

Markers	Aneuploid seedlings from the cross of 'Gala × Fuji'																				
	LG	GF01	GF02	GF03	GF04	GF05	GF06	GF07	GF08	GF09	GF10	GF11	GF12	GF13	GF14	GF15	GF16	GF17	GF18	GF19	GF20
CH05g08	1	ad	bd	ac	bc	ad	ad	bd	bd	bc	bc	bd	bc	bc	bd	ac	ac	ad	bd	bc	ad
Hi07d08	1	bd	ad	bc	ac	bc	bc	ac	ac	ad	ad	ac	ad	ad	ac	bd	bd	bc	ac	ad	bc
Hi12c02	1	ac	ac	bd	ad	ad	bc	bc	ad	ac	ad	ad	bc	ac	ad	bc	bc	bc	ad	ad	bc
KA4B	1	hk	hk	h-	kk	h-	h-	h-	kk	hk	kk	kk	h-	hk	kk	h-	h-	h-	kk	kk	h-
Hi02c07	1	ll	ll	lm	lm	lm	lm	lm	ll	lm	ll	ll	lm	lm	ll	lm	lm	lm	ll	ll	lm
Hi02b10	1	nn	nn	np	np	nn	np	np	nn	np	nn	np	--	nn	np	np	np	nn	nn	np	np
CH02a04z	2	b	bc	bc	bd	bd	bc	bd	ac	acd	bd	bcd	bcd	ad	bd	ad	bd	ad	bcd	bcd	ac
CH02c02a_3	2	b	bd	bc	bc	bc	bd	bc	ad	ac-	ad	ac-	ac-	ad	bc	ac	bc	ac	ac-	ac-	bc
CH02c06	2	a	bc	bd	bc	bc	bd	bc	ad	bcd	ad	acd	acd	ac	bd	ac	bc	ac	acd	acd	bc
CH03d01	2	-	ad	ac	ad	ad	ac	ad	bc	c--	ad	ac-	ac-	bd	ac	bd	ad	bd	ac-	ac-	bc
CH05e03	2	b	ac	ad	ac	ac	ad	ac	bd	bcd	ac	acd	acd	bc	ad	bc	ac	bc	acd	acd	bd
CN493139	2	a	ad	bd	ad	bc	bc	ac	ad	acd	bd	bcd	bcd	ac	ad	ac	bc	ac	bcd	acd	bd
Hi02a07	2	a	bc	bd	bd	bc	bd	ac	ad	ac-	bc	c--	c--	ac	bd	ac	bc	ad	c--	c--	ad
CH02c02a_2	2	l	ll	lm	lm	lm	lm	ll	ll	lll	ll	lll	llm	ll	lm	ll	lm	ll	llm	lll	ll
CH03d10	2	l	lm	lm	lm	ll	lm	ll	ll	lll	lm	llm	llm	ll	lm	ll	lm	ll	llm	lll	lm
Hi05c06_3	2	n	nn	np	np	nn	np	nn	np	nnp	np	nnp	nnp	nn	np	nn	nn	nn	nnp	nnp	np
CH03e03	3	ac	bd	bd	ad	ad	ac	bd	acd	acd	ac	bcd	bcd	acd	acd	bd	ad	bd	bc	bcd	acd
CH03g07	3	bc	bc	ad	ad	ad	bc	bd	acd	acd	ac	bcd	bcd	acd	acd	bd	ad	bc	ac	bcd	acd
HGA8bY	3	bc	bd	bd	bd	ad	bc	bd	bc-	ac-	bc	ac-	ac-	bc-	bc-	bd	ad	bd	bc	bc-	bc-
Hi04c10x_1	3	bc	ac	bd	bd	bd	ac	ad	ac-	c--	bc	c--	ac-	c--	c--	ad	bd	ac	bd	c--	ac-
Hi07e08x	3	ad	ac	ac	bc	bc	ad	ac	c--	c--	ad	ac-	ac-	c--	c--	ac	bc	ac	bd	ac-	c--
AU223657	3	ll	ll	lm	lm	lm	ll	ll	llm	llm	ll	lll	llm	lll	llm	ll	ll	ll	lm	lll	llm
CH02c02b	4	bd	ac	bd	ac	ad	bd	bd	acd	acd	ac	bc	bcd	ad	bc	bd	bcd	ac	bcd	bcd	acd
CH05d02	4	ad	bc	bc	ac	bd	bd	bd	bc-	ac-	bc	bc	--	ad	bd	bd	bc-	bd	bc-	bc-	bc-
GD162	4	ad	ac	bc	ac	bd	bd	bd	bcd	acd	ac	bc	bcd	ad	bd	bd	bcd	bd	bcd	bcd	bcd
Hi04c10x_3	4	bd	ac	ac	bd	ad	ad	bd	ac-	c--	bc	ac	c--	bd	ad	ac	ac-	ad	ac-	ac-	ac-
CH04e02	4	ee	eg	ee	fg	ef	ee	ee	eeg	eef	fg	eg	efg	ef	ef	ee	efg	ee	efg	efg	efg
Hi07b02_4	4	fg	ef	fg	ee	eg	fg	fg	efg	eeg	ee	ef	efg	eg	ef	fg	efg	fg	efg	eeg	efg
CH03a04	5	ad	ac	ad	ac	acd	bc	ac	bcd	bd	ad	acd	ad	acd	ac	acd	acd	bcd	ad	bc	ac
CH04g09y	5	bd	ad	ac	ac	acd	ac	bc	acd	ad	ad	acd	bc	acd	bd	acd	bcd	bcd	bd	ac	bc
CH05e06	5	bc	bd	ac	bd	bcd	bd	ad	acd	bd	bc	bcd	ad	bcd	ac	bcd	acd	acd	ac	bd	ad
CH03a09	5	ef	fg	ef	eg	efg	eg	fg	eeg	ee	ef	eeg	ef	eeg	fg	efg	efg	efg	ef	eg	fg
CH04e03	5	ef	fg	eg	fg	efg	fg	eg	eeg	fg	ef	efg	eg	efg	ee	efg	eeg	eeg	ee	fg	eg
CH04h02_2	5	hk	hk	hh	hk	hhk	hk	k-	hkk	k-	hk	hhk	hk	hkk	hk	hhk	hhk	hkk	hk	hk	k-

Markers	Aneuploid seedlings from the cross of 'Gala × Fuji'																				
	LG	GF01	GF02	GF03	GF04	GF05	GF06	GF07	GF08	GF09	GF10	GF11	GF12	GF13	GF14	GF15	GF16	GF17	GF18	GF19	GF20
CH04h02_4	5	kk	h-	h-	h-	hk-	h-	h-	hk-	h-	kk	hk-	kk	hk-	h-	hk-	hk-	hk-	kk	h-	h-
Hi04d02	5	hk	hk	hh	hk	hkk	hk	k-	hhk	k-	hk	hkk	hk	hhk	hk	hkk	hhk	hkk	hk	hk	k-
Hi11a03	5	hh	hk	hk	hk	hhk	hk	k-	hkk	hk	k-	hhk	hk	hkk	hk	hhk	hkk	hkk	hk	hk	k-
Hi21c08	5	hk	kk	hk	hk	hkk	hk	h-	hhk	hk	h-	hhk	hk	hkk	hk	hhk	hkk	hhk	hk	hk	h-
CH02a08z	5	nn	np	np	np	np1p2	np	np	np1p2	np	nn	np1p2	np	np1p2	nn	np1p2	np	np1p2	nn	np	np
CH03d07	6	bc	ac	ac	bc	bd	ad	bc	bc	ac	ac	bcd	bcd	acd	bcd	bcd	bc	acd	bc	bc	bcd
CH03d12	6	bd	bd	ad	ad	ac	bc	ad	ad	bd	bd	ac-	ac-	bc-	ac-	ac-	ad	bc-	ad	ad	ac-
Hi01d05	6	eg	fg	eg	eg	ee	ef	fg	eg	fg	fg	eeg	eeg	eeg	eeg	eeg	eg	efg	eg	eg	eeg
AJ000761	6	k-	k-	k-	k-	k-	hh	k-	k-	k-	k-	hk-	hk-	hk-	hk-	hk-	k-	hk-	k-	k-	hk-
CH03c01	6	h-	h-	h-	h-	kk	kk	h-	h-	h-	h-	hk-	hk-	hk-	hk-	hk-	h-	hk-	h-	h-	hk-
Hi04c10x_2	7	ad	ad	bc	bc	bd	ac	ac	ac	bc	bc	bc	bc	bc-	bd	ac	ac	ac	ad	ad	bd
CH05b06z_2	7	eg	eg	ef	ef	fg	ee	ef	ee	ef	ef	ef	ef	efg	fg	ee	ee	ee	eg	eg	fg
CH04e05	7	lm	ll	ll	lm	lm	ll	ll	ll	lm	lm	lm	lm	lll	lm	ll	ll	ll	ll	ll	lm
Hi05b09	7	lm	lm	ll	ll	ll	lm	lm	lm	ll	ll	ll	ll	lll	ll	lm	lm	lm	lm	lm	ll
CH01c06	8	ad	bc	ac	bc	ad	ac	bd	bc	bc	bc	ac	ac	bd	bd	ac	bd	bc	ac	bd	bc
Hi04b12	8	ad	bd	bc	ad	bc	bd	ac	ad	ad	ad	bd	bd	ac	ac	bd	ac	ad	bd	ac	ad
CH02g09	8	lm	ll	ll	lm	ll	ll	lm	lm	ll	ll	ll	ll	lm	lm	ll	lm	lm	ll	ll	lm
Hi04e05	8	lm	lm	ll	ll	lm	lm	ll	ll	lm	lm	lm	lm	ll	ll	lm	ll	ll	lm	lm	ll
Hi23g12	8	np	np	nn	np	nn	np	nn	np	np	np	np	np	nn	nn	np	nn	np	np	nn	np
CH01h02_2	9	ad	bc	bc	ac-	ad	ad	ac	ad	ac	bc-	bc	ad	ad	ac-	bc-	bd	bc-	ac-	ad	ac-
CH05c07	9	bc	bc	bc	bcd	bd	ac	ac	ac	bd	ad	bcd	ad	bd	ac	bcd	bcd	ac	acd	bcd	bcd
GD142	9	bd	bd	ac	acd	ac	ac	ad	ac	ad	acd	ad	bd	ad	acd	acd	bc	bcd	acd	ac	acd
Hi05e07	9	ad	ad	bc	c--	bc	bc	bd	bc	bd	ac-	bc	ad	bc	c--	ac-	ac	ac-	c--	bc	c--
NH029a	9	ac	ac	bd	bcd	bd	bd	bc	bd	bc	acd	bd	ac	bd	bcd	acd	ad	acd	bcd	bd	bcd
CH01h02_1	9	k-	k-	hh	hhk	hh	hh	k-	hh	k-	hkk	hh	k-	k-	hkk	hhk	hk	hkk	hhk	hh	hkk
Hi01d01	9	ll	ll	ll	llm	lm	lm	lm	lm	lm	lll	lm	ll	lm	llm	lll	ll	lll	llm	lm	llm
CH05d08y_2	9	nn	nn	np	np1p2	np	np	np	np	np	np1p2	nn	nn	np	np1p2	np1p2	nn	np1p2	np1p2	np	np1p2
CH01f07a	10	ac	bc	ad	bd	bd	ac	ac	ad	bd	acd	bd	bd	bd	bcd	ad	acd	acd	bcd	acd	acd
CH01f12	10	bd	bc	ac	bd	bd	ad	ad	ad	bd	bcd	ac	ad	bd	bcd	bd	bcd	acd	bcd	bcd	acd
CH02b03b	10	ad	bc	bd	ac	ac	bd	bd	bc	ac	bc-	ac	ac	ac	ac-	bc	bc-	bc-	ac-	bc-	bc-
CH02b07	10	ac	bc	bd	bc	ac	ac	bc	ac	bd	bcd	ac	ad	bc	bcd	bc	bcd	acd	bcd	bcd	acd
CH02c11	10	ad	bc	bd	ac	ac	bc	bc	bc	ac	bc-	ac	ac	ac	ac-	bc	bc-	bc-	ac-	bc-	bc-
MS06g03	10	ad	ac	bd	ad	bd	bd	ad	bd	ac	ac-	bc	bd	ad	ac-	ad	ac-	c--	ac-	ac-	c--
CH02a10	10	ll	lm	lm	lm	ll	ll	lm	ll	lm	lll	ll	ll	lm	lll	lm	lll	lll	lll	lll	lll

Markers	LG	Aneuploid seedlings from the cross of 'Gala × Fuji'																			
		GF01	GF02	GF03	GF04	GF05	GF06	GF07	GF08	GF09	GF10	GF11	GF12	GF13	GF14	GF15	GF16	GF17	GF18	GF19	GF20
CH03d11	10	lm	lm	ll	lm	ll	ll	lm	ll	lm	llm	ll	ll	lm	llm	lm	llm	llm	llm	llm	llm
CH04c06y_1	10	ll	ll	lm	ll	lm	lm	ll	lm	ll	lll	lm	lm	ll	lll	ll	lll	llm	lll	lll	llm
Hi02d04	10	ll	ll	ll	ll	lm	ll	lm	ll	ll	llm	lm	lm	lm	lll	lm	llm	llm	lll	lll	lll
Hi04f08	10	nn	np	nn	nn	nn	nn	nn	nn	nn	nnp	np	np	nn	nnp	nn	nnp	nnp	nnp	nnp	nnp
MS02a01	10	np	nn	np	nn	nn	np	np	nn	nn	nnp	nn	nn	nn	nnp	nn	nnp	nnp	nnp	nnp	nnp
CH02d08	11	ac	bc	bd	ad	ac	ad	ad	bd	bd	ac	ac	acd	bd	ac	bc	ad	bcd	bd	bc	ad
CH04g07	11	ac	ac	ad	bd	bc	bd	bc	bd	ad	bc	ac	bcd	bd	bc	ac	bc	bcd	ad	ad	bd
CH04h02_1	11	bd	ad	ac	bc	bd	bc	ac	ac	ac	ad	bd	bc-	ac	bd	ad	bc	ac-	ac	ad	bc
Hi06b06	11	ad	ad	ac	bc	bd	bc	bd	bc	ac	bd	ad	acd	bc	bd	ad	bd	bcd	ac	bc	bc
CH04h02_3	11	nn	nn	np	np	nn	np	np	nn	np	nn	nn	nnp	np	nn	nn	np	nnp	np	nn	np
CH01b12y	12	bd	ad	acd	bd	ad	bcd	bd	bc	ad	acd	ad	bc	ac	bc	acd	bcd	acd	acd	acd	acd
CH01g12	12	bc	ac	bcd	ac	bc	acd	ac	ad	bc	bcd	ad	bc	bd	ad	bcd	acd	bcd	bcd	bcd	bcd
NZ28f04	12	bd	ad	bcd	ad	bd	acd	ad	ac	bd	bcd	ac	bd	ac	ac	bcd	acd	bcd	bcd	bcd	bcd
CH01f02	12	fg	eg	eef	fg	ee	eef	fg	ef	fg	efg	eg	ee	ef	ef	efg	eef	efg	efg	eef	eeg
CH05d04	12	ee	eg	efg	ee	eg	eef	ee	ef	eg	eef	fg	eg	ef	ef	eeg	efg	efg	eeg	eef	efg
CH05d11	12	ef	ee	efg	ee	fg	eeg	ee	eg	ee	efg	fg	ef	eg	eg	efg	eeg	eeg	efg	eeg	efg
CH03h03z_2	12	nn	nn	nnp	nn	np	nnp	nn	np	nn	nnp	np	nn	np	np	nnp	nnp	nnp	nnp	nnp	nnp
CH03a08	13	ad	ad	bd	ad	ad	bc	bc	ad	ad	bd	bc	bc	bcd	ad	bcd	ad	acd	acd	bc	bcd
CH03h03z_1	13	bd	bd	ac	bd	bd	ac	ac	ad	bd	ad	ac	ac	ac-	bd	ac-	bd	c--	c--	ac	ac-
CH05c06_1	13	ad	bc	ac	bc	bc	ad	bc	ad	bc	ad	bc	ac	c--	bc	bc-	ac	bc-	c--	ac	c--
CH05f04	13	bc	ac	bd	bd	ac	ac	ac	bd	bd	ac	bc	ac	c--	ac	ac	bc	ac-	c--	bc	c--
CH05h05	13	bd	ad	bc	ad	ad	bc	ad	bc	bc	ad	bd	ad	bcd	ad	ac-	bd	acd	bcd	bd	bcd
Hi03e04	13	bc	bc	ac	ac	bc	ad	ad	bc	bc	ac	ad	ad	ac-	ad	ac-	ad	bc-	bc-	ad	ac-
Hi20b03	13	ac	bd	ad	bd	bd	ac	ad	ad	ad	ac	ac	ac	acd	bd	acd	ad	bcd	bcd	ac	acd
NH009b	13	bc	ac	bd	ac	ac	bd	bc	bc	bd	bc	bd	bd	bcd	ac	bcd	bc	acd	acd	bd	bcd
AU223486	13	k-	k-	hk	k-	k-	hk	hk	k-	k-	hh	hk	hk	hhk	k-	hkk	k-	hkk	hhk	hk	hkk
GD147	13	k-	hh	k-	hh	hh	k-	k-	k-	k-	k-	k-	k-	hkk	hh	hhk	k-	hhk	hhk	k-	hkk
Hi05c06_2	13	h-	kk	hk	kk	kk	h-	h-	hk	h-	h-	h-	h-	hhk	kk	hkk	h-	hhk	hkk	h-	hhk
Hi07b02_3	13	ll	lm	ll	lm	lm	ll	ll	ll	ll	ll	ll	ll	lll	lm	lll	ll	llm	llm	ll	lll
NZ03c01x_2	13	lm	lm	lm	lm	lm	ll	ll	ll	lm	lm	ll	ll	lll	lm	lll	lm	llm	llm	lm	lll
CH01g05	14	ac	bc	ad	ac	bc	ad	bcd	ad	ad	bd	bc	bd	bc	ad	acd	ad	bc	bc	bcd	ad
CH03a02	14	ac	ad	ac	ac	bc	ac	bcd	ac	bc	ad	bc	ad	bd	ac	acd	bc	bd	bc	bcd	ac
CH03d08	14	bc	bd	bd	ad	ad	bc	acd	bc	ac	bc	ac	ad	ad	bc	bcd	bc	ad	ad	acd	bc
CH05g07z_1	14	hk	hk	hk	hk	hk	hk	hhk	k-	k-	hh	hk	hh	k-	k-	hkk	hk	hk	hk	hhk	k-

Markers	LG	Aneuploid seedlings from the cross of 'Gala × Fuji'																			
		GF01	GF02	GF03	GF04	GF05	GF06	GF07	GF08	GF09	GF10	GF11	GF12	GF13	GF14	GF15	GF16	GF17	GF18	GF19	GF20
CH05g07z_2	14	hk	hk	hk	hk	hk	hk	hkh	h-	kk	h-	kk	hk	h-	h-	hkk	hk	hk	hk	hkh	h-
CH02c02a_1	15	ad	ad	ad	bc	bd	ad	bd	ad	ac	bc	ac-	bc	ac	ac	ac-	bd	bc	ad	ad	
CH02d11	15	bc	ac	bc	bd	ad	bd	ad	bd	bc	bc	acd	ac	bc	bc	bcd	bd	ac	ad	ac	
CH03b10	15	ac	bc	ac	ad	bd	ad	bd	ad	ac	ac	bcd	bc	ac	ac	ac	acd	ad	bc	bd	bc
Hi04c05	15	ad	ac	ad	bd	bc	ac	bc	ac	ad	ad	bc-	bd	ad	ad	ad	ac-	ac	bd	bc	bd
Hi06f09	15	ad	bc	bd	ad	ac	bc	ac	bc	bd	ad	bcd	ad	bd	bd	ad	bcd	ac	ad	bc	bd
NZ02b01	15	ad	ac	ad	bd	bc	ac	bc	ac	ad	ad	bc-	bd	ad	ad	ad	ac-	ac	bd	bc	bd
CH02c09	15	lm	lm	lm	lm	ll	lm	ll	lm	lm	ll	lll	ll	lm	lm	lm	llm	lm	ll	ll	ll
Hi02g06	15	np	nn	np	nn	nn	nn	nn	np	np	np	np1p2	np	np	nn	np	np1p2	nn	np	nn	np
CH02d10a	16	bc	bc	ac	bd	bd	ad	bc	bd	bc	bc	ac	bc-	bc-	ac-	bd	ac-	ad	bd	ad	ac
CH04f10	16	bd	bd	bd	bc	ad	ac	ac	ac	ad	ad	bd	bc-	bc-	bc-	ad	bc-	bc	ad	bc	bd
CH05a04	16	bc	ac	ac	ad	bd	bd	ad	bd	bc	bc	ac	acd	acd	acd	bc	acd	ad	bd	ad	ac
CH05c06_2	16	bd	ad	bd	bd	bd	ad	ad	bd	bd	ac	ad	bcd	acd	acd	ad	acd	bd	bd	ad	ad
Hi01d06y	16	ad	ad	ad	ac	bd	bc	bc	bc	bd	bd	ad	acd	acd	acd	bd	acd	ac	bd	ac	ad
Hi04e04	16	ad	bc	bd	ac	ac	bc	bc	ac	ad	ad	bd	bcd	bcd	bcd	ac	bcd	bc	ac	bc	bd
CH05b06z_1	16	ef	ef	ef	ef	ef	ee	ee	ef	eg	ee	ee	eef	efg	eef	ee	efg	ef	ef	ee	ee
Hi01c11x	16	eg	eg	eg	eg	eg	fg	fg	eg	fg	ef	fg	eeg	eeg	efg	fg	efg	eg	eg	fg	fg
CH01h01	17	bd	b	bc	bd	bd	ac	ac	bd	ad	bd	acd	bd	ac	bcd	bd	acd	ac	bcd	bcd	bd
CH04c06y_2	17	bd	a	ac	ac	ad	ad	bd	bd	ad	ad	c--	bd	ac	bc-	bd	c--	bc	bc-	c--	ac
CH05d08y_1	17	bd	a	bd	ac	bc	bc	ad	ac	bc	bc	c--	ac	bd	ac-	ac	c--	ad	ac-	c--	bd
CH05g03	17	ad	a	ac	ad	ad	bc	bc	ad	ad	ad	bcd	ad	bc	acd	ad	bcd	bc	acd	acd	ad
CH04c06y_3	17	lm	m	lm	lm	lm	lm	ll	ll	lm	lm	llm	ll	ll	lll	lm	llm	ll	llm	llm	lm
GD96	17	lm	l	lm	lm	ll	lm	ll	lm	ll	lm	lll	ll	ll	lll	ll	lll	ll	lll	lll	lm
Hi03c05	17	ll	l	ll	ll	lm	ll	lm	ll	ll	lm	llm	lm	lm	lll	lm	llm	lm	lll	lll	ll
Hi05c06_1	17	ll	m	ll	lm	lm	ll	lm	lm	ll	ll	lll	lm	ll	llm	lm	lll	lm	llm	lll	ll
Hi07b02_1	17	lm	l	lm	ll	lm	ll	lm	ll	lm	ll	llm	ll	lm	lll	lm	lll	lm	lll	llm	ll
Hi07b02_2	17	np	n	nn	np	np	nn	np	nn	nn	np	nnp	nn	nn	nnp	np	nnp	np	nnp	nnp	nn

Markers	LG	Aneuploid seedlings from the cross of 'Gala × Fuji'																			
		GF21	GF22	GF23	GF24	GF25	GF26	GF27	GF28	GF29	GF30	GF31	GF32	GF33	GF34	GF35	GF36	GF37	GF38	GF39	GF40
CH05g08	1	ac	bd	bc	bd	ac	bd	ad	ad	bd	bd	bd	bd	ad	bd	bd	bd	ad	bd	bc	ac
Hi07d08	1	bd	ac	bc	ac	ad	ac	bc	bc	ac	ac	ac	ac	bc	ac	ac	ac	ad	bd	bc	ac
Hi12c02	1	bc	bc	ac	ad	ac	ad	bd	ad	ad	ad	ad	bd	ac	ad	ad	ad	ad	bc	ad	ad
KA4B	1	h-	h-	h-	kk	hk	kk	h-	kk	kk	kk	h-	h-	h-	kk	kk	kk	kk	h-	kk	kk
Hi02c07	1	lm	lm	lm	lm	lm	ll	lm	ll	ll	ll	lm	lm	lm	ll	ll	ll	ll	lm	ll	lm
Hi02b10	1	np	np	np	np	np	nn	np	nn	nn	nn	np	np	np	nn	nn	nn	nn	np	nn	np
CH02a04z	2	bcd	ad	ac	ad	acd	bcd	acd	bcd	bd	ac	ad	acd	acd	acd	acd	acd	bcd	bcd	acd	bcd
CH02c02a_3	2	bc-	ac	ad	ac	ac-	ac-	bc-	bc-	bc	ad	ac	ac-	bc-	ac-	ac-	ac-	ac-	bc-	bc-	ac-
CH02c06	2	bcd	ac	ad	ac	acd	bcd	acd	bcd	bc	ad	ac	bcd	bcd	bcd	acd	bcd	acd	bcd	acd	bcd
CH03d01	2	ac-	bd	bc	bd	c--	ac-	ac-	ac-	ad	bc	bd	c--	c--	c--	c--	ac-	ac-	ac-	c--	ac-
CH05e03	2	acd	bc	bd	bc	bcd	acd	bcd	acd	ac	bd	bc	bcd	bcd	bcd	bcd	acd	acd	acd	bcd	acd
CN493139	2	bcd	bc	ad	bc	acd	bcd	acd	bcd	ac	ad	bc	bcd	bcd	acd	bcd	acd	acd	bcd	bcd	bcd
Hi02a07	2	ac-	ac	ad	ac	ac-	c--	ac-	c--	ac	ad	ac	ac-	ac-	ac-	c--	c--	c--	c--	ac-	c--
CH02c02a_2	2	llm	ll	ll	ll	lll	llm	lll	lll	ll	ll	ll	llm	llm	lll	llm	lll	lll	llm	llm	lll
CH03d10	2	llm	ll	ll	ll	lll	llm	lll	llm	ll	ll	ll	llm	llm	lll	llm	lll	lll	llm	llm	llm
Hi05c06_3	2	nnp	nn	np	nn	nnp	nnp	nnp	nnp	nn	np	nn	nnp	nnp	nnp	nnp	nnp	nnp	nnp	nnp	nnp
CH03e03	3	ad	bcd	acd	acd	bc	bc	acd	ac	ad	ad	bcd	acd	ac	ac	acd	bcd	ad	bcd	bcd	bd
CH03g07	3	ad	bcd	bcd	acd	bd	bc	acd	bc	ad	ad	bcd	bcd	ac	bc	acd	acd	ad	bcd	bcd	bd
HGA8bY	3	bd	ac-	bc-	bc-	ac	ac	bc-	bc	ad	ad	ac-	bc-	bc	bc	bc-	bc-	ad	bc-	ac-	ac
Hi04c10x_1	3	bd	c--	ac-	c--	ad	ac	c--	ac	bd	bd	ac-	ac-	ac	ac	c--	c--	bd	ac-	ac-	ad
Hi07e08x	3	bc	ac-	c--	c--	bd	bd	c--	ad	bc	bc	ac-	c--	ad	ad	c--	ac-	bc	ac-	ac-	ac
AU223657	3	ll	lll	llm	llm	lm	lm	lll	ll	lm	lm	llm	lll	lm	ll	lll	lll	ll	llm	llm	ll
CH02c02b	4	ad	ac	acd	acd	ad	bcd	acd	bcd	acd	ad	acd	acd	bc	ad	bcd	bcd	bcd	bcd	ad	bcd
CH05d02	4	ad	bd	ac-	ac-	bc	ac-	ac-	bc-	ac-	--	bc-	bc-	bc	bd	ac-	bc-	bc-	bc-	ad	ac-
GD162	4	ad	bd	acd	acd	bc	acd	acd	bcd	acd	bd	bcd	bcd	bc	bd	acd	bcd	bcd	bcd	ad	acd
Hi04c10x_3	4	bd	ad	c--	c--	ac	c--	c--	ac-	c--	ad	ac-	ac-	ac	ad	c--	ac-	ac-	ac-	bd	c--
CH04e02	4	ef	fg	eef	eef	eg	eef	eef	efg	eef	ee	efg	efg	eg	ef	eef	efg	efg	eef	ef	eef
Hi07b02_4	4	eg	ee	eeg	eeg	ef	eeg	eeg	efg	eeg	fg	efg	efg	ef	eg	eeg	efg	efg	eeg	eg	eeg
CH03a04	5	ad	acd	acd	acd	acd	bcd	bc	acd	ad	acd	acd	acd	bc	ad	bcd	acd	ad	bcd	acd	bcd
CH04g09y	5	bd	bcd	bcd	bcd	bcd	acd	ac	bcd	bd	bcd	bcd	acd	bd	bd	bcd	acd	ad	acd	bcd	acd
CH05e06	5	ac	acd	acd	acd	acd	acd	bd	acd	ac	acd	bd	bcd	bd	ac	acd	acd	ac	bcd	acd	bcd
CH03a09	5	ef	efg	efg	efg	efg	eeg	eg	efg	ef	efg	efg	eeg	eg	ef	eeg	eeg	ef	eeg	efg	eeg
CH04e03	5	ee	eeg	eeg	eeg	eeg	eeg	fg	eeg	eg	eeg	efg	efg	fg	ee	eeg	eeg	ee	efg	eeg	efg
CH04h02_2	5	k-	hkk	hkk	hkk	hkk	hkk	hh	hkk	k-	hkk	hkk	hkk	hk	hk	hkk	hkk	hk	hkk	hk-	hk-

Markers	Aneuploid seedlings from the cross of 'Gala × Fuji'																				
	LG	GF21	GF22	GF23	GF24	GF25	GF26	GF27	GF28	GF29	GF30	GF31	GF32	GF33	GF34	GF35	GF36	GF37	GF38	GF39	GF40
CH03d11	10	llm	llm	ll	llm	lm	llm	llm	ll	llm	llm	lm	lm	llm	llm	llm	llm	llm	llm	llm	llm
CH04c06y_1	10	llm	llm	lm	llm	llm	llm	lll	lm	llm	llm	ll	lm	llm	lll	llm	lll	llm	lll	llm	llm
Hi02d04	10	lll	lll	lm	lll	lll	lll	llm	lm	llm	lll	lm	lm	llm	lll	lll	lll	llm	llm	lll	lll
Hi04f08	10	nnp	nnp	np	nnp	nnp	nnp	nnp	np	nnp	nnp	nn	nn	nnp	nnp	nnp	nnp	nnp	nnp	nnp	nnp
MS02a01	10	nnp	nnp	nn	nnp	nnp	nnp	nnp	nn	nnp	nnp	nn	np	nnp	nnp	nnp	nnp	nnp	nnp	nnp	nnp
CH02d08	11	ad	ac	ac	ad	bcd	ac	bcd	ad	bd	acd	bd	acd	ad	ac	ad	acd	acd	ad	bc	ad
CH04g07	11	bd	ac	ad	bc	acd	bd	bcd	ad	ad	bcd	ad	bcd	ad	bc	bc	bcd	acd	bd	ac	bd
CH04h02_1	11	ac	bd	bd	bc	ac-	bd	ac-	bc	ac	bc-	ad	ac-	bc	bd	bc	bc-	bc-	bc	ad	bc
Hi06b06	11	bc	ad	ac	bd	acd	bc	bcd	ac	ac	bcd	ac	bcd	ac	bd	bd	bcd	acd	bd	ad	bc
CH04h02_3	11	np	nn	nn	np	nnp	np	nnp	np	nn	nnp	np	nnp	np	nn	np	nnp	nnp	np	nn	np
CH01b12y	12	acd	acd	ad	bcd	acd	ac	bc	bc	acd	acd	bcd	bcd	bc	ad	bc	acd	acd	acd	bcd	bcd
CH01g12	12	bcd	bcd	bc	acd	bcd	bd	ad	ad	bcd	bcd	acd	acd	ad	bc	ad	bcd	bcd	bcd	acd	acd
NZ28f04	12	bcd	acd	bd	acd	bcd	bc	ad	ac	bcd	bcd	acd	acd	ac	bd	ac	bcd	bcd	bcd	acd	acd
CH01f02	12	efg	eef	eg	eeg	efg	ee	fg	ef	efg	efg	eef	efg	fg	eg	ef	efg	eef	efg	eef	eef
CH05d04	12	eef	eef	eg	efg	eef	fg	ee	ef	eeg	efg	efg	efg	ee	eg	ef	efg	efg	eeg	eef	eef
CH05d11	12	efg	eeg	ef	efg	efg	fg	ee	eg	efg	efg	eeg	efg	ee	ef	eg	efg	eeg	efg	eeg	eeg
CH03h03z_2	12	nnp	nnp	nn	nnp	nnp	np	nn	np	nnp	nnp	nnp	nnp	np	nn	np	nnp	nnp	nnp	nnp	nnp
CH03a08	13	ac	ad	ac	bcd	bd	ac	ac	bcd	acd	ac	bcd	acd	acd	bcd	ac	acd	acd	ac	acd	acd
CH03h03z_1	13	bc	bd	bc	ac-	ad	bc	bc	ac-	c--	bc	ac-	c--	c--	ac-	bc	c--	c--	bc	c--	c--
CH05c06_1	13	bd	ac	bd	bc-	bc	ad	ad	c--	c--	bd	c--	c--	bc-	bc-	ac	bc-	c--	bd	bc-	bc-
CH05f04	13	ad	bc	ad	ac-	ac	bd	bd	c--	c--	ad	c--	c--	ac-	ac-	bc	ac-	c--	ad	ac-	ac-
CH05h05	13	ac	bd	ac	acd	ad	bc	bc	bcd	bcd	ac	bcd	bcd	acd	acd	bd	acd	bcd	ac	acd	acd
Hi03e04	13	bd	ac	bd	bc-	ac	bd	bd	ac-	bc-	ac	bc-	bc-	ac-	bc-	bd	bc-	ac-	bd	bc-	bc-
Hi20b03	13	bc	ad	bc	acd	ad	bc	ac	acd	bcd	bc	acd	bcd	bcd	acd	bd	bcd	bcd	bc	bcd	bcd
NH009b	13	ad	bc	ad	bcd	bc	ad	bd	bcd	acd	ad	bcd	acd	acd	bcd	ac	acd	acd	ad	acd	acd
AU223486	13	k-	k-	k-	hhk	hh	k-	k-	hkk	hhk	k-	hhk	hhk	hkk	hkk	k-	hkk	hhk	k-	hk-	hk-
GD147	13	hk	k-	hk	hkk	hk	hk	k-	hkk	hhk	hk	hkk	hhk	hhk	hkk	hh	hkk	hkk	hk	hk-	hk-
Hi05c06_2	13	hk	h-	hk	hkk	hk	hk	h-	hhk	hkk	hk	hhk	hkk	hkk	hhk	kk	hkk	hhk	hk	hk-	hk-
Hi07b02_3	13	lm	ll	lm	lll	ll	lm	ll	lll	llm	lm	lll	lll	lll	lll	llm	llm	llm	lm	llm	llm
NZ03c01x_2	13	ll	lm	ll	lll	ll	lm	ll	lll	llm	lm	lll	lll	lll	lll	ll	llm	llm	lm	llm	llm
CH01g05	14	bc	bcd	acd	bd	ac	ad	bc	bc	ac	bd	ac	bcd	acd	acd	bd	bd	ad	acd	bcd	ad
CH03a02	14	bd	bcd	acd	bd	bc	ac	bd	bd	ad	bc	ad	bcd	acd	acd	bc	bc	ac	acd	bcd	ad
CH03d08	14	ad	acd	bcd	ac	bd	bc	ad	ad	bd	ac	bd	acd	bcd	bcd	ac	ac	bc	bcd	acd	bc
CH05g07z_1	14	k-	hkk	hkk	k-	hk	k-	hk	k-	k-	hh	k-	hkk	hhk	hkk	hh	hh	k-	hkk	hk-	k-

Markers	LG	Aneuploid seedlings from the cross of 'Gala × Fuji'																			
		GF21	GF22	GF23	GF24	GF25	GF26	GF27	GF28	GF29	GF30	GF31	GF32	GF33	GF34	GF35	GF36	GF37	GF38	GF39	GF40
CH05g07z_2	14	h-	hkk	hhk	h-	hk	h-	hk	h-	h-	kk	h-	hhk	hhk	hkk	kk	kk	h-	hkk	hk-	h-
CH02c02a_1	15	bc	bc	ac-	bd	ac-	bc-	ad	ac	ac-	bc-	ac-	bd	ac-	bc-	ad	ac	ac-	ad	bc-	ac-
CH02d11	15	ac	ac	bcd	ad	ac-	ac-	bd	ac	acd	acd	acd	ac	acd	acd	bc	bc	acd	bd	acd	bcd
CH03b10	15	bc	bd	acd	bd	bcd	bcd	ad	bc	bcd	bcd	bcd	bc	bcd	bcd	ac	ac	bcd	ac	bcd	acd
Hi04c05	15	bd	bd	ac-	bc	bc-	bc-	ac	bd	bc-	bc-	bc-	bc	bc-	bc-	ad	ad	bc-	ac	bc-	ac-
Hi06f09	15	ad	ad	acd	ac	acd	acd	bc	bd	bcd	acd	acd	ad	acd	ad	bd	bd	bcd	bc	acd	bcd
NZ02b01	15	bd	bd	ac-	bc	bc-	bc-	ac	bd	bc-	bc-	bc-	bc	bc-	bc-	ad	ad	bc-	ac	bc-	ac-
CH02c09	15	ll	ll	llm	ll	lll	lll	llm	ll	lll	llm	lll	ll	llm	lll	llm	llm	lll	llm	lll	llm
Hi02g06	15	nn	np	np1p2	nn	np1p2	np1p2	nn	np	np1p2	np1p2	np1p2	nn	np1p2	np1p2	np	np	np1p2	nn	np1p2	np1p2
CH02d10a	16	ad-	ac	bc-	ad	bc-	bc-	ac-	ac-	bc-	bc-	ac-	ac-	ac-	bc-	ac-	bc	bc-	bc-	ac-	ac-
CH04f10	16	ac-	bc	bc-	ad	bc-	ac-	ac-	bc-	ac-	bc-	ac-	bc-	bc-	ac-	bc-	ac	ac-	ac-	bc-	ac-
CH05a04	16	bcd	ad	acd	bc	acd	bcd	bcd	acd	bcd	acd	bcd	bcd	acd	bcd	acd	bd	acd	bcd	acd	bcd
CH05c06_2	16	bcd	bd	acd	bc	acd	bcd	bcd	acd	bcd	acd	bcd	bcd	acd	bcd	bcd	bc	acd	bcd	bcd	bcd
Hi01d06y	16	bcd	ac	acd	bd	acd	bcd	bcd	acd	bcd	acd	bcd	acd	acd	bcd	ad	bc	bcd	bcd	acd	bcd
Hi04e04	16	acd	ac	bcd	ad	bcd	acd	acd	bcd	acd	bcd	acd	bcd	acd	acd	ad	bcd	acd	bcd	acd	acd
CH05b06z_1	16	efg	ef	efg	fg	eef	efg	eef	eef	eeg	efg	eef	eef	efg	efg	eef	fg	eef	efg	eef	eef
Hi01c11x	16	efg	eg	efg	ee	eeg	eeg	eeg	eeg	efg	efg	eeg	eeg	efg	eeg	efg	ee	efg	efg	eeg	eeg
CH01h01	17	bcd	bcd	acd	bd	acd	bcd	bcd	acd	acd	acd	acd	ac	bcd	bcd	bcd	bc	acd	acd	ad	bcd
CH04c06y_2	17	bc-	bc-	c--	ad	c--	bc-	bc-	bc-	bc-	c--	c--	bd	bc-	bc-	c--	ad	c--	c--	c--	bc-
CH05d08y_1	17	ac-	ac-	c--	bc	c--	ac-	ac-	ac-	ac-	c--	c--	ad	ac-	ac-	c--	bc	c--	c--	c--	ac-
CH05g03	17	acd	acd	bcd	ad	bcd	acd	acd	bcd	bcd	acd	bcd	bc	acd	acd	ac	ac	bcd	bcd	bcd	acd
CH04c06y_3	17	llm	lll	llm	llm	llm	lll	lll	llm	lll	llm	llm	llm	llm	llm	ll	llm	llm	llm	llm	llm
GD96	17	lll	lll	lll	llm	lll	lll	lll	lll	lll	lll	ll	lll	lll	lll	llm	lll	lll	lll	lll	lll
Hi03c05	17	lll	lll	llm	ll	lll	lll	llm	llm	llm	lll	llm	llm	lll	lll	ll	llm	llm	lll	lll	lll
Hi05c06_1	17	llm	llm	lll	llm	lll	llm	llm	llm	llm	lll	lll	llm	llm	llm	lll	ll	lll	lll	lll	llm
Hi07b02_1	17	llm	lll	llm	ll	llm	lll	llm	lll	llm	lll	llm	llm	llm	llm	llm	llm	llm	llm	lll	lll
Hi07b02_2	17	nnp	nnp	nnp	nn	nnp	nnp	nnp	nnp	nnp	nnp	nnp	np	nnp	nnp	nnp	np	nnp	nnp	nnp	nnp

Note: '-' represents a null allele, or missing data; 'p1' and 'p2' are con-dominant alleles.