

**Supplemental Table 3.** Data on the ABA- regulated gene coding MAP kinase.

	Annotation	ID / GenBank Acc No.	Homologus proteins	Other factors leading to the up- <sup>(U)</sup> and down-regulation <sup>(D)</sup> of MAPK genes	Known MAP kinase interacting partner(s)	References
<b>UP-REGULATED GENES</b> <i>Arachis hypogaea</i> (peanut)						
MAPK (A group)	<b>AhMPK3</b>	EU182580	GmMPK1, MsMMK4, CsTIPK, PtMPK3-1, AtMPK3, NtWIPK, LeMPK3	wounding stress <sup>U</sup> , H <sub>2</sub> O <sub>2</sub> <sup>U</sup> , SA <sup>U</sup> , MeJA <sup>U</sup>	-	Kumar et al., 2009
<b>Brassica napus (canola)</b>						
MAPKK (A group)	<b>BnaMCK1</b>	HQ916282	AtMCK1, OsMCK1	SA <sup>U</sup> , <i>S. sclerotiorum</i> <sup>U</sup> (pathogenic fungus)	BnaMPK6	Liang et al., 2013, Sun et al., 2014, Yu et al., 2014
MAPK (B group)	<b>BnOIPK</b>	-	AtMPK4	Chitosan <sup>U</sup> , JA <sup>U</sup> , SA <sup>U</sup>	-	Yin et al., 2010
<b>Brassica rapa (field mustard)</b>						
MAPK (B group)	<b>BraMAPK5</b>	Bra035233*	AtMAPK5	waterlogging <sup>U</sup> , NaCl <sup>U</sup> , cold <sup>U</sup> and wound <sup>D</sup> stress, 6-BA <sup>U</sup> , BR <sup>U</sup> , NAA <sup>U</sup> , IAA <sup>U</sup>	-	Lu et al., 2015
MAPK (D group)	<b>BraMAPK17-1</b>	Bra026665*	AtMAPK17	BR <sup>U</sup> , heat <sup>U</sup> and cold <sup>U</sup> stress,	-	Lu et al., 2015
MAPK (D group)	<b>BraMAPK17-2</b>	Bra024886*	AtMAPK17	heat <sup>U</sup> , NaCl <sup>U</sup> , PEG <sup>U</sup> , waterlogging <sup>U</sup> , wound <sup>U</sup> and cold <sup>D</sup> stress, 6-BA <sup>U</sup> , BR <sup>U</sup> , GA3 <sup>U</sup> , NAA <sup>U</sup> , IAA <sup>U</sup>	-	Lu et al., 2015
MAPK (D group)	<b>BraMAPK18-1</b>	Bra038128*	AtMAPK18	NaCl <sup>U</sup> , PEG <sup>U</sup> , cold <sup>U</sup> , waterlogging stress <sup>U</sup>	-	Lu et al., 2015
MAPK (D group)	<b>BraMAPK19-1</b>	Bra027317*	AtMAPK19	NaCl <sup>U</sup> , PEG <sup>U</sup> cold <sup>U</sup> , waterlogging <sup>U</sup> , heat stress <sup>U</sup>	-	Lu et al., 2015
<b>Capsicum annuum (pepper)</b>						
MAPK (D group)	<b>CaMPK9-1</b>	CA12g10140	AtMPK8, AtMPK15, AtMPK9	NaCl <sup>U</sup> , plant pathogenic bacterium ( <i>Ralstonia solanacearum</i> ) <sup>U</sup>	-	Liu et al., 2015
MAPK (D group)	<b>CaMPK17-1</b>	CA05g08630	AtMPK15	plant pathogenic bacterium ( <i>Ralstonia solanacearum</i> ) <sup>U</sup>	-	Liu et al., 2015
<b>Chorispora bungeana</b>						

MAPK (A group)	<b>CbMAPK3</b>	AY805424	AtMPK3, NtWIPK, CaMPK1, PsMAPK3, MsMMK4, Petroselinum crispum PARSLEY MAPK	NaCl <sup>U</sup> , cold stress <sup>U</sup>	-	Zhang et al., 2006
<b><i>Curcuma longa L. (turmeric)</i></b>						
MAPK (A group)	<b>CIMPK6</b>	KP782042	AtMPK6, ZmMPK6, BnMPK6, OsMPK6	MeJA <sup>U</sup> , SA <sup>U</sup> , GA <sup>U</sup>	-	Nanda et al., 2016
<b><i>Gossypium hirsutum (upland cotton)</i></b>						
MAPKKK (Raf-like)	<b>GhMAPKKK49</b>	KP057883	SIMAPKKK24, ZmMAPKKK57, AtRaf41, BnaRaf41	drought <sup>U</sup> and wounding stress <sup>U</sup> , H <sub>2</sub> O <sub>2</sub> <sup>U</sup> , GA <sup>U</sup> , MeJA <sup>U</sup> , SA <sup>U</sup> , 6-BA <sup>U</sup> , NAA <sup>U</sup> , ET <sup>U</sup>	GhMAPKK4, GhMAPKK9	Liu et al., 2016
MAPKK (A group)	<b>GhMCK2_2</b>	FJ966886.1	AtMCK2	SA <sup>U</sup> , JA <sup>U</sup> , H <sub>2</sub> O <sub>2</sub> <sup>U</sup> , wounding stress <sup>U</sup>	GhMPK3, GhMPK6, GhMPK18, GhMPK12, GhMPK14 GhMPK19, GhMPK23, GhMPK27	Zhang et al., 2016
MAPKK (C group)	<b>GhMCK4</b>	-	AtMCK4	SA <sup>U</sup> , wounding stress <sup>U</sup>	GhMPK8, GhMPK16, GhMPK20	Li et al., 2014, Zhang et al., 2016
MAPKK (C group)	<b>GhMCK5</b>	HQ637469.1	AtMCK5	SA <sup>U</sup> , H <sub>2</sub> O <sub>2</sub> <sup>U</sup> , wounding stress <sup>U</sup>	GhMPK3, GhMPK6, GhMPK12, GhMPK13, GhMPK27	Zhang et al., 2016
MAPKK (A group)	<b>GhMCK6</b>	GU188977.1	AtMCK6	SA <sup>U</sup> , JA <sup>U</sup> , H <sub>2</sub> O <sub>2</sub> <sup>U</sup> , PEG <sup>U</sup> , drought <sup>U</sup> , heat <sup>U</sup> , wounding <sup>U</sup> , and cold stress <sup>U</sup>	GhMPK3, GhMPK6, GhMPK16 GhMPK18,	Zhang et al., 2016
MAPKK (D group)	<b>GhMCK7</b>	-	AtMCK7	SA <sup>U</sup> , JA <sup>U</sup> , H <sub>2</sub> O <sub>2</sub> <sup>U</sup> , drought <sup>U</sup> , heat <sup>U</sup> , wounding <sup>U</sup> and cold stress <sup>U</sup>	GhMPK8, GhMPK14, GhMPK16, GhMPK25	Zhang et al., 2016
MAPKK (D group)	<b>GhMCK10_1</b>	-	AtMCK10	SA <sup>U</sup> , JA <sup>U</sup> , H <sub>2</sub> O <sub>2</sub> <sup>U</sup> , cold <sup>U</sup> and wounding stress <sup>U</sup>	17 of the 21 MAPK genes (no interaction: GhMPK5, GhMPK10, GhMPK14, GhMPK25)	Zhang et al., 2016
MAPKK	<b>GhMPK11</b>	KP901089	TcMPK4, AtMPK11 and AtMPK4,	GA <sub>3</sub> <sup>U</sup> , pathogens ( <i>R. Solanacearum</i> ,	-	Wang et al., 2016,

(D group)			NaMPK4	<i>R. solani</i> ) <sup>U</sup>		Zhang et al., 2016
MAPKK (D group)	<b>GhMPK17</b>	KJ192192	AtMPK17, ZmMPK17, OsMPK17-2	PEG <sup>U</sup> and cold stress <sup>U</sup>	-	Zhang et al., 2014b
<b><i>Ipomoea batatas</i> (sweet potato)</b>						
MAPK (A group)	<b>IbMPK3</b>	KT934378	NtWIPK 22, CaMPK1, PsMAPK3, AtMPK3, MsMMK4	NaCl <sup>U</sup> , H <sub>2</sub> O <sub>2</sub> <sup>U</sup> , cold stress <sup>U</sup> , SA <sup>U</sup> , JA <sup>U</sup>	-	Kim et al., 2016
MAPK (A group)	<b>IbMPK6</b>	KT934379	NtSIPK, CaMAPK2, MsMMK1, AtMPK6, PsMAPK	salinity stress <sup>U</sup> , H <sub>2</sub> O <sub>2</sub> <sup>U</sup> , SA <sup>U</sup> , JA <sup>U</sup>	-	Kim et al., 2016
<b><i>Malus domestica</i> (apple)</b>						
MAPK (A group)	<b>MdMPK1</b>	GU139791.1	PcMKK2, NtSIPK, LeMEK1, AtMCK2	-	MdMCK1	Wang et al., 2010b
<b><i>Musa acuminata</i> L. (banana)</b>						
MAPK (D group)	<b>MaMAPK2</b>	KF582546	AtMPK20	ETH <sup>U</sup> , MeJA <sup>U</sup> , SA <sup>U</sup> , pathogenic fungus( <i>Fusarium Oxysporum</i> f. Sp) <sup>U</sup>	-	Wang et al., 2015b
MAPK (D group)	<b>MaMAPK3</b>	KF594427	AtMPK9, AtMPK17, OsMPK12, OsMPK13	ETH <sup>U</sup> , MeJA <sup>U</sup> , SA <sup>U</sup> , pathogenic fungus( <i>Fusarium Oxysporum</i> f. Sp) <sup>U</sup>	-	Wang et al., 2015b
MAPK (B group)	<b>MaMAPK4</b>	KF594427	OsMPK2, AtMPK4, AtMPK11	ABA <sup>U</sup> , ETH <sup>U</sup> , MeJA <sup>U</sup> , SA <sup>U</sup>	-	Wang et al., 2015b
MAPK (D group)	<b>MaMAPK6</b>	KF594427	OsMPK11	ABA <sup>U</sup> , ETH <sup>U</sup> , MeJA <sup>U</sup> , SA <sup>U</sup> , pathogenic fungus ( <i>Fusarium Oxysporum</i> f. Sp) <sup>U</sup>	-	Wang et al., 2015b
<b><i>Manihot esculenta</i> (cassava)</b>						
MAPK (A group)	<b>MeMAPK1</b>	-	CsMPK6, MDMPK6-1, MDMPK6-2, SiMAPK1, SiMAPK2, AtMPK6, OsMPK6	PEG <sup>U</sup> , H <sub>2</sub> O <sub>2</sub> <sup>D</sup> , NaCl <sup>U</sup> , cold stress <sup>D</sup>	-	Yan et al., 2016
MAPK (B group)	<b>MeMAPK10</b>	-	MdMPK4-4, CsMPK4-1	PEG <sup>U</sup> , cold stress <sup>D</sup> , NaCl <sup>U</sup>	-	Yan et al., 2016
MAPK (B group)	<b>MeMAPK17</b>	-	CsMPK4-2, MdMPK4-1, MdMPK4-2, SiMAPK5, SiMAPK6	NaCl <sup>U</sup> , H <sub>2</sub> O <sub>2</sub> <sup>D</sup> , cold stress <sup>D</sup>	-	Yan et al., 2016
<b><i>Origanum onites</i> L. (Lamiaceae)</b>						
MAPKK (A group)	<b>OoMAPKK1</b>	EF558371	NtMEK1, LeMCK3, AtMCK6, OsMEK1, OsMAPKK6, ZmMEK1	cold <sup>U</sup> and wounding stress <sup>U</sup>	-	Poyraz, 2013
<b><i>Oryza minuta</i></b>						
MAPKK	<b>OmMCK1</b>	DQ989217	OsMCK1, OsMCK6 AtMCK1, AtMCK2 ,	MeJA <sup>U</sup> , ETH <sup>U</sup> , SA <sup>U</sup> , MV <sup>U</sup>	-	You et al., 2007

(A group)			AtMKK6			
<b>Oryza sativa</b>						
MAPK (A group)	<b>OsMPK1 (OsMPK6, OsMAPK6, OsSIPK)</b>	AJ535841	NtSIPK, AtMPK6, MsSIMK	JA <sup>U</sup> , SA <sup>U</sup> , ETH <sup>U</sup> , CHX <sup>U</sup> , JA/SA + CHX <sup>U</sup> , cantharidin <sup>U</sup> , okadaic acid <sup>U</sup> , H <sub>2</sub> O <sub>2</sub> <sup>U</sup> , chitosan <sup>U</sup> , NaCl <sup>U</sup> , cold stress <sup>U</sup>	OsMKK4	Lee et al., 2008b, Zhang et al., 2012b, Yoo et al., 2014
MAPK (C group)	<b>OsMPK4 (OsMAPK4, OsMPK7, OsMAPkinase2, OsMPK2, OsMSRMK3, OsMPK3)</b>	AJ512642	OsMAPK3, AtMPK1	wounding <sup>U</sup> , JA <sup>U</sup> , SA <sup>U</sup> , ET <sup>U</sup> , H <sub>2</sub> O <sub>2</sub> <sup>U</sup> , protein phosphatase inhibitors <sup>U</sup> , chitosan <sup>U</sup> , high salt/sugar <sup>U</sup> , heavy metals <sup>U</sup>	-	Agrawal et al., 2003a, Reyna et al., 2006
MAPK (A group)	<b>OsMPK3 (OsMPK5, OsMAP1, OsMAPK2, OsMAPK5, OsMSRMK2, OsBIMK1)</b>	AJ486975	AtMPK3, ZmMAPK4, NtSIPK, NtWIPK,	H <sub>2</sub> O <sub>2</sub> <sup>U</sup> , SA <sup>U</sup> , BTH <sup>U</sup> , dichloroisonicotinic acid <sup>U</sup> , probenazole <sup>U</sup> , JA and its methyl ester <sup>U</sup> , plant pathogenic bacteria ( <i>Pseudomonas syringae</i> pv. <i>Syringae</i> ) <sup>U</sup> , wounding <sup>U</sup>	OsMKK6	Agrawal et al., 2002, Xiong and Yang, 2003, Zhang et al., 2012b, Jalmi and Sinha, 2016, Song and Goodman, 2002 Xie et al., 2014
MAPK (B group)	<b>OsMPK14 (OsMPK3, OsMAPK3, OsMAP3, OsMAPKK33)</b>	GQ265780	AtMPK4, OsMPK6, AtMPK16	low temperature <sup>U</sup> , high salinity <sup>U</sup> , drought <sup>D</sup> , light in roots <sup>U</sup> , light in shoots <sup>D</sup>	OsMKK3	Liang et al., 2010, Lee et al., 2011, Wankhede et al. 2013
MAPK (D group)	<b>OsMPK17-1 (OsBWMK1, OsMPK12)</b>	AF177392	OsRMAPK2, AtMPK9	JA <sup>U</sup> , SA <sup>U</sup>	-	Agrawal et al., 2003b
MAPK (D group)	<b>OsMPK20-4 (OsWJUMK1, OsMPK8, OsMPKG1)</b>	AJ512643	OsMAPK44, AtMPK20, AtMPK18	H <sub>2</sub> O <sub>2</sub> <sup>U</sup> , heavy metals <sup>U</sup> , cold stress	OsMKK6, OsMPK3	Agrawal et al., 2003a, Sheikh et al., 2012
MAPK (D group)	<b>OsMPK7 (OsMAPK44)</b>	AY506572	OsMPK20-4, AtMPK20	NaCl <sup>U</sup> , drought <sup>U</sup> , H <sub>2</sub> O <sub>2</sub> <sup>U</sup> , bacterial pathovar ( <i>X. oryzae</i> ) <sup>U</sup>	OsMKK3	Jeong et al., 2006, Zhang et al., 2014e, Jalmi and Sinha, 2016
MAPKKK (Raf-like)	<b>OsEDR1 (OsMAPKKK1)</b>	AY167575	AtEDR1, HvEDR1	wounding <sup>U</sup> , JA <sup>U</sup> , SA <sup>U</sup> , ET <sup>U</sup> , H <sub>2</sub> O <sub>2</sub> <sup>U</sup>	-	Kim et al., 2003
MAPKKK (Raf-like)	<b>OsDSM1(OsMAPKKK6)</b>	LOC_Os02g50970	AtEDR1, AtCTR1	NaCl <sup>U</sup> , drought <sup>U</sup>	-	Ning et al., 2010
<b>Reaumuria soongorica</b>						
MAPK (C group)	<b>RsMPK2</b>	<i>EU846599</i>	<i>PsMPK2</i> , NtNTF3, <i>PsMPK2</i> , PhMEK1	H <sub>2</sub> O <sub>2</sub> <sup>U</sup> , PEG <sup>U</sup>	-	Liu et al., 2010
<b>Solanum lycopersicum (tomato)</b>						
MAPK	<b>SIMAPK3</b>	-	-	H <sub>2</sub> O <sub>2</sub> <sup>U</sup> , MeJA <sup>U</sup> , SA <sup>U</sup>	-	Li et al., 2017d
<b>Solanum tuberosum (potato)</b>						

MAPK (A group)	<b>StMPK1</b>	- (98% identical to an EST sequence ( AB062138)	<i>LeMPK1</i> , <i>SIPK</i> , AtMPK6, OsMPK6	JA <sup>U</sup> , wounding <sup>U</sup> , pathogenic fungus ( <i>Fusarium Oxysporum</i> f. Sp) <sup>U</sup> and heat stress <sup>U</sup>	-	Blanco et al., 2006
<b>Zea mays (maize)</b>						
MAPKK (A group)	<b>ZmMKK1</b>	AB062138.1	OsMKK1, AtMKK1, NtMEK1	NaCl <sup>U</sup> , ETH <sup>U</sup> , PEG <sup>U</sup> , H <sub>2</sub> O <sub>2</sub> <sup>U</sup> , 4°C <sup>U</sup>	ZmMEKK1	Cai et al., 2014
MAPKK (B group)	<b>ZmMKK3</b>	JN972438	OsMKK3, AtMKK3	H <sub>2</sub> O <sub>2</sub> <sup>U</sup> , PEG <sup>U</sup>	-	Zhang et al., 2012d
MAPK (A group)	<b>ZmMPK6-2 (ZmMPK5)</b>	AB016802	AtMPK6, OsMPK1	BR <sup>U</sup> , SA <sup>U</sup> , ETH <sup>U</sup> , H <sub>2</sub> O <sub>2</sub> <sup>U</sup> , CdCl <sub>2</sub> <sup>U</sup> , UV <sup>U</sup> , light <sup>U</sup> , hexavalent chromium (VI) <sup>U</sup> , cold <sup>U</sup> , NaCl <sup>U</sup> wounding stress <sup>U</sup>	-	Zhang et al. 2006, 2007, 2010; Lin et al., 2009; Ding et al. 2013; Sun et al., 2015; Ma et al., 2016
MAPK (D group)	<b>ZmMPK6</b>	NM_001111768	OsMPK15, OsMPK16-1, TaMPK2, GhMPK16, AtMPK16	SA <sup>U</sup> , H <sub>2</sub> O <sub>2</sub> <sup>U</sup> , PEG <sup>U</sup> , NaCl <sup>U</sup>	-	Sun et al., 2015
MAPK (C group)	<b>ZmMPK7</b>	EU616650	OsMSRMK, AtMPK17	H <sub>2</sub> O <sub>2</sub> <sup>U</sup>	-	Zong et al., 2009
MAPK (C group)	<b>ZmMPK8</b>	-	OsMPK16, OsMPK17, AtMPK8, AtMPK15	drought stress <sup>U</sup>	-	Sun et al., 2015
<b>DOWN-REGULATED GENES</b> <i>Brachypodium distachyon</i> (purple false brome)						
MAPKK (A group)	<b>BdMKK6.2</b>	JX297555	OsMPK6, AtMPK6, AtMPK10	H <sub>2</sub> O <sub>2</sub> <sup>U</sup> , cold <sup>U</sup> , heat <sup>U</sup> and PEG <sup>D</sup>	-	Chen et al., 2012; Sun et al., 2016
<b>Cucumis sativus L. (cucumber)</b>						
MAPK (A group)	<b>CsNMAPK</b>	DQ812086	GmMAPK1, PsMAPK3, MsMAPK, StWIPK, LeMAPK, CaMAPK1	H <sub>2</sub> O <sub>2</sub> <sup>U</sup> , SA <sup>U</sup> and cold stress <sup>D</sup>	-	Xu et al., 2008b
<b>Malus domestica (apple)</b>						
MAPK (A group)	<b>MdMKK1</b>	GU139793	PcMKK2, NtSIPKK, LeMEK1, AtMKK2	-	MdMPK1	Wang et al., 2010a
<b>Manihot esculenta (cassava)</b>						
MAPK (C group)	<b>MeMAPK4</b>	-	CsMPK1, SIMAPK9	osmotic <sup>D</sup> , H <sub>2</sub> O <sub>2</sub> <sup>D</sup> , NaCl <sup>U</sup> , cold stress <sup>D</sup>	-	Yan et al., 2016
MAPK (D group)	<b>MeMAPK19</b>	-	CsMPK9-2	osmotic <sup>D</sup> , H <sub>2</sub> O <sub>2</sub> <sup>D</sup> , cold <sup>D</sup> and NaCl <sup>U</sup>	-	Yan et al., 2016
<b>Musa acuminata L. (banana)</b>						

MAPK (D group)	<b>MaMAPK1</b>	<i>KF582545</i>	AtMPK20	ETH <sup>u</sup> , MeJA <sup>u</sup> , SA <sup>u</sup> , pathogenic fungus( <i>Fusarium Oxysporum</i> f. Sp) <sup>u</sup>	-	Wang et al., 2015b
<b><i>Rheum australe D.</i></b>						
MAPK (A group)	<b>RaMPK1</b>	<i>DQ078119</i>	GmMPK2, PcMPK6, NTF4-2, StMPK, MsMMK1, LeMPK2, NtSIPK, NbSIPK, AtMPK, OsMPK6	SA <sup>D</sup> , JA <sup>u</sup>	-	Ghawana et al., 2010
<b><i>Zea mays (maize)</i></b>						
MAPKK (group C)	<b>ZmMCK4</b>	<i>EU954741</i>	<i>MsSIMKK, AtMCK5, AtMCK4, NtMEK2</i>	H <sub>2</sub> O <sub>2</sub> <sup>u</sup> , cold(4°C) <sup>u</sup> PEG, NaCl <sup>u</sup>	-	Kong et al., 2011
MAPK (group B)	<b>ZmSIMK1</b>	AY433815	AtMPK4, AtMPK11	NaCl <sup>u</sup> , SA <sup>u</sup> , H <sub>2</sub> O <sub>2</sub> , drought stress <sup>u</sup>	-	Gu et al., 2010

\*Brassica Database (BRAD) <http://brassicadb.org/brad>