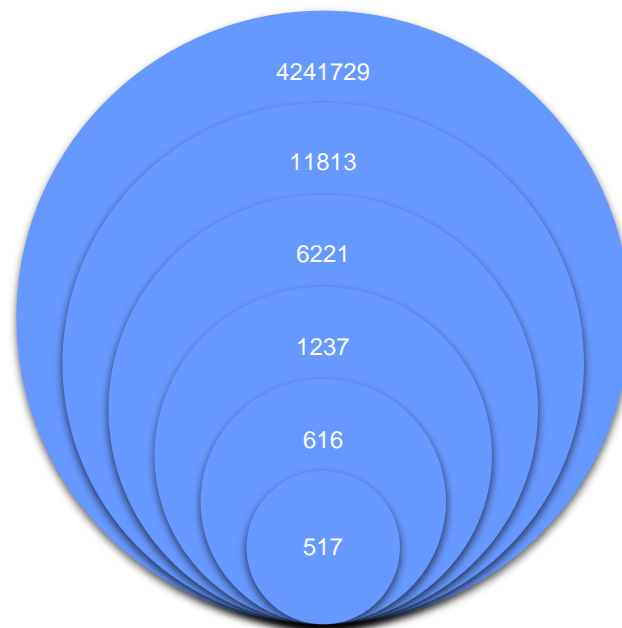


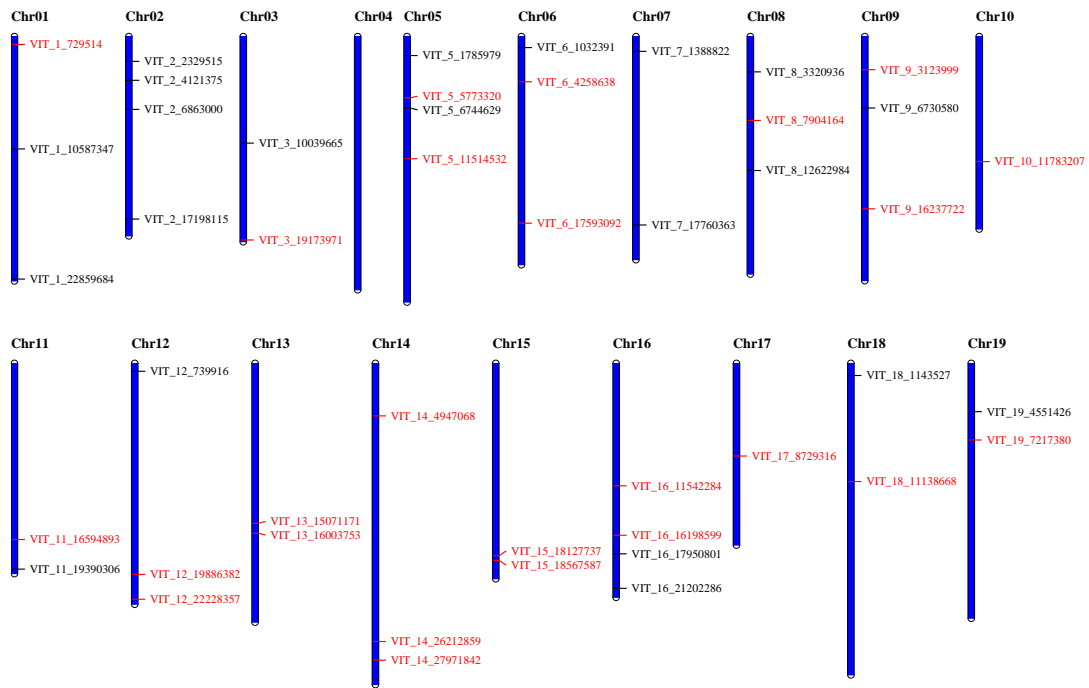
Appendix A Thermal cycling conditions for the KASP genotyping system

Stage	Temperature	Duration	Cycles per step
1. Hot-start <i>Taq</i> activation	94°C	15 min	1
2. Touchdown	94°C	20 s	10
	61°C (drop 0.6 °C per cycle)	60 s	
3. Amplification	94°C	20 s	26
	55°C	60 s	



Appendix B Screening process of 517 SNP loci.

SNP sites were only conserved if (1) the DNA chain of the chromosome before and after the sequence was greater than 50 bp, had dimorphism, and had a missing rate of < 0.05 (11,813 SNPs were screened out); (2) the MAF was > 0.05 (6,221 SNPs were screened out); (3) the MAF was > 0.3 (1,237 SNPs were screened); (4) the average sequencing depth was $\geq 10\times$ (616 SNPs were screened); (5) it was specific using 100 bp before and after the SNP locus in comparison with the grape reference genome.



Appendix C Distribution of 46 KASP markers on chromosomes (the 25 core markers are shown in red)

Appendix D Sequences of 46 KASP markers successfully screened

Type	Marker name	Alleles X/Y	Primer_AlleleX	Primer_AlleleY	Primer_Common
Core markers	VIT_1_729514	A/G	GAAGGTGACCAAGTTCATGCTGCTGA AGGTTTCTTGAAAAAGTACTGAT	GAAGGTCGGAGTCAACGGATTCTGAAGGTT TCTTGAAAAAGTACTGAC	CACAGGTTGGACAAGCAA AGGGAATT
	VIT_3_19173971	T/A	GAAGGTGACCAAGTTCATGCTCAAGT GACCAATCATGGAGTTCCAT	GAAGGTCGGAGTCAACGGATTCAAGTGACC AATCATGGAGTTCCAA	CGCTCCTCATGCGGTGTA GCAA
	VIT_5_5773320	C/T	GAAGGTGACCAAGTTCATGCTGGCTG TATCCTGTCTTGAAGCTC	GAAGGTCGGAGTCAACGGATTTGGCTGTAT CCTGTCTTGAAGCTT	GATCCAAGGTCACGAGCT GTTTATGAT
	VIT_5_11514532	C/T	GAAGGTGACCAAGTTCATGCTAATAAG GCAATTAAC TTGACCAAGACG	GAAGGTCGGAGTCAACGGATTGAATAAGGC AATTAAC TTGACCAAGACA	CTTTACATTTGTCTGTGG AATTTAGCAGTTA
	VIT_6_4258638	C/T	GAAGGTGACCAAGTTCATGCTTGTTCCA GAGATCCTGTTTTCTCG	GAAGGTCGGAGTCAACGGATTACTGTCCAG AGATCCTGTTTTCTCA	CTTTCAGCAGGCAGCAAT GGAAAGTT
	VIT_6_17593092	A/T	GAAGGTGACCAAGTTCATGCTCTGCAT TCGTTACCTGTCAACTTA	GAAGGTCGGAGTCAACGGATTCTGCATTCCG TTCACCTGTCAACTTT	ATCTGCATCTTCGAGCTT GTCCTTAATT
	VIT_8_7904164	C/G	GAAGGTGACCAAGTTCATGCTTCCAAT TTTCAATTCATTTAAGAGCATGAC	GAAGGTCGGAGTCAACGGATTTCCAATTTT CAATTCATTTAAGAGCATGAG	CTACCTCGGATCTGAATT GAAACTTTGAT
	VIT_8_12622984	T/G	GAAGGTGACCAAGTTCATGCTGATGAA TGATTGCTAATTATATTTTAGCATCTA	GAAGGTCGGAGTCAACGGATTATGAATGAT TGCTAATTATATTTTAGCATCTC	GTCTGATTGTGATTTATCT GTGGACGTTAA
	VIT_9_3123999	A/T	GAAGGTGACCAAGTTCATGCTTGTCTT GACTCATCATATTTGACAGCA	GAAGGTCGGAGTCAACGGATTTGTCTTGAC TCATCATATTTGACAGCT	GGTGTGAAGACGATAATG GGTCCAAT
	VIT_9_16237722	G/A	GAAGGTGACCAAGTTCATGCTGCAAG TCGAGCTCTCTGTCCG	GAAGGTCGGAGTCAACGGATTAGCAAGTC GAGCTCTCTGTCCA	GGCTTATATTGGAGATAA AGGAGTCAACTT
	VIT_10_11783207	A/T	GAAGGTGACCAAGTTCATGCTTTCTGG CCTTTGAACCGCCCTA	GAAGGTCGGAGTCAACGGATTTTCTGGCCT TTGAACCGCCCTT	AGTAGGAGAGAAAAGCCT CAATTGTCAA
	VIT_12_22228357	A/C	GAAGGTGACCAAGTTCATGCTCAACTT	GAAGGTCGGAGTCAACGGATTAAC TTCACG	GGTCGACGGCAGCCACA

		CACGGTGACCGAATTCATA	GTGACCGAATTCATC	GGTTT	
VIT_13_15071171	A/T	GAAGGTGACCAAGTTCATGCTAGGTG GTTGTGCTGAGATGGCA	GAAGGTCGGAGTCAACGGATTAGGTGGTT GTGCTGAGATGGCT	AGTGAGAAATACAAGGCA GATGGTCTAT	
VIT_14_4947068	T/G	GAAGGTGACCAAGTTCATGCTTATTCC TACCTGCGTTTCGTCGA	GAAGGTCGGAGTCAACGGATTATTCCTACC TGCCTTCGTCGC	CTGTGGCCCCGGTGGGGC TT	
VIT_14_26212859	G/A	GAAGGTGACCAAGTTCATGCTGACTG AATTAGGGGGGTTTGGG	GAAGGTCGGAGTCAACGGATTCTGACTGAAT TAGGGGGGTTTGGG	CGTGGTCATCCATGTTAT TGGAAGCTA	
VIT_14_27971842	A/G	GAAGGTGACCAAGTTCATGCTTGTAT TGAACAATCAGTGAGTTGGGT	GAAGGTCGGAGTCAACGGATTGTTATTGAA CAATCAGTGAGTTGGGC	ATGGTGCAACAAGTACCA TTTTTTTATGCTT	
VIT_15_18127737	T/G	GAAGGTGACCAAGTTCATGCTGGATG TGATGTAGGGGTCCTTGT	GAAGGTCGGAGTCAACGGATTGATGTGATG TAGGGGTCCTTGG	CATATCACCTTTTCTAGG ACTAAAACCCAA	
VIT_15_18567587	T/G	GAAGGTGACCAAGTTCATGCTCTGTAT TAAAGCTCTTGGGTGAAAACT	GAAGGTCGGAGTCAACGGATTTGTATTAAA GCTCTTGGGTGAAAAACG	ATTGTTGGGCACAAATAC GCTCAAGATT	
VIT_16_11542284	A/G	GAAGGTGACCAAGTTCATGCTGTTCAA CCAAAGCCTAACAATAGATCAT	GAAGGTCGGAGTCAACGGATTTTCAACCAA AGCCTAACAATAGATCAC	GGGTTGAGGTAGGTATTG TAACTCTTTTTT	
VIT_16_16198599	A/G	GAAGGTGACCAAGTTCATGCTGCACA ACAATTTCTCCAGCTTCGTT	GAAGGTCGGAGTCAACGGATTCACAACAAT TTCTCCAGCTTCGTC	AGAAATGGACTCACGTAG GTGTAAAGTT	
VIT_16_17950801	A/G	GAAGGTGACCAAGTTCATGCTTCTGCT TGAGGGGGAGTGACAA	GAAGGTCGGAGTCAACGGATTCTGCTTGAG GGGGAGTGACAG	TAGTGAAACATCTCCCA CTTGATTCATA	
VIT_17_8729316	T/A	GAAGGTGACCAAGTTCATGCTCCATTT TTTGACTTTTGGGTTTACTTTGTT	GAAGGTCGGAGTCAACGGATTCCATTTTTT GACTTTTGGGTTTACTTTGTA	TAGGATGATAAAGAGGAC AGCATCAATAAAA	
VIT_18_11138668	A/G	GAAGGTGACCAAGTTCATGCTGACAT GTTTCCATACTGATCCTCCTA	GAAGGTCGGAGTCAACGGATTACATGTTTC CATACTGATCCTCCTG	CTGGACATTTTCAACCAT GATGATGATGAT	
Extended markers	VIT_1_10587347	C/A	GAAGGTGACCAAGTTCATGCTAAGGA GAGCATTGGTTCTCTTCC	GAAGGTCGGAGTCAACGGATTGAAGGAGA GCATTGGTTCTCTTCA	CCCAATGAAAGCTCCATC AAATCCATAAT
	VIT_1_22859684	T/G	GAAGGTGACCAAGTTCATGCTATCTTC	GAAGGTCGGAGTCAACGGATTCTTCTACTC TATATAAATAATAGTAAGA	

VIT_2_2329515	A/G	TACTCATCGTTTTCTTCCAA GAAGGTGACCAAGTTCATGCTGTCCA GTTGTGGATTTCTCAGCAA	ATCGTTTTCTTCCAC GAAGGTCGGAGTCAACGGATTTCCAGTTGT GGATTTCTCAGCAG	AAAATGAGGGAAGGAA AAGGGCTCTTCTTCCCTC TCTTGTT
VIT_2_4121375	G/C	GAAGGTGACCAAGTTCATGCTTGGAT GCACGGATCATTGCTCC	GAAGGTCGGAGTCAACGGATTTGGATGCAC GGATCATTGCTCG	CAAAATCTTCTTACGGTC TATGATTATGAGAAT
VIT_2_6863000	G/A	GAAGGTGACCAAGTTCATGCTAAAAAG AAAAGGGAAAACAAAAACTACTCC	GAAGGTCGGAGTCAACGGATTAAAAAAAGA AAAGGGAAAACAAAAACTACTCT	GATTTTCATTGATTAGTTG GGTTTGGTTTGAA
VIT_2_17198115	G/C	GAAGGTGACCAAGTTCATGCTTCTCC GCTTCTCCGCC	GAAGGTCGGAGTCAACGGATTTCTCCGCT TCTCCGCCG	AAAATCTTGCGGGCGTAG TCGAGAT
VIT_3_10039665	C/A	GAAGGTGACCAAGTTCATGCTGCGTG CCGGTTGAAATTGAATTTATG	GAAGGTCGGAGTCAACGGATTGCGTGCCG GTTGAAATTGAATTTATT	GGTTTCCATGTTTTAACTC TCAAAAGACAAATTT
VIT_5_1785979	C/T	GAAGGTGACCAAGTTCATGCTGGTCC CTCACCTATTACTCCAG	GAAGGTCGGAGTCAACGGATTCGGTCCCT CACCTATTACTCCAA	TTTCGGACATGGAAAGCT TGAGTTTCTT
VIT_5_6744629	A/G	GAAGGTGACCAAGTTCATGCTTGAGTC AATCTCGCCGAATATGAGT	GAAGGTCGGAGTCAACGGATTAGTCAATCT CGCCGAATATGAGC	AAACTCAAGATTGGACAG CAATATCCATATT
VIT_6_1032391	G/A	GAAGGTGACCAAGTTCATGCTTTACAA CAGACGCTTTCTCCATGG	GAAGGTCGGAGTCAACGGATTGTTACAACA GACGCTTTCTCCATGA	GTAGGGTTGTCAGATTAG GAGGGAAA
VIT_7_1388822	A/G	GAAGGTGACCAAGTTCATGCTCGTCC GGATGCATTGCGCCT	GAAGGTCGGAGTCAACGGATTGTCCGGAT GCATTGCGCCC	GGCAAACGCTGATTGGCT GGAGTA
VIT_7_17760363	C/T	GAAGGTGACCAAGTTCATGCTGGATTT ATGGAGGAAAACAAAGAAAAGTCTG	GAAGGTCGGAGTCAACGGATTGGATTTATG GAGGAAAACAAAGAAAAGTCTG	CTGCTGGAAGTCCGGT CATTGAT
VIT_8_3320936	C/T	GAAGGTGACCAAGTTCATGCTTGGAG GGTAAAAATGAACTCAATTTGAC	GAAGGTCGGAGTCAACGGATTATTGGAGG GTAAAAATGAACTCAATTTGAT	CCTTTCTGATGATAGAAG CAGTGGGAA
VIT_9_6730580	G/T	GAAGGTGACCAAGTTCATGCTTGTTC AGCAGATAATGCATACGAC	GAAGGTCGGAGTCAACGGATTATGTTGCAG CAGATAATGCATACGAA	CACACTTCTATTTTATCAT CAGCACCTTTATT
VIT_11_16594893	C/T	GAAGGTGACCAAGTTCATGCTGATAAG	GAAGGTCGGAGTCAACGGATTAAGATAAG	TATGGGAGTGGCCATGTT

		TCCAGGATCCAGAGCC	TCCAGGATCCAGAGCT	ACTCCTA
VIT_11_19390306	G/A	GAAGGTGACCAAGTTCATGCTGTTCAA GCTGGGGGAGAATATATAC	GAAGGTCGGAGTCAACGGATTGGTTCAAGC TGGGGGAGAATATATAT	GTCGGAGTCCATGTATCG CCGTTA
VIT_12_739916	C/T	GAAGGTGACCAAGTTCATGCTGCTGA ACACACTTTTTCCAAGTTCG	GAAGGTCGGAGTCAACGGATTAAGCTGAAC ACACTTTTTCCAAGTTCA	GGTTTGGGAGGGGACAA AGATCTAATT
VIT_12_19886382	T/C	GAAGGTGACCAAGTTCATGCTAAAATC TCCAGGGCCTTTCATCACA	GAAGGTCGGAGTCAACGGATTATCTCCAGG GCCTTTCATCACG	CTGATTTGGCAGGCTGCA CTTACTA
VIT_13_16003753	A/G	GAAGGTGACCAAGTTCATGCTACTAAA ATCTCCACAGCTTCCTCA	GAAGGTCGGAGTCAACGGATTTAAAATCTC CCACAGCTTCCTCG	GGTCATGATTACGAGCCA CATAAATTACTA
VIT_16_21202286	A/G	GAAGGTGACCAAGTTCATGCTACCCAA TGGAATCGATCCAATGTCA	GAAGGTCGGAGTCAACGGATTCCAATGGAA TCGATCCAATGTCTG	CTGGTTAATTTAGACGA AGCCAAGTATA
VIT_18_1143527	A/T	GAAGGTGACCAAGTTCATGCTACCATT CGTCCAAATGCCAAAAAACTA	GAAGGTCGGAGTCAACGGATTACCATTTCGT CCAAATGCCAAAAAACTT	CAACTCGTGTTACCTTTAT TCAGGAACAA
VIT_19_4551426	A/G	GAAGGTGACCAAGTTCATGCTCAATGT GTATTACTTCAGTTTTGAACTCAA	GAAGGTCGGAGTCAACGGATTAATGTGTAT TACTTCAGTTTTGAACTCAG	CTGTCAAAGATTCCAGA CAAGGACTTA
VIT_19_7217380	A/T	GAAGGTGACCAAGTTCATGCTGGTCTT CATCCAAGATATGTATCTCATT	GAAGGTCGGAGTCAACGGATTGGTCTTCAT CCAAGATATGTATCTCATA	CATACGATTAATGGATG CGGGCAGTT

The name of the marker is composed of "VIT_ chromosome position of SNP _the specific position of the SNP ".

