Appendix A Information of the wheat MPK cascade genes

Gene name	Accession No.	cDNA (bp)	Amino acids (aa)	Molecular weight (mW)	Isoelectric point (pI)	Conserved motif and position	Subcellular position
TaMPKKK;A	AK330734	1369	251	26,242.68	10.89	GTPAFMAPEV/162-171	Mitochondria
TaMPKKK;A3	AK334817	2,376	663	71,766.97	9.37	GSPYWMAPEV/411-420	Cytoplasm
TaMPKKK1	AK335039	2,219	591	64,530.37	5.97	GTVYWMAPEV/472-481	Cytoplasm
TaMPKKK4	AK335442	3,634	872	90,039.76	9.69	GSPYWMAPEV/564-573	Chloroplast
TaMPKKK7	AK335105	4,485	1,323	146,165.75	6.05	GTPYWMAPEV/178-187	Cytoplasm
TaMPKKK8	AK336073	2,430	523	56,790.16	6.58	GTVFWMAPEV/424-433	Cytoplasm
TaMPKK1	AK333543	1,838	355	40,032.04	5.62	SAVLASS/215-221	Mitochondria
TaMPKK6	AK330201	1,976	449	16,637.91	5.27	SAIFDTL/41-47	Mitochondria
TaMPK1	AK333212	1,897	393	44,268.54	5.63	TEY/220-222	Cytoplasm
TaMPK3	AK332648	1,509	369	42,326.38	6.97	TEY/191-193	Cytoplasm
TaMPK4	HQ650111	1,110	369	42,204.46	7.15	TEY/191-193	Cytoplasm
TaMPK6	AK330924	1,626	376	42.860.89	5.59	TEY/201-203	Cytoplasm
TaMPK7	tplb0009i20	2,194	548	61,998.93	9.15	TEY/187-189	Mitochondria
TaMPK9	AK331818	2,468	598	66,513.12	9.17	TEY/17-19	Cytoplasm
TaMPK12	AK333198	2,297	250	28,295.37	7.12	TEY/79-81	Cytoplasm
TaMPK12;1	AK334728	2,276	498	56,875.91	6.72	TDY/175-177	Cytoplasm
TaMPK14	DQ322666	2,274	549	62,318.90	8.77	TDY/175-177	Cytoplasm
TaMPK16	AK330685	2,020	490	55.950.06	6.97	TDY/183-185	Cytoplasm
TaMPK17	tplb0009k03	2,009	494	56.003.22	8.37	TDY/185-187	Mitochondria

Appendix B The wheat MPK cascade genes as well as primers, Tm, and PCR product sizes in semiquantitative RT-PCR and qPCR

Gene name	Primer pair	Tm	PCR product (bp)
TaMPKKK;A	Forward: 5′–CGGACGAGGAAAGCGAAACAGAGG Reverse: 5′–GCATCAGCGAAACGGACACCAA	58℃	375
TaMPKKK;A3	Forward: 5′–GCAGCAAAGCCACGGTAAAGACAA Reverse: 5′–ATATGCTGGATGCGGAGGTGATGG	58℃	263
TaMPKKK1	Forward: 5′–ACCTTCCGCGTCCAAACTT Reverse: 5′–CTACTCCCCGGGCAGAACA	56℃	302
TaMPKKK4	Forward: 5′–CGTTTTTGATTTGCGTGATAGA Reverse: 5′–GTGGGGATGACAACAAAGACTC	50℃	318
TaMPKKK7	Forward: 5′–GGCGGTCAACAAGTGCTGGTCAAA Reverse: 5′–CGGGGCCTCGTGTATCTCTG	56℃	330
TaMPKKK8	Forward: 5′–GTGATACCGAGGAGTGAAGA Reverse: 5′–ACGGTCGGAAAGTGAAC	54℃	284
TaMPKK1	Forward: 5′–CTTTGCAGCGAGTTTCTTCC Reverse: 5′–AGGGCCTTGATTCATTACCATA	52℃	169
TaMPKK6	Forward: 5′–TGACACGCGAGCCAGAAAAGAGAT Reverse: 5′–TGCCCGACATACACATTCCCTGAG	58℃	375
TaMPK1	Forward: 5′–CACCCGGAGAATCAAAAGGAGA Reverse: 5′–GCCATCGTTCACGGACTATCG	56℃	182
TaMPK3	Forward: 5′–ATGAGCGAGTCTGACCTGGAGTTC Reverse: 5′–AGTAGTGAGCCTGCCGGGTTCTTC	58℃	400
TaMPK4	Forward: 5′–GTACCCGCACGCCCATCCTC Reverse: 5′–CATCTCCTGCCACAACATTTCTCG	58℃	217
TaMPK6	Forward: 5′–GACGAGGCTCTGCACCACCCATAC Reverse: 5′–CAGAAAGGCCCCAAAAGAAATAGT	52℃	334
TaMPK7	Forward: 5′–AGGGAGGGTGAAGTTGTCTGAAAT Reverse: 5′–CATCCGGAAACAAAACAAAAACTC	50℃	233
TaMPK9	Forward: 5′–GCAAGCAGGCCGACGATTAGC Reverse: 5′–GACGGCGCCAACCTTCCTG	58℃	342
TaMPK12	Forward: 5′–AGCTCGCGGACCTACCTCAAG Reverse: 5′–CACTCCGCTAAACCATCTCCAACT	54℃	266
TaMPK12;1	Forward: 5′–TCCGGACTTCTGCTCAGGGTATTA Reverse: 5′–CGGCGCGACATTTTTCAACT	56℃	343
TaMPK14	Forward: 5′–TGCCATTGGATCAGGAAGG Reverse: 5′–AATTGCGGAACACCATCAGTC	52℃	287
TaMPK16	Forward: 5′–GCCGCGAGTTCCGTGACATCTACA Reverse: 5′–GAGCAAGGCCGAAGTCGCAAATCT	58℃	234
TaMPK17	Forward: 5′–CGAGGCCCTGACAGACCCATACTT Reverse: 5′–TTCACCCTTCGCACCACCTTTTTC	58℃	277
TaTubulin	Forward: 5′–CATGCTATCCCTCGTCTCGACCT Reverse: 5′–CGCACTTCATGATGGAGTTGTAT	56℃	356
TaMPK4 sense expression cassette	Forward: 5′–TTCCATGGCGATGATGGTGGAT Reverse: 5′–TTGGTAACCTCACATATTCACCATCC	56℃	1110
TaMPK4 sense expression cassette	Forward: 5′–TTTCCATGGCGGCCTCGGGGTGGT Reverse: 5′–TTTGGTTACCTTCATTCAGCAGG	56℃	651