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MSD1      1  MAIECITSMPQQLLNQET---KEQEKPLVFDASVLKHQVN-LPTQFIWPDDEEQACLNVPELDVPFIDLG 65
AtGA20ox1 1  MAVSFVTTSP EE-EDKPKLGLGNIQT-PLIFNPSMLNLQAN-IPNQFIWPDDEKPSINVLELDVPLIDLQ 67
AtGA20ox2 1  MAILCTTSPAEKEHEPKQDLEKDQTSPLIFNPSLLNLQSQ-IPNQFIWPDDEKPSIDIPELNVPFIDLS 69
AtGA20ox3 1  MATECIATVPQIFSENKT-----KEDSS-IFDAKLLNQSHHIPPQFVWPDHEKPSTDVQPLQVPLIDLA 64
AtGA20ox4 1  --MECIIKLPQRFNKNKS-----KKNPLRIFDSTVLNHQPDHIPQEFVWPDHEKPSKNVPILQVPVIDLA 63

MSD1      66  GFLSGDPVAAMEASKVVG EACQKHGFFLVNHHGIDEKLISDAHVFMDDFFELPLSQKQRAQRKTGEHCGY 135
AtGA20ox1 68  NLLS-DPSSTLDASRLISEACKKHGFFLVNHHGISEELISDAHEYTSRFFDMPLSEKQVRLKSGESVGY 136
AtGA20ox2 69  -----SQDSTLEAPRVIAEACTKHGFFLVNHHGVSESLIADAHRLMESFFDMPLAGKQKAQRKPGEESCGY 134
AtGA20ox3 65  GFLSGDSCLEASEATRLVSKAATKHGFFLITNHHGVDESLLSRAYLHMDSFFKAPACEKQKAQRKWGESSGY 134
AtGA20ox4 64  GFLSNDPLLVSEAEERLVSEAAKKHGGFFLVNHHGVDERLLSTAHKLMDTFFKSPNYEKLKAQRKVGETTGY 133

MSD1      136  ASSFTGRFSSKLPWKETLSFQFSADEKS---PNLVRDYLCTMGNFEKFGDVYQDYCKAMSNLSLGIME 202
AtGA20ox1 137  ASSFTGRFSTKLPWKETLSFRFCDDMSR---SKSVQDYFCDALGHGFQFFGKVYQDYCEAMSSLSLKIME 203
AtGA20ox2 135  ASSFTGRFSTKLPWKETLSFQFSNDNSG---SRTVQDYFSDTLGQEFQFGKVYQDYCEAMSSLSLKIME 201
AtGA20ox3 135  ASSFVGRFSSKLPWKETLSFKFSPEEK--IHSQTVKDFVSKMGDGYEDFGKVYQDYAEAMNTLSLKIME 202
AtGA20ox4 134  ASSFVGRFKENLPWKETLSFSFSPTEKSENYSQTVKNYISKTMGDGYKDFGSVYQDYAEETMSNLSLKIME 203

MSD1      203  ILGMSLGVGKAHFEFFFEENSSIMRLNYYPTCQKPELTLGTGPHCDPTSLTILHQDQVGGQLQVYVDDQWH 272
AtGA20ox1 204  LLGLSLGVKRDYFREFFFEENDSIMRLNYYPPCIKPDLTTLGTGPHCDPTSLTILHQDQVNGLQVFVENQWR 273
AtGA20ox2 202  LLGLSLGVNRDYFRGFFFEENDSIMRLNHYPPCQTPDLTLGTGPHCDPSSLTILHQDQVNGLQVFVDNQWQ 271
AtGA20ox3 203  LLGMSLGVERRYFKEFFFEEDSDSIFRLNYYPQCKPELALGTGPHCDPTSLTILHQDQVGGQLQVFVDNKWQ 272
AtGA20ox4 204  LLGMSLGIKREHFEFFFEEDNESIFRLNYYPKCKQPDVLVLTGPHCDPTSLTILQDQVSGLQVFVDNQWQ 273

MSD1      273  SISPHFNAFVVNIGDTFMALSNTRYKSCLHRAVVNSEKTRKSLAFFLCPKSDKVVTTPPCELVDN--YNPR 340
AtGA20ox1 274  SIRPNPKAFVVNIGDTFMALSNDRYKSCLHRAVVNSEERKSLAFFLCPKKDRVVTTPPRELDS--ITSR 341
AtGA20ox2 272  SIRPNPKAFVVNIGDTFMALSNIGFKSCLHRAVVNRESARKSMAFFLCPKKDKVVKPPSDILEK--MKTR 339
AtGA20ox3 273  SIPPNPFAFVVNIGDTFMALTNTRYKSCLHRAVVNSEERERKTFAFFLCPKGEKVVKPPPEELVNGVKSGER 342
AtGA20ox4 274  SIPPQPALVVNIGDTLMALTNIGYKSCLHRAVVNGETTRKTLAFFLCPKVDKVVKPPSELE-----GER 338

MSD1      341  IYPDFTWSMLLEFTQKHRYADIKTLEAFKWWQCKST-- 377
AtGA20ox1 342  RYPDFTWSMFLEFTQKHRYADMNTLQAFSDWLTG---PI 377
AtGA20ox2 340  KYPDFTWSMFLEFTQKHRYADVNTLDSFSNWWITNNNP 378
AtGA20ox3 343  KYPDFTWSMFLEFTQKHRYADMNTLDEFIWLKNRRSF- 380
AtGA20ox4 339  AYPDFTWSMFLEFTMKHYRADMNTLEEFNWLKNKGSF- 376

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FIGURE S1. Amino acid sequence alignment of MSD1 and its close homologs in Arabidopsis.

Alignment of MSD1 with the four AtGA20ox was performed using ClustalW. The red line represents DIOX_N domain. The black line represents 2OG-FeII_Oxy domain.

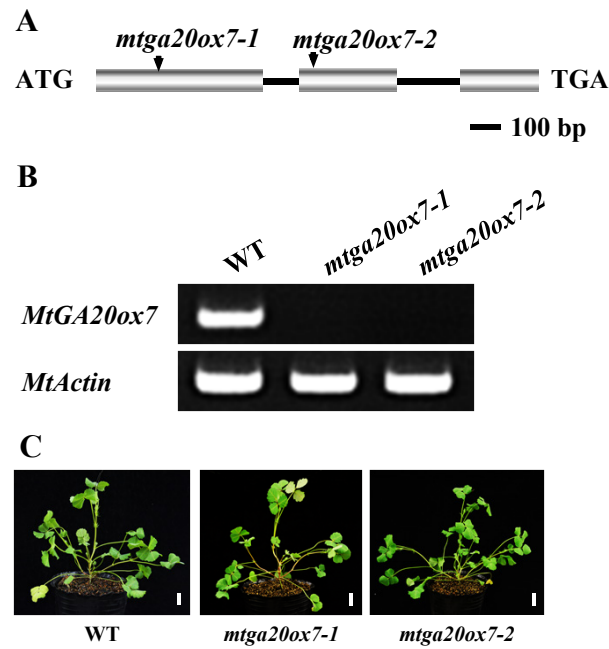


FIGURE S2. Identification of the *mtga20ox7* mutant.

(A) Schematic representation of the gene structure of *MtGA20ox7* and the *Tnt1* insertion sites in *mtga20ox7-1* and *mtga20ox7-2*. (B) RT-PCR analysis of *MtGA20ox7* expression in wild type (WT) and various *mtga20ox7* alleles. *MtActin* was used as the loading control. (C) Phenotypic analysis of 4-week-old WT, *mtga20ox7-1* and *mtga20ox7-2*. Bars = 2 cm.

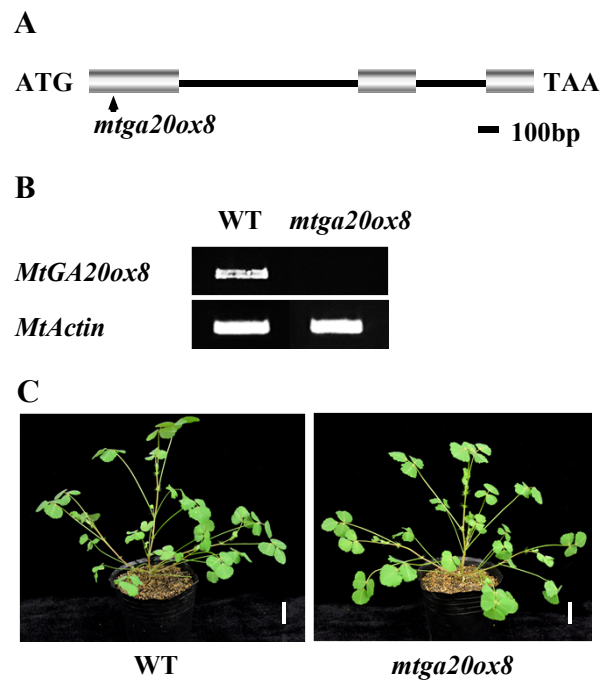


FIGURE S3. Identification of the *mtga20ox8* mutant.

(A) Schematic representation of the gene structure of *MtGA20ox8* and the *Tnt1* insertion sites in *mtga20ox8*. (B) RT-PCR analysis of *MtGA20ox8* expression in wild type (WT) and *mtga20ox8* mutant. *MtActin* was used as the loading control. (C) Phenotypic analysis of 4-week-old WT and *mtga20ox8*. Bars = 2 cm.

Table S1. Primers used in this study.

Primers	Sequences 5'-3'	Application
NF5514-F	CTTGGAGTTGGTAAAGCTCA	For genotyping of NF5514
NF5514-R	AAATGAACAGAGCCCTAACC	
NF12848-F	CTTGGCGTTTCTTTTCATCTC	For genotyping of NF12848
NF12848-R	TGTTGTGTTAGGATGCAGTT	
NF10524-F	CTTGGCGTTTCTTTTCATCTC	For genotyping of NF10524
NF10524-R	TGTTGTGTTAGGATGCAGTT	
NF21287-F	CTTGGCGTTTCTTTTCATCTC	For genotyping of NF21287
NF21287-R	TGTTGTGTTAGGATGCAGTT	
NF1343-F	AGGCACACCATTAAACCTTCC	For genotyping of NF1343
NF1343-R	TTGGTCTTGGTGTAGAATGG	
NF18196-F	AGGCACACCATTAAACCTTCC	For genotyping of NF18196
NF18196-R	TTGGTCTTGGTGTAGAATGG	
NF19184-F	GGCCATTAAATGCATGTTTGA	For genotyping of NF19184
NF19184-R	TTCTCCAACCTTCCTTTGAG	
LTR6	GCTACCAACCAAACCAAGTCAA	Primers in Tnt1 for genotyping of different mutant
LTR31	CTCCTCTCGGGGTCGTGGTT	
RT-MSD1-F	ATGGCAATAGAATGCATAAC	For cloning of the <i>MSD1</i> CDS and RT-PCR
RT-MSD1-R	TCATGTGCTTTTACATTGAA	
RT-MtGA20ox7-F	ATGGCTATAGAGTGCATAAC	For cloning of the <i>MtGA20ox7</i> CDS and RT-PCR
RT-MtGA20ox7-R	TCAGCTACTTTTTTGTGGA	
RT-MtGA20ox8-F	ATGCATGTCCCTTAACCCTTC	For cloning of the <i>MtGA20ox8</i> CDS and RT-PCR
RT-MtGA20ox8-R	TTAGTTGAGTTGTTTTCTC	
RT-MtActin-F	TCTTACTCTCAAGTACCCCATGAGC	For RT-PCR analysis of <i>MtActin</i>
RT-MtActin-R	GTGGGAGTGCATAACCCTCATAGATT	
qMtActin-F	TCAATGTGCCTGCCATGTATGT	For qRT-PCR analysis of <i>MtActin</i>
qMtActin-R	ACTCACACCGTCACCAGAATCC	
qPCR-MSD1-F	ACCTTGTCAGAGACTATTTGTG	For qRT-PCR analysis of <i>MSD1</i>
qPCR-MSD1-R	AGTAGGATAGTAATTGAGCCTCA	
qPCR-MtGA20ox7-F	AATTCCTTTCTGGTGACCCTT	For qRT-PCR analysis of <i>MtGA20ox7</i>
qPCR-MtGA20ox7-R	AAAGGTAGTCTTTAACAATATTTGT	
qPCR-MtGA20ox8-F	TCCACCAAGATCAAGTTGAGGG	For qRT-PCR analysis of <i>MtGA20ox8</i>
qPCR-MtGA20ox8-R	GCGCCATAAATGTGTCACCA	

Table S2. Accession numbers used in this study.

Gene name and species	Accession numbers
<i>MtGA20ox1/MSD1 (Medicago truncatula)</i>	Medtr1g102070
<i>MtGA20ox2 (Medicago truncatula)</i>	Medtr3g096500
<i>MtGA20ox3 (Medicago truncatula)</i>	Medtr8g093930
<i>MtGA20ox4 (Medicago truncatula)</i>	Medtr1g081840
<i>MtGA20ox5 (Medicago truncatula)</i>	Medtr3g088745
<i>MtGA20ox6 (Medicago truncatula)</i>	Medtr8g093980
<i>MtGA20ox7 (Medicago truncatula)</i>	Medtr6g464620
<i>MtGA20ox8 (Medicago truncatula)</i>	Medtr8g033380
<i>AtGA20ox1 (Arabidopsis thaliana)</i>	At4g25420
<i>AtGA20ox2 (Arabidopsis thaliana)</i>	At5g51810
<i>AtGA20ox3 (Arabidopsis thaliana)</i>	At5g07200
<i>AtGA20ox4 (Arabidopsis thaliana)</i>	At1g60980
<i>AtGA20ox5 (Arabidopsis thaliana)</i>	At1g44090
<i>OsGA20ox1 (Oryza sativa)</i>	Os03g0856700
<i>OsGA20ox2 (Oryza sativa)</i>	Os01g0883800
<i>OsGA20ox3 (Oryza sativa)</i>	Os07g0169700
<i>OsGA20ox4 (Oryza sativa)</i>	Os05g0421900