10.1071/FP23179

Functional Plant Biology

Supplementary Material

Mutant *crtRB1* gene negates the unfavourable effects of *opaque2* gene on germination and seed vigour among *shrunken2*-based biofortified sweet corn genotypes

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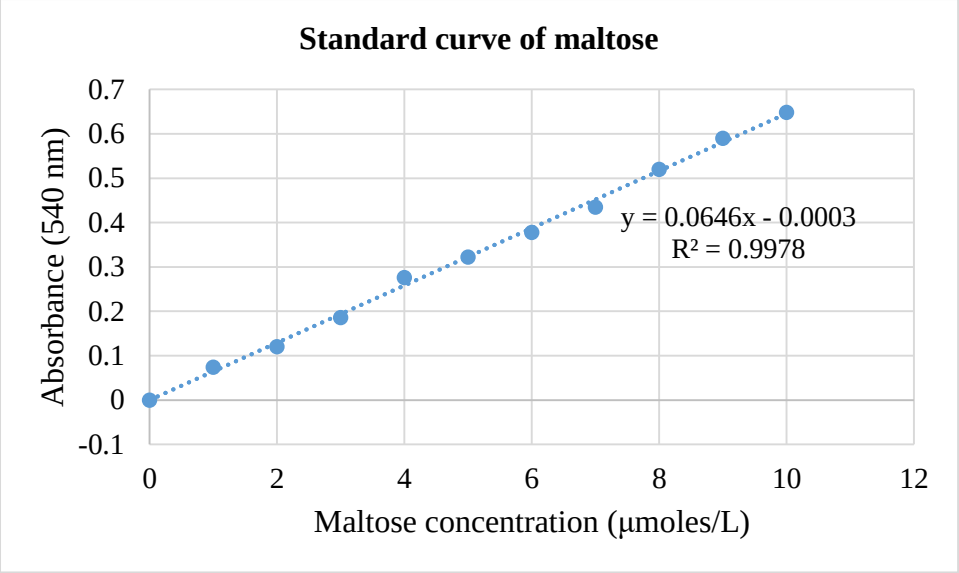

Supplementary Fig. S1: Maltose standard curve for α-amylase assay.

Table S1: Genes present in different MAS-derived sweet corn inbreds used in the study

S. No.	Genotype	Gene (s) introgressed	Traits improved
1.	SWT-16-A	*crtRB1*	BC, BCX and ProA
2.	SWT-16-B	*crtRB1*	BC, BCX and ProA
3.	SWT-16-C	*crtRB1*	BC, BCX and ProA
4.	SWT-16-D	*o2*	Lys and Trp
5.	SWT-16-E	*o2*	Lys and Trp
6.	SWT-16-F	*o2*	Lys and Trp
7.	SWT-16-G	*crtRB1 + o2*	BC, BCX, ProA, Lys and Trp
8.	SWT-16-H	*crtRB1 + o2*	BC, BCX, ProA, Lys and Trp
9.	SWT-16-I	*crtRB1 + o2*	BC, BCX, ProA, Lys and Trp
10.	SWT-16 (original inbred)	-	-
11.	SWT-17-A	*crtRB1*	BC, BCX and ProA
12.	SWT-17-B	*crtRB1*	BC, BCX and ProA
13.	SWT-17-C	*crtRB1*	BC, BCX and ProA
14.	SWT-17-D	*o2*	Lys and Trp
15.	SWT-17-E	*o2*	Lys and Trp
16.	SWT-17-F	*o2*	Lys and Trp
17.	SWT-17-G	*crtRB1 + o2*	BC, BCX, ProA, Lys and Trp
18.	SWT-17-H	*crtRB1 + o2*	BC, BCX, ProA, Lys and Trp
19.	SWT-17-I	*crtRB1 + o2*	BC, BCX, ProA, Lys and Trp
20.	SWT-17 (original inbred)	-	-
21.	SWT-18-A	*crtRB1*	BC, BCX and ProA
22.	SWT-18-B	*crtRB1*	BC, BCX and ProA
23.	SWT-18-C	*crtRB1*	BC, BCX and ProA
24.	SWT-18-D	*o2*	Lys and Trp
25.	SWT-18-E	*o2*	Lys and Trp
26.	SWT-18-F	*o2*	Lys and Trp
27.	SWT-18-G	*crtRB1 + o2*	BC, BCX, ProA, Lys and Trp
28.	SWT-18-H	*crtRB1 + o2*	BC, BCX, ProA, Lys and Trp
29.	SWT-18-I	*crtRB1 + o2*	BC, BCX, ProA, Lys and Trp
30.	SWT-18 (original inbred)	-	-

MAS: Marker-assisted selection, *crtRB1*: *β-carotene hydroxylase1*, *o2*: *opaque2*, BC: β-carotene, BCX: β-cryptoxanthin, ProA: Provitamin A, Lys: Lysine, Trp: Tryptophan, -A to -I: MAS derived inbreds.

Table S2: Replicated values of biofortified and original sweet corn inbreds for seed vigour and physic-biochemical traits

Genotype	GMP			VI-I			VI-II			EC			DH			SOD			POD			EST			AMY		
	R1	R2	R3	R1	R2	R3	R1	R2	R3	R1	R2	R3	R1	R2	R3	R1	R2	R3	R1	R2	R3	R1	R2	R3	R1	R2	R3
***crtRB1*-based inbreds**																											
SWT-16-A	83.00	89.00	83.00	2488.84	2520.68	2404.56	159.01	137.98	147.59	10.53	10.55	10.20	1.31	1.45	1.30	7.60	7.40	7.06	10.53	9.77	10.71	23.34	19.20	25.20	6.66	9.74	6.40
SWT-16-B	87.00	83.00	87.00	2615.80	2826.56	2527.24	138.55	153.03	138.01	10.78	10.41	10.00	1.39	1.45	1.38	7.71	7.67	7.65	11.00	12.03	11.65	20.07	19.69	26.12	6.36	7.10	7.62
SWT-16-C	89.00	85.00	85.00	2576.44	2632.46	2651.88	152.29	131.32	137.26	10.41	11.38	10.10	1.64	1.39	1.44	5.80	7.32	6.27	10.06	10.71	11.00	24.37	21.79	24.69	7.32	7.84	7.60
SWT-17-A	85.00	89.00	87.00	2640.00	2723.62	2685.76	167.76	180.39	169.41	10.86	10.22	10.40	1.48	1.47	1.54	6.57	6.36	6.20	10.15	9.59	10.62	25.70	26.10	25.45	8.14	8.24	8.07
SWT-17-B	83.00	87.00	85.00	2756.16	2406.60	2537.64	158.01	168.34	163.30	9.28	10.93	10.50	1.37	1.39	1.33	7.25	7.32	6.92	11.84	11.75	11.28	29.62	28.13	24.47	8.48	8.95	7.08
SWT-17-C	89.00	87.00	89.00	2867.76	2954.16	2763.18	164.91	172.57	172.92	10.57	10.49	10.80	1.40	1.33	1.25	7.24	7.44	7.59	8.65	9.87	10.24	27.17	28.99	27.55	7.04	7.24	8.24
SWT-18-A	87.00	85.00	89.00	2586.02	2547.72	2774.64	158.49	137.00	153.92	10.15	10.62	10.40	1.42	1.49	1.50	8.07	7.88	8.91	10.34	10.43	10.06	27.10	23.86	21.09	8.03	8.24	7.12
SWT-18-B	87.00	85.00	85.00	2643.52	2520.00	2501.84	179.96	179.51	177.16	10.82	10.62	10.20	1.49	1.44	1.30	7.21	5.91	4.85	10.71	10.53	10.24	22.61	24.24	27.45	7.50	7.53	8.00
SWT-18-C	83.00	89.00	85.00	2622.36	2568.72	2598.96	194.62	182.58	166.67	10.04	9.79	10.20	1.36	1.40	1.33	7.50	7.57	8.16	11.84	11.94	12.78	22.16	27.19	31.49	8.16	8.03	8.13
***o2*-based inbreds**																											
SWT-16-D	80.00	80.00	82.00	1759.20	1920.80	2079.52	142.08	142.67	139.81	12.28	12.35	12.00	1.40	1.52	1.42	5.03	5.11	5.00	10.53	9.49	11.09	27.95	30.66	21.36	7.92	6.08	8.45
SWT-16-E	86.00	80.00	84.00	2435.52	2485.60	2220.96	156.96	145.44	152.85	12.58	12.15	12.40	1.55	1.63	1.44	4.47	4.93	4.66	12.50	11.84	12.03	32.90	34.56	34.91	7.27	7.50	8.05
SWT-16-F	80.00	86.00	82.00	2537.60	2283.30	2227.12	139.68	152.12	165.23	12.61	12.06	12.00	1.47	1.58	1.34	7.11	6.84	6.58	9.96	10.34	8.18	30.16	31.22	30.32	6.04	6.67	6.45
SWT-17-D	82.00	86.00	84.00	2428.84	2547.32	2331.40	176.39	153.84	165.73	12.76	12.52	12.20	1.40	1.68	1.34	4.22	4.69	4.86	10.43	10.81	10.24	32.98	34.09	29.10	6.21	6.61	6.48
SWT-17-E	82.00	84.00	82.00	2606.40	2146.56	2194.32	138.91	150.44	140.52	13.22	12.69	12.50	1.27	1.28	1.46	6.76	7.15	7.31	10.90	10.06	10.62	31.84	32.30	27.05	6.74	6.61	7.01
SWT-17-F	82.00	84.00	86.00	2586.28	2222.45	2464.76	162.72	154.99	174.00	12.45	12.57	12.20	1.57	1.61	1.45	5.10	5.31	4.35	11.09	11.47	11.47	35.25	32.58	30.97	7.83	8.54	8.12
SWT-18-D	80.00	78.00	82.00	1785.14	1740.48	2013.92	142.35	121.88	129.72	13.70	12.18	13.20	1.54	1.64	1.44	7.26	7.37	7.13	10.15	10.81	10.34	29.03	32.55	28.68	7.11	8.01	8.08
SWT-18-E	80.00	84.00	84.00	2304.00	2348.48	2519.86	138.17	154.63	149.69	13.74	13.14	12.40	1.60	1.40	1.35	9.47	9.33	9.27	9.02	7.99	9.87	26.40	26.20	24.34	7.18	7.03	6.85
SWT-18-F	80.00	82.00	82.00	1830.40	2126.04	1984.08	144.73	137.77	128.02	12.67	11.89	12.20	1.63	1.81	1.64	7.20	6.99	6.54	8.93	9.87	9.77	27.17	29.01	31.65	6.35	6.60	7.21
***o2+crtRB1*-based inbreds**																											
SWT-16-G	86.00	88.00	82.00	2114.74	2757.04	2174.64	149.14	152.84	150.90	10.60	11.25	10.38	1.34	1.48	1.33	8.20	8.33	8.42	9.21	9.02	9.77	34.20	30.57	26.74	7.50	7.00	6.57
SWT-16-H	88.00	84.00	84.00	2544.96	2388.12	2331.84	150.60	150.76	165.39	11.41	10.81	10.18	1.42	1.48	1.41	7.30	5.28	5.76	10.06	12.59	12.41	21.00	32.44	28.99	8.17	9.01	8.27
SWT-16-I	82.00	86.00	84.00	2493.58	2269.78	2343.64	157.48	158.21	157.65	11.01	11.22	10.54	1.67	1.42	1.47	4.42	5.46	5.95	11.75	11.18	11.09	30.07	17.91	28.91	6.03	7.23	7.24
SWT-17-G	86.00	88.00	84.00	2394.24	2608.32	2147.04	160.84	158.32	165.88	12.34	11.61	12.32	1.51	1.50	1.57	4.13	4.25	7.31	9.77	9.77	8.55	26.74	29.01	30.76	5.76	6.30	6.06
SWT-17-H	84.00	88.00	86.00	2422.56	2425.28	2297.92	137.64	153.09	146.06	12.10	11.57	11.80	1.40	1.42	1.36	9.38	9.54	8.67	11.94	11.84	12.69	17.77	26.98	30.03	7.37	8.68	8.64

SWT-17-I	82.00	88.00	84.00	2256.32	2408.65	2279.76	161.42	175.80	159.15	11.31	11.79	11.60	1.43	1.36	1.28	6.91	7.14	6.80	10.15	10.06	9.77	32.81	33.52	34.92	7.25	7.42	6.98
SWT-18-G	84.00	86.00	84.00	2283.96	2405.42	2247.84	156.96	154.62	167.79	11.89	12.63	11.80	1.45	1.52	1.53	7.24	7.84	8.49	10.90	10.71	11.00	21.36	19.70	18.28	8.96	8.01	8.50
SWT-18-H	86.00	86.00	88.00	2798.44	2631.60	3042.16	167.97	162.02	159.66	11.90	12.12	12.40	1.52	1.47	1.33	4.50	4.78	4.76	9.87	10.06	10.15	30.73	31.27	32.20	8.90	7.49	7.56
SWT-18-I	88.00	84.00	92.00	2863.52	2714.04	3160.20	141.33	173.69	153.45	10.52	12.18	11.26	1.39	1.43	1.36	7.46	7.63	7.46	12.12	11.75	10.81	28.99	27.10	24.36	8.27	8.20	8.63
Original inbreds																											
SWT-16	88.00	84.00	88.00	3079.66	2803.92	2741.76	146.52	147.76	162.27	10.84	10.44	10.12	1.57	1.39	1.34	8.45	7.71	7.14	12.50	12.22	12.59	24.31	26.56	24.36	8.09	8.48	8.13
SWT-17	82.00	86.00	84.00	2402.10	2365.32	2456.48	167.52	149.57	156.78	11.98	12.64	12.35	1.45	1.24	1.54	7.02	6.48	7.72	9.96	10.43	10.15	29.32	29.62	28.92	7.32	7.44	8.17
SWT-18	88.00	88.00	88.00	2672.40	2947.84	3128.24	170.86	191.22	181.37	12.01	12.42	12.16	1.32	1.39	1.29	5.17	5.24	5.02	10.24	10.06	9.96	33.10	34.58	32.22	7.15	7.06	7.22

crtRB1: *β-carotene hydroxylase1*, *o2*: *opaque2*, -A, -B and -C: *crtRB1* introgressed inbreds, -D, -E and -F: *o2* introgressed inbreds, -G, -H and -I: *o2+crtRB1* introgressed inbreds, R1, R2 & R3: three different replications, GMP: germination percentage (%), VI-I: vigour index-I (cm), VI-II: vigour index-II (mg), EC: electrical conductivity (µS/cm/g of seed), DH: dehydrogenase enzyme (OD/g/mL), SOD: superoxide dismutase activity (units/g FW), POD: peroxidase activity (µmol/min/g FW), EST: esterase activity (µM/min/g FW), AMY: α-amylase activity (µg maltose/min/g FW); CD: critical difference. R1, R2 &o R3: Replication-1, -2 & -3.