

# Supplementary Material

## 1 SUPPLEMENTARY DATA

**Table S1.** Features of MAPK family genes from the *Fragaria vesca*, *Malus domestica*, *Pyrus bretschneideri*, *Prunus mume*, *Prunus persica*, and *Rosa chinensis* genome

**Table S2.** Number distribution of MAPK genes in Clusters

**Table S3.** Chromosomal location of the MAPK family genes in *Fragaria vesca*, *Malus domestica*, *Pyrus bretschneideri*, *Prunus mume*, *Prunus persica*, and *Rosa chinensis*

**Table S4.** Duplication events between *Fragaria vesca*, *Malus domestica*, *Pyrus bretschneideri*, *Prunus mume*, *Prunus persica*, and *Rosa chinensis*

**Figure S1.** Multiple sequence alignment of 97 MAPK genes from *Malus domestica*, *Pyrus bretschneideri*, *Prunus persica*, *Prunus mume*, *Rosa chinensis*, and *Fragaria vesca*. 97 identified MAPK proteins contained I-XI characterized multiple protein domains

**Figure S2.** Amino acid residues of 15 conserved motifs within MAPK protein sequences in six Rosaceae species

**Figure S3.** Functional distances of Cluster A, B, C, D

## 2 SUPPLEMENTARY TABLES AND FIGURES

### 2.1 SUPPLEMENTARY TABLES

**Table S1** Features of MAPK family genes from the *Fragaria vesca*, *Malus domestica*, *Pyrus bretschneideri*, *Prunus mume*, *Prunus persica*, and *Rosa chinensis* genome

S pecies	MAPK Name	Sequence ID	ORF length(aa)	Coding region length(bp)	Exon
<i>Fragaria vesca</i>	FvMAPK1	FvH4_2g39360.1	372	1119	3
	FvMAPK2	FvH4_3g33900.1	371	1116	7
	FvMAPK3	FvH4_7g15060.1	373	1122	6
	FvMAPK4	FvH4_5g03050.1	377	1134	6
	FvMAPK5	FvH4_1g00480.1	391	1176	5
	FvMAPK6	FvH4_1g12630.1	370	1113	3
	FvMAPK7	FvH4_5g17180.1	691	2076	11
	FvMAPK8	FvH4_3g34090.1	365	1098	6
	FvMAPK9	FvH4_4g14280.1	561	1686	10
	FvMAPK10	FvH4_4g32500.1	580	1743	11
	FvMAPK11	FvH4_3g17440.1	609	1830	10
	FvMAPK12	FvH4_6g38240.1	618	1857	10
<i>Pyrus bretschneideri</i>	PbMAPK1	rna3250	618	1857	10
	PbMAPK2	rna3743	372	1119	2
	PbMAPK3	rna6040	561	1686	10
	PbMAPK4	rna6332	370	1113	6
	PbMAPK5	rna8450	367	1104	6
	PbMAPK6	rna10064	635	1908	11
	PbMAPK7	rna10610	618	1857	10
	PbMAPK8	rna12286	370	1113	6

	PbMAPK9	rna12296	374	1125	6
	PbMAPK10	rna12409	406	1221	5
	PbMAPK11	rna14178	621	1866	11
	PbMAPK12	rna17471	378	1137	6
	PbMAPK13	rna19934	564	1695	10
	PbMAPK14	rna20400	403	1212	5
	PbMAPK15	rna31336	608	1827	10
	PbMAPK16	rna31337	603	1812	10
	PbMAPK17	rna40806	507	1524	10
	PbMAPK18	rna40803	531	1596	12
	PbMAPK19	rna40804	484	1455	12
	PbMAPK20	rna41066	564	1695	10
	PbMAPK21	rna45988	608	1827	10
	PbMAPK22	rna46535	379	1140	6
	PbMAPK23	rna51417	373	1122	6
<i>Prunus mume</i>	PmMAPK1	Pm005869	372	1119	2
	PmMAPK2	Pm026678	368	1107	2
	PmMAPK3	Pm000966	370	1113	6
	PmMAPK4	Pm018234	373	1122	6
	PmMAPK5	Pm023935	376	1131	6
	PmMAPK6	Pm027774	407	1224	5
	PmMAPK7	Pm025094	626	1881	13
	PmMAPK8	Pm008036	558	1677	9
	PmMAPK9	Pm014593	606	1821	9
	PmMAPK10	Pm011269	597	1794	9
	PmMAPK11	Pm029207	578	1737	10
	PmMAPK12	Pm000736	370	1113	6
<i>Malus domestica</i>	MdMAPK1	MD00G1111900	373	1122	6
	MdMAPK2	MD01G1069100	373	1122	6
	MdMAPK3	MD02G1004000	403	1212	5
	MdMAPK4	MD02G1140700	358	1077	3
	MdMAPK5	MD03G1108500	370	1113	6
	MdMAPK6	MD03G1251600	608	1827	10
	MdMAPK7	MD06G1089500	377	1134	6
	MdMAPK8	MD06G1230300	634	1905	11
	MdMAPK9	MD08G1025900	352	1059	3
	MdMAPK10	MD09G1151800	618	1857	10
	MdMAPK11	MD11G1120700	367	1104	6
	MdMAPK12	MD11G1121500	370	1113	6
	MdMAPK13	MD11G1272700	607	1824	10
	MdMAPK14	MD13G1024800	583	1752	11
	MdMAPK15	MD13G1181100	564	1695	10
	MdMAPK16	MD14G1110400	379	1140	6
	MdMAPK17	MD14G1234900	618	1857	11

<i>Prunus persica</i>	MdMAPK18	MD15G1022600	372	1119	2
	MdMAPK19	MD15G1147300	406	1221	5
	MdMAPK20	MD15G1253700	378	1137	3
	MdMAPK21	MD16G1181800	564	1695	10
	MdMAPK22	MD17G1139400	618	1857	10
	PpMAPK1	XP_007227726.2	560	1683	10
	PpMAPK2	XP_007222000.1	587	1764	11
	PpMAPK3	XP_020425780.1	588	1767	11
	PpMAPK4	XP_020425785.1	508	1527	11
	PpMAPK5	XP_007225773.1	372	1119	3
	PpMAPK6	XP_007218147.1	373	1122	6
	PpMAPK7	XP_020415049.1	618	1857	11
	PpMAPK8	XP_020417719.1	609	1830	10
	PpMAPK9	XP_007209255.1	376	1131	6
<i>Rosa chinensis</i>	PpMAPK10	XP_007210883.1	628	1887	11
	PpMAPK11	XP_020422225.1	370	1113	7
	PpMAPK12	XP_007205387.1	370	1113	6
	PpMAPK13	XP_020424045.1	368	1107	3
	PpMAPK14	XP_007202173.1	407	1224	5
	RcMAPK1	XP_024157102.1	370	1113	6
	RcMAPK2	XP_024157625.1	365	1098	6
	RcMAPK3	XP_024165472.1	372	1119	2
	RcMAPK4	XP_024170191.1	376	1131	6
	RcMAPK5	XP_024170353.1	620	1863	11
	RcMAPK6	XP_024175895.1	373	1122	6
	RcMAPK7	XP_024179597.1	398	1197	5
	RcMAPK8	XP_024181184.1	618	1857	10
	RcMAPK9	XP_024182226.1	370	1113	2
	RcMAPK10	XP_024191793.1	574	1725	11
	RcMAPK11	XP_024191794.1	505	1518	10
	RcMAPK12	XP_024193778.1	561	1686	10
	RcMAPK13	XP_024199678.1	609	1830	10
	RcMAPK14	XP_024199679.1	597	1794	9

**Table S2.** Number distribution of MAPK genes in Clusters

Species	Number of MAPK genes	Cluster			
		A	B	C	D
<i>Fragaria vesca</i>	12	3	2	2	5
<i>Pyrus bretschneideri</i>	23	8	5	1	9
<i>Prunus persica</i>	14	5	2	2	5
<i>Prunus mume</i>	12	3	2	2	5
<i>Malus domestica</i>	22	5	4	4	9
<i>Rosa chinensis</i>	14	4	3	2	5
Total	97	28	18	13	38

**Table S3.** Chromosomal location of the MAPK family genes in *Fragaria vesca*, *Malus domestica*, *Pyrus bretschneideri*, *Prunus mume*, *Prunus persica*, and *Rosa chinensis*

Gene name	Chromosome name	start	stop
FvMAPK1	Fvb2	28285769	28288441
FvMAPK2	Fvb3	29321014	29323852
FvMAPK3	Fvb7	13137567	13141874
FvMAPK4	Fvb5	1826755	1830951
FvMAPK5	Fvb1	257648	261267
FvMAPK6	Fvb1	6939295	6942142
FvMAPK7	Fvb5	9798986	9803632
FvMAPK8	Fvb3	29503534	29507313
FvMAPK9	Fvb4	17846892	17852871
FvMAPK10	Fvb4	31159514	31164595
FvMAPK11	Fvb3	11105786	11110452
FvMAPK12	Fvb6	30243654	30249719
PmMAPK1	Pm2	13426673	13428592
PmMAPK2	Pm8	11162132	11163561
PmMAPK3	Pm1	5929065	5930985
PmMAPK4	Pm5	17007404	17011789
PmMAPK5	Pm7	9355221	9358805
PmMAPK6	Pm8	16998106	17001298
PmMAPK7	Pm7	15979218	15985644
PmMAPK8	Pm2	30424089	30427599
PmMAPK9	Pm4	14063001	14066620
PmMAPK10	Pm3	9959653	9963198
PmMAPK11	scaffold205	1989703	1994152
PmMAPK12	Pm1	4461784	4464553
MdMAPK1	Chr00	23585044	23590045
MdMAPK2	Chr01	17313617	17318232
MdMAPK3	Chr02	283420	287361
MdMAPK4	Chr02	11704459	11707099
MdMAPK5	Chr03	9441402	9444107
MdMAPK6	Chr03	33919970	33925118
MdMAPK7	Chr06	21793744	21797906
MdMAPK8	Chr06	35987049	35991465
MdMAPK9	Chr08	1877129	1879699
MdMAPK10	Chr09	12015424	12021447
MdMAPK11	Chr11	11031046	11033880
MdMAPK12	Chr11	11213230	11215921
MdMAPK13	Chr11	38933605	38938592
MdMAPK14	Chr13	1752726	1756522
MdMAPK15	Chr13	15088337	15093916
MdMAPK16	Chr14	17536069	17547603
MdMAPK17	Chr14	31482743	31487314



MdMAPK18	Chr15	1311139	1313543
MdMAPK19	Chr15	10938594	10942321
MdMAPK20	Chr15	21405605	21408509
MdMAPK21	Chr16	15589266	15594723
MdMAPK22	Chr17	12538046	12543510
PpMAPK1	NC_034009.1	11690289	11696616
PpMAPK2	NC_034009.1	31029167	31033905
PpMAPK3	NC_034009.1	31029167	31033908
PpMAPK4	NC_034009.1	31029167	31033084
PpMAPK5	NC_034009.1	34008706	34011571
PpMAPK6	NC_034010.1	22100895	22106096
PpMAPK7	NC_034011.1	19066446	19072286
PpMAPK8	NC_034012.1	8859795	8864874
PpMAPK9	NC_034013.1	11189497	11193697
PpMAPK10	NC_034013.1	17644958	17649855
PpMAPK11	NC_034014.1	6183150	6186490
PpMAPK12	NC_034014.1	6299165	6301769
PpMAPK13	NC_034015.1	16682138	16685138
PpMAPK14	NC_034015.1	22037574	22041300
RcMAPK1	NC_037092.1	66928359	66931228
RcMAPK2	NC_037092.1	67392470	67396312
RcMAPK3	NC_037093.1	61982376	61985095
RcMAPK4	NC_037094.1	14752369	14756679
RcMAPK5	NC_037094.1	1234528	1239293
RcMAPK6	NC_037088.1	49590990	49596049
RcMAPK7	NC_037089.1	572330	576036
RcMAPK8	NC_037089.1	69082991	69088721
RcMAPK9	NC_037089.1	12489583	12492321
RcMAPK10	NC_037091.1	63216202	63221048
RcMAPK11	NC_037091.1	63216202	63220437
RcMAPK12	NC_037091.1	44422157	44427685
RcMAPK13	NC_037092.1	22747309	22752269
RcMAPK14	NC_037092.1	22747309	22752269
PbMAPK1	Chr17	12360175	12365742
PbMAPK2	Chr15	1060929	1061236
PbMAPK3	Chr13	8980240	8986234
PbMAPK4	Chr6	11466506	11469159
PbMAPK5	Chr11	7686856	7689655
PbMAPK6	Chr6	20289518	20294106
PbMAPK7	Chr9	13175968	13182175
PbMAPK8	Chr3	20683025	20685355
PbMAPK9	Chr3	20852565	20855476
PbMAPK10	Chr15	11131488	11135057
PbMAPK11	Chr14	18219038	18223685

PbMAPK12	Chr6	9762524	9766693
PbMAPK13	Chr1	13938338	13944140
PbMAPK14	Chr2	1560448	1564319
PbMAPK15	Chr11	27836491	27841706
PbMAPK16	Chr11	27837663	27841706
PbMAPK17	Chr13	3968635	3972021
PbMAPK18	Chr13	3968635	3972244
PbMAPK19	Chr13	3968635	3972244
PbMAPK20	Chr16	6128072	6134039
PbMAPK21	Chr3	2282426	2287482
PbMAPK22	Chr14	13092045	13096115
PbMAPK23	NW_008989303.1	67132	71580

**Table S4.** Duplication events between *Fragaria vesca*, *Malus domestica*, *Pyrus bretschneideri*, *Prunus mume*, *Prunus persica*, and *Rosa chinensis*

<i>Species name</i>	<b>Duplicated Genes Pairs</b>			<i>Species name</i>	<b>Number of collinear gene pairs</b>
<i>Prunus mume</i>	Pm005869	==	XM_007225711.2	<i>Prunus persica</i>	18
	Pm008036	==	XM_007227664.2		
	Pm005869	==	XM_020568456.1		
	Pm000966	==	XM_020566636.1		
	Pm000736	==	XM_020566636.1		
	Pm000966	==	XM_007205325.2		
	Pm014593	==	XM_007216912.2		
	Pm011269	==	XM_020562130.1		
	Pm018234	==	XM_007218085.2		
	Pm018234	==	XM_007209193.2		
	Pm026678	==	XM_007225711.2		
	Pm027774	==	XM_007202111.2		
	Pm026678	==	XM_020568456.1		
	Pm023935	==	XM_007218085.2		
	Pm023935	==	XM_007209193.2		
	Pm025094	==	XM_007210821.2		
	Pm029207	==	XM_020570191.1		
	Pm029207	==	XM_007210821.2		
	rna19934	==	Pm008036		
	rna20400	==	Pm027774		
<i>Pyrus bretschneideri</i>	rna12286	==	Pm000736	<i>Prunus mume</i>	22
	rna12286	==	Pm000966		
	rna45988	==	Pm011269		
	rna6332	==	Pm000966		
	rna17471	==	Pm018234		
	rna10064	==	Pm025094		
	rna17471	==	Pm023935		

	rna20724	==	Pm018234		
	rna10610	==	Pm014593		
	rna8450	==	Pm000736		
	rna31336	==	Pm011269		
	rna6040	==	Pm008036		
	rna40805	==	Pm029207		
	rna46535	==	Pm023935		
	rna14178	==	Pm025094		
	rna3743	==	Pm005869		
	rna12409	==	Pm027774		
	rna3743	==	Pm026678		
	rna41066	==	Pm008036		
	rna3250	==	Pm014593		
	Pm000736	==	FvH4_3g34090.1		
	Pm000966	==	FvH4_3g33900.1		
	Pm005869	==	FvH4_1g12630.1		
	Pm005869	==	FvH4_2g39360.1		
	Pm008036	==	FvH4_4g14280.1		
	Pm011269	==	FvH4_3g17440.1		
	Pm014593	==	FvH4_6g38240.1		
	Pm018234	==	FvH4_5g03050.1		
<i>Prunus mume</i>	Pm018234	==	FvH4_7g15060.1	<i>Fragaria vesca</i>	17
	Pm023935	==	FvH4_5g03050.1		
	Pm025094	==	FvH4_5g17180.1		
	Pm023935	==	FvH4_7g15060.1		
	Pm026678	==	FvH4_1g12630.1		
	Pm027774	==	FvH4_1g00480.1		
	Pm026678	==	FvH4_2g39360.1		
	Pm029207	==	FvH4_4g32500.1		
	Pm029207	==	FvH4_5g17180.1		
	XM_024326458.2	==	Pm005869		
	XM_024325416.2	==	Pm014593		
	XM_024326458.2	==	Pm026678		
	XM_024323829.2	==	Pm027774		
	XM_024320127.2	==	Pm018234		
	XM_024320127.2	==	Pm023935		
<i>Prunus mume</i>	XM_024314423.2	==	Pm018234	<i>Rosa chinensis</i>	17
	XM_024314585.2	==	Pm025094		
	XM_024314423.2	==	Pm023935		
	XM_024314585.2	==	Pm029207		
	XM_024338010.2	==	Pm008036		
	XM_024336025.2	==	Pm029207		
	XM_024301857.2	==	Pm000736		
	XM_024301334.2	==	Pm000966		

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	XM_024343910.2	==	Pm011269		
	XM_040508990.1	==	Pm005869		
	XM_040508990.1	==	Pm026678		
	MD11G1120700	==	Pm000736		
	MD11G1120700	==	Pm000966		
	MD11G1272700	==	Pm011269		
	MD13G1181100	==	Pm008036		
	MD13G1024800	==	Pm029207		
	MD02G1140700	==	Pm005869		
	MD02G1140700	==	Pm026678		
	MD02G1004000	==	Pm027774		
	MD01G1069100	==	Pm018234		
	MD01G1069100	==	Pm023935		
	MD15G1022600	==	Pm005869		
	MD15G1253700	==	Pm005869		
	MD15G1253700	==	Pm026678		
	MD15G1147300	==	Pm027774		
<i>Malus domestica</i>	MD15G1022600	==	Pm026678	<i>Prunus mume</i>	29
	MD03G1107700	==	Pm000736		
	MD03G1108500	==	Pm000966		
	MD03G1251600	==	Pm011269		
	MD14G1110400	==	Pm018234		
	MD14G1110400	==	Pm023935		
	MD14G1234900	==	Pm025094		
	MD06G1089500	==	Pm018234		
	MD06G1089500	==	Pm023935		
	MD06G1230300	==	Pm025094		
	MD17G1139400	==	Pm014593		
	MD16G1181800	==	Pm008036		
	MD08G1025900	==	Pm005869		
	MD08G1025900	==	Pm026678		
	MD09G1151800	==	Pm014593		
	FvH4_1g12630.1	==	rna3743		
	FvH4_1g00480.1	==	rna12409		
	FvH4_1g00480.1	==	rna20400		
	FvH4_2g39360.1	==	rna3743		
	FvH4_3g17440.1	==	rna31336		
<i>Fragaria vesca</i>	FvH4_3g34090.1	==	rna8450	<i>Pyrus bretschneideri</i>	22
	FvH4_3g33900.1	==	rna12286		
	FvH4_3g17440.1	==	rna45988		
	FvH4_3g33900.1	==	rna6332		
	FvH4_4g14280.1	==	rna19934		
	FvH4_4g32500.1	==	rna40805		
	FvH4_4g14280.1	==	rna6040		

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	FvH4_4g14280.1	==	rna41066		
	FvH4_5g17180.1	==	rna14178		
	FvH4_5g03050.1	==	rna46535		
	FvH4_5g03050.1	==	rna17471		
	FvH4_5g17180.1	==	rna10064		
	FvH4_6g38240.1	==	rna3250		
	FvH4_6g38240.1	==	rna10610		
	FvH4_7g15060.1	==	rna51417		
	FvH4_7g15060.1	==	rna17471		
	FvH4_7g15060.1	==	rna20724		
	XM_024326458.2	==	rna3743		
	XM_024323829.2	==	rna12409		
	XM_024325416.2	==	rna3250		
	XM_024323829.2	==	rna20400		
	XM_024325416.2	==	rna10610		
	XM_024320127.2	==	rna51417		
	XM_024320127.2	==	rna17471		
	XM_024320127.2	==	rna20724		
	XM_024314585.2	==	rna14178		
<i>Rosa</i>	XM_024314585.2	==	rna10064	<i>Pyrus</i>	20
<i>chinensis</i>	XM_024314423.2	==	rna17471	<i>bretschneideri</i>	
	XM_024338010.2	==	rna19934		
	XM_024336025.2	==	rna40805		
	XM_024338010.2	==	rna6040		
	XM_024338010.2	==	rna41066		
	XM_024343910.2	==	rna31336		
	XM_024301857.2	==	rna8450		
	XM_024301334.2	==	rna12286		
	XM_024343910.2	==	rna45988		
	XM_024301334.2	==	rna6332		
	FvH4_1g00480.1	==	XM_024323829.2		
	FvH4_1g12630.1	==	XM_024326458.2		
	FvH4_1g12630.1	==	XM_040508990.1		
	FvH4_3g17440.1	==	XM_024343910.2		
	FvH4_3g33900.1	==	XM_024301334.2		
	FvH4_3g34090.1	==	XM_024301857.2		
<i>Fragaria</i>	FvH4_2g39360.1	==	XM_024326458.2	<i>Rosa chinensis</i>	16
<i>vesca</i>	FvH4_2g39360.1	==	XM_040508990.1		
	FvH4_5g03050.1	==	XM_024320127.2		
	FvH4_5g03050.1	==	XM_024314423.2		
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	rna45988	==	MD11G1272700		
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	rna17471	==	MD06G1089500		
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	rna10064	==	MD14G1234900		
	rna10610	==	MD09G1151800		
	rna10610	==	MD17G1139400		
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<i>Pyrus bretschneideri</i>	rna31336	==	MD03G1251600	<i>Malus domestica</i>	34
	rna8450	==	MD11G1120700		
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	rna6040	==	MD16G1181800		
	rna14178	==	MD06G1230300		
	rna46535	==	MD06G1089500		
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	rna12409	==	MD02G1004000		
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	rna3743	==	MD15G1022600		
	rna12409	==	MD15G1147300		
	rna41066	==	MD13G1181100		
	rna41066	==	MD16G1181800		
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	MD03G1107700	==	XM_020566636.1		
	MD03G1108500	==	XM_007205325.2		
<i>Malus domestica</i>				<i>Prunus persica</i>	26

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	MD08G1025900	==	XM_020568456.1	
	MD11G1272700	==	XM_020562130.1	
	MD11G1120700	==	XM_020566636.1	
	MD13G1181100	==	XM_007227664.2	
	MD13G1024800	==	XM_020570191.1	
	MD14G1110400	==	XM_007218085.2	
	MD14G1234900	==	XM_007210821.2	
	MD14G1110400	==	XM_007209193.2	
	MD15G1022600	==	XM_007225711.2	
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	FvH4_1g00480.1	==	MD02G1004000	
	FvH4_1g12630.1	==	MD08G1025900	
	FvH4_1g00480.1	==	MD15G1147300	
	FvH4_1g12630.1	==	MD15G1022600	
	FvH4_2g39360.1	==	MD02G1140700	
	FvH4_2g39360.1	==	MD08G1025900	
	FvH4_2g39360.1	==	MD15G1022600	
	FvH4_3g17440.1	==	MD03G1251600	
	FvH4_3g34090.1	==	MD03G1107700	
	FvH4_3g33900.1	==	MD03G1108500	
	FvH4_3g17440.1	==	MD11G1272700	
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	FvH4_5g03050.1	==	MD14G1110400	
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<i>Malus domestica</i>	MD09G1151800	==	XM_024325416.2	<i>Rosa chinensis</i>	24
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	XM_007202111.2	==	rna12409		
	XM_020568456.1	==	rna3743		
	XM_007202111.2	==	rna20400		
<i>Prunus persica</i>	XM_007218085.2	==	rna51417	<i>Pyrus bretschneideri</i>	22
	XM_007218085.2	==	rna17471		
	XM_007218085.2	==	rna20724		
	XM_020562130.1	==	rna31336		
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	XM_007216912.2	==	rna10610		
	XM_020566636.1	==	rna8450		
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	XM_007210821.2	==	rna14178		

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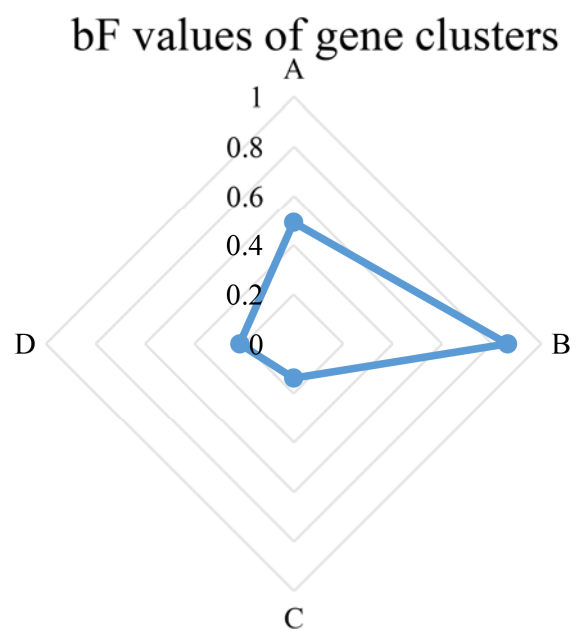
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	XM_007210821.2	==	rna10064		
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	XM_020570191.1	==	XM_024336025.2		
	XM_007227664.2	==	XM_024338010.2		
	XM_007225711.2	==	XM_040508990.1		
	XM_020568456.1	==	XM_024326458.2		
	XM_007202111.2	==	XM_024323829.2		
	XM_020568456.1	==	XM_040508990.1		
<i>Prunus</i>	XM_007218085.2	==	XM_024320127.2	<i>Rosa chinensis</i>	16
<i>persica</i>	XM_007218085.2	==	XM_024314423.2		
	XM_020562130.1	==	XM_024343910.2		
	XM_007216912.2	==	XM_024325416.2		
	XM_020566636.1	==	XM_024301857.2		
	XM_007205325.2	==	XM_024301334.2		
	XM_007209193.2	==	XM_024320127.2		
	XM_007209193.2	==	XM_024314423.2		
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	XM_007225711.2	==	FvH4_1g12630.1		
	XM_007225711.2	==	FvH4_2g39360.1		
	XM_007227664.2	==	FvH4_4g14280.1		
	XM_020570191.1	==	FvH4_4g32500.1		
	XM_020570191.1	==	FvH4_5g17180.1		
	XM_020568456.1	==	FvH4_1g12630.1		
	XM_007202111.2	==	FvH4_1g00480.1		
<i>Prunus</i>	XM_020568456.1	==	FvH4_2g39360.1	<i>Fragaria vesca</i>	17
<i>persica</i>	XM_007218085.2	==	FvH4_5g03050.1		
	XM_007218085.2	==	FvH4_7g15060.1		
	XM_020562130.1	==	FvH4_3g17440.1		
	XM_007216912.2	==	FvH4_6g38240.1		
	XM_007205325.2	==	FvH4_3g33900.1		
	XM_020566636.1	==	FvH4_3g34090.1		
	XM_007209193.2	==	FvH4_5g03050.1		
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## 2.2 SUPPLEMENTARY FIGURES







**Figure S3.** Functional distances of Cluster A, B, C, D