant breeding and in GM plants with increase levels of protein produced in diseased plants. |
| 20. | WO<br>0004167 | Du Pont               | N | 13/07/99 | Serine O-acetyltransferase -2            | Involved in sulphate assimilation. For plant breeding or producing GM plants.                   |
| 21. | WO<br>0003026 | Du Pont               | N | 12/07/99 | ADA2 transcription co-activator          | To alter the transcription rate of other genes in GM plants.                                    |
| 22. | EP 967278     | Mitsui Chemical Inc   | N | 28/06/99 | Os-MPC1 protein                          | Use in control of flowering.  |

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|-----|---------------|--|---|----------|--|---|
| 23. | WO<br>9967406 | Applied<br>Phytologics                                   | N | 25/06/99 | Beta-glucanase gene<br>Gns9 primer                               | Use in creating GM plants which<br>produce selected proteins under<br>certain conditions.                           |
| 24. | FR2779737     | Institute<br>National<br>Research<br>Agronomique         | N | 11/06/99 | D-ribulose-5-phosphate-3-<br>epimerase nematode<br>response gene | Activated at beginning of root<br>nematode infection and used to<br>produce GM plants with increased<br>resistance. |
| 25. | EP 969092     | National<br>Institute of<br>Agrobiologica<br>l Resources | N | 11/06/99 | Blast disease resistance<br>(Pi-b)                               | To produce GM disease resistant<br>plants.  |
| 26. | WO<br>9928446 | Du Pont  | N | 10/06/99 | Branched chain amino<br>acid biosynthetic genes                  | Plant breeding, gene mapping and<br>finding targets for herbicides.   |
| 27. | WO<br>9963092 | Whitehead<br>Institute of<br>Biomedical<br>Research      | N | 03/06/99 | Auxin transport protein<br>E1R1                                  | Involved in growth and response to<br>gravity. Used to produce GM crops<br>with auxin herbicide tolerance.          |
| 28. | WO<br>9963055 | University of<br>Maryland                                | N | 02/06/99 | Isopentyl isomerase 1  | Involved in production of carotenoids<br>so for use in GM plants with altered<br>carotenoid levels.                 |
| 29. | EP1034274     | Du Pont  | N | 20/05/99 | Jab1   | Involved in gene expression and use<br>in altering transcription.   |
| 30. | WO<br>9957285 | Du Pont  | N | 06/05/99 | Sucrose phosphate<br>synthase                                    | Alteration of sucrose content.  |
| 31. | WO<br>9957249 | Japan<br>Science and<br>Technology<br>Group              | N | 30/04/99 | Nicotianamine synthase   | To produce GM plants with tolerance<br>to iron deficiency.  |
| 32. | WO<br>9955883 | Du Pont  | N | 29/04/99 | Neutral triacylglycerol<br>lipase                                | Alteration of fatty acid levels in GM<br>plants.  |

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|-----|---------------|---|---|----------|--|---|
| 33. | WO<br>9955879 | Du Pont                                     | N | 22/04/99 | Inisitol 1,3,4-triphosphate<br>5/6-kinase      | ITK is an enzyme involved in phytic acid production. To develop feeds with lower levels of phytate and improved feed quality. |
| 34. | WO<br>9955882 | Du Pont                                     | N | 22/04/99 | Extragenic suppressor<br>protein               | Involved in phytic acid production so can be used to produce low phytate crops with improved feed quality.                    |
| 35. | WO<br>9955889 | Du Pont                                     | N | 22/04/99 | Phytoene synthase C-<br>terminal               | Involved in carotenoid synthesis.   |
| 36. | WO<br>9955887 | Du Pont                                     | N | 16/04/99 | Beta-carotene hydroxylase                      | Converts beta-carotene into zeaxanthin. Used to alter carotenoid content and alter colour.                                    |
| 37. | CN<br>1237328 | Anhui<br>Academy<br>Agricultural<br>Science | N | 10/04/99 | OPG13 primer                                   | Use in molecular marking technique to determine purity of rice varieties.   |
| 38. | WO<br>9953069 | Du Pont                                     | N | 08/04/99 | PITSLRE protein kinase<br>subunit CDC2         | Involved in regulation of cell cycle and used to regulate cell growth.  |
| 39. | WO<br>9953072 | Du Pont                                     | N | 08/04/99 | Starch R1 phosphorylation<br>protein           | For use in genetic manipulation of starch production in plants.   |
| 40. | WO<br>9953082 | Du Pont                                     | N | 07/04/99 | Hexose carrier protein                         | Involved in carbohydrate transport and to alter carbohydrate distribution in plants.  |
| 41. | WO<br>9953068 | Du Pont                                     | N | 07/04/99 | Sucrose transport protein.                     | To manipulate carbohydrate metabolism in plants.  |
| 42. | WO<br>9949013 | Du Pont                                     | N | 22/03/99 | Phosphoribosylanthranilate<br>isomerase        | Enzyme involved in tryptophan synthesis. Not present in animals so could be used as target for herbicides.                    |
| 43. | WO<br>9949021 | Du Pont                                     | N | 22/03/99 | Serine<br>palmitoyltransferase Lcb2<br>subunit | Involved in production of sphingolipids and may allow increased production of ceramide used in cosmetics.                     |

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|-----|---------------|---|---|----------|--|---|
| 44. | WO<br>9949047 | Du Pont   | N | 22/03/99 | Brittle-1 gene portions                            | Membrane transporter for ADP-glucose used in starch synthesis. Use in altering starch synthesis.                            |
| 45. | WO<br>9947679 | Blumwald,<br>Apse,<br>Snedden &<br>Aharon                     | N | 19/03/99 | Na/H antiport transporter                          | In salt regulation and to use for salt tolerance in plants.   |
| 46. | WO<br>9949053 | Du Pont   | N | 19/03/99 | Serine palmitoyltransferase<br>Lcb1 polynucleotide | To control shingolipid levels in plants which play a role in cell differentiation and senescence.                           |
| 47. | WO<br>9949058 | Du Pont   | N | 19/03/99 | Tryptophan synthetase<br>alpha subunit             | To use in altering levels of tryptophan in plants.  |
| 48. | WO<br>9948486 | Du Pont   | N | 19/03/99 | Cyclin genes                                       | Involved in cell cycle and may be useful targets for herbicides.  |
| 49. | WO<br>9949064 | Plant<br>Bioscience<br>Ltd                                    | N | 19/03/99 | Gigantea (GI) sequences                            | Useful in changing the flowering characteristics of plants.   |
| 50. | WO<br>9947689 | Du Pont   | N | 10/03/99 | DAD 1 and AAC-11                                   | DAD and Aac are inhibitors of apoptosis. Useful for studies of cell death and growth in tissue culture.                     |
| 51. | WO<br>9947688 | Du Pont   | N | 10/03/99 | XIAP associated factor 1<br>protein                | An inhibitor of apoptosis. Useful for studies of cell death and growth in tissue culture.                                   |
| 52. | WO<br>9945129 | Mogen<br>International  | N | 08/03/99 | Xa21 gene  | Plays a role in hypersensitive response to pathogens and may help production of disease tolerant plants.                    |
| 53. | WO<br>0008161 | Japan<br>Ministry of<br>Agriculture,<br>Fisheries and<br>Food | N | 04/03/99 | Glutelin PCR primer                                | To amplify the rice glutelin promoter used in GM rice with glycinin gene from soybean for improved nutrition and processing |

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|-----|---------------|--------------------------------------|---------------|----------|---|---|
| 54. | WO<br>9943827 | Du Pont                              | N             | 18/02/99 | Cyclopropane synthetase                         | Involved in fatty acid synthesis and use in modifying lipid content of plants.                          |
| 55. | WO<br>9943820 | Du Pont                              | N             | 16/02/99 | EIF-4E protein                                  | A plant translation factor to control protein synthesis in plants.                                      |
| 56. | EP0984064     | Japan Tobacco                        | N             | 10/02/99 | RPC213 promoter                                 | Promoter for expression in flower organs of rice to use in modification of flowers.                     |
| 57. | WO<br>9936551 | Du Pont                              | N             | 13/01/99 | Cytosolic phosphoglucomutase                    | Decreasing starch content and increasing oil and protein content.                                       |
| 58. | WO<br>9859046 | University of California             | N             | 30/12/98 | Gns9 CDS  | Resistance to fungal infections.  |
| 59. | EP 926241     | University of York                   | N             | 24/11/98 | Dehydrodiconiferyl alcohol glucosyl transferase | Regulation of salicylic acid-mediated pathogen responses and regulation of senescence and ripening      |
| 60. | US5977435     | Performance Plants                   | Y<br>02/11/99 | 21/10/98 | Phosphatase RAP                                 | Altering phosphate metabolism   |
| 61. | EP1025210     | Du Pont                              | N             | 20/10/98 | LeuD subunit of 3-isopropylmalate dehydratase   | Involved in branched chain amino acid synthesis.  |
| 62. | EP0916725     | Japan Tobacco                        | N             | 10/20/98 | Phospho-enol-pyruvic-carboxylate fragment       | Alteration of photosynthetic abilities.   |
| 63. | EP1012317     | Purdue Research Foundation           | N             | 11/09/98 | Pyruvate decarboxylase promoter                 | Operates under hypoxic conditions and can be used to give expression of other genes in such conditions. |
| 64. | EP1026249     | Hokko Chemical Industry & Japan MAFF | N             | 31/08/98 | Anthranilate synthase isozyme alpha sub-unit    | To alter tryptophan content and nutritional value of feed.  |
| 65. | US<br>5969127 | Acad Sinica                          | Y<br>19/10/99 | 24/08/98 | Alpha AMY 3'UTR                                 | To direct expression of coding sequence in angiosperm cell.   |

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| 66. | WO<br>9902689        | Du Pont  | N             | 07/07/98 | SUG1                               | Regulation of gene expression.   |
| 67. | WO<br>9901558        | University of<br>Cambridge                     | N             | 30/06/98 | Glycosyltransferase EST            | Modulation of glycosyltransferase activity   |
| 68. | JP<br>200000488<br>4 | Norinsuisans<br>ho Nogyo<br>Seibutsu<br>Shigen | ?             | 19/06/98 | d1 gene                            | To use in creation of dwarf type rice plants for ornamental purposes.              |
| 69. | WO<br>9904024        | Dow<br>Agriscieces                             | N             | 16/06/98 | Mature RIP-10                      | Increasing tryptophan levels in feed.  |
| 70. | EP1002113            | Du Pont  | N             | 11/06/98 | Cystathionine beta-lyase fragment  | To modify levels of amino acids in food and feed.                                  |
| 71. | EP0996734            | Du Pont  | N             | 11/06/98 | Histone acetyltransferase<br>rGCN5 | Involved in transcription and use to regulate histone acetyl transferase activity. |
| 72. | US<br>5928925        | National<br>Food<br>Research<br>Institute      | Y<br>27/07/99 | 05/06/98 | Ornithine<br>carbonyltransferase   | For production of plants tolerant to phaseolotoxin.                                |
| 73. | EP1015557            | University of<br>Rutgers                       | N             | 03/06/98 | ClpP NEP promoter                  | Useful for producing proteins in plant plastids.                                   |
| 74. | EP0990027            | Hoechst-<br>Schering<br>AgrEvo                 | N             | 02/06/98 | Pantothenate synthetase            | Part of synthesis of Coenzyme A used to identify inhibitor compounds.              |
| 75. | EP0979283            | University of<br>Washington<br>State           | N             | 02/06/98 | OsMADS8                            | Involved in regulation of floral development.                                      |
| 76. | EP0977863            | Du Pont  | N             | 06/05/98 | glycogenin                         | Altering starch synthesis.   |
| 77. | US<br>6124616        | Norinsuisan<br>sho Shokuhin<br>Sogo            | 26/09/00      | 20/04/98 | chitinase                          | To develop GM disease resistant crops.   |

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| 78. | WO<br>9954483  | Hokko<br>Chemical<br>Industry            | N             | 17/04/98 | Dihydropicolinate<br>synthetase (DHPS)                  | To use in production of crops with<br>high lysine content and improved<br>nutritional characteristics. |
| 79. | JP<br>11290082 | Iwate Ken                                | ?             | 17/04/98 | OSIDM gene  | Gene involved in development of plant<br>so could be used to produce dwarf<br>varieties.               |
| 80. | US5994623      | Du Pont                                  | Y<br>30/11/99 | 07/04/98 | 4-alpha-<br>glucanotransferase                          | Altering the starch composition of<br>plants.  |
| 81. | EP0971580      | Purdue<br>Research<br>Foundation         | N             | 03/04/98 | Anther specific promoter                                | To direct expression of other genes to<br>the anther.  |
| 82. | EP0973880      | Du Pont                                  | N             | 27/03/98 | Lysine ketoglutarate<br>reductase                       | To control lysine levels in plants.  |
| 83. | WO<br>9842853  | University of<br>California              | N             | 24/03/98 | Sugar depletion regulatory<br>sequence 5                | To enhance sugar reduction gene<br>activity.   |
| 84. | JP<br>11253167 | Mitsui<br>Chemical<br>Industry           | ?             | 13/03/98 | Microsatellite marker near<br>semidwarf gene            | To help identify strain and grade of<br>rice.  |
| 85. | JP<br>11206374 | Mitsui<br>Chemical                       | ?             | 21/01/98 | IR36 microsatellite                                     | Rice breeding  |
| 86. | WO<br>9936542  | Institute of<br>Molecular<br>Agrobiology | N             | 16/01/98 | MAP inase gene promoter                                 | To regulate kinase gene expression.  |
| 87. | EP0913469      | Japan<br>Tobacco                         | N             | 26/12/97 | Floral organ specific<br>chitinase gene and<br>promoter | Modification of floral parts or plants.  |
| 88. | FR<br>2772787  | Rhone-<br>Poulenc                        | N             | 24/12/97 | Actin gene intron 1                                     | Regulatory gene that could be used<br>with herbicide tolerance gene.                                   |
| 89. | WO<br>9814601  | Exseed<br>Genetics                       | N             | 30/09/97 | Waxy gene   | Codes for starch synthase to produce<br>modified starches.   |
| 90. | JP<br>11098996 | Japan<br>Tobacco                         | ?             | 29/09/97 | Pistil specific expressive<br>gene                      | To modify/improve fertility, female<br>sterility.  |

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| 91.  | WO<br>9914350  | Institute of<br>Molecular<br>Agrobiology                  | N             | 15/09/97 | RANK-1                                | Involved in disease resistance.  |
| 92.  | WO<br>9810062  | Monsanto  | N             | 02/09/97 | Glutenin-1 promoter                   | Used to express a non-plant gene<br>(e.g. antibody) in a plant.                                    |
| 93.  | EP0917536      | John Innes<br>Centre<br>Innovations                       | N             | 20/07/97 | Mlo gene                              | Involved in disease resistance so use<br>in GM disease resistant crop<br>production.               |
| 94.  | EP0846770      | Japan<br>Tobacco  | N             | 12/06/97 | Ubiquitin gene intron                 | To control expression of foreign<br>genes.   |
| 95.  | WO<br>9745546  | University of<br>York                                     | N             | 30/05/97 | Glucosyl transferase                  | Involved in wound response and can<br>be used to induce production of<br>disease defence proteins. |
| 96.  | WO<br>9742326  | Mogen   | N             | 02/05/97 | Trehalose phosphate<br>synthase       | Altering carbon flow in plants and<br>altering carbohydrate/protein balance<br>in GM animals.      |
| 97.  | EP0929685      | Pioneer Hi-<br>Bred                                       | N             | 27/04/97 | prolamin                              | To increase sulphur rich amino acid<br>content of seed and feeds.                                  |
| 98.  | JP<br>10248570 | Iwate Ken   | ?             | 07/03/97 | Metallothionein gene<br>promoter      | To regulate gene expression.   |
| 99.  | WO<br>9732011  | Novartis  | N             | 27/02/97 | Protoporphyrin oxidase                | Development of herbicide tolerant<br>crops.  |
| 100. | WO<br>9732028  | Novartis  | N             | 27/02/97 | Protox-1                              | Use in breeding and genome<br>mapping.   |
| 101. | JP<br>10057073 | Mitsui Toatsu   | ?             | 25/02/97 | Microsatellite marker                 | Used to identify different rice grades.  |
| 102. | US<br>5981833  | University of<br>Iowa & US<br>Secretary of<br>Agriculture | Y<br>09/11/99 | 04/02/97 | atp RNA processing site               | Used in production of cytoplasmic<br>sterility for hybrid seed production.                         |
| 103. | US5914449      | Mitsubishi  | Y<br>22/06/99 | 31/01/97 | Cytosolic pyruvate kinase<br>fragment | To increase lipid content in seeds and<br>plants by inhibiting enzyme activity.                    |

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| 104. | WO<br>9729193  | Commonwealth Science and Industry Research Org.                                     | N             | 24/01/97 | Polyphenol oxidase GRP06                     | To control browning in plants.                                   |
| 105. | JP<br>10201475 | Hokko Chemical Industry & Norinsiusansho Nogyo Kenkyu                               | ?             | 22/01/97 | RNA polymerase sigma factor                  | For development of promoters.                                    |
| 106. | EP0833915      | Commonwealth Science and Industry Research Org and National University of Australia | N             | 09/01/97 | Gibberelin-regulated MYB polypeptide         | To modify growth, flowering, germination etc in plants.          |
| 107. | JP<br>10146200 | Norinsiusansho Nogyo Kenkyu   | ?             | 15/11/96 | Cox Vb                                       | Used in directing proteins to organelles.                        |
| 108. | JP<br>10117781 | Hokko Chemical Co   | ?             | 17/10/96 | Dihydropicolinate synthase                   | To increase lysine levels in plants.                             |
| 109. | US<br>5677175  | Pudue Research Foundation   | Y<br>14/10/97 | 11/10/96 | Pathogen inducible regulatory element Pr-10c | To be used in vectors to increase disease resistance in plants.  |
| 110. | JP<br>10057069 | Hitachi   | ?             | 22/08/96 | Delta-1-pyrroline-5-carboxylate synthase     | For use in production of salt tolerance and reducing water loss. |
| 111. | JP<br>10014576 | Mitsui Gyosai Shokubutsu Bio Kenkyusho  | ?             | 28/06/96 | SPK gene signal                              | Modifying plant composition.                                     |

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| 112. | JP<br>10014575 | Mitsui Gyosai<br>Shokubutsu<br>Bio<br>Kenkyusho &<br>Mitsui Toatsu | ?             | 28/06/96 | RBE transcription factors                  | To be used in alteration of starch content.   |
| 113. | JP<br>10004970 | Mitsui Gyosai<br>Shokubutsu<br>Bio<br>Kenkyusho &<br>Mitsui Toatsu | ?             | 24/06/96 | Type IV starch branching enzyme            | Altering starch composition.  |
| 114. | JP<br>9313187  | Mitsui Toatsu  | ?             | 30/05/96 | Cytoplasmic male sterility marker          | Rice breeding.  |
| 115. | JP<br>9000270  | Meiji Seika<br>Kaisha  | ?             | 04/04/96 | Blight resistance induced promoter         | To be used to detect a substance that can induce the gene.                          |
| 116. | US<br>5801016  | Japan<br>Tobacco   | Y<br>01/08/98 | 28/03/96 | Phospholipase D promoter fragment          | To increase expression of other genes.  |
| 117. | US<br>5028250  | Takara<br>Shuzo  | Y<br>22/2/00  | 26/03/96 | Endo-xyloglucan transferase promoter       | To direct gene expression to certain times to affect plant morphology.              |
| 118. | WO<br>9622375  | University of<br>California  | N             | 17/01/96 | Xa21 disease resistance                    | Production of disease resistant crops.  |
| 119. | US<br>5861542  | University of<br>Washington<br>State                               | Y<br>19/01/99 | 13/10/95 | OsMADS1                                    | Regulatory protein involved in plant development. Used to alter flowering time etc. |
| 120. | JP<br>9084588  | Norinsuisans<br>ho Nogyo<br>Seibutsu<br>Shigen                     | ?             | 26/09/95 | Mitochondrial ribosome protein RPS11       | To transport foreign proteins to the mitochondria.                                  |
| 121. | JP<br>9084587  | Norinsuisans<br>ho Nogyo<br>Seibutsu<br>Shigen                     | ?             | 26/09/95 | Catalse B promoter                         | For use in production of GM plants.   |
| 122. | JP<br>9075091  | Iwate Ken  | ?             | 13/09/95 | Mono-nuclear anther stage expression gene. | To use for expression of other genes in the anther.                                 |

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|------|---------------|---|---------------|----------|--|---|
| 123. | US<br>5824859 | University of<br>Pennsylvania                     | Y<br>20/10/98 | 07/07/95 | Partial HY4                            | Affect stem length and may be used<br>to produce short stem length crops. |
| 124. | US<br>5693506 | University of<br>California                       | Y<br>02/12/97 | 26/05/95 | RAMY-1A promoter                       | Use in GM plant production.   |
| 125. | US<br>5912333 | Japan<br>Tobacco                                  | Y<br>15/06/99 | 04/05/95 | Carbonic anhydrase                     | To improve carbon fixation.   |
| 126. | JP<br>8066193 | Nissan<br>Chemical<br>Industry                    | ?             | 21/10/94 | NADPH-dependent<br>reductase           | For use in breeding and production of<br>disease resistant crops.         |
| 127. | US<br>5747327 | Japan<br>Tobacco                                  | Y<br>05/05/98 | 30/09/94 | Phospholipase D                        | To alter lipid levels in plants.  |
| 128. | US<br>5824868 | Japan<br>Tobacco                                  | Y<br>05/05/98 | 16/08/94 | PPFK-OS1                               | Alteration of sugar content in plants.                                    |
| 129. | US<br>5530187 | Salk Institute                                    | Y<br>25/06/96 | 15/07/94 | Chitinase RCH10                        | Use in producing plants with improved<br>resistance to fungal infection.  |
| 130. | JP<br>7213185 | Sumitomo<br>Chemical Co.                          | ?             | 03/02/94 | Signal sequence of<br>prolamin peptide | To improve content of sulphur<br>containing amino acids in crops.         |
| 131. | JP<br>6261767 | Mitsui Gyosai<br>Shokubutsu<br>Bio<br>Kenkyusho   | ?             | 22/10/93 | Starch branching enzyme<br>promoter    | Used in production of plants with<br>altered starch content.              |
| 132. | JP<br>7059575 | Mitsubishi  | ?             | 20/08/93 | Waxy gene enhancer                     | Use in GM plant production  |
| 133. | WO<br>9325695 | Plant Genetic<br>Systems                          | N             | 11/06/93 | Anther specific promoter<br>of PE1     | Use in production of male sterility and<br>hybrid seed.                   |
| 134. | JP<br>6277068 | Mitsui Toatsu                                     | ?             | 27/03/93 | Sucrose phosphate<br>synthetic enzyme  | To improve synthesis of sucrose and<br>starch in plants.                  |
| 135. | JP<br>6277063 | Norin<br>Suisansho<br>Nogyo<br>Seibutsu<br>Shigen | ?             | 08/10/92 | Retrotransposon probe<br>Tos15         | To identify uniformity of rice varieties.                                 |

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|------|---------------|--|---------------|----------|---|---|
| 136. | WO<br>9307279 | Smart Plants                           | N             | 02/10/92 | Partial phenylalanine ammonia-lyase promoters       | For use in production of GM plants by controlling foreign gene expression.  |
| 137. | EP<br>0600993 | Agricultural Genetics                  | Y<br>10/1199  | 26/08/92 | Sucrose synthase promoter/intron 1                  | Used with foreign genes to target production to phloem.   |
| 138. | EP<br>0651812 | Max Planck                             | Y<br>15/03/00 | 08/07/92 | Fragment of rice actin-1                            | Used as promoter in conjunction with other gene sequences.  |
| 139. | JP<br>6070779 | Mitsui Gyosai Shokubutsu Bio Kenkyusho | ?             | 07/07/92 | Soluble starch synthetic enzyme and transit peptide | To transport proteins to the amyloplast.  |
| 140. | JP<br>6153963 | Mitsui Gyosai Shokubutsu Bio Kenkyusho | ?             | 24/06/92 | Protein kinase from rice seed                       | To increase production of protein kinase, protein and starch.   |
| 141. | JP<br>6225774 | Mitsui Gyosai Shokubutsu Bio Kenkyusho | ?             | 16/06/92 | Blight-specific resistance lipoxygenase             | Used for expression of proteins in the chloroplast.   |
| 142. | US<br>5399680 | Salk Institute                         | Y<br>21/03/95 | 21/05/92 | RCH10 chitinase gene                                | For study of plant defence genes.   |
| 143. | JP<br>6098656 | Mitsui Gyosai Shokubutsu Bio Kenkyusho | ?             | 30/03/92 | Starch branching enzyme                             | To increase the content of amylopectin in starch for mass production.   |
| 144. | US<br>5639948 | Plant Genetic Systems                  | 17/06/97      | 06/02/92 | GE1 promoter  | Stamen specific promoter for producing male-sterile and male-fertility restored systems for hybrid seed production. |
| 145. | JP<br>5153981 | Mitsubishi                             | ?             | 29/11/91 | Starch synthase gene                                | To improve amylose content of GM crops.   |
| 146. | JP<br>5168482 | Mitusi Toatsu                          | ?             | 26/11/91 | Allergen gene                                       | To reduce allergenicity of rice.  |

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|------|---------------|-----------------------------------|---------------|----------|---|--|
| 147. | JP<br>5137581 | Mitsui Toatsu                     | ?             | 19/11/91 | Mitochondrial ATPase<br>beta subunit                    | For targeting production of foreign<br>proteins to the mitochondria. |
| 148. | US<br>5641876 | Cornell<br>Research<br>Foundation | Y<br>24/06/97 | 15/10/90 | Atcin 1   | Involved in plant architecture and<br>growth.                        |
| 149. | JP<br>4117287 | Mitsui Toatsu                     | ?             | 06/09/90 | Allergen gene   | To produce low allergen rice.  |
| 150. | JP<br>3277291 | Mitsui Toatsu                     | ?             | 27/03/90 | Light-harvesting<br>chlorophyll a/b-combined<br>protein | Alteration of photosynthesis.  |
| 151. | JP<br>2182190 | Mitsubishi                        | ?             | 16/06/89 | Glutamine synthase                                      | For production of herbicide tolerant<br>crops.                       |
| 152. | JP<br>2100682 | Mitsui Toatsu                     | ?             | 07/10/88 | Total chloroplast DNA<br>sequence                       | Research   |