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Supplementary Material

Genetic variation for leaf carbon isotope discrimination and its association with transpiration efficiency in canola (*Brassica napus*)

Shek M. Hossain[A,D], *Josette Masle*[B], *Andrew Easton*[C,E], *Malcolm N. Hunter*[A], *Ian D. Godwin*[A], *Graham D. Farquhar*[B] *and Christopher J. Lambrides*[A,F]

[A]The University of Queensland, School of Agriculture and Food Sciences, Brisbane, Qld 4072, Australia.

[B]Plant Sciences, Research School of Biology, Australian National University, ACT 2601, Australia.

[C]Advanta Seeds Pty Ltd, 268 Anzac Avenue, Toowoomba, QLD 4350, Australia.

[D]Present address: CSIRO Agriculture and Food, Building 101, Clunies Ross Street, Black Mountain, ACT 2601, Australia.

[E]Present address: Natural Resource Management (NRM) North, PO Box 1224, Launceston, TAS 7250, Australia.

[F]Corresponding author. Email: chris.lambrides@uq.edu.au

Table S1. The monthly climate statistics for the canola growing seasons in 2005, 2006 and 2007

Table S2. The monthly climate statistics for the canola growing seasons in Pot06

Table S3. Trait values for 107 B. napus lines grown in different field experiments (83 in F05; 68 in F06; 34 in F07).

Table S1. The monthly climate statistics for the canola growing seasons in 2005, 2006 and 2007[A]

Climate statistics	Year	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Mean maximum temperature (°C)	2005	24.6	21.4	21.9	23.0	26.5	30.1	29.1	34.8	28.0
	2006	24.9	21.3	21.5	24.2	25.0	28.4	30.2	29.6	27.3
	2007	26.6	19.4	20.5	23.0	26.2	30.5			
Mean minimum temperature (°C)	2005	10.1	9.9	7.6	6.1	10.3	15.9	18.0	19.6	13.9
	2006	7.9	7.0	6.4	6.8	11.2	13.6	15.5	16.5	13.2
	2007	12.2	8.8	4.8	8.9	9.5	14.3			
Mean rainfall (mm)	2005	48.2	74.2	2.8	7.3	52.6	158.9	144.4	25.3	664.9
	2006	13.8	19.6	37.3	35.5	76.5	0.8	104.8	75.9	597.5
	2007	9.4	74.2	1.4	83.3	16.4	45.6	113.1	113.0	606.5
Mean daily solar exposure (MJ/(m*m))	2005	13.6	10.6	13.6	16.6	19.6	21.3	23.1		
	2006	15.9	12.3	12.9	17.2	19.8	22.4	26.0	23.1	19.4
	2007	14.6	10.9	15.2	15.*4*	21.4	24.3	22.2	21.5	19.4
Mean 9am relative humidity (%)	2005	73.0	79.0	74.0	62.0	70.0	69.0	74.0	56.0	70.0
	2006	60.0	70.0	71.0	61.0	67.0	58.0	58.0	60.0	64.0
	2007	68.0	67.0	55.0	65.0	60.0	55.0			

[A]Station: University of Queensland Gatton, Number: 40082, Lat: 27.54° Lon: 152.34° Elevation: 89 m

Table S2. The monthly climate statistics for the canola growing seasons in Pot06 [A]

Year	Climate statistics	May	Jun	Jul	Aug	Sep
2006	Mean minimum temperature (°C)	12.4	11.4	10.7	11.1	14.3
	Mean maximum temperature (°C)	25.0	21.8	22.5	24.0	24.2
	Mean daily sunshine (hours)	9.1	6.4	7.2	8.8	8.1
	Mean 3pm relative humidity (%)	40.0	52.0	45.0	45.0	53.0

[A] Source: Australian Bureau of Meteorology

Table S3. Trait values for 107 B. napus lines grown in different field experiments (83 in F05; 68 in F06; 34 in F07). Data presented here are the mean of double replicated trials conducted in Gatton in 2005, 2006 and 2007 respectively.

			F05						F06							F07				
Genotype	Hybrid status	Cyto-plasm	Δ (‰)	SLW (gm-2)	SPAD	HGT (cm)	Flowering time (days)	VGR	Δ (‰)	SLW (gm-2)	SPAD	HGT (cm)	Flowering time (days)	OIC (%)	VGR	Δ (‰)	HGT (cm)	Flowering time (days)	OIC (%)	VGR
65052	P	INR	21.9	59.9	46.5	25	70.0	3	20.1	46.6	42.5	120	77.5	38.3	1					
65053	P	INR	22.4	40.2	36.7	53	53.0	3	20.8	66.2	38.7	110	64.0	37.0	5	22	105	62	34	4
65054	P	INR	21.9	55.8	41.3	20	92.0	4	20.6	53.9	42.1	100	94.0	30.5	1	22	105	72	25	5
65055	P	INR	21.8	55.2	45.5	23	93.5	5	20.2	64.8	55.5	150	89.5	36.2	9					
65056	P	INR	21.9	63.6	45.8	25	66.5	3	20.5	53.7	49.4	100	81.0	34.0	1	22	120	71	32	2
CBI4403	H	INR	21.6	53.0		25	76.0	6	20.9	53.3	44.6	150	77.5	37.3	9	21	155	72	35	8
CBI4404	H	INR	21.9	49.9		28	74.5	6	20.5	60.4	43.3	160	74.0	36.1	9	22	158	71	38	9
CBI4407	H	INR	21.9	44.9		28	92.0	6	20.1	65.1	47.6	150	87.5	32.5	9	21	143	75	31	9
H4722	H	INR	21.6	54.2		28	64.0	5	21.3	51.7	46.3	140	69.0	37.7	9	22	133	66	39	9
RC3085	P	INR	22.3	62.3		23	65.0	4	20.4	64.2	43.4	110	77.5	36.4	5	21	111	70	29	6
41001	P	INR	22.4	45.7	37.4	48	55.0													
61001	P	INR	22.2	33.4	37.4	83	52.0													
CBI4401	H	INR	22.0	45.4		28	75.5	7												
H1480	H	INR	22.6	58.4		28		5												
H4481	H	INR	21.7	65.2		30	61.5	5												
H4592	H	INR	21.8	51.0		35	60.0	5												
H4815	H	INR	21.4	45.0		40	57.0	4					63.0	32.9		21	115	62	38	6
44021	A	INR							19.8	51.3	41.7	120	74.5	29.7	5					
44502	OP/B	INR							19.8	59.5	51.6	145	73.0	40.0	5					
45118	A	INR							19.7	54.8	41.2	120	65.0	41.5	5	21	115	69	36	5
45119	A	INR							20.3	55.3	40.3	130	75.0	38.1	1					
45136	A	INR							20.1	67.1	41.9	145	83.5	31.7	9	22	138	72	35	9
65057	R	INR							21.2	58.7	40.7	130	81.5	31.9	1					
65058	R	INR							19.9	74.2	45.6	135	74.0	31.5	5					
65059	R	INR							19.8	68.8	48.1	140	91.5	29.7	5	22	143	81	26	6
AC1329	A	INR							19.7	52.5	41.4	125	73.0	35.0	5					
AC1421	A	INR							20.2	68.6	37.9	135	65.5	36.8	9					
AC1504	A	INR							20.7	56.2	39.2	130	76.0	37.2	9					

AC1592	A	INR							20.5	58.0	46.9	135	75.5	35.5	9						
AC1609	A	INR							20.2		50.7	140	80.0	39.9	9	21	130	70	34	9	
AC9102	A	INR							20.6	52.2	37.8	145	74.0	39.5	9	22	140	70	37	9	
H5597	H	INR							20.5	55.6	39.9	140	79.5	37.7	5	22	160	78	39	6	
H5598	H	INR							20.6	57.7	39.2	135	77.5	37.4	9						
H5599	H	INR							20.5	60.2	38.7	140	72.0	39.1	1						
54002	P	N	21.3	69.0	41.4	20	64.5	3	20.1	55.9	43.8	138	78.0	30.6	5	21	130	71	28	6	
55118	P	N	21.7	63.7	44.0	25	63.0	4	20.7	61.4	43.7	100	64.5	40.8	5	22	120	70	36	5	
55119	P	N	21.6	55.3	39.6	23	70.0	4	20.3	49.5	37.6	130	74.0	37.5	5	22	130	71	33	4	
55136	OP	N	21.9	43.8	41.9	30	70.0	5	20.4	61.6	39.2	140	77.0	33.9	5						
AB0530	OP	N	21.7	54.4	42.1	20	80.0	5	20.1	62.5	43.8	140	84.0	33.9	1						
AB0800	OP	N	20.7	39.9	41.6	40	73.0	4	20.0	53.6	46.4	140	95.0	31.6	5						
AB0876	OP	N	21.5	59.1	42.7	20	76.0	3	20.2	64.5	54.2	150	75.5	40.2	9						
AB0882	OP	N	21.6	46.3	35.9	23	79.0	4	20.6	68.7	39.9	140			9						
AB1361	OP	N	22.0	48.6	39.2	20	89.0	4	21.2	51.3	45.8	160	87.0	36.7	9						
AB1423	OP	N	21.4	53.4	42.5	20		5	19.9	69.0	44.2	130	86.0	27.8	5	22	143	77	31	7	
AB1461	OP	N	22.5	37.9	44.1	25	74.0	6	20.6	37.3	40.7	155	77.0	38.5	5						
AB1476	OP	N	21.4	68.8		25	88.0	5	19.2	60.3	45.5	150	85.0	35.1	5	22	150	72	35	4	
AB1489	OP	N	21.9	59.2		28	85.5	6	21.0	48.8	50.1	160	90.0	38.2	5						
BC1329	P	N	20.8	45.8	48.5	28	65.0	5	19.9	56.0	44.0	100	76.0	36.3	6	20	115	69	33	5	
BC1421	P	N	21.8	39.9		33	60.0	6	20.3	65.1	35.6	120	67.0	39.2	9						
BC1504	P	N	22.0	35.4		25	64.5	5	20.9	56.0	41.6	140	76.0	39.6	5						
BC1592	P	N	21.8	54.8		20	80.5	4	21.1	47.9	48.8	130	80.5	32.2	5						
BC1609	P	N	21.0	56.2	52.3	23	74.0	4	19.4	68.7	48.0	135	78.5	37.4	5	21	138	77	35	5	
BC9102	P	N	22.5	46.6	37.5	30	67.0	6	22.1	41.5	35.6	140	71.5	39.8	7	23	143	68	39	6	
BC9338	P	N	21.8	46.5	36.5	25	66.5	5	21.2	57.6	39.9	110	72.0	41.2	6	22	133	66	37	6	
BJ9747	OP	N	21.3	54.4		25	80.5	5	19.7	66.1	46.7	140	84.0	38.3	5	22	148	75	35	6	
X2803	OP	N	21.6	51.0		25	79.0	5	20.0	56.2	48.5	145	78.0	35.9	5	22	151	71	33	7	
X2852	OP	N	21.1	56.9		35		5	20.7	51.9	44.5	150	82.0	36.0	9						
75395	OP/P	N	20.8	66.0	42.8	25		4													
AB0633	OP	N	22.0	59.3	40.4	18		2													
AB0803	OP	N	21.9	50.1	43.5	20		4													
AB0831	OP	N	21.6	57.4	46.3	25		5													
AB0883	OP	N	22.3	41.8	34.8	25		5													

AB0885	OP	N	21.8	47.2	42.0	23		4														
AB0892	OP	N	21.4	55.7	43.5	23		4														
AB1340	OP	N	21.5	52.1	41.6	23		5														
AB1347	OP	N	22.4	39.5	43.2	18		4														
AB1362	OP	N	21.7	56.1	48.2	25		5														
AB1372	OP	N	21.4	61.2	44.7	28		5														
AB1375	OP	N	21.2	52.1	41.1	25		5														
AB1376	OP	N	21.4	59.6	41.8	28		6														
AB1424	OP	N	22.4	43.4	35.9	33		5														
AB1430	OP	N	22.0	54.5	38.5	23		5														
AB1463	OP	N	22.3	54.1		28		6														
AB1486	OP	N	21.3	69.5		28		6														
AB1487	OP	N	21.9	51.5		23		6														
AB1488	OP	N	21.8	52.3		28		6														
AB1529	OP	N	22.1	52.3		23		6														
AB1530	OP	N	21.3	46.1		23		4														
AB1531	OP	N	21.9	43.8		23		6														
AB1564	OP	N	22.1	46.7	35.3	25		6														
X2814	OP	N	21.5	51.2		25		5														
X2818	OP	N	21.9	57.5		28		5														
X2819	OP	N	21.6	44.8		25		5														
X2851	OP	N	21.5	64.6		23		5														
X2860	OP	N	21.9	62.9		38		5											119	69	34	
X2861	OP	N	21.4	53.0		33		6														
AB1582	OP	N							18.7		44.1	65	110.0	23.6	5							
BC1284	B	N							20.0	59.6	42.3	80	65.0	36.4	5							
BC1296	B	N							20.0	70.0	43.0	75	66.0	37.7	9							
BC1305	B	N							20.2	73.7	39.2	120	66.5	36.2	9							
BC9272	B	N							19.9	71.5	41.7	80	67.0	33.0	5							
BC9276	B	N							20.3	58.9	46.8	155	78.5	31.5	9							
64003	P	PM	21.4	59.6	44.3	35	57.0	4	20.4	58.9	45.5	135	67.0	35.8	9	22	120	65	36	8		
65051	P	PM	22.4	47.9	37.5	55	51.0	4	20.9	60.9	33.3	90	58.5	28.3	9							
AB1562	OP	PM	22.5	37.9		54	53.5	4	21.5	57.6			58.5	30.4								
H1750	H	PM	21.6	39.0		25		5	21.0	59.0	48.5	140	63.5	38.0	9	22	130	63	38	9		

H1751	H	PM	21.7	43.6		38		5												
44002	A	PM							19.6	56.2	46.3	130	73.0	34.3	9	22	118	69	31	8
80251	OP	TT	22.4	49.2	42.0	23	80.5	3	21.1	63.7	46.7	140	77.0	37.2	5	22	118	66	38	7
AB1429	OP	TT	23.8	38.3	37.2	23	73.5	3	21.6	51.5	46.7	140	79.0	32.5	9	23	143	68	28	9
AB1462	OP	TT	22.9	46.6	37.7	20	74.5	4	21.5	57.9	40.8	130	78.0	34.1	5					
AB1484	OP	TT	23.1	44.6		23	61.5	4	21.7	52.2	39.2	110	64.5	33.7	9	22	115	65	38	8
T2062	OP	TT	23.6	34.3		20	81.0	4	22.2	56.7			80.0	37.8		23	140	77	35	
X2859	OP	TT	22.0	57.9		30	68.0	5	21.4	53.6	40.0	145	78.0	36.4	5	23	131	66	31	6
AB1333	OP	TT	23.2	52.2	40.7	18		4												
AB1434	OP	TT	23.2	48.4	38.4	18		3												
AB1435	OP	TT	23.1	50.2	38.4	20		3												
n			83	83	46	83	46	81	67	65	65	65	67	67	65	34	35	35	35	33
Mean			21.90	51.40	41.31	27.65	70.80	4.41	20.46	58.52	43.51	130.12	76.33	35.50	6.23	21.79	131.60	69.95	34.02	6.61
SE Mean			0.06	0.93	0.57	1.08	1.66	0.11	0.08	0.92	0.55	2.63	1.12	0.44	0.32	0.10	2.56	0.77	0.64	0.33
Minimum			20.70	33.40	34.80	18.00	51.00	1.50	18.70	37.30	33.30	65.00	58.50	23.60	1.00	20.40	105.00	61.50	24.80	2.00
Maximum			23.80	69.50	52.30	83.00	93.50	6.50	22.20	74.20	55.50	160.00	110.00	41.50	9.00	23.20	160.00	80.50	39.00	9.00
Range			3.10	36.10	17.50	65.00	42.50	5.00	3.50	36.90	22.20	95.00	51.50	17.90	8.00	2.80	55.00	19.00	14.20	7.00
LSD																				

*Δ = Carbon isotope discrimination (‰), SLW = Specific leaf weight (gm^{-2}), SPAD = leaf chlorophyll content (SPAD meter reading), HGT = Plant height (cm), Flowering time (days), VGR = Early vigour (by visual observation during early vegetatitive stage), OIC = seed oil content (%) at 8.5% moisture level

†H=Hybrid, P=Inbred parent, A=Male sterile female, R= Restorer line, OP=Open pollinated;

††F=INRA-Ogura cytoplasm, PM=Polima cytoplasm, N= napus cytoplasm, TT= Triazine tolerant, J = *B. junc*