

# SSR-based molecular profiling of 237 persimmon (*Diospyros kaki* Thunb.) germplasms using an ASTRINGENCY-linked marker

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## Tables

Table 1. Summary of the *AST* locus-linked marker and six *ssrdk* markers, and their discrimination ability for 127 non-PCNA, 3 C-PCNA, and 54 PCNA persimmon genotypes

Marker	Total alleles	Rare alleles	Allele number per individual genotype		PIC	Number of non-PCNA and C-PCNA genotypes		Number of PCNA genotypes	
			Range	Mean		Discriminated	Non-discriminated	Discriminated	Non-discriminated
<i>AST</i> <sup>a</sup> and six <i>ssrdk</i> <sup>b</sup>	101	41	19–32	25.4	-	130	0	54	0
six <i>ssrdk</i>	75	28	15–27	21.0	-	128	2	50	4
<i>AST</i> (A, a) <sup>c</sup>	26 (21, 5)	13 (12, 1)	2–7	4.4	0.90	113	17	5	49
<i>ssrdk</i> 10	15	7	2–6	3.8	0.84	38	92	9	45
<i>ssrdk</i> 14	12	3	2–6	3.9	0.85	55	75	9	45
<i>ssrdk</i> 16	12	2	1–6	4.0	0.86	62	68	14	40
<i>ssrdk</i> 17	9	2	1–5	3.2	0.79	21	109	0	54
<i>ssrdk</i> 29	7	3	1–5	2.5	0.70	11	119	0	54
<i>ssrdk</i> 30	20	11	1–6	3.6	0.86	59	71	5	49

<sup>a</sup> *AST* locus-linked marker

<sup>b</sup> Naval et al. (2010)

<sup>c</sup> The number for specific alleles (A and a) is in parentheses

Table 2. Cultivars with identical genotypes in the *AST* locus–linked marker and all six *ssrdk* markers

Group <sup>a</sup>	Name <sup>b</sup>
1	Akagaki (J), Tohachi (J)
2	Akanihon (J), Fuji-Yawatahama (J), Koshuhyakume (J)
3	Amahyakume (J), Kaki Tipo (I)
4	Brazzale (I), Moro (I), Rispoli (I), Zenjimaru (J)
5	Chokenji (J), Kubo (J)
6	Chung Nam (K), Okayamaokugosho (J)
7	Edoichi (J), Kurokuma (J)
8	Hiratanenashi (J), Hiratanenashi-Italy (I), Nakataniwase (J), Spur Hiratanenashi (J), Sugitawase (J), Tone Hiratanenashi (I), Tonewase (J)
9	Hiroshimashimofuri (J), Tenryubo (J)
10	Horaigaki (J), Kikuhira (J)
11	Kubogataobishi (J), Shoujyou (J)
12	Mizushimagosho-Italy (I), Shogatsu (J)
13	Yamatogaki (J), Yamatohyakume (J)
14	Aichiwasefuyu (J), Benisakigake (J), Fuyu-edagawari (J), Fuyu-New Zealand (N), Fuyu-supur type (J), Fuyu-Yamagata (J), Matsumotowasefuyu (J), Matsumotowasefuyu edagawari-Fukui (J), Matsumotowasefuyu edagawari-Wakayama (J), Nishiura (J), Sunami (J), Tanbawasefuyu (J), Fuyu (J)
15	Flat Fuyu (N), Kodagosho (J), Okugosho (J)
16	Fukugosho (J), Giant Fuyu (I), Mikado (J)
17	Fukurogosho (J), Hazegosho (J), Zennosuke (J)
18	Gosho-Fukushima (J), Gosho-Gose (J), Izushikogosho (J), Kaibaragosho (J)
19	Ichikikeijiro (J), Ichikikeijiro-Italy (I), Jiro (J), Jiro-c (I), Jiro-male (J), Maekawajiro (J), Taikakeijiro-e (J), Wakasugikei Jiro (J), Yaizuwasejiro (J)
20	Isahaya (J), Manmosu (J), Mushirodagosho (J)
21	Izushiogosho (J), Ogosho (J)

<sup>a</sup> Groups 1–13 are non-PCNA, and 14–21 are PCNA

<sup>b</sup> Origins of accessions are marked with (I) for Italy, (J) for Japan, (K) for Korea, and (N) for New Zealand

Table 3. Detected *AST* and *ast* alleles in 127 non-PCNA and 3 C-PCNA persimmon genotypes

ID	Name	No. of alleles <sup>a</sup>			Detected alleles <sup>b</sup>			
		total	<i>AST</i>	<i>ast</i>	<i>AST</i>		<i>ast</i>	
1	Yukigaki	3	1	2	224		349	355
2	Sakushumishirazu	4	1	3	222		349	353 355
3	Tenryubo	4	1 (3)	3 (3)	224		349	353 355
4	Egosho	4	1 (1–2)	3 (4–5)	231		349	351 353
5	Rojo Brillante <sup>c</sup>	3	2	1	224	228	353	
6	Yotan	3	2	1	224	228	353	
7	Kanzo (Kanzou)	3	2 (3–4)	1 (2–3)	224	231	353	
8	Ichiryo	4	2	2	222	224	351	353
9	Kosyuhyakume (Kosyu-hyakume)	4	2 (3–4)	2 (2–3)	224	231	349	353
10	Okozu	4	2	2	224	231	349	353
11	Orandagosho	4	2	2	224	231	349	353
12	Nitari	4	2	2	224	231	349	355
13	Toyoichi	4	2	2	224	231	351	353
14	Sangokuichi	4	2 (4)	2 (2)	224	244	349	353
15	Umurbey	4	2	2	226	231	351	353
16	Goshogaki-Sagae	4	2	2	226	233	349	353
17	Heixinshi (Hei-xin-shi)	4	2 (5)	2 (1)	226	254	349	353
18	Hotoku	4	2	2	231	233	353	355

Table 3. Detected *AST* and *ast* alleles in 127 non-PCNA and 3 C-PCNA persimmon genotypes

ID	Name	No. of alleles <sup>a</sup>			Detected alleles <sup>b</sup>					
		total	<i>AST</i>	<i>ast</i>	<i>AST</i>			<i>ast</i>		
19	310-24 <sup>c</sup>	5	2	3	220	228		349	351	353
20	Kunitomi	5	2 (3)	3 (3)	224	226		349	353	355
21	Yoshidagosho <sup>c</sup>	5	2	3	224	226		349	353	355
22	Kasuga	5	2	3	224	228		351	353	355
23	Yoshino	5	2 (1–2)	3 (4–5)	224	231		349	353	355
24	Taiten <sup>c</sup>	5	2	3	224	240		349	353	355
25	Shogatsu-Italy	5	2	3	228	229		349	353	355
26	Aosa	5	2	3	228	231		349	351	353
27	Daishiro	5	2	3	228	231		349	351	353
28	Taigetsu <sup>c</sup>	5	2	3	229	240		351	353	355
29	Qu-jing-shui-shi	3	3	0	224	232	236			
30	Iwasedo	3	3	0	226	228	231			
31	Kagawagoban	4	3	1	222	224	230	349		
32	Konashiba	4	3	1	222	224	231	349		
33	Shirotodamashi	4	3	1	222	224	231	349		
34	Raotianhong	4	3 (5)	1 (1)	222	226	229	351		
35	Oshorogaki	4	3	1	222	228	231	349		
36	Otani	4	3	1	224	225	226	353		
37	Karasumi	4	3	1	224	225	228	349		

Table 3. Detected *AST* and *ast* alleles in 127 non-PCNA and 3 C-PCNA persimmon genotypes

ID	Name	No. of alleles <sup>a</sup>			Detected alleles <sup>b</sup>				
		total	<i>AST</i>	<i>ast</i>	<i>AST</i>			<i>ast</i>	
38	Amahachiya	4	3	1	224	226	228	353	
39	Chu-tou-shi	4	3	1	224	226	229	349	
40	Tianbaogai	4	3	1	224	228	229	349	
41	Shinhachiya	4	3	1	224	228	240	353	
42	Bongaki B	4	3	1	224	228	250	349	
43	Emon	4	3 (5)	1 (1)	224	231	240	349	
44	Mixian niuxinshi	4	3	1	226	228	229	349	
45	Atago-Ehime (Atago)	4	3 (4)	1 (2)	226	228	231	349	
46	Moriya	4	3	1	226	228	231	349	
47	Kubo	4	3	1	231	233	250	353	
48	Monbei (Monpei)	5	3 (4)	2 (2)	222	224	225	349	355
49	Obishi	5	3	2	222	224	231	349	353
50	Yashima	5	3 (4)	2 (2)	222	226	231	351	353
51	Gionbo	5	3 (3–4)	2 (2–3)	222	226	233	353	355
52	Otera	5	3	2	224	228	229	349	353
53	Dojohachiya (Dojo-Hachiya)	5	3 (4)	2 (2)	224	228	229	349	355
54	Mizutafuyu	5	3	2	224	228	229	353	355
55	Zenjimarū	5	3 (4)	2 (2)	224	228	240	349	353
56	Izaemon	5	3	2	224	229	231	349	355
57	Kurokuma <sup>c</sup>	5	3 (3)	2 (3)	224	229	240	351	353

Table 3. Detected *AST* and *ast* alleles in 127 non-PCNA and 3 C-PCNA persimmon genotypes

ID	Name	No. of alleles <sup>a</sup>			Detected alleles <sup>b</sup>						
		total	<i>AST</i>	<i>ast</i>	<i>AST</i>				<i>ast</i>		
58	Hoshoumaru	5	3	2	224	231	233			349	353
59	Naganogosho	5	3	2	224	231	233			349	355
60	Nikkotennenkinenbutsu	5	3	2	224	233	250			351	355
61	Ibogaki	5	3	2	225	226	231			349	355
62	Mizushima	5	3 (2–3)	2 (3–4)	225	228	231			351	353
63	Gailey	5	3	2	225	228	250			349	353
64	Amahyakume <sup>c</sup>	5	3 (3)	2 (3)	226	228	229			351	353
65	Aburaden	5	3	2	226	244	250			351	353
66	Shibumyotan	5	3	2	228	231	233			349	353
67	Ebo	6	3	3	222	225	231			349	351 353
68	Aburatsubo	6	3	3	222	228	229			349	351 353
69	Ciocolatino	6	3	3	224	226	229			349	351 353
70	Tsurunoko	6	3	3	224	228	229			349	351 355
71	Okayamaokugosho	6	3	3	224	229	232			351	353 355
72	Luotian-tianshi (Luo-tian-tian-shi) <sup>c</sup>	4	4 (6)	0 (0)	220	224	226	228			
73	Toyoka	4	4	0	222	224	228	231			
74	Deng-long-shi	4	4	0	222	226	229	236			
75	Fang-shi Shaanxi	4	4	0	224	226	228	248			
76	Oyotsumizo	4	4	0	224	228	233	240			

Table 3. Detected *AST* and *ast* alleles in 127 non-PCNA and 3 C-PCNA persimmon genotypes

ID	Name	No. of alleles <sup>a</sup>			Detected alleles <sup>b</sup>				
		total	<i>AST</i>	<i>ast</i>	<i>AST</i>				<i>ast</i>
77	Fang-shi	4	4	0	225	226	230	236	
78	Bo-ai-shui-shi	4	4	0	229	230	234	236	
79	Eboshi	5	4	1	222	226	230	231	353
80	Tsukiyo	5	4	1	222	226	231	233	353
81	Amayotsumizo	5	4 (5)	1 (1)	222	228	231	233	349
82	Yatsudera	5	4	1	222	228	231	250	353
83	Omidanshi	5	4 (3)	1 (3)	224	225	228	231	353
84	Shimofuri	5	4	1	224	225	228	231	353
85	Togosho	5	4	1	224	226	228	231	349
86	Harbiye	5	4	1	224	226	228	231	353
87	Triumph	5	4	1	224	226	228	231	353
88	Tamopan	5	4	1	224	226	229	236	349
89	Mopanshi	5	4 (5)	1 (1)	224	226	229	238	349
90	Yamatohyakume	5	4	1	224	228	231	233	349
91	Koshumaru	5	4	1	224	228	231	250	353
92	Rendaiji	5	4	1	224	231	233	240	349
93	Aoso	5	4	1	225	226	233	250	349
94	Hegurogaki	5	4	1	225	228	231	240	355
95	Yukineri	5	4	1	226	228	231	233	355
96	Hacchiuri	5	4	1	226	229	230	231	353



Table 3. Detected *AST* and *ast* alleles in 127 non-PCNA and 3 C-PCNA persimmon genotypes

ID	Name	No. of alleles <sup>a</sup>			Detected alleles <sup>b</sup>								
		total	<i>AST</i>	<i>ast</i>	<i>AST</i>					<i>ast</i>			
97	Suzakunishiki	6	4	2	222	228	229	233			351	353	
98	Yokono	6	4 (3–4)	2 (2–3)	222	229	231	233			349	353	
99	Fudegaki	6	4 (3–4)	2 (2–3)	224	225	231	233			351	353	
100	Jinshi	6	4	2	224	226	228	229			349	351	
101	Shoujyou	6	4	2	224	226	228	231			351	353	
102	Beniemon	6	4	2	224	226	231	240			351	353	
103	Beniwase	6	4	2	224	226	231	250			351	353	
104	Ichidagaki	6	4	2	224	228	231	233			349	353	
105	Aizumishirazu <sup>c</sup>	6	4 (3–4)	2 (2–3)	224	228	231	240			349	353	
106	Hiratanenashi	6	4	2	224	228	231	250			349	353	
107	Cheong-do Si (Chung-do Si) <sup>c</sup>	6	4	2	224	229	231	244			349	355	
108	Yotsumizo <sup>c</sup>	6	4	2	224	231	233	240			349	353	
109	Gofu	6	4	2	225	228	229	231			349	353	
110	Inasa	6	4	2	228	230	240	244			353	355	
111	Miyazakitanenashi	7	4	3	224	231	233	240			349	353	355
112	Hagakushi	5	5 (6)	0 (0)	222	229	231	233	234				
113	Gao-jiao-shi	5	5	0	224	225	226	228	236				
114	Zhai-jia-hong	5	5	0	224	226	228	229	236				
115	Anxi youshi	5	5	0	224	226	228	231	250				

Table 3. Detected *AST* and *ast* alleles in 127 non-PCNA and 3 C-PCNA persimmon genotypes

ID	Name	No. of alleles <sup>a</sup>			Detected alleles <sup>b</sup>						
		total	<i>AST</i>	<i>ast</i>	<i>AST</i>					<i>ast</i>	
116	Kurogaki	5	5	0	226	228	231	248	252		
117	Shogatsu (Shougatsu) <sup>c</sup>	5	5 (6)	0 (0)	228	229	231	233	240		
118	Dejima	6	5	1	222	224	225	228	231		353
119	Saijo (Saijyo) <sup>c</sup>	6	5 (5)	1 (1)	222	224	226	231	233		349
120	Saefuji	6	5	1	224	225	226	228	231		353
121	Nishimurawase <sup>c</sup>	6	5 (5)	1 (1)	224	225	226	228	240		349
122	Huo-shi	6	5	1	226	229	231	234	254		353
123	Kikuhira	6	5	1	228	229	231	232	233		349
124	Gong-cheng-shui-shi	6	5	1	228	230	231	242	250		351
125	Inayama	6	6	0	222	224	225	226	228	231	
126	Akagaki <sup>c</sup>	6	6 (6)	0 (0)	222	224	225	226	240	250	
127	Kyara	6	6	0	222	224	226	231	232	233	
128	Mikatanigosho	6	6 (6)	0 (0)	222	224	228	229	231	240	
129	Kakiyamagaki	6	6	0	222	228	229	240	242	250	
130	Sa Kok-Si	6	6	0	224	228	229	231	233	240	
	Range	3–7	1–6	0–3	220–254					349–355	
	Mean	4.9	3.4	1.5							

Table 3. Detected *AST* and *ast* alleles in 127 non-PCNA and 3 C-PCNA persimmon genotypes

ID	Name	No. of alleles <sup>a</sup>			Detected alleles <sup>b</sup>	
		total	<i>AST</i>	<i>ast</i>	<i>AST</i>	<i>ast</i>

<sup>a</sup> Allele copy number estimated from qPCR is shown in parentheses (Akagi et al. 2010)

<sup>b</sup> the numbers mean called fragment sizes

<sup>c</sup> Detected alleles are also presented in Kono et al. (2016)

Table 4. Detected *ast* alleles in 54 PCNA persimmon genotypes

ID	Name	No. of <i>ast</i> allele <sup>a</sup>	Detected <i>ast</i> alleles <sup>b</sup>		
131	Okitsu-21	2	349	353	
132	Gosho-gose	2	349	355	
133	Kishuu	2	349	355	
134	F-2	2	353	355	
135	Gosho	3	347	349	355
136	Misatogosho	3	347	349	355
137	Akitsu-19	3	349	351	353
138	Akitsu-23	3	349	351	353
139	Kinshuu	3	349	351	353
140	IiG-16	3	349	351	355
141	109-27	3	349	353	355
142	Fujiwaragosho	3	349	353	355
143	Fuyu-Israel	3	349	353	355
144	Ikutomi	3	349	353	355
145	Izu	3	349	353	355
146	Jiro <sup>c</sup>	3	349	353	355
147	Kazusa	3	349	353	355
148	Midai	3	349	353	355
149	Mikado	3	349	353	355
150	Mizugosho	3	349	353	355
151	Mushirodagosho	3	349	353	355
152	Ogosho	3	349	353	355
153	Okitsu-1	3	349	353	355
154	Okitsu-17 (V-13) <sup>c</sup>	3	349	353	355
155	Okitsu-22	3	349	353	355
156	Okugosho	3	349	353	355
157	Sagiyamagosho	3	349	353	355
158	Soushuu	3	349	353	355
159	Suruga	3	349	353	355
160	Tenjingosho	3	349	353	355
161	Tokudagosho	3	349	353	355
162	Yamatogosho	3	349	353	355

Table 4. Detected *ast* alleles in 54 PCNA persimmon genotypes

ID	Name	No. of <i>ast</i> allele <sup>a</sup>	Detected <i>ast</i> alleles <sup>b</sup>				
163	Okitsu-25	3	351	353	355		
164	Fukurogosho	4	347	349	353	355	
165	Shinshuu	4	347	349	353	355	
166	18-4	4	349	351	353	355	
167	Akitsu-5	4	349	351	353	355	
168	Benigosho	4	349	351	353	355	
169	Fuyu <sup>c</sup>	4	349	351	353	355	
170	Hanagosho	4	349	351	353	355	
171	Kanshu <sup>c</sup>	4	349	351	353	355	
172	Okitsu-15	4	349	351	353	355	
173	Okitsu-16	4	349	351	353	355	
174	Okitsu-2	4	349	351	353	355	
175	Reigyoku	4	349	351	353	355	
176	Taiga	4	349	351	353	355	
177	Taiho	4	349	351	353	355	
178	Taishuu <sup>c</sup>	4	349	351	353	355	
179	Tanrei	4	349	351	353	355	
180	Tokyogosho	4	349	351	353	355	
181	Yoshimotogosho	4	349	351	353	355	
182	Youhou	4	349	351	353	355	
183	Yuubeni	4	349	351	353	355	
184	Okitsu-20	5	347	349	351	353	355
	Range	2–5	347–355				
	Mean	3.3					

<sup>a</sup> *AST* allele was not detected

<sup>b</sup> The numbers mean called fragment sizes

<sup>c</sup> Detected alleles are also presented in Kono et al. (2016)

Table 5. Summary of direct sequence analysis of *ast* fragments for 48 non-PCNA accessions with one *ast* fragment peak and 3 non-PCNA local cultivars having ancient origin with two *ast* fragment peaks

ID	Name <sup>a</sup>	<i>ast</i> allele type	ID	Name	<i>ast</i> allele type
31	Kagawagoban (J)	349	6	Yotan (J)	353-1
32	Konashiba (J)	349	41	Shinhachiya (J)	353-1
33	Shirotodamashi (J)	349	79	Eboshi (J)	353-1
35	Oshorogaki (J)	349	80	Tsukiyo (J)	353-1
37	Karasumi (J)	349	82	Yatsudera (J)	353-1
39	Chu-tou-shi (C)	349	86	Harbiye (T)	353-1
40	Tianbaogai (C)	349	87	Triumph (Is)	353-1
42	Bongaki B (J)	349	91	Koshumaru (J)	353-1
43	Emon (J)	349	122	Huo-shi (C)	353-1
44	Mixian niuxinshi (C)	349	36	Otani (J)	353-2a 353-2c
45	Atago-Ehime (Atago) (J)	349	38	Amahachiya (J)	353-2a 353-2b
46	Moriya (J)	349	47	Kubo (J) <sup>b</sup>	353-2a
81	Amayotsumizo (J)	349	83	Omidanshi (J)	353-2a 353-2b
85	Togosho (J)	349	84	Shimofuri (J)	353-2a 353-2b
88	Tamopan (C)	349	96	Hacchiuri (J)	353-2a
89	Mopanshi (C)	349	120	Saefuji (J)	353-2a
90	Yamatohyakume (J) <sup>b</sup>	349	189	Chokenji (J) <sup>b</sup>	353-2a
92	Rendaiji (J)	349	118	Dejima (J)	353-2b
93	Aoso (J)	349			
119	Saijo (J)	349	94	Hegurogaki (J)	355
121	Nishimurawase (J)	349	95	Yukineri (J)	355
123	Kikuhira (J) <sup>b</sup>	349			
204	Horaigaki (J) <sup>b</sup>	349	5	Rojo Brillante (J)	353-? 353-?
236	Yamatogaki (J) <sup>b</sup>	349	7	Kanzo (Kanzou) (J)	353-? 353-?
34	Raotianhong (C)	351	55	Zenjimaru (J) <sup>c</sup>	349 353-1
124	Gong-cheng-shui-shi (C)	351	104	Ichidagaki (J) <sup>c</sup>	349 353-1
			105	Aizumishirazu (J) <sup>c</sup>	349 353-2a

<sup>a</sup> Origins of accessions are marked with (C) for China, (Is) for Israel, (J) for Japan, and (T) for Turkey

<sup>b</sup> ‘Yamatohyakume’ and ‘Yamatogaki’ (group 13), ‘Kikuhira’ and ‘Horaigaki’ (group 10), and ‘Kubo’ and ‘Chokenji’ (group 5) are possible synonyms (Table 2)

<sup>c</sup> *ast* fragment was partly sequenced from 28<sup>th</sup> nucleotide to the 3'-end

**SSR-based molecular profiling of 237 persimmon (*Diospyros kaki* Thunb.) germplasms using an *ASTRINGENCY*-linked marker**

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Supplemental Table S1. List of 237 persimmon accessions used in this study

ID <sup>a</sup>	Name	Accession type	Astringency phenotype	Origin	JP acc. No. <sup>b</sup>
141	109-27	Selection	PCNA	Japan	-
166	18-4	Selection	PCNA	Japan	-
19	310-24	Selection	C-PCNA	Japan–China	-
140	IiG-16	Selection	PCNA	Japan	115462
65	Aburaden	Local cultivar	Non-PCNA	Japan	117198
68	Aburatsubo	Local cultivar	Non-PCNA	Japan	115206
185	Aichiwasefuyu	Local cultivar	PCNA	Japan	115207
105	Aizumishirazu	Local cultivar	Non-PCNA	Japan	115208
126	Akagaki	Local cultivar	Non-PCNA	Japan	115210
186	Akanihon	Local cultivar	Non-PCNA	Japan	115211
137	Akitsu-19	Selection	PCNA	Japan	219974
138	Akitsu-23	Selection	PCNA	Japan	-
167	Akitsu-5	Selection	PCNA	Japan	115470
38	Amahachiya	Local cultivar	Non-PCNA	Japan	117199
64	Amahyakume	Local cultivar	Non-PCNA	Japan	115213
81	Amayotsumizo	Local cultivar	Non-PCNA	Japan	115214
115	Anxi youshi	Local cultivar	Non-PCNA	China	116606
26	Aosa	Local cultivar	Non-PCNA	Japan	115215
93	Aoso	Local cultivar	Non-PCNA	Japan	115216
45	Atago-Ehime (Atago)	Local cultivar	Non-PCNA	Japan	115217
102	Beniemon	Local cultivar	Non-PCNA	Japan	115220
168	Benigoshō	Local cultivar	PCNA	Japan	115222
187	Benisakigake	Local cultivar	PCNA	Japan	115224
103	Beniwase	Local cultivar	Non-PCNA	Japan	115225
78	Bo-ai-shui-shi	Local cultivar	Non-PCNA	China	116617
42	Bongaki B	Local cultivar	Non-PCNA	Japan	115226
188	Brazzale	Local cultivar	Non-PCNA	Italy	210183
107	Cheong-do Si (Chung-do Si)	Local cultivar	Non-PCNA	Korea	115360
189	Chokenji	Local cultivar	Non-PCNA	Japan	115229
39	Chu-tou-shi	Local cultivar	Non-PCNA	China	116657
190	Chung Nam	Local cultivar	Non-PCNA	Korea	115230
69	Cioccolato	Local cultivar	Non-PCNA	Italy	210198
27	Daishiro	Local cultivar	Non-PCNA	Japan	202815
118	Dejima	Local cultivar	Non-PCNA	Japan	118588
74	Deng-long-shi	Local cultivar	Non-PCNA	China	115395
53	Dojohachiya (Dojo-Hachiya)	Local cultivar	Non-PCNA	Japan	115233
67	Ebo	Local cultivar	Non-PCNA	Japan	115234
79	Eboshi	Local cultivar	Non-PCNA	Japan	115235
191	Edoichi	Local cultivar	Non-PCNA	Japan	115236
4	Egoshō	Local cultivar	Non-PCNA	Japan	115237
43	Emon	Local cultivar	Non-PCNA	Japan	115238
134	F-2	Selection	PCNA	Japan	115456
77	Fang-shi	Local cultivar	Non-PCNA	China	115264
75	Fang-shi Shaanxi	Local cultivar	Non-PCNA	China	117221
192	Flat Fuyu	Local cultivar	PCNA	New Zealand	115692
99	Fudegaki	Local cultivar	Non-PCNA	Japan	115239

ID <sup>a</sup>	Name	Accession type	Astringency phenotype	Origin	JP acc. No. <sup>b</sup>
193	Fuji-Yawatahama	Local cultivar	Non-PCNA	Japan	117909
142	Fujiwaragosho	Local cultivar	PCNA	Japan	115240
194	Fukugosho	Local cultivar	PCNA	Japan	115241
164	Fukurogosho	Local cultivar	PCNA	Japan	115242
169	Fuyu	Local cultivar	PCNA	Japan	115243
195	Fuyu-edagawari	Local cultivar	PCNA	Japan	115244
143	Fuyu-Israel	Local cultivar	PCNA	Israel	115690
196	Fuyu-New Zealand	Local cultivar	PCNA	New Zealand	115691
197	Fuyu-supur type	Local cultivar	PCNA	Japan	115703
198	Fuyu-Yamagata	Local cultivar	PCNA	Japan	219966
63	Gailey	Local cultivar	Non-PCNA	Brazil	115693
113	Gao-jiao-shi	Local cultivar	Non-PCNA	China	115297
199	Giant Fuyu	Local cultivar	PCNA	Italy	210197
51	Gionbo	Local cultivar	Non-PCNA	Japan	115248
109	Gofu	Local cultivar	Non-PCNA	Japan	115249
124	Gong-cheng-shui-shi	Local cultivar	Non-PCNA	China	116634
135	Gosho	Local cultivar	PCNA	Japan	115251
200	Gosho-Fukushima	Local cultivar	PCNA	Japan	202804
132	Gosho-Gose	Local cultivar	PCNA	Japan	116615
16	Goshogaki-Sagae	Local cultivar	Non-PCNA	Japan	117911
96	Hacchiuri	Local cultivar	Non-PCNA	Japan	115256
112	Hagakushi	Local cultivar	Non-PCNA	Japan	115253
170	Hanagosho	Local cultivar	PCNA	Japan	115254
86	Harbiye	Local cultivar	Non-PCNA	Turkey	219968
201	Hazegosho	Local cultivar	PCNA	Japan	115257
94	Hegurogaki	Local cultivar	Non-PCNA	Japan	115258
17	Heixinshi (Hei-xin-shi)	Local cultivar	Non-PCNA	China	116630
106	Hiratanenashi	Local cultivar	Non-PCNA	Japan	115261
202	Hiratanenashi-Italy	Local cultivar	Non-PCNA	Italy	210188
203	Hiroshimashimofuri	Local cultivar	Non-PCNA	Japan	202803
204	Horaigaki	Local cultivar	Non-PCNA	Japan	115263
58	Hoshoumaru	Local cultivar	Non-PCNA	Japan	115265
18	Hotoku	Local cultivar	Non-PCNA	Japan	115266
122	Huo-shi	Local cultivar	Non-PCNA	China	115259
61	Ibogaki	Local cultivar	Non-PCNA	Japan	115267
104	Ichidagaki	Local cultivar	Non-PCNA	Japan	115268
205	Ichikikejjiro	Local cultivar	PCNA	Japan	115269
206	Ichikikejjiro-Italy	Local cultivar	PCNA	Italy	210199
8	Ichiryō	Local cultivar	Non-PCNA	Japan	115270
144	Ikutomi	Local cultivar	PCNA	Japan	115271
110	Inasa	Local cultivar	Non-PCNA	Japan	115272
125	Inayama	Local cultivar	Non-PCNA	Japan	115273
207	Isahaya	Local cultivar	PCNA	Japan	115705
30	Iwasedo	Local cultivar	Non-PCNA	Japan	115274
56	Izaemon	Local cultivar	Non-PCNA	Japan	115275
145	Izu	Crossbred cultivar	PCNA	Japan	115276
208	Izushikogosho	Local cultivar	PCNA	Japan	115277
209	Izushiogosho	Local cultivar	PCNA	Japan	115278
100	Jinshi	Local cultivar	Non-PCNA	China	116629
146	Jiro	Local cultivar	PCNA	Japan	115280
210	Jiro-c	Local cultivar	PCNA	Italy	210192
211	Jiro-male	Local cultivar	PCNA	Japan	116601
31	Kagawagoban	Local cultivar	Non-PCNA	Japan	115285
212	Kaibaragosho	Local cultivar	PCNA	Japan	115291
213	Kaki Tipo	Local cultivar	Non-PCNA	Italy	210189
129	Kakiyamagaki	Local cultivar	Non-PCNA	China	115286
171	Kanshu	Crossbred cultivar	PCNA	Japan	232688
7	Kanzo (Kanzou)	Local cultivar	Non-PCNA	Japan	115289
37	Karasumi	Local cultivar	Non-PCNA	Japan	115290



ID <sup>a</sup>	Name	Accession type	Astringency phenotype	Origin	JP acc. No. <sup>b</sup>
22	Kasuga	Local cultivar	Non-PCNA	Japan	115292
147	Kazusa	Local cultivar	PCNA	Japan	115473
123	Kikuhira	Local cultivar	Non-PCNA	Japan	115295
139	Kinshuu	Crossbred cultivar	PCNA	Japan	117272
133	Kishuu	Crossbred cultivar	PCNA	Japan	232689
214	Kodagoshi	Local cultivar	PCNA	Japan	115474
32	Konashiba	Local cultivar	Non-PCNA	Japan	115296
91	Koshumaru	Local cultivar	Non-PCNA	Japan	115301
9	Kosyuhyakume (Kosyu-hyakume)	Local cultivar	Non-PCNA	Japan	115300
47	Kubo	Local cultivar	Non-PCNA	Japan	115303
215	Kubogataobishi	Local cultivar	Non-PCNA	Japan	115304
20	Kunitomi	Local cultivar	Non-PCNA	Japan	115305
116	Kurogaki	Local cultivar	Non-PCNA	Japan	115307
57	Kurokuma	Local cultivar	Non-PCNA	Japan	116632
127	Kyara	Local cultivar	Non-PCNA	Japan	115309
72	Luotian-tianshi (Luo-tian-tian-shi)	Local cultivar	C-PCNA	China	116647
216	Maekawajiro	Local cultivar	PCNA	Japan	115310
217	Manmosu	Local cultivar	PCNA	Japan	115311
218	Matsumotowasefuyu	Local cultivar	PCNA	Japan	115312
219	Matsumotowasefuyu edagawari-Fukui	Local cultivar	PCNA	Japan	213422
220	Matsumotowasefuyu edagawari-Wakayama	Local cultivar	PCNA	Japan	117906
148	Midai	Local cultivar	PCNA	Japan	115314
149	Mikado	Local cultivar	PCNA	Japan	115315
128	Mikatanigosho	Local cultivar	Non-PCNA	Japan	115317
136	Misatogoshi	Local cultivar	PCNA	Japan	-
44	Mixian niuxinshi	Local cultivar	Non-PCNA	China	116608
111	Miyazakitanenashi	Local cultivar	Non-PCNA	Japan	115319
150	Mizugoshi	Local cultivar	PCNA	Japan	116641
62	Mizushima	Local cultivar	Non-PCNA	Japan	115320
221	Mizushimagoshi-Italy	Local cultivar	Non-PCNA	Italy	-
54	Mizutafuyu	Local cultivar	Non-PCNA	Japan	115322
48	Monbei (Monpei)	Local cultivar	Non-PCNA	Japan	115323
89	Mopanshi	Local cultivar	Non-PCNA	China	116635
46	Moriya	Local cultivar	Non-PCNA	Japan	115324
222	Moro	Local cultivar	Non-PCNA	Italy	210185
151	Mushirodagoshi	Local cultivar	PCNA	Japan	115326
59	Naganogoshi	Local cultivar	Non-PCNA	Japan	115327
223	Nakataniwase	Local cultivar	Non-PCNA	Japan	219967
60	Nikkotennenkinenbutsu	Local cultivar	Non-PCNA	Japan	-
121	Nishimurawase	Local cultivar	Non-PCNA	Japan	115334
224	Nishiura	Local cultivar	PCNA	Japan	202805
12	Nitari	Local cultivar	Non-PCNA	Japan	115335
49	Obishi	Local cultivar	Non-PCNA	Japan	115337
152	Ogoshi	Local cultivar	PCNA	Japan	115338
71	Okayamaokugoshi	Local cultivar	Non-PCNA	Japan	115341
153	Okitsu-1	Selection	PCNA	Japan	115430
172	Okitsu-15	Selection	PCNA	Japan	115438
173	Okitsu-16	Selection	PCNA	Japan	115439
154	Okitsu-17 (V-13)	Selection	PCNA	Japan	115440
174	Okitsu-2	Selection	PCNA	Japan	115431
184	Okitsu-20	Selection	PCNA	Japan	115441
131	Okitsu-21	Selection	PCNA	Japan	115442
155	Okitsu-22	Selection	PCNA	Japan	115443
163	Okitsu-25	Selection	PCNA	Japan	115445
10	Okozu	Local cultivar	Non-PCNA	Japan	202800
156	Okugoshi	Local cultivar	PCNA	Japan	115342
83	Omidanshi	Local cultivar	Non-PCNA	Japan	115476
11	Orandagosho	Local cultivar	Non-PCNA	Japan	115345
35	Oshorogaki	Local cultivar	Non-PCNA	Japan	115346

ID <sup>a</sup>	Name	Accession type	Astringency phenotype	Origin	JP acc. No. <sup>b</sup>
36	Otani	Local cultivar	Non-PCNA	Japan	115347
52	Otera	Local cultivar	Non-PCNA	Japan	115348
76	Oyotsumizo	Local cultivar	Non-PCNA	Japan	115349
29	Qu-jing-shui-shi	Local cultivar	Non-PCNA	Korea	116633
34	Raotianhong	Local cultivar	Non-PCNA	China	116625
175	Reigyoku	Crossbred cultivar	PCNA	Japan	-
92	Rendaiji	Local cultivar	Non-PCNA	Japan	115353
225	Rispoli	Local cultivar	Non-PCNA	Italy	210191
5	Rojo Brillante	Local cultivar	Non-PCNA	Spain	213423
130	Sa Kok-Si	Local cultivar	Non-PCNA	Korea	115363
120	Saefuji	Local cultivar	Non-PCNA	Japan	115687
157	Sagiyamagosho	Local cultivar	PCNA	Japan	116649
119	Saijo (Saijyo)	Local cultivar	Non-PCNA	Japan	115355
2	Sakushumishirazu	Local cultivar	Non-PCNA	Japan	115356
14	Sangukuichi	Local cultivar	Non-PCNA	Japan	115358
66	Shibumyotan	Local cultivar	Non-PCNA	Japan	115364
84	Shimofuri	Local cultivar	Non-PCNA	Japan	115368
41	Shinhachiya	Local cultivar	Non-PCNA	Japan	115369
165	Shinshuu	Crossbred cultivar	PCNA	Japan	115466
33	Shirotodamashi	Local cultivar	Non-PCNA	Japan	115375
117	Shogatsu (Shougatsu)	Local cultivar	Non-PCNA	Japan	115380
25	Shogatsu-Italy	Local cultivar	Non-PCNA	Italy	210187
101	Shoujyou	Local cultivar	Non-PCNA	Japan	115699
158	Soushuu	Crossbred cultivar	PCNA	Japan	232687
226	Spur Hiratanenashi	Local cultivar	Non-PCNA	Japan	115376
227	Sugitawase	Local cultivar	Non-PCNA	Japan	115377
228	Sunami	Local cultivar	PCNA	Japan	116658
159	Suruga	Crossbred cultivar	PCNA	Japan	115379
97	Suzakunishiki	Crossbred cultivar	Non-PCNA	Japan	-
176	Taiga	Crossbred cultivar	PCNA	Japan	-
28	Taigetsu	Crossbred cultivar	Non-PCNA	Japan	219975
177	Taiho	Crossbred cultivar	PCNA	Japan	-
229	Taikakejiro-e	Local cultivar	PCNA	Japan	117209
178	Taishuu	Crossbred cultivar	PCNA	Japan	116695
24	Taiten	Crossbred cultivar	Non-PCNA	Japan	219976
88	Tamopan	Local cultivar	Non-PCNA	China	115387
230	Tanbawasefuyu	Local cultivar	PCNA	Japan	202809
179	Tanrei	Crossbred cultivar	PCNA	Japan	117276
160	Tenjingosho	Local cultivar	PCNA	Japan	115390
3	Tenryubo	Local cultivar	Non-PCNA	Japan	115391
40	Tianbaogai	Local cultivar	C-PCNA	China	210180
85	Togosho	Local cultivar	Non-PCNA	Japan	115394
231	Tohachi	Local cultivar	Non-PCNA	Japan	115392
161	Tokudagosho	Local cultivar	PCNA	Japan	115393
180	Tokyogosho	Crossbred cultivar	PCNA	Japan	115689
232	Tone Hiratanenashi	Local cultivar	Non-PCNA	Italy	210190
233	Tonewase	Local cultivar	Non-PCNA	Japan	115479
13	Toyoichi	Local cultivar	Non-PCNA	Japan	115397
73	Toyoka	Local cultivar	Non-PCNA	Japan	115398
87	Triumph	Local cultivar	Non-PCNA	Israel	210194
80	Tsukiyo	Local cultivar	Non-PCNA	Japan	115402
70	Tsurunoko	Local cultivar	Non-PCNA	Japan	115400
15	Umurbey	Local cultivar	Non-PCNA	Turkey	219969
234	Wakasugikei Jiro	Local cultivar	PCNA	Japan	115405
235	Yaizuwasejiro	Local cultivar	PCNA	Japan	115415
236	Yamatogaki	Local cultivar	Non-PCNA	Japan	115412
162	Yamatogosho	Local cultivar	PCNA	Japan	115413
90	Yamatohyakume	Local cultivar	Non-PCNA	Japan	115414
50	Yashima	Local cultivar	Non-PCNA	Japan	115416

ID <sup>a</sup>	Name	Accession type	Astringency phenotype	Origin	JP acc. No. <sup>b</sup>
82	Yatsudera	Local cultivar	Non-PCNA	Japan	202797
98	Yokono	Local cultivar	Non-PCNA	Japan	115417
21	Yoshidagoshi	Local cultivar	Non-PCNA	Japan	115420
181	Yoshimotogoshi	Local cultivar	PCNA	Japan	115421
23	Yoshino	Local cultivar	Non-PCNA	Japan	115422
6	Yotan	Local cultivar	Non-PCNA	Japan	115423
108	Yotsumizo	Local cultivar	Non-PCNA	Japan	115425
182	Youhou	Crossbred cultivar	PCNA	Japan	115471
1	Yukigaki	Local cultivar	Non-PCNA	Japan	-
95	Yukineri	Local cultivar	Non-PCNA	Japan	115426
183	Yuubeni	Crossbred cultivar	PCNA	Japan	116696
55	Zenjamaru	Local cultivar	Non-PCNA	Japan	115427
237	Zennosuke	Local cultivar	PCNA	Japan	115428
114	Zhai-jia-hong	Local cultivar	Non-PCNA	China	116662

<sup>a</sup> ID numbers of the accessions refer to the numbers in Table 3 (1–130) and Table 4 (131–184). ID 185–237 were allocated alphabetically for the other accessions. These accessions showed one of the identical genotypes in ID 1–184 by *AST* locus-linked and six *ssrdk* markers (Table 2)

<sup>b</sup> JP acc. No. = accession number in the NARO Genebank ([http://www.gene.affrc.go.jp/about\\_en.php](http://www.gene.affrc.go.jp/about_en.php))

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Supplemental Table S2. Genotype by six ssrdk markers<sup>a</sup> for 127 non-PCNA, 3 C-PCNA, and 54 PCNA persimmon accessions

ID <sup>b</sup>	Name	dk10					dk14					dk16					dk17			dk29			dk30				
1	Yukigaki	213	217	223	225	230	171	175	177	183	185	187	158	162	168	176	150	160	134	140	157	162	166	180	182		
2	Sakushumishirazu	213	215	217	225	230	171	177	181	185	187	154	158	162	166	168	150	158	160	134	140	162	166	180	182		
3	Tenryubo	204	213	215	223	225	165	175	177	183	154	158	162	176	150	158	160	134	140	157	166	172	174	178			
4	Egosho	204	213	215	223	225	175	183	185	158	162	164	168	182	150	177	134	140	157	162	166	176					
5	Rojo Brillante	213	215	223	230		175	183	185	158	162	168	176	182	150	177	134	140	157	162	174	176	182				
6	Yotan	215	217	223	225		165	173	175	183	158	160	168	176	182	150	154	162	177	134	140	162	166	176			
7	Kanzo (Kanzou)	213	223				177	183			158	162	164	168	176	150	158			134	140	166	170	178			
8	Ichiryo	213	217	225	227	232	171	173	175	177	185	160	162	166		150	154	158	134	157	158	166					
9	Kosyuhyakume (Kosyu-hyakume)	204	223	225			177	181	183	185	154	158	162	164	166	150	158	162	134	157	166	176	178	180			
10	Okozu	204	213	215	223	225	173	175	177	183	158	162	166			150	158	162	134	140	166	180					
11	Orandagosho	223	225				171	177	181	185	154	158	162	166		150	158	160	134	157	162	166	176	178	180	182	
12	Nitari	213	217	223			171	175	177	183	158	162	164	166		150			134	140	166	172	176	182			
13	Toyoichi	213	215	217	221	227	171	173	177	183	158	162	164	168	182	148	150	154	158	134	140	157	166	176	178	180	
14	Sangukuichi	213	215	223			173	175	177	181	154	158	162	168	176	150	158	162	134	140	166	170	178	182			
15	Umurbey	213	215	223			177	183	185	158	176	182			148	150			134	140	157	162	166	176			
16	Goshogaki-Sagae	213	215	223			175	177	183	187	158	162	166	176		150	158	177	134	140	157	158	166	182			
17	Heixinshi (Hei-xin-shi)	215	223	225	227		171	177	185		162	168	176		148	150	160		134		160	164	182	183	186		
18	Hotoku	213	223	225	227		175	183			154	158	160	162	176	150	158	160	162	134	146	157	166	174	182		
19	310-24	215	223	225	229		165	171	173	175	183	158	162	164	176	150	154	158	160	162	134	151	157	166	174	178	180
20	Kunitomi	213	215	223	225		175	183	185		158	162	168	176	182	150	158	162	134	140	162	172	174	182			
21	Yoshidagosho	213	215	223	225		175	177	181		158	162	164	176		150	158	177	134	146	157	166	174	176	178		
22	Kasuga	213	215	223	225		165	175	177	181	158	160	164	176		150	158	160	134	140	157	162	166	174			
23	Yoshino	213	215	223	225		173	175	177	181	185	154	158	162	166	150	160	162	134	140	166	178	182				
24	Taiten	213	215	223	225		175	183			158	162	176		150	160	162		134	140	157	162	166	178	182		
25	Shogatsu-Italy	213	215	223	225		171	177	181	183	185	154	158	162	176	182	150	158	162	134	140	157	162	172	176	182	
26	Aosa	213	215	223			165	171	175	183	185	154	162	164		150	162	177	134	140	162	166	172	176	178	180	
27	Daishiro	213	215	223			165	175			154	162	164	168	182	150	158	160	162	134	140	158	162	166	172		
28	Taigetsu	213	215	223			175	183	185		158	162	176		150	160	162		134	140	166	172	176	178	182		
29	Qu-jing-shui-shi	215	225	227			175	177	185		166	168	178		148	150			129	134	157	160	166	170	174		
30	Iwasedo	204	213	223	229	230	171	175	183	185	158	162	164	176		150	158	160	134	140	158	162	166	176			
31	Kagawagoban	204	215	223	225	230	175	177	183		162	166	168		150	158			134	140	166	172					
32	Konashiba	213	215	223	225	230	175	183			154	158	160	162	168	150	158	162	134	140	166	172	174				
33	Shirodamashi	213	215				171	175	177	185	154	162	166	176		150	154	158	160	164	134	140	157	172	174	176	178
34	Raotianhong	223	225	227	230		171	175	177	179	162	168	178		150	154	160		134	157	162	168	170	174	186		
35	Oshorogaki	215	223	227			171	175	177	183	158	160	162	168	174	148	150	158	160	134	140	146	166	178	182	186	
36	Otani	213	221	223			171	173	175	185	158	162	168		150	154	158	160	134	140	162	166	178	182			
37	Karasumi	204	213	215	223	225	165	175	177	181	154	158	162	168	176	150	158	160	134	140	157	162	166	178			
38	Amahachiya	204	223	225	230		177	183	185		154	158	162	164	168	150	154	158	160	134	146	157	166	176	180		
39	Chu-tou-shi	213	215	223	227		173	175	177		162	168			150	154	160	164	134	146	174	178	186				
40	Tianbaogai	213	217	223	225	230	173	175	177	183	185	162	168		150	154	160		134	140	146	151	178	180	186		
41	Shinhachiya	204	213	215	223		175	183	185		154	158	162	166	176	182	150	158	160	162	134	162	166	176	182		
42	Bongaki B	215	223				175	177	181	183	185	154	158	168		150			134		162	166	176				
43	Emon	204	213	215	223		173	175	177	181	183	185	154	158	162	168	170	176	150	160	134	140	146	166	172	178	180
44	Mixian niuxinshi	215	223	225	227	230	175	177	185		168				150	154	160		134		164	166	182				
45	Atago-Ehime (Atago)	213	223	230			173	175	177	185	162	166	176		150	160	162		140	157	162	166	176	182			
46	Moriya	204	215	217	223		173	175	177		160	168	176	182		150	154	160	134	146	157	162	166	176	178	182	
47	Kubo	213	217	225			173	175	177	181	183	185	158	162	164	168	182	150	158	160	134	140	166	172	176		
48	Monbei (Monpei)	213	215	217	223	225	171	177	181		154	158	162	176		150	160		134	140	166	172	182				
49	Obishi	204	213	223	225	230	175	177	181	183	187	158	162	168		150	158	160	134	140	166	172	180				
50	Yashima	215	223	225			175	183	185		158	162	164	168		150	160	162	134	140	162	166	172	176	182		
51	Gionbo	213	215	217	223		171	175	185		162	166	168	170	176	150	154	158	162	134	157	166					
52	Otera	215	223	225			175	177	181	183	185	154	158	162		150	158	160	134	157	162	166	172	176	182		





Supplemental Table S2. Genotype by six ssrdk markers<sup>a</sup> for 127 non-PCNA, 3 C-PCNA, and 54 PCNA persimmon accessions

ID <sup>b</sup>	Name	dk10				dk14				dk16				dk17			dk29			dk30													
179	Tanrei	215	217	223		171	175	181	183		154	158	162	176		150	158	160	162		134	140	157		166	172	174	182					
180	Tokyogosho	213	215	217	223		175	177	181	183		154	158	162	168	176		150	158	160		134	140			166	172	174	182				
181	Yoshimotogosho	213	215	217	223	225		165	171	175	177	181	183		154	158	160	162	168	176		150	160	162		134	140	157		166	182		
182	Youhou	213	215	217	223			165	175	177							158	162	168	176		150	158	160	162		134	140	157		172	174	182
183	Yuubeni	213	215	225				175	177	183							158	160	162	168	176		150	160	162		134	140	157		174	178	182
184	Okitsu-20	204	213	217	223	225		177	181	183							154	162	164	166	168		150	160	162		134	140	157		166	176	182

<sup>a</sup> Naval et al. (2010)

<sup>b</sup> ID numbers of the accessions refer to the numbers in Table 3 (1–130) and Table 4 (131–184)

**SSR-based molecular profiling of 237 persimmon (*Diospyros kaki* Thunb.) germplasms using an *ASTRINGENCY*-linked marker**

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Supplemental Table S3. DNA sequences of *ast* allele-linked fragments for 45 non-PCNA accessions with only one-size peak of *ast* fragment

<i>ast</i> allele	Accession's Name	DDBJ Acc. No. <sup>a</sup>	Sequence
a349	Kagawagoban	LC341156	CCCCTCAGTGGCAGTGTGCAACCTTTAAAGCAATGAACCTTTGGGCAAGGCTGGCTGTCGTTATAGTTTTGAGGCTCCCATCTCAGTGATATTGCAGCAGCTCCCTAAAGTA GTGAAGCTTCAAGGCTGGTTGTGCTGTAATTTAGAGCTCTCCTTTTTGGGGGCCCTAGACATGGGCCTACTGGCCTATGCCTTAAGCCGGCCCTGATTGCATATTGAGGTTA ATAAATATACATGTATATATTATATGTAATATATATATATATATATTGTAATTAAGCTCATTAAAGTATGCAAAGCATGAGGGGCATTGTTGAAAGAAGTCTCCGGATGAGTGTTT
a349	Konashiba	LC341157	CCCCTCAGTGGCAGTGTGCAACCTTTAAAGCAATGAACCTTTGGGCAAGGCTGGCTGTCGTTATAGTTTTGAGGCTCCCATCTCAGTGATATTGCAGCAGCTCCCTAAAGTA GTGAAGCTTCAAGGCTGGTTGTGCTGTAATTTAGAGCTCTCCTTTTTGGGGGCCCTAGACATGGGCCTACTGGCCTATGCCTTAAGCCGGCCCTGATTGCATATTGAGGTTA ATAAATATACATGTATATATTATATGTAATATATATATATATATATTGTAATTAAGCTCATTAAAGTATGCAAAGCATGAGGGGCATTGTTGAAAGAAGTCTCCGGATGAGTGTTT
a349	Shirodamashi	LC341158	CCCCTCAGTGGCAGTGTGCAACCTTTAAAGCAATGAACCTTTGGGCAAGGCTGGCTGTCGTTATAGTTTTGAGGCTCCCATCTCAGTGATATTGCAGCAGCTCCCTAAAGTA GTGAAGCTTCAAGGCTGGTTGTGCTGTAATTTAGAGCTCTCCTTTTTGGGGGCCCTAGACATGGGCCTACTGGCCTATGCCTTAAGCCGGCCCTGATTGCATATTGAGGTTA ATAAATATACATGTATATATTATATGTAATATATATATATATATATTGTAATTAAGCTCATTAAAGTATGCAAAGCATGAGGGGCATTGTTGAAAGAAGTCTCCGGATGAGTGTTT
a349	Oshorogaki	LC341159	CCCCTCAGTGGCAGTGTGCAACCTTTAAAGCAATGAACCTTTGGGCAAGGCTGGCTGTCGTTATAGTTTTGAGGCTCCCATCTCAGTGATATTGCAGCAGCTCCCTAAAGTA GTGAAGCTTCAAGGCTGGTTGTGCTGTAATTTAGAGCTCTCCTTTTTGGGGGCCCTAGACATGGGCCTACTGGCCTATGCCTTAAGCCGGCCCTGATTGCATATTGAGGTTA ATAAATATACATGTATATATTATATGTAATATATATATATATATATTGTAATTAAGCTCATTAAAGTATGCAAAGCATGAGGGGCATTGTTGAAAGAAGTCTCCGGATGAGTGTTT
a349	Karasumi	LC341160	CCCCTCAGTGGCAGTGTGCAACCTTTAAAGCAATGAACCTTTGGGCAAGGCTGGCTGTCGTTATAGTTTTGAGGCTCCCATCTCAGTGATATTGCAGCAGCTCCCTAAAGTA GTGAAGCTTCAAGGCTGGTTGTGCTGTAATTTAGAGCTCTCCTTTTTGGGGGCCCTAGACATGGGCCTACTGGCCTATGCCTTAAGCCGGCCCTGATTGCATATTGAGGTTA ATAAATATACATGTATATATTATATGTAATATATATATATATATATTGTAATTAAGCTCATTAAAGTATGCAAAGCATGAGGGGCATTGTTGAAAGAAGTCTCCGGATGAGTGTTT
a349	Chu-tou-shi	LC341161	CCCCTCAGTGGCAGTGTGCAACCTTTAAAGCAATGAACCTTTGGGCAAGGCTGGCTGTCGTTATAGTTTTGAGGCTCCCATCTCAGTGATATTGCAGCAGCTCCCTAAAGTA GTGAAGCTTCAAGGCTGGTTGTGCTGTAATTTAGAGCTCTCCTTTTTGGGGGCCCTAGACATGGGCCTACTGGCCTATGCCTTAAGCCGGCCCTGATTGCATATTGAGGTTA ATAAATATACATGTATATATTATATGTAATATATATATATATATATTGTAATTAAGCTCATTAAAGTATGCAAAGCATGAGGGGCATTGTTGAAAGAAGTCTCCGGATGAGTGTTT
a349	Tianbaogai	LC341162	CCCCTCAGTGGCAGTGTGCAACCTTTAAAGCAATGAACCTTTGGGCAAGGCTGGCTGTCGTTATAGTTTTGAGGCTCCCATCTCAGTGATATTGCAGCAGCTCCCTAAAGTA GTGAAGCTTCAAGGCTGGTTGTGCTGTAATTTAGAGCTCTCCTTTTTGGGGGCCCTAGACATGGGCCTACTGGCCTATGCCTTAAGCCGGCCCTGATTGCATATTGAGGTTA ATAAATATACATGTATATATTATATGTAATATATATATATATATATTGTAATTAAGCTCATTAAAGTATGCAAAGCATGAGGGGCATTGTTGAAAGAAGTCTCCGGATGAGTGTTT
a349	Bongaki B	LC341163	CCCCTCAGTGGCAGTGTGCAACCTTTAAAGCAATGAACCTTTGGGCAAGGCTGGCTGTCGTTATAGTTTTGAGGCTCCCATCTCAGTGATATTGCAGCAGCTCCCTAAAGTA GTGAAGCTTCAAGGCTGGTTGTGCTGTAATTTAGAGCTCTCCTTTTTGGGGGCCCTAGACATGGGCCTACTGGCCTATGCCTTAAGCCGGCCCTGATTGCATATTGAGGTTA ATAAATATACATGTATATATTATATGTAATATATATATATATATATTGTAATTAAGCTCATTAAAGTATGCAAAGCATGAGGGGCATTGTTGAAAGAAGTCTCCGGATGAGTGTTT
a349	Emon	LC341164	CCCCTCAGTGGCAGTGTGCAACCTTTAAAGCAATGAACCTTTGGGCAAGGCTGGCTGTCGTTATAGTTTTGAGGCTCCCATCTCAGTGATATTGCAGCAGCTCCCTAAAGTA GTGAAGCTTCAAGGCTGGTTGTGCTGTAATTTAGAGCTCTCCTTTTTGGGGGCCCTAGACATGGGCCTACTGGCCTATGCCTTAAGCCGGCCCTGATTGCATATTGAGGTTA ATAAATATACATGTATATATTATATGTAATATATATATATATATATTGTAATTAAGCTCATTAAAGTATGCAAAGCATGAGGGGCATTGTTGAAAGAAGTCTCCGGATGAGTGTTT
a349	Mixian niuxinshi	LC341165	CCCCTCAGTGGCAGTGTGCAACCTTTAAAGCAATGAACCTTTGGGCAAGGCTGGCTGTCGTTATAGTTTTGAGGCTCCCATCTCAGTGATATTGCAGCAGCTCCCTAAAGTA GTGAAGCTTCAAGGCTGGTTGTGCTGTAATTTAGAGCTCTCCTTTTTGGGGGCCCTAGACATGGGCCTACTGGCCTATGCCTTAAGCCGGCCCTGATTGCATATTGAGGTTA ATAAATATACATGTATATATTATATGTAATATATATATATATATATTGTAATTAAGCTCATTAAAGTATGCAAAGCATGAGGGGCATTGTTGAAAGAAGTCTCCGGATGAGTGTTT
a349	Atago-Ehime	LC341166	CCCCTCAGTGGCAGTGTGCAACCTTTAAAGCAATGAACCTTTGGGCAAGGCTGGCTGTCGTTATAGTTTTGAGGCTCCCATCTCAGTGATATTGCAGCAGCTCCCTAAAGTA GTGAAGCTTCAAGGCTGGTTGTGCTGTAATTTAGAGCTCTCCTTTTTGGGGGCCCTAGACATGGGCCTACTGGCCTATGCCTTAAGCCGGCCCTGATTGCATATTGAGGTTA ATAAATATACATGTATATATTATATGTAATATATATATATATATATTGTAATTAAGCTCATTAAAGTATGCAAAGCATGAGGGGCATTGTTGAAAGAAGTCTCCGGATGAGTGTTT
a349	Moriya	LC341167	CCCCTCAGTGGCAGTGTGCAACCTTTAAAGCAATGAACCTTTGGGCAAGGCTGGCTGTCGTTATAGTTTTGAGGCTCCCATCTCAGTGATATTGCAGCAGCTCCCTAAAGTA GTGAAGCTTCAAGGCTGGTTGTGCTGTAATTTAGAGCTCTCCTTTTTGGGGGCCCTAGACATGGGCCTACTGGCCTATGCCTTAAGCCGGCCCTGATTGCATATTGAGGTTA ATAAATATACATGTATATATTATATGTAATATATATATATATATATTGTAATTAAGCTCATTAAAGTATGCAAAGCATGAGGGGCATTGTTGAAAGAAGTCTCCGGATGAGTGTTT
a349	Amayotsumizo	LC341168	CCCCTCAGTGGCAGTGTGCAACCTTTAAAGCAATGAACCTTTGGGCAAGGCTGGCTGTCGTTATAGTTTTGAGGCTCCCATCTCAGTGATATTGCAGCAGCTCCCTAAAGTA GTGAAGCTTCAAGGCTGGTTGTGCTGTAATTTAGAGCTCTCCTTTTTGGGGGCCCTAGACATGGGCCTACTGGCCTATGCCTTAAGCCGGCCCTGATTGCATATTGAGGTTA ATAAATATACATGTATATATTATATGTAATATATATATATATATATTGTAATTAAGCTCATTAAAGTATGCAAAGCATGAGGGGCATTGTTGAAAGAAGTCTCCGGATGAGTGTTT
a349	Togoshi	LC341169	CCCCTCAGTGGCAGTGTGCAACCTTTAAAGCAATGAACCTTTGGGCAAGGCTGGCTGTCGTTATAGTTTTGAGGCTCCCATCTCAGTGATATTGCAGCAGCTCCCTAAAGTA GTGAAGCTTCAAGGCTGGTTGTGCTGTAATTTAGAGCTCTCCTTTTTGGGGGCCCTAGACATGGGCCTACTGGCCTATGCCTTAAGCCGGCCCTGATTGCATATTGAGGTTA ATAAATATACATGTATATATTATATGTAATATATATATATATATATTGTAATTAAGCTCATTAAAGTATGCAAAGCATGAGGGGCATTGTTGAAAGAAGTCTCCGGATGAGTGTTT





<i>ast</i> allele	Accession's Name	DDBJ Acc. No. <sup>a</sup>	Sequence
a353-1	Koshumaru	LC341187	CCCCTCAGTGGCAGTGTGCAACCTTTTAAAGCAATGAACCTTTTGTGCAAGGCTGGCTGCCGTTATAGTTTIGAGGCTCCCATCTCAGTGGTATTGCAGCAGCTCCCTAAAGCA GTGAAGCTTCAAGGCTGGTTGTGCTGCAATTTTGGAGCCCTCCTTTTTTGGGGGCCCTAGACATAGGCCTTACTGGCCTATGCCTTAAGCCGGCCCTGATTGCATATTGAGGTTA ATAAATATACATGTATATGTTATATGTATATATATATATATATGTATATTGTAATTAAGCTCATTAAAGTATGCAAAGCATGAGGGGCATTGTTGGAAGAAGTCTCCGGATGAG
a353-1	Huo-shi	LC341188	CCCCTCAGTGGCAGTGTGCAACCTTTTAAAGCAATGAACCTTTTGTGCAAGGCTGGCTGCCGTTATAGTTTIGAGGCTCCCATCTCAGTGGTATTGCAGCAGCTCCCTAAAGCA GTGAAGCTTCAAGGCTGGTTGTGCTGCAATTTTGGAGCCCTCCTTTTTTGGGGGCCCTAGACATAGGCCTTACTGGCCTATGCCTTAAGCCGGCCCTGATTGCATATTGAGGTTA ATAAATATACATGTATATGTTATATGTATATATATATATATGTATATTGTAATTAAGCTCATTAAAGTATGCAAAGCATGAGGGGCATTGTTGGAAGAAGTCTCCGGATGAG
a353-2a	Otani	LC341189	CCCCTCAGTGGCAGTGTGCAACCTTTTAAAGCAATGAACCTTTTGTGCAAGGCTAGCTGCCGTTATAGTTTIGAGGCTCCCATCTCAGTGGTATTGCAGTAGCTCCCTAAAGCA GTGAAGCTTCAAGGCTGGTTGTGCTGCAATTTTGGAGCCCTCCTTTTTTGGGGGCCCTAGACATGGACCTTACTGGCCTATGCCTTAAGCCGACCTGATTGCATATTGAGGTTA ATAAATATACATGTATATGTTATATGTATATATATATATATGTATATTGTAATTAAGCTCATTAAAGTATGCAAAGCATGAGGGGCATTGTTGGAAGAAGTCTCCGGATGAG
a353-2a	Amahachiya	LC341190	CCCCTCAGTGGCAGTGTGCAACCTTTTAAAGCAATGAACCTTTTGTGCAAGGCTAGCTGCCGTTATAGTTTIGAGGCTCCCATCTCAGTGGTATTGCAGTAGCTCCCTAAAGCA GTGAAGCTTCAAGGCTGGTTGTGCTGCAATTTTGGAGCCCTCCTTTTTTGGGGGCCCTAGACATGGACCTTACTGGCCTATGCCTTAAGCCGACCTGATTGCATATTGAGGTTA ATAAATATACATGTATATGTTATATGTATATATATATATATGTATATTGTAATTAAGCTCATTAAAGTATGCAAAGCATGAGGGGCATTGTTGGAAGAAGTCTCCGGATGAG
a353-2a	Kubo <sup>b</sup>	LC341191	CCCCTCAGTGGCAGTGTGCAACCTTTTAAAGCAATGAACCTTTTGTGCAAGGCTAGCTGCCGTTATAGTTTIGAGGCTCCCATCTCAGTGGTATTGCAGTAGCTCCCTAAAGCA GTGAAGCTTCAAGGCTGGTTGTGCTGCAATTTTGGAGCCCTCCTTTTTTGGGGGCCCTAGACATGGACCTTACTGGCCTATGCCTTAAGCCGACCTGATTGCATATTGAGGTTA ATAAATATACATGTATATGTTATATGTATATATATATATATGTATATTGTAATTAAGCTCATTAAAGTATGCAAAGCATGAGGGGCATTGTTGGAAGAAGTCTCCGGATGAG
a353-2a	Omidanshi	LC341192	CCCCTCAGTGGCAGTGTGCAACCTTTTAAAGCAATGAACCTTTTGTGCAAGGCTAGCTGCCGTTATAGTTTIGAGGCTCCCATCTCAGTGGTATTGCAGTAGCTCCCTAAAGCA GTGAAGCTTCAAGGCTGGTTGTGCTGCAATTTTGGAGCCCTCCTTTTTTGGGGGCCCTAGACATGGACCTTACTGGCCTATGCCTTAAGCCGACCTGATTGCATATTGAGGTTA ATAAATATACATGTATATGTTATATGTATATATATATATATGTATATTGTAATTAAGCTCATTAAAGTATGCAAAGCATGAGGGGCATTGTTGGAAGAAGTCTCCGGATGAG
a353-2a	Shimofuri	LC341193	CCCCTCAGTGGCAGTGTGCAACCTTTTAAAGCAATGAACCTTTTGTGCAAGGCTAGCTGCCGTTATAGTTTIGAGGCTCCCATCTCAGTGGTATTGCAGTAGCTCCCTAAAGCA GTGAAGCTTCAAGGCTGGTTGTGCTGCAATTTTGGAGCCCTCCTTTTTTGGGGGCCCTAGACATGGACCTTACTGGCCTATGCCTTAAGCCGACCTGATTGCATATTGAGGTTA ATAAATATACATGTATATGTTATATGTATATATATATATATGTATATTGTAATTAAGCTCATTAAAGTATGCAAAGCATGAGGGGCATTGTTGGAAGAAGTCTCCGGATGAG
a353-2a	Hacchiuri	LC341194	CCCCTCAGTGGCAGTGTGCAACCTTTTAAAGCAATGAACCTTTTGTGCAAGGCTAGCTGCCGTTATAGTTTIGAGGCTCCCATCTCAGTGGTATTGCAGTAGCTCCCTAAAGCA GTGAAGCTTCAAGGCTGGTTGTGCTGCAATTTTGGAGCCCTCCTTTTTTGGGGGCCCTAGACATGGACCTTACTGGCCTATGCCTTAAGCCGACCTGATTGCATATTGAGGTTA ATAAATATACATGTATATGTTATATGTATATATATATATATGTATATTGTAATTAAGCTCATTAAAGTATGCAAAGCATGAGGGGCATTGTTGGAAGAAGTCTCCGGATGAG
a353-2a	Saefuji	LC341195	CCCCTCAGTGGCAGTGTGCAACCTTTTAAAGCAATGAACCTTTTGTGCAAGGCTAGCTGCCGTTATAGTTTIGAGGCTCCCATCTCAGTGGTATTGCAGTAGCTCCCTAAAGCA GTGAAGCTTCAAGGCTGGTTGTGCTGCAATTTTGGAGCCCTCCTTTTTTGGGGGCCCTAGACATGGACCTTACTGGCCTATGCCTTAAGCCGACCTGATTGCATATTGAGGTTA ATAAATATACATGTATATGTTATATGTATATATATATATATGTATATTGTAATTAAGCTCATTAAAGTATGCAAAGCATGAGGGGCATTGTTGGAAGAAGTCTCCGGATGAG
a353-2b	Amahachiya	LC341196	CCCCTCAGTGGCAGTGTGCAACCTTTTAAAGCAATGAACCTTTTGTGCAAGGCTAGCTGCCGTTATAGTTTIGAGGCTCCCATCTCAGTGGTATTGCAGTAGCTCCCTAAAGCA GTGAAGCTTCAAGGCTGGTTGTGCTGCAATTTTGGAGCCCTCCTTTTTTGGGGGCCCTAGACATGGACCTTACTGGCCTATGCCTTAAGCCGACCTGATTGCATATTGAGGTTA ATAAATATACATGTATATGTTATATGTATATATATATATATGTATATTGTAATTAAGCTCATTAAAGTATGCAAAGCATGAGGGGCATTGTTGGAAGAAGTCTCCGGATGAG
a353-2b	Omidanshi	LC341197	CCCCTCAGTGGCAGTGTGCAACCTTTTAAAGCAATGAACCTTTTGTGCAAGGCTAGCTGCCGTTATAGTTTIGAGGCTCCCATCTCAGTGGTATTGCAGTAGCTCCCTAAAGCA GTGAAGCTTCAAGGCTGGTTGTGCTGCAATTTTGGAGCCCTCCTTTTTTGGGGGCCCTAGACATGGACCTTACTGGCCTATGCCTTAAGCCGACCTGATTGCATATTGAGGTTA ATAAATATACATGTATATGTTATATGTATATATATATATATGTATATTGTAATTAAGCTCATTAAAGTATGCAAAGCATGAGGGGCATTGTTGGAAGAAGTCTCCGGATGAG
a353-2b	Shimofuri	LC341198	CCCCTCAGTGGCAGTGTGCAACCTTTTAAAGCAATGAACCTTTTGTGCAAGGCTAGCTGCCGTTATAGTTTIGAGGCTCCCATCTCAGTGGTATTGCAGTAGCTCCCTAAAGCA GTGAAGCTTCAAGGCTGGTTGTGCTGCAATTTTGGAGCCCTCCTTTTTTGGGGGCCCTAGACATGGACCTTACTGGCCTATGCCTTAAGCCGACCTGATTGCATATTGAGGTTA ATAAATATACATGTATATGTTATATGTATATATATATATATGTATATTGTAATTAAGCTCATTAAAGTATGCAAAGCATGAGGGGCATTGTTGGAAGAAGTCTCCGGATGAG
a353-2b	Dejima	LC341199	CCCCTCAGTGGCAGTGTGCAACCTTTTAAAGCAATGAACCTTTTGTGCAAGGCTAGCTGCCGTTATAGTTTIGAGGCTCCCATCTCAGTGGTATTGCAGTAGCTCCCTAAAGCA GTGAAGCTTCAAGGCTGGTTGTGCTGCAATTTTGGAGCCCTCCTTTTTTGGGGGCCCTAGACATGGACCTTACTGGCCTATGCCTTAAGCCGACCTGATTGCATATTGAGGTTA ATAAATATACATGTATATGTTATATGTATATATATATATATGTATATTGTAATTAAGCTCATTAAAGTATGCAAAGCATGAGGGGCATTGTTGGAAGAAGTCTCCGGATGAG
a353-2c	Otani	LC341200	CCCCTCAGTGGCAGTGTGCAACCTTTTAAAGCAATGAACCTTTTGTGCAAGGCTAGCTGCCGTTATAGTTTIGAGGCTCCCATCTCAGTGGTATTGCAGCAGCTCCCTAAAGCA GTGAAGCTTCAAGGCTGGTTGTGCTGCAATTTTGGAGCCCTCCTTTTTTGGGGGCCCTAGACATGGACCTTACTGGCCTATGCCTTAAGCCGACCTGATTGCATATTGAGGTTA ATAAATATACATGTATATGTTATATGTATATATATATATATGTATATTGTAATTAAGCTCATTAAAGTATGCAAAGCATGAGGGGCATTGTTGGAAGAAGTCTCCGGATGAG
a355	Hegurogaki	LC341201	CCCCTCAGTGGCAGTGTGCAACCTTTTAAAGCAATGAACCTTTTGTGCAAGGCTAGCTGCCGTTATAGTTTIGAGGCTCCCATCTCAGTGGTATTGCAGTAGCTCCCTAAAGCA GTGAAGCTTCAAGGCTGGTTGTGCTGCAATTTTGGAGCCCTCCTTTTTTGGGGGCCCTAGACATGGACCTTACTGGCCTATGCCTTAAGCCGACCTGATTGCATATTGAGGTTA ATAAATATACATGTATATGTTATATGTATATATATATATATGTATATTGTAATTAAGCTCATTAAAGTATGCAAAGCATGAGGGGCATTGTTGGAAGAAGTCTCCGGATG
a355	Yukineri	LC341202	CCCCTCAGTGGCAGTGTGCAACCTTTTAAAGCAATGAACCTTTTGTGCAAGGCTAGCTGCCGTTATAGTTTIGAGGCTCCCATCTCAGTGGTATTGCAGTAGCTCCCTAAAGCA GTGAAGCTTCAAGGCTGGTTGTGCTGCAATTTTGGAGCCCTCCTTTTTTGGGGGCCCTAGACATGGACCTTACTGGCCTATGCCTTAAGCCGACCTGATTGCATATTGAGGTTA ATAAATATACATGTATATGTTATATGTATATATATATATATATGTATATTGTAATTAAGCTCATTAAAGTATGCAAAGCATGAGGGGCATTGTTGGAAGAAGTCTCCGGATG

<sup>a</sup> DDBJ acc. No. = accession number in the DNA Data Bank of Japan (<http://www.ddbj.nig.ac.jp/index-e.html>)

<sup>b</sup> *ast* fragment sequence for possible synonyms was identical: 'Yamatohyakume' and 'Yamatogaki' (group 13), 'Kikuhira' and 'Horaigaki' (group 10), and 'Kubo' and 'Chokenji' (group 5) (Table 2)