

Supplementary Table S1. The 16 genomes of Brassicaceae

Species	Version
<i>Arabidopsis thaliana</i>	V10.1
<i>Arabis alpina</i>	V4
<i>Aethionema arabicum</i>	V1.0
<i>Arabidopsis halleri</i>	Tada Mine V1.1
<i>Arabidopsis lyrata</i>	MN47 V2.1
<i>Caradmine hirsuta</i>	V1.0
<i>Descurainia sophia</i>	V1.1
<i>Isatis indigotica</i>	V1
<i>Sisymbrium irio</i>	V1.0
<i>Schrenkiella parvula</i>	V1.0
<i>Brassica napus</i>	Darmor-bzh V10
<i>Brassica nigra</i>	Ni100 V2.0
<i>Brassica oleracea</i>	JZS V2.0
<i>Brassica rapa</i>	ChiifuV3.0
<i>Raphanus sativus</i>	V1.0
<i>Brassica juncea</i>	tumida V2

Supplementary Table S2. The copy numbers of *RCO* homologues in three species (*B. rapa*, *B. juncea* and *B. nigra*) different variants.

Category name	Short name	The copy numbers of <i>RCO</i> homologues in LF subgenome	The copy numbers of <i>RCO</i> homologues in MF1 subgenome	The copy numbers of <i>RCO</i> homologues in MF2 subgenome	The name of genome
<i>B. rapa</i>	Chiifu_V3.0	2	1	1	<i>B. rapa</i> L. ssp. <i>pekinensis</i> Chiifu-401-42 (v3.0)
<i>B. rapa</i>	BRO	2	1	1	<i>Brassica rapa</i> cv. BRO V1
<i>B. rapa</i>	CCA	2	1	1	<i>Brassica rapa</i> cv. CCA V1
<i>B. rapa</i>	CCB	2	1	1	<i>Brassica rapa</i> cv. CCB V1
<i>B. rapa</i>	CXA	2	1	1	<i>Brassica rapa</i> cv. CXA V1
<i>B. rapa</i>	CXB	2	1	1	<i>Brassica rapa</i> cv. CXB V1
<i>B. rapa</i>	MIZ	2	1	1	<i>Brassica rapa</i> cv. MIZ V1
<i>B. rapa</i>	OIA	2	1	1	<i>Brassica rapa</i> cv. OIA V1
<i>B. rapa</i>	OIB	4	1	1	<i>Brassica rapa</i> cv. OIB V1
<i>B. rapa</i>	IOC	4	1	1	<i>Brassica rapa</i> cv. OIC V1
<i>B. rapa</i>	PCA	2	1	1	<i>Brassica rapa</i> cv. PCA V1
<i>B. rapa</i>	PCB	2	1	1	<i>Brassica rapa</i> cv. PCB V1
<i>B. rapa</i>	TCA	2	1	1	<i>Brassica rapa</i> cv. TCA V1
<i>B. rapa</i>	TUA	1	1	1	<i>Brassica rapa</i> cv. TUA V1
<i>B. rapa</i>	TUE	2	1	1	<i>Brassica rapa</i> cv. TUE V1
<i>B. rapa</i>	WTC	2	1	1	<i>Brassica rapa</i> cv. WTC V1
<i>B. rapa</i>	Z1	2	1	1	<i>Brassica rapa</i> cv. Z1 V1
<i>B. juncea</i> A	T84-66-V2_A	4	1	1	<i>Brassica juncea</i> cv. tumida V2_A
<i>B. juncea</i> B	T84-66-V2_B	2	1	2	<i>Brassica juncea</i> cv. tumida V2_B
<i>B. juncea</i> A	AU213 V1_A	4	1	1	<i>Brassica juncea</i> cv. AU213 V1_A
<i>B. juncea</i> B	AU213 V1_B	2	0	2	<i>Brassica juncea</i> cv. AU213 V1_B
<i>B. juncea</i> A	SY V1_A	6	0	0	<i>Brassica juncea</i> var. Sichuan Yellow V1_A
<i>B. juncea</i> B	SY V1_B	0	0	2	<i>Brassica juncea</i> var. Sichuan Yellow V1_B
<i>B. juncea</i> A	Varuna V1_A	4	1	1	<i>Brassica juncea</i> cv. Varuna V1_A
<i>B. juncea</i> B	Varuna V1_B	2	2	1	<i>Brassica juncea</i> cv. Varuna V1_B
<i>B. nigra</i>	Ni100 V2.0	2	1	2	<i>Brassica. nigra</i> cv. Ni100 V2.0
<i>B. nigra</i>	San V1.1	2	1	2	<i>Brassica. nigra</i> cv. Sangam V1.1

Supplementary Table S3. The protein sequences of 55 *RCO* homologues (including *ChRCO*)
See excel

Supplementary Table S4. Genetic analyses of the lobed leaves in the F2 segregating population

F2 population	Observation				Mendelian expectations	χ^2 value	P -value
	Lobed	Semi- lobed	Serrated	Total	Lobed/Semi- lobed/Serrated		
20JZS0771	79	164	87	330	1:2:1	0.4	0.82

P-value > 0.05 is considered as meeting Mendel's Law of Separation

Supplementary Table S5. The information of 10 KASP markers

Marker name	The chromosome of T84-66V2	position	Ref	Alt	A1 sequence (5' to 3')	A2 sequence (5' to 3')	C1 sequence (5' to 3')
BjLob1	AA_Chr10	17665913	T	C	GAAGGTGACCA AGTTCATGCTAA ACCCCGAGACG TGAAGGAAAT	GAAGGTCGGAG TCAACGGATTA AACCCCGAGAC GTGAAGGAAAC	CAGAATCAT GGGGTGGT GATAGAT
BjLob2	AA_Chr10	17898660	T	G	GAAGGTGACCA AGTTCATGCTTT GCAGAGACCTG TTCTGATACCT	GAAGGTCGGAG TCAACGGATTT TGCAGAGACCT GTTCTGATACC	ATCCACTTT CTATGAGA AGAGGCC
BjLob3	AA_Chr10	18338865	A	G	GAAGGTGACCA AGTTCATGCTTA GACGCTGTTTCG AAGGACACATA	GAAGGTCGGAG TCAACGGATTT AGACGCTGTTC GAAGGACACAT	TTTTGTTGG ATAAGAAG ACACGCC
BjLob4	AA_Chr10	18373531	C	A	GAAGGTGACCA AGTTCATGCTGT GTTTTTCATGTAT AATAGATGCGT GAC	GAAGGTCGGAG TCAACGGATTG TGTTTTTCATGT ATAATAGATGC GTGAA	TAGGAAGT CGTTGAAGT CGAACTT
BjLob5	AA_Chr10	18392782	C	T	GAAGGTGACCA AGTTCATGCTGA TCATACCACTCA CAAGGCCCTC	GAAGGTCGGAG TCAACGGATTG ATCATACCACT CACAAGGCCCT	TCTTGTCTG ATGAATAA CCGTCGT
BjLob6	AA_Chr10	18396136	C	G	GAAGGTGACCA AGTTCATGCTTC ATAGCAACAAA CCAAAGCATAA TC	GAAGGTCGGAG TCAACGGATTT CATAGCAACAA ACCAAAGCATA ATG	TTTATGGTC TCTGTGAGC GGTTTA
BjLob7	AA_Chr10	18456694	T	C	GAAGGTGACCA AGTTCATGCTAC AATCCTAATAAC TACACCTAATAA CTACAT	GAAGGTCGGAG TCAACGGATTA CAATCCTAATA ACTACACCTAA TAACTACAC	ATCTCTTTG CACAAGGTT AAAGCC
BjLob8	AA_Chr10	18520454	A	T	GAAGGTGACCA AGTTCATGCTGC TCGATGCAGCT AGATCCA GAAGGTGACCA	GAAGGTCGGAG TCAACGGATTG CTCGATGCAGC TAGATCCT GAAGGTCGGAG	AGATGCCAT GATGAGAC TCTCTTC
BjLob9	AA_Chr10	18657613	G	T	GAAGGTGACCA AGTTCATGCTGG ATGATGGAATC AAAGAAAAGCA G	GAAGGTCGGAG TCAACGGATTG GATGATGGAAT CAAAGAAAAGC AT	GATCCAAG CCCTAATGT TGTC AAC
BjLob10	AA_Chr10	18789848	T	A	GAAGGTGACCA AGTTCATGCTAC AAAGCCTAATA CGAATCAGAAG T	GAAGGTCGGAG TCAACGGATTA CAAAGCCTAAT ACGAATCAGAA GA	CCATTTTGA ATATGGAAT CCGCCA

Supplementary Table S6. qPCR primers

Primer name	Sequence (5' to 3')
BjRCOs-QF	CAACGACGAGCAATGTTGAAA
BjRCOs-QR	CTTGGATATTGGCACGCATT
BjLMI1s-QF	ATACGATTCGCTCAGGCAAG
BjLMI1s-QR	GATGAGCATCGGGTTGTTGT
ACTIN2-QF	GGAGCTGAGAGATTCCGTTG
ACTIN2-QR	GAACCACCACTGAGGACGAT

Supplementary Table S7. Specific gene sequences

gene name	Specific sequence (5' to 3')
<i>BjRCO.1</i>	ATGTTGAAAACACGAGAGTTGCTTT
<i>BjLMI1.1</i>	AGAGAAGAAAATTTAAACAACAATC
<i>BjRCO.2</i>	ATGTTGAAAACATGAGAGTTGCTTT
<i>BjLMI1.2</i>	AGAGCAGAAAATTTAAACAACAATC
Actin-1	CAAGAGAGGTATTCTTACCCTCAA
Actin-2	CAGAGGCGCCGCTTAACCCGAAAG
Actin-3	TATGTATGTCGCTATTCAGGCTGTTC
Actin-4	CGTGCCGATCTACGAGGGTTATGCT

Supplementary Table S8. *BjRCO* s sequences

gene name	gene sequence (include 3' UTR and 5' UTR) (5' to 3')
<i>BjRCO.1</i>	GGGGAACCTCTATCTCAATATAAGTATGTGTATAACTATCTCTTTCTCACTGCATGCT CTCACACTTCGTTGCACCTCCAAAAAAGTGTATAGAAGAAGAACTTATCGTCACG CCTGACCCGCTCATTACAAGAACAGCAAGACTAAAGGAAATGGAATGGTCAACG ACGAGCAATGTTGAAAACACGAGAGTTGCTTTTATGCCACTTCAGTGGCTGGAGTC TAACTCATCCAACCTCGCTCCAAAACCTTCAGCTATGATCCTTATGCAGGAAATTCGTC TACGCCCGTCCTTACGCAAACCGGACCGGTTATTTCTGTACCGGAATCATCAGAAA AGATACCAATGCGTGCCAATATCCAAGTAACGACGACGAGATGATAAAGAAGAA GCAGAAACTAACGACTGAACAATTAGCTTCACTTGAACAGAGTTTTCAAGAAGATA TCAAACCTTGATTACAGACAGGAAGGTGAAGCTGTCTGAAGGAGCTTCGTCTGCAGCCA CGTCAGGTAGCTGTTTGGTTCCAGAACCGCCGTGCACGGTGGAGGGTGAAGCATCT CGAGGAGTCGTACAACCTCGCTAAGGAAAAGAGTACGACGTGGTTTCAAGACAGAAT CAAATGCTACACGATGAGGTGATGAATCTGAGAGGTGTAATACTAAAAGACCATTT GATGAAGAGGCCAAATGAATCTGAACAACAATCAAATAGCCGGAGGGAGTCAAATT TACGGTACTGCAGATCAATATAATAATCCAATGTGTGTTGCTTCAACTTGTGGCCC CCGTTATCATCGCAACAGCCTTACCCATGGTAGGTGTTTCGGATCTTGGAGAGCGA GAGAGACTCACGTCAAGCTTAAGATTTGTCTGGAGTTTTAAATTTTAAGTAATGTTAG ACTAAGGCAGACTTTTATCATATGAATGGAATGTTTTGTGTCCTAAACCTAGCCA TATTTTGGATCTGTAAATGGTTCATAGAAGATCAGTGTACTTAGGGCAAATCGGTGG CCTTGGGTCAACAAGACCAACAATCTTAAAGAATGTCTAAACAAAACAAGCTAGTA TAATTT
<i>BjRCO.2</i>	GCAAGGTGAGACTAAAAAATCACACTTCACCCTCTTTCAACCTCTATCTCCATACTC AACCTCTATCACAATATAAGTATAAGTGTATATCTCTTTCTCACTGCATGCTCTCACA CTTCGTTGCACCTCCAAAAAAGTGTATAGAAGAAGAACTTATCGTCACGCCTGAC CCGCTCATTACAAGAACAGCAAGACTAAAGGAAATGGAATGGTCAACGACGAGC AATGTTGAAAACATGAGAGTTGCTTTTATGCCACTTCAGTGGCTGGAGTCTAACTCA TCCAACCTCGCTCCAAAACCTTCAGCTATGATCCTTATGCAGGAAATTCGTCTACGCCC GTCCTTACGCAAACCGGACCGGTTATTTCTGTACCGGAATCATCAGAAAAGATCAC CAATGCGTGCCAATATCCAAGTAACGACGACGAGATGATAAAGAAGAAGCAGAAA CTAACGACTGAACAATTAGCTTCACTTGAACAGAGTTTTCAAGAAGATATCAAACCTT GATTCAGACAGGAAGGTGAAGCTGTCTGAAGGAGCTTCGTCTGCAGCCACGTCAGG TAGCTGTTTGGTTCCAGAACCGCCGTGCACGGTGGAGGGTGAAGCATCTCGAGGA GTCGTACAACCTCGCTAAGGAAAGAGTACGACGTGGTTTCAAGACAGAATCAAATGC TACACGATGAGGTGATGAATCTGAGAGGTGTAATACTAAAAGACCATTTGATGAAG AGGCAAATGAATCTGAACAACAATCAAATAGCCGGAGGGAGTCAAATTTACGGTA CTGCAGATCAATATAATAATCCAATGTGTGTTGCTTCAACTTGTGGCCCCCGTTATC ATCGCAACAGCCTTACCCATGGTAGGTGTTTCGGATCTTGGAGAGCGAGAGAGACT CACGTCAAGCTTAAGATTTGTCTGGAGTTTTAAATTTTAAGTAATGTTAGACTAAGGC AGACTTTTATCATATGAATGGAATGTTTTGTGTCCTAAACCTAGCCATATTTTGGTA TCTGTAAATGGTTCATAGAAGATCAGTGTACTTAGGGCAAATCGGTGGCCTTGGGT CACAAGACCAACAATCTTAAAGAATGTCTAAACAAAACAAGCTAGTATAATTT

Supplementary Table S9. Specific alternative splicing sequences

Alternative splicing name	Specific sequence (5' to 3')
<i>BjRCO.1</i>	CGAGAGTTGCTTTTATGCCACTTCAGTGGCTGGAGTCTAACTCATCC AACTCGCTCCAAAACCTTCAGCTATGATCCTTATGCAGGAAATTCGT
<i>BjRCO.1_A3SS</i>	CGAGAGTTGCTTTTATGCCACTTCAGTGGCTGGAGTCTAACTCATCC AACTCGCTCCAAAACCTTCAGCTATGATCCTTATGCAGTTTTACCAG
<i>BjRCO.2</i>	TGAGAGTTGCTTTTATGCCACTTCAGTGGCTGGAGTCTAACTCATCCA ACTCGCTCCAAAACCTTCAGCTATGATCCTTATGCAGGAAATTCGT
<i>BjRCO.2_A3SS</i>	TGAGAGTTGCTTTTATGCCACTTCAGTGGCTGGAGTCTAACTCATCCA ACTCGCTCCAAAACCTTCAGCTATGATCCTTATGCAGTTTTACCAG