

Additional file 8A-1 Expression data of the *BdMAPK* family genes after abiotic stresses treatment.

	4°C 3h			45°C 3h			PEG 3h			H ₂ O ₂ 3h			Nacl 3h		
	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down
BdMPK3	11.6535	0.0000	up	1.3961	0.0071		1.0638	0.1858		1.3491	0.0009		0.5962	0.0004	
BdMPK4	0.7864	0.0412		0.3600	0.0003	down	0.2749	0.0001	down	0.1630	0.0000	down	0.4539	0.0257	
BdMPK6	3.0795	0.0000	up	1.1780	0.0051		0.7943	0.0026		0.6764	0.0015		0.2952	0.0005	down
BdMPK7-1	1.1811	0.2310		0.3338	0.0106		0.4514	0.0027	down	0.7071	0.0508		0.4718	0.0001	down
BdMPK7-2	1.5658	0.5324		0.5369	0.3225		0.5822	0.3719		1.0907	0.8830		0.9282	0.1248	
BdMPK11	1.9048	0.0111		0.5376	0.0192		1.2930	0.1073		0.2338	0.0010	down	0.3071	0.0000	down
BdMPK14	2.0775	0.0053	up	0.7855	0.1234		1.0552	0.6587		0.5380	0.0195		0.3659	0.0000	down
BdMPK16	5.4391	0.0000	up	1.4529	0.0002		1.0625	0.1126		0.3442	0.0000	down	0.4543	0.0151	
BdMPK17	9.0092	0.0000	up	1.6331	0.0000		1.6548	0.0001		2.0378	0.0000	up	1.3349	0.0011	
BdMPK20-1	2.9210	0.0000	up	1.7503	0.0000		0.9065	0.0098		0.6238	0.0000		0.4215	0.0005	down
BdMPK20-2	2.0138	0.0000	up	0.6587	0.0001		0.9915	0.7606		0.3712	0.0000	down	0.3848	0.0000	down
BdMPK20-3	2.8412	0.0002	up	1.2559	0.0456		0.4536	0.0045	down	0.9485	0.5115		0.3397	0.0047	down
BdMPK20-4	4.1072	0.0000	up	1.3793	0.0014		0.4362	0.0001	down	0.1558	0.0000	down	0.4558	0.0020	down
BdMPK20-5	0.9183	0.0972		0.3384	0.0000	down	0.7373	0.0000		0.1937	0.0000	down	0.3856	0.0013	down
BdMPK21-1	2.6706	0.0005	up	0.8050	0.0730		0.9666	0.7511		0.4693	0.0020	down	0.3124	0.0000	down

Additional file 8A-2 Expression data of the *BdMAPK* family genes after abiotic stresses treatment.

	4°C 6h			45°C 6h			PEG 6h			H ₂ O ₂ 6h			NaCl 6h		
	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down
BdMPK3	4.9111	0.0000	up	0.9920	0.7231		0.8759	0.0031		1.8955	0.0008		0.6579	0.0001	
BdMPK4	2.2720	0.0001	up	1.9707	0.0001		0.7858	0.0208		1.0926	0.0821		1.4817	0.0007	
BdMPK6	1.7393	0.0158		1.4292	0.0006		0.8376	0.0173		1.1414	0.0416		0.4800	0.0013	down
BdMPK7-1	0.3771	0.0065	down	0.9974	0.9669		0.0850	0.0000	down	0.2447	0.0002	down	0.5061	0.0005	
BdMPK7-2	1.4916	0.3921		0.5929	0.2198		0.5306	0.2246		1.7301	0.2754		0.6423	0.0001	
BdMPK11	1.4738	0.3089		0.8205	0.4550		0.2633	0.0031	down	0.9717	0.8694		0.7193	0.0018	
BdMPK14	1.0932	0.7104		2.3155	0.0012	up	0.5744	0.0106		4.1052	0.0000	up	0.2822	0.0000	down
BdMPK16	6.3005	0.0000	up	1.6436	0.0004		0.3863	0.0000	down	1.1578	0.0429		0.9136	0.1458	
BdMPK17	7.9386	0.0000	up	2.3749	0.0002	up	1.6433	0.0002		1.6403	0.0002		0.9355	0.0832	
BdMPK20-1	1.4241	0.0035		1.7731	0.0002		0.3211	0.0000	down	0.3868	0.0000	down	1.4830	0.0260	
BdMPK20-2	0.7645	0.0001		0.3668	0.0015	down	0.0551	0.0000	down	0.4130	0.0000	down	1.4831	0.0347	
BdMPK20-3	4.9684	0.0000	up	2.2099	0.0161		0.4628	0.0000	down	5.1672	0.0000	up	0.4179	0.0000	down
BdMPK20-4	3.8987	0.0000	up	1.4295	0.0039		0.0275	0.0000	down	0.4642	0.0000	down	1.1548	0.4139	
BdMPK20-5	0.4916	0.0000	down	0.5826	0.0000		0.0503	0.0000	down	0.3395	0.0000	down	1.6808	0.0753	
BdMPK21-1	6.2327	0.0003	up	1.2577	0.4767		1.2503	0.2612		9.7254	0.0001	up	0.2792	0.0000	down

Additional file 8B-1 Expression data of the *BdMAPKK* family genes after abiotic stresses treatment.

	4°C 3h			45°C 3h			PEG 3h			H ₂ O ₂ 3h			NaCl 3h		
	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down
BdMKK1	1.4958	0.0007		0.5386	0.0001		0.6813	0.0017		0.4863	0.0001	down	0.1803	0.0002	down
BdMKK3-1	2.9757	0.0000	up	0.8452	0.1102		0.9204	0.3009		1.7097	0.0005		0.5216	0.0000	
BdMKK3-2	5.1906	0.0000	up	2.2720	0.0002	up	1.9955	0.0004		1.7559	0.0008		0.2513	0.0000	down
BdMKK3-3	2.8605	0.0009	up	1.9093	0.0050		4.2744	0.0002	up	3.3791	0.0004	up	0.9214	0.0458	
BdMKK4	2.9055	0.0280		2.3512	0.0156		1.3667	0.4643		0.8442	0.7323		0.4662	0.0010	down
BdMKK5	1.4282	0.4215		1.3858	0.5725		0.7550	0.0249		1.3001	0.3021		0.5750	0.0025	
BdMKK6	2.2631	0.0000	up	1.3857	0.0002		0.7017	0.0000		0.2385	0.0000	down	0.5382	0.0000	
BdMKK10-1	0.9943	0.9943		0.5090	0.3387		0.5576	0.4187		0.4972	0.6127		0.4603	0.0935	
BdMKK10-2	3.8832	0.0000	up	1.3459	0.0002		0.6906	0.0000		3.2667	0.0000	up	0.9575	0.6624	
BdMKK10-3	8.0010	0.0095	up	0.0304	0.0280		4.4706	0.0005	up	0.8654	0.3517		0.2882	0.0184	
BdMKK10-5	1.5438	0.0000		6.7047	0.0000	up	1.4813	0.0004		1.3804	0.0024		2.0765	0.0000	up

Additional file 8B-2 Expression data of the *BdMAPKK* family genes after abiotic stresses treatment.

	4°C 6h			45°C 6h			PEG 6h			H ₂ O ₂ 6h			Nacl 6h		
	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down
BdMKK1	0.8014	0.0117		0.4950	0.0028	down	0.1947	0.0000	down	0.6661	0.0002		0.6620	0.0004	
BdMKK3-1	1.8033	0.0014		0.5716	0.0001		1.0327	0.5637		4.0481	0.0000	up	0.2134	0.0000	down
BdMKK3-2	3.6097	0.0001	up	0.8039	0.0574		0.7926	0.0754		4.4882	0.0001	up	0.1941	0.0000	down
BdMKK3-3	1.9408	0.0034		0.3884	0.0001	down	3.2115	0.0001	up	8.8085	0.0000	up	0.4561	0.0000	down
BdMKK4	0.0775	0.0153		0.5053	0.4682		0.0706	0.0131		2.5075	0.2819		0.3921	0.0355	
BdMKK5	1.0564	0.3027		8.9427	0.0000	up	1.1144	0.0979		8.9362	0.0000	up	0.2402	0.0008	down
BdMKK6	1.7737	0.0004		1.3989	0.0083		0.1996	0.0000	down	2.0132	0.0002	up	0.4417	0.0000	down
BdMKK10-1	5.1275	0.0589		3.7559	0.6016		0.3579	0.6807		0.8643	0.8994		0.0004	0.1544	
BdMKK10-2	1.1456	0.0343		0.9272	0.1487		1.0528	0.2797		7.3364	0.0000	up	0.2757	0.0000	down
BdMKK10-3	0.0599	0.2679		0.1086	0.0797		0.0010	0.0019	down	6.5630	0.1186		0.6895	0.2316	
BdMKK10-5	0.7758	0.0011		15.8837	0.0000	up	0.3668	0.0002	down	0.8199	0.0311		0.2102	0.0000	down

Additional file 8C-1 Expression data of the *BdMAPKKK* family genes after abiotic stresses treatment.

	4°C 3h			45°C 3h			PEG 3h			H ₂ O ₂ 3h			NaCl 3h		
	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down
BdMAPKKK1	1.4108	0.2861		0.4581	0.0072	down	0.2688	0.0257		0.5878	0.2073		1.1080	0.3329	
BdMAPKKK2	1.7019	0.0014		0.4611	0.0000	down	0.4646	0.0006	down	0.0587	0.0000	down	0.4624	0.0012	down
BdMAPKKK3	3.3328	0.0028	up	1.1163	0.6412		0.8579	0.7991		0.1138	0.0038	down	0.5833	0.0003	
BdMAPKKK4	2.8266	0.0000	up	2.4454	0.0000	up	4.6403	0.0000	up	0.3948	0.0066	down	0.7296	0.0042	
BdMAPKKK5	2.3194	0.0186		1.6124	0.4227		0.4627	0.1355		0.0720	0.0035	down	0.7233	0.0000	
BdMAPKKK6	5.7655	0.0000	up	7.3109	0.0383		1.0967	0.4818		0.1026	0.0014	down	0.8200	0.0026	
BdMAPKKK7	1.2198	0.2238		0.5454	0.0130		0.2937	0.0099	down	0.0313	0.0002	down	0.4243	0.0001	down
BdMAPKKK8	0.8470	0.6998		0.3856	0.0458		0.3598	0.0828		0.1890	0.0150		0.6577	0.0019	
BdMAPKKK9	1.1796	0.0179		0.3865	0.0002	down	0.3802	0.0004	down	0.0721	0.0001	down	0.3266	0.0006	down
BdMAPKKK10	1.5466	0.1173		0.4381	0.0177		0.5863	0.0861		0.1794	0.0013	down	0.8598	0.1452	
BdMAPKKK11	1.1466	0.3421		0.4634	0.0027	down	0.3957	0.0014	down	0.1738	0.0002	down	0.6904	0.0483	
BdMAPKKK12	3.3001	0.0005	up	1.7640	0.0412		1.1841	0.3053		0.3198	0.0413		0.6438	0.0001	
BdMAPKKK13	2.0226	0.1025		0.6982	0.3528		0.7177	0.3874		0.3062	0.0415		0.8482	0.1832	
BdMAPKKK14	4.1162	0.0058	up	0.2535	0.0222		0.5082	0.0680		1.1060	0.7277		0.2941	0.0027	down
BdMAPKKK15	2.6043	0.0046	up	0.6391	0.0319		0.6067	0.0201		0.2155	0.0096	down	0.7540	0.0026	
BdMAPKKK16	2.4008	0.0063	up	0.7971	0.1662		0.9058	0.4975		0.7474	0.1894		0.8282	0.0979	
BdMAPKKK17	2.3187	0.0448		0.8817	0.7102		0.7812	0.4436		0.1730	0.0207		0.6081	0.0012	
BdMAPKKK18	4.9919	0.0013	up	2.6022	0.0093	up	1.8179	0.0397		0.3580	0.0121		0.4235	0.0000	down
BdMAPKKK19	3.0828	0.0003	up	1.4435	0.0228		1.2202	0.0507		0.6284	0.0576		1.1815	0.0098	
BdMAPKKK20	1.6994	0.0483		0.4341	0.0270		0.8335	0.4284		0.5560	0.0984		0.5941	0.0001	
BdMAPKKK21	15.4844	0.0002	up	5.8730	0.0023	up	1.5745	0.1004		0.8412	0.6082		3.5312	0.0000	up
BdMAPKKK22	1.8859	0.1692		0.9909	0.9843		0.8104	0.6624		0.7860	0.5865		1.0145	0.5681	
BdMAPKKK23	1.2817	0.1400		1.1540	0.3628		1.4146	0.0147		0.3341	0.0005	down	0.4769	0.0005	down
BdMAPKKK24	2.7411	0.0051	up	0.6225	0.0612		0.3326	0.0037	down	0.0676	0.0022	down	0.4598	0.0106	

BdMAPKKK25	1.0762	0.4336	0.2311	0.0000	down	0.7290	0.0079	0.5929	0.0335	0.8838	0.0032				
BdMAPKKK26	1.8600	0.0249	0.9457	0.4575		1.0775	0.6852	0.4955	0.0195	0.6402	0.0096				
BdMAPKKK27	7.8248	0.0005	up	6.5229	0.0004	up	2.6788	0.0040	up	0.9487	0.7592	0.7686	0.0915		
BdMAPKKK28	0.6812	0.0116	0.3290	0.0000	down	0.5067	0.0000	0.5365	0.0022	0.5994	0.0007				
BdMAPKKK29	2.8850	0.0511	0.6698	0.3687		0.5788	0.2214	0.3786	0.0892	0.7317	0.0560				
BdMAPKKK30	18.0785	0.0000	up	9.0442	0.0000	up	3.6875	0.0000	up	1.8431	0.0025	0.7671	0.4743		
BdMAPKKK31	2.3833	0.0614	0.2673	0.0152		0.4505	0.0697	0.6270	0.2501	0.9979	0.9763				
BdMAPKKK32	1.7289	0.2058	0.4658	0.0837		0.8172	0.5697	0.6954	0.3471	1.0166	0.8903				
BdMAPKKK33	2.0077	0.0256	0.6554	0.1170		0.4361	0.0146	0.1614	0.0046	down	0.4486	0.0000	down		
BdMAPKKK34	3.1428	0.1155	0.6002	0.3486		0.6027	0.3842	1.1613	0.7765	0.9981	0.9727				
BdMAPKKK35	3.1714	0.0018	up	2.4843	0.0180		0.7330	0.1175	0.8290	0.6328	1.1405	0.0249			
BdMAPKKK36	7.2796	0.0006	up	0.4424	0.0162		0.5817	0.0540	1.5629	0.1691	0.4796	0.0001	down		
BdMAPKKK37	3.3315	0.0222	1.3679	0.4261		0.7492	0.4441	0.6471	0.3237	0.8489	0.0081				
BdMAPKKK38	2.3209	0.0094	up	1.4721	0.1758		0.8602	0.4468	0.4564	0.1099	0.7515	0.0140			
BdMAPKKK39	3.9018	0.0098	up	1.2874	0.5007		1.0017	0.9960	0.4025	0.0630	1.4141	0.0212			
BdMAPKKK40	2.0211	0.1495	0.6480	0.3178		0.6676	0.3519	0.9063	0.8101	1.0637	0.2378				
BdMAPKKK41	1.2491	0.1208	0.6930	0.0144		0.6023	0.0016	1.4637	0.0053	1.2879	0.0013				
BdMAPKKK42	3.1126	0.0061	up	0.0512	0.0001	down	0.0045	0.0000	down	0.3051	0.0037	down	0.0811	0.0002	down
BdMAPKKK43	3.2795	0.0033	up	0.7665	0.2927		1.4088	0.1465	0.3720	0.0788	0.6836	0.0000			
BdMAPKKK44	4.9926	0.0063	up	1.1869	0.5628		0.6127	0.1609	0.3043	0.0120	1.5240	0.0329			
BdMAPKKK45	2.9944	0.0079	up	0.4617	0.0200		0.7852	0.3050	1.2858	0.2988	0.7980	0.2126			
BdMAPKKK46	2.5077	0.0373	0.8112	0.5233		0.8048	0.4974	0.4057	0.0773	0.7199	0.0368				
BdMAPKKK47	2.3455	0.0272	1.5079	0.2199		0.7304	0.2786	0.8723	0.6188	3.3490	0.0000	up			
BdMAPKKK48	1.0654	0.5941	0.2899	0.0002	down	0.6761	0.0096	0.4663	0.0211	0.5706	0.0005				
BdMAPKKK49	3.7778	0.0135	3.0405	0.0218		0.7240	0.3489	0.9123	0.7783	1.6444	0.0020				
BdMAPKKK50	1.0418	0.9464	1.8413	0.1144		0.8267	0.6270	0.5771	0.0013	0.6240	0.1327				
BdMAPKKK51	9.5601	0.0008	up	4.5122	0.0030	up	1.6988	0.1160	33.0582	0.0001	up	103.9945	0.0000	up	
BdMAPKKK52	49.0899	0.0000	up	1.5718	0.0100		0.7824	0.1810	2.3534	0.0000	up	4.3787	0.0039	up	
BdMAPKKK53	3.3627	0.0006	up	78.7300	0.0000	up	10.9649	0.0000	up	12.9934	0.0000	up	14.0156	0.0001	up

BdMAPKKK54	2.3747	0.1338	1.7664	0.0094	0.2669	0.0001	down	0.0046	0.0000	down	0.3977	0.0076	down	
BdMAPKKK55	3.0225	0.0108	1.4900	0.1829	2.3910	0.0211		0.5697	0.0826		1.6666	0.2368		
BdMAPKKK56	1.2309	0.6102	1.3594	0.4617	0.3665	0.0526		0.0790	0.0040	down	0.4481	0.0017	down	
BdMAPKKK57	0.4451	0.0026	down	0.0180	0.0000	down	0.9866	0.9438	2.6549	0.0021	up	0.4998	0.0162	
BdMAPKKK58	3.2629	0.0355	2.5461	0.0074	up	15.9661	0.0001	up	11.8081	0.0002	up	1.0075	0.9843	
BdMAPKKK59	2.7741	0.0004	up	0.7130	0.0128	1.0146	0.8904	2.8346	0.0007	up	22.7227	0.0009	up	
BdMAPKKK60	0.2571	0.0035	down	0.1721	0.0001	down	0.0979	0.0844	0.2914	0.0000	down	0.2512	0.0003	down
BdMAPKKK61	0.2766	0.0213	0.1808	0.0020	down	0.4258	0.0549	0.7264	0.3220	0.6019	0.0163			
BdMAPKKK62	2.1944	0.0047	up	5.7740	0.0003	up	1.0710	0.6265	0.6332	0.0959	1.7133	0.0020		
BdMAPKKK63	1.6018	0.0007	2.4238	0.0098	up	1.5012	0.0888	0.8665	0.4293	1.6552	0.0051			
BdMAPKKK64	2.4080	0.0234	0.4333	0.0336	0.9368	0.8089	0.8446	0.4917	0.7179	0.1366				
BdMAPKKK65	2.5616	0.0000	up	0.7510	0.1909	0.7799	0.0619	0.2079	0.0047	down	0.4620	0.0018	down	
BdMAPKKK66	0.9911	0.9822	0.5641	0.1936	1.3631	0.3626	1.5144	0.1518	0.1806	0.0000	down			
BdMAPKKK67	3.2438	0.0000	up	0.6351	0.1206	0.5886	0.0209	0.9983	0.9959	1.4266	0.3216			
BdMAPKKK68	1.0993	0.3472	0.9169	0.2501	1.1269	0.2444	0.1731	0.0001	down	0.6500	0.0098			
BdMAPKKK69	1.6519	0.0913	5.7863	0.0017	up	2.8639	0.0105	16.1324	0.0002	up	11.8599	0.0000	up	
BdMAPKKK70	5.5602	0.0020	up	1.3268	0.3222	0.9644	0.8928	0.4757	0.1625	1.8956	0.0001			
BdMAPKKK71	1.2343	0.0004	1.2049	0.1130	1.0046	0.4171	3.0369	0.0001	up	0.8391	0.1044			
BdMAPKKK72	2.7625	0.0036	up	20.9155	0.0001	up	1.6520	0.0431	3.4298	0.0026	up	0.9040	0.7735	
BdMAPKKK73	1.3406	0.3013	0.8911	0.6768	1.5459	0.1525	0.1823	0.0050	down	0.8812	0.5821			
BdMAPKKK74	1.1390	0.0724	0.4469	0.0005	down	0.5804	0.0009	0.4826	0.0002	down	0.8903	0.1240		
BdMAPKKK75	1.2199	0.2354	0.8382	0.0002	0.6177	0.0046	0.5097	0.0008	1.6524	0.0000				

Additional file 8C-2 Expression data of the *BdMAPKKK* family genes after abiotic stresses treatment.

	4°C 6h			45°C 6h			PEG 6h			H ₂ O ₂ 6h			NaCl 6h		
	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down
BdMAPKKK1	5.5153	0.0086	up	2.0798	0.0399		0.2702	0.0381		5.3520	0.0042	up	0.8052	0.0134	
BdMAPKKK2	2.6708	0.0029	up	2.8822	0.0021	up	0.3046	0.0116		0.6449	0.1179		1.6682	0.0002	
BdMAPKKK3	2.7702	0.0554		7.4887	0.0025	up	0.3376	0.1031		0.3973	0.1171		2.1256	0.0029	up
BdMAPKKK4	0.7652	0.0000		6.9043	0.0001	up	0.6969	0.0000		0.4561	0.0002	down	2.4092	0.0000	up
BdMAPKKK5	4.1296	0.0335		11.5528	0.0030	up	0.4315	0.0861		1.4220	0.3610		1.5646	0.0004	
BdMAPKKK6	2.3953	0.0011	up	3.5689	0.0229		0.1937	0.0112		0.3925	0.0211		2.1342	0.0019	up
BdMAPKKK7	1.4636	0.1401		2.7061	0.0096	up	0.1534	0.0108		0.3676	0.0218		1.4381	0.0037	
BdMAPKKK8	4.2186	0.0209		1.4221	0.4420		0.6742	0.4679		3.8294	0.0220		1.3473	0.0006	
BdMAPKKK9	0.8841	0.2422		0.8076	0.1225		0.1133	0.0003	down	0.3438	0.0004	down	1.6392	0.0020	
BdMAPKKK10	3.3510	0.0000	up	0.9922	0.9482		0.5811	0.0028		1.2902	0.0043		1.7383	0.0192	
BdMAPKKK11	2.4703	0.0000	up	1.9362	0.0001		0.5446	0.0242		1.2726	0.0018		1.0343	0.6267	
BdMAPKKK12	3.6646	0.0000	up	2.8386	0.0029	up	0.7562	0.0005		0.8270	0.3797		1.8337	0.0005	
BdMAPKKK13	2.7498	0.0057	up	1.2220	0.1080		0.5168	0.1218		0.5505	0.0039		1.4107	0.0004	
BdMAPKKK14	3.8265	0.0216		0.4883	0.0228		0.5749	0.1284		2.5812	0.0044	up	0.8052	0.0000	
BdMAPKKK15	4.4482	0.0005	up	1.4463	0.2047		0.5612	0.0041		0.7869	0.5504		1.6607	0.0010	
BdMAPKKK16	3.3186	0.0004	up	1.3990	0.1573		0.8247	0.1446		1.3013	0.3081		1.0639	0.0018	
BdMAPKKK17	2.4674	0.0054	up	1.8019	0.0753		0.2205	0.0047	down	0.4953	0.1200		2.2046	0.0017	up
BdMAPKKK18	2.1641	0.0024	up	8.0830	0.0001	up	0.5507	0.0077		0.2282	0.0197		1.0623	0.6860	
BdMAPKKK19	5.3386	0.0002	up	4.2367	0.0006	up	1.7135	0.0082		1.0023	0.9909		3.1967	0.0000	up
BdMAPKKK20	2.8196	0.0000	up	0.7601	0.0242		0.6566	0.0000		1.0654	0.8339		1.1507	0.0118	
BdMAPKKK21	24.5059	0.0000	up	26.1910	0.0001	up	2.1620	0.0059	up	1.1284	0.6735		3.2035	0.0020	up
BdMAPKKK22	3.7650	0.0388		2.9563	0.0586		1.1368	0.7956		2.2787	0.0996		1.0377	0.7944	
BdMAPKKK23	1.6486	0.0062		1.7846	0.0368		1.0843	0.5278		0.5728	0.0274		0.7407	0.0180	
BdMAPKKK24	0.7197	0.0711		0.5448	0.0099		0.0865	0.0000	down	0.0470	0.0003	down	0.6499	0.0016	
BdMAPKKK25	1.4531	0.0046		0.2541	0.0007	down	0.5695	0.0005		1.2982	0.2700		0.4825	0.0003	down

BdMAPKKK26	1.3009	0.0774		1.0970	0.3066		0.5938	0.0000		0.4122	0.0010	down	1.2862	0.0253
BdMAPKKK27	0.9967	0.9762		9.9382	0.0002	up	0.3428	0.0000	down	0.3877	0.0444		1.4785	0.0013
BdMAPKKK28	1.1605	0.6426		0.8663	0.5649		1.4148	0.1677		2.0913	0.0741		0.8152	0.0002
BdMAPKKK29	5.7800	0.0002	up	1.3319	0.0585		0.8718	0.3148		1.2863	0.4307		1.5085	0.0001
BdMAPKKK30	10.7775	0.0000	up	20.6463	0.0000	up	0.7664	0.2635		0.8918	0.1072		0.4583	0.0014
BdMAPKKK31	6.0997	0.0003	up	0.8980	0.5420		0.8058	0.1946		1.9838	0.0476		1.1482	0.2036
BdMAPKKK32	2.0705	0.0112		1.0327	0.8754		1.1327	0.4309		1.5771	0.0896		1.7244	0.0916
BdMAPKKK33	1.9482	0.0170		0.7405	0.1810		0.2031	0.0005	down	0.4366	0.0364		1.3677	0.0165
BdMAPKKK34	7.0989	0.0073	up	1.1205	0.8103		0.8370	0.6741		2.9693	0.0214		0.9348	0.1629
BdMAPKKK35	3.6920	0.0000	up	6.7243	0.0000	up	0.6648	0.1397		1.2143	0.0345		2.9151	0.0001
BdMAPKKK36	41.2858	0.0002	up	1.6507	0.1704		0.5103	0.0568		1.7173	0.1387		0.9132	0.3500
BdMAPKKK37	6.2793	0.0000	up	3.8342	0.0013	up	1.1265	0.4330		1.5860	0.0461		1.0201	0.2669
BdMAPKKK38	2.6360	0.0035	up	3.7989	0.0019	up	0.4865	0.0174		0.6473	0.3453		1.6925	0.0002
BdMAPKKK39	6.5931	0.0000	up	2.6502	0.0002	up	1.4034	0.0614		1.3830	0.1365		1.8184	0.0000
BdMAPKKK40	4.0695	0.0000	up	1.8566	0.0062		1.5610	0.0008		2.9001	0.0040	up	1.1540	0.0281
BdMAPKKK41	2.7542	0.0043	up	1.8411	0.0102		1.0353	0.8165		4.9998	0.0003	up	1.2135	0.0245
BdMAPKKK42	0.5215	0.1399		0.9137	0.8350		0.1074	0.0031	down	0.1139	0.0035	down	4.4810	0.0032
BdMAPKKK43	1.7120	0.0016		2.9715	0.0035	up	0.9772	0.8859		1.0582	0.3926		1.2055	0.0991
BdMAPKKK44	7.3178	0.0010	up	2.5159	0.0339		0.6812	0.0276		0.8340	0.1778		1.4581	0.0073
BdMAPKKK45	4.3505	0.0003	up	0.7399	0.0801		0.8658	0.5499		3.2358	0.0047	up	1.2762	0.0432
BdMAPKKK46	2.4506	0.0030	up	2.0358	0.0399		0.5211	0.0187		0.7537	0.5150		2.4209	0.0171
BdMAPKKK47	3.2757	0.0000	up	3.7856	0.0000	up	1.1203	0.1911		3.2338	0.0001	up	0.7667	0.0103
BdMAPKKK48	0.9361	0.6008		0.2822	0.0023	down	0.6350	0.0943		1.5898	0.1076		0.8485	0.2297
BdMAPKKK49	5.1204	0.0015	up	4.8541	0.0016	up	1.1381	0.5349		2.3621	0.0147		1.3600	0.0055
BdMAPKKK50	0.4111	0.1937		1.5839	0.4193		0.0476	0.0027	down	0.0420	0.0011	down	4.8408	0.0026
BdMAPKKK51	9.0268	0.0002	up	5.6153	0.0000	up	2.7871	0.0002	up	44.8628	0.0000	up	71.7733	0.0000
BdMAPKKK52	15.6940	0.0001	up	2.2514	0.0074	up	0.5912	0.1056		0.7082	0.1264		3.4440	0.0085
BdMAPKKK53	1.7499	0.0046		33.5506	0.0001	up	3.4091	0.0017	up	7.8332	0.0007	up	9.8739	0.0007
BdMAPKKK54	3.7264	0.0038	up	5.6214	0.0016	up	0.0102	0.0001	down	0.8215	0.4401		0.4655	0.0394

BdMAPKKK55	1.9840	0.0093	30.6414	0.0000	up	0.3934	0.0093	down	0.1068	0.0000	down	0.5423	0.1409		
BdMAPKKK56	0.9802	0.9440	3.6310	0.0434		0.4991	0.0689		0.5431	0.0829		1.1911	0.0635		
BdMAPKKK57	1.0600	0.6783	5.2932	0.0002	up	0.7272	0.0604		4.7358	0.0002	up	0.9242	0.7960		
BdMAPKKK58	2.9329	0.0297	74.5161	0.0004	up	7.7473	0.0018	up	8.8030	0.0010	up	95.7290	0.0003	up	
BdMAPKKK59	1.9360	0.0031	3.8266	0.0002	up	3.6128	0.0001	up	0.0012	0.0000	down	0.4688	0.0034	down	
BdMAPKKK60	5.2005	0.0403	7.3681	0.0583		4.3675	0.0589		29.2919	0.0037	up	0.8302	0.3417		
BdMAPKKK61	0.1678	0.0006	down	3.1397	0.0009	up	0.1296	0.0000	down	4.1031	0.0006	up	0.7536	0.2396	
BdMAPKKK62	3.6019	0.0109	6.3067	0.0020	up	1.6072	0.1312		2.7019	0.0299		1.5347	0.0000		
BdMAPKKK63	0.6020	0.0001	1.5316	0.1083		1.0794	0.6196		1.1994	0.4301		4.8071	0.0007	up	
BdMAPKKK64	4.0324	0.0004	up	0.8608	0.3027		1.4089	0.0219		1.7598	0.0503		0.8452	0.0735	
BdMAPKKK65	0.8589	0.4964	1.5073	0.1077		0.1726	0.0009	down	0.2437	0.0026	down	2.6589	0.0000	up	
BdMAPKKK66	0.8195	0.6337	3.4291	0.0000	up	0.6191	0.2546		2.5745	0.0038	up	0.9479	0.0234		
BdMAPKKK67	2.0593	0.0090	up	1.0418	0.8165		1.4489	0.0253		4.8362	0.0013	up	9.6044	0.0000	up
BdMAPKKK68	0.1166	0.0017	down	0.8557	0.5484		0.0750	0.0012	down	0.0430	0.0000	down	2.1324	0.0407	
BdMAPKKK69	2.2173	0.0854	12.6345	0.0017	up	5.5487	0.0065	up	18.4537	0.0023	up	16.6947	0.0000	up	
BdMAPKKK70	5.9311	0.0015	up	3.1442	0.0057	up	0.8247	0.3839		0.6632	0.1940		3.7408	0.0000	up
BdMAPKKK71	1.0393	0.7611	5.3930	0.0001	up	0.7808	0.1095		5.1465	0.0003	up	0.9416	0.5932		
BdMAPKKK72	1.2869	0.1956	22.4148	0.0007	up	1.3383	0.1132		4.8590	0.0000	up	1.6950	0.0127		
BdMAPKKK73	0.4089	0.0416	3.7308	0.0252		0.1731	0.0027	down	0.8588	0.6071		1.3749	0.0195		
BdMAPKKK74	4.9966	0.0029	up	1.2279	0.5611		1.5951	0.1470		3.6479	0.0061	up	0.9124	0.4248	
BdMAPKKK75	6.2199	0.0080	up	1.6066	0.2840		1.1871	0.6431		2.6280	0.0760		1.3824	0.0025	

Additional file 8D Expression data of the *BdMAPK* family genes after heavy metal treatment.

	CdCl ₂ 6h			CdCl ₂ 12h			PbSO ₄ 6h			PbSO ₄ 12h			ZnCl ₂ 6h			ZnCl ₂ 12h		
	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down
BdMPK3	3.6243	0.0000	up	4.6020	0.0000	up	1.3618	0.0001		0.4638	0.0000	down	0.6195	0.0000		0.7725	0.0016	
BdMPK4	1.7802	0.0001		0.8836	0.6185		2.9350	0.0000	up	0.5947	0.0860		2.0640	0.0000	up	0.9776	0.9312	
BdMPK6	2.1157	0.0002	up	1.6969	0.0026		0.9421	0.3676		0.6906	0.0048		0.6028	0.0006		0.8553	0.0752	
BdMPK7-1	2.4875	0.0001	up	0.8931	0.0674		1.4694	0.0003		0.2568	0.0000	down	0.6418	0.0002		0.5630	0.0010	
BdMPK7-2	2.0798	0.0001	up	2.4847	0.0001	up	0.9596	0.2588		1.0518	0.2278		0.6081	0.0000		1.3237	0.0019	
BdMPK11	1.7464	0.0003		0.9719	0.4202		1.9588	0.0032		0.4987	0.0000	down	1.2938	0.0038		0.8559	0.0729	
BdMPK14	1.8525	0.0000		1.9502	0.0001		0.8257	0.0000		0.8261	0.0005		0.4516	0.0000	down	0.9812	0.5042	
BdMPK16	1.8589	0.0005		0.6045	0.0026		2.1304	0.0002	up	0.4379	0.0004	down	1.5499	0.0010		0.8272	0.0737	
BdMPK17	1.3039	0.0022		1.0455	0.2209		0.9286	0.0542		0.6668	0.0003		0.8429	0.0065		0.6796	0.0017	
BdMPK20-1	1.9647	0.0003		0.5021	0.0012		2.3604	0.0002	up	0.3780	0.0003	down	1.5845	0.0015		0.7247	0.0090	
BdMPK20-2	2.7701	0.0012	up	0.7351	0.0002		3.4798	0.0006	up	0.5229	0.0000		1.8671	0.0069		1.2384	0.0011	
BdMPK20-3	2.3559	0.0001	up	0.9309	0.4672		0.8704	0.0142		0.4296	0.0000	down	0.5835	0.0001		0.6530	0.0001	
BdMPK20-4	2.0411	0.0020	up	0.6228	0.0000		2.5186	0.0008	up	0.4365	0.0000	down	1.7939	0.0042		0.6679	0.0004	
BdMPK20-5	2.6135	0.0004	up	0.9301	0.3386		2.2662	0.0001	up	0.3139	0.0000	down	1.4307	0.0039		0.6734	0.0008	
BdMPK21-1	1.1212	0.0145		1.1494	0.0431		0.8247	0.0049		0.9329	0.2218		0.6266	0.0008		1.1460	0.0610	

Additional file 8E Expression data of the *BdMAPKK* family genes after heavy metal treatment.

	CdCl ₂ 6h			CdCl ₂ 12h			PbSO ₄ 6h			PbSO ₄ 12h			ZnCl ₂ 6h			ZnCl ₂ 12h		
	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down
BdMKK1	1.7771	0.0000		0.7502	0.1039		2.1849	0.0001	up	0.3525	0.0016	down	1.2345	0.0023		0.6216	0.0284	
BdMKK3-1	1.5512	0.0001		1.5512	0.0000		0.5568	0.0000		0.9372	0.0153		0.2983	0.0022	down	0.8800	0.0134	
BdMKK3-2	1.5433	0.0003		1.4241	0.0340		0.6713	0.0013		0.9843	0.0361		0.4582	0.0001	down	1.0628	0.0231	
BdMKK3-3	3.0541	0.0002	up	2.7296	0.0000	up	0.5501	0.0001		0.6019	0.0000		0.4004	0.0000	down	0.8294	0.0032	
BdMKK4	5.3306	0.0023	up	1.6177	0.0955		0.3239	0.0004	down	0.0916	0.0000	down	0.1380	0.0008	down	0.7167	0.2803	
BdMKK5	2.3659	0.1567		4.1116	0.0001	up	2.0957	0.4313		0.2746	0.0001	down	0.1842	0.0012	down	1.3997	0.0157	
BdMKK6	2.0155	0.0000	up	1.0116	0.4633		1.4506	0.0146		0.5566	0.0000		0.5749	0.0011		0.8785	0.0367	
BdMKK10-1	0.0394	0.4934		0.2063	0.0036	down	0.0042	0.2861		0.4505	0.0903		0.2275	0.7477		0.1499	0.1049	
BdMKK10-2	1.9628	0.0000		6.8192	0.0000	up	0.6851	0.0006		1.3103	0.0001		0.3738	0.0000	down	0.9615	0.3620	
BdMKK10-3	3.0922	0.0299		0.0881	0.2046		0.0552	0.1059		0.1175	0.0013	down	0.2790	0.0265		0.1006	0.0051	down
BdMKK10-5	1.4477	0.0003		28.9525	0.0000	up	0.8292	0.0036		0.5139	0.0230		0.4956	0.0000	down	1.6276	0.0010	

Additional file 8F Expression data of the *BdMAPKKK* family genes after heavy metal treatment.

	Cdcl ₂ 6h			Cdcl ₂ 12h			PbSO ₄ 6h			PbSO ₄ 12h			Zncl ₂ 6h			Zncl ₂ 12h		
	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down
BdMAPKKK1	1.2431	0.0009		2.4113	0.0000	up	0.7340	0.0003		0.9920	0.8997		0.5372	0.0000		0.9856	0.6969	
BdMAPKKK2	0.5551	0.0001		0.5869	0.0080		1.5316	0.0005		0.4769	0.0002	down	0.9351	0.0980		0.4586	0.0001	down
BdMAPKKK3	1.4826	0.0413		1.1853	0.0253		1.4670	0.0332		0.3186	0.0000	down	0.7849	0.1032		0.3992	0.0000	down
BdMAPKKK4	1.5957	0.0000		1.6998	0.0021		1.0269	0.1499		0.2239	0.0000	down	0.3358	0.0000	down	0.3094	0.0000	down
BdMAPKKK5	0.6786	0.0008		0.8640	0.0015		1.3864	0.0004		0.6466	0.0001		0.8380	0.0037		0.7177	0.0002	
BdMAPKKK6	1.2113	0.0660		1.1313	0.2111		2.4393	0.0003	up	0.6023	0.0000		1.3101	0.0241		0.5007	0.0000	
BdMAPKKK7	0.7970	0.0019		1.3270	0.0001		1.8546	0.0000		0.7912	0.0001		1.0204	0.4580		0.9820	0.4328	
BdMAPKKK8	1.0372	0.3508		0.8993	0.0731		1.1396	0.0440		0.6942	0.0010		0.7519	0.0014		0.6699	0.0008	
BdMAPKKK9	0.6123	0.0026		0.4200	0.0001	down	2.7405	0.0001	up	0.7063	0.0004		1.6298	0.0019		0.5428	0.0001	
BdMAPKKK10	1.5687	0.0385		1.5409	0.0067		1.3047	0.1443		0.9154	0.3629		0.9223	0.6092		0.9030	0.2831	
BdMAPKKK11	1.0316	0.7230		1.0723	0.8081		1.0387	0.4309		0.8307	0.2352		0.7785	0.0021		0.7016	0.0551	
BdMAPKKK12	0.7622	0.0008		0.7854	0.0000		1.2139	0.0002		0.5949	0.0000		0.8123	0.0001		0.5543	0.0000	
BdMAPKKK13	0.9044	0.4314		0.9425	0.2076		0.9953	0.8221		0.8123	0.0073		0.8418	0.0863		0.7496	0.0019	
BdMAPKKK14	0.7593	0.0002		1.9528	0.0000		0.6168	0.0000		0.9359	0.1743		0.5289	0.0000		0.9045	0.0005	
BdMAPKKK15	0.3999	0.0000	down	0.6646	0.0015		1.2791	0.0008		0.8381	0.0109		1.0563	0.0675		0.6870	0.0006	
BdMAPKKK16	1.2060	0.1662		1.5777	0.0000		1.0691	0.0049		0.6373	0.0000		0.6356	0.0001		0.6395	0.0001	
BdMAPKKK17	0.5583	0.0004		0.4836	0.0012	down	1.8954	0.0002		0.6995	0.0042		1.4235	0.0024		0.5733	0.0008	
BdMAPKKK18	2.0101	0.0074	up	0.7119	0.0980		1.0671	0.6642		0.2126	0.0001	down	0.3333	0.0022	down	0.3019	0.0000	down
BdMAPKKK19	1.8074	0.0002		1.4803	0.0135		1.2353	0.0009		0.7141	0.0001		0.8226	0.0006		0.6719	0.0001	
BdMAPKKK20	1.4498	0.0012		2.0934	0.0000	up	0.9629	0.3483		0.8327	0.0011		0.7048	0.0003		0.8525	0.0292	
BdMAPKKK21	0.5758	0.0005		1.1860	0.0127		1.0947	0.1856		0.9168	0.0581		1.0765	0.1900		0.7595	0.0014	
BdMAPKKK22	1.5395	0.0000		2.2935	0.0000	up	0.9354	0.0993		1.0481	0.0482		0.5983	0.0001		0.9577	0.1663	
BdMAPKKK23	1.0344	0.5764		0.3937	0.0014	down	1.3292	0.0082		0.5274	0.0000		0.5369	0.0012		0.6852	0.0000	
BdMAPKKK24	0.8664	0.0469		0.5330	0.0185		0.9728	0.6372		0.7527	0.1559		0.6898	0.0097		0.6991	0.4082	
BdMAPKKK25	2.1476	0.0000	up	0.7424	0.0001		1.2786	0.0005		0.6874	0.0000		0.4492	0.0000	down	0.7937	0.0013	

BdMAPKKK26	1.2522	0.0034	0.7072	0.3367		1.3557	0.0121	0.2493	0.0001	down	0.3371	0.0000	down	0.1510	0.0011	down
BdMAPKKK27	1.7224	0.0055	2.5835	0.0001	up	0.9752	0.6184	0.3430	0.0000	down	0.3200	0.0000	down	0.4637	0.0001	down
BdMAPKKK28	1.2884	0.0025	1.0733	0.5106		1.2115	0.0004	1.0121	0.8921		0.7787	0.0128		1.4799	0.0005	
BdMAPKKK29	1.3224	0.0050	1.6630	0.0039		1.1610	0.0336	1.0159	0.8557		0.8203	0.0018		1.0040	0.9633	
BdMAPKKK30	2.2543	0.0024	up	5.3243	0.0179	0.2935	0.0003	down	0.4981	0.1667	0.2085	0.0025	down	0.9678	0.9308	
BdMAPKKK31	0.9671	0.6392	1.1939	0.0001		0.7750	0.1031	0.6999	0.0037		0.7526	0.0884		0.8706	0.1830	
BdMAPKKK32	2.9256	0.0121	3.2823	0.0000	up	1.3585	0.2824	0.8328	0.0214		0.7028	0.2360		0.8561	0.0364	
BdMAPKKK33	0.9990	0.9921	0.7010	0.0014		1.3652	0.0069	0.6134	0.0003		1.1474	0.0892		0.6635	0.0001	
BdMAPKKK34	1.7751	0.0000	4.5569	0.0000	up	0.7854	0.0002	0.8874	0.0620		0.4305	0.0000	down	0.9407	0.2604	
BdMAPKKK35	2.4369	0.0002	up	3.4252	0.0000	up	1.3286	0.0124	0.7442	0.0000	0.7642	0.0141		0.5430	0.0000	
BdMAPKKK36	1.3015	0.0198	0.8197	0.0282		1.6239	0.0014	0.3506	0.0000	down	0.9630	0.5769		0.1698	0.0018	down
BdMAPKKK37	1.3660	0.0004	1.8116	0.0003		1.2638	0.0121	1.0264	0.4143		0.8541	0.0431		0.8142	0.0029	
BdMAPKKK38	1.4730	0.0000	1.5646	0.0001		1.8619	0.0000	0.7215	0.0001		0.9518	0.4930		0.6658	0.0001	
BdMAPKKK39	2.0044	0.0000	up	2.3012	0.0003	up	0.8259	0.0101	1.0195	0.8254	0.6909	0.0007		1.2215	0.0546	
BdMAPKKK40	1.6241	0.0000	2.8649	0.0001	up	1.2019	0.0007	1.2111	0.0053		0.5927	0.0000		1.3073	0.0016	
BdMAPKKK41	1.7448	0.0006	2.6798	0.0000	up	0.9942	0.9189	1.0573	0.0497		0.5081	0.0002		1.0348	0.2697	
BdMAPKKK42	2.5215	0.0261	3.9275	0.0000	up	2.6089	0.0342	0.7894	0.5220		0.3328	0.0180		1.3265	0.0687	
BdMAPKKK43	1.9688	0.0000	1.7876	0.0008		2.3669	0.0000	up	0.6121	0.0004	0.8700	0.0024		0.5051	0.0001	
BdMAPKKK44	1.0241	0.4995	1.7268	0.0039		0.9546	0.7730	0.9493	0.5942		0.5544	0.0005		0.7687	0.0466	
BdMAPKKK45	3.0728	0.0001	up	1.8925	0.0346	1.0447	0.6070	0.6493	0.0004		0.6499	0.0048		0.6259	0.0000	
BdMAPKKK46	1.6036	0.0816	1.3365	0.0251		3.1941	0.0032	up	1.1902	0.0956	2.7062	0.0055	up	0.9599	0.6963	
BdMAPKKK47	1.5001	0.0002	2.6230	0.0001	up	1.1690	0.0056	1.9108	0.0003		0.4798	0.0001	down	1.8125	0.0006	
BdMAPKKK48	1.4040	0.0505	0.8355	0.0595		1.4286	0.0201	0.5480	0.0077		0.6171	0.0081		0.4843	0.0001	down
BdMAPKKK49	1.8436	0.0002	4.5185	0.0000	up	1.0806	0.2791	1.4479	0.0095		0.5934	0.0004		1.1175	0.0886	
BdMAPKKK50	1.4190	0.1216	0.7308	0.1503		0.5174	0.0087	0.1044	0.0002	down	0.8319	0.4164		0.1731	0.0006	down
BdMAPKKK51	52.5030	0.0000	up	290.7587	0.0000	up	0.9318	0.0002	0.5352	0.0003	0.4357	0.0000	down	0.4387	0.0001	down
BdMAPKKK52	15.9118	0.0000	up	8.8028	0.0003	up	0.6022	0.1171	0.2344	0.0001	down	1.6741	0.0579	0.3486	0.0055	down
BdMAPKKK53	41.9267	0.0000	up	909.7584	0.0000	up	0.8914	0.5360	3.8594	0.0001	up	0.6197	0.1004	15.6724	0.0011	up
BdMAPKKK54	0.8079	0.3635	2.3529	0.0082	up	45.1552	0.0001	up	0.1338	0.0001	down	0.1086	0.0007	down	0.6022	0.0678

BdMAPKKK55	0.2109	0.0008	down	2.8384	0.0505		0.3788	0.0079	down	0.2825	0.0237	0.1693	0.0004	down	0.5519	0.2054		
BdMAPKKK56	0.7210	0.0162		0.3014	0.0004	down	1.4428	0.0056		0.6757	0.0045	1.1786	0.2113		0.9562	0.6327		
BdMAPKKK57	8.4316	0.0105		1.7063	0.0415		1.7637	0.1236		0.1351	0.0011	down	0.1564	0.0176	0.2426	0.0010	down	
BdMAPKKK58	80.5300	0.0000	up	30.4128	0.0000	up	1.3384	0.2049		0.3715	0.0000	down	1.9140	0.0140	0.3268	0.0045	down	
BdMAPKKK59	2.6465	0.0001	up	216.6854	0.0000	up	0.2402	0.0003	down	3.0613	0.0462	0.0056	0.0000	down	81.6736	0.0000	up	
BdMAPKKK60	0.1904	0.0002	down	0.3808	0.0003	down	0.0405	0.0000	down	0.3358	0.0057	down	0.4084	0.0018	down	0.3787	0.0290	
BdMAPKKK61	1.4190	0.2611		0.7483	0.0999		0.8663	0.4899		0.2096	0.0003	down	0.2864	0.0030	down	0.4659	0.0049	down
BdMAPKKK62	0.9220	0.1206		2.6382	0.0000	up	0.6908	0.0001		1.6044	0.0001		0.5929	0.0081		1.5819	0.0533	
BdMAPKKK63	2.0576	0.0002	up	1.2090	0.2992		1.3323	0.0404		1.0163	0.8701	0.8348	0.0000		0.5962	0.0053		
BdMAPKKK64	1.5549	0.0002		1.6367	0.0001		0.9712	0.3466		0.9346	0.0730	0.6534	0.0001		0.8832	0.0087		
BdMAPKKK65	0.8578	0.0470		0.4234	0.0009	down	2.0634	0.0000	up	0.6313	0.0007		1.2950	0.0002		0.5737	0.0004	
BdMAPKKK66	1.7215	0.0000		0.5850	0.0044		0.7225	0.0000		0.1097	0.0000	down	0.3977	0.0000	down	0.1405	0.0000	down
BdMAPKKK67	3.0110	0.0000	up	2.9927	0.0006	up	1.4060	0.0000		0.7475	0.0193	0.5707	0.0000		0.3765	0.0002	down	
BdMAPKKK68	0.0430	0.0002	down	0.1258	0.0007	down	0.8152	0.1475		0.2383	0.0068	down	0.6003	0.0163		0.2405	0.0058	down
BdMAPKKK69	15.7226	0.0000	up	49.7689	0.0000	up	1.4300	0.0372		0.5575	0.0045	0.4690	0.0013	down	0.6277	0.0282		
BdMAPKKK70	1.0122	0.8948		1.0501	0.7323		1.5453	0.0002		1.2908	0.0000	1.1901	0.0635		1.0267	0.2126		
BdMAPKKK71	4.9421	0.0001	up	9.3525	0.0000	up	0.9654	0.7607		0.3054	0.0002	down	0.2166	0.0001	down	0.4475	0.0014	down
BdMAPKKK72	5.9766	0.0049	up	6.7654	0.0008	up	0.9397	0.6250		0.3602	0.0253	0.3981	0.0021	down	0.5127	0.0699		
BdMAPKKK73	0.7570	0.0789		1.5779	0.0227		0.4547	0.0033	down	0.3425	0.0045	down	0.1988	0.0018	down	0.6750	0.0395	
BdMAPKKK74	1.9164	0.0001		2.4282	0.0004	up	0.7094	0.0007		0.9179	0.0234	0.6201	0.0007		1.0485	0.1149		
BdMAPKKK75	2.0363	0.0002	up	2.9244	0.0000	up	0.4759	0.0000	down	2.6893	0.0001	up	0.8740	0.1856	1.9209	0.0001		

Additional file 8G Expression data of the *BdMAPK* family genes after phytohormone treatment.

	ABA 3h			ABA 6h			JA 3h			JA 6h			SA 3h			SA 6h		
	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down
BdMPK3	0.8304	0.0502		0.5477	0.0000		0.2014	0.2541		0.6355	0.0012		3.4890	0.0000	up	4.2512	0.0000	up
BdMPK4	0.3248	0.0002	down	1.3210	0.0019		0.1749	0.0000	down	0.3837	0.0010	down	0.3838	0.0006	down	1.7738	0.0002	
BdMPK6	0.9488	0.2667		0.5313	0.0204		0.8561	0.0186		0.5075	0.0001		0.7485	0.0006		1.0917	0.1128	
BdMPK7-1	1.5517	0.0267		1.2895	0.0429		2.1245	0.0057	up	0.5264	0.0114		0.2865	0.0015	down	0.2027	0.0042	down
BdMPK7-2	1.5076	0.5193		0.9864	0.9720		1.9634	0.2784		0.4789	0.1131		0.5883	0.3786		0.9841	0.9799	
BdMPK11	0.8250	0.2540		0.3835	0.0128		0.4246	0.0078	down	0.3523	0.0027	down	0.6983	0.0447		0.4376	0.0143	
BdMPK14	0.7145	0.0117		0.6775	0.0026		0.6602	0.0278		0.4531	0.0033	down	0.4961	0.0001	down	0.3935	0.0000	down
BdMPK16	1.5649	0.0001		0.9208	0.1027		1.1628	0.0632		0.7504	0.0002		1.3117	0.0015		0.5124	0.0008	
BdMPK17	2.0983	0.0000	up	1.4842	0.0004		0.7372	0.0002		0.4479	0.0000	down	2.0438	0.0000	up	2.6387	0.0000	up
BdMPK20-1	1.1031	0.0010		0.7684	0.0108		1.4820	0.0000		0.3554	0.0215		1.5773	0.0000		0.8679	0.0198	
BdMPK20-2	1.7402	0.0000		0.7487	0.0061		1.4645	0.0001		0.3813	0.0012	down	1.6492	0.0002		0.1692	0.0000	down
BdMPK20-3	0.8733	0.1567		1.0025	0.0208		1.3437	0.0170		0.4564	0.0068	down	1.2941	0.0298		0.4684	0.0013	down
BdMPK20-4	0.5421	0.0001		0.2763	0.0000	down	0.4757	0.0000	down	0.2799	0.0000	down	1.3620	0.0009		0.1394	0.0000	down
BdMPK20-5	0.9857	0.3732		0.4788	0.0000	down	2.1693	0.0000	up	1.1240	0.0007		0.1930	0.0000	down	0.0361	0.0000	down
BdMPK21-1	1.0989	0.5347		2.2029	0.0086	up	1.9789	0.0010		0.7718	0.1769		1.9662	0.0010		1.8224	0.0233	

Additional file 8H Expression data of the *BdMAPKK* family genes after phytohormone treatment.

	ABA 3h			ABA 6h			JA 3h			JA 6h			SA 3h			SA 6h		
	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down
BdMKK1	0.7009	0.0010		0.3915	0.0000	down	0.7274	0.0016		0.3790	0.0000	down	0.8817	0.0380		0.6775	0.0001	
BdMKK3-1	1.5681	0.0036		1.0791	0.0443		1.7395	0.0003		0.5553	0.0001		1.8228	0.0017		1.8161	0.0001	
BdMKK3-2	2.5613	0.0003	up	0.5837	0.0029		2.2748	0.0002	up	0.2796	0.0002	down	3.2640	0.0001	up	1.1293	0.2162	
BdMKK3-3	7.7182	0.0001	up	1.8373	0.0008		2.1846	0.0023	up	0.1927	0.0001	down	9.7501	0.0000	up	3.3051	0.0000	up
BdMKK4	1.3858	0.2769		0.1286	0.0350		2.2490	0.3028		0.5185	0.5130		0.6938	0.1419		1.1496	0.8926	
BdMKK5	1.0300	0.7325		0.5360	0.0028		0.9095	0.3756		0.3874	0.0003	down	0.4968	0.0084	down	3.2689	0.0000	up
BdMKK6	1.1126	0.0699		0.9130	0.1385		0.9166	0.0377		0.2961	0.0009	down	1.3569	0.0003		0.3245	0.0000	down
BdMKK10-1	1.4719	0.6253		1.6477	0.4357		0.6712	0.7072		0.7120	0.6230		0.0901	0.2631		0.6234	0.4071	
BdMKK10-2	0.8002	0.0000		1.1647	0.0180		4.9562	0.0000	up	2.0235	0.0026	up	5.7786	0.0000	up	5.2924	0.0000	up
BdMKK10-3	1.8313	0.0629		1.9432	0.5237		0.0076	0.0000	down	0.1796	0.2067		0.3155	0.6545		9.9166	0.0742	
BdMKK10-5	0.4626	0.0006	down	0.5980	0.0006		1.1715	0.0001		0.6599	0.0275		1.6193	0.0865		3.0096	0.0001	up

Additional file 8I Expression data of the *BdMAPKKK* family genes after phytohormone treatment.

	ABA 3h			ABA 6h			JA 3h			JA 6h			SA 3h			SA 6h		
	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down
BdMAPKKK1	0.3333	0.0454		0.7072	0.3858		0.4083	0.0039	down	0.8485	0.5362		0.7483	0.0691		0.9185	0.8129	
BdMAPKKK2	0.9366	0.4808		1.0635	0.8908		0.3124	0.0000	down	0.8053	0.2564		0.4294	0.0000	down	0.6926	0.1023	
BdMAPKKK3	2.6183	0.0321		2.4571	0.0497		0.3994	0.0001	down	1.0457	0.8897		0.9661	0.7310		1.5011	0.2456	
BdMAPKKK4	15.9114	0.0000	up	4.7318	0.0000	up	1.0336	0.1638		0.6434	0.1491		0.7269	0.0001		1.2321	0.0690	
BdMAPKKK5	0.6731	0.3461		0.8695	0.7855		0.5676	0.1765		0.6652	0.4318		1.3198	0.3788		1.5717	0.2383	
BdMAPKKK6	1.6193	0.0007		1.3382	0.0996		0.5660	0.0067		0.5711	0.1063		0.6192	0.0152		0.4290	0.0434	
BdMAPKKK7	0.9395	0.7320		1.1396	0.5718		0.5952	0.0189		0.8582	0.6423		0.5979	0.0207		0.8758	0.5993	
BdMAPKKK8	0.4459	0.1738		1.0626	0.8868		0.3754	0.0472		0.3551	0.0602		0.3485	0.0459		0.4829	0.1304	
BdMAPKKK9	0.8523	0.0612		0.8188	0.0688		0.2845	0.0005	down	0.4866	0.0020	down	0.5229	0.0138		0.4468	0.0136	
BdMAPKKK10	0.7328	0.2579		0.8413	0.1575		0.3968	0.0145		0.4083	0.0189		0.5843	0.0673		0.4992	0.0277	
BdMAPKKK11	0.5557	0.0311		0.8124	0.0206		0.2674	0.0003	down	0.2867	0.0036	down	0.2224	0.0011	down	0.2039	0.0037	down
BdMAPKKK12	1.0826	0.5588		1.4106	0.0000		0.6209	0.0145		0.8534	0.0000		1.0390	0.7535		0.8557	0.1965	
BdMAPKKK13	0.8739	0.7103		0.8438	0.1630		0.5294	0.1259		0.7444	0.0197		0.7473	0.4201		0.6911	0.0142	
BdMAPKKK14	0.9979	0.9946		1.2914	0.0064		0.8054	0.4912		0.7699	0.0072		0.5430	0.0803		0.6818	0.2084	
BdMAPKKK15	0.7773	0.1678		1.1608	0.0677		0.3341	0.0010	down	0.8763	0.1646		1.0852	0.5600		0.9053	0.3782	
BdMAPKKK16	0.7492	0.1866		0.8946	0.2772		0.3995	0.0027	down	0.5056	0.0024		0.7321	0.0761		0.8724	0.2153	
BdMAPKKK17	1.3086	0.4306		1.1690	0.4558		0.5825	0.1317		0.8477	0.3677		0.9831	0.9553		0.3175	0.0518	
BdMAPKKK18	3.1890	0.0045	up	1.4946	0.0083		0.6172	0.0748		0.5368	0.0300		0.4111	0.0588		0.7432	0.2332	
BdMAPKKK19	1.3113	0.0839		2.1858	0.0021	up	0.4481	0.0004	down	0.6285	0.0120		1.3975	0.0157		1.8271	0.0115	
BdMAPKKK20	0.8258	0.3798		0.9002	0.1654		0.5232	0.0250		0.5556	0.0000		0.4508	0.0128		0.8322	0.0879	
BdMAPKKK21	0.9801	0.9267		3.1706	0.0005	up	2.5928	0.0160		5.5680	0.0001	up	4.0392	0.0023	up	7.4201	0.0001	up
BdMAPKKK22	0.7061	0.5025		1.3055	0.5603		0.8110	0.5383		0.6632	0.4162		0.6363	0.3659		1.0950	0.8257	
BdMAPKKK23	1.6943	0.0122		1.5107	0.0104		0.2991	0.0016	down	0.3389	0.0003	down	0.1161	0.0000	down	0.1067	0.0001	down
BdMAPKKK24	0.5788	0.0396		0.0889	0.0003	down	0.3693	0.0056	down	0.1561	0.0006	down	0.1742	0.0008	down	0.0767	0.0001	down
BdMAPKKK25	0.6433	0.0029		0.6330	0.0108		0.2792	0.0004	down	0.2667	0.0001	down	0.1183	0.0000	down	0.1584	0.0027	down

BdMAPKKK26	1.6724	0.0015		0.8740	0.0278		0.3092	0.0021	down	0.1079	0.0016	down	2.4286	0.0002	up	0.7090	0.1127	
BdMAPKKK27	5.6625	0.0004	up	1.4965	0.0005		4.3023	0.0044	up	1.6838	0.0073		4.1754	0.0091	up	1.2491	0.4795	
BdMAPKKK28	0.7146	0.0064		1.4187	0.1526		0.5345	0.0018		0.7813	0.2620		0.3737	0.0000	down	0.8102	0.3305	
BdMAPKKK29	0.6444	0.3149		0.8808	0.1500		0.4720	0.1201		0.7634	0.0162		0.7477	0.4843		0.8266	0.0912	
BdMAPKKK30	2.3066	0.0286		0.2982	0.0199		1.4048	0.0000		0.1822	0.0000	down	0.5150	0.0635		3.1828	0.0006	up
BdMAPKKK31	0.4075	0.0505		0.7096	0.0390		0.3291	0.0313		0.4870	0.0043	down	0.5195	0.1134		1.0050	0.9761	
BdMAPKKK32	0.9608	0.9157		1.4714	0.0417		0.3724	0.0524		0.6001	0.0177		0.4188	0.0657		0.6148	0.0264	
BdMAPKKK33	0.5344	0.0454		0.4275	0.0033	down	0.4564	0.0186		0.6863	0.0491		0.4625	0.0185		0.2163	0.0028	down
BdMAPKKK34	0.5280	0.3208		0.6938	0.4050		0.9590	0.9299		0.4060	0.0612		1.0254	0.9639		1.4826	0.3107	
BdMAPKKK35	0.7636	0.1934		1.6583	0.0354		1.0150	0.9273		1.0238	0.8437		1.0694	0.7422		2.0408	0.0002	up
BdMAPKKK36	0.5225	0.0379		0.9817	0.9440		0.4593	0.0185		1.0455	0.8644		0.4662	0.0200		0.4572	0.0389	
BdMAPKKK37	0.7411	0.4310		1.4613	0.0241		0.5552	0.1534		0.9417	0.3725		1.1754	0.6488		2.3958	0.0002	up
BdMAPKKK38	1.0583	0.7879		1.0698	0.6871		0.5730	0.0326		0.6941	0.0841		0.6982	0.1342		0.8136	0.3892	
BdMAPKKK39	0.9194	0.7904		1.4223	0.0067		0.5922	0.1532		0.8743	0.2905		0.7473	0.4312		0.9082	0.6338	
BdMAPKKK40	0.7504	0.5077		1.6730	0.0009		1.0899	0.8421		1.3080	0.0164		1.4131	0.4141		3.3623	0.0005	up
BdMAPKKK41	0.6433	0.0343		1.3696	0.0578		0.7315	0.0356		1.0552	0.6887		0.7872	0.0137		1.7505	0.0143	
BdMAPKKK42	0.7526	0.5276		1.8139	0.1685		2.8013	0.0395		1.6918	0.2743		6.9559	0.0008	up	0.4438	0.1074	
BdMAPKKK43	1.4587	0.1263		1.9717	0.0008		1.0623	0.7651		0.7203	0.0326		0.6145	0.0624		0.6384	0.0587	
BdMAPKKK44	0.5128	0.1304		0.7827	0.2913		0.5828	0.1800		1.1529	0.4801		1.3331	0.3945		1.7779	0.0932	
BdMAPKKK45	0.9578	0.8707		0.8947	0.4493		0.7660	0.2603		0.6951	0.0400		0.4091	0.0117		0.5696	0.0135	
BdMAPKKK46	0.7059	0.3116		1.0030	0.9851		0.6627	0.2343		1.2697	0.1485		0.6732	0.2511		0.6973	0.2057	
BdMAPKKK47	0.3781	0.0175		0.7898	0.0042		0.1431	0.0017	down	0.1790	0.0000	down	0.5403	0.0689		1.2468	0.0553	
BdMAPKKK48	0.6755	0.0419		0.6550	0.0223		0.5310	0.0038		0.8108	0.1564		0.2106	0.0000	down	0.3543	0.0020	down
BdMAPKKK49	0.6020	0.1919		0.8247	0.3696		0.7014	0.3207		0.8781	0.5370		0.9584	0.8968		1.3685	0.2107	
BdMAPKKK50	4.6665	0.0010	up	1.2163	0.6115		1.2773	0.3196		0.1864	0.0264		0.8800	0.3201		0.1942	0.0178	
BdMAPKKK51	1.0284	0.9226		1.4894	0.0050		30.8565	0.0002	up	11.3941	0.0000	up	27.7630	0.0002	up	35.1312	0.0000	up
BdMAPKKK52	2.3627	0.0156		1.4664	0.3315		79.5148	0.0000	up	16.2239	0.0001	up	11.9021	0.0006	up	1.5931	0.1679	
BdMAPKKK53	9.5582	0.0003	up	3.4782	0.0004	up	8.1960	0.0000	up	7.6233	0.0001	up	15.2253	0.0000	up	12.2872	0.0000	up
BdMAPKKK54	485.1608	0.0000	up	1753.9443	0.0000	up	1.5292	0.2829		10.0388	0.0005	up	491.4942	0.0001	up	2.7340	0.0208	

BdMAPKKK55	0.7657	0.3301	0.6206	0.0372	6.3452	0.0013	up	25.0828	0.0003	up	0.7208	0.2793	16.1444	0.0000	up	
BdMAPKKK56	0.5554	0.1946	0.5617	0.1320	0.2909	0.0432		0.5322	0.0928		0.1861	0.0106	0.2252	0.0222		
BdMAPKKK57	1.3125	0.1210	1.1164	0.3848	0.7276	0.2901		0.1451	0.0000	down	0.1175	0.0038	down	0.8553	0.2687	
BdMAPKKK58	105.8135	0.0000	up	211.0281	0.0001	up		3.0807	0.0080	up	6.4661	0.0087	up	3.6675	0.0032	up
BdMAPKKK59	2.1559	0.0028	up	8.0272	0.0001	up		0.0030	0.0000	down	8.8270	0.0000	up	0.0028	0.0000	down
BdMAPKKK60	0.4240	0.2594		0.6303	0.7502			0.9996	0.9941		0.5386	0.3547		0.0485	0.0154	
BdMAPKKK61	0.4391	0.0312		0.1348	0.0012	down		0.5115	0.0662		0.6492	0.3388		0.0409	0.0005	down
BdMAPKKK62	1.4462	0.0656		2.1782	0.0365			0.5912	0.0335		0.5405	0.0794		1.7911	0.0115	
BdMAPKKK63	2.6435	0.0002	up	1.8348	0.0017			4.4816	0.0001	up	1.5855	0.0148		27.8611	0.0000	up
BdMAPKKK64	1.0510	0.8483		1.5584	0.0166			0.6566	0.2964		0.8056	0.0882		1.0766	0.7685	
BdMAPKKK65	1.5069	0.0043		1.5436	0.0792			0.6081	0.0001		0.7329	0.2201		0.8073	0.0042	
BdMAPKKK66	1.5780	0.3269		0.6570	0.2078			1.2669	0.3597		0.2896	0.0000	down	0.8292	0.4739	
BdMAPKKK67	0.9825	0.7026		0.5433	0.0262			7.8679	0.0007	up	7.9706	0.0000	up	1.3765	0.0016	
BdMAPKKK68	0.1467	0.0050	down	0.9126	0.7626			0.2924	0.0038	down	0.0722	0.0001	down	0.3610	0.0374	
BdMAPKKK69	6.5310	0.0026	up	27.4913	0.0003	up		2.2873	0.0576		3.6320	0.0103		1.2232	0.4422	
BdMAPKKK70	1.5543	0.2179		1.4600	0.1137			0.4882	0.0478		0.6309	0.0926		1.6356	0.1086	
BdMAPKKK71	0.8535	0.0127		0.5158	0.0049			0.6929	0.0043		0.3513	0.0011	down	0.6121	0.0002	
BdMAPKKK72	1.5776	0.0494		0.7324	0.0071			1.1830	0.3244		0.8037	0.0752		1.2911	0.3627	
BdMAPKKK73	3.1498	0.0084	up	2.1853	0.0471			1.0952	0.7225		0.9143	0.7507		1.1434	0.6023	
BdMAPKKK74	0.6691	0.0016		1.1118	0.7113			0.6851	0.5515		0.6132	0.1167		0.3335	0.0003	down
BdMAPKKK75	0.5367	0.0020		0.6938	0.4054			0.3931	0.0265		0.5602	0.1688		0.5684	0.0009	

Additional file 8J Expression data of the *BdMAPK* family genes after biotic stresses treatment.

	pH14 4h			pH14 12h			Guy11 4h			Guy11 12h			F0968 4h			F0968 12h		
	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down
BdMPK3	0.7979	0.0595		0.6917	0.0002		0.9005	0.0433		0.9745	0.4045		0.4990	0.0000	down	0.5982	0.0001	
BdMPK4	0.4587	0.0000	down	0.2845	0.0000	down	0.3316	0.0000	down	0.4940	0.0001	down	0.2345	0.0000	down	0.3985	0.0001	down
BdMPK6	0.6426	0.0010		0.4205	0.0000	down	0.5785	0.0001		0.8121	0.0093		0.3703	0.0000	down	0.4343	0.0001	down
BdMPK7-1	0.4386	0.0011	down	0.3413	0.0008	down	0.2765	0.0001	down	0.6092	0.0222		0.2797	0.0001	down	0.1862	0.0000	down
BdMPK7-2	1.0537	0.8439		0.4893	0.0052	down	1.0819	0.5785		0.9895	0.9399		0.3308	0.0010	down	0.3640	0.0081	down
BdMPK11	0.3910	0.0034	down	0.2130	0.0014	down	0.2413	0.0001	down	0.4901	0.1006		0.2343	0.0003	down	0.6168	0.0050	
BdMPK14	1.5592	0.1470		0.8099	0.3418		0.8486	0.3367		1.2002	0.6321		0.7059	0.0353		0.7307	0.0105	
BdMPK16	0.3713	0.0001	down	0.3290	0.0005	down	0.4860	0.0006	down	0.8165	0.0285		0.2041	0.0092	down	0.2420	0.0000	down
BdMPK17	1.6681	0.0125		0.8307	0.1936		0.8763	0.5334		1.2736	0.1208		0.6319	0.0446		0.7265	0.0550	
BdMPK20-1	1.0285	0.1209		0.4862	0.0249		0.8279	0.0006		1.6843	0.0000		0.6526	0.0004		0.9621	0.1188	
BdMPK20-2	0.2495	0.0004	down	0.3546	0.0005	down	0.3568	0.0006	down	0.5251	0.0043		0.2821	0.0002	down	0.3364	0.0005	down
BdMPK20-3	0.6164	0.0028		0.2747	0.0000	down	0.6067	0.0011		1.0175	0.8244		0.3800	0.0002	down	0.5323	0.0004	
BdMPK20-4	0.7066	0.0056		0.2454	0.0024	down	0.4066	0.0002	down	0.9795	0.8158		0.3016	0.0001	down	0.3662	0.0001	down
BdMPK20-5	0.2955	0.0001	down	0.4264	0.0004	down	0.4782	0.0010	down	0.7766	0.0663		0.3501	0.0002	down	0.3593	0.0004	down
BdMPK21-1	0.2129	0.0001	down	0.1453	0.0000	down	0.2672	0.0001	down	0.3117	0.0003	down	0.1852	0.0000	down	0.1800	0.0000	down

Additional file 8K Expression data of the *BdMAPKK* family genes after biotic stresses treatment.

	pH14 4h			pH14 12h			Guy11 4h			Guy11 12h			F0968 4h			F0968 12h		
	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down
BdMKK1	0.3320	0.0000	down	0.1891	0.0021	down	0.2760	0.0000	down	0.4376	0.0001	down	0.2435	0.0000	down	0.2549	0.0000	down
BdMKK3-1	0.8628	0.2745		0.5024	0.0045		0.7228	0.0512		0.9237	0.5354		0.5837	0.0103		0.8372	0.2001	
BdMKK3-2	0.8488	0.0476		0.5105	0.0032		0.5965	0.0028		1.1520	0.1680		0.4329	0.0003	down	0.7692	0.1373	
BdMKK3-3	0.2753	0.0000	down	0.1091	0.0000	down	0.1804	0.0000	down	0.3046	0.0000	down	0.1315	0.0000	down	0.1858	0.0000	down
BdMKK4	0.2185	0.0475		0.3573	0.0127		1.3496	0.5149		1.7446	0.0918		1.3321	0.7642		1.1048	0.8256	
BdMKK5	0.3076	0.0004	down	0.2909	0.0003	down	0.2850	0.0003	down	0.5644	0.0052		0.3221	0.0010	down	0.2322	0.0003	down
BdMKK6	1.0055	0.9726		0.4283	0.0049	down	0.7114	0.0889		0.9206	0.6571		0.6089	0.0326		0.7533	0.1407	
BdMKK10-1	0.1589	0.2668		1.0641	0.9364		1.9835	0.0951		0.0306	0.0018	down	3.9837	0.0206		0.0735	0.0041	down
BdMKK10-2	1.3642	0.0016		0.4706	0.0000	down	1.0849	0.0051		1.4490	0.0009		0.7104	0.0000		0.8312	0.0064	
BdMKK10-3	0.0436	0.0001	down	0.0570	0.0044	down	0.0037	0.0000	down	0.8376	0.4960		0.0398	0.0206		0.1726	0.0010	down
BdMKK10-5	12.9862	0.0000	up	3.5376	0.0002	up	5.4003	0.0001	up	11.4780	0.0000	up	2.8447	0.0054	up	5.2509	0.0001	up

Additional file 8L Expression data of the *BdMAPKKK* family genes after biotic stresses treatment.

	pH14 4h			pH14 12h			Guy11 4h			Guy11 12h			F0968 4h			F0968 12h		
	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down	fold-change	p-value	up/down
BdMAPKKK1	0.9199	0.7568		0.4189	0.0283		0.4070	0.0186		1.1249	0.0038		0.9624	0.4118		1.7119	0.0297	
BdMAPKKK2	0.7554	0.3757		0.3020	0.0040	down	0.3765	0.0028	down	0.8900	0.1435		0.4050	0.0045	down	0.9957	0.9179	
BdMAPKKK3	0.6996	0.2561		0.6921	0.2844		0.5051	0.0319		1.3163	0.2942		0.4806	0.0340		0.7632	0.3270	
BdMAPKKK4	1.0555	0.7842		0.9994	0.9976		0.6424	0.0600		1.6179	0.0382		0.6785	0.0682		1.4188	0.0887	
BdMAPKKK5	2.7292	0.0710		1.4731	0.4410		1.8456	0.2922		4.4481	0.0301		2.4691	0.1301		2.7155	0.0551	
BdMAPKKK6	1.6949	0.0755		1.0081	0.9705		0.8533	0.5074		2.3667	0.0169		0.8347	0.4604		2.3085	0.0162	
BdMAPKKK7	1.6573	0.2286		0.9343	0.8470		0.8959	0.7262		2.4107	0.0944		1.2786	0.5209		3.0715	0.0193	
BdMAPKKK8	0.6763	0.2873		0.5104	0.0750		0.5015	0.0680		0.7578	0.3763		0.6268	0.1682		1.2040	0.6303	
BdMAPKKK9	1.8590	0.0688		1.1802	0.5804		1.0685	0.7555		2.2315	0.0161		1.4721	0.1515		2.0361	0.0321	
BdMAPKKK10	1.0563	0.8481		0.7581	0.3744		0.6515	0.1965		1.1983	0.5363		0.7633	0.3655		1.2075	0.5162	
BdMAPKKK11	0.5880	0.0619		0.3453	0.0093	down	0.3622	0.0065	down	0.7580	0.2650		0.5238	0.0357		1.0881	0.7940	
BdMAPKKK12	0.6450	0.1345		0.4282	0.0239		0.3152	0.0078	down	0.8261	0.5871		0.6120	0.2118		0.6576	0.1585	
BdMAPKKK13	0.4194	0.0027	down	0.3322	0.0020	down	0.2703	0.0007	down	0.6195	0.0660		0.4276	0.0031	down	0.5915	0.0284	
BdMAPKKK14	0.6023	0.2028		0.3871	0.0472		0.1578	0.0109		0.3660	0.0366		0.3144	0.0447		0.3196	0.0360	
BdMAPKKK15	0.8324	0.3952		0.3831	0.0080	down	0.3190	0.0055	down	0.9343	0.7440		0.5779	0.0623		0.6229	0.1387	
BdMAPKKK16	0.8567	0.0722		0.4571	0.0002	down	0.3280	0.0001	down	0.8668	0.4488		0.6262	0.0626		0.8517	0.1830	
BdMAPKKK17	0.7589	0.2364		0.6000	0.0622		0.6357	0.0497		1.6752	0.0246		0.8013	0.2042		1.0047	0.9808	
BdMAPKKK18	1.4004	0.0140		0.8410	0.3340		0.5392	0.0020		1.4883	0.1860		0.7808	0.2770		1.2049	0.3757	
BdMAPKKK19	0.9696	0.3383		0.4357	0.0000	down	0.3809	0.0000	down	0.7220	0.0108		0.4950	0.0090	down	0.7976	0.0001	
BdMAPKKK20	0.8917	0.2983		0.5454	0.0478		0.5416	0.0328		0.9640	0.8350		0.7101	0.0334		0.7675	0.4723	
BdMAPKKK21	6.3110	0.0010	up	3.5020	0.0049	up	3.5386	0.0052	up	6.7001	0.0009	up	3.7510	0.0063	up	3.0596	0.0247	
BdMAPKKK22	0.8408	0.6232		0.5373	0.0828		0.4719	0.0581		0.8417	0.5375		0.9016	0.7053		0.4904	0.0030	down
BdMAPKKK23	0.1433	0.0000	down	0.2606	0.0002	down	0.2249	0.0000	down	0.3470	0.0004	down	0.2318	0.0005	down	0.1301	0.0000	down
BdMAPKKK24	0.1915	0.0001	down	0.3254	0.0028	down	0.1608	0.0000	down	0.3479	0.0221		0.9541	0.8785		0.3632	0.0027	down
BdMAPKKK25	0.1129	0.0066	down	0.2536	0.0109		0.1684	0.0066	down	0.2452	0.0248		0.3975	0.0639		0.1516	0.0005	down

BdMAPKKK26	0.2775	0.0004	down	0.0643	0.0000	down	0.1948	0.0008	down	1.0908	0.4819	0.1702	0.0001	down	0.4176	0.0304		
BdMAPKKK27	1.7584	0.1327		1.0513	0.8752		0.6295	0.2001		1.5834	0.1986	0.8122	0.6565		0.9673	0.9311		
BdMAPKKK28	0.3444	0.0195		0.3489	0.0243		0.2622	0.0115		0.2787	0.0086	down	0.3764	0.0380	0.2628	0.0169		
BdMAPKKK29	0.7312	0.0164		0.3360	0.0003	down	0.3055	0.0002	down	0.7594	0.1689	0.4756	0.0314		0.4741	0.0491		
BdMAPKKK30	0.1871	0.0163		0.2316	0.0014	down	0.0550	0.0002	down	0.1988	0.0010	down	0.1017	0.0002	down	0.1375	0.0069	down
BdMAPKKK31	0.2488	0.0002	down	0.1853	0.0001	down	0.1611	0.0000	down	0.2406	0.0002	down	0.1888	0.0013	down	0.1956	0.0000	down
BdMAPKKK32	0.5822	0.0402		0.3119	0.0033	down	0.2345	0.0013	down	0.6124	0.0590	0.3981	0.0071	down	0.4047	0.0230		
BdMAPKKK33	0.7227	0.1497		0.6004	0.1070		0.4347	0.0104		1.3081	0.3283	0.8287	0.4496		0.7339	0.3064		
BdMAPKKK34	0.4499	0.0348		0.3545	0.0152		0.2492	0.0041	down	0.6304	0.0954	0.4224	0.0106		0.3365	0.0011	down	
BdMAPKKK35	1.0858	0.8470		0.8355	0.6828		0.7830	0.5319		1.3837	0.4561	0.8002	0.6479		0.9675	0.9362		
BdMAPKKK36	1.7503	0.1477		1.2379	0.5042		0.7940	0.6127		2.5827	0.0235	1.6105	0.2354		0.8283	0.5197		
BdMAPKKK37	1.3712	0.2776		0.6505	0.1710		0.6604	0.1699		1.6682	0.1327	0.7890	0.3946		0.7095	0.2875		
BdMAPKKK38	0.8969	0.7639		0.5548	0.1746		0.5125	0.1112		1.1406	0.7267	0.7133	0.3977		0.8506	0.6639		
BdMAPKKK39	1.7429	0.1710		0.7642	0.4660		0.7652	0.4625		1.9593	0.1573	0.7793	0.5313		1.0909	0.8056		
BdMAPKKK40	0.9827	0.9564		0.5655	0.1276		0.4407	0.0526		1.1232	0.7229	0.9830	0.9571		0.7822	0.4558		
BdMAPKKK41	0.6056	0.0007		0.4745	0.0000	down	0.4066	0.0007	down	0.6641	0.0007	0.4971	0.0001	down	0.4047	0.0003	down	
BdMAPKKK42	2.0106	0.0052	up	0.1903	0.0001	down	0.3515	0.0003	down	0.0511	0.0005	down	1.3517	0.0292	1.1671	0.3964		
BdMAPKKK43	1.1464	0.6679		1.0385	0.9055		0.9268	0.8335		1.3491	0.3684	0.9200	0.7953		0.9632	0.9354		
BdMAPKKK44	2.0902	0.0047	up	0.8502	0.2699		1.0384	0.8516		2.2071	0.0117	1.5517	0.0025		1.4790	0.0255		
BdMAPKKK45	0.8037	0.4784		0.7277	0.3192		0.5486	0.1005		0.6304	0.1899	1.0009	0.9975		0.6927	0.2971		
BdMAPKKK46	0.7209	0.0686		0.3921	0.0042	down	0.4480	0.0029	down	0.9914	0.9476	0.6569	0.0291		0.5669	0.0250		
BdMAPKKK47	1.7628	0.1599		0.7247	0.3723		0.9051	0.7448		1.8695	0.0999	1.5768	0.1866		1.2873	0.4411		
BdMAPKKK48	0.4742	0.0070	down	0.5184	0.0070		0.3805	0.0041	down	0.8953	0.4551	0.6706	0.0471		0.4619	0.0350		
BdMAPKKK49	1.4751	0.1665		0.6873	0.1673		0.6342	0.1232		1.7989	0.0649	0.9847	0.9544		0.9396	0.8296		
BdMAPKKK50	0.2115	0.0081	down	0.2514	0.0207		0.1167	0.0031	down	0.2832	0.0285	0.4330	0.0588		0.4457	0.0733		
BdMAPKKK51	15.6062	0.0000	up	7.7397	0.0003	up	5.8440	0.0001	up	20.6489	0.0000	up	2.0921	0.0047	up	1.2613	0.1569	
BdMAPKKK52	5.5717	0.0014	up	1.5404	0.0084		0.0800	0.0000	down	0.8214	0.1441	1.1264	0.3964		0.1605	0.0049	down	
BdMAPKKK53	7.5337	0.0003	up	10.8535	0.0000	up	3.4463	0.0255		11.8390	0.0004	up	11.6055	0.0000	up	1.7144	0.0450	
BdMAPKKK54	0.3622	0.0062	down	0.1047	0.0012	down	0.1821	0.0007	down	0.4404	0.0213	0.2119	0.0016	down	2.6019	0.0028	up	

BdMAPKKK55	2.4710	0.0077	up	2.3554	0.0023	up	1.7998	0.0189		8.5951	0.0049	up	2.5588	0.0021	up	2.5857	0.0038	up
BdMAPKKK56	0.2944	0.0000	down	0.1762	0.0000	down	0.1309	0.0002	down	0.4181	0.0000	down	0.2500	0.0000	down	0.2136	0.0000	down
BdMAPKKK57	0.4722	0.0023	down	0.2307	0.0004	down	0.1694	0.0010	down	0.5287	0.0010		1.4192	0.0338		0.1073	0.0005	down
BdMAPKKK58	59.4767	0.0002	up	123.5010	0.0000	up	74.5925	0.0002	up	217.7818	0.0000	up	87.4904	0.0000	up	66.3592	0.0000	up
BdMAPKKK59	67.3139	0.0000	up	26.2491	0.0000	up	20.0294	0.0000	up	0.4901	0.0004	down	14.5715	0.0000	up	0.0702	0.0000	down
BdMAPKKK60	0.2995	0.0000	down	0.3934	0.0028	down	0.1481	0.0210		0.2221	0.0001	down	0.0005	0.0000	down	0.1005	0.0000	down
BdMAPKKK61	0.4305	0.1967		10.2148	0.0205		0.0022	0.0004	down	2.6898	0.1630		7.1934	0.0226		7.1411	0.0249	
BdMAPKKK62	0.4461	0.1582		0.2958	0.0381		0.2687	0.0530		0.6825	0.4430		0.3918	0.0532		0.2089	0.0106	
BdMAPKKK63	1.9791	0.0022		0.8397	0.4445		0.8379	0.0321		2.2033	0.0002	up	1.2912	0.1866		1.3410	0.1563	
BdMAPKKK64	0.7359	0.0014		0.5335	0.0000		0.4061	0.0000	down	0.6766	0.0004		0.6181	0.0000		0.5865	0.0000	
BdMAPKKK65	0.5684	0.1090		0.4687	0.0546		0.3717	0.0183		0.8481	0.5028		0.5295	0.0473		0.4270	0.0262	
BdMAPKKK66	0.2572	0.0353		0.4534	0.0978		0.1344	0.0017	down	0.7346	0.5211		0.6131	0.1596		0.6665	0.2900	
BdMAPKKK67	0.5632	0.1844		0.2795	0.0131		0.1973	0.0039	down	0.9418	0.8471		0.5408	0.0513		0.3922	0.0296	
BdMAPKKK68	6.9316	0.0126		3.4126	0.0390		2.8640	0.0721		2.1548	0.2078		2.6647	0.1074		5.4533	0.0184	
BdMAPKKK69	29.6064	0.0003	up	16.1694	0.0001	up	16.1917	0.0001	up	26.9639	0.0002	up	5.9153	0.0009	up	3.4385	0.0045	up
BdMAPKKK70	1.0804	0.7305		0.6472	0.1076		0.4608	0.0221		1.7515	0.0797		0.7348	0.2438		0.4829	0.0390	
BdMAPKKK71	0.2448	0.0000	down	0.3512	0.0010	down	0.1428	0.0000	down	0.4836	0.0001	down	0.4855	0.0033	down	0.2515	0.0000	down
BdMAPKKK72	0.1778	0.0075	down	0.1438	0.0009	down	0.0789	0.0006	down	0.5046	0.0553		0.3031	0.0053	down	0.1406	0.0027	down
BdMAPKKK73	3.8417	0.0004	up	1.7212	0.1846		0.7187	0.0082		6.0975	0.0003	up	0.5200	0.0034		3.0967	0.0195	
BdMAPKKK74	0.6965	0.4692		0.2820	0.0734		0.4555	0.1499		0.9185	0.8493		0.4985	0.1935		0.5094	0.1324	
BdMAPKKK75	1.2167	0.1590		0.5304	0.0190		0.6257	0.0571		1.5676	0.0187		0.9606	0.7361		0.8798	0.3251	