

The genome-wide identification and expression analysis of RLCK-VII subfamily genes reveal their roles in stress responses of upland cotton

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Supplemental materials

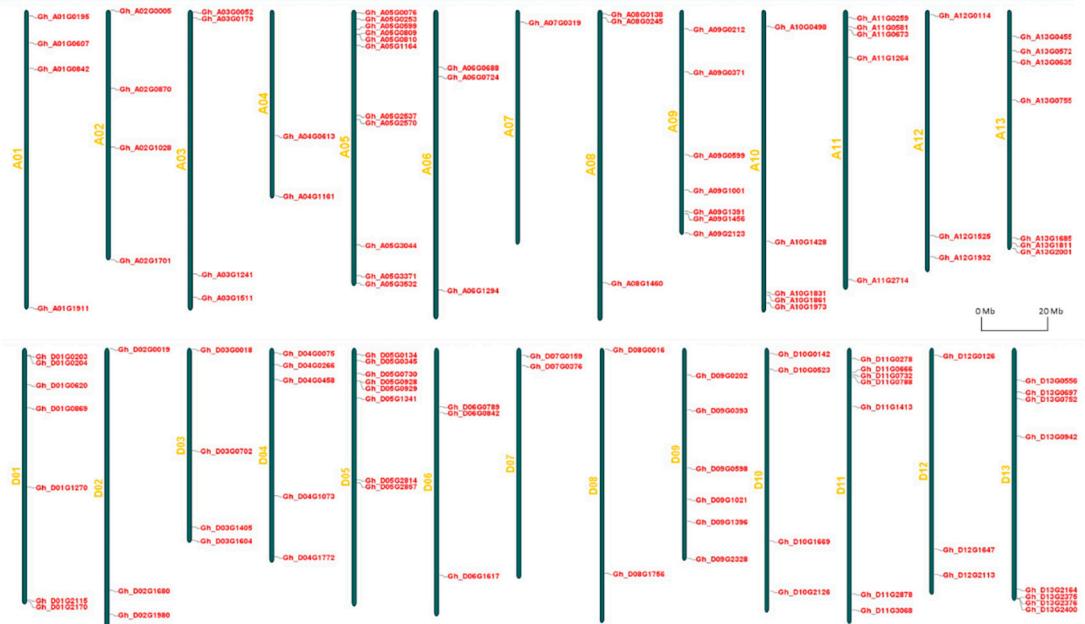


Figure S1. Distribution of *GhRLCKs* on chromosomes. *GhRLCKs* on the At subgenome of *G. hirsutum* (Top panel). *GhRLCKs* on Dt subgenome of *G. hirsutum* (Lower panel).

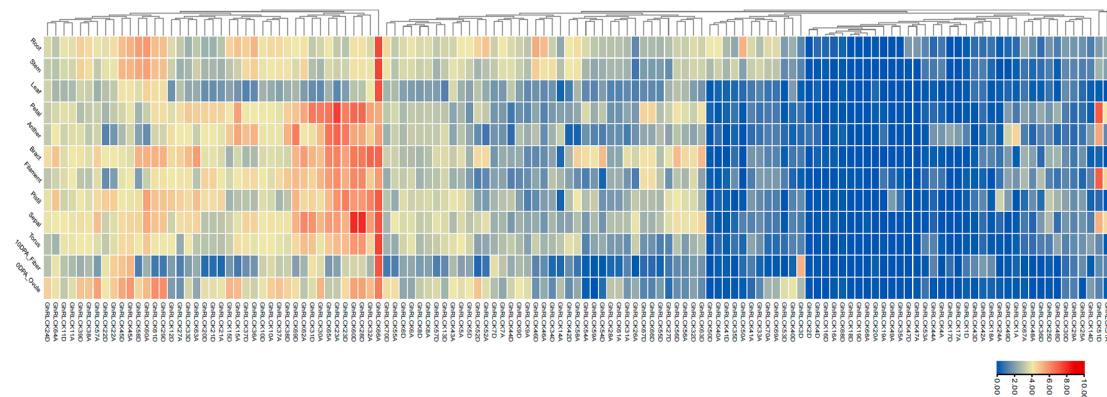


Figure S2. Transcriptional profiling of *GhRLCKs* in upland cotton different tissues/organs. Heat map showing the expression level of the 129 *GhRLCKs* genes in various tissues (root, stem, leaf, petal, anther, bract, filament, pistil, sepal, torus, 10 DPA fiber, and 0 DPA ovule) of TM-1 based on RNA-seq data. The scale bar is presented underneath the charts.

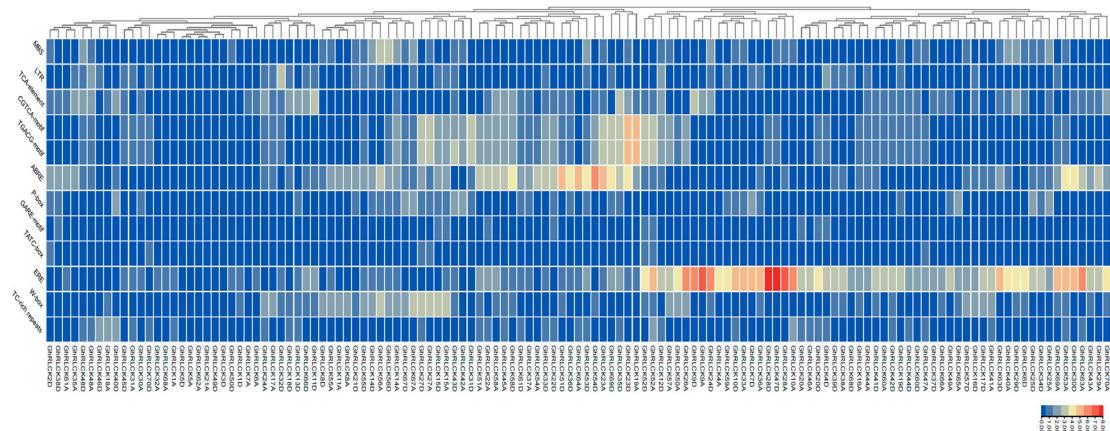


Figure S3. The cis-regulatory elements in *GhRLCKs* promoter regions. MBS, drought stress response element; LTR, low-temperature responsiveness element; TCA-element, salicylic acid responsiveness element; CGTCA-motif, MeJA-responsiveness cis-acting regulatory element; TGACG-motif, MeJA responsiveness element; ABRE, abscisic acid responsiveness element; P-box, GARE-motif; TATC-box, gibberellin-responsive element; TC-rich repeats, defense and stress responsiveness cis-element; W-box, plant defense signaling cis-acting element; ERE: ethylene response element; The colors indicate the number of cis-acting elements in *GhRLCK* genes. The scale bar is presented underneath the charts.

Table S1. The groupings of the 46 *RLCK-VII* subfamily members in *A. thaliana*

ID	Gene Name	ID	Gene Name	ID	Gene Name
Group I		Group IV		Group VII	
AT2G28590	AtPBL6	AT1G24030	AtPBL28	AT1G74490	AtPBL29
AT1G07870	AtPBL5	AT4G17660	AtPBL20	AT1G26970	AtPBL4
AT5G02800	AtPBL7	AT5G47070	AtPBL19	AT1G69790	AtPBL18
AT5G18610	AtPBL27	AT2G28940	AtPBL37	AT1G14370	AtPBL2
AT5G13160	AtPBS1	AT2G39110	AtPBL38	AT2G02800	AtPBL3
AT1G61860	AtPBL41	AT5G03320	AtPBL40	Group VIII	
AT3G20530	AtPBL23	AT3G09830	AtPBL39	AT3G28690	AtPBL36
Group II		Group V		AT5G15080	AtPBL34
AT3G26940	AtCDG1	AT4G35600	AtPBL30	AT3G01300	AtPBL35
AT1G76370	AtPBL22	AT2G17220	AtPBL32	Group IX	
AT1G20650	AtPBL21	AT1G76360	AtPBL31	AT1G61590	AtPBL15
Group III		Group VI		AT1G72540	AtPBL33
AT5G16500	AtPBL43	AT3G55450	AtPBL1	AT2G26290	AtPBL12
AT3G02810	AtPBL42	AT2G39660	AtBIK1	AT5G35580	AtPBL13
AT4G13190	AtPBL24	AT2G28930	AtPBL10	AT2G05940	AtPBL14
AT3G07070	AtPBL26	AT1G07570	AtPBL9	AT5G56460	AtPBL16
AT3G24790	AtPBL25	AT5G02290	AtPBL11	AT5G01020	AtPBL8
				AT2G07180	AtPBL17

Table S2. The grouping of the 129 RLCK-VII subfamily members in upland cotton

ID	Gene Name	ID	Gene Name	ID	Gene Name
	Group I	Gh_D01G1270	<i>GhRLCK35D</i>	Gh_A13G0635	<i>GhRLCK70A</i>
Gh_D08G0016	<i>GhRLCK14D</i>	Gh_D04G1772	<i>GhRLCK34D</i>	Gh_D13G0752	<i>GhRLCK70D</i>
Gh_A08G2568	<i>GhRLCK14A</i>	Gh_A04G1161	<i>GhRLCK33A</i>	Gh_D12G1647	<i>GhRLCK69D</i>
Gh_D13G2400	<i>GhRLCK15D</i>	Gh_D11G0278	<i>GhRLCK25D</i>	Gh_A12G1525	<i>GhRLCK69A</i>
Gh_A13G2001	<i>GhRLCK15A</i>	Gh_A11G0259	<i>GhRLCK25A</i>	Gh_A09G1001	<i>GhRLCK67A</i>
Gh_D01G2115	<i>GhRLCK11D</i>	Gh_D12G2113	<i>GhRLCK24D</i>	Gh_D09G1021	<i>GhRLCK67D</i>
Gh_A01G2145	<i>GhRLCK11A</i>	Gh_A12G1932	<i>GhRLCK24A</i>	Gh_A05G0599	<i>GhRLCK66A</i>
Gh_A05G2570	<i>GhRLCK10A</i>	Gh_A08G1460	<i>GhRLCK23A</i>	Gh_D05G0730	<i>GhRLCK66D</i>
Gh_D05G2857	<i>GhRLCK10D</i>	Gh_D08G1756	<i>GhRLCK23D</i>		Group VIII
Gh_A10G1861	<i>GhRLCK9A</i>	Gh_A08G0245	<i>GhRLCK26A</i>	Gh_D07G0376	<i>GhRLCK42D</i>
Gh_D10G2126	<i>GhRLCK9D</i>	Gh_A11G0673	<i>GhRLCK27A</i>	Gh_A07G0319	<i>GhRLCK41A</i>
Gh_D09G2328	<i>GhRLCK5D</i>	Gh_D11G0788	<i>GhRLCK27D</i>	Gh_A05G0076	<i>GhRLCK40A</i>
Gh_A09G2123	<i>GhRLCK5A</i>	Gh_D13G2375	<i>GhRLCK29D</i>	Gh_D05G0134	<i>GhRLCK41D</i>
Gh_D09G0598	<i>GhRLCK6D</i>	Gh_D05G0928	<i>GhRLCK28D</i>	Gh_D09G0202	<i>GhRLCK37D</i>
Gh_A09G0599	<i>GhRLCK6A</i>	Gh_A05G0809	<i>GhRLCK28A</i>	Gh_A09G0212	<i>GhRLCK36A</i>
Gh_A01G0195	<i>GhRLCK8A</i>	Gh_A10G1831	<i>GhRLCK30A</i>	Gh_D11G0732	<i>GhRLCK38D</i>
Gh_D01G2270	<i>GhRLCK8D</i>	Gh_D10G2531	<i>GhRLCK31D</i>	Gh_A11G3042	<i>GhRLCK37A</i>
Gh_D10G1669	<i>GhRLCK7D</i>	Gh_A05G2537	<i>GhRLCK29A</i>	Gh_D04G0458	<i>GhRLCK40D</i>
Gh_A10G1428	<i>GhRLCK7A</i>	Gh_D05G2814	<i>GhRLCK30D</i>	Gh_A13G0455	<i>GhRLCK38A</i>
Gh_D01G0203	<i>GhRLCK13D</i>	Gh_D04G1073	<i>GhRLCK32D</i>	Gh_D13G0697	<i>GhRLCK39D</i>
Gh_D01G0204	<i>GhRLCK12D</i>	Gh_A04G0613	<i>GhRLCK31A</i>		Group IX
Gh_D10G0142	<i>GhRLCK3D</i>	Gh_A09G1391	<i>GhRLCK32A</i>	Gh_A03G0052	<i>GhRLCK47A</i>
Gh_A06G1294	<i>GhRLCK4A</i>	Gh_D09G1396	<i>GhRLCK33D</i>	Gh_D03G1604	<i>GhRLCK47D</i>
Gh_D06G1617	<i>GhRLCK4D</i>		Group V	Gh_D05G1341	<i>GhRLCK48D</i>
Gh_D11G2878	<i>GhRLCK2D</i>	Gh_D03G0018	<i>GhRLCK58D</i>	Gh_A05G1164	<i>GhRLCK48A</i>
Gh_D01G0620	<i>GhRLCK1D</i>	Gh_A02G1701	<i>GhRLCK58A</i>	Gh_A10G0498	<i>GhRLCK49A</i>
Gh_A01G0607	<i>GhRLCK1A</i>	Gh_A12G0114	<i>GhRLCK57A</i>	Gh_D10G0523	<i>GhRLCK49D</i>
	Group II	Gh_D12G0126	<i>GhRLCK57D</i>	Gh_A06G0724	<i>GhRLCK50A</i>
Gh_A09G0371	<i>GhRLCK21A</i>	Gh_A13G0572	<i>GhRLCK56A</i>	Gh_D06G0842	<i>GhRLCK50D</i>
Gh_D09G0393	<i>GhRLCK21D</i>	Gh_D13G0556	<i>GhRLCK56D</i>	Gh_A07G2351	<i>GhRLCK51A</i>
Gh_D11G0666	<i>GhRLCK20D</i>	Gh_D02G1980	<i>GhRLCK55D</i>	Gh_D07G0159	<i>GhRLCK51D</i>
Gh_A11G0581	<i>GhRLCK20A</i>	Gh_A03G1511	<i>GhRLCK55A</i>	Gh_A13G1685	<i>GhRLCK52A</i>
Gh_A01G0842	<i>GhRLCK22A</i>	Gh_A02G0870	<i>GhRLCK59A</i>	Gh_D13G2490	<i>GhRLCK52D</i>
Gh_D01G0869	<i>GhRLCK22D</i>		Group VI	Gh_D06G0789	<i>GhRLCK54D</i>
	Group III	Gh_A05G3044	<i>GhRLCK64A</i>	Gh_A06G0688	<i>GhRLCK54A</i>
Gh_D11G3068	<i>GhRLCK17D</i>	Gh_A10G1973	<i>GhRLCK65A</i>	Gh_A05G0253	<i>GhRLCK53A</i>
Gh_A11G2714	<i>GhRLCK17A</i>	Gh_A03G2069	<i>GhRLCK61A</i>	Gh_D05G0345	<i>GhRLCK53D</i>
Gh_D13G0942	<i>GhRLCK18D</i>	Gh_D05G0929	<i>GhRLCK60D</i>	Gh_A03G0179	<i>GhRLCK46A</i>
Gh_A13G0755	<i>GhRLCK18A</i>	Gh_A05G0810	<i>GhRLCK60A</i>	Gh_D03G1405	<i>GhRLCK46D</i>
Gh_A05G3371	<i>GhRLCK19A</i>	Gh_D13G2376	<i>GhRLCK61D</i>	Gh_D02G0019	<i>GhRLCK45D</i>
Gh_D04G0266	<i>GhRLCK19D</i>	Gh_A09G1456	<i>GhRLCK62A</i>	Gh_A02G0005	<i>GhRLCK45A</i>
Gh_A11G1264	<i>GhRLCK16A</i>	Gh_D01G2170	<i>GhRLCK63D</i>		

Gh_D11G1413 *GhRLCK16D* Gh_A01G1911 *GhRLCK63A*

Group IV

Group VII

Gh_A03G1241 *GhRLCK35A* Gh_A02G1028 *GhRLCK68A*

Gh_D02G1680 *GhRLCK36D* Gh_D03G0702 *GhRLCK68D*

Table S3. The gene pairs detected by synteny analysis

Gene 1	Gene 2	Gene 1	Gene 2	Gene 1	Gene 2
GhRLCK8A	GhRLCK6A	GhRLCK54A	GhRLCK51D	GhRLCK69A	GhRLCK70A
GhRLCK8A	GhRLCK7A	GhRLCK54A	GhRLCK49D	GhRLCK69A	GhRLCK70D
GhRLCK8A	GhRLCK6D	GhRLCK50A	GhRLCK53D	GhRLCK24A	GhRLCK23D
GhRLCK8A	GhRLCK7D	GhRLCK4A	GhRLCK1D	GhRLCK24A	GhRLCK27D
GhRLCK1A	GhRLCK4A	GhRLCK4A	GhRLCK3D	GhRLCK24A	GhRLCK25D
GhRLCK1A	GhRLCK4D	GhRLCK41A	GhRLCK41D	GhRLCK56A	GhRLCK55D
GhRLCK1A	GhRLCK2D	GhRLCK26A	GhRLCK27A	GhRLCK56A	GhRLCK57D
GhRLCK63A	GhRLCK62A	GhRLCK26A	GhRLCK27D	GhRLCK70A	GhRLCK69D
GhRLCK55A	GhRLCK57A	GhRLCK23A	GhRLCK25A	GhRLCK52A	GhRLCK48D
GhRLCK55A	GhRLCK56A	GhRLCK23A	GhRLCK24A	GhRLCK52A	GhRLCK53D
GhRLCK55A	GhRLCK57D	GhRLCK23A	GhRLCK27D	GhRLCK52A	GhRLCK54D
GhRLCK55A	GhRLCK56D	GhRLCK23A	GhRLCK25D	GhRLCK52A	GhRLCK51D
GhRLCK31A	GhRLCK32A	GhRLCK23A	GhRLCK24D	GhRLCK15A	GhRLCK14D
GhRLCK31A	GhRLCK30A	GhRLCK36A	GhRLCK38D	GhRLCK1D	GhRLCK4D
GhRLCK31A	GhRLCK33D	GhRLCK36A	GhRLCK37A	GhRLCK1D	GhRLCK3D
GhRLCK40A	GhRLCK41A	GhRLCK6A	GhRLCK5A	GhRLCK1D	GhRLCK2D
GhRLCK40A	GhRLCK42D	GhRLCK6A	GhRLCK7A	GhRLCK11D	GhRLCK10D
GhRLCK53A	GhRLCK54A	GhRLCK6A	GhRLCK5D	GhRLCK11D	GhRLCK9D
GhRLCK53A	GhRLCK52A	GhRLCK6A	GhRLCK7D	GhRLCK32D	GhRLCK33D
GhRLCK53A	GhRLCK48D	GhRLCK67A	GhRLCK66D	GhRLCK41D	GhRLCK42D
GhRLCK53A	GhRLCK50D	GhRLCK32A	GhRLCK30A	GhRLCK53D	GhRLCK54D
GhRLCK53A	GhRLCK54D	GhRLCK32A	GhRLCK32D	GhRLCK53D	GhRLCK51D
GhRLCK53A	GhRLCK51D	GhRLCK62A	GhRLCK65A	GhRLCK53D	GhRLCK49D
GhRLCK53A	GhRLCK49D	GhRLCK62A	GhRLCK63D	GhRLCK66D	GhRLCK67D
GhRLCK66A	GhRLCK67A	GhRLCK62A	GhRLCK60D	GhRLCK28D	GhRLCK29D
GhRLCK66A	GhRLCK67D	GhRLCK5A	GhRLCK7A	GhRLCK60D	GhRLCK61D
GhRLCK28A	GhRLCK29D	GhRLCK5A	GhRLCK6D	GhRLCK48D	GhRLCK54D
GhRLCK60A	GhRLCK62A	GhRLCK5A	GhRLCK7D	GhRLCK48D	GhRLCK51D
GhRLCK60A	GhRLCK65A	GhRLCK7A	GhRLCK6D	GhRLCK48D	GhRLCK49D
GhRLCK60A	GhRLCK61D	GhRLCK7A	GhRLCK5D	GhRLCK30D	GhRLCK9D
GhRLCK48A	GhRLCK54A	GhRLCK7A	GhRLCK8D	GhRLCK54D	GhRLCK51D
GhRLCK48A	GhRLCK49A	GhRLCK30A	GhRLCK32D	GhRLCK54D	GhRLCK49D
GhRLCK48A	GhRLCK52A	GhRLCK30A	GhRLCK30D	GhRLCK50D	GhRLCK51D
GhRLCK48A	GhRLCK54D	GhRLCK9A	GhRLCK11D	GhRLCK4D	GhRLCK3D
GhRLCK48A	GhRLCK49D	GhRLCK9A	GhRLCK10D	GhRLCK14D	GhRLCK15D
GhRLCK29A	GhRLCK30A	GhRLCK65A	GhRLCK60D	GhRLCK37D	GhRLCK38D
GhRLCK10A	GhRLCK9A	GhRLCK25A	GhRLCK24A	GhRLCK6D	GhRLCK5D
GhRLCK10A	GhRLCK11D	GhRLCK25A	GhRLCK23D	GhRLCK6D	GhRLCK7D
GhRLCK10A	GhRLCK9D	GhRLCK25A	GhRLCK24D	GhRLCK5D	GhRLCK7D
GhRLCK64A	GhRLCK65A	GhRLCK27A	GhRLCK24A	GhRLCK7D	GhRLCK8D
GhRLCK64A	GhRLCK61D	GhRLCK27A	GhRLCK25D	GhRLCK25D	GhRLCK27D
GhRLCK54A	GhRLCK49A	GhRLCK27A	GhRLCK24D	GhRLCK25D	GhRLCK24D

<i>GhRLCK54A</i>	<i>GhRLCK52A</i>	<i>GhRLCK57A</i>	<i>GhRLCK56A</i>	<i>GhRLCK27D</i>	<i>GhRLCK24D</i>
<i>GhRLCK54A</i>	<i>GhRLCK53D</i>	<i>GhRLCK57A</i>	<i>GhRLCK55D</i>	<i>GhRLCK57D</i>	<i>GhRLCK56D</i>
<i>GhRLCK54A</i>	<i>GhRLCK48D</i>	<i>GhRLCK57A</i>	<i>GhRLCK56D</i>	<i>GhRLCK69D</i>	<i>GhRLCK70D</i>

Table S4. Ka/KS calculation of the duplicated RLCK V-II genes in upland cotton

Paralogous pairs	Ka	Ks	Ka/Ks
<i>GhRLCK8A/GhRLCK6A</i>	0.079	0.54	0.147
<i>GhRLCK8A/GhRLCK7A</i>	0.078	0.475	0.163
<i>GhRLCK8A/GhRLCK6D</i>	0.082	0.524	0.157
<i>GhRLCK8A/GhRLCK7D</i>	0.078	0.481	0.161
<i>GhRLCK1A/GhRLCK4A</i>	0.286	2.015	0.142
<i>GhRLCK1A/GhRLCK4D</i>	0.264	2.126	0.124
<i>GhRLCK1A/GhRLCK2D</i>	0.223	0.681	0.328
<i>GhRLCK63A/GhRLCK62A</i>	0.534	4.99	0.107
<i>GhRLCK55A/GhRLCK57A</i>	0.086	0.5	0.172
<i>GhRLCK55A/GhRLCK56A</i>	0.068	0.479	0.142
<i>GhRLCK55A/GhRLCK57D</i>	0.085	0.492	0.173
<i>GhRLCK55A/GhRLCK56D</i>	0.067	0.507	0.133
<i>GhRLCK31A/GhRLCK32A</i>	0.108	0.406	0.267
<i>GhRLCK31A/GhRLCK33D</i>	0.099	0.407	0.244
<i>GhRLCK40A/GhRLCK41A</i>	0.058	0.469	0.124
<i>GhRLCK40A/GhRLCK41A</i>	0.053	0.469	0.114
<i>GhRLCK53A/GhRLCK54A</i>	0.081	0.61	0.132
<i>GhRLCK53A/GhRLCK52A</i>	0.117	1.128	0.103
<i>GhRLCK53A/GhRLCK48D</i>	0.297	1.303	0.228
<i>GhRLCK53A/GhRLCK50D</i>	0.234	1.729	0.135
<i>GhRLCK53A/GhRLCK54D</i>	0.083	0.582	0.143
<i>GhRLCK53A/GhRLCK51D</i>	0.242	2.206	0.11
<i>GhRLCK53A/GhRLCK49D</i>	0.284	1.745	0.163
<i>GhRLCK66A/GhRLCK67A</i>	0.093	0.505	0.184
<i>GhRLCK66A/GhRLCK67D</i>	0.09	0.508	0.176
<i>GhRLCK28A/GhRLCK29D</i>	0.077	0.676	0.115
<i>GhRLCK60A/GhRLCK62A</i>	0.173	1.67	0.103
<i>GhRLCK60A/GhRLCK65A</i>	0.177	3.067	0.058
<i>GhRLCK60A/GhRLCK61D</i>	0.069	0.698	0.099
<i>GhRLCK48A/GhRLCK54A</i>	0.282	1.865	0.151
<i>GhRLCK48A/GhRLCK49A</i>	0.113	0.641	0.177
<i>GhRLCK48A/GhRLCK52A</i>	0.343	1.561	0.219
<i>GhRLCK48A/GhRLCK54D</i>	0.281	1.854	0.151
<i>GhRLCK48A/GhRLCK49D</i>	0.112	0.659	0.17
<i>GhRLCK29A/GhRLCK30A</i>	0.098	0.77	0.127
<i>GhRLCK10AGhRLCK9A</i>	0.039	0.448	0.086
<i>GhRLCK10A/GhRLCK11D</i>	0.133	1.461	0.091
<i>GhRLCK10A/GhRLCK9D</i>	0.037	0.475	0.079
<i>GhRLCK64A/GhRLCK65A</i>	0.074	0.651	0.113
<i>GhRLCK64A/GhRLCK61D</i>	0.194	1.731	0.112
<i>GhRLCK54A/GhRLCK49A</i>	0.283	2.318	0.122
<i>GhRLCK54A/GhRLCK52A</i>	0.112	0.809	0.138
<i>GhRLCK54A/GhRLCK53D</i>	0.077	0.583	0.132
<i>GhRLCK54A/GhRLCK48D</i>	0.304	1.814	0.168
<i>GhRLCK54A/GhRLCK51D</i>	0.234	5.004	0.047
<i>GhRLCK54A/GhRLCK49D</i>	0.285	2.12	0.135
<i>GhRLCK50A/GhRLCK53D</i>	0.258	2.786	0.092
<i>GhRLCK4A/GhRLCK1D</i>	0.281	2.144	0.131
<i>GhRLCK4A/GhRLCK3D</i>	0.141	0.834	0.169

<i>GhRLCK41A/GhRLCK42D</i>	0.005	0.033	0.155
<i>GhRLCK26A/GhRLCK27A</i>	0.123	0.701	0.175
<i>GhRLCK26A/GhRLCK27D</i>	0.127	0.68	0.186
<i>GhRLCK23A/GhRLCK25A</i>	0.125	0.969	0.129
<i>GhRLCK23A/GhRLCK24A</i>	0.104	0.667	0.157
<i>GhRLCK23A/GhRLCK27D</i>	0.244	2.188	0.112
<i>GhRLCK23A/GhRLCK25D</i>	0.127	0.91	0.14
<i>GhRLCK23A/GhRLCK24D</i>	0.101	0.668	0.151
<i>GhRLCK36A/GhRLCK38D</i>	0.062	0.478	0.129
<i>GhRLCK36A/GhRLCK37A</i>	0.062	0.494	0.125
<i>GhRLCK6A/GhRLCK5A</i>	0.051	0.69	0.074
<i>GhRLCK6A/GhRLCK7A</i>	0.072	0.482	0.15
<i>GhRLCK6A/GhRLCK5D</i>	0.052	0.68	0.077
<i>GhRLCK6A/GhRLCK7D</i>	0.074	0.503	0.147
<i>GhRLCK67A/GhRLCK66D</i>	0.091	0.534	0.171
<i>GhRLCK32A/GhRLCK32D</i>	0.102	0.401	0.253
<i>GhRLCK62A/GhRLCK65A</i>	0.216	1.633	0.132
<i>GhRLCK62A/GhRLCK63D</i>	0.103	0.587	0.176
<i>GhRLCK62A/GhRLCK60D</i>	0.178	2.072	0.086
<i>GhRLCK5A/GhRLCK7A</i>	0.062	0.553	0.111
<i>GhRLCK5A/GhRLCK6D</i>	0.05	0.697	0.072
<i>GhRLCK5A/GhRLCK7D</i>	0.062	0.603	0.102
<i>GhRLCK7A/GhRLCK6D</i>	0.074	0.496	0.15
<i>GhRLCK7A/GhRLCK5D</i>	0.061	0.566	0.108
<i>GhRLCK7A/GhRLCK8D</i>	0.071	0.478	0.148
<i>GhRLCK30A/GhRLCK30D</i>	0.1	0.795	0.126
<i>GhRLCK9A/GhRLCK11D</i>	0.153	1.897	0.08
<i>GhRLCK9A/GhRLCK10D</i>	0.038	0.471	0.08
<i>GhRLCK65A/GhRLCK60D</i>	0.181	2.345	0.077
<i>GhRLCK25A/GhRLCK24A</i>	0.143	0.825	0.174
<i>GhRLCK25A/GhRLCK23D</i>	0.129	0.93	0.139
<i>GhRLCK25A/GhRLCK24D</i>	0.139	0.844	0.165
<i>GhRLCK27A/GhRLCK24A</i>	0.229	1.992	0.115
<i>GhRLCK27A/GhRLCK24D</i>	0.229	1.844	0.124
<i>GhRLCK57A/GhRLCK56A</i>	0.091	0.521	0.175
<i>GhRLCK57A/GhRLCK55D</i>	0.086	0.467	0.185
<i>GhRLCK57A/GhRLCK56D</i>	0.087	0.515	0.169
<i>GhRLCK69A/GhRLCK70A</i>	0.044	0.524	0.085
<i>GhRLCK69A/GhRLCK70D</i>	0.044	0.524	0.085
<i>GhRLCK24A/GhRLCK23D</i>	0.105	0.635	0.165
<i>GhRLCK24A/GhRLCK27D</i>	0.235	1.85	0.127
<i>GhRLCK24A/GhRLCK25D</i>	0.143	0.838	0.171
<i>GhRLCK56A/GhRLCK55D</i>	0.068	0.463	0.146
<i>GhRLCK56A/GhRLCK57D</i>	0.092	0.504	0.182
<i>GhRLCK70A/GhRLCK69D</i>	0.041	0.492	0.083
<i>GhRLCK52A/GhRLCK48D</i>	0.342	1.501	0.228
<i>GhRLCK52A/GhRLCK53D</i>	0.122	1.062	0.115
<i>GhRLCK52A/GhRLCK54D</i>	0.124	0.846	0.146
<i>GhRLCK52A/GhRLCK51D</i>	0.203	1.668	0.121
<i>GhRLCK15A/GhRLCK14D</i>	0.163	0.913	0.179
<i>GhRLCK1D/GhRLCK4D</i>	0.259	2.28	0.113

<i>GhRLCK1D/GhRLCK3D</i>	0.316	2.035	0.155
<i>GhRLCK1D/GhRLCK2D</i>	0.225	0.698	0.323
<i>GhRLCK11D/GhRLCK10D</i>	0.134	1.504	0.089
<i>GhRLCK11D/GhRLCK9D</i>	0.146	2.018	0.073
<i>GhRLCK32D/GhRLCK33D</i>	0.094	0.391	0.24
<i>GhRLCK41D/GhRLCK42D</i>	0.05	0.439	0.114
<i>GhRLCK53D/GhRLCK54D</i>	0.081	0.557	0.145
<i>GhRLCK53D/GhRLCK51D</i>	0.238	2.801	0.085
<i>GhRLCK53D/GhRLCK49D</i>	0.28	1.873	0.149
<i>GhRLCK66D/GhRLCK67D</i>	0.088	0.538	0.164
<i>GhRLCK28D/GhRLCK29D</i>	0.088	0.724	0.122
<i>GhRLCK60D/GhRLCK61D</i>	0.073	0.736	0.1
<i>GhRLCK48D/GhRLCK54D</i>	0.303	1.803	0.168
<i>GhRLCK48D/GhRLCK51D</i>	0.281	3.891	0.072
<i>GhRLCK48D/GhRLCK49D</i>	0.115	0.678	0.169
<i>GhRLCK30D/GhRLCK9D</i>	0.584	2.813	0.208
<i>GhRLCK54D/GhRLCK51D</i>	0.232	3.652	0.064
<i>GhRLCK54D/GhRLCK49D</i>	0.287	1.994	0.144
<i>GhRLCK50D/GhRLCK51D</i>	0.083	0.915	0.091
<i>GhRLCK4D/GhRLCK3D</i>	0.143	0.779	0.184
<i>GhRLCK14D/GhRLCK15D</i>	0.168	0.972	0.173
<i>GhRLCK37D/GhRLCK38D</i>	0.059	0.484	0.122
<i>GhRLCK6D/GhRLCK5D</i>	0.053	0.687	0.077
<i>GhRLCK6D/GhRLCK7D</i>	0.076	0.528	0.145
<i>GhRLCK5D/GhRLCK7D</i>	0.061	0.604	0.101
<i>GhRLCK7D/GhRLCK8D</i>	0.07	0.486	0.144
<i>GhRLCK25D/GhRLCK27D</i>	0.284	4.005	0.071
<i>GhRLCK25D/GhRLCK24D</i>	0.139	0.857	0.162
<i>GhRLCK27D/GhRLCK24D</i>	0.235	1.725	0.136
<i>GhRLCK57D/GhRLCK56D</i>	0.088	0.498	0.176
<i>GhRLCK69D/GhRLCK70D</i>	0.041	0.468	0.088

Table S5. The cis-elements in the promoter of *GhRLCKs*

Gene	MB S	LTR	TCA- element	CGTCA -motif	TGACG -motif	ABR E	P- box	GARE -motif	TATC -box	ERE	W- box	TC-rich repeats
<i>GhRLCK8A</i>	0	0	0	0	0	2	0	0	0	0	2	0
<i>GhRLCK1A</i>	0	0	0	0	0	0	0	0	0	1	0	1
<i>GhRLCK22A</i>	0	0	1	2	2	3	0	1	0	2	0	1
<i>GhRLCK63A</i>	0	0	1	0	0	3	0	0	0	6	0	1
<i>GhRLCK11A</i>	0	0	0	0	0	2	0	0	0	0	2	0
<i>GhRLCK45A</i>	0	0	2	2	2	3	0	0	0	1	1	1
<i>GhRLCK59A</i>	0	1	0	0	0	0	1	0	0	4	0	0
<i>GhRLCK68A</i>	0	0	0	0	0	0	0	0	0	1	0	0
<i>GhRLCK58A</i>	0	0	2	2	2	3	0	0	0	2	1	0
<i>GhRLCK47A</i>	1	0	0	1	1	0	0	0	1	2	0	1
<i>GhRLCK46A</i>	0	0	0	0	0	0	0	0	0	3	0	1
<i>GhRLCK35A</i>	0	1	2	0	0	2	0	0	0	0	0	0
<i>GhRLCK55A</i>	1	0	0	0	0	2	0	0	0	1	2	0
<i>GhRLCK61A</i>	0	0	1	0	0	2	0	0	0	1	0	0
<i>GhRLCK31A</i>	0	1	0	1	1	0	0	0	0	1	0	1
<i>GhRLCK33A</i>	1	0	0	0	0	0	1	0	0	5	0	0
<i>GhRLCK40A</i>	2	0	1	0	0	1	0	0	0	4	0	0
<i>GhRLCK53A</i>	1	0	0	1	1	4	0	0	0	5	1	1
<i>GhRLCK66A</i>	0	0	1	0	0	0	0	0	0	2	1	0
<i>GhRLCK28A</i>	1	0	0	0	0	1	0	0	0	7	0	0
<i>GhRLCK60A</i>	0	0	1	1	1	0	0	0	0	3	0	0
<i>GhRLCK48A</i>	1	2	2	1	1	1	0	0	0	0	0	1
<i>GhRLCK29A</i>	0	0	1	0	0	3	0	0	0	3	0	0
<i>GhRLCK10A</i>	1	0	0	0	0	0	0	0	0	6	0	2
<i>GhRLCK64A</i>	0	0	0	0	0	5	0	0	0	1	0	1
<i>GhRLCK19A</i>	0	0	1	5	5	2	0	0	0	1	0	0
<i>GhRLCK42A</i>	1	0	0	2	2	0	2	0	0	0	0	0
<i>GhRLCK54A</i>	0	0	0	1	1	3	0	0	0	0	0	0
<i>GhRLCK50A</i>	0	0	0	1	1	0	0	0	0	4	2	0
<i>GhRLCK4A</i>	0	0	0	0	0	0	0	0	0	4	0	0
<i>GhRLCK41A</i>	0	0	0	0	0	1	0	0	0	3	2	1
<i>GhRLCK51A</i>	0	0	0	2	2	3	0	0	0	2	1	1
<i>GhRLCK44A</i>	0	1	1	1	1	1	0	0	0	2	0	0
<i>GhRLCK26A</i>	0	0	0	2	2	0	0	0	0	6	2	0
<i>GhRLCK23A</i>	1	0	1	3	3	5	0	0	0	1	0	0
<i>GhRLCK14A</i>	2	0	1	2	2	2	1	0	0	1	2	0
<i>GhRLCK36A</i>	0	1	0	0	0	1	1	0	0	5	1	0
<i>GhRLCK21A</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>GhRLCK6A</i>	0	0	1	0	0	0	0	0	0	1	0	0
<i>GhRLCK67A</i>	2	1	0	1	1	1	2	0	0	0	3	0
<i>GhRLCK32A</i>	0	0	0	0	0	0	0	0	0	1	0	0

<i>GhRLCK62A</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>GhRLCK5A</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>GhRLCK49A</i>	0	0	1	0	0	0	1	0	0	3	0	0
<i>GhRLCK7A</i>	0	0	1	0	0	0	0	0	0	0	0	0
<i>GhRLCK30A</i>	0	0	1	1	1	0	1	0	0	1	0	0
<i>GhRLCK9A</i>	0	0	2	0	0	0	0	0	0	7	0	0
<i>GhRLCK65A</i>	0	0	0	0	0	0	2	0	0	2	1	0
<i>GhRLCK25A</i>	2	0	1	0	0	1	2	0	0	2	0	0
<i>GhRLCK20A</i>	0	0	0	0	0	0	0	1	0	3	0	1
<i>GhRLCK27A</i>	1	0	0	3	3	1	1	0	1	0	3	0
<i>GhRLCK16A</i>	0	0	0	1	1	1	0	0	0	2	1	0
<i>GhRLCK17A</i>	0	1	1	1	1	1	0	0	0	0	2	0
<i>GhRLCK37A</i>	0	0	1	1	1	2	1	0	0	1	0	0
<i>GhRLCK57A</i>	1	0	0	2	2	0	0	0	0	3	2	0
<i>GhRLCK69A</i>	0	1	0	1	1	2	0	0	0	5	1	0
<i>GhRLCK24A</i>	0	1	2	1	1	1	0	0	0	0	2	1
<i>GhRLCK38A</i>	0	1	0	0	0	1	0	0	0	3	1	0
<i>GhRLCK56A</i>	3	1	0	0	0	3	1	0	0	1	3	0
<i>GhRLCK70A</i>	0	0	2	0	0	2	0	0	0	4	1	0
<i>GhRLCK18A</i>	0	0	1	0	0	0	0	0	0	0	1	2
<i>GhRLCK52A</i>	0	0	1	3	3	1	0	1	1	5	1	2
<i>GhRLCK43A</i>	0	0	1	0	0	2	0	0	0	3	1	0
<i>GhRLCK15A</i>	0	1	0	2	2	2	1	1	0	1	3	0
<i>GhRLCK13D</i>	0	0	2	0	0	0	1	0	0	1	1	1
<i>GhRLCK12D</i>	1	2	2	2	2	1	0	0	0	3	0	1
<i>GhRLCK1D</i>	0	0	0	0	0	0	0	0	0	1	1	0
<i>GhRLCK22D</i>	0	0	1	2	2	3	1	1	0	0	0	1
<i>GhRLCK35D</i>	0	0	3	3	3	3	1	0	0	2	0	1
<i>GhRLCK11D</i>	0	1	3	0	0	1	0	0	0	2	1	0
<i>GhRLCK63D</i>	1	0	1	0	0	2	0	0	0	5	0	0
<i>GhRLCK8D</i>	1	0	0	0	0	1	0	0	0	0	2	0
<i>GhRLCK45D</i>	0	1	1	1	1	0	0	0	0	1	0	0
<i>GhRLCK36D</i>	0	0	1	1	1	4	1	0	0	1	0	0
<i>GhRLCK55D</i>	1	1	0	1	1	2	0	0	0	1	2	0
<i>GhRLCK58D</i>	0	0	2	2	2	4	0	0	0	1	1	0
<i>GhRLCK68D</i>	0	1	0	0	0	0	0	0	0	2	0	0
<i>GhRLCK46D</i>	0	1	0	0	0	0	0	0	0	0	0	2
<i>GhRLCK47D</i>	1	0	0	1	1	0	0	0	0	8	0	0
<i>GhRLCK43D</i>	1	1	1	2	3	0	2	0	0	1	1	0
<i>GhRLCK19D</i>	1	1	1	1	1	0	1	0	0	3	0	0
<i>GhRLCK40D</i>	0	0	2	0	0	1	2	0	0	0	0	2
<i>GhRLCK32D</i>	0	3	1	1	1	0	0	0	0	1	1	0
<i>GhRLCK34D</i>	1	0	0	0	0	1	1	0	0	3	0	0
<i>GhRLCK41D</i>	0	0	1	1	1	1	0	0	0	3	1	0

<i>GhRLCK53D</i>	2	1	0	1	1	4	1	0	0	2	0	1
<i>GhRLCK66D</i>	0	1	2	0	0	1	0	0	0	2	1	0
<i>GhRLCK28D</i>	0	0	0	1	1	0	0	0	0	8	0	0
<i>GhRLCK60D</i>	1	0	1	1	1	0	0	0	0	2	0	0
<i>GhRLCK48D</i>	2	1	2	1	1	1	0	0	0	0	0	1
<i>GhRLCK30D</i>	0	0	1	0	0	4	0	0	0	5	0	0
<i>GhRLCK10D</i>	1	0	0	0	0	0	1	0	0	5	0	1
<i>GhRLCK54D</i>	0	0	1	2	2	6	0	0	0	0	1	0
<i>GhRLCK50D</i>	1	0	0	0	0	0	0	0	0	1	0	0
<i>GhRLCK4D</i>	0	2	0	1	1	0	0	1	0	3	0	1
<i>GhRLCK51D</i>	0	0	1	1	1	5	0	0	0	1	1	0
<i>GhRLCK42D</i>	0	0	1	1	1	0	0	0	0	3	1	1
<i>GhRLCK14D</i>	2	1	0	0	0	2	1	0	0	1	2	0
<i>GhRLCK23D</i>	1	0	2	5	5	4	0	0	0	1	0	0
<i>GhRLCK37D</i>	0	0	1	0	0	0	0	0	0	2	0	0
<i>GhRLCK21D</i>	1	1	0	0	0	2	1	0	0	0	1	0
<i>GhRLCK6D</i>	1	0	1	0	0	0	0	0	0	4	1	0
<i>GhRLCK67D</i>	1	0	0	1	1	1	2	0	0	0	2	0
<i>GhRLCK33D</i>	0	1	1	2	2	3	0	0	0	1	0	1
<i>GhRLCK5D</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>GhRLCK3D</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>GhRLCK49D</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>GhRLCK7D</i>	0	1	0	0	0	0	2	0	0	5	0	0
<i>GhRLCK9D</i>	0	0	3	0	0	0	0	0	0	6	0	0
<i>GhRLCK31D</i>	0	0	0	3	3	1	1	0	0	0	0	0
<i>GhRLCK25D</i>	1	0	0	0	0	1	2	0	0	3	0	0
<i>GhRLCK20D</i>	0	0	0	1	1	0	0	1	0	4	0	1
<i>GhRLCK38D</i>	0	0	1	0	0	2	1	1	0	0	0	0
<i>GhRLCK27D</i>	0	0	0	3	3	2	1	0	1	0	3	1
<i>GhRLCK16D</i>	0	1	1	0	0	1	0	0	0	2	2	0
<i>GhRLCK2D</i>	1	0	1	0	0	2	1	0	1	0	0	0
<i>GhRLCK17D</i>	0	0	0	0	0	1	0	0	0	3	2	0
<i>GhRLCK57D</i>	1	0	0	0	0	1	0	0	0	2	2	0
<i>GhRLCK69D</i>	0	1	0	3	3	4	1	0	0	2	0	0
<i>GhRLCK24D</i>	2	1	2	0	0	0	0	0	0	6	1	0
<i>GhRLCK56D</i>	3	0	0	1	1	2	1	0	0	1	2	0
<i>GhRLCK39D</i>	0	1	0	0	0	1	0	0	0	3	1	0
<i>GhRLCK70D</i>	0	1	0	1	1	0	0	0	1	0	0	1
<i>GhRLCK18D</i>	0	1	2	0	0	1	0	0	0	0	1	1
<i>GhRLCK44D</i>	0	0	1	1	1	0	0	0	0	2	0	1
<i>GhRLCK29D</i>	2	0	2	0	0	0	0	0	0	4	1	0
<i>GhRLCK61D</i>	0	0	1	1	1	2	1	0	0	1	0	1
<i>GhRLCK15D</i>	0	1	0	2	2	2	1	1	0	0	3	0
<i>GhRLCK52D</i>	0	0	1	3	3	1	0	1	1	4	1	0

Table S6. Primers used in this study

Gene	Forward Primer	Reverse Prime
RT-PCR primers		
GhRLCK18A	CGTCAAGAACATGCTTGCTG	ATGCTGTAAGAGGGCTCAG
GhRLCK7	GGTCGTTATCCCATAACGA	GTCTGCCATACTCCTTCG
GhRLCK1A	CGGCATCATTGGAGAACAGAC	GCTGATTCTCCGGGTGAAG
GhRLCK20A	GAAACCCAAGCCTCCTGAATC	ATCCACCTGCCCGATCATG
GhRLCK24A	CTGCTCCTGAACTGAGAAC	TGTGTGGCATCCCTCAACTC
GhRLCK54D	TGGAGATCCATCATCCCTAG	AGGTAGACAGATCCTCCGAC
GhRLCK53D	AACAAGACGAGGACACCGTC	CTATGATTCGCTTCAGGGC
GhRLCK4D	GTCTTGTGTTAGGTGGATG	ATCTTCTGCTGCCTCCATC
GhRLCK49	ACCCAAGGATTCATCTTCG	ATCACTCCTAGTTCCCTGAG
GhRLCK64A	GCTAGAACCAAAGCTGAGAGC	GTGGCTGTTCTAACGTTCACTG
GhRLCK9A	ACACCACCAACAAACAAAC	GTTGAAGCTGCCAATTACG
GhRLCK43A	ATTGAAGAACAGCCGGAC	GGATTCTGCCGTAGATCTTG
GhRLCK22D	TCGCCATTCTGCTGATTG	CAAATCCTCCTCACCAAGC
GhRLCK42D	TGTTGGGCTGTCTGAAACG	TGGATCAGGGTTGTCAGATG
GhUBQ7	AGGCATTCCACCTGACCAAC	CAGCGAGCTTGACCTTCTTC
VIGS primer		
GhRLCK7	CGGAATTCCGGCCAGAACATGCTATTAGG	GGGGTACCTTGTCAACACAGGACC