Identification of the Paternal Parent of ‘Bing’ Sweet Cherry and Confirmation of Descendants Using Single Nucleotide Polymorphism Markers

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ABSTRACT. ‘Bing’ is an iconic sweet cherry (*Prunus avium* L.) cultivar in the United States that even after more than 130 years of cultivation remains the most highly regarded dark sweet cherry and is the standard by which new sweet cherries are judged. ‘Bing’ has been repeatedly used as a parent in North American breeding programs and is found in the lineages of several important modern cultivars. The maternal parent of ‘Bing’ is reported to be ‘Black Republican’, an old cultivar commercially grown for fruit in the Willamette Valley, OR, after ≈1860 and now is usually only grown as a pollenizer cultivar; however, the paternal parent of ‘Bing’ is unknown. The objective of this study was to deduce the paternal parent of ‘Bing’ and validate the pedigree records for the relatives of ‘Bing’ using statistical algorithms that use genomewide single nucleotide polymorphism (SNP) data. With a high probability, it was determined that the sweet cherry cultivar Napoleon, also known as Royal Ann in the Pacific northwestern United States, a large, firm, bluish-type, light-fleshed, and productive cherry, is the paternal parent of ‘Bing’. This parentage deduction results in an increase in the known relatedness among U.S. cultivated sweet cherry breeding germplasm because ‘Napoleon’ is an important founder previously known to be present in the ancestry of every self-compatible sweet cherry cultivar bred to date, directly and through ‘Bing’ and its descendants.

‘Bing’ is the dominant fresh market sweet cherry cultivar grown in the western United States accounting for approximately half of the production acreage. The predominance of ‘Bing’ is the result of its heavy yields of large, firm, sweet, flavorful fruit with dark purplish flesh. Because of these desirable qualities, ‘Bing’ has been used in breeding and is well known as the mother of ‘Rainier’, the dominant U.S. cultivar in the yellow blush market class.

The original seedling that was later named ‘Bing’ was planted in 1875 in a nursery belonging to Seth Lewelling in Milwaukee, in the Willamette Valley of Oregon, and was later propagated and sold by the Lewelling Nursery (Hedrick, 1915). ‘Bing’ was derived from open pollination of ‘Black Republican’ and is believed to have been named after a Chinese workman (Hedrick, 1915). The seed parent, ‘Black Republican’, is an old and previously popular cultivar commercially grown for fruit in the Willamette Valley, OR, after ≈1860 and now is usually only planted as a pollenizer. The pollen part of ‘Bing’ was not recorded. Because all sweet cherry cultivars grown in the United States before 1968 were self-incompatible, ‘Bing’ could not have originated from self-pollination of ‘Black Republican’ (Lapins, 1970). Instead, it must have resulted from pollen that was compatible in styles of ‘Black Republican’.

Other common cultivars growing in the region at that time included ‘Napoleon’, ‘Black Heart’, and ‘Black Tartarian’ (Hedrick, 1915).

As a result of the importance of ‘Bing’ as a commercial cultivar and its value as a breeding parent, knowledge of the paternal parent of ‘Bing’ and confirmation of its contribution to the pedigrees of modern cultivars would provide useful insight to inform genetic studies and breeding decisions. Complete and correct pedigree records are critical for breeding decision-making and also where pedigree-based statistical methods are used for genetic analyses of trait inheritance (Bink et al., 2008; Rosyara et al., 2009). For example, pedigree records help to increase power and precision while reducing false discovery rate in quantitative trait locus discovery studies (Bink et al., 2012; Lebrech et al., 2008). In addition, complete pedigree records increase the accuracy of estimates of relatedness among breeding material, informing crossing decisions to avoid or exploit inbreeding. Thus, performing paternity tests to validate or correct pedigree information is an important goal for sweet cherry breeding.

Paternity testing is a process in which candidates are examined for the most likely parents of a target offspring. The availability of DNA marker information has greatly facilitated the development of computational methods for parentage determination, pedigree reconstruction, estimation of relatedness, and inferences about genealogical relationships (Blouin, 2003). Several statistical strategies based on probability theory have been developed for such purposes. Most notably, DNA-based parentage confirmation is an accepted tool

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used in human paternity identification (Li et al., 2012). In clonally propagated perennial plants such as cherry (*Prunus* L.), where centuries-old potential ancestors are frequently available, DNA markers have been used to determine paternity. Paternity analyses have been conducted in apple (*Malus × domestica* Borkh.) using random amplified polymorphic DNA markers (Harada et al., 1993) and chloroplast markers (Savolainen et al., 1995). Paternity analyses using simple sequence repeat (SSR) markers have been conducted in olive [*Olea europaea* L. (De la Rosa et al., 2004, 2013)], peach [*Prunus persica* L. (Yamamoto et al., 2003)], and wine grape [*Vitis vinifera* L. (Bowers et al., 1999)]. Schueler et al. (2003) used SSR markers for sweet cherry cultivar identification and studies of gene flow in wild sweet cherry where seed maternity and paternity were determined based on SSR genotypes of seed endocarp and embryos, respectively.

In the last two decades, SSR markers have been the DNA markers of choice for tests of paternity. However, SNP markers provide considerable advantages over SSRs including: 1) lower mutation rates; 2) suitability for standardized representation of genotyping results as a digital DNA signature (Fries and Durstewitz, 2001); and 3) suitability for high-throughput automation (Kruglyak, 1997). One disadvantage is that any individual SNP has a lower information content compared with a typical multiallelic SSR. However, this latter limitation can be compensated for by handling many more SNP markers.

Our objectives were to first determine the paternal parentage of ‘Bing’ sweet cherry and then to confirm the paternity of ‘Bing’ descendants. These analyses used statistical algorithms with different numbers of genomewide SNPs, thereby allowing a determination of optimal marker density for paternity analysis. The ability to identify the paternal parent of ‘Bing’ was facilitated by three factors. First, only a few sweet cherry cultivars existed in the United States in the 19th century and thus the number of potential paternal parents of ‘Bing’ is limited. These cultivars are still available. Second, sweet cherry is not native to the United States but rather to regions of Europe, the Middle East, and western Asia (Iezzoni et al., 1990). Finally, these analyses were possible as a result of the availability of new high-resolution genotypic data for sweet cherry. A genomewide 6K Infinium® II array (RosBREED 6K cherry SNP array v1) was developed and used to genotype a diverse array of 269 sweet cherry individuals (Peace et al., 2012). A total of 1825 SNPs were polymorphic in this germplasm (Peace et al., 2012), indicating that a large number of polymorphic markers suitable for paternity analysis were available.

Materials and Methods

PLANT MATERIAL AND GENOTYPIC DATA. The sweet cherry germplasm used ($n = 48$) consisted of founder cultivars, modern cultivars, breeding selections, and germplasm collection accessions (Table 1). All 48 individuals, which are part of the larger RosBREED sweet cherry Crop Reference Set representing North American sweet cherry breeding germplasm (C. Peace, J. Luby, E. van de Weg, M. Bink, and A. Iezzoni, unpublished data), were previously genotyped using the RosBREED cherry 6K SNP array v1 (Peace et al., 2012). A further subset of 15 cultivars and selections was tested for their probability of being the paternal parent of ‘Bing’. Of these, seven were included as negative controls because they were wild or landrace selections

introduced to the United States after 1900 (Table 2). A subset of three descendant cultivars was tested to confirm ‘Bing’ as a parent, and eight descendant cultivars and selections were tested to confirm ‘Bing’ as a grandparent (Table 3).

Different numbers of genomewide SNPs from the 6K array data set were used to evaluate whether marker number influenced the ability to determine parentage in sweet cherry. From all available SNPs, the first and largest set of 519 informative SNP markers was chosen that satisfied the following criteria: 1) minor allele frequency greater than 0.1; and 2) presence in the 48 accessions of all three genotypic classes, AA, AB, and BB. From this set, a second set of 180 SNPs was chosen that spanned all eight pseudo-chromosomes and with one SNP positioned approximately every 2 Mbp (≈ 8 cM) using the peach whole genome sequence, Peach v1.0 (Verde et al., 2013), as a proxy for the sweet cherry genome (Peace et al., 2012). A third set of 60 SNPs was chosen from the first set of SNPs using a wider spacing of approximately one marker at every 5 Mbp (≈ 20 cM). In this set of 60 markers, the minor allele frequency threshold was increased to greater than 0.2 to improve marker informativeness. Alleles at the self-incompatibility locus were from Haldar et al. (2010) and Iezzoni et al. (2005).

STATISTICAL DETERMINATION OF PARENT–OFFSPRING RELATIONSHIPS. Candidates for the paternal parent of ‘Bing’ and the likelihood that ‘Bing’ was the true parent of other modern sweet cherry cultivars were tested using two statistical approaches: composite paternity index (CPI) and pairwise calculation of genetic relatedness. The CPI is based on the null hypothesis that there is no relationship vs. the alternative hypothesis that the pair under consideration is a parent and offspring relationship (Evet and Weir, 1998). The calculation of genetic relatedness, however, provides a quantitative measure of the degree of relatedness without knowledge of the type of relationship.

COMPOSITE PATERNITY INDEX. Likelihood of parentage, expressed as the paternity index (PI) of Evett and Weir (1998), was used. In our case, we assumed that the maternal parent was known and the potential paternal parent was sought. As described in Evett and Weir (1998), X_i is the conditional probability that the alleged paternal parent is the true paternal parent, whereas Y_i is the conditional probability that a random individual from the same population is the true paternal parent. Thus, PI for each marker (i) can be expressed as the ratio of the probability that the alleged parent could be the source of the allele acquired from the paternal parent (X_i) to the probability that a random individual of the same population could have contributed the allele (Y_i). For the case of locus i with two codominant alleles A and B , as is the case with biallelic SNPs, with respective allele frequencies p and q ($= 1 - p$), the X_i and Y_i for each of the possible parent–offspring combinations was derived following Elston (1986).

For combining information from multiple markers, the log-scaled CPI (LCPI) for n markers was determined according to Elston (1986) as: $LCPI = -\log_{10}(PI_1 \times PI_2 \times \dots \times PI_n)$, where the number of markers was 60, 180, or 519 depending on the SNP set used.

The LCPI was calculated using the program “paternity vs 1.0.0” written in R programming language and available from R-Forge mirror (Theußl and Zeileis, 2009). Positive evidence for paternity was set at a LCPI threshold of 1.3 or greater, which corresponds to a probability of paternity of 0.95 or greater. Therefore, if a candidate paternal parent had a LCPI of less than

Table 1. Sweet cherry cultivars, selections, and wild accessions, their parents if known, coefficient of relatedness (ρ) to ‘Bing’ using single nucleotide polymorphism markers ($n = 519$), and *S*-locus genotype.^z

Name	Maternal parent	Paternal parent	Relatedness coefficient	<i>S</i> -locus genotype
AA	PMR-1	Rainier	0.34	—, ^y
Ambrunes	— ^y	—	0 ^x	3,6
BB	PMR-1	Rainier	0.32	4,9
Benton	Stella	Beaulieu	0.08	4',9
Black Republican	Napoleon	Unknown	0.61	1,4
Brooks	Rainier	Early Burlat	0.31	1,9
Cashmere	Stella	Early Burlat	0.25	—,4'
CC	PMR-1	Rainier	0.35	4,9
Chelan	Stella	Beaulieu	0	3,9
Chinook	Bing	Gil Peck	0.67	1,4
Cowiche	PC7147-4 ^w	PC7146-11 ^v	0.19	5,9
DD	PMR-1	Rainier	0.38	1,9
Early Burlat	—	—	0.05	3,9
EE	PMR-1	Rainier	0.58	4,9
Emperor Francis	—	—	0	3,4
GG	Rainier	PMR-1	0.38	1,4
Gil Peck	Napoleon	Giant	0.40	1,3
Glacier	Stella	Early Burlat	0.05	4',9
JJ	PMR-1	Rainier	0.18	—,—
Index	Stella	—	0.55	—,4'
Kiona	Glacier	Cashmere	0.11	4',9
Lambert	Napoleon	Black Heart	0.42	3,4
Lapins	Van	Stella	0	1,4'
MIM 3	—	—	0	—,—
MIM 13	—	—	0	—,—
MIM 17	—	—	0	—,—
MIM 20	—	—	0	—,—
MIM 23	—	—	0	—,—
Napoleon	—	—	0.66	3,4
New York 54	—	—	0	2,6
PMR-1	—	—	0.35	4,9
Rainier	Bing	Van	0.50	1,4
Regina	Schneiders	Rube	0	1,3
Sam	V1060140 ^u	—	0.31	2,4
Sato Nashiki	Governor Wood	Napoleon	0.27	3,6
Schmidt	—	—	0	2,4
Schneiders	—	—	0	3,12
Selah	P8-79 ^t	Stella	0.37	3,4'
Stella	Lambert	J12420	0.18	3,4'
Summit	Van	Sam	0.10	1,2
Sweetheart	Van	Newstar ^s	0.03	3,4'
Tieton	Stella	Early Burlat	0	3,9
Ulster	Schmidt	Lambert	0.40	3,4
Van	Empress Eugenie	—	0.03	1,3
Venus	Hedelfingen	Windsor	0.28	1,3
Vic	Bing	Schmidt	0.57	2,4
Walpurgis	—	—	0.32	—,—
Windsor	—	—	0.15	1,3

^zThe coefficient of relatedness was calculated following method of Queller and Goodnight (1989) implemented in software KINGROUP (Kononov et al., 2004).

^yUnknown.

^xEstimates 0 or less are presented as zero indicating no relationship.

^w‘Stella’ × unknown.

^v‘Stella’ × ‘Beaulieu’.

^u‘Windsor’ × unknown.

^t‘Bing’ × ‘Rainier’.

^s‘Van’ × ‘Stella’.

Table 2. Six historical sweet cherry cultivars tested for their probability of being the paternal parent of ‘Bing’ where ‘Black Republican’ is the reported maternal parent. Seven landrace and wild accessions introduced into the United States after 1900 were included as negative controls (*italics*).^z

Group	Name	LCPI			S-locus genotype
		Markers used (no.)			
		60	180	519	
Cultivars	Napoleon	6.4	6.2	16.8	3,4
	Emperor Francis	x ^y	x	x	3,4
	Schmidt	x	x	x	2,4
	Schneiders	1.5	x	x	3,12
	Walpurgis	3.3	x	x	—,—
	Windsor	2.2	x	x	1,3
Landrace	<i>Ambrunes</i>	x	x	x	3.6
Wild accessions	<i>MIM 3</i>	x	x	x	—,—
	<i>MIM 13</i>	x	x	x	—,—
	<i>MIM 17</i>	x	x	x	—,—
	<i>MIM 20</i>	x	x	x	—,—
	<i>MIM 23</i>	x	x	x	—,—
	<i>New York 54</i>	x	x	x	2,6

^zAll individuals included in this table have unknown maternal and paternal parents. Log of composite paternity index (LCPI) was calculated using R software package “paternity vs. 1.0.0” (available from R-Forge: Theußl and Zeileis, 2009).

^yNonsignificant relationship with LCPI less than 1.3.

1.3, it was excluded as a “likely” paternal parent. Of the potential paternal parents identified, the one with the highest LCPI value was considered most likely.

PAIRWISE CALCULATIONS OF GENETIC RELATEDNESS. Pairwise calculations of the coefficient of relatedness between ‘Bing’ and other sweet cherry cultivars were done using the modified maximum likelihood method of Milligan (2003), Queller and Goodnight (1989), and Thompson (1975) implemented in the software KINGROUP (Konovalov et al., 2004). In this method, the coefficient of relatedness is calculated for two outbred diploid individuals X and Y that have been genotyped at L loci (in our analysis L = 519), where (a, b) and (c, d) denote their respective codominant alleles at a single locus. Using the

marker information, the relatedness coefficient, ρ , can be defined as:

$$\rho(X, Y) = \frac{\sum_{i=1}^L (\delta_{ac} + \delta_{ad} + \delta_{bc} + \delta_{bd} - p_a - p_b - p_c - p_d)}{\sum_{i=1}^L (2 + \delta_{ab} + \delta_{cd} - p_a - p_b - p_c - p_d)}$$

where δ_{xy} is the Kronecker delta variable ($\delta_{ij} = 1$ if $i = j$, $\delta_{ij} = 0$ otherwise) and a, b, c, d are alleles and their corresponding reference population allelic frequencies are p_a , p_b , p_c , p_d (Konovalov and Heg, 2008; Queller and Goodnight, 1989). In our study, allele frequencies were calculated at 519 SNP marker loci using 48 accessions. We used the extension of

Table 3. Sweet cherry cultivars and selections tested to confirm the reported parentage using the log of composite paternity index (LCPI) calculated with varying single nucleotide polymorphism marker numbers in sweet cherry.^z

			LPCI ^y			
			Markers used (no.)			
Name	Maternal parent	Paternal parent	60	180	519	S-locus genotype
Chinook	Bing	Gil Peck	4.6	8.4	26.5	1,4
Rainier	Bing	Van	3.9	7.2	9	1,4
Vic	Bing	Schmidt	4.8	6.7	19.3	2,4
AA	PMR-1	Rainier	3.1	5.3	16.4	—, ^x
BB	PMR-1	Rainier	4.2	6.3	17.2	4,9
Brooks	Rainier	Early Burlat	2.9	11.7	32.1	1,9
CC	PMR-1	Rainier	3.8	5.3	13.8	4,9
DD	PMR-1	Rainier	3.9	4.8	14.9	1,9
EE	PMR-1	Rainier	5.2	6.4	18.6	4,9
GG	Rainier	PMR-1	3.2	6.2	25.7	1,4
JJ	PMR-1	Rainier	3.7	4.3	13.6	—,—

^zThe sweet cherry cultivars and selections listed were chosen based on ‘Bing’ as a reported parent or grandparent. LCPI was calculated using R software package “paternity vs. 1.0.0” (available from R-Forge: Theußl and Zeileis, 2009). The S-locus genotypes where available are also shown.

^yLCPI less than 1.3 indicates a nonsignificant relationship.

^xUnknown.

Konovalov and Heg (2008) that allows negative relatedness values, which are indications of no relationship. Using this formula, a coefficient of relatedness for a parent–offspring relationship would be ≈ 0.5 , whereas 1.0 would be the value for paired samples of the same individual (i.e., clonal replicates).

CALCULATIONS OF INBREEDING COEFFICIENTS. The inbreeding coefficient of a diploid individual is defined as the probability that the two alleles carried by the gametes are identical by descent (Kempthorne, 1957). For an individual X, the inbreeding coefficient F_x is equal to the coancestry between its parents. Thus, if X has parents F and M, then the inbreeding coefficient of X is $F_x = F_{FM}$.

Inbreeding coefficients for hypothetical matings between ‘Bing’ and ‘Stella’ and their offspring (Fig. 1) were calculated based on pedigree information only using the “inbreeding” function of the R package “pedigree” (Vazquez et al., 2010). Inbreeding coefficients were first calculated with the paternal parent of ‘Bing’ listed as unknown. Then the most likely paternal parent of ‘Bing’ was listed, and the coefficients were recalculated.

Results

A total of 519 SNPs was available for paternity analysis because they met the first two SNP filtering criteria (Supplemental Table S1; Supplemental Fig. S1). The average marker density on the peach genome sequence for the 519 markers was 1 SNP per 0.41 Mbp with a maximum gap of 5.2 Mbp on scaffold 4 at the 21.6- to 26.8-Mbp interval. For the set of 180 markers, the average marker density was 1 SNP per 1.22 Mbp with a maximum gap of 5.62 Mbp also on scaffold 4 at 21.6 to 27.2 Mbp. Finally, for the set of 60 markers, the average marker density was 1 SNP per 3.85 Mbp with a maximum gap of 9.01 Mbp on scaffold 2 at 3.4 to 12.4 Mbp.

Among the six historical cultivars tested as the alleged paternal parent of ‘Bing’, ‘Napoleon’ received by far the greatest support for paternity, and better resolution was achieved using more markers (Table 2). Because these analyses were done using ‘Black Republican’ as the known maternal parent, this analysis also supports ‘Black Republican’ as the maternal parent of ‘Bing’. Although three other cultivars (Schneiders, Walpurgis, and Windsor) were supported as the possible parental parent of ‘Bing’ with the 60-SNP marker set, ‘Napoleon’ was the sole likely candidate when 180 and 519 SNPs were used, and support for ‘Napoleon’ was highest when 519 SNPs were used. ‘Emperor Francis’, ‘Schmidt’, and the seven landrace and wild selections used as negative controls were completely excluded as paternal parents of ‘Bing’ because they had LCPI values less than 1.3 for all marker sets indicating a probability of paternity of less than 0.95.

The estimated coefficients of relatedness (ρ) for ‘Bing’ paired with other individuals in the germplasm set ranged from 0 or less (unrelated) to 0.67 (Table 1). Individuals that had values consistent with a parent–offspring relationship ($\rho \approx 0.5$) included ‘Black Republican’ ($\rho = 0.61$), ‘EE’ ($\rho = 0.58$), ‘Rainier’ ($\rho = 0.50$), ‘Chinook’ ($\rho = 0.67$), ‘Index’ ($\rho = 0.55$), ‘Napoleon’ ($\rho = 0.66$), and ‘Vic’ ($\rho = 0.57$). Of these individuals, ‘Black Republican’ is the reported maternal parent of ‘Bing’, whereas ‘Rainier’, ‘Chinook’, and ‘Vic’ are reported to be ‘Bing’ offspring and ‘EE’ is reported to be a second-generation ‘Bing’ offspring (Table 1). Therefore, these results also support ‘Black Republican’ as one of the parents of ‘Bing’

and ‘Napoleon’ as the likely other parent. The estimated coefficients of relatedness for ‘Bing’ and two individuals of unknown origin, PMR-1 and ‘Walpurgis’, were 0.35 and 0.32, respectively, suggesting a relationship.

The ‘Bing’ parentage of ‘Black Republican’ $\times$ ‘Napoleon’ was further confirmed with the SNP data because no inheritance errors were found. Using the 60-SNP set, the exclusive parental source, either ‘Black Republican’ or ‘Napoleon’, of 31 of the ‘Bing’ alleles could be determined. The parental source of the remaining 29 alleles could be either ‘Black Republican’ or ‘Napoleon’ (Fig. 2). With the 519-SNP set, the ‘Black Republican’ or ‘Napoleon’ source of alleles could be exclusively determined for 362 of the SNPs (Supplemental Fig. S2).

The LCPI values for all SNP sets supported the pedigree records of ‘Bing’ as the parent of ‘Chinook’, ‘Rainier’, and ‘Vic’ (Table 3; Fig. 1A). The LCPI values also supported the reported paternal parents of these three ‘Bing’ offspring (i.e., ‘Gil Peck’, ‘Van’, and ‘Schmidt’, respectively). The correctness of the reported parents of the ‘Brooks’ (‘Bing’ grandchild through ‘Rainier’) and the seven other selections reported to have ‘Rainier’ as a parent was also supported with high probability. Similar to the ‘Bing’ analysis (Table 1), the reported parentages were probable with all marker numbers (i.e., 60, 180, and 519); however, the support was highest for 519 markers. The available *S*-locus genotypes (Table 3) also supported the reported parentages.

The finding that ‘Napoleon’ is the paternal parent of ‘Bing’ means that ‘Bing’ and ‘Stella’ share a common ancestor because ‘Napoleon’ is the grandparent of ‘Stella’ (Fig. 1A–B). With such a relationship, the inbreeding coefficient would be expected to be 0.125, which is consistent with the 0.18 coefficient of relatedness for ‘Bing’ and ‘Stella’ calculated using 519 SNP markers (Table 1). The expected inbreeding coefficients for hypothetical progeny between ‘Bing’ $\times$ ‘Stella’ and progeny from the ‘Bing’ and ‘Stella’ lineages with and without ‘Napoleon’ as the paternal parent of ‘Bing’ ranged from 0.008 to 0.328 (Table 4). In all cases, the pedigree-based inbreeding coefficients of the hypothetical offspring were much higher when ‘Napoleon’ was included as the paternal parent of ‘Bing’ compared with when they were calculated with the paternal parent of ‘Bing’ as unknown. The highest inbreeding coefficients were for hypothetical progeny from the use of ‘Selah’ as a parent because ‘Selah’ has parentage from both the ‘Stella’ and ‘Bing’ lineages (Fig. 1A–B). Inbreeding coefficients calculated for hypothetical progeny with and without the inclusion of ‘Napoleon’ as the parent of ‘Bing’ were also influenced by shared ancestry with other cultivars. ‘Early Burlat’ is a parent of ‘Brooks’, ‘Glacier’, and ‘Tieton’, whereas ‘Van’ is a parent of ‘Lapins’, ‘Rainier’, and ‘Sweetheart’ (Fig. 1). Therefore, pedigree-based inbreeding coefficients for hypothetical progeny from crosses within these groups of cultivars were increased beyond that expected with just shared ‘Bing’ ancestry (Table 4).

Discussion

‘Napoleon’ was identified as the paternal parent of ‘Bing’ and ‘Black Republican’ was confirmed as the maternal parent of ‘Bing’. This cross was possible because ‘Napoleon’ was among the first cultivars planted in Oregon in the late 1800s. The *S*-locus genotypes are also consistent with the proposed parentage, because it is possible for an *S*₃-containing pollen

A

B

Fig. 1. (A) Pedigrees for sweet cherry individuals in the 'Bing' lineage. The sweet cherry cultivar Napoleon is included as the newly identified paternal parent of 'Bing'. The intensity of green illustrates the degree of relatedness (p) to 'Bing' according to pedigree records, whereas yellow indicates no known pedigree relationship to 'Bing'. (B) Pedigrees of sweet cherry individuals in the 'Stella' lineage. The intensity of blue indicates the degree of relationship to 'Stella' according to pedigree records, whereas yellow indicates no known pedigree relationship to 'Stella'. The online version is in color.

grain from 'Napoleon' to have grown down a 'Black Republican' (S_1S_4) style and fertilized an S_4 egg, resulting in the S_3S_4 pair of 'Bing'. This parentage is also consistent with the inheritance of skin and flesh color in sweet cherry in which yellow fruit with a red blush is recessive to mahogany fruit (Schmidt, 1998). 'Napoleon' and 'Rainier' have yellow skin with a red blush, whereas 'Bing' fruit is mahogany. 'Bing' is heterozygous at the fruit color locus and passed the recessive allele for yellow fruit to 'Rainier'.

Hedrick (1915) considered 'Napoleon' and 'Black Tartarian' to be the parents of 'Black Republican', thereby potentially increasing the contribution of 'Napoleon' to 'Bing' beyond the 50% of solely a parent-offspring relationship. The observed coefficients of relatedness based on 519 SNP makers (0.66 for 'Bing' and 'Napoleon', 0.61 for 'Bing' and 'Black Republican') are greater than would be expected for a solely parent-offspring relationship but lower than the 0.75 expected if

'Napoleon' were the parent of 'Black Republican'. 'Napoleon' parentage of 'Black Republican' was used by Choi and Kappel (2004) in their analysis of inbreeding and coancestry in sweet cherry. Using our 519-SNP data set, 'Napoleon' as a parent of 'Black Republican' was supported ($p = 0.48$); however, 'Black Tartarian' could not be confirmed as a result of lack of a verified clone. An alternative hypothesis is that other unknown relationships exist among the founder cultivars, resulting in an increase in the SNP-based coefficients of relatedness compared with pedigree-based expectations.

'Bing' parentage of 'Chinook', 'Rainier', 'Vic', and eight other selections was also supported by the paternity analysis. Probabilities for detecting parentage (LCPI values) almost always increased when SNP numbers increased from 60 to 180 to 519, yet importantly, the conclusion that 'Napoleon' is the paternal parent of 'Bing' and that 'Bing' is the true parent or grandparent of 11 cultivars and selections were the same

Fig. 2. Graphical representation of probable parental source of alleles in sweet cherry cultivar Bing. Only 60 single nucleotide polymorphism (SNP) markers and the S locus are presented (for all markers, see Supplementary Fig. 2). Positions are physical positions (bp) of the peach whole genome sequence, Peach v1.0 (Verde et al., 2013). The online version is in color, where color indicates parent from which allele is inherited.

Table 4. Inbreeding coefficients according to pedigree for progeny individuals generated from hypothetical crosses between sweet cherry cultivars Bing, Rainier, and Brooks and seven cultivars from the ‘Stella’ lineage.^z

Parent 2	Parent 1		
	Bing	Rainier	Brooks
Stella	0.063 (0.188)	0.032 (0.094)	0.016 (0.047)
Benton	0.031 (0.094)	0.016 (0.047)	0.008 (0.023)
Chelan	0.031 (0.094)	0.016 (0.047)	0.008 (0.023)
Glacier	0.031 (0.094)	0.016 (0.047)	0.133 (0.148)
Lapins	0.031 (0.094)	0.141 (0.172)	0.070 (0.086)
Selah	0.219 (0.328)	0.203 (0.250)	0.101 (0.125)
Sweetheart	0.016 (0.047)	0.195 (0.211)	0.098 (0.105)
Tieton	0.031 (0.094)	0.016 (0.047)	0.133 (0.148)

^zThe first coefficient was calculated assuming that the paternal parent was unknown and unrelated to all others, whereas the second coefficient in parentheses was calculated with ‘Napoleon’ as the paternal parent of ‘Bing’.

regardless of marker number. The cultivars for which ‘Bing’ parentage could not be ruled out with only 60 SNP markers may have ‘Napoleon’ or ‘Black Republican’ ancestry as a result of the limited diversity of sweet cherry available in the Pacific northwestern United States in the 1800s. Additionally, when considering the offspring and grandchildren of ‘Bing’, the high LCPI values using 60 and 180 SNPs indicate that, for sweet cherry, the lower number of markers provided sufficient discriminatory power. As expected, the larger number of SNPs increased the power of excluding false candidates and identifying parents.

The finding that ‘Bing’ and ‘Stella’ have a common ancestor increases the known degree of relatedness among cultivated and breeding germplasm of North American sweet cherry with implications for breeding decisions. ‘Stella’ is an extensively used parent in sweet cherry breeding worldwide because it is the donor of self-compatibility caused by the presence of a mutated S_a allele, i.e., S_a' . This mutation originated from irradiated ‘Napoleon’ pollen that was used to pollinate ‘Emperor Francis’ (Lewis and Crowe, 1954). The cultivar Selah was unique in the germplasm set examined in having both ‘Bing’ and ‘Stella’ as ancestors and thus has ‘Napoleon’ ancestry from both sides. For other cultivars derived from ‘Stella’ and/or ‘Napoleon’, their close relatedness ($p > 0.20$) to ‘Bing’ could be the result of the common ‘Napoleon’ ancestor. For example, the maternal parent of ‘Lambert’ and ‘Gil Peck’ is ‘Napoleon’, and according to 520 markers, these cultivars had coefficients of relatedness with ‘Bing’ of 0.42 and 0.40, respectively.

In this study, the coefficient of relatedness also suggested a close relationship of ‘Bing’ with PMR-1 and ‘Walpurgis’, although no pedigrees are available. PMR-1 originated as a chance seedling in Washington State in the 1970s (Toyama et al., 1993). Therefore, it is possible that the relatedness of PMR-1 to ‘Bing’ could be the result of ancestry with ‘Bing’, ‘Napoleon’, and/or ‘Black Republican’. The S_b allele of PMR-1 could have been derived from ‘Early Burlat’ or ‘Beaulieu’. ‘Walpurgis’ on the other hand is a European cultivar; therefore, the relatedness to ‘Bing’ may be the result of ancestry with either ‘Napoleon’ or ‘Black Republican’ rather than directly with ‘Bing’.

Establishing complete and correct pedigree records, as illustrated for ‘Bing’, is an important requirement to maximize

the ability to identify and validate quantitative trait loci using pedigree-based methods (Bink et al., 2008; Rosyara et al., 2009, 2013). The identification of previously unknown parents enables more precise estimates of coefficients of identity by descent. Identifying which ‘Napoleon’-derived chromosome segments, and which ‘Black Republican’-derived chromosome segments, are maintained in superior cultivars is now possible as a result of confirmation of parentage and the available genomewide set of polymorphic SNP markers.

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Supplemental Fig. S1. Physical map positions, according to the whole peach genome sequence, Peach v1.0 (Verde et al., 2013), of the 519 single nucleotide polymorphism (SNP) markers used in this sweet cherry paternity study. Three different sets were used for calculation of the log of composite paternity index (LCPI). Colors identify the set of 180 markers (blue and purple) and set of 60 markers (red and purple). The purple-colored markers are common in all marker sets (519, 180, and 60 markers).

NCBI ss	Chr	Position	Napoleon		Black Republican		Bing	
ss490545390	1	348,730	A	B	A	B	A	B
ss490558959	1	450,381	A	B	A	A	B	A
ss490545406	1	538,005	A	A	A	A	A	A
ss490545413	1	599,759	A	A	A	A	A	A
ss490545708	1	694,731	A	B	A	B	A	B
ss490545434	1	885,553	A	B	A	B	A	B
ss490545452	1	1,111,320	A	B	A	B	A	B
ss490545461	1	1,197,874	A	A	A	A	A	A
ss490545716	1	1,235,182	B	B	B	B	B	B
ss490545464	1	1,238,095	B	B	B	B	B	B
ss490545473	1	1,331,155	A	B	A	B	A	B
ss490545482	1	1,450,317	A	B	A	B	A	B
ss490545503	1	1,737,374	B	B	B	B	B	B
ss490545528	1	2,115,377	A	B	A	B	A	B
ss490545541	1	2,241,751	A	B	A	B	-	-
ss490545556	1	2,441,717	A	B	A	B	A	B
ss490559162	1	2,602,122	B	B	B	B	B	B
ss490545597	1	3,137,813	A	A	A	A	A	A
ss490545844	1	5,839,154	A	B	A	A	B	A
ss490545848	1	5,878,432	B	A	B	B	A	B
ss490545852	1	5,894,052	A	B	A	A	B	A
ss490545888	1	6,215,653	A	A	A	A	A	A
ss490545912	1	6,460,845	B	B	B	B	B	B
ss490545967	1	7,374,161	B	B	B	B	B	B
ss490545984	1	7,504,437	B	B	B	B	B	B
ss490546020	1	7,824,263	A	A	A	A	A	A
ss490558825	1	8,412,096	A	A	A	A	A	A
ss490546174	1	9,597,368	A	B	A	B	B	B
ss490546226	1	10,175,178	B	A	A	A	A	A

Transmitted SNP alleles

Black Republican

Napoleon

Either Black Republican or Napoleon

Not transmitted SNP allele

Black Republican

Napoleon

Supplemental Fig. S2. Graphic representation of probable parental source of alleles in sweet cherry cultivar Bing with all 519 single nucleotide polymorphism (SNP) markers. Positions are physical positions (bp) of the peach whole genome sequence, Peach v1.0 (Verde et al., 2013); NCBI = National Center for Biotechnology Information (Bethesda, MD); ss = submitted SNP; Chr = chromosome.

ss490546230	1	10,176,147	B	A	A	A	A	A	A
ss490546026	1	10,178,231	A	B	B	B	B	B	B
ss490546269	1	10,284,090	A	B	B	B	B	B	B
ss490546281	1	10,316,151	A	A	A	A	A	A	A
ss490546285	1	10,330,576	B	A	A	A	A	A	A
ss490546068	1	11,102,635	B	B	A	B	B	B	B
ss490546478	1	11,855,405	B	B	A	B	B	B	B
ss490546494	1	12,191,200	B	B	A	B	B	B	B
ss490546498	1	12,292,557	A	A	B	A	A	A	A
ss490546526	1	13,052,512	A	B	B	B	B	B	B
ss490546566	1	14,110,306	A	B	A	B	A	B	B
ss490546574	1	14,281,912	A	B	A	B	A	B	B
ss490546611	1	15,061,804	A	B	A	B	A	B	B
ss490558902	1	16,608,849	A	B	A	B	A	B	B
ss490546643	1	16,612,689	A	B	A	B	A	B	B
ss490546651	1	17,571,526	A	B	A	B	A	B	B
ss490546675	1	19,836,475	A	B	A	B	A	B	B
ss490546679	1	19,999,922	A	B	A	B	A	B	B
ss490559249	1	21,773,370	B	B	B	B	B	B	B
ss490546874	1	24,575,772	A	B	A	B	A	B	B
ss490546942	1	25,423,943	A	A	A	A	A	A	A
ss490546990	1	26,047,253	B	B	B	B	B	B	B
ss490547035	1	26,698,128	A	B	A	B	B	B	B
ss490547103	1	27,626,876	A	B	A	A	B	A	A
ss490547111	1	27,714,539	A	B	A	A	B	A	A
ss490559197	1	27,721,194	B	A	B	B	A	B	B
ss490547194	1	29,638,469	A	B	A	A	B	A	A
ss490547213	1	30,054,079	A	A	A	B	A	B	B
ss490546439	1	30,065,891	A	A	A	B	A	B	B
ss490546447	1	30,413,870	A	A	A	B	A	B	B
ss490547287	1	31,633,964	A	B	A	A	B	A	A
ss490547294	1	31,805,500	A	B	A	A	B	A	A
ss490547298	1	31,881,572	A	B	A	A	B	A	A
ss490547306	1	32,053,318	A	B	A	A	B	A	A
ss490547352	1	32,270,077	B	A	B	B	A	B	B
ss490559347	1	32,621,488	B	A	B	B	A	B	B

Supplemental Fig. S2. Continued.

ss490559350	1	32,621,532	A	B	A	A	B	A
ss490547453	1	32,759,983	A	B	A	B	B	B
ss490547487	1	32,894,074	A	A	A	B	A	B
ss490547510	1	33,007,179	A	B	A	A	B	A
ss490559328	1	33,117,964	A	A	A	B	A	B
ss490547599	1	33,392,756	B	A	B	B	A	B
ss490547659	1	33,790,546	A	B	A	B	B	B
ss490547676	1	33,883,266	B	B	B	A	B	A
ss490547684	1	33,907,538	B	B	B	A	B	A
ss490559168	1	34,168,048	B	B	B	A	B	A
ss490559153	1	34,192,653	A	A	A	B	A	B
ss490559118	1	34,197,844	A	A	A	B	A	B
ss490546621	1	34,430,805	B	B	B	B	B	B
ss490546645	1	34,916,586	B	A	B	B	A	B
ss490547882	1	35,371,782	A	B	A	B	A	A
ss490547886	1	35,408,469	B	A	B	B	A	B
ss490547915	1	35,614,161	A	B	A	B	A	A
ss490548010	1	36,188,884	A	B	A	B	A	A
ss490548030	1	36,319,573	B	B	B	B	B	B
ss490548117	1	36,725,185	A	B	A	A	B	A
ss490548121	1	36,738,631	B	A	B	B	A	B
ss490548153	1	36,865,299	B	A	B	B	A	B
ss490558950	1	37,078,592	A	A	A	B	A	B
ss490546794	1	38,376,904	A	A	A	B	A	B
ss490559258	1	39,849,154	A	B	A	A	B	A
ss490548285	1	39,922,772	A	A	A	B	-	-
ss490548289	1	40,057,233	A	A	A	B	A	B
ss490546833	1	40,061,065	A	B	A	A	B	A
ss490559070	1	43,353,354	A	B	A	A	B	A
ss490546889	1	43,556,762	A	A	A	B	A	B
ss490548402	1	43,706,470	A	B	A	A	B	A
ss490548406	1	43,806,891	B	A	B	B	A	B
ss490558932	1	43,832,684	B	B	B	A	B	A
ss490548418	1	43,875,207	A	B	A	B	A	A
ss490558982	1	44,008,459	A	A	A	A	A	A
ss490558979	1	44,008,562	A	A	A	A	A	A

Supplemental Fig. S2. Continued.

ss490558976	1	44,008,658	B	B	B	B	B	B	B
ss490548444	1	44,045,161	B	B	B	B	B	B	B
ss490548448	1	44,090,182	A	B	A	B	A	A	A
ss490548488	1	44,565,586	A	B	A	B	A	A	A
ss490548510	1	44,764,542	B	B	B	B	B	B	B
ss490558944	1	45,077,993	A	B	A	A	B	A	A
ss490548551	1	45,163,766	A	B	A	B	B	B	B
ss490548559	1	45,322,930	A	B	A	B	A	A	A
ss490559081	1	45,469,715	B	A	B	B	A	B	B
ss490548571	1	45,473,214	B	A	B	B	A	B	B
ss490548593	1	45,680,542	A	A	A	B	A	B	B
ss490548614	1	45,682,217	B	B	B	A	B	A	A
ss490548655	1	45,924,398	B	A	B	B	A	B	B
ss490548667	1	46,402,818	A	B	A	B	B	B	B
ss490548745	1	46,530,908	A	B	A	B	A	A	A
ss490548777	2	911,589	A	B	A	B	A	B	B
ss490548809	2	1,435,086	B	A	B	B	A	B	B
ss490548813	2	1,951,353	B	A	B	B	A	B	B
ss490548888	2	2,008,976	B	A	B	B	A	B	B
ss490548892	2	3,229,768	A	B	A	A	B	A	A
ss490548900	2	3,396,708	A	B	A	B	A	B	B
ss490548920	2	3,488,474	A	B	A	A	B	A	A
ss490548928	2	4,354,053	A	B	A	A	B	A	A
ss490547061	2	4,953,599	B	B	B	B	B	B	B
ss490548935	2	4,976,130	B	B	B	B	B	B	B
ss490548943	2	5,493,845	A	B	A	A	B	A	A
ss490548994	2	5,865,200	A	A	A	A	A	A	A
ss490549029	2	9,649,536	A	B	A	B	A	B	B
ss490549037	2	11,187,571	A	B	A	B	A	B	B
ss490549052	2	11,540,955	A	B	A	B	A	B	B
ss490559390	2	12,407,490	A	B	A	B	A	B	B
ss490549109	2	12,408,002	A	B	A	B	A	B	B
ss490547158	2	14,255,547	A	B	A	B	A	B	B
ss490549138	2	14,471,355	A	B	A	B	A	B	B

Supplemental Fig. S2. Continued.

ss490549172	2	14,926,622	A	B	A	A	B	A
ss490549176	2	15,084,429	A	B	A	B	A	B
ss490549219	2	15,090,036	B	A	B	B	A	B
ss490549227	2	15,355,971	B	A	B	B	A	B
ss490549258	2	15,372,418	B	A	B	B	A	B
ss490549278	2	15,624,043	A	B	A	B	A	B
ss490549287	2	15,711,952	A	B	A	B	A	B
ss490549379	2	15,747,822	A	B	A	B	A	B
ss490549955	2	16,118,423	B	A	B	B	A	B
ss490549999	2	19,297,736	B	B	B	B	B	B
ss490550007	2	19,304,771	B	B	B	B	B	B
ss490550015	2	19,581,374	A	B	A	B	A	B
ss490550019	2	19,615,344	B	A	B	B	A	B
ss490550027	2	19,664,779	A	B	A	B	A	B
ss490550035	2	19,684,679	B	A	B	B	A	B
ss490550074	2	19,724,366	A	B	A	B	A	B
ss490550125	2	19,752,871	A	B	A	A	B	A
ss490550173	2	20,340,464	A	B	A	A	B	A
ss490550213	2	20,470,247	B	A	B	B	A	B
ss490550229	2	20,694,575	A	B	A	A	B	A
ss490559045	2	20,925,443	A	A	A	A	A	A
ss490559042	2	21,264,736	A	B	A	A	B	A
ss490559039	2	21,486,683	B	B	A	B	B	B
ss490559037	2	22,162,871	A	B	A	B	A	B
ss490559013	2	22,162,942	A	B	A	B	A	B
ss490550363	2	22,163,062	A	B	A	B	A	B
ss490550431	2	22,163,199	A	B	A	B	A	B
ss490550493	2	22,593,260	A	A	A	A	A	A
ss490550501	2	22,763,311	A	A	B	A	A	A
ss490550521	2	23,331,142	B	B	A	B	B	B
ss490550529	2	23,843,142	B	A	B	B	A	B
ss490550577	2	23,891,054	B	A	B	B	A	B
ss490550626	2	24,033,313	A	B	A	A	B	A
ss490550691	2	24,131,520	B	B	A	B	B	B
ss490559255	2	24,536,908	B	B	A	B	B	B
ss490550831	2	25,004,410	A	B	A	B	A	B

Supplemental Fig. S2. Continued.

ss490550883	2	25,512,709	A	B	A	B	A	B
ss490550887	2	26,346,122	A	A	B	A	A	A
ss490551030	3	193,994	A	B	B	B	B	B
ss490551110	3	1,174,681	A	B	A	B	A	B
ss490551118	3	1,257,143	A	B	A	B	A	B
ss490551167	3	2,262,982	A	B	A	B	A	B
ss490551234	3	2,699,030	A	B	B	B	B	B
ss490551267	3	2,743,517	A	A	A	B	A	B
ss490547825	3	3,086,237	B	B	B	A	B	A
ss490551321	3	3,136,656	A	B	A	B	A	B
ss490551325	3	3,593,732	A	B	B	B	B	B
ss490551333	3	3,927,957	A	B	A	B	A	B
ss490551337	3	4,138,750	A	B	A	B	A	B
ss490559471	3	4,301,861	A	A	A	B	A	B
ss490551353	3	4,334,085	A	A	A	A	A	A
ss490551394	3	4,450,769	B	B	B	B	B	B
ss490551435	3	4,468,725	B	B	B	B	B	B
ss490551450	3	4,571,814	B	B	B	B	B	B
ss490551490	3	4,934,519	A	A	A	A	A	A
ss490551507	3	6,646,570	A	B	A	B	A	B
ss490547928	3	7,412,958	A	A	A	B	A	B
ss490551568	3	7,622,320	A	A	A	B	A	B
ss490547960	3	8,552,044	B	B	B	B	B	B
ss490551623	3	8,859,929	A	A	A	A	A	A
ss490551684	3	9,782,875	B	B	B	A	B	A
ss490551699	3	10,399,039	-	-	-	-	-	-
ss490551705	3	12,188,902	B	B	B	B	B	B
ss490551720	3	13,025,963	B	B	B	A	B	A
ss490559450	3	13,144,730	A	A	A	B	A	B
ss490548016	3	13,208,005	A	A	A	B	A	B
ss490551869	3	13,406,263	A	A	A	B	A	B
ss490551878	3	13,878,008	A	B	A	B	A	B
ss490551889	3	13,881,088	A	B	A	B	A	B
ss490551892	3	15,309,954	B	B	B	A	B	A

Supplemental Fig. S2. Continued.

ss490551939	3	15,455,662	B	A	A	A	A	A	A
ss490551960	3	15,682,037	A	B	B	B	B	B	B
ss490551969	3	15,730,479	A	B	A	B	A	B	B
ss490551972	3	16,692,901	B	B	B	A	A	B	A
ss490548147	3	17,036,907	B	A	A	A	A	A	A
ss490552015	3	17,302,344	B	A	A	A	A	A	A
ss490552023	3	17,343,716	A	B	B	B	B	B	B
ss490552032	3	17,988,706	A	B	A	B	A	B	B
ss490552038	3	18,138,999	A	A	A	B	A	B	B
ss490552061	3	18,281,259	A	A	A	B	A	B	B
ss490552191	3	18,419,753	A	B	B	B	B	B	B
ss490552196	3	18,512,598	A	B	B	B	B	B	B
ss490552270	3	19,018,695	A	B	B	B	B	B	B
ss490552272	3	21,003,752	A	A	A	A	A	A	A
ss490559194	3	21,119,693	A	A	A	A	A	A	A
ss490552318	4	234,975	A	B	A	A	B	A	A
ss490552332	4	275,572	A	A	A	A	A	A	A
ss490552394	4	569,769	A	A	B	A	A	A	A
ss490548393	4	919,839	B	B	A	B	B	B	B
ss490552435	4	1,117,948	A	A	A	A	A	A	A
ss490552446	4	1,983,101	B	A	B	B	A	B	B
ss490552449	4	2,170,096	A	A	A	A	A	A	A
ss490559127	4	2,559,655	B	B	B	B	B	B	B
ss490552562	4	2,682,092	A	B	A	A	B	A	A
ss490552570	4	2,712,550	A	B	A	A	B	A	A
ss490552576	4	4,329,962	B	B	A	B	B	B	B
ss490552606	4	4,353,195	A	B	A	B	A	B	B
ss490552620	4	4,471,205	A	B	A	B	A	B	B
ss490552626	4	4,551,204	A	A	B	A	A	A	A
ss490552643	4	5,231,853	B	B	A	B	B	B	B
ss490552646	4	5,425,119	B	A	B	B	A	B	B
ss490552649	4	5,490,025	B	A	B	B	A	B	B
ss490552675	4	5,790,270	B	B	A	B	B	B	B
ss490558877	4	5,856,246	A	B	A	B	A	B	B
ss490552696	4	5,911,133	B	A	B	B	A	B	B

Supplemental Fig. S2. Continued.

ss490552699	4	6,348,991	B	B	B	B	B	B	B
ss490552713	4	6,464,070	A	A	A	A	A	A	A
ss490552727	4	6,545,181	A	A	A	A	A	A	A
ss490552730	4	6,580,288	B	B	B	B	B	B	B
ss490552744	4	6,828,082	B	B	B	B	B	B	B
ss490552747	4	7,065,857	A	B	A	A	B	A	A
ss490552750	4	7,148,241	B	B	B	B	B	B	B
ss490552753	4	7,349,971	A	B	A	A	B	A	A
ss490552767	4	7,402,206	A	A	A	A	A	A	A
ss490552832	4	7,429,956	A	B	A	A	B	A	A
ss490548662	4	7,456,033	A	B	A	A	B	A	A
ss490552843	4	7,706,352	A	A	A	A	A	A	A
ss490545355	4	8,827,326	B	B	A	B	B	B	B
ss490552856	4	8,955,576	B	B	B	B	B	B	B
ss490552880	4	8,985,625	A	A	A	A	A	A	A
ss490559107	4	9,145,953	B	A	A	A	A	A	A
ss490552883	4	9,148,953	A	B	B	B	B	B	B
ss490559054	4	10,145,480	A	B	A	B	A	A	A
ss490552928	4	10,225,433	B	B	B	B	B	B	B
ss490552959	4	10,230,259	A	B	A	B	A	A	A
ss490552964	4	10,403,896	A	B	A	B	A	A	A
ss490552970	4	11,462,176	B	B	B	B	B	B	B
ss490552973	4	12,567,325	A	A	B	A	A	A	A
ss490559147	4	12,715,001	A	A	B	A	A	A	A
ss490558926	4	12,865,643	B	B	A	B	B	B	B
ss490552979	4	12,955,416	A	A	B	A	A	A	A
ss490553016	4	12,987,703	B	B	A	B	B	B	B
ss490553025	4	13,089,513	B	B	A	B	-	-	-
ss490553036	4	13,093,284	A	A	B	A	A	A	A
ss490553048	4	13,886,648	B	B	A	B	B	B	B
ss490553059	4	14,081,510	B	B	A	B	B	B	B
ss490558929	4	14,516,715	B	B	B	B	B	B	B
ss490553123	4	14,821,190	A	A	A	A	A	A	A
ss490558865	4	15,070,360	B	B	B	B	B	B	B
ss490558868	4	16,075,683	A	B	A	B	A	B	B

Supplemental Fig. S2. Continued.

ss490558871	4	17,222,313	B	B	B	B	B	B	B
ss490553144	4	17,859,388	B	B	A	B	B	B	B
ss490553184	4	17,859,446	A	A	B	A	A	A	A
ss490553192	4	17,859,661	B	B	A	B	B	B	B
ss490553198	4	17,943,880	A	A	B	A	A	A	A
ss490553204	4	18,701,563	A	B	A	B	A	A	A
ss490553207	4	19,293,490	A	A	B	A	A	A	A
ss490553209	4	19,411,509	A	B	A	B	B	B	B
ss490553268	4	19,561,278	B	B	B	B	B	B	B
ss490553274	4	19,599,189	A	A	A	A	A	A	A
ss490548855	4	19,657,873	A	A	A	A	A	A	A
ss490553289	4	20,865,038	A	B	A	B	A	B	B
ss490553438	4	20,926,979	A	B	A	B	A	B	B
ss490553464	4	21,145,128	A	B	A	B	A	B	B
ss490553467	4	21,580,914	B	B	B	B	B	B	B
ss490553543	4	27,192,075	A	B	A	B	B	B	B
ss490553644	4	27,218,201	A	A	A	A	A	A	A
ss490553674	4	29,560,911	A	A	A	B	-	-	-
ss490553735	5	689,941	B	A	A	A	A	A	A
ss490553738	5	934,368	B	B	B	B	B	B	B
ss490553741	5	1,629,739	A	B	A	B	A	B	B
ss490559171	5	1,645,289	A	B	A	B	A	B	B
ss490549013	5	1,658,127	A	B	A	B	A	B	B
ss490553811	5	1,709,155	A	B	B	B	B	B	B
ss490553817	5	2,351,581	A	B	B	B	B	B	B
ss490553823	5	3,193,567	A	B	A	B	A	B	B
ss490559270	5	3,299,986	A	B	A	B	A	B	B
ss490559267	5	3,464,400	B	B	B	A	B	A	A
ss490559156	5	3,464,457	A	B	A	B	A	B	B
ss490553847	5	3,464,517	A	B	A	B	A	B	B
ss490553853	5	3,469,706	A	B	A	B	A	B	B
ss490553895	5	3,644,242	A	B	A	B	A	B	B
ss490553907	5	3,695,755	B	A	A	A	A	A	A
ss490553910	5	4,302,944	A	B	A	B	B	B	B

Supplemental Fig. S2. Continued.

ss490553919	5	4,413,731	B	A	B	B	A	B
ss490553922	5	4,486,238	A	B	A	B	B	B
ss490553929	5	4,710,627	A	B	A	B	B	B
ss490553960	5	4,755,463	A	B	A	B	A	A
ss490553963	5	4,897,952	A	B	A	B	A	A
ss490559113	5	5,409,519	A	B	A	B	B	B
ss490559110	5	5,429,352	A	B	A	B	A	A
ss490554201	5	9,393,638	A	B	A	B	B	B
ss490554283	5	9,393,745	A	B	A	B	B	B
ss490554313	5	11,943,249	A	B	A	A	A	B
ss490554346	5	12,331,780	A	B	A	B	A	A
ss490554352	5	12,506,702	B	A	B	B	A	B
ss490554372	5	12,750,950	A	A	A	B	A	B
ss490554417	5	12,785,307	A	A	A	B	A	B
ss490559186	5	12,917,888	A	B	A	B	A	B
ss490554495	5	13,191,542	A	B	A	B	A	B
ss490559206	5	13,240,090	A	B	A	B	A	B
ss490559203	5	13,715,106	A	B	A	B	A	B
ss490554529	5	15,546,701	A	B	A	B	A	B
ss490554550	5	15,546,817	A	B	A	B	A	B
ss490554609	5	15,559,243	A	B	B	B	B	B
ss490554753	5	15,817,487	A	B	A	B	A	B
ss490554756	5	16,375,840	A	B	A	B	A	B
ss490549476	5	17,319,331	B	A	A	A	A	A
ss490554898	5	17,328,363	A	A	A	A	A	A
ss490554904	5	17,743,459	A	B	A	B	B	B
ss490554953	5	18,100,331	A	B	A	B	B	B
ss490554977	5	18,146,501	A	B	A	B	B	B
ss490554989	6	286,381	A	A	A	A	A	A
ss490555047	6	735,222	B	B	B	B	B	B
ss490549593	6	1,811,133	A	B	A	B	A	B
ss490555075	6	1,852,409	A	A	A	A	A	A
ss490559372	6	2,247,834	A	B	A	A	B	A
ss490555169	6	3,912,624	A	B	A	B	A	B
ss490555172	6	3,920,291	A	B	A	B	A	B

Supplemental Fig. S2. Continued.

ss490555175	6	3,973,271	A	B	A	B	A	B
ss490555200	6	4,050,337	A	B	A	B	A	B
ss490549680	6	4,315,623	A	A	A	A	A	A
ss490559286	6	4,331,813	A	A	A	A	A	A
ss490559283	6	4,620,418	A	B	A	B	A	B
ss490555236	6	4,620,420	A	B	A	B	A	B
ss490555284	6	4,806,232	A	B	A	B	A	B
ss490555293	6	5,460,138	B	B	A	B	B	B
ss490555314	6	5,542,394	B	B	A	B	B	B
ss490555316	6	5,931,170	B	B	A	B	B	B
ss490555328	6	5,978,925	B	B	A	B	B	B
ss490555360	6	6,245,490	A	A	A	A	A	A
ss490555411	6	6,843,830	B	A	B	B	A	B
ss490555413	6	7,537,950	B	B	B	B	B	B
ss490555416	6	7,575,939	A	A	A	A	A	A
ss490555425	6	7,626,959	B	A	B	B	A	B
ss490555428	6	7,838,040	B	B	B	B	B	B
ss490555481	6	7,901,830	A	B	A	B	A	B
ss490555554	6	8,691,599	A	A	A	A	A	A
ss490555574	6	10,369,567	A	B	A	A	B	A
ss490555577	6	11,072,866	A	A	B	A	A	A
ss490555580	6	11,128,369	B	B	A	B	B	B
ss490555606	6	11,210,515	B	B	B	B	B	B
ss490549926	6	11,910,096	B	B	B	B	B	B
ss490555615	6	12,119,303	A	A	B	A	A	A
ss490555624	6	12,126,728	B	B	A	B	B	B
ss490555635	6	12,400,263	A	A	B	A	A	A
ss490555682	6	12,638,852	A	A	B	A	A	A
ss490559341	6	14,555,604	B	B	A	B	B	B
ss490559338	6	14,662,485	A	B	A	A	B	A
ss490559335	6	14,662,583	A	B	A	A	B	A
ss490555714	6	14,662,633	A	A	B	A	A	A
ss490555746	6	15,628,669	B	A	B	B	A	B
ss490555771	6	16,636,989	B	B	A	B	B	B
ss490555792	6	17,629,589	A	B	A	A	B	A

Supplemental Fig. S2. Continued.

ss490559223	6	18,081,683	B	A	B	B	A	B
ss490559226	6	19,912,441	A	B	A	B	A	B
ss490559229	6	19,912,562	A	B	A	B	A	B
ss490555845	6	19,912,697	A	B	A	B	A	B
ss490555857	6	19,982,724	A	B	A	B	A	B
ss490555863	6	20,091,471	A	B	A	B	A	B
ss490555869	6	20,112,900	A	B	A	B	A	B
ss490555878	6	20,150,761	A	B	A	B	A	B
ss490555911	6	20,209,981	A	B	A	B	A	B
ss490555926	6	20,514,744	A	B	A	B	A	B
ss490558953	6	20,604,253	B	B	B	B	B	B
ss490555951	6	20,719,389	A	B	A	B	A	B
ss490550096	6	20,786,682	A	B	A	B	A	B
ss490555972	6	20,850,123	A	B	A	B	A	B
ss490550124	6	20,982,940	A	B	A	B	A	B
ss490556005	6	21,758,738	A	B	A	B	A	B
ss490556014	6	22,296,379	A	B	A	A	B	A
ss490558923	6	22,578,566	B	A	B	B	A	B
ss490556048	6	22,953,307	A	B	A	B	A	B
ss490550212	6	23,138,881	A	B	A	B	A	B
ss490559115	6	23,941,299	A	B	A	B	A	B
ss490550220	6	24,324,785	A	B	A	A	A	B
ss490556182	6	24,433,974	A	B	A	A	A	B
ss490558886	6	24,914,294	B	B	A	B	B	B
ss490558890	6	25,325,556	B	B	A	B	B	B
ss490556207	6	25,325,607	B	B	A	B	B	B
ss490556216	6	25,429,330	B	A	B	B	B	A
ss490556220	6	25,631,852	A	B	A	A	A	B
ss490556239	6	25,713,330	A	B	A	B	A	B
ss490556242	6	26,089,443	A	B	A	B	A	B
ss490556260	6	26,149,926	A	B	A	B	A	B
ss490556308	6	26,484,157	A	B	A	B	A	B
ss490559104	6	27,373,564	A	B	A	B	A	B
ss490556376	6	28,294,400	A	B	A	B	A	B
ss490556421	6	28,590,655	A	B	A	B	A	B

Supplemental Fig. S2. Continued.

ss490556424	7	1,298,051	A	B	A	B	B	B
ss490556436	7	1,392,399	A	B	A	B	A	A
ss490556439	7	1,783,512	A	B	A	B	A	A
ss490556458	7	1,835,696	A	B	A	B	B	B
ss490556467	7	2,085,075	B	A	B	B	A	B
ss490556479	7	2,252,124	B	A	B	B	A	B
ss490556549	7	2,530,796	A	B	A	A	B	A
ss490559378	7	4,261,930	B	B	B	B	B	B
ss490559416	7	4,466,543	B	B	B	A	B	A
ss490556594	7	4,467,254	B	B	B	A	B	A
ss490556651	7	5,729,126	A	B	A	B	A	A
ss490556657	7	7,884,834	B	B	B	B	B	B
ss490559192	7	8,002,087	B	B	B	B	B	B
ss490556684	7	8,149,634	A	B	A	B	A	A
ss490556699	7	8,954,812	A	A	A	B	A	B
ss490550496	7	9,635,219	B	B	B	B	B	B
ss490556768	7	9,642,445	B	B	B	B	B	B
ss490556777	7	10,992,603	A	B	A	B	A	B
ss490556795	7	11,125,571	A	B	A	B	A	B
ss490556804	7	11,504,432	A	B	A	B	A	B
ss490550555	7	11,774,569	B	A	B	B	A	B
ss490559301	7	11,790,341	A	B	A	B	A	B
ss490556971	7	12,192,907	A	B	A	B	A	B
ss490556986	7	14,253,560	A	B	B	B	B	B
ss490550655	7	14,418,839	A	A	A	A	A	A
ss490557026	7	14,527,951	B	B	B	B	B	B
ss490557029	7	14,929,134	B	B	B	B	B	B
ss490557035	7	14,967,053	A	B	A	B	A	B
ss490558905	7	15,029,527	A	A	A	A	A	A
ss490550700	7	15,241,465	B	B	B	A	B	A
ss490557186	7	15,744,830	A	B	A	B	A	B
ss490557205	7	16,660,251	A	B	B	B	B	B
ss490557244	7	16,890,828	A	B	B	B	B	B
ss490557253	7	17,591,054	A	A	A	A	A	A
ss490559061	7	17,697,521	B	A	A	A	A	A

Supplemental Fig. S2. Continued.

ss490559058	7	17,855,163	B	A	A	A	A	A	A
ss490558908	7	17,855,350	A	B	B	B	B	B	B
ss490558911	7	19,283,645	B	B	B	B	A	A	A
ss490558914	7	19,283,697	B	B	B	B	A	A	A
ss490558917	7	19,283,789	A	A	A	A	B	B	B
ss490557318	7	19,283,829	B	B	B	B	A	A	A
ss490550814	7	19,919,742	A	B	A	B	A	B	A
ss490559425	7	19,981,542	A	A	A	A	A	A	A
ss490558893	7	20,690,600	B	B	B	A	B	A	A
ss490557345	7	20,819,981	A	B	A	B	A	B	A
ss490557364	7	20,835,592	A	B	A	B	A	B	A
ss490557376	7	20,894,129	A	A	A	B	A	B	A
ss490557421	7	20,941,604	B	B	B	B	B	B	B
ss490557478	7	21,112,835	A	B	A	B	A	B	A
ss490557605	7	21,282,777	A	A	A	B	A	B	A
ss490557632	7	21,747,135	A	B	A	B	A	B	A
ss490557699	7	22,024,984	B	A	A	A	A	A	A
ss490557705	8	79,992	A	B	A	B	B	B	B
ss490557711	8	150,929	A	B	A	B	A	A	A
ss490559359	8	233,014	A	B	A	B	B	B	B
ss490557732	8	241,070	B	B	B	B	B	B	B
ss490550948	8	629,163	A	B	A	B	A	A	A
ss490557738	8	831,811	A	B	A	B	B	B	B
ss490557747	8	876,457	A	B	A	B	A	A	A
ss490559220	8	1,044,709	A	B	A	B	B	B	B
ss490550977	8	2,188,896	B	B	A	B	B	B	B
ss490557805	8	2,567,793	A	B	A	B	A	B	A
ss490557812	8	2,835,801	A	B	A	B	A	B	A
ss490557854	8	3,993,707	B	B	B	B	B	B	B
ss490557869	8	4,491,335	A	B	A	A	B	A	A
ss490557915	8	5,668,188	A	B	A	B	A	B	A
ss490557920	8	5,802,063	A	B	A	B	A	B	A
ss490557923	8	6,011,965	B	B	B	B	B	B	B
ss490557932	8	6,475,367	A	B	A	B	A	B	A

Supplemental Fig. S2. Continued.

ss490557938	8	6,563,189	B	B	A	B	B	B
ss490557941	8	6,724,389	A	B	A	B	A	B
ss490557973	8	7,919,697	A	B	A	B	A	B
ss490557992	8	8,493,539	B	A	B	B	A	B
ss490551087	8	8,546,822	B	A	B	B	A	B
ss490557995	8	8,558,749	B	A	B	B	A	B
ss490558009	8	9,004,156	A	A	A	A	A	A
ss490558018	8	9,204,806	B	B	B	B	B	B
ss490558033	8	10,189,188	A	B	A	B	A	B
ss490558045	8	10,401,185	B	A	B	B	A	B
ss490558103	8	12,024,509	B	A	B	B	A	B
ss490558941	8	12,227,080	A	B	A	A	B	A
ss490558130	8	12,634,796	A	B	A	A	B	A
ss490551176	8	13,901,359	B	A	B	B	A	B
ss490558206	8	13,903,589	B	A	B	B	A	B
ss490558257	8	14,357,714	A	A	A	A	A	A
ss490558260	8	14,374,888	A	B	A	A	B	A
ss490558308	8	14,841,426	A	A	A	A	A	A
ss490558311	8	14,888,590	B	A	B	B	A	B
ss490558317	8	14,923,589	A	B	A	A	B	A
ss490559048	8	16,036,151	B	A	B	B	A	B
ss490559419	8	16,350,869	B	A	B	B	A	B
ss490559422	8	16,350,931	B	A	B	B	A	B
ss490551327	8	17,114,381	B	A	B	B	A	B
ss490558540	8	17,307,331	A	B	A	A	B	A
ss490558555	8	17,492,237	A	B	A	A	B	A
ss490558603	8	18,157,624	A	B	A	A	B	A
ss490558609	8	18,215,533	B	A	B	B	A	B
ss490558732	8	19,869,798	B	B	A	B	B	B
ss490559133	8	19,873,761	A	A	B	A	A	A
ss490559304	8	21,311,784	A	B	A	B	B	B
ss490559307	8	21,311,977	A	B	A	B	B	B
ss490559310	8	21,311,991	A	B	A	B	A	A
ss490559313	8	21,312,240	A	B	A	B	B	B
ss490559316	8	21,312,298	A	B	A	B	A	A
ss490558810	8	21,655,170	A	B	A	B	A	A

Supplemental Fig. S2. Continued.

Supplemental Table S1. List of 519 single nucleotide polymorphism markers, *S*-locus, and their peach physical map positions on the peach whole genome sequence, Peach v1.0 (Verde et al., 2013).^z

SN	NCBI SS	Original Full Name	Chr	Physical position (bp)	Present in sample sets		
					1	2	3
1	ss490545390	RosBREED_snp_sweet_cherry_Pp1_00348730	1	348730	Y	Y	Y
2	ss490558959	RosCOS1201-071_snp_sweet_cherry_Pp1_00450381	1	450381	Y	N	N
3	ss490545406	RosBREED_snp_sweet_cherry_Pp1_00538005	1	538005	Y	N	N
4	ss490545413	RosBREED_snp_sweet_cherry_Pp1_00599759	1	599759	Y	N	N
5	ss490545708	RosBREED_snp_tart_cherry_a_Pp1_00694731	1	694731	Y	N	N
6	ss490545434	RosBREED_snp_sweet_cherry_Pp1_00885553	1	885553	Y	N	Y
7	ss490545452	RosBREED_snp_sweet_cherry_Pp1_01111320	1	1111320	Y	N	N
8	ss490545461	RosBREED_snp_sweet_cherry_Pp1_01197874	1	1197874	Y	N	N
9	ss490545716	RosBREED_snp_tart_cherry_a_Pp1_01235182	1	1235182	Y	N	N
10	ss490545464	RosBREED_snp_sweet_cherry_Pp1_01238095	1	1238095	Y	N	N
11	ss490545473	RosBREED_snp_sweet_cherry_Pp1_01331155	1	1331155	Y	N	Y
12	ss490545482	RosBREED_snp_sweet_cherry_Pp1_01450317	1	1450317	Y	N	N
13	ss490545503	RosBREED_snp_sweet_cherry_Pp1_01737374	1	1737374	Y	N	N
14	ss490545528	RosBREED_snp_sweet_cherry_Pp1_02115377	1	2115377	Y	Y	Y
15	ss490545541	RosBREED_snp_sweet_cherry_Pp1_02241751	1	2241751	Y	N	N
16	ss490545556	RosBREED_snp_sweet_cherry_Pp1_02441717	1	2441717	Y	N	N
17	ss490559162	RosCOS1602-202_snp_sweet_cherry_Pp1_02602122	1	2602122	Y	N	Y
18	ss490545597	RosBREED_snp_sweet_cherry_Pp1_03137813	1	3137813	Y	N	Y
19	ss490545844	RosBREED_snp_sweet_cherry_Pp1_05839154	1	5839154	Y	N	Y
20	ss490545848	RosBREED_snp_sweet_cherry_Pp1_05878432	1	5878432	Y	N	N
21	ss490545852	RosBREED_snp_sweet_cherry_Pp1_05894052	1	5894052	Y	N	N
22	ss490545888	RosBREED_snp_sweet_cherry_Pp1_06215653	1	6215653	Y	N	Y
23	ss490545912	RosBREED_snp_sweet_cherry_Pp1_06460845	1	6460845	Y	N	N
24	ss490545967	RosBREED_snp_sweet_cherry_Pp1_07374161	1	7374161	Y	N	Y
25	ss490545984	RosBREED_snp_sweet_cherry_Pp1_07504437	1	7504437	Y	N	N
26	ss490546020	RosBREED_snp_sweet_cherry_Pp1_07824263	1	7824263	Y	N	N
27	ss490558825	RosCOS0478-267_snp_sweet_cherry_Pp1_08412096	1	8412096	Y	N	Y
28	ss490546174	RosBREED_snp_sweet_cherry_Pp1_09597368	1	9597368	Y	Y	Y
29	ss490546226	RosBREED_snp_sweet_cherry_Pp1_10175178	1	10175178	Y	N	Y
30	ss490546230	RosBREED_snp_sweet_cherry_Pp1_10176147	1	10176147	Y	N	N
31	ss490546026	RosBREED_snp_tart_cherry_a_Pp1_10178231	1	10178231	Y	N	N
32	ss490546269	RosBREED_snp_sweet_cherry_Pp1_10284090	1	10284090	Y	N	Y
33	ss490546281	RosBREED_snp_sweet_cherry_Pp1_10316151	1	10316151	Y	N	N
34	ss490546285	RosBREED_snp_sweet_cherry_Pp1_10330576	1	10330576	Y	N	N
35	ss490546068	RosBREED_snp_tart_cherry_a_Pp1_11102635	1	11102635	Y	N	Y
36	ss490546478	RosBREED_snp_sweet_cherry_Pp1_11855405	1	11855405	Y	N	Y
37	ss490546494	RosBREED_snp_sweet_cherry_Pp1_12191200	1	12191200	Y	Y	N
38	ss490546498	RosBREED_snp_sweet_cherry_Pp1_12292557	1	12292557	Y	N	N
39	ss490546526	RosBREED_snp_sweet_cherry_Pp1_13052512	1	13052512	Y	N	Y
40	ss490546566	RosBREED_snp_sweet_cherry_Pp1_14110306	1	14110306	Y	N	Y
41	ss490546574	RosBREED_snp_sweet_cherry_Pp1_14281912	1	14281912	Y	N	N
42	ss490546611	RosBREED_snp_sweet_cherry_Pp1_15061804	1	15061804	Y	N	Y
43	ss490558902	RosCOS1084-357_snp_sweet_cherry_Pp1_16608849	1	16608849	Y	Y	Y
44	ss490546643	RosBREED_snp_sweet_cherry_Pp1_16612689	1	16612689	Y	N	N
45	ss490546651	RosBREED_snp_sweet_cherry_Pp1_17571526	1	17571526	Y	N	Y
46	ss490546675	RosBREED_snp_sweet_cherry_Pp1_19836475	1	19836475	Y	N	Y
47	ss490546679	RosBREED_snp_sweet_cherry_Pp1_19999922	1	19999922	Y	Y	N
48	ss490559249	RosCOS2143-270_snp_sweet_cherry_Pp1_21773370	1	21773370	Y	N	Y
49	ss490546874	RosBREED_snp_sweet_cherry_Pp1_24575772	1	24575772	Y	N	Y
50	ss490546942	RosBREED_snp_sweet_cherry_Pp1_25423943	1	25423943	Y	N	Y
51	ss490546990	RosBREED_snp_sweet_cherry_Pp1_26047253	1	26047253	Y	N	Y
52	ss490547035	RosBREED_snp_sweet_cherry_Pp1_26698128	1	26698128	Y	N	Y
53	ss490547103	RosBREED_snp_sweet_cherry_Pp1_27626876	1	27626876	Y	N	Y
54	ss490547111	RosBREED_snp_sweet_cherry_Pp1_27714539	1	27714539	Y	N	N
55	ss490559197	RosCOS1756-104_snp_sweet_cherry_Pp1_27721194	1	27721194	Y	Y	N
56	ss490547194	RosBREED_snp_sweet_cherry_Pp1_29638469	1	29638469	Y	N	Y

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Supplemental Table S1. Continued.

SN	NCBI SS	Original Full Name	Chr	Physical position (bp)	Present in sample sets		
					1	2	3
57	ss490547213	RosBREED_snp_sweet_cherry_Pp1_30054079	1	30054079	Y	N	Y
58	ss490546439	RosBREED_snp_tart_cherry_a_Pp1_30065891	1	30065891	Y	N	N
59	ss490546447	RosBREED_snp_tart_cherry_a_Pp1_30413870	1	30413870	Y	Y	N
60	ss490547287	RosBREED_snp_sweet_cherry_Pp1_31633964	1	31633964	Y	N	Y
61	ss490547294	RosBREED_snp_sweet_cherry_Pp1_31805500	1	31805500	Y	N	N
62	ss490547298	RosBREED_snp_sweet_cherry_Pp1_31881572	1	31881572	Y	N	N
63	ss490547306	RosBREED_snp_sweet_cherry_Pp1_32053318	1	32053318	Y	N	Y
64	ss490547352	RosBREED_snp_sweet_cherry_Pp1_32270077	1	32270077	Y	N	Y
65	ss490559347	RosCOS2753-188_snp_sweet_cherry_Pp1_32621488	1	32621488	Y	N	N
66	ss490559350	RosCOS2753-232_snp_sweet_cherry_Pp1_32621532	1	32621532	Y	N	N
67	ss490547453	RosBREED_snp_sweet_cherry_Pp1_32759983	1	32759983	Y	N	N
68	ss490547487	RosBREED_snp_sweet_cherry_Pp1_32894074	1	32894074	Y	N	N
69	ss490547510	RosBREED_snp_sweet_cherry_Pp1_33007179	1	33007179	Y	N	N
70	ss490559328	RosCOS2622-075_snp_sweet_cherry_Pp1_33117964	1	33117964	Y	N	N
71	ss490547599	RosBREED_snp_sweet_cherry_Pp1_33392756	1	33392756	Y	N	Y
72	ss490547659	RosBREED_snp_sweet_cherry_Pp1_33790546	1	33790546	Y	N	N
73	ss490547676	RosBREED_snp_sweet_cherry_Pp1_33883266	1	33883266	Y	N	N
74	ss490547684	RosBREED_snp_sweet_cherry_Pp1_33907538	1	33907538	Y	N	N
75	ss490559168	RosCOS1612-172_snp_sweet_cherry_Pp1_34168048	1	34168048	Y	N	Y
76	ss490559153	RosCOS1549-533_snp_sweet_cherry_Pp1_34192653	1	34192653	Y	N	N
77	ss490559118	RosCOS1520-129_snp_sweet_cherry_Pp1_34197844	1	34197844	Y	N	N
78	ss490546621	RosBREED_snp_tart_cherry_a_Pp1_34430805	1	34430805	Y	N	N
79	ss490546645	RosBREED_snp_tart_cherry_a_Pp1_34916586	1	34916586	Y	N	N
80	ss490547882	RosBREED_snp_sweet_cherry_Pp1_35371782	1	35371782	Y	N	Y
81	ss490547886	RosBREED_snp_sweet_cherry_Pp1_35408469	1	35408469	Y	N	N
82	ss490547915	RosBREED_snp_sweet_cherry_Pp1_35614161	1	35614161	Y	N	N
83	ss490548010	RosBREED_snp_sweet_cherry_Pp1_36188884	1	36188884	Y	N	N
84	ss490548030	RosBREED_snp_sweet_cherry_Pp1_36319573	1	36319573	Y	N	Y
85	ss490548117	RosBREED_snp_sweet_cherry_Pp1_36725185	1	36725185	Y	N	N
86	ss490548121	RosBREED_snp_sweet_cherry_Pp1_36738631	1	36738631	Y	N	N
87	ss490548153	RosBREED_snp_sweet_cherry_Pp1_36865299	1	36865299	Y	N	N
88	ss490558950	RosCOS1169-212_snp_sweet_cherry_Pp1_37078592	1	37078592	Y	Y	Y
89	ss490546794	RosBREED_snp_tart_cherry_a_Pp1_38376904	1	38376904	Y	N	Y
90	ss490559258	RosCOS2373-074_snp_sweet_cherry_Pp1_39849154	1	39849154	Y	N	Y
91	ss490548285	RosBREED_snp_sweet_cherry_Pp1_39922772	1	39922772	Y	N	N
92	ss490548289	RosBREED_snp_sweet_cherry_Pp1_40057233	1	40057233	Y	N	N
93	ss490546833	RosBREED_snp_tart_cherry_a_Pp1_40061065	1	40061065	Y	N	N
94	ss490559070	RosCOS1405-103_snp_sweet_cherry_Pp1_43353354	1	43353354	Y	N	Y
95	ss490546889	RosBREED_snp_tart_cherry_a_Pp1_43556762	1	43556762	Y	N	N
96	ss490548402	RosBREED_snp_sweet_cherry_Pp1_43706470	1	43706470	Y	N	N
97	ss490548406	RosBREED_snp_sweet_cherry_Pp1_43806891	1	43806891	Y	N	N
98	ss490558932	RosCOS1139-146_snp_sweet_cherry_Pp1_43832684	1	43832684	Y	N	N
99	ss490548418	RosBREED_snp_sweet_cherry_Pp1_43875207	1	43875207	Y	N	N
100	ss490558982	RosCOS1232-306_snp_sweet_cherry_Pp1_44008459	1	44008459	Y	N	Y
101	ss490558979	RosCOS1232-203_snp_sweet_cherry_Pp1_44008562	1	44008562	Y	N	N
102	ss490558976	RosCOS1232-107_snp_sweet_cherry_Pp1_44008658	1	44008658	Y	N	N
103	ss490548444	RosBREED_snp_sweet_cherry_Pp1_44045161	1	44045161	Y	N	N
104	ss490548448	RosBREED_snp_sweet_cherry_Pp1_44090182	1	44090182	Y	N	N
105	ss490548488	RosBREED_snp_sweet_cherry_Pp1_44565586	1	44565586	Y	N	Y
106	ss490548510	RosBREED_snp_sweet_cherry_Pp1_44764542	1	44764542	Y	Y	N
107	ss490558944	RosCOS1159-099_snp_sweet_cherry_Pp1_45077993	1	45077993	Y	N	N
108	ss490548551	RosBREED_snp_sweet_cherry_Pp1_45163766	1	45163766	Y	N	N
109	ss490548559	RosBREED_snp_sweet_cherry_Pp1_45322930	1	45322930	Y	N	N
110	ss490559081	RosCOS1409-570_snp_sweet_cherry_Pp1_45469715	1	45469715	Y	N	N
111	ss490548571	RosBREED_snp_sweet_cherry_Pp1_45473214	1	45473214	Y	N	N
112	ss490548593	RosBREED_snp_sweet_cherry_Pp1_45680542	1	45680542	Y	N	Y

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Supplemental Table S1. Continued.

SN	NCBI SS	Original Full Name	Chr	Physical position (bp)	Present in sample sets		
					1	2	3
113	ss490548614	RosBREED_snp_sweet_cherry_Pp1_45924398	1	45924398	Y	N	N
114	ss490548655	RosBREED_snp_sweet_cherry_Pp1_46402818	1	46402818	Y	N	N
115	ss490548667	RosBREED_snp_sweet_cherry_Pp1_46530908	1	46530908	Y	N	Y
116	ss490548745	RosBREED_snp_sweet_cherry_Pp2_00911589	2	911589	Y	Y	Y
117	ss490548777	RosBREED_snp_sweet_cherry_Pp2_01435086	2	1435086	Y	N	N
118	ss490548809	RosBREED_snp_sweet_cherry_Pp2_01951353	2	1951353	Y	N	Y
119	ss490548813	RosBREED_snp_sweet_cherry_Pp2_02008976	2	2008976	Y	N	N
120	ss490548888	RosBREED_snp_sweet_cherry_Pp2_03229768	2	3229768	Y	N	Y
121	ss490548892	RosBREED_snp_sweet_cherry_Pp2_03396708	2	3396708	Y	Y	N
122	ss490548900	RosBREED_snp_sweet_cherry_Pp2_03488474	2	3488474	Y	N	N
123	ss490548920	RosBREED_snp_sweet_cherry_Pp2_04354053	2	4354053	Y	N	Y
124	ss490548928	RosBREED_snp_sweet_cherry_Pp2_04953599	2	4953599	Y	N	N
125	ss490547061	RosBREED_snp_tart_cherry_a_Pp2_04976130	2	4976130	Y	N	N
126	ss490548935	RosBREED_snp_sweet_cherry_Pp2_05493845	2	5493845	Y	N	Y
127	ss490548943	RosBREED_snp_sweet_cherry_Pp2_05865200	2	5865200	Y	N	Y
128	ss490548994	RosBREED_snp_sweet_cherry_Pp2_09649536	2	9649536	Y	N	Y
129	ss490549029	RosBREED_snp_sweet_cherry_Pp2_11187571	2	11187571	Y	N	Y
130	ss490549037	RosBREED_snp_sweet_cherry_Pp2_11540955	2	11540955	Y	N	N
131	ss490549052	RosBREED_snp_sweet_cherry_Pp2_12407490	2	12407490	Y	Y	Y
132	ss490559390	RosCOS3437-232_snp_sweet_cherry_Pp2_12408002	2	12408002	Y	N	N
133	ss490549109	RosBREED_snp_sweet_cherry_Pp2_14255547	2	14255547	Y	N	Y
134	ss490547158	RosBREED_snp_tart_cherry_a_Pp2_14471355	2	14471355	Y	N	N
135	ss490549138	RosBREED_snp_sweet_cherry_Pp2_14926622	2	14926622	Y	N	N
136	ss490549172	RosBREED_snp_sweet_cherry_Pp2_15084429	2	15084429	Y	N	Y
137	ss490549176	RosBREED_snp_sweet_cherry_Pp2_15090036	2	15090036	Y	N	N
138	ss490549219	RosBREED_snp_sweet_cherry_Pp2_15355971	2	15355971	Y	N	N
139	ss490549227	RosBREED_snp_sweet_cherry_Pp2_15372418	2	15372418	Y	N	N
140	ss490549258	RosBREED_snp_sweet_cherry_Pp2_15624043	2	15624043	Y	Y	N
141	ss490549278	RosBREED_snp_sweet_cherry_Pp2_15711952	2	15711952	Y	N	N
142	ss490549287	RosBREED_snp_sweet_cherry_Pp2_15747822	2	15747822	Y	N	N
143	ss490549379	RosBREED_snp_sweet_cherry_Pp2_16118423	2	16118423	Y	N	Y
144	ss490549955	RosBREED_snp_sweet_cherry_Pp2_19297736	2	19297736	Y	N	Y
145	ss490549999	RosBREED_snp_sweet_cherry_Pp2_19581374	2	19581374	Y	N	N
146	ss490550007	RosBREED_snp_sweet_cherry_Pp2_19615344	2	19615344	Y	N	N
147	ss490550015	RosBREED_snp_sweet_cherry_Pp2_19664779	2	19664779	Y	N	N
148	ss490550019	RosBREED_snp_sweet_cherry_Pp2_19684679	2	19684679	Y	N	N
149	ss490550027	RosBREED_snp_sweet_cherry_Pp2_19724366	2	19724366	Y	N	N
150	ss490550035	RosBREED_snp_sweet_cherry_Pp2_19752871	2	19752871	Y	N	N
151	ss490550074	RosBREED_snp_sweet_cherry_Pp2_20340464	2	20340464	Y	N	Y
152	ss490550125	RosBREED_snp_sweet_cherry_Pp2_20694575	2	20694575	Y	N	N
153	ss490550173	RosBREED_snp_sweet_cherry_Pp2_20925443	2	20925443	Y	N	N
154	ss490550213	RosBREED_snp_sweet_cherry_Pp2_21264736	2	21264736	Y	N	N
155	ss490550229	RosBREED_snp_sweet_cherry_Pp2_21486683	2	21486683	Y	Y	Y
156	ss490559045	RosCOS1328-437_snp_sweet_cherry_Pp2_22162871	2	22162871	Y	N	N
157	ss490559042	RosCOS1328-366_snp_sweet_cherry_Pp2_22162942	2	22162942	Y	N	N
158	ss490559039	RosCOS1328-249_snp_sweet_cherry_Pp2_22163062	2	22163062	Y	N	N
159	ss490559037	RosCOS1328-114_snp_sweet_cherry_Pp2_22163199	2	22163199	Y	N	N
160	ss490559013	RosCOS1310-102_snp_sweet_cherry_Pp2_22593260	2	22593260	Y	N	Y
161	ss490550363	RosBREED_snp_sweet_cherry_Pp2_22763311	2	22763311	Y	N	N
162	ss490550431	RosBREED_snp_sweet_cherry_Pp2_23331142	2	23331142	Y	N	N
163	ss490550493	RosBREED_snp_sweet_cherry_Pp2_23843142	2	23843142	Y	N	Y
164	ss490550501	RosBREED_snp_sweet_cherry_Pp2_23891054	2	23891054	Y	N	N
165	ss490550521	RosBREED_snp_sweet_cherry_Pp2_24033313	2	24033313	Y	N	N
166	ss490550529	RosBREED_snp_sweet_cherry_Pp2_24131520	2	24131520	Y	N	N
167	ss490550577	RosBREED_snp_sweet_cherry_Pp2_24536908	2	24536908	Y	N	Y
168	ss490550626	RosBREED_snp_sweet_cherry_Pp2_25004410	2	25004410	Y	N	N

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Supplemental Table S1. Continued.

SN	NCBI SS	Original Full Name	Chr	Physical position (bp)	Present in sample sets		
					1	2	3
169	ss490550691	RosBREED_snp_sweet_cherry_Pp2_25512709	2	25512709	Y	Y	N
170	ss490559255	RosCOS2370-108_snp_sweet_cherry_Pp2_26346122	2	26346122	Y	N	Y
171	ss490550831	RosBREED_snp_sweet_cherry_Pp3_00193994	3	193994	Y	Y	Y
172	ss490550883	RosBREED_snp_sweet_cherry_Pp3_01174681	3	1174681	Y	Y	N
173	ss490550887	RosBREED_snp_sweet_cherry_Pp3_01257143	3	1257143	Y	N	Y
174	ss490551030	RosBREED_snp_sweet_cherry_Pp3_02262982	3	2262982	Y	N	Y
175	ss490551110	RosBREED_snp_sweet_cherry_Pp3_02699030	3	2699030	Y	N	Y
176	ss490551118	RosBREED_snp_sweet_cherry_Pp3_02743517	3	2743517	Y	N	N
177	ss490551167	RosBREED_snp_sweet_cherry_Pp3_03086237	3	3086237	Y	N	N
178	ss490551234	RosBREED_snp_sweet_cherry_Pp3_03593732	3	3593732	Y	Y	N
179	ss490551267	RosBREED_snp_sweet_cherry_Pp3_03927957	3	3927957	Y	N	Y
180	ss490547825	RosBREED_snp_tart_cherry_a_Pp3_04138750	3	4138750	Y	N	N
181	ss490551321	RosBREED_snp_sweet_cherry_Pp3_04301861	3	4301861	Y	N	N
182	ss490551325	RosBREED_snp_sweet_cherry_Pp3_04334085	3	4334085	Y	N	N
183	ss490551333	RosBREED_snp_sweet_cherry_Pp3_04450769	3	4450769	Y	Y	N
184	ss490551337	RosBREED_snp_sweet_cherry_Pp3_04468725	3	4468725	Y	N	N
185	ss490559471	RosCOS3819-166_snp_sweet_cherry_Pp3_04571814	3	4571814	Y	N	N
186	ss490551353	RosBREED_snp_sweet_cherry_Pp3_04934519	3	4934519	Y	N	Y
187	ss490551394	RosBREED_snp_sweet_cherry_Pp3_06646570	3	6646570	Y	N	Y
188	ss490551435	RosBREED_snp_sweet_cherry_Pp3_07412958	3	7412958	Y	N	N
189	ss490551450	RosBREED_snp_sweet_cherry_Pp3_07622320	3	7622320	Y	N	Y
190	ss490551490	RosBREED_snp_sweet_cherry_Pp3_08552044	3	8552044	Y	N	Y
191	ss490551507	RosBREED_snp_sweet_cherry_Pp3_08859929	3	8859929	Y	N	N
192	ss490547928	RosBREED_snp_tart_cherry_a_Pp3_09782875	3	9782875	Y	N	Y
193	ss490551568	RosBREED_snp_sweet_cherry_Pp3_10399039	3	10399039	Y	N	N
194	ss490547960	RosBREED_snp_tart_cherry_a_Pp3_12115409	3	12115409	Y	Y	N
195	ss490551623	RosBREED_snp_sweet_cherry_Pp3_12188902	3	12188902	Y	N	N
196	ss490551684	RosBREED_snp_sweet_cherry_Pp3_13025963	3	13025963	Y	N	Y
197	ss490551699	RosBREED_snp_sweet_cherry_Pp3_13144730	3	13144730	Y	N	N
198	ss490551705	RosBREED_snp_sweet_cherry_Pp3_13208005	3	13208005	Y	N	Y
199	ss490551720	RosBREED_snp_sweet_cherry_Pp3_13406263	3	13406263	Y	N	N
200	ss490559450	RosCOS3766-391_snp_sweet_cherry_Pp3_13878008	3	13878008	Y	N	N
201	ss490548016	RosBREED_snp_tart_cherry_a_Pp3_13881088	3	13881088	Y	N	N
202	ss490551869	RosBREED_snp_sweet_cherry_Pp3_15309954	3	15309954	Y	Y	Y
203	ss490551878	RosBREED_snp_sweet_cherry_Pp3_15455662	3	15455662	Y	N	N
204	ss490551889	RosBREED_snp_sweet_cherry_Pp3_15682037	3	15682037	Y	N	N
205	ss490551892	RosBREED_snp_sweet_cherry_Pp3_15730479	3	15730479	Y	N	N
206	ss490551939	RosBREED_snp_sweet_cherry_Pp3_16692901	3	16692901	Y	N	Y
207	ss490551960	RosBREED_snp_sweet_cherry_Pp3_17036907	3	17036907	Y	N	N
208	ss490551969	RosBREED_snp_sweet_cherry_Pp3_17302344	3	17302344	Y	Y	N
209	ss490551972	RosBREED_snp_sweet_cherry_Pp3_17343716	3	17343716	Y	N	N
210	ss490548147	RosBREED_snp_tart_cherry_a_Pp3_17988706	3	17988706	Y	N	Y
211	ss490552015	RosBREED_snp_sweet_cherry_Pp3_18138999	3	18138999	Y	N	N
212	ss490552023	RosBREED_snp_sweet_cherry_Pp3_18281259	3	18281259	Y	N	N
213	ss490552032	RosBREED_snp_sweet_cherry_Pp3_18419753	3	18419753	Y	N	N
214	ss490552038	RosBREED_snp_sweet_cherry_Pp3_18512598	3	18512598	Y	N	N
215	ss490552061	RosBREED_snp_sweet_cherry_Pp3_19018695	3	19018695	Y	N	Y
216	ss490552191	RosBREED_snp_sweet_cherry_Pp3_21003752	3	21003752	Y	N	Y
217	ss490552196	RosBREED_snp_sweet_cherry_Pp3_21119693	3	21119693	Y	Y	N
218	ss490552270	RosBREED_snp_sweet_cherry_Pp4_00234975	4	234975	Y	Y	Y
219	ss490552272	RosBREED_snp_sweet_cherry_Pp4_00275572	4	275572	Y	N	N
220	ss490559194	RosCOS1689-287_snp_sweet_cherry_Pp4_00569769	4	569769	Y	N	N
221	ss490552318	RosBREED_snp_sweet_cherry_Pp4_00919839	4	919839	Y	N	N
222	ss490552332	RosBREED_snp_sweet_cherry_Pp4_01117948	4	1117948	Y	N	Y
223	ss490552394	RosBREED_snp_sweet_cherry_Pp4_01983101	4	1983101	Y	N	N
224	ss490548393	RosBREED_snp_tart_cherry_a_Pp4_02170096	4	2170096	Y	N	Y

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Supplemental Table S1. Continued.

SN	NCBI SS	Original Full Name	Chr	Physical position (bp)	Present in sample sets		
					1	2	3
225	ss490552435	RosBREED_snp_sweet_cherry_Pp4_02559655	4	2559655	Y	Y	N
226	ss490552446	RosBREED_snp_sweet_cherry_Pp4_02682092	4	2682092	Y	N	N
227	ss490552449	RosBREED_snp_sweet_cherry_Pp4_02712550	4	2712550	Y	N	Y
228	ss490559127	RosCOS1533-077_snp_sweet_cherry_Pp4_04329962	4	4329962	Y	N	Y
229	ss490552562	RosBREED_snp_sweet_cherry_Pp4_04353195	4	4353195	Y	Y	N
230	ss490552570	RosBREED_snp_sweet_cherry_Pp4_04471205	4	4471205	Y	N	N
231	ss490552576	RosBREED_snp_sweet_cherry_Pp4_04551204	4	4551204	Y	N	N
232	ss490552606	RosBREED_snp_sweet_cherry_Pp4_05231853	4	5231853	Y	N	Y
233	ss490552620	RosBREED_snp_sweet_cherry_Pp4_05425119	4	5425119	Y	N	N
234	ss490552626	RosBREED_snp_sweet_cherry_Pp4_05490025	4	5490025	Y	N	N
235	ss490552643	RosBREED_snp_sweet_cherry_Pp4_05790270	4	5790270	Y	N	N
236	ss490552646	RosBREED_snp_sweet_cherry_Pp4_05856246	4	5856246	Y	N	N
237	ss490552649	RosBREED_snp_sweet_cherry_Pp4_05911133	4	5911133	Y	N	N
238	ss490552675	RosBREED_snp_sweet_cherry_Pp4_06348991	4	6348991	Y	N	Y
239	ss490558877	RosCOS0546-209_snp_sweet_cherry_Pp4_06464070	4	6464070	Y	Y	N
240	ss490552696	RosBREED_snp_sweet_cherry_Pp4_06545181	4	6545181	Y	N	N
241	ss490552699	RosBREED_snp_sweet_cherry_Pp4_06580288	4	6580288	Y	N	N
242	ss490552713	RosBREED_snp_sweet_cherry_Pp4_06828082	4	6828082	Y	N	N
243	ss490552727	RosBREED_snp_sweet_cherry_Pp4_07065857	4	7065857	Y	N	N
244	ss490552730	RosBREED_snp_sweet_cherry_Pp4_07148241	4	7148241	Y	N	N
245	ss490552744	RosBREED_snp_sweet_cherry_Pp4_07349971	4	7349971	Y	N	Y
246	ss490552747	RosBREED_snp_sweet_cherry_Pp4_07402206	4	7402206	Y	N	N
247	ss490552750	RosBREED_snp_sweet_cherry_Pp4_07429956	4	7429956	Y	N	N
248	ss490552753	RosBREED_snp_sweet_cherry_Pp4_07456033	4	7456033	Y	N	N
249	ss490552767	RosBREED_snp_sweet_cherry_Pp4_07706352	4	7706352	Y	N	N
250	ss490552832	RosBREED_snp_sweet_cherry_Pp4_08827326	4	8827326	Y	N	Y
251	ss490548662	RosBREED_snp_tart_cherry_a_Pp4_08955576	4	8955576	Y	N	N
252	ss490552843	RosBREED_snp_sweet_cherry_Pp4_08985625	4	8985625	Y	N	N
253	ss490545355	Pa1Cl_snp_sweet_cherry_Pp4_09145953	4	9145953	Y	N	N
254	ss490552856	RosBREED_snp_sweet_cherry_Pp4_09148953	4	9148953	Y	N	N
255	ss490552880	RosBREED_snp_sweet_cherry_Pp4_10145480	4	10145480	Y	N	Y
256	ss490559107	RosCOS1499-100_snp_sweet_cherry_Pp4_10225433	4	10225433	Y	N	N
257	ss490552883	RosBREED_snp_sweet_cherry_Pp4_10230259	4	10230259	Y	N	N
258	ss490559054	RosCOS1363-161_snp_sweet_cherry_Pp4_10403896	4	10403896	Y	Y	N
259	ss490552928	RosBREED_snp_sweet_cherry_Pp4_11462176	4	11462176	Y	N	Y
260	ss490552959	RosBREED_snp_sweet_cherry_Pp4_12567325	4	12567325	Y	N	Y
261	ss490552964	RosBREED_snp_sweet_cherry_Pp4_12715001	4	12715001	Y	N	N
262	ss490552970	RosBREED_snp_sweet_cherry_Pp4_12865643	4	12865643	Y	N	N
263	ss490552973	RosBREED_snp_sweet_cherry_Pp4_12955416	4	12955416	Y	N	N
264	ss490559147	RosCOS1546-059_snp_sweet_cherry_Pp4_12987703	4	12987703	Y	N	N
265	ss490558926	RosCOS1132-199_snp_sweet_cherry_Pp4_13089513	4	13089513	Y	N	N
266	ss490552979	RosBREED_snp_sweet_cherry_Pp4_13093284	4	13093284	Y	N	N
267	ss490553016	RosBREED_snp_sweet_cherry_Pp4_13886648	4	13886648	Y	N	Y
268	ss490553025	RosBREED_snp_sweet_cherry_Pp4_14081510	4	14081510	Y	N	N
269	ss490553036	RosBREED_snp_sweet_cherry_Pp4_14516715	4	14516715	Y	N	N
270	ss490553048	RosBREED_snp_sweet_cherry_Pp4_14821190	4	14821190	Y	N	N
271	ss490553059	RosBREED_snp_sweet_cherry_Pp4_15070360	4	15070360	Y	Y	Y
272	ss490558929	RosCOS1134-107_snp_sweet_cherry_Pp4_16075683	4	16075683	Y	N	Y
273	ss490553123	RosBREED_snp_sweet_cherry_Pp4_17222313	4	17222313	Y	N	Y
274	ss490558865	RosCOS0544-090_snp_sweet_cherry_Pp4_17859388	4	17859388	Y	N	N
275	ss490558868	RosCOS0544-148_snp_sweet_cherry_Pp4_17859446	4	17859446	Y	N	N
276	ss490558871	RosCOS0544-363_snp_sweet_cherry_Pp4_17859661	4	17859661	Y	N	N
277	ss490553144	RosBREED_snp_sweet_cherry_Pp4_17943880	4	17943880	Y	N	N
278	ss490553184	RosBREED_snp_sweet_cherry_Pp4_18701563	4	18701563	Y	N	Y
279	ss490553192	RosBREED_snp_sweet_cherry_Pp4_19293490	4	19293490	Y	N	N
280	ss490553198	RosBREED_snp_sweet_cherry_Pp4_19411509	4	19411509	Y	N	N

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Supplemental Table S1. Continued.

SN	NCBI SS	Original Full Name	Chr	Physical position (bp)	Present in sample sets		
					1	2	3
281	ss490553204	RosBREED_snp_sweet_cherry_Pp4_19561278	4	19561278	Y	N	N
282	ss490553207	RosBREED_snp_sweet_cherry_Pp4_19599189	4	19599189	Y	Y	N
283	ss490553209	RosBREED_snp_sweet_cherry_Pp4_19657873	4	19657873	Y	N	Y
284	ss490553268	RosBREED_snp_sweet_cherry_Pp4_20865038	4	20865038	Y	N	Y
285	ss490553274	RosBREED_snp_sweet_cherry_Pp4_20926979	4	20926979	Y	N	N
286	ss490548855	RosBREED_snp_tart_cherry_a_Pp4_21145128	4	21145128	Y	N	N
287	ss490553289	RosBREED_snp_sweet_cherry_Pp4_21580914	4	21580914	Y	N	Y
288	ss490553438	RosBREED_snp_sweet_cherry_Pp4_26771048	4	26771048	Y	Y	N
289	ss490553464	RosBREED_snp_sweet_cherry_Pp4_27192075	4	27192075	Y	N	Y
290	ss490553467	RosBREED_snp_sweet_cherry_Pp4_27218201	4	27218201	Y	N	N
291	ss490553543	RosBREED_snp_sweet_cherry_Pp4_29560911	4	29560911	Y	N	Y
292	ss490553644	RosBREED_snp_sweet_cherry_Pp5_00689941	5	689941	Y	N	Y
293	ss490553674	RosBREED_snp_sweet_cherry_Pp5_00934368	5	934368	Y	N	N
294	ss490553735	RosBREED_snp_sweet_cherry_Pp5_01629739	5	1629739	Y	N	Y
295	ss490553738	RosBREED_snp_sweet_cherry_Pp5_01645289	5	1645289	Y	Y	N
296	ss490553741	RosBREED_snp_sweet_cherry_Pp5_01658127	5	1658127	Y	N	N
297	ss490559171	RosCOS1616-297_snp_sweet_cherry_Pp5_01709155	5	1709155	Y	N	N
298	ss490549013	RosBREED_snp_tart_cherry_a_Pp5_02351581	5	2351581	Y	N	Y
299	ss490553811	RosBREED_snp_sweet_cherry_Pp5_03193567	5	3193567	Y	N	Y
300	ss490553817	RosBREED_snp_sweet_cherry_Pp5_03299986	5	3299986	Y	N	N
301	ss490553823	RosBREED_snp_sweet_cherry_Pp5_03464400	5	3464400	Y	N	N
302	ss490559270	RosCOS2380-161_snp_sweet_cherry_Pp5_03464457	5	3464457	Y	N	N
303	ss490559267	RosCOS2380-101_snp_sweet_cherry_Pp5_03464517	5	3464517	Y	N	N
304	ss490559156	RosCOS1551-132_snp_sweet_cherry_Pp5_03469706	5	3469706	Y	Y	N
305	ss490553847	RosBREED_snp_sweet_cherry_Pp5_03644242	5	3644242	Y	N	N
306	ss490553853	RosBREED_snp_sweet_cherry_Pp5_03695755	5	3695755	Y	N	N
307	ss490553895	RosBREED_snp_sweet_cherry_Pp5_04302944	5	4302944	Y	N	Y
308	ss490553907	RosBREED_snp_sweet_cherry_Pp5_04413731	5	4413731	Y	N	N
309	ss490553910	RosBREED_snp_sweet_cherry_Pp5_04486238	5	4486238	Y	N	N
310	ss490553919	RosBREED_snp_sweet_cherry_Pp5_04710627	5	4710627	Y	N	N
311	ss490553922	RosBREED_snp_sweet_cherry_Pp5_04755463	5	4755463	Y	N	N
312	ss490553929	RosBREED_snp_sweet_cherry_Pp5_04897952	5	4897952	Y	N	N
313	ss490553960	RosBREED_snp_sweet_cherry_Pp5_05409519	5	5409519	Y	N	Y
314	ss490553963	RosBREED_snp_sweet_cherry_Pp5_05429352	5	5429352	Y	N	N
315	ss490559113	RosCOS1500-271_snp_sweet_cherry_Pp5_09393638	5	9393638	Y	N	Y
316	ss490559110	RosCOS1500-163_snp_sweet_cherry_Pp5_09393745	5	9393745	Y	N	N
317	ss490554201	RosBREED_snp_sweet_cherry_Pp5_11943249	5	11943249	Y	Y	Y
318	ss490554283	RosBREED_snp_sweet_cherry_Pp5_12331780	5	12331780	Y	N	N
319	ss490554313	RosBREED_snp_sweet_cherry_Pp5_12506702	5	12506702	Y	N	Y
320	ss490554346	RosBREED_snp_sweet_cherry_Pp5_12750950	5	12750950	Y	N	N
321	ss490554352	RosBREED_snp_sweet_cherry_Pp5_12785307	5	12785307	Y	Y	N
322	ss490554372	RosBREED_snp_sweet_cherry_Pp5_12917888	5	12917888	Y	N	N
323	ss490554417	RosBREED_snp_sweet_cherry_Pp5_13191542	5	13191542	Y	N	N
324	ss490559186	RosCOS1619-289_snp_sweet_cherry_Pp5_13240090	5	13240090	Y	N	N
325	ss490554495	RosBREED_snp_sweet_cherry_Pp5_13715106	5	13715106	Y	N	Y
326	ss490559206	RosCOS1765-517_snp_sweet_cherry_Pp5_15546701	5	15546701	Y	Y	Y
327	ss490559203	RosCOS1765-401_snp_sweet_cherry_Pp5_15546817	5	15546817	Y	N	N
328	ss490554529	RosBREED_snp_sweet_cherry_Pp5_15559243	5	15559243	Y	N	N
329	ss490554550	RosBREED_snp_sweet_cherry_Pp5_15817487	5	15817487	Y	N	N
330	ss490554609	RosBREED_snp_sweet_cherry_Pp5_16375840	5	16375840	Y	Y	Y
331	ss490554753	RosBREED_snp_sweet_cherry_Pp5_17319331	5	17319331	Y	Y	Y
332	ss490554756	RosBREED_snp_sweet_cherry_Pp5_17328363	5	17328363	Y	N	N
333	ss490549476	RosBREED_snp_tart_cherry_a_Pp5_17743459	5	17743459	Y	N	Y
334	ss490554898	RosBREED_snp_sweet_cherry_Pp5_18100331	5	18100331	Y	N	N
335	ss490554904	RosBREED_snp_sweet_cherry_Pp5_18146501	5	18146501	Y	N	N
336	ss490554953	RosBREED_snp_sweet_cherry_Pp5_18423946	5	18423946	Y	Y	N

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Supplemental Table S1. Continued.

SN	NCBI SS	Original Full Name	Chr	Physical position (bp)	Present in sample sets		
					1	2	3
337	ss490554977	RosBREED_snp_sweet_cherry_Pp6_00286381	6	286381	Y	N	Y
338	ss490554989	RosBREED_snp_sweet_cherry_Pp6_00735222	6	735222	Y	Y	N
339	ss490555047	RosBREED_snp_sweet_cherry_Pp6_01811133	6	1811133	Y	N	Y
340	ss490549593	RosBREED_snp_tart_cherry_f_Pp6_01852409	6	1852409	Y	N	N
341	ss490555075	RosBREED_snp_sweet_cherry_Pp6_02247834	6	2247834	Y	N	N
342	ss490559372	RosCOS3322-362_snp_sweet_cherry_Pp6_03912624	6	3912624	Y	N	Y
343	ss490555169	RosBREED_snp_sweet_cherry_Pp6_03920291	6	3920291	Y	N	N
344	ss490555172	RosBREED_snp_sweet_cherry_Pp6_03973271	6	3973271	Y	N	N
345	ss490555175	RosBREED_snp_sweet_cherry_Pp6_04050337	6	4050337	Y	N	N
346	ss490555200	RosBREED_snp_sweet_cherry_Pp6_04315623	6	4315623	Y	N	N
347	ss490549680	RosBREED_snp_tart_cherry_a_Pp6_04331813	6	4331813	Y	N	N
348	ss490559286	RosCOS2579-487_snp_sweet_cherry_Pp6_04620418	6	4620418	Y	N	N
349	ss490559283	RosCOS2579-485_snp_sweet_cherry_Pp6_04620420	6	4620420	Y	N	Y
350	ss490555236	RosBREED_snp_sweet_cherry_Pp6_04806232	6	4806232	Y	N	N
351	ss490555284	RosBREED_snp_sweet_cherry_Pp6_05460138	6	5460138	Y	N	N
352	ss490555293	RosBREED_snp_sweet_cherry_Pp6_05542394	6	5542394	Y	Y	N
353	ss490555314	RosBREED_snp_sweet_cherry_Pp6_05931170	6	5931170	Y	N	Y
354	ss490555316	RosBREED_snp_sweet_cherry_Pp6_05978925	6	5978925	Y	N	N
355	ss490555328	RosBREED_snp_sweet_cherry_Pp6_06245490	6	6245490	Y	N	N
356	ss490555360	RosBREED_snp_sweet_cherry_Pp6_06843830	6	6843830	Y	N	Y
357	ss490555411	RosBREED_snp_sweet_cherry_Pp6_07537950	6	7537950	Y	N	N
358	ss490555413	RosBREED_snp_sweet_cherry_Pp6_07575939	6	7575939	Y	N	N
359	ss490555416	RosBREED_snp_sweet_cherry_Pp6_07626959	6	7626959	Y	N	N
360	ss490555425	RosBREED_snp_sweet_cherry_Pp6_07838040	6	7838040	Y	N	Y
361	ss490555428	RosBREED_snp_sweet_cherry_Pp6_07901830	6	7901830	Y	N	N
362	ss490555481	RosBREED_snp_sweet_cherry_Pp6_08691599	6	8691599	Y	N	Y
363	ss490555554	RosBREED_snp_sweet_cherry_Pp6_10369567	6	10369567	Y	Y	Y
364	ss490555574	RosBREED_snp_sweet_cherry_Pp6_11072866	6	11072866	Y	N	Y
365	ss490555577	RosBREED_snp_sweet_cherry_Pp6_11128369	6	11128369	Y	N	N
366	ss490555580	RosBREED_snp_sweet_cherry_Pp6_11210515	6	11210515	Y	N	Y
367	ss490555606	RosBREED_snp_sweet_cherry_Pp6_11910096	6	11910096	Y	N	Y
368	ss490549926	RosBREED_snp_tart_cherry_a_Pp6_12119303	6	12119303	Y	N	N
369	ss490555615	RosBREED_snp_sweet_cherry_Pp6_12126728	6	12126728	Y	N	N
370	ss490555624	RosBREED_snp_sweet_cherry_Pp6_12400263	6	12400263	Y	N	N
371	ss490555635	RosBREED_snp_sweet_cherry_Pp6_12638852	6	12638852	Y	N	Y
372	ss490555682	RosBREED_snp_sweet_cherry_Pp6_14555604	6	14555604	Y	N	Y
373	ss490559341	RosCOS2633-261_snp_sweet_cherry_Pp6_14662485	6	14662485	Y	N	N
374	ss490559338	RosCOS2633-161_snp_sweet_cherry_Pp6_14662583	6	14662583	Y	N	N
375	ss490559335	RosCOS2633-111_snp_sweet_cherry_Pp6_14662633	6	14662633	Y	N	N
376	ss490555714	RosBREED_snp_sweet_cherry_Pp6_15628669	6	15628669	Y	N	Y
377	ss490555746	RosBREED_snp_sweet_cherry_Pp6_16636989	6	16636989	Y	Y	Y
378	ss490555771	RosBREED_snp_sweet_cherry_Pp6_17629589	6	17629589	Y	N	N
379	ss490555792	RosBREED_snp_sweet_cherry_Pp6_18081683	6	18081683	Y	N	Y
380	ss490559223	RosCOS1983-146_snp_sweet_cherry_Pp6_19912441	6	19912441	Y	N	Y
381	ss490559226	RosCOS1983-267_snp_sweet_cherry_Pp6_19912562	6	19912562	Y	N	N
382	ss490559229	RosCOS1983-426_snp_sweet_cherry_Pp6_19912697	6	19912697	Y	N	N
383	ss490555845	RosBREED_snp_sweet_cherry_Pp6_19982724	6	19982724	Y	N	N
384	ss490555857	RosBREED_snp_sweet_cherry_Pp6_20091471	6	20091471	Y	N	Y
385	ss490555863	RosBREED_snp_sweet_cherry_Pp6_20112900	6	20112900	Y	N	N
386	ss490555869	RosBREED_snp_sweet_cherry_Pp6_20150761	6	20150761	Y	N	N
387	ss490555878	RosBREED_snp_sweet_cherry_Pp6_20209981	6	20209981	Y	N	N
388	ss490555911	RosBREED_snp_sweet_cherry_Pp6_20514744	6	20514744	Y	N	N
389	ss490555926	RosBREED_snp_sweet_cherry_Pp6_20604253	6	20604253	Y	N	N
390	ss490558953	RosCOS1197-398_snp_sweet_cherry_Pp6_20719389	6	20719389	Y	N	N
391	ss490555951	RosBREED_snp_sweet_cherry_Pp6_20786682	6	20786682	Y	N	N
392	ss490550096	RosBREED_snp_tart_cherry_a_Pp6_20850123	6	20850123	Y	Y	N

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Supplemental Table S1. Continued.

SN	NCBI SS	Original Full Name	Chr	Physical position (bp)	Present in sample sets		
					1	2	3
393	ss490555972	RosBREED_snp_sweet_cherry_Pp6_20982940	6	20982940	Y	N	Y
394	ss490550124	RosBREED_snp_tart_cherry_a_Pp6_21758738	6	21758738	Y	N	Y
395	ss490556005	RosBREED_snp_sweet_cherry_Pp6_22296379	6	22296379	Y	N	Y
396	ss490556014	RosBREED_snp_sweet_cherry_Pp6_22578566	6	22578566	Y	N	N
397	ss490558923	RosCOS1124-244_snp_sweet_cherry_Pp6_22953307	6	22953307	Y	N	N
398	ss490556048	RosBREED_snp_sweet_cherry_Pp6_23138881	6	23138881	Y	N	N
399	ss490550212	RosBREED_snp_tart_cherry_a_Pp6_23941299	6	23941299	Y	N	Y
400	ss490559115	RosCOS1503-168_snp_sweet_cherry_Pp6_24324785	6	24324785	Y	N	N
401	ss490550220	RosBREED_snp_tart_cherry_a_Pp6_24433974	6	24433974	Y	N	N
402	ss490556182	RosBREED_snp_sweet_cherry_Pp6_24914294	6	24914294	Y	N	Y
403	ss490558886	RosCOS0548-072_snp_sweet_cherry_Pp6_25325556	6	25325556	Y	N	N
404	ss490558890	RosCOS0548-123_snp_sweet_cherry_Pp6_25325607	6	25325607	Y	N	N
405	ss490556207	RosBREED_snp_sweet_cherry_Pp6_25429330	6	25429330	Y	N	N
406	ss490556216	RosBREED_snp_sweet_cherry_Pp6_25631852	6	25631852	Y	N	N
407	ss490556220	RosBREED_snp_sweet_cherry_Pp6_25713330	6	25713330	Y	N	N
408	ss490556239	RosBREED_snp_sweet_cherry_Pp6_26089443	6	26089443	Y	N	Y
409	ss490556242	RosBREED_snp_sweet_cherry_Pp6_26149926	6	26149926	Y	N	N
410	ss490556260	RosBREED_snp_sweet_cherry_Pp6_26484157	6	26484157	Y	Y	N
411	ss490556308	RosBREED_snp_sweet_cherry_Pp6_27373564	6	27373564	Y	N	Y
412	ss490559104	RosCOS1493-311_snp_sweet_cherry_Pp6_28294400	6	28294400	Y	N	Y
413	ss490556376	RosBREED_snp_sweet_cherry_Pp6_28590655	6	28590655	Y	N	N
414	ss490556421	RosBREED_snp_sweet_cherry_Pp7_01298051	7	1298051	Y	Y	Y
415	ss490556424	RosBREED_snp_sweet_cherry_Pp7_01392399	7	1392399	Y	N	N
416	ss490556436	RosBREED_snp_sweet_cherry_Pp7_01783512	7	1783512	Y	N	N
417	ss490556439	RosBREED_snp_sweet_cherry_Pp7_01835696	7	1835696	Y	Y	N
418	ss490556458	RosBREED_snp_sweet_cherry_Pp7_02085075	7	2085075	Y	N	N
419	ss490556467	RosBREED_snp_sweet_cherry_Pp7_02252124	7	2252124	Y	N	Y
420	ss490556479	RosBREED_snp_sweet_cherry_Pp7_02530796	7	2530796	Y	N	N
421	ss490556549	RosBREED_snp_sweet_cherry_Pp7_04261930	7	4261930	Y	Y	Y
422	ss490559378	RosCOS3342-211_snp_sweet_cherry_Pp7_04466543	7	4466543	Y	N	N
423	ss490559416	RosCOS3729-417_snp_sweet_cherry_Pp7_04467254	7	4467254	Y	N	N
424	ss490556594	RosBREED_snp_sweet_cherry_Pp7_05729126	7	5729126	Y	N	Y
425	ss490556651	RosBREED_snp_sweet_cherry_Pp7_07884834	7	7884834	Y	N	Y
426	ss490556657	RosBREED_snp_sweet_cherry_Pp7_08002087	7	8002087	Y	N	N
427	ss490559192	RosCOS1674-276_snp_sweet_cherry_Pp7_08149634	7	8149634	Y	N	N
428	ss490556684	RosBREED_snp_sweet_cherry_Pp7_08954812	7	8954812	Y	N	N
429	ss490556699	RosBREED_snp_sweet_cherry_Pp7_09635219	7	9635219	Y	N	N
430	ss490550496	RosBREED_snp_tart_cherry_a_Pp7_09642445	7	9642445	Y	N	Y
431	ss490556768	RosBREED_snp_sweet_cherry_Pp7_10992603	7	10992603	Y	Y	N
432	ss490556777	RosBREED_snp_sweet_cherry_Pp7_11125571	7	11125571	Y	N	Y
433	ss490556795	RosBREED_snp_sweet_cherry_Pp7_11504432	7	11504432	Y	N	N
434	ss490556804	RosBREED_snp_sweet_cherry_Pp7_11774569	7	11774569	Y	N	N
435	ss490550555	RosBREED_snp_tart_cherry_a_Pp7_11790341	7	11790341	Y	N	N
436	ss490559301	RosCOS2599-403_snp_sweet_cherry_Pp7_12192907	7	12192907	Y	N	Y
437	ss490556971	RosBREED_snp_sweet_cherry_Pp7_14253560	7	14253560	Y	N	Y
438	ss490556986	RosBREED_snp_sweet_cherry_Pp7_14418839	7	14418839	Y	N	N
439	ss490550655	RosBREED_snp_tart_cherry_a_Pp7_14527951	7	14527951	Y	N	N
440	ss490557026	RosBREED_snp_sweet_cherry_Pp7_14929134	7	14929134	Y	N	N
441	ss490557029	RosBREED_snp_sweet_cherry_Pp7_14967053	7	14967053	Y	Y	Y
442	ss490557035	RosBREED_snp_sweet_cherry_Pp7_15029527	7	15029527	Y	N	N
443	ss490558905	RosCOS1089-100_snp_sweet_cherry_Pp7_15241465	7	15241465	Y	N	N
444	ss490550700	RosBREED_snp_tart_cherry_a_Pp7_15744830	7	15744830	Y	N	Y
445	ss490557186	RosBREED_snp_sweet_cherry_Pp7_16660251	7	16660251	Y	N	Y
446	ss490557205	RosBREED_snp_sweet_cherry_Pp7_16890828	7	16890828	Y	N	Y
447	ss490557244	RosBREED_snp_sweet_cherry_Pp7_17591054	7	17591054	Y	N	N
448	ss490557253	RosBREED_snp_sweet_cherry_Pp7_17697521	7	17697521	Y	N	N

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Supplemental Table S1. Continued.

SN	NCBI SS	Original Full Name	Chr	Physical position (bp)	Present in sample sets		
					1	2	3
449	ss490559061	RosCOS1396-262_snp_sweet_cherry_Pp7_17855163	7	17855163	Y	Y	Y
450	ss490559058	RosCOS1396-075_snp_sweet_cherry_Pp7_17855350	7	17855350	Y	N	N
451	ss490558908	RosCOS1107-107_snp_sweet_cherry_Pp7_19283645	7	19283645	Y	N	Y
452	ss490558911	RosCOS1107-159_snp_sweet_cherry_Pp7_19283697	7	19283697	Y	N	N
453	ss490558914	RosCOS1107-251_snp_sweet_cherry_Pp7_19283789	7	19283789	Y	N	N
454	ss490558917	RosCOS1107-291_snp_sweet_cherry_Pp7_19283829	7	19283829	Y	N	N
455	ss490557318	RosBREED_snp_sweet_cherry_Pp7_19919742	7	19919742	Y	N	N
456	ss490550814	RosBREED_snp_tart_cherry_a_Pp7_19981542	7	19981542	Y	N	N
457	ss490559425	RosCOS3736-060_snp_sweet_cherry_Pp7_20690600	7	20690600	Y	N	Y
458	ss490558893	RosCOS0921-061_snp_sweet_cherry_Pp7_20819981	7	20819981	Y	N	N
459	ss490557345	RosBREED_snp_sweet_cherry_Pp7_20835592	7	20835592	Y	N	N
460	ss490557364	RosBREED_snp_sweet_cherry_Pp7_20894129	7	20894129	Y	N	N
461	ss490557376	RosBREED_snp_sweet_cherry_Pp7_20941604	7	20941604	Y	Y	N
462	ss490557421	RosBREED_snp_sweet_cherry_Pp7_21112835	7	21112835	Y	N	N
463	ss490557478	RosBREED_snp_sweet_cherry_Pp7_21282777	7	21282777	Y	N	N
464	ss490557605	RosBREED_snp_sweet_cherry_Pp7_21747135	7	21747135	Y	N	N
465	ss490557632	RosBREED_snp_sweet_cherry_Pp7_22024984	7	22024984	Y	N	Y
466	ss490557699	RosBREED_snp_sweet_cherry_Pp8_00079992	8	79992	Y	N	Y
467	ss490557705	RosBREED_snp_sweet_cherry_Pp8_00150929	8	150929	Y	Y	N
468	ss490557711	RosBREED_snp_sweet_cherry_Pp8_00233014	8	233014	Y	N	N
469	ss490559359	RosCOS3030-170_snp_sweet_cherry_Pp8_00241070	8	241070	Y	N	N
470	ss490557732	RosBREED_snp_sweet_cherry_Pp8_00629163	8	629163	Y	N	N
471	ss490550948	RosBREED_snp_tart_cherry_a_Pp8_00831811	8	831811	Y	N	N
472	ss490557738	RosBREED_snp_sweet_cherry_Pp8_00876457	8	876457	Y	N	N
473	ss490557747	RosBREED_snp_sweet_cherry_Pp8_01044709	8	1044709	Y	N	Y
474	ss490559220	RosCOS1919-113_snp_sweet_cherry_Pp8_01569566	8	1569566	Y	Y	N
475	ss490550977	RosBREED_snp_tart_cherry_a_Pp8_02188896	8	2188896	Y	N	Y
476	ss490557805	RosBREED_snp_sweet_cherry_Pp8_02567793	8	2567793	Y	Y	N
477	ss490557812	RosBREED_snp_sweet_cherry_Pp8_02835801	8	2835801	Y	N	Y
478	ss490557854	RosBREED_snp_sweet_cherry_Pp8_03993707	8	3993707	Y	N	Y
479	ss490557869	RosBREED_snp_sweet_cherry_Pp8_04491335	8	4491335	Y	N	N
480	ss490557915	RosBREED_snp_sweet_cherry_Pp8_05668188	8	5668188	Y	N	Y
481	ss490557920	RosBREED_snp_sweet_cherry_Pp8_05802063	8	5802063	Y	Y	N
482	ss490557923	RosBREED_snp_sweet_cherry_Pp8_06011965	8	6011965	Y	N	N
483	ss490557932	RosBREED_snp_sweet_cherry_Pp8_06475367	8	6475367	Y	N	N
484	ss490557938	RosBREED_snp_sweet_cherry_Pp8_06563189	8	6563189	Y	N	Y
485	ss490557941	RosBREED_snp_sweet_cherry_Pp8_06724389	8	6724389	Y	N	N
486	ss490557973	RosBREED_snp_sweet_cherry_Pp8_07919697	8	7919697	Y	N	Y
487	ss490557992	RosBREED_snp_sweet_cherry_Pp8_08493539	8	8493539	Y	N	N
488	ss490551087	RosBREED_snp_tart_cherry_a_Pp8_08546822	8	8546822	Y	N	N
489	ss490557995	RosBREED_snp_sweet_cherry_Pp8_08558749	8	8558749	Y	N	Y
490	ss490558009	RosBREED_snp_sweet_cherry_Pp8_09004156	8	9004156	Y	N	N
491	ss490558018	RosBREED_snp_sweet_cherry_Pp8_09204806	8	9204806	Y	N	Y
492	ss490558033	RosBREED_snp_sweet_cherry_Pp8_10189188	8	10189188	Y	N	Y
493	ss490558045	RosBREED_snp_sweet_cherry_Pp8_10401185	8	10401185	Y	N	N
494	ss490558103	RosBREED_snp_sweet_cherry_Pp8_12024509	8	12024509	Y	Y	Y
495	ss490558941	RosCOS1154-267_snp_sweet_cherry_Pp8_12227080	8	12227080	Y	N	N
496	ss490558130	RosBREED_snp_sweet_cherry_Pp8_12634796	8	12634796	Y	N	N
497	ss490551176	RosBREED_snp_tart_cherry_a_Pp8_13901359	8	13901359	Y	N	Y
498	ss490558206	RosBREED_snp_sweet_cherry_Pp8_13903589	8	13903589	Y	N	N
499	ss490558257	RosBREED_snp_sweet_cherry_Pp8_14357714	8	14357714	Y	N	N
500	ss490558260	RosBREED_snp_sweet_cherry_Pp8_14374888	8	14374888	Y	N	N
501	ss490558308	RosBREED_snp_sweet_cherry_Pp8_14841426	8	14841426	Y	N	Y
502	ss490558311	RosBREED_snp_sweet_cherry_Pp8_14888590	8	14888590	Y	N	N
503	ss490558317	RosBREED_snp_sweet_cherry_Pp8_14923589	8	14923589	Y	N	N
504	ss490559048	RosCOS1338-411_snp_sweet_cherry_Pp8_16036151	8	16036151	Y	N	Y

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Supplemental Table S1. Continued.

SN	NCBI SS	Original Full Name	Chr	Physical position (bp)	Present in sample sets		
					1	2	3
505	ss490559419	RosCOS3732-078_snp_sweet_cherry_Pp8_16350869	8	16350869	Y	N	N
506	ss490559422	RosCOS3732-140_snp_sweet_cherry_Pp8_16350931	8	16350931	Y	Y	N
507	ss490551327	RosBREED_snp_tart_cherry_a_Pp8_17114381	8	17114381	Y	N	Y
508	ss490558540	RosBREED_snp_sweet_cherry_Pp8_17307331	8	17307331	Y	N	N
509	ss490558555	RosBREED_snp_sweet_cherry_Pp8_17492237	8	17492237	Y	N	N
510	ss490558603	RosBREED_snp_sweet_cherry_Pp8_18157624	8	18157624	Y	N	Y
511	ss490558609	RosBREED_snp_sweet_cherry_Pp8_18215533	8	18215533	Y	N	N
512	ss490558732	RosBREED_snp_sweet_cherry_Pp8_19869798	8	19869798	Y	N	Y
513	ss490559133	RosCOS1537-174_snp_sweet_cherry_Pp8_19873761	8	19873761	Y	N	N
514	ss490559304	RosCOS2609-056_snp_sweet_cherry_Pp8_21311784	8	21311784	Y	N	Y
515	ss490559307	RosCOS2609-252_snp_sweet_cherry_Pp8_21311977	8	21311977	Y	N	N
516	ss490559310	RosCOS2609-266_snp_sweet_cherry_Pp8_21311991	8	21311991	Y	N	N
517	ss490559313	RosCOS2609-516_snp_sweet_cherry_Pp8_21312240	8	21312240	Y	N	N
518	ss490559316	RosCOS2609-573_snp_sweet_cherry_Pp8_21312298	8	21312298	Y	N	N
519	ss490558810	RosBREED_snp_sweet_cherry_Pp8_21655170	8	21655170	Y	Y	Y
600	—	<i>S Locus</i>	6	—	N	N	N

^z“Y” indicates which markers were included in the marker sets. The number of markers in sample sets 1, 2, and 3 are 519, 180, and 60 markers, respectively.

NCBI = National Center for Biotechnology Information (Bethesda, MD); Chr = chromosome; ss = submitted SNP.