**Supplementary Information**

# Genomics-based diversity analysis of Vanilla species using a Vanilla planifolia draft genome and Genotyping-By-Sequencing

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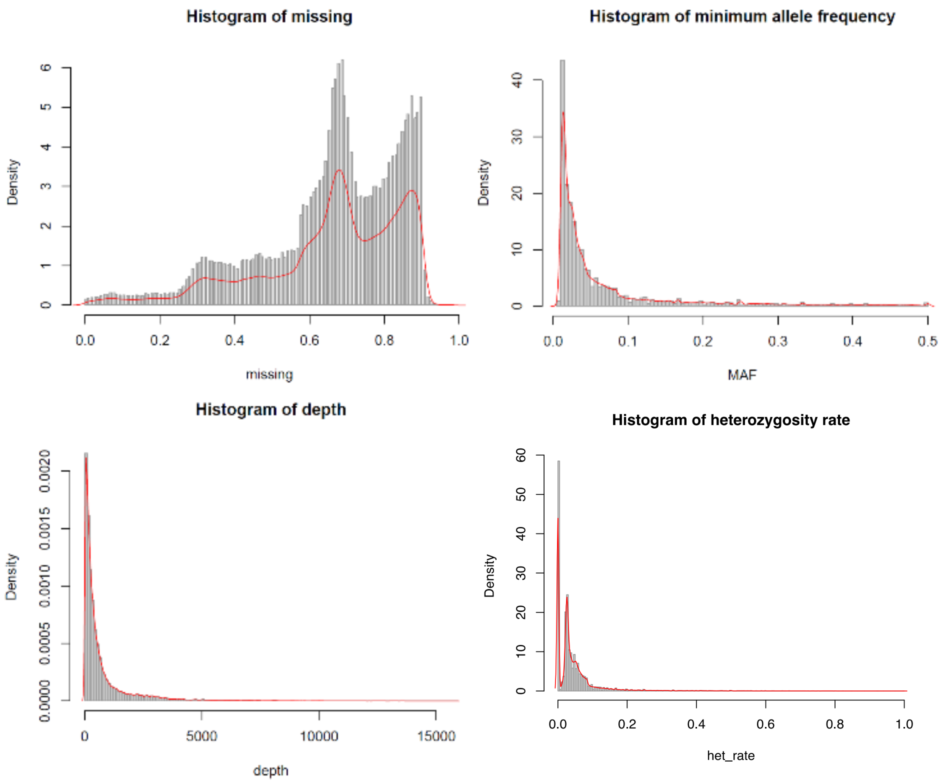
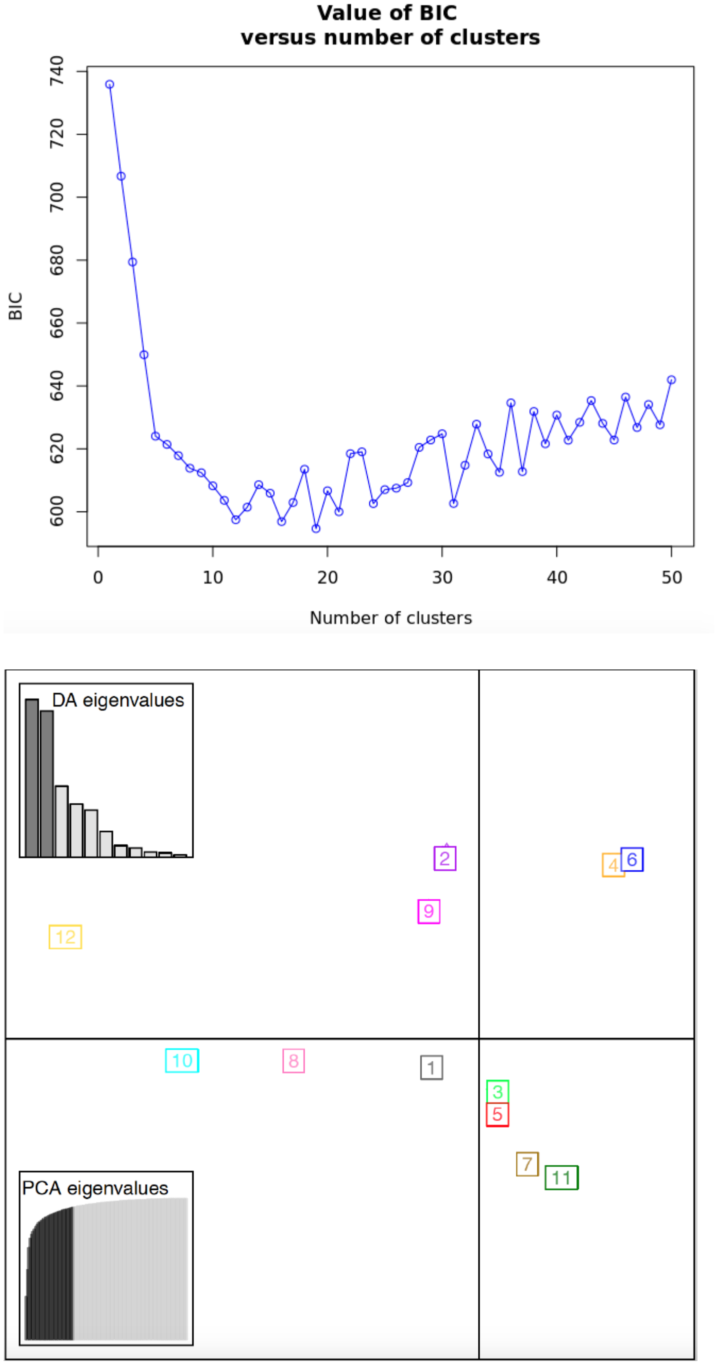


Supplementary Figure S1. Histograms of missing SNPs, minimum allele frequency, SNP mean depth, and heterozygosity rate. Results include 5,082 SNPs filtered from the total 521,732 SNPs by maximum missing rate, minor allele frequency, minimum read depth, maximum read depth, maximum heterozygosity rate, and linkage disequilibrium.



Supplementary Figure S2. Discriminant analysis of principle components (DAPC) on 5,082 filtered SNPs. Results of find.clusters analysis on SNP data identifying optimal number of groups (top). K=12 groups were determined to be optimal based on the lowest value of the Bayesian information criterion (BIC). Results of DAPC analysis on SNP data using the optimal groups identified by find.clusters (bottom).

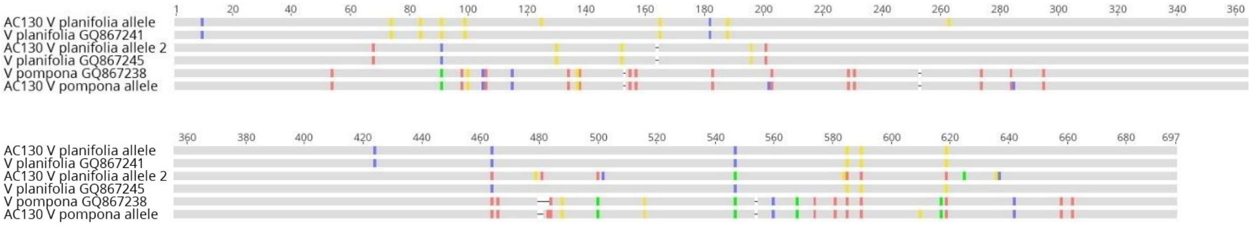


Figure S3. ITS sequence alignment for representative AC130, *V. planifolia*, and *V. po*mpona alleles. AC130 was confirmed as a hybrid by comparing cloned ITS sequences from this accession to published ITS sequences from NCBI. Colored bars represent SNP variants among sequences.

Supplementary Table S1. Missing rate (F_Miss), mean read depth (MEAN_DEPTH), heterozygosity rate (F_het), total read counts (Total_readcounts), number of mapped reads (Mapped_readcounts), and mapping rate (number of mapped reads divided by the total number of reads, F_mapped) for each accession in this study (INDV).

| INDV | F_MISS | MEAN_DEPTH | F_het | Total_readcounts | Mapped_readcounts | F_mapped |
|---|---|---|---|---|---|---|
| AC101 | 0.6678 | 7.6552 | 0.0444 | 1702711 | 1095698 | 0.6435 |
| AC102 | 0.8849 | 2.7756 | 0.0313 | 1273411 | 1193469 | 0.9372 |
| AC103 | 0.6363 | 6.4555 | 0.0631 | 1002741 | 935938 | 0.9334 |
| AC104 | 0.6541 | 6.8092 | 0.0584 | 1021392 | 962785 | 0.9426 |
| AC105 | 0.8320 | 2.5105 | 0.0655 | 859321 | 802578 | 0.9340 |
| AC106 | 0.4510 | 7.5754 | 0.0457 | 709439 | 651374 | 0.9182 |
| AC107 | 0.6262 | 5.7669 | 0.0600 | 826420 | 778007 | 0.9414 |
| AC108 | 0.3954 | 8.2830 | 0.0401 | 960858 | 905497 | 0.9424 |
| AC109 | 0.4917 | 11.7423 | 0.0498 | 1382589 | 1298892 | 0.9395 |
| AC110 | 0.6193 | 9.2317 | 0.0627 | 1509176 | 1406870 | 0.9322 |
| AC111 | 0.8885 | 3.1522 | 0.0274 | 1479631 | 1383117 | 0.9348 |
| AC112 | 0.9003 | 2.3357 | 0.0348 | 1018451 | 963000 | 0.9456 |
| AC113 | 0.4050 | 12.6263 | 0.0363 | 1283603 | 1207835 | 0.9410 |
| AC114 | 0.7100 | 7.9936 | 0.0331 | 1261750 | 1185601 | 0.9396 |
| AC115 | 0.8445 | 3.4330 | 0.0712 | 1208126 | 1132419 | 0.9373 |
| AC116 | 0.6857 | 7.2913 | 0.0404 | 1169986 | 1102663 | 0.9425 |
| AC117 | 0.3912 | 15.3937 | 0.0349 | 1689264 | 1405652 | 0.8321 |
| AC118 | 0.8675 | 2.8981 | 0.0631 | 1100658 | 1031003 | 0.9367 |
| AC119 | 0.8653 | 4.1325 | 0.0409 | 1563129 | 1397531 | 0.8941 |
| AC120 | 0.4318 | 10.1431 | 0.0322 | 1571829 | 1417990 | 0.9021 |
| AC121 | 0.8409 | 3.8244 | 0.0658 | 1351988 | 1272727 | 0.9414 |
| AC122 | 0.8478 | 3.1805 | 0.0699 | 1132766 | 1059960 | 0.9357 |
| AC123 | 0.8110 | 3.7772 | 0.0405 | 1415925 | 1333599 | 0.9419 |
| AC124 | 0.6679 | 9.1970 | 0.0433 | 1569450 | 1405471 | 0.8955 |
| AC125 | 0.8753 | 3.0327 | 0.0530 | 1261126 | 1190211 | 0.9438 |
| AC126 | 0.4015 | 13.4265 | 0.0346 | 1403526 | 1316542 | 0.9380 |
| AC127 | 0.8677 | 3.3031 | 0.0500 | 1217511 | 1146952 | 0.9420 |
| AC128 | 0.9019 | 2.7442 | 0.0370 | 1237361 | 1171302 | 0.9466 |
| AC129 | 0.6777 | 7.3809 | 0.0430 | 1207540 | 1137128 | 0.9417 |
| AC130 | 0.3325 | 11.6410 | 0.0543 | 1245253 | 1164765 | 0.9354 |
| AC131 | 0.8405 | 3.6244 | 0.0686 | 1217584 | 1145359 | 0.9407 |
| AC132 | 0.5497 | 8.5513 | 0.0788 | 1186054 | 1114081 | 0.9393 |
| AC133 | 0.4127 | 13.5738 | 0.0363 | 1161176 | 1023830 | 0.8817 |
| AC134 | 0.8498 | 3.3279 | 0.0673 | 1204291 | 1123762 | 0.9331 |
| AC135 | 0.6950 | 7.3267 | 0.0373 | 1127332 | 1059853 | 0.9401 |
| AC136 | 0.7049 | 6.9328 | 0.0368 | 979223 | 922408 | 0.9420 |
| AC137 | 0.6953 | 7.4591 | 0.0393 | 1228976 | 1159039 | 0.9431 |
| AC138 | 0.6999 | 6.9776 | 0.0409 | 1080744 | 1015826 | 0.9399 |
| AC139 | 0.8715 | 3.7851 | 0.0428 | 1313563 | 1238533 | 0.9429 |

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|---|---|---|---|---|---|---|
| AC140 | 0.8758 | 3.1817 | 0.0422 | 1124344 | 1044480 | 0.9290 |
| AC141 | 0.8942 | 3.0878 | 0.0322 | 1382801 | 1302187 | 0.9417 |
| AC142 | 0.6835 | 7.6019 | 0.0423 | 1282825 | 1208402 | 0.9420 |
| AC143 | 0.7847 | 5.9457 | 0.0332 | 1475289 | 1381289 | 0.9363 |
| AC144 | 0.8730 | 3.1817 | 0.0562 | 1272049 | 1197605 | 0.9415 |
| AC145 | 0.8707 | 2.7137 | 0.0517 | 928049 | 872551 | 0.9402 |
| AC146 | 0.8694 | 3.2929 | 0.0529 | 1183059 | 1113428 | 0.9411 |
| AC147 | 0.5870 | 7.9652 | 0.0557 | 1461253 | 1374415 | 0.9406 |
| AC148 | 0.9051 | 2.5050 | 0.0288 | 1012188 | 959139 | 0.9476 |
| AC149 | 0.8668 | 2.9622 | 0.0503 | 1020096 | 959147 | 0.9403 |
| AC150 | 0.8668 | 2.9072 | 0.0454 | 1011492 | 942778 | 0.9321 |
| AC151 | 0.4359 | 10.5502 | 0.0390 | 1198373 | 1115532 | 0.9309 |
| AC152 | 0.8726 | 3.0584 | 0.0459 | 998069 | 943661 | 0.9455 |
| AC153 | 0.6581 | 5.9399 | 0.0584 | 885450 | 832549 | 0.9403 |
| AC154 | 0.9080 | 1.5053 | 0.0358 | 798370 | 742886 | 0.9305 |
| AC155 | 0.7470 | 6.4023 | 0.0315 | 904735 | 848722 | 0.9381 |
| AC156 | 0.6659 | 5.5706 | 0.0557 | 873839 | 824535 | 0.9436 |
| AC157 | 0.5371 | 9.5282 | 0.0823 | 1400060 | 1315257 | 0.9394 |
| AC158 | 0.7039 | 5.9184 | 0.0454 | 983622 | 926992 | 0.9424 |
| AC159 | 0.6341 | 7.4923 | 0.0638 | 1197069 | 1125203 | 0.9400 |
| AC160 | 0.4378 | 9.3481 | 0.0397 | 1095125 | 1019003 | 0.9305 |
| AC161 | 0.9109 | 2.3586 | 0.0307 | 1021470 | 961955 | 0.9417 |
| AC162 | 0.8892 | 1.1285 | 0.0768 | 424993 | 384769 | 0.9054 |
| AC164 | 0.4527 | 9.7346 | 0.0362 | 1121629 | 1046816 | 0.9333 |
| AC165 | 0.7070 | 5.9426 | 0.0393 | 1158956 | 1096692 | 0.9463 |
| AC166 | 0.6364 | 7.8215 | 0.0573 | 1347035 | 1264177 | 0.9385 |
| AC167 | 0.6452 | 6.7758 | 0.0569 | 1393073 | 1310508 | 0.9407 |
| AC168 | 0.4220 | 9.2387 | 0.0352 | 1229386 | 1137917 | 0.9256 |
| AC169 | 0.6499 | 6.1902 | 0.0570 | 1225243 | 1140834 | 0.9311 |
| AC170 | 0.5271 | 7.5764 | 0.0502 | 1148501 | 1070933 | 0.9325 |
| AC171 | 0.4279 | 9.2183 | 0.0357 | 1232666 | 1138693 | 0.9238 |
| AC172 | 0.8688 | 2.9915 | 0.0640 | 1225529 | 1153053 | 0.9409 |
| AC173 | 0.4866 | 7.1756 | 0.0360 | 1016347 | 940776 | 0.9256 |
| AC174 | 0.4381 | 9.8647 | 0.0385 | 1109863 | 1023604 | 0.9223 |
| AC175 | 0.6778 | 4.0242 | 0.0612 | 854786 | 792439 | 0.9271 |
| AC176 | 0.4451 | 8.2828 | 0.0401 | 1019600 | 943506 | 0.9254 |
| AC177 | 0.7656 | 2.9367 | 0.0342 | 729856 | 680633 | 0.9326 |
| AC178 | 0.4946 | 5.4575 | 0.0381 | 791307 | 731328 | 0.9242 |
| AC179 | 0.7003 | 5.2425 | 0.0492 | 922327 | 860827 | 0.9333 |
| AC180 | 0.4464 | 8.2473 | 0.0401 | 926877 | 859723 | 0.9275 |
| AC181 | 0.4369 | 8.0271 | 0.0361 | 1016258 | 952139 | 0.9369 |
| AC182 | 0.8246 | 2.6473 | 0.0598 | 1037109 | 977925 | 0.9429 |
| AC183 | 0.6474 | 6.3294 | 0.0553 | 1100825 | 1033886 | 0.9392 |
| AC184 | 0.4183 | 10.1539 | 0.0365 | 1049946 | 977108 | 0.9306 |

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|---|---|---|---|---|---|---|
| AC185 | 0.5128 | 10.2530 | 0.0368 | 1106923 | 1035680 | 0.9356 |
| AC186 | 0.4203 | 9.4675 | 0.0405 | 1033508 | 962323 | 0.9311 |
| AC187 | 0.4499 | 7.9518 | 0.0378 | 1063769 | 997294 | 0.9375 |
| AC188 | 0.4310 | 9.0943 | 0.0354 | 1115975 | 1050555 | 0.9414 |
| AC189 | 0.5597 | 7.7200 | 0.0781 | 1692299 | 1098659 | 0.6492 |
| AC190 | 0.6361 | 7.6234 | 0.0574 | 1526647 | 1103977 | 0.7231 |
| AC191 | 0.9422 | 0.9872 | 0.0375 | 1670433 | 1117493 | 0.6690 |
| AC192 | 0.9413 | 0.9378 | 0.0390 | 1402635 | 1055131 | 0.7522 |
| AC193 | 0.8741 | 2.8065 | 0.0486 | 1395910 | 930068 | 0.6663 |
| AC194 | 0.5070 | 10.2593 | 0.0517 | 1357813 | 1011516 | 0.7450 |
| AC195 | 0.4201 | 9.9625 | 0.0343 | 1090002 | 1024664 | 0.9401 |
| AC196 | 0.4442 | 7.7727 | 0.0331 | 872417 | 820701 | 0.9407 |
| AC197 | 0.4425 | 7.4127 | 0.0342 | 908257 | 853074 | 0.9392 |
| AC198 | 0.4131 | 11.5246 | 0.0342 | 1040117 | 975499 | 0.9379 |
| AC199 | 0.4230 | 10.3785 | 0.0398 | 980781 | 915374 | 0.9333 |
| AC200 | 0.6621 | 4.8250 | 0.0643 | 721578 | 669181 | 0.9274 |
| AC201 | 0.4271 | 9.4882 | 0.0365 | 1034226 | 972673 | 0.9405 |
| AC202 | 0.4445 | 9.8416 | 0.0397 | 1142537 | 1059420 | 0.9273 |
| AC203 | 0.4526 | 9.5420 | 0.0383 | 1123601 | 1050136 | 0.9346 |
| AC204 | 0.7398 | 5.9326 | 0.0376 | 990312 | 923119 | 0.9321 |
| AC205 | 0.6922 | 7.3813 | 0.0389 | 891063 | 821829 | 0.9223 |
| AC206 | 0.6327 | 10.0804 | 0.0367 | 1141217 | 1060179 | 0.9290 |
| AC207 | 0.7138 | 6.9602 | 0.0426 | 1088146 | 1014708 | 0.9325 |
| AC208 | 0.7371 | 6.9657 | 0.0305 | 1090027 | 1026024 | 0.9413 |
| AC209 | 0.4213 | 10.7187 | 0.0364 | 1155495 | 1086302 | 0.9401 |
| AC210 | 0.7898 | 5.2000 | 0.0398 | 925209 | 862141 | 0.9318 |
| AC211 | 0.7069 | 8.3476 | 0.0299 | 1244635 | 1166519 | 0.9372 |
| AC212 | 0.7482 | 6.4364 | 0.0328 | 1005105 | 940494 | 0.9357 |
| AC213 | 0.7254 | 5.7215 | 0.0369 | 843790 | 793825 | 0.9408 |
| AC214 | 0.7199 | 6.5414 | 0.0507 | 1192704 | 1121148 | 0.9400 |
| AC215 | 0.7226 | 6.5732 | 0.0513 | 1275902 | 1202583 | 0.9425 |
| AC216 | 0.7122 | 7.5981 | 0.0502 | 1338870 | 1263259 | 0.9435 |
| AC217 | 0.7194 | 6.4827 | 0.0496 | 1171653 | 1107048 | 0.9449 |
| AC218 | 0.4312 | 10.6667 | 0.0346 | 1255344 | 1185221 | 0.9441 |
| AC219 | 0.4098 | 12.8305 | 0.0345 | 1080298 | 1018860 | 0.9431 |

Supplementary Table S2. Allele calls for each accession in this study for the 5,082 SNPs. Contig_position is the contig and base pair position of the SNP when mapping onto the VaplaK095A02V draft assembly. SNP values 0, 1, 2, or NA represent the number of reference alleles where 0 = homozygous alternate allele, 1 = heterozygous, 2 = homozygous reference allele, and NA = missing data.

Supplementary Table S3. Accession numbers, species assignment, gene target, and GenBank ID for single gene sequences from this study.

| Accession | Species | Gene Target | GenBank |
|---|---|---|---|
| AC101 | V. phaeantha | rbcL | MK201688 |
| AC104 | V. pompona | rbcL | MK201689 |
| AC106 | V. planifolia | rbcL | MK201690 |
| AC108 | V. planifolia and unknown | rbcL | MK201691 |
| AC109 | V. planifolia x V. phaeantha | rbcL | MK201692 |
| AC110 | V. pompona | rbcL | MK201693 |
| AC115 | V. dilloniana | rbcL | MK201694 |
| AC118 | V. imperialis | rbcL | MK201695 |
| AC119 | V. poitaei | rbcL | MK201696 |
| AC123 | V. appendiculata | rbcL | MK201697 |
| AC124 | V. phaeantha | rbcL | MK201698 |
| AC126 | V. planifolia | rbcL | MK201699 |
| AC127 | V. roscheri | rbcL | MK201700 |
| AC129 | V. phaeanthan and unknown | rbcL | MK201701 |
| AC130 | V. planifolia x V. pompona | rbcL | MK201702 |
| AC132 | V. pompona x V. phaeantha | rbcL | MK201703 |
| AC133 | V. planifolia | rbcL | MK201704 |
| AC134 | V. dilloniana | rbcL | MK201705 |
| AC139 | V. barbellata | rbcL | MK201706 |
| AC142 | V. pompona and V. odorata | rbcL | MK201707 |
| AC147 | V. phaeantha x V. pompona | rbcL | MK201708 |
| AC158 | V. pompona and V. odorata | rbcL | MK201709 |
| AC165 | V. pompona and V. odorata | rbcL | MK201710 |
| AC168 | V. planifolia | rbcL | MK201711 |
| AC170 | V. planifolia x V. phaeantha | rbcL | MK201712 |
| AC173 | V. planifolia | rbcL | MK201713 |
| AC174 | V. planifolia | rbcL | MK201714 |
| AC175 | V. pompona and V. odorata | rbcL | MK201715 |
| AC177 | V. odorata | rbcL | MK201716 |
| AC178 | V. planifolia | rbcL | MK201717 |
| AC181 | V. planifolia | rbcL | MK201718 |
| AC183 | V. pompona | rbcL | MK201719 |
| AC184 | V. planifolia | rbcL | MK201720 |
| AC185 | V. planifolia | rbcL | MK201721 |
| AC186 | V. planifolia | rbcL | MK201722 |
| AC191 | V. mexicana | rbcL | MK201723 |
| AC193 | V. barbellata | rbcL | MK201724 |
| AC194 | V. planifolia x V. phaeantha | rbcL | MK201725 |
| AC195 | V. planifolia | rbcL | MK201726 |
| AC196 | V. planifolia | rbcL | MK201727 |

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|---|---|---|---|
| AC197 | V. planifolia | rbcL | MK201728 |
| AC202 | V. planifolia | rbcL | MK201729 |
| AC203 | V. planifolia | rbcL | MK201730 |
| AC204 | V. hartii | rbcL | MK201731 |
| AC205 | V. x tahitensis | rbcL | MK201732 |
| AC206 | V. x tahitensis | rbcL | MK201733 |
| AC207 | V. odorata | rbcL | MK201734 |
| AC208 | V. ensifolia | rbcL | MK201735 |
| AC209 | V. planifolia | rbcL | MK201736 |
| AC210 | V. odorata | rbcL | MK201737 |
| AC211 | V. odorata and unknown | rbcL | MK201738 |
| AC212 | V. ensifolia | rbcL | MK201739 |
| AC213 | V. odorata | rbcL | MK201740 |
| AC214 | V. palmarum | rbcL | MK201741 |
| AC215 | V. palmarum | rbcL | MK201742 |
| AC216 | V. palmarum | rbcL | MK201743 |
| AC217 | V. palmarum | rbcL | MK201744 |
| AC130 | V. planifolia x V. pompona | ITS - planifolia allele 1 | MK190714 |
| AC130 | V. planifolia x V. pompona | ITS - planifolia allele 2 | MK190715 |
| AC130 | V. planifolia x V. pompona | ITS - pompona allele | MK190716 |

Supplementary Data S1. Species-specific SNPs screened from the total 521,732 SNPs identified in this study. Contig_position identifies the SNP called when mapping onto the VaplaK095A02V draft assembly, the alleles column is the reference and alternate allele, chrom is the contig number, pos is the bp location of the SNP in the contig. All accessions are labeled with their corresponding alleles by columns. Each tab in the database contains putative species-specific alleles for that species.