10.1071/FP09047_AC

Accessory Publication: Functional Plant Biology, 2009, 36(8), 696–720.

## Accessory Publication

**Table 1.** Examples of plant stress genes that were identified by genetic technologies

| Gene | Mutant phenotype | Origin of variability | Plant | Reference |
|---|---|---|---|---|
| | | ***Map-based cloning*** | | |
| Salt Overly Sensitive 1<br>SOS1 | Salt hypersensitive | EMS mutagenesis | Arabidopsis | Wu *et al.* 1996<br>Shi *et al.* 2000 |
| Salt Overly Sensitive 2<br>SOS2 | Salt hypersensitive | EMS mutagenesis | Arabidopsis | Liu *et al.* 2000<br>Halfter *et al.* 2000<br>Gong *et al.* 2004 |
| Salt Overly Sensitive 3<br>SOS3 | Salt hypersensitive | EMS mutagenesis | Arabidopsis | Ishitani *et al.* 2000<br>Halfter *et al.* 2000<br>Gong *et al.* 2004 |
| Lateral Root Growth<br>dig | Drought hypersensitive root growth | EMS mutagenesis | Arabidopsis | Xiong *et al.* 2006<br>Yu *et al.* 2008 |
| ABA Insensitive 1<br>ABI1 | ABA insensitive | EMS mutagenesis | Arabidopsis | Koorneef 1984<br>Leung *et al.* 1994<br>Meyer *et al.* 1994 |
| ABI2 | ABA insensitive | EMS mutagenesis | Arabidopsis | Koorneef 1984<br>Leung *et al.* 1997 |
| ABI3 | ABA insensitive | EMS mutagenesis | Arabidopsis | Giraudat *et al.* 1992 |
| ABI4 | ABA insensitive | EMS mutagenesis | Arabidopsis | Finkelstein *et al.* 1998 |
| ABI5 | ABA insensitive | EMS mutagenesis | Arabidopsis | Finkelstein and Lynch 2000 |
| ERA1 | ABA hypersensitive | EMS mutagenesis | Arabidopsis | Cutler *et al.* 1996 |
| ABH1 | ABA hypersensitive, drought tolerant | EMS mutagenesis | Arabidopsis | Hugouvieux *et al.* 2001 |

| | | | | |
|---|---|---|---|---|
| Open Stomata 1 OST1 | Leaf temperature, infrared imaging, ABA insensitive | EMS mutagenesis | Arabidopsis | Merlot *et al.* 2002<br>Mustilli *et al.* 2002 |
| LOS, HOS, COS genes | RD29A-LUC activation/repression | EMS mutagenesis | Arabidopsis | Ishitani *et al.* 1997<br>Chinnusamy *et al.* 2002<br>Zhu *et al.* 2004 |
| HOS1 | RD29A-LUC activation | EMS mutagenesis | Arabidopsis | Ishitani *et al.* 1998<br>Lee *et al.* 2001 |
| FIERY1/HOS2 | RD29A-LUC activation | EMS mutagenesis | Arabidopsis | Xiong *et al.* 2004 |
| HOS5 | RD29A-LUC activation | EMS mutagenesis | Arabidopsis | Xiong *et al.* 1999 |
| FIERY2 | RD29A-LUC activation | EMS mutagenesis | Arabidopsis | Xiong *et al.* 2002*a* |
| HOS9 | RD29A-LUC activation | EMS mutagenesis | Arabidopsis | Zhu *et al.* 2004 |
| HOS10 | RD29A-LUC activation | EMS mutagenesis | Arabidopsis | Zhu *et al.* 2005 |
| LOS2/Enolase | Low RD29A-LUC expression, cold hypersensitive | EMS mutagenesis | Arabidopsis | Lee *et al.* 2002 |
| LOS5/ABA3 | Low RD29A-LUC expression, drought hypersensitive | EMS mutagenesis | Arabidopsis | Xiong *et al.* 2001 |
| LOS6/ABA1 | Low RD29A-LUC expression, drought hypersensitive | EMS mutagenesis | Arabidopsis | Xiong *et al.* 2002*b* |
| Altered RCI2A | RCI2A-LUC activation, altered drought, cold sensitivity | EMS mutagenesis | Arabidopsis | Medina *et al.* 2005 |
| Repressor of Silencing 1 ROS1 | RD29A-LUC supression | EMS mutagenesis | Arabidopsis | Gong *et al.* 2002 |
| Repressor of Silencing 3 ROS3 | RD29A-LUC supression | EMS mutagenesis | Arabidopsis | Zheng *et al.* 2008 |
| Redox Imbalanced RIMB | 2CPA-LUC activation | EMS mutagenesis | Arabidopsis | Heiber *et al.* 2007 |
| miR399 | AtIPS1-GUS activation, phosphate nutrition | EMS mutagenesis | Arabidopsis | Fujii *et al.* 2005<br>Bari *et al.* 2006<br>Chiou *et al.* 2006 |
| HOT5 | Heat sensitive, missing heat acclimation | EMS mutagenesis, T-DNA mutagenesis | Arabidopsis | Lee *et al.* 2008 |

| | | | | |
|---|---|---|---|---|
| ***Microarray-based cloning*** | | | | |
| AtHKT1 | Salt hypersensitive | Fast neutron mutagenesis | Arabidopsis | Gong *et al.* 2004 |
| ***QTL mapping*** | | | | |
| AtHKT1 | Difference in salt tolerance | Natural variability | Arabidopsis | Rus *et al.* 2006 |
| SOS1, NHX1, NHX5 | Salt sensitivity, salt exclusion | Natural variation | Wheat, *Lophopyrum elongatum* | Mullan *et al.* 2007 |
| SKC1/ *OsHKT1,5* | Salt tolerance | Natural variation | Rice | Ren *et al.* 2005 |
| HKT transporters | Salt tolerance | Natural variation | Barley, wheat, rice | Huang *et al.* 2008<br>Lindsay 2004<br>James *et al.* 2006 |
| NAX1 | Salt tolerance, NaCl exclusion | Natural variability | Wheat | Huang *et al.* 2006<br>James *et al.* 2006 |
| NAX2/ TmHKT1,5 | Salt tolerance, NaCl exclusion | Natural variability | Wheat | Byrt *et al.* 2007 |
| Kna1 | Salt tolerance, NaCl exclusion | Natural variability | Wheat | Byrt *et al.* 2007 |
| ERECTA | Transpiration efficiency, inflorescence morphology, pathogen resistance | Natural variation | Arabidopsis | Torii *et al.* 1996<br>Godiard *et al.* 2003<br>Masle *et al.* 2005 |
| CBF2 | Cold hypersensitivity | Natural variation | Arabidopsis | Alonso-Blanco *et al.* 2005 |
| CBF genes | Cold tolerance | Natural variation | Arabidopsis | McKhann *et al.* 2008<br>Le *et al.* 2008 |
| CBF genes | Cold tolerance | Natural variation | Barley | Tondelli *et al.* 2006 |
| CBF genes | Cold tolerance | Natural variation | *Triticum monococcum* | Miller *et al.* 2006<br>Knox *et al.* 2008 |
| ***T-DNA insert mapping*** | | | | |
| CPL | RD29A-LUC activation | T-DNA mutagenesis | Arabidopsis | Koiwa, *et al.* 2002 |
| HOS15 | RD29A-LUC activation | T-DNA mutagenesis | Arabidopsis | Zhu *et al.* 2008 |
| RPA2 | RD29A-LUC activation in *ros1-1* mutant background | T-DNA mutagenesis | Arabidopsis | Kapoor *et al.* 2005 |
| AGO6 | RD29A-LUC activation in *ros1-1* mutant background | T-DNA mutagenesis | Arabidopsis | Zheng *et al.* 2007 |
| HKT1 | Suppressing *sos3-1* NaCl | T-DNA mutagenesis | Arabidopsis | Rus Yokoi *et al.* 2001 |

| | | | | |
|---|---|---|---|---|
| | hypersensitivity | | | |
| STO1 | NaCl tolerant germination | T-DNA mutagenesis | Arabidopsis | Ruggiero *et al.* 2004 |
| PPR40 | ABA, salt hypersensitivity | T-DNA insertion | Arabidopsis | Zsigmond *et al.* 2008 |
| *SOS1* | Salt hypersensitive | T-DNA mutagenesis | Arabidopsis | Koiwa *et al.* 2006 |
| *WBC11* | Salt responsive LUC gene activation, drought sensitive | Promoter trapping | Arabidopsis | Alvarado *et al.* 2004<br>Galbiati *et al.* 2008<br>Panikashvili *et al.* 2007 |
| OsGSK1 | Salt responsive GUS riporter activity | Promoter trapping | Rice | Koh *et al.* 2007 |
| *AtPDR3* | Stomata specific expression, drought tolerant | Promoter trapping | Arabidopsis | Galbiati *et al.* 2008 |
| Various stress-induced genes | Abiotic stress induction of GUS | Promoter trapping | Rice | Chen *et al.* 2008 |
| *Shine SHN* | Drought tolerant | Activation tagging | Arabidopsis | Aharoni *et al.* 2004 |
| SDT1 | Drought tolerant | Activation tagging | Arabidopsis | Li *et al.* 2005 |
| EDT1 | Drought tolerant | Activation tagging | Arabidopsis | Yu *et al.* 2008 |
| | Herbicide and chilling tolerant | Activation tagging | Tobacco | Ahad *et al.* 2003 |
| *CDT-1* | Drought tolerant | Activation tagging | *Craterostigma plantagineum* | Furini *et al.* 1997<br>Hilbricht *et al.* 2008 |
| *ADR1* | Enhanced PR1-LUC luminescence, drought tolerant | Activation tagging | Arabidopsis | Grant *et al.* 2003<br>Chini *et al.* 2004 |
| *AtHKT1* | *sos3-1 supressor* | Activation tagging | Arabidopsis | Koiwa *et al.* 2006 |
| SDT1 | Salt and drought tolerant | Activation tagging | Arabidopsis | Li *et al.* 2005 |
| EDT1 | Drought tolerant | Activation tagging | Arabidopsis | Yu *et al.* 2008 |
| HOT5 | Heat sensitive, missing heat acclimation | EMS mutagenesis, T-DNA mutagenesis | Arabidopsis | Lee *et al.* 2008 |
| ***Transposon insert mapping*** | | | | |
| Putative receptor-like kinase, sensor-histidine kinase | Low-oxygen induced GUS activity, low-oxygen intolerant | Promoter trapping | Arabidopsis | Baxter-Burrell 2003 |
| ***Insert amplification and sequencing*** | | | | |
| RAP2.12 | ADH1-LUC activation | cDNA library transfer | Arabidopsis | Papdi *et al.* 2008 |

| | | | | |
|---|---|---|---|---|
| *2AER* | Salt tolerance | cDNA library transfer | Arabidopsis | Papdi *et al.* 2008 |
| *AtPP2AC* | ABA insensitive | cDNA library transfer | Arabidopsis | Kuhn *et al.* 2006 |
| AtbZIP60 | Salt tolerance | cDNA library transfer | Arabidopsis | Fujita *et al.* 2007 |
| ONAC063 | Thermotolerance | cDNA library transfer | Rice | Yokotani *et al.* 2009 |
| ST6-66, ST225 | Salt tolerance | cDNA library transfer | Thellungiella, Arabidopsis | Du *et al.* 2008 |
| ***Reverse genetics*** | | | | |
| ALS | Herbicide resistance | Gene targeting | Rice | Endo *et al.* 2007 |
| *ADH2* | | Gene targeting | Rice | Terada *et al.* 2007 |
| Dehydrin | Osmotic stress tolerance | Gene targeting | *Physcomitrella patens* | Saavedra *et al.* 2006 |
| PpABI1A, PpABI1B | ABA signaling, freezing tolerance | Gene targeting | *Physcomitrella patens* | Komatsu *et al.* 2009 |
| *CCA1*, *LHY* | Multiple stress sensitivity | T-DNA insert screen | Arabidopsis | Kant *et al.* 2008 |
| *SnRK2.2*, *SnRK2.3* | ABA insensitivity | T-DNA insert screen | Arabidopsis | Fujii *et al.* 2007 |
| elF4E factor | susceptibility to biotic stresses | TILLING | Melon | Nieto *et al.* 2007 |
| HOT5 | heat acclimation | TILLING | Arabidopsis | Lee *et al.* 2008 |
| *SWI3B* | ABA insensitive germination | TILLING | Arabidopsis | Saez *et al.* 2008 |