**Table 2.** The list of the identified proteins in the thylakoid membranes of the *ch1-1* plants by LC-MS/MS analysis.

|  |  |  |  |
| --- | --- | --- | --- |
| Locus | TAIR Description | Mascot score | Number of matched peptides |
| AT1G01170 |  Protein of unknown function (DUF1138)  | 247 | 5 |
| AT1G01620 |  plasma membrane intrinsic protein 1C  | 92 | 2 |
| AT1G02280 |  translocon at the outer envelope membrane of chloroplasts 33  | 64 | 1 |
| AT1G02910 |  tetratricopeptide repeat (TPR)-containing protein  | 107 | 3 |
| AT1G03130 |  photosystem I subunit D-2  | 2603 | 76 |
| AT1G03160 |  FZO-like  | 147 | 3 |
| AT1G03600 |  photosystem II family protein  | 1296 | 33 |
| AT1G03630 |  protochlorophyllide oxidoreductase C  | 1324 | 28 |
| AT1G03860 |  prohibitin 2  | 39 | 1 |
| AT1G04620 |  coenzyme F420 hydrogenase family / dehydrogenase, beta subunit family  | 312 | 6 |
| AT1G04630 |  GRIM-19 protein  | 239 | 3 |
| AT1G05140 |  Peptidase M50 family protein  | 187 | 4 |
| AT1G05190 |  Ribosomal protein L6 family  | 141 | 3 |
| AT1G05790 |  lipase class 3 family protein  | 705 | 18 |
| AT1G06430 |  FTSH protease 8  | 1235 | 28 |
| AT1G06680 |  photosystem II subunit P-1  | 2293 | 46 |
| AT1G06690 |  NAD(P)-linked oxidoreductase superfamily protein  | 88 | 2 |
| AT1G06950 |  translocon at the inner envelope membrane of chloroplasts 110  | 937 | 17 |
| AT1G07070 |  Ribosomal protein L35Ae family protein  | 36 | 1 |
| AT1G07320 |  ribosomal protein L4  | 72 | 2 |
| AT1G07660 |  Histone superfamily protein  | 36 | 1 |
| AT1G07920 |  GTP binding Elongation factor Tu family protein  | 669 | 14 |
| AT1G08640 |  Chloroplast J-like domain 1  | 80 | 2 |
| AT1G08880 |  Histone superfamily protein  | 124 | 3 |
| AT1G09170 |  P-loop nucleoside triphosphate hydrolases superfamily protein with CH (Calponin Homology) domain  | 38 | 1 |
| AT1G10610 |  basic helix-loop-helix (bHLH) DNA-binding superfamily protein  | 36 | 1 |
| AT1G11180 |  Secretory carrier membrane protein (SCAMP) family protein  | 74 | 2 |
| AT1G11270 |  F-box and associated interaction domains-containing protein  | 43 | 1 |
| AT1G11660 |  heat shock protein 70 (Hsp 70) family protein  | 35 | 1 |
| AT1G12250 |  Pentapeptide repeat-containing protein  | 468 | 7 |
| AT1G12900 |  glyceraldehyde 3-phosphate dehydrogenase A subunit 2  | 395 | 8 |
| AT1G13440 |  glyceraldehyde-3-phosphate dehydrogenase C2  | 52 | 1 |
| AT1G14150 |  PsbQ-like 2  | 458 | 8 |
| AT1G14345 |  NAD(P)-linked oxidoreductase superfamily protein  | 470 | 8 |
| AT1G15210 |  pleiotropic drug resistance 7  | 53 | 1 |
| AT1G15480 |  Tetratricopeptide repeat (TPR)-like superfamily protein  | 36 | 1 |
| AT1G15690 |  Inorganic H pyrophosphatase family protein  | 259 | 5 |
| AT1G15820 |  light harvesting complex photosystem II subunit 6  | 2806 | 49 |
| AT1G15980 |  NDH-dependent cyclic electron flow 1  | 892 | 17 |
| AT1G16350 |  Aldolase-type TIM barrel family protein  | 36 | 1 |
| AT1G18060 |  unknown protein | 88 | 2 |
| AT1G18170 |  FKBP-like peptidyl-prolyl cis-trans isomerase family protein  | 623 | 11 |
| AT1G18730 |  NDH dependent flow 6  | 52 | 1 |
| AT1G19150 |  photosystem I light harvesting complex gene 6  | 39 | 1 |
| AT1G20020 |  ferredoxin-NADP()-oxidoreductase 2  | 3235 | 72 |
| AT1G20180 |  Protein of unknown function (DUF677)  | 37 | 1 |
| AT1G20260 |  ATPase, V1 complex, subunit B protein  | 95 | 2 |
| AT1G20620 |  catalase 3  | 642 | 12 |
| AT1G21500 |  unknown protein | 822 | 19 |
| AT1G22410 |  Class-II DAHP synthetase family protein  | 39 | 1 |
| AT1G22700 |  Tetratricopeptide repeat (TPR)-like superfamily protein  | 171 | 4 |
| AT1G24360 |  NAD(P)-binding Rossmann-fold superfamily protein  | 114 | 3 |
| AT1G26380 |  FAD-binding Berberine family protein  | 37 | 1 |
| AT1G28380 |  MAC/Perforin domain-containing protein  | 38 | 1 |
| AT1G29910 |  chlorophyll A/B binding protein 3  | 3814 | 90 |
| AT1G30380 |  photosystem I subunit K  | 373 | 10 |
| AT1G31330 |  photosystem I subunit F  | 2525 | 60 |
| AT1G32220 |  NAD(P)-binding Rossmann-fold superfamily protein  | 410 | 7 |
| AT1G32770 |  NAC domain containing protein 12  | 38 | 1 |
| AT1G34000 |  one-helix protein 2  | 538 | 17 |
| AT1G35680 |  Ribosomal protein L21  | 50 | 1 |
| AT1G42960 |  expressed protein localized to the inner membrane of the chloroplast.  | 43 | 1 |
| AT1G44575 |  Chlorophyll A-B binding family protein  | 4965 | 121 |
| AT1G45474 |  photosystem I light harvesting complex gene 5  | 648 | 13 |
| AT1G48030 |  mitochondrial lipoamide dehydrogenase 1  | 210 | 4 |
| AT1G49240 |  actin 8  | 55 | 1 |
| AT1G50250 |  FTSH protease 1  | 2321 | 46 |
| AT1G50450 |  Saccharopine dehydrogenase  | 352 | 6 |
| AT1G51110 |  Plastid-lipid associated protein PAP / fibrillin family protein  | 613 | 14 |
| AT1G51400 |  Photosystem II 5 kD protein  | 323 | 6 |
| AT1G51980 |  Insulinase (Peptidase family M16) protein  | 362 | 8 |
| AT1G52220 |  FUNCTIONS IN: molecular\_function unknown | 145 | 3 |
| AT1G52230 |  photosystem I subunit H2  | 796 | 25 |
| AT1G53240 |  Lactate/malate dehydrogenase family protein  | 42 | 1 |
| AT1G53310 |  phosphoenolpyruvate carboxylase 1  | 36 | 1 |
| AT1G54350 |  ABC transporter family protein  | 67 | 1 |
| AT1G54500 |  Rubredoxin-like superfamily protein  | 556 | 9 |
| AT1G54520 |  unknown protein | 268 | 5 |
| AT1G54780 |  thylakoid lumen 18.3 kDa protein  | 3973 | 88 |
| AT1G55480 |  protein containing PDZ domain, a K-box domain, and a TPR region  | 246 | 9 |
| AT1G55670 |  photosystem I subunit G  | 909 | 23 |
| AT1G56070 |  Ribosomal protein S5/Elongation factor G/III/V family protein  | 54 | 1 |
| AT1G56500 |  haloacid dehalogenase-like hydrolase family protein  | 1760 | 35 |
| AT1G59840 |  cofactor assembly of complex C  | 39 | 1 |
| AT1G61520 |  photosystem I light harvesting complex gene 3  | 3179 | 76 |
| AT1G64680 |  unknown protein | 45 | 1 |
| AT1G64770 |  NDH-dependent cyclic electron flow 1  | 399 | 9 |
| AT1G65230 |  Uncharacterized conserved protein (DUF2358)  | 187 | 4 |
| AT1G65260 |  plastid transcriptionally active 4  | 590 | 10 |
| AT1G66200 |  glutamine synthase clone F11  | 44 | 1 |
| AT1G66300 |  F-box/RNI-like/FBD-like domains-containing protein  | 35 | 1 |
| AT1G67090 |  ribulose bisphosphate carboxylase small chain 1A  | 76 | 2 |
| AT1G67580 |  Protein kinase superfamily protein  | 39 | 1 |
| AT1G67700 |  unknown protein | 58 | 1 |
| AT1G68830 |  STT7 homolog STN7  | 45 | 1 |
| AT1G69440 |  Argonaute family protein  | 36 | 1 |
| AT1G71500 |  Rieske (2Fe-2S) domain-containing protein  | 2583 | 36 |
| AT1G71810 |  Protein kinase superfamily protein  | 251 | 5 |
| AT1G72150 |  PATELLIN 1  | 36 | 1 |
| AT1G72640 |  NAD(P)-binding Rossmann-fold superfamily protein  | 63 | 1 |
| AT1G73060 |  Low PSII Accumulation 3  | 40 | 1 |
| AT1G73690 |  cyclin-dependent kinase D1 | 35 | 1 |
| AT1G73990 |  signal peptide peptidase  | 247 | 4 |
| AT1G74070 |  Cyclophilin-like peptidyl-prolyl cis-trans isomerase family protein  | 620 | 15 |
| AT1G74470 |  Pyridine nucleotide-disulphide oxidoreductase family protein  | 2326 | 45 |
| AT1G74640 |  alpha/beta-Hydrolases superfamily protein  | 50 | 1 |
| AT1G74730 |  Protein of unknown function (DUF1118)  | 566 | 16 |
| AT1G74850 |  plastid transcriptionally active 2  | 45 | 1 |
| AT1G74880 |  NAD(P)H:plastoquinone dehydrogenase complex subunit O  | 244 | 6 |
| AT1G77140 |  vacuolar protein sorting 45  | 71 | 2 |
| AT1G77290 |  Glutathione S-transferase family protein  | 36 | 1 |
| AT1G77490 |  thylakoidal ascorbate peroxidase  | 830 | 15 |
| AT1G78140 |  S-adenosyl-L-methionine-dependent methyltransferases superfamily protein  | 151 | 3 |
| AT1G78620 |  Protein of unknown function DUF92, transmembrane  | 39 | 1 |
| AT1G78630 |  Ribosomal protein L13 family protein  | 211 | 3 |
| AT1G78820 |  D-mannose binding lectin protein with Apple-like carbohydrate-binding domain  | 51 | 1 |
| AT1G78830 |  Curculin-like (mannose-binding) lectin family protein  | 91 | 2 |
| AT1G78900 |  vacuolar ATP synthase subunit A  | 209 | 4 |
| AT1G78915 |  Tetratricopeptide repeat (TPR)-like superfamily protein  | 197 | 4 |
| AT1G79040 |  photosystem II subunit R  | 859 | 31 |
| AT1G79600 |  Protein kinase superfamily protein  | 474 | 11 |
| AT1G80030 |  Molecular chaperone Hsp40/DnaJ family protein  | 156 | 3 |
| AT2G01140 |  Aldolase superfamily protein  | 208 | 6 |
| AT2G01870 |  unknown protein | 96 | 4 |
| AT2G02170 |  Remorin family protein  | 37 | 1 |
| AT2G02740 |  ssDNA-binding transcriptional regulator  | 83 | 1 |
| AT2G03750 |  P-loop containing nucleoside triphosphate hydrolases superfamily protein  | 38 | 1 |
| AT2G05070 |  photosystem II light harvesting complex gene 2.2  | 4130 | 99 |
| AT2G05310 |  unknown protein | 38 | 1 |
| AT2G05620 |  proton gradient regulation 5  | 355 | 8 |
| AT2G05710 |  aconitase 3  | 44 | 1 |
| AT2G07698 |  ATPase, F1 complex, alpha subunit protein  | 1177 | 25 |
| AT2G18710 |  SECY homolog 1  | 137 | 3 |
| AT2G20260 |  photosystem I subunit E-2  | 1796 | 37 |
| AT2G20450 |  Ribosomal protein L14  | 35 | 1 |
| AT2G20890 |  photosystem II reaction center PSB29 protein  | 2309 | 51 |
| AT2G21330 |  fructose-bisphosphate aldolase 1  | 4547 | 111 |
| AT2G21870 |  copper ion binding | 52 | 1 |
| AT2G21960 |  unknown protein | 303 | 7 |
| AT2G22170 |  Lipase/lipooxygenase, PLAT/LH2 family protein  | 75 | 1 |
| AT2G22230 |  Thioesterase superfamily protein  | 48 | 1 |
| AT2G22750 |  basic helix-loop-helix (bHLH) DNA-binding superfamily protein  | 40 | 1 |
| AT2G23670 |  homolog of Synechocystis YCF37  | 879 | 15 |
| AT2G24420 |  DNA repair ATPase-related  | 41 | 1 |
| AT2G26340 |  unknown protein.  | 64 | 1 |
| AT2G27710 |  60S acidic ribosomal protein family  | 109 | 2 |
| AT2G27730 |  copper ion binding  | 543 | 7 |
| AT2G28630 |  3-ketoacyl-CoA synthase 12  | 45 | 1 |
| AT2G28800 |  63 kDa inner membrane family protein  | 392 | 11 |
| AT2G28900 |  outer plastid envelope protein 16-1  | 325 | 5 |
| AT2G29140 |  pumilio 3  | 73 | 2 |
| AT2G29540 |  RNApolymerase 14 kDa subunit  | 35 | 1 |
| AT2G30390 |  ferrochelatase 2  | 117 | 3 |
| AT2G30950 |  FtsH extracellular protease family  | 2065 | 49 |
| AT2G32340 |  TraB family protein  | 45 | 1 |
| AT2G32630 |  Pentatricopeptide repeat (PPR-like) superfamily protein  | 42 | 1 |
| AT2G32850 |  Protein kinase superfamily protein  | 35 | 1 |
| AT2G33150 |  peroxisomal 3-ketoacyl-CoA thiolase 3  | 84 | 2 |
| AT2G33800 |  Ribosomal protein S5 family protein  | 113 | 2 |
| AT2G34460 |  NAD(P)-binding Rossmann-fold superfamily protein  | 1144 | 22 |
| AT2G34730 |  myosin heavy chain-related  | 37 | 1 |
| AT2G35490 |  Plastid-lipid associated protein PAP / fibrillin family protein  | 1078 | 17 |
| AT2G35760 |  Uncharacterised protein family (UPF0497)  | 121 | 4 |
| AT2G36145 |  unknown protein | 36 | 1 |
| AT2G36160 |  Ribosomal protein S11 family protein  | 119 | 2 |
| AT2G36885 |  unknown protein | 36 | 1 |
| AT2G37170 |  plasma membrane intrinsic protein 2  | 40 | 1 |
| AT2G37230 |  Tetratricopeptide repeat (TPR)-like superfamily protein  | 235 | 9 |
| AT2G38040 |  acetyl Co-enzyme a carboxylase carboxyltransferase alpha subunit  | 50 | 1 |
| AT2G39470 |  PsbP-like protein 2  | 469 | 11 |
| AT2G39730 |  rubisco activase  | 666 | 13 |
| AT2G40000 |  ortholog of sugar beet HS1 PRO-1 2  | 184 | 5 |
| AT2G40010 |  Ribosomal protein L10 family protein  | 38 | 1 |
| AT2G40100 |  light harvesting complex photosystem II  | 417 | 9 |
| AT2G41040 |  S-adenosyl-L-methionine-dependent methyltransferases superfamily protein  | 42 | 1 |
| AT2G42130 |  Plastid-lipid associated protein PAP / fibrillin family protein  | 157 | 3 |
| AT2G42220 |  Rhodanese/Cell cycle control phosphatase superfamily protein  | 1066 | 20 |
| AT2G43030 |  Ribosomal protein L3 family protein  | 210 | 3 |
| AT2G43560 |  FKBP-like peptidyl-prolyl cis-trans isomerase family protein  | 217 | 4 |
| AT2G44640 |  FUNCTIONS IN: molecular\_function unknown | 42 | 1 |
| AT2G44870 |  unknown protein | 351 | 6 |
| AT2G44970 |  alpha/beta-Hydrolases superfamily protein  | 36 | 1 |
| AT2G45740 |  peroxin 11D  | 73 | 1 |
| AT2G45960 |  plasma membrane intrinsic protein 1B  | 96 | 2 |
| AT2G46820 |  photosystem I P subunit  | 1536 | 33 |
| AT2G47510 |  fumarase 1  | 41 | 1 |
| AT3G01060 |  unknown protein | 319 | 5 |
| AT3G01390 |  vacuolar membrane ATPase 10  | 51 | 1 |
| AT3G01440 |  PsbQ-like 1  | 723 | 17 |
| AT3G01480 |  cyclophilin 38  | 120 | 3 |
| AT3G02090 |  Insulinase (Peptidase family M16) protein  | 129 | 3 |
| AT3G03100 |  NADH:ubiquinone oxidoreductase, 17.2kDa subunit  | 87 | 2 |
| AT3G04260 |  plastid transcriptionally active 3  | 90 | 2 |
| AT3G07180 |  GPI transamidase component PIG-S-related  | 37 | 1 |
| AT3G07700 |  Protein kinase superfamily protein  | 150 | 3 |
| AT3G08030 |  Protein of unknown function, DUF642  | 37 | 1 |
| AT3G08580 |  ADP/ATP carrier 1  | 1060 | 31 |
| AT3G08920 |  Rhodanese/Cell cycle control phosphatase superfamily protein  | 426 | 11 |
| AT3G08940 |  light harvesting complex photosystem II  | 3202 | 69 |
| AT3G09630 |  Ribosomal protein L4/L1 family  | 38 | 1 |
| AT3G10060 |  FKBP-like peptidyl-prolyl cis-trans isomerase family protein  | 826 | 22 |
| AT3G10130 |  SOUL heme-binding family protein  | 120 | 3 |
| AT3G10690 |  DNA GYRASE A  | 297 | 7 |
| AT3G10920 |  manganese superoxide dismutase 1  | 37 | 1 |
| AT3G12470 |  Polynucleotidyl transferase, ribonuclease H-like superfamily protein  | 38 | 1 |
| AT3G14110 |  Tetratricopeptide repeat (TPR)-like superfamily protein  | 495 | 7 |
| AT3G14415 |  Aldolase-type TIM barrel family protein  | 149 | 4 |
| AT3G14590 |  Calcium-dependent lipid-binding (CaLB domain) family protein  | 124 | 3 |
| AT3G15110 |  unknown protein | 253 | 6 |
| AT3G15120 |  P-loop containing nucleoside triphosphate hydrolases superfamily protein  | 40 | 1 |
| AT3G15360 |  thioredoxin M-type 4  | 156 | 3 |
| AT3G15520 |  Cyclophilin-like peptidyl-prolyl cis-trans isomerase family protein  | 222 | 4 |
| AT3G15840 |  post-illumination chlorophyll fluorescence increase  | 40 | 1 |
| AT3G16000 |  MAR binding filament-like protein 1  | 1298 | 27 |
| AT3G16250 |  NDH-dependent cyclic electron flow 1  | 74 | 2 |
| AT3G16950 |  lipoamide dehydrogenase 1  | 45 | 1 |
| AT3G17930 |  unknown protein | 186 | 6 |
| AT3G18720 |  F-box family protein  | 39 | 1 |
| AT3G18890 |  NAD(P)-binding Rossmann-fold superfamily protein  | 1302 | 27 |
| AT3G21055 |  photosystem II subunit T  | 375 | 5 |
| AT3G21430 |  DNA binding  | 76 | 2 |
| AT3G23400 |  Plastid-lipid associated protein PAP / fibrillin family protein  | 2308 | 46 |
| AT3G25520 |  ribosomal protein L5  | 116 | 2 |
| AT3G25760 |  allene oxide cyclase 1  | 87 | 2 |
| AT3G25805 |  unknown protein | 160 | 6 |
| AT3G25920 |  ribosomal protein L15  | 198 | 5 |
| AT3G26060 |  Thioredoxin superfamily protein  | 173 | 4 |
| AT3G26070 |  Plastid-lipid associated protein PAP / fibrillin family protein  | 1027 | 22 |
| AT3G26570 |  phosphate transporter 2 | 47 | 1 |
| AT3G26740 |  CCR-like  | 41 | 1 |
| AT3G27160 |  Ribosomal protein S21 family protein  | 120 | 2 |
| AT3G27830 |  ribosomal protein L12-A  | 592 | 10 |
| AT3G27925 |  DegP protease 1  | 489 | 8 |
| AT3G30842 |  pleiotropic drug resistance 10  | 43 | 1 |
| AT3G43540 |  Protein of unknown function (DUF1350)  | 107 | 2 |
| AT3G44880 |  Pheophorbide a oxygenase family protein with Rieske [2Fe-2S] domain  | 235 | 5 |
| AT3G45050 |  unknown protein | 41 | 1 |
| AT3G45140 |  lipoxygenase 2  | 2148 | 47 |
| AT3G46060 |  RAB GTPase homolog 8A  | 126 | 2 |
| AT3G46730 |  NB-ARC domain-containing disease resistance protein  | 116 | 3 |
| AT3G46780 |  plastid transcriptionally active 16  | 6283 | 104 |
| AT3G47070 |  LOCATED IN: thylakoid, chloroplast thylakoid membrane, chloroplast, chloroplast envelope | 1252 | 24 |
| AT3G47390 |  cytidine/deoxycytidylate deaminase family protein  | 39 | 1 |
| AT3G47470 |  light-harvesting chlorophyll-protein complex I subunit A4  | 2061 | 38 |
| AT3G47520 |  malate dehydrogenase  | 126 | 2 |
| AT3G47860 |  chloroplastic lipocalin  | 41 | 1 |
| AT3G48000 |  aldehyde dehydrogenase 2B4  | 38 | 1 |
| AT3G48850 |  phosphate transporter 3 | 38 | 1 |
| AT3G50820 |  photosystem II subunit O-2  | 6939 | 158 |
| AT3G51140 |  Protein of unknown function (DUF3353)  | 61 | 1 |
| AT3G51820 |  UbiA prenyltransferase family protein  | 93 | 2 |
| AT3G52070 |  unknown protein | 38 | 1 |
| AT3G52300 |  ATP synthase D chain, mitochondrial  | 283 | 4 |
| AT3G54890 |  photosystem I light harvesting complex gene 1  | 422 | 8 |
| AT3G55330 |  PsbP-like protein 1  | 206 | 6 |
| AT3G55410 |  2-oxoglutarate dehydrogenase, E1 component  | 190 | 4 |
| AT3G56010 |  unknown protein | 45 | 1 |
| AT3G56650 |  Mog1/PsbP/DUF1795-like photosystem II reaction center PsbP family protein  | 296 | 6 |
| AT3G56940 |  dicarboxylate diiron protein, putative (Crd1)  | 288 | 6 |
| AT3G58010 |  plastoglobulin 34kD  | 146 | 5 |
| AT3G58540 |  unknown protein | 36 | 1 |
| AT3G58600 |  Adaptin ear-binding coat-associated protein 1 NECAP-1  | 127 | 4 |
| AT3G59200 |  F-box/RNI-like superfamily protein  | 36 | 1 |
| AT3G59780 |  Rhodanese/Cell cycle control phosphatase superfamily protein  | 773 | 13 |
| AT3G60750 |  Transketolase  | 38 | 1 |
| AT3G60810 |  unknown protein | 95 | 2 |
| AT3G61470 |  photosystem I light harvesting complex gene 2  | 510 | 9 |
| AT3G61620 |  3'-5'-exoribonuclease family protein  | 44 | 1 |
| AT3G61870 |  unknown protein | 1506 | 24 |
| AT3G63140 |  chloroplast stem-loop binding protein of 41 kDa  | 38 | 1 |
| AT3G63160 |  FUNCTIONS IN: molecular\_function unknown | 378 | 9 |
| AT3G63410 |  S-adenosyl-L-methionine-dependent methyltransferases superfamily protein  | 241 | 3 |
| AT4G00860 |  Protein of unknown function (DUF1138)  | 151 | 2 |
| AT4G01037 |  Ubiquitin carboxyl-terminal hydrolase family protein  | 95 | 3 |
| AT4G01050 |  thylakoid rhodanese-like  | 2572 | 52 |
| AT4G01150 |  unknown protein | 2039 | 38 |
| AT4G01690 |  Flavin containing amine oxidoreductase family  | 492 | 10 |
| AT4G01800 |  Albino or Glassy Yellow 1  | 609 | 13 |
| AT4G02530 |  chloroplast thylakoid lumen protein  | 579 | 13 |
| AT4G02725 |  unknown protein | 120 | 3 |
| AT4G02770 |  photosystem I subunit D-1  | 2466 | 79 |
| AT4G03280 |  photosynthetic electron transfer C  | 2557 | 44 |
| AT4G03520 |  Thioredoxin superfamily protein  | 47 | 1 |
| AT4G04020 |  fibrillin  | 1163 | 18 |
| AT4G04640 |  ATPase, F1 complex, gamma subunit protein  | 5958 | 202 |
| AT4G04940 |  transducin family protein / WD-40 repeat family protein  | 37 | 1 |
| AT4G05180 |  photosystem II subunit Q-2  | 2059 | 65 |
| AT4G06744 |  Leucine-rich repeat (LRR) family protein  | 45 | 1 |
| AT4G09010 |  ascorbate peroxidase 4  | 1678 | 43 |
| AT4G09320 |  Nucleoside diphosphate kinase family protein  | 36 | 1 |
| AT4G09650 |  ATP synthase delta-subunit gene  | 1992 | 42 |
| AT4G10340 |  light harvesting complex of photosystem II 5  | 14400 | 365 |
| AT4G11010 |  nucleoside diphosphate kinase 3  | 40 | 1 |
| AT4G11960 |  PGR5-like B  | 36 | 1 |
| AT4G12360 |  Bifunctional inhibitor/lipid-transfer protein/seed storage 2S albumin superfamily protein  | 37 | 1 |
| AT4G12800 |  photosystem I subunit l  | 693 | 14 |
| AT4G13200 |  unknown protein | 414 | 7 |
| AT4G13500 |  unknown protein | 91 | 2 |
| AT4G14070 |  acyl-activating enzyme 15  | 50 | 1 |
| AT4G14210 |  phytoene desaturase 3  | 356 | 6 |
| AT4G15233 |  ABC-2 and Plant PDR ABC-type transporter family protein  | 115 | 3 |
| AT4G15510 |  Photosystem II reaction center PsbP family protein  | 38 | 1 |
| AT4G16920 |  Disease resistance protein (TIR-NBS-LRR class) family  | 37 | 1 |
| AT4G17530 |  RAB GTPase homolog 1C  | 48 | 1 |
| AT4G17600 |  Chlorophyll A-B binding family protein  | 58 | 1 |
| AT4G19100 |  Protein of unknown function (DUF3464)  | 40 | 1 |
| AT4G19170 |  nine-cis-epoxycarotenoid dioxygenase 4  | 304 | 7 |
| AT4G20130 |  plastid transcriptionally active 14  | 38 | 1 |
| AT4G20260 |  plasma-membrane associated cation-binding protein 1  | 124 | 1 |
| AT4G20300 |  Protein of unknown function (DUF1639)  | 36 | 1 |
| AT4G20360 |  RAB GTPase homolog E1B  | 127 | 2 |
| AT4G21280 |  photosystem II subunit QA  | 3650 | 101 |
| AT4G22240 |  Plastid-lipid associated protein PAP / fibrillin family protein  | 1148 | 18 |
| AT4G22890 |  PGR5-LIKE A  | 1608 | 25 |
| AT4G23890 |  unknown protein | 900 | 20 |
| AT4G24190 |  Chaperone protein htpG family protein  | 52 | 1 |
| AT4G24750 |  Rhodanese/Cell cycle control phosphatase superfamily protein  | 341 | 6 |
| AT4G25080 |  magnesium-protoporphyrin IX methyltransferase  | 873 | 15 |
| AT4G27440 |  protochlorophyllide oxidoreductase B  | 736 | 14 |
| AT4G27700 |  Rhodanese/Cell cycle control phosphatase superfamily protein  | 928 | 21 |
| AT4G28300 |  Protein of unknown function (DUF1421)  | 36 | 1 |
| AT4G28660 |  photosystem II reaction center PSB28 protein  | 52 | 1 |
| AT4G28740 |  FUNCTIONS IN: molecular\_function unknown | 217 | 4 |
| AT4G28750 |  Photosystem I reaction centre subunit IV / PsaE protein  | 1555 | 49 |
| AT4G29780 |  unknown protein | 36 | 1 |
| AT4G30010 |  unknown protein | 79 | 2 |
| AT4G31390 |  Protein kinase superfamily protein  | 217 | 5 |
| AT4G32260 |  ATPase, F0 complex, subunit B/B', bacterial/chloroplast  | 3793 | 96 |
| AT4G32470 |  Cytochrome bd ubiquinol oxidase, 14kDa subunit  | 162 | 3 |
| AT4G32770 |  tocopherol cyclase, chloroplast / vitamin E deficient 1 (VTE1) / sucrose export defective 1 (SXD1)  | 349 | 6 |
| AT4G33010 |  glycine decarboxylase P-protein 1  | 94 | 2 |
| AT4G34240 |  aldehyde dehydrogenase 3I1  | 67 | 1 |
| AT4G35250 |  NAD(P)-binding Rossmann-fold superfamily protein  | 868 | 19 |
| AT4G36390 |  Methylthiotransferase  | 39 | 1 |
| AT4G37200 |  Thioredoxin superfamily protein  | 545 | 9 |
| AT4G37925 |  subunit NDH-M of NAD(P)H:plastoquinone dehydrogenase complex  | 205 | 4 |
| AT4G37930 |  serine transhydroxymethyltransferase 1  | 1141 | 20 |
| AT4G38100 |  unknown protein | 84 | 2 |
| AT4G38970 |  fructose-bisphosphate aldolase 2  | 3549 | 85 |
| AT4G39080 |  vacuolar proton ATPase A3  | 64 | 1 |
| AT4G39200 |  Ribosomal protein S25 family protein  | 40 | 1 |
| AT4G39710 |  FK506-binding protein 16-2  | 644 | 11 |
| AT4G39730 |  Lipase/lipooxygenase, PLAT/LH2 family protein  | 87 | 2 |
| AT5G01220 |  sulfoquinovosyldiacylglycerol 2  | 44 | 1 |
| AT5G01530 |  light harvesting complex photosystem II  | 7395 | 147 |
| AT5G01920 |  Protein kinase superfamily protein  | 45 | 1 |
| AT5G02160 |  unknown protein | 951 | 21 |
| AT5G03880 |  Thioredoxin family protein  | 431 | 8 |
| AT5G03900 |  Iron-sulphur cluster biosynthesis family protein  | 42 | 1 |
| AT5G04360 |  limit dextrinase  | 75 | 2 |
| AT5G04900 |  NYC1-like  | 47 | 1 |
| AT5G05200 |  Protein kinase superfamily protein  | 151 | 3 |
| AT5G05740 |  ethylene-dependent gravitropism-deficient and yellow-green-like 2  | 44 | 1 |
| AT5G06130 |  chaperone protein dnaJ-related  | 44 | 1 |
| AT5G07020 |  proline-rich family protein  | 294 | 4 |
| AT5G08050 |  Protein of unknown function (DUF1118)  | 421 | 9 |
| AT5G08670 |  ATP synthase alpha/beta family protein  | 232 | 5 |
| AT5G08680 |  ATP synthase alpha/beta family protein  | 908 | 20 |
| AT5G08740 |  NAD(P)H dehydrogenase C1  | 460 | 8 |
| AT5G09590 |  mitochondrial HSO70 2  | 123 | 2 |
| AT5G09660 |  peroxisomal NAD-malate dehydrogenase 2  | 557 | 10 |
| AT5G11450 |  Mog1/PsbP/DUF1795-like photosystem II reaction center PsbP family protein  | 63 | 1 |
| AT5G12860 |  dicarboxylate transporter 1  | 75 | 2 |
| AT5G12950 |  Putative glycosyl hydrolase of unknown function (DUF1680)  | 36 | 1 |
| AT5G13120 |  cyclophilin 20-2  | 155 | 4 |
| AT5G13450 |  delta subunit of Mt ATP synthase  | 135 | 3 |
| AT5G14040 |  phosphate transporter 3 | 46 | 1 |
| AT5G15090 |  voltage dependent anion channel 3  | 103 | 2 |
| AT5G16660 |  unknown protein | 209 | 2 |
| AT5G17170 |  rubredoxin family protein  | 1548 | 27 |
| AT5G17670 |  alpha/beta-Hydrolases superfamily protein  | 45 | 1 |
| AT5G17720 |  alpha/beta-Hydrolases superfamily protein  | 36 | 1 |
| AT5G18660 |  NAD(P)-binding Rossmann-fold superfamily protein  | 41 | 1 |
| AT5G19310 |  Homeotic gene regulator  | 37 | 1 |
| AT5G19760 |  Mitochondrial substrate carrier family protein  | 141 | 3 |
| AT5G19940 |  Plastid-lipid associated protein PAP / fibrillin family protein  | 788 | 16 |
| AT5G20140 |  SOUL heme-binding family protein  | 312 | 7 |
| AT5G20900 |  jasmonate-zim-domain protein 12  | 36 | 1 |
| AT5G21430 |  Chaperone DnaJ-domain superfamily protein  | 420 | 8 |
| AT5G23060 |  calcium sensing receptor  | 3560 | 63 |
| AT5G23120 |  photosystem II stability/assembly factor, chloroplast (HCF136)  | 1276 | 24 |
| AT5G23300 |  pyrimidine d  | 62 | 1 |
| AT5G25980 |  glucoside glucohydrolase 2  | 448 | 9 |
| AT5G27390 |  Mog1/PsbP/DUF1795-like photosystem II reaction center PsbP family protein  | 122 | 2 |
| AT5G27550 |  P-loop containing nucleoside triphosphate hydrolases superfamily protein  | 42 | 1 |
| AT5G28540 |  heat shock protein 70 (Hsp 70) family protein  | 84 | 2 |
| AT5G28750 |  Bacterial sec-independent translocation protein mttA/Hcf106  | 140 | 3 |
| AT5G35170 |  adenylate kinase family protein  | 139 | 3 |
| AT5G35370 |  S-locus lectin protein kinase family protein  | 35 | 1 |
| AT5G37360 |  unknown protein | 900 | 16 |
| AT5G37510 |  NADH-ubiquinone dehydrogenase, mitochondrial, putative  | 107 | 2 |
| AT5G37710 |  alpha/beta-Hydrolases superfamily protein  | 36 | 1 |
| AT5G38660 |  acclimation of photosynthesis to environment  | 2430 | 38 |
| AT5G38880 |  unknown protein | 77 | 2 |
| AT5G40640 |  unknown protein | 190 | 5 |
| AT5G40750 |  FBD / Leucine Rich Repeat domains containing protein  | 204 | 5 |
| AT5G40810 |  Cytochrome C1 family  | 61 | 1 |
| AT5G40950 |  ribosomal protein large subunit 27  | 84 | 2 |
| AT5G42270 |  FtsH extracellular protease family  | 2069 | 45 |
| AT5G42330 |  unknown protein | 40 | 1 |
| AT5G42650 |  allene oxide synthase  | 2651 | 52 |
| AT5G44650 |  Encodes a nucleus-encoded thylakoid protein, cooperates with the plastid-encoded Ycf3 protein in photosystem i assembly. Also induces tolerance to multiple environmental stresses and reduces photooxidative damage.  | 48 | 1 |
| AT5G46110 |  Glucose-6-phosphate/phosphate translocator-related  | 134 | 4 |
| AT5G46390 |  Peptidase S41 family protein  | 35 | 1 |
| AT5G46800 |  Mitochondrial substrate carrier family protein  | 315 | 5 |
| AT5G48790 |  Domain of unknown function (DUF1995)  | 207 | 5 |
| AT5G49360 |  beta-xylosidase 1  | 244 | 4 |
| AT5G50850 |  Transketolase family protein  | 137 | 2 |
| AT5G50920 |  CLPC homologue 1  | 81 | 2 |
| AT5G51010 |  Rubredoxin-like superfamily protein  | 122 | 4 |
| AT5G51690 |  1-amino-cyclopropane-1-carboxylate synthase 12  | 38 | 1 |
| AT5G53490 |  Tetratricopeptide repeat (TPR)-like superfamily protein  | 339 | 9 |
| AT5G53580 |  NAD(P)-linked oxidoreductase superfamily protein  | 324 | 7 |
| AT5G54160 |  O-methyltransferase 1  | 35 | 1 |
| AT5G54270 |  light-harvesting chlorophyll B-binding protein 3  | 558 | 11 |
| AT5G55710 |  FUNCTIONS IN: molecular\_function unknown | 335 | 7 |
| AT5G58260 |  oxidoreductases, acting on NADH or NADPH, quinone or similar compound as acceptor  | 213 | 5 |
| AT5G59250 |  Major facilitator superfamily protein  | 280 | 5 |
| AT5G60250 |  zinc finger (C3HC4-type RING finger) family protein  | 44 | 1 |
| AT5G60990 |  DEA(D/H)-box RNA helicase family protein  | 39 | 1 |
| AT5G61910 |  DCD (Development and Cell Death) domain protein  | 41 | 1 |
| AT5G62140 |  unknown protein | 48 | 1 |
| AT5G64040 |  photosystem I reaction center subunit PSI-N, chloroplast, putative / PSI-N, putative (PSAN)  | 3411 | 76 |
| AT5G64290 |  dicarboxylate transport 2.1  | 98 | 3 |
| AT5G64940 |  ABC2 homolog 13  | 106 | 2 |
| AT5G65220 |  Ribosomal L29 family protein  | 265 | 3 |
| AT5G65570 |  Tetratricopeptide repeat (TPR)-like superfamily protein  | 427 | 11 |
| AT5G66190 |  ferredoxin-NADP()-oxidoreductase 1  | 3034 | 60 |
| AT5G66470 |  RNA binding | 35 | 1 |
| AT5G66570 |  PS II oxygen-evolving complex 1  | 7130 | 172 |
| AT5G66760 |  succinate dehydrogenase 1-1  | 65 | 1 |
| AT5G67030 |  zeaxanthin epoxidase (ZEP) (ABA1)  | 264 | 4 |
| AT5G67500 |  voltage dependent anion channel 2  | 243 | 4 |
| AT5G67590 |  NADH-ubiquinone oxidoreductase-related  | 36 | 1 |
| ATCG00020 |  photosystem II reaction center protein A  | 11300 | 361 |
| ATCG00120 |  ATP synthase subunit alpha  | 10375 | 286 |
| ATCG00130 |  ATPase, F0 complex, subunit B/B', bacterial/chloroplast  | 6366 | 147 |
| ATCG00150 |  ATPase, F0 complex, subunit A protein  | 307 | 7 |
| ATCG00190 |  RNA polymerase subunit beta  | 39 | 1 |
| ATCG00270 |  photosystem II reaction center protein D  | 6357 | 137 |
| ATCG00280 |  photosystem II reaction center protein C  | 9411 | 275 |
| ATCG00340 |  Photosystem I, PsaA/PsaB protein  | 3771 | 76 |
| ATCG00350 |  Photosystem I, PsaA/PsaB protein  | 1921 | 54 |
| ATCG00430 |  photosystem II reaction center protein G  | 354 | 9 |
| ATCG00470 |  ATP synthase epsilon chain  | 1343 | 28 |
| ATCG00480 |  ATP synthase subunit beta  | 19446 | 569 |
| ATCG00490 |  ribulose-bisphosphate carboxylases  | 946 | 20 |
| ATCG00500 |  acetyl-CoA carboxylase carboxyl transferase subunit beta  | 38 | 1 |
| ATCG00520 |  unfolded protein binding  | 300 | 7 |
| ATCG00540 |  photosynthetic electron transfer A  | 4587 | 112 |
| ATCG00560 |  photosystem II reaction center protein L  | 703 | 12 |
| ATCG00580 |  photosystem II reaction center protein E  | 692 | 14 |
| ATCG00680 |  photosystem II reaction center protein B  | 13205 | 276 |
| ATCG00700 |  photosystem II reaction center protein N  | 46 | 1 |
| ATCG00710 |  photosystem II reaction center protein H  | 1948 | 117 |
| ATCG00720 |  photosynthetic electron transfer B  | 2482 | 35 |
| ATCG00730 |  photosynthetic electron transfer D  | 804 | 32 |
| ATCG00770 |  ribosomal protein S8  | 152 | 3 |
| ATCG00780 |  ribosomal protein L14  | 86 | 2 |
| ATCG00800 |  structural constituent of ribosome  | 42 | 1 |
| ATCG00810 |  ribosomal protein L22  | 56 | 1 |
| ATCG01060 |  iron-sulfur cluster binding | 2667 | 51 |
| ATCG01070 |  NADH-ubiquinone/plastoquinone oxidoreductase chain 4L  | 413 | 10 |
| ATCG01090 |  NADPH dehydrogenases  | 233 | 5 |
| ATCG01110 |  NAD(P)H dehydrogenase subunit H  | 211 | 5 |
| ATMG00070 |  NADH dehydrogenase subunit 9  | 162 | 4 |