

New Phytologist Supporting Information

Article title: A multi-omics framework reveals strawberry flavor genes and their regulatory elements

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Table S1. A List of individuals used in eQTL study and their origins

| ID | Origin | Bioproject/SRA | GWAS panel ^a | ID | Origin | Bioproject/SRA | GWAS panel |
|-------------|--------|----------------|-------------------------|-------------------|--------------|----------------|------------|
| FL13_76_102 | UF | PRJNA787565 | Y | Florida127 | UF | PRJNA787565 | |
| FL13_76_12 | UF | PRJNA787565 | Y | FloridaBeauty | UF | PRJNA787565 | |
| FL13_76_19 | UF | PRJNA787565 | Y | FloridaBrilliance | UF | PRJNA787565 | |
| FL13_76_1 | UF | PRJNA787565 | Y | Northeaster | Cosmopolitan | PRJNA787565 | |
| FL13_76_24 | UF | PRJNA787565 | Y | 16C096P006 | UC | PRJNA787565 | |
| FL13_76_25 | UF | PRJNA787565 | Y | 17C138P062 | UC | PRJNA787565 | |
| FL13_76_26 | UF | PRJNA787565 | Y | 12C070P602 | UC | PRJNA787565 | |
| FL13_76_27 | UF | PRJNA787565 | Y | 17C618P658 | UC | PRJNA787565 | |
| FL13_76_30 | UF | PRJNA787565 | Y | 17C693P610 | UC | PRJNA787565 | |
| FL13_76_32 | UF | PRJNA787565 | Y | 18B026P031 | UC | PRJNA787565 | |
| FL13_76_37 | UF | PRJNA787565 | Y | UCD_Victor | UC | PRJNA787565 | |
| FL13_76_39 | UF | PRJNA787565 | Y | 18B196P007 | UC | PRJNA787565 | |
| FL13_76_4 | UF | PRJNA787565 | | 12C008P002 | UC | PRJNA787565 | |
| FL13_76_52 | UF | PRJNA787565 | Y | 18C430P006 | UC | PRJNA787565 | |
| FL13_76_53 | UF | PRJNA787565 | Y | 16C555P053 | UC | PRJNA787565 | |
| FL13_76_58 | UF | PRJNA787565 | Y | 16C095P159 | UC | PRJNA787565 | |
| FL13_76_59 | UF | PRJNA787565 | Y | San_Andreas | UC | PRJNA787565 | |
| FL13_76_61 | UF | PRJNA787565 | Y | 12C024P614 | UC | PRJNA787565 | |
| FL13_76_68 | UF | PRJNA787565 | | 18B019P024 | UC | PRJNA787565 | |
| FL13_76_72 | UF | PRJNA787565 | Y | 18C835P025 | UC | PRJNA787565 | |
| FL13_76_79 | UF | PRJNA787565 | Y | 17C138P021 | UC | PRJNA787565 | |
| FL13_76_85 | UF | PRJNA787565 | Y | 18B020P012 | UC | PRJNA787565 | |
| Festival | UF | PRJNA787565 | Y | 12C009P605 | UC | PRJNA787565 | |
| WinterDawn | UF | PRJNA787565 | Y | 17C721P606 | UC | PRJNA787565 | |
| FL18_50_110 | UF | PRJNA787565 | Y | 19C192P004 | UC | PRJNA787565 | |
| FL18_50_112 | UF | PRJNA787565 | Y | 19C202P004 | UC | PRJNA787565 | |
| FL18_50_120 | UF | PRJNA787565 | Y | 19C202P009 | UC | PRJNA787565 | |

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|--------------|---------|-------------|---|--------------|----|-------------|--|
| FL18 50 38 | UF | PRJNA787565 | Y | 19C125P016 | UC | PRJNA787565 | |
| FL18 50 40 | UF | PRJNA787565 | Y | 19C164P042 | UC | PRJNA787565 | |
| FL18 50 X | UF | PRJNA787565 | | 19C174P009 | UC | PRJNA787565 | |
| FL18 50 52 | UF | PRJNA787565 | Y | 19B014P005 | UC | PRJNA787565 | |
| FL18 50 90 | UF | PRJNA787565 | Y | 19B031P027 | UC | PRJNA787565 | |
| FL18 50 96 | UF | PRJNA787565 | Y | 19B033P006 | UC | PRJNA787565 | |
| FL18 51 16 | UF | PRJNA787565 | Y | 19B034P017 | UC | PRJNA787565 | |
| FL18 51 17 | UF | PRJNA787565 | Y | 19B042P078 | UC | PRJNA787565 | |
| FL18 51 38 | UF | PRJNA787565 | Y | 19B046P078 | UC | PRJNA787565 | |
| FL15 89 25 | UF | PRJNA787565 | Y | 19B053P014 | UC | PRJNA787565 | |
| FL10 133 103 | Mara BC | SRP039356 | | 19B058P005 | UC | SRP039356 | |
| FL10 133 152 | Mara BC | SRP039356 | | 19B061P027 | UC | SRP039356 | |
| FL10 133 203 | Mara BC | SRP039356 | | 19B065P017 | UC | SRP039356 | |
| FL10 133 204 | Mara BC | SRP039356 | | 19B071P055 | UC | SRP039356 | |
| FL10 133 24 | Mara BC | SRP039356 | | 19B079P003 | UC | SRP039356 | |
| FL10 133 37 | Mara BC | SRP039356 | | 19B081P058 | UC | SRP039356 | |
| FL10 133 42 | Mara BC | SRP039356 | | 19B085P064 | UC | SRP039356 | |
| FL10 133 51 | Mara BC | SRP039356 | | Chandler | UC | SRP039356 | |
| FL10 133 6 | Mara BC | SRP039356 | | 16C108P060 D | UC | SRP039356 | |
| FL10 133 89 | Mara BC | SRP039356 | | 17C138P024 | UC | SRP039356 | |
| FL10 133 91 | Mara BC | SRP039356 | | 17C139P045 | UC | SRP039356 | |
| FL10 133 93 | Mara BC | SRP039356 | | 16C111P065 | UC | SRP039356 | |
| FL10 133 98 | Mara BC | SRP039356 | | 18B126P101 D | UC | SRP039356 | |
| Elyana | Mara BC | SRP039356 | Y | 17C260P649 | UC | SRP039356 | |
| FL13 75 127 | Mara BC | PRJNA787565 | Y | 18C446P007 | UC | PRJNA787565 | |
| FL13 75 146 | Mara BC | PRJNA787565 | Y | 18B210P001 | UC | PRJNA787565 | |
| FL13 75 150 | Mara BC | PRJNA787565 | Y | 18B061P008 | UC | PRJNA787565 | |
| FL13 75 153 | Mara BC | PRJNA787565 | Y | 18C774P039 | UC | PRJNA787565 | |
| FL13 75 158 | Mara BC | PRJNA787565 | Y | 16C001P021 | UC | PRJNA787565 | |
| FL13 75 169 | Mara BC | PRJNA787565 | Y | 16C024P054 | UC | PRJNA787565 | |

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|--------------|---------|-------------|---|-----------------|----|-------------|--|
| FL13 75 170 | Mara BC | PRJNA787565 | Y | Albion | UC | PRJNA787565 | |
| FL13 75 171 | Mara BC | PRJNA787565 | | 17C286P666 | UC | PRJNA787565 | |
| FL13 75 176 | Mara BC | PRJNA787565 | Y | 17C242P023 | UC | PRJNA787565 | |
| FL13 75 183 | Mara BC | PRJNA787565 | Y | Cabrillo | UC | PRJNA787565 | |
| FL13 75 194 | Mara BC | PRJNA787565 | Y | 18C448P022 | UC | PRJNA787565 | |
| FL13 75 39 | Mara BC | PRJNA787565 | Y | Monterey | UC | PRJNA787565 | |
| FL13 75 51 | Mara BC | PRJNA787565 | Y | 17C140P012 | UC | PRJNA787565 | |
| FL13 75 55 | Mara BC | PRJNA787565 | Y | 17C235P020 | UC | PRJNA787565 | |
| FL13 75 59 | Mara BC | PRJNA787565 | Y | UCD Royal Royce | UC | PRJNA787565 | |
| FL13 75 66 | Mara BC | PRJNA787565 | Y | 16C112P056 | UC | PRJNA787565 | |
| FL13 75 67 | Mara BC | PRJNA787565 | Y | 18B204P013 | UC | PRJNA787565 | |
| FL13 75 72 | Mara BC | PRJNA787565 | Y | UCD Valiant | UC | PRJNA787565 | |
| FL13 75 79 | Mara BC | PRJNA787565 | Y | 18C822P022 | UC | PRJNA787565 | |
| FL13 75 86 | Mara BC | PRJNA787565 | Y | 18C753P001 | UC | PRJNA787565 | |
| FL13 75 87 | Mara BC | PRJNA787565 | Y | 19C155P001 | UC | PRJNA787565 | |
| FL13 75 90 | Mara BC | PRJNA787565 | Y | 19C182P005 | UC | PRJNA787565 | |
| Maradesbois | Mara BC | PRJNA787565 | Y | 19C207P020 | UC | PRJNA787565 | |
| Radiance | UF | PRJNA787565 | Y | 19B009P021 | UC | PRJNA787565 | |
| FL10 133 193 | Mara BC | PRJNA787565 | | 19B021P014 | UC | PRJNA787565 | |
| FL11 71 9 | UF | PRJNA787565 | | 19B024P002 | UC | PRJNA787565 | |
| FL11 98 41 | UF | PRJNA787565 | | 19B032P031 | UC | PRJNA787565 | |
| FL12 115 10 | UF | PRJNA787565 | Y | 19B044P009 | UC | PRJNA787565 | |
| FL12 26 49 | UF | PRJNA787565 | | 19B045P063 | UC | PRJNA787565 | |
| FL12 55 220 | UF | PRJNA787565 | | 19B050P068 | UC | PRJNA787565 | |
| FL12 70 55 | UF | PRJNA787565 | | 19B051P013 | UC | PRJNA787565 | |
| FL12 82 44 | UF | PRJNA787565 | | 19B051P016 | UC | PRJNA787565 | |
| FL12 90 53 | UF | PRJNA787565 | | 19B051P024 | UC | PRJNA787565 | |
| FL13 27 142 | UF | PRJNA787565 | | 19B052P033 | UC | PRJNA787565 | |
| FL13 51 134 | UF | PRJNA787565 | | 19B063P023 | UC | PRJNA787565 | |
| FL13 65 160 | UF | PRJNA787565 | | 19B063P026 | UC | PRJNA787565 | |

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|-------------|----|-------------|--|---------------|--------------|-------------|--|
| FL14 34 33 | UF | PRJNA787565 | | 19B075P038 | UC | PRJNA787565 | |
| FL14 55 203 | UF | PRJNA787565 | | 19B081P039 | UC | PRJNA787565 | |
| FL14 83 36 | UF | PRJNA787565 | | Sunnyberry | Cosmopolitan | SRR10076577 | |
| FL14 9 129 | UF | PRJNA787565 | | Kingsberry | Cosmopolitan | SRR10076582 | |
| FL15 21 98 | UF | PRJNA787565 | | Snowprincess | Cosmopolitan | SRR9618685 | |
| FL15 42 52 | UF | PRJNA787565 | | Xiaobai | Cosmopolitan | SRR9618669 | |
| FL16 30 128 | UF | PRJNA787565 | | Benihoppe | Cosmopolitan | SRR9618677 | |
| FL16 33 8 | UF | PRJNA787565 | | Seolhyang | Cosmopolitan | SRR6345712 | |
| FL16 49 90 | UF | PRJNA787565 | | TOYONOKA | Cosmopolitan | SRR5826137 | |
| FL16 69 142 | UF | PRJNA787565 | | 16C108P060 | Duplication | PRJNA787565 | |
| FL16 74 68 | UF | PRJNA787565 | | 18B126P101 | Duplication | PRJNA787565 | |
| Camarosa | UC | PRJNA787565 | | 17C138P062 D | Duplication | PRJNA787565 | |
| FL10 89 | UF | PRJNA787565 | | San Andreas D | Duplication | PRJNA787565 | |

^a Whether it is also included in the volatile-GWAS panel.

Table S2. List of commercially synthesized DNA and primers.

| Name | Description | Sequence |
|-----------|---------------------------------|--|
| FaASa1-OX | FaASa1 overexpression construct | <pre> ggggACAAGTTTGTACAAAAAAGCAGGCTTCATGCAAGGC CTCTGCTTGTCTTACCGCTTGGTTACCCCGGCCACTCACC GGTTGTGTCCTGTTCCGGTCATCGGCATTTC AACCCAGAAC CTCAAGCTCGACACTGTCATGTGTCCCAAACTGAACTAC GTCCCGAGTATCAGATGCTGCTCTCAGAAGAATCAGTCTT TAACA ACTGATGCAAAGAAGTTCGAAGAGGCATCAAAGC ATGGGAATCCTGTTCCCTCTTACCGGTGCCTCTTCTCTGAT CAACTCACGTCGGTTCTTGCATATCGGTGTTTGGTGAAGG AGGATGATCGAGAGGCCCAAGTTTTCTGTTTGAGTCAGT CGAACAGAGCACTCAGGGGAGGTACAGCATTGTTGGTGC TCAACCAGCAATGGAAATTGTTGCAAAGAAAATAAAGGT GACTGTTCTTGACCATGAAGCAGGCTGTTCTATTGAGCAG TTTGTGCGAGGATCCCATGGCGGTTCCGAAACGAATCTCCG ATAACTGGAGGCCTCAGCTCATCGATGAACTTCTTGACGC TTTTTGTGGTGGATGGGTTGGATTCTTCTCATACGACACA GTCCGGTACATGGAGAAGAAGAGACTGCCGTTCTCGAAG GCTCCGGAGGATGACAGGAATCTACCGGACATGCATTTA GGACTGTATGAAGATGTTATTGTCTTTGATCATGTAGAGA AGAAAATCTATGCTATTCATTGGGTGAGGTTAGACAGGT ACTCCTCGGTTGAGAAAGCGTATAAAGATGGAGCAAGAC GGTTGAAAATTTAGTGGCTCGAGTCCATGACATAGAGT CGCCAAAGATTTCTCCAGGTGCTTTCAGTCTGGAAACTCA GAAATTTGATCCAGCTCTGACTATCTCCAACATGACGGGC GAGGCATACAAGAACATTGTGAAGCAGGCAAAGAAGCA TATTCTGTCCGGGGATATATTCCAATTGTGCTGAGTCAG CGATTTCGAACGGCGTACATTTGCCCATCCGTTTGAAATCT ATAGATCCCTGAGGACAGTAAATCCTAGTCCCTATCTGAC TTACCTGCAGGCTAGAGGATGCATACTGGTAGCTTCCAGT CCAGAGATTTTAATGAGTGCCAAAAAGAAGAAGATTGTC AACCGGCCATTAGCCGGA ACTGCGAGACGAGGCAAGACA TTGGAAGAGGACCAGCAGTTGGAGGTTAAGCTTCTGCAG GACGAGAAGCAGTGCGCCGAACACATAATGCTGGTGGAC TTAGGACGCAACGATGTTGGGAAGGTCTCAAAGTCTGGC TCTGTTAAGGTGGACAGGTTAATGGACATAGAACGCTAC TCGCACGTCATGCATATCAGCTCTACGGTCACCGGAGAG CTTCGTGACGGTCTCACTTGCTGGGACGCGCTCCGAGCTG CACTGCCTGTAGGTA CTGTCAGTGGTGCTCCAAAGATGA AGGCCATAGAGCTTATAGATAAGTTGGAAGTGAACAGGC GCGGCCCGTACAGTGGCGGATTTGGAACAATTTCAATTCT TGGTGATATGGACATTGCACTAGCTCTGAGGACCATGGT AATCCCAACAGCGCCCCGGTTTGACACAATGTACTTCTAC AGCAATGGCAACACCCGCCGCGAGTGGGTTGCATATCTC CAAGCTGGTGCAGGAATAGTAGCGGACAGTGACCCAGAT GATGAGAATCTAGAGTGCCAAAACA AAGCTGCAGGTCTT GCTCGCGCTATTGACTTGGCCGAGGCTGCATTTCGTGGGTG TGGAACAGTGAAACCCAGCTTTCTTGTACAAAGTGGTcccc </pre> |

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|-----------------|--------------------------------|--|
| FaOMT-OX | FaOMT overexpression construct | ggggACAAGTTTGTACAAAAAAGCAGGCTTCATGGGTTCC ACCGGCGAGACTCAGATGACTCCGACCCATGTCTCCGAC GAGGAAGCCAACCTCTTCGCCATGCAACTCGCCAGCGCC TCCGTCCTCCCCATGGTCCTCAAAGCCGCCATCGAGCTCG ACCTCTTGGAGATCATGGCCAAGGCCGGACCCGGCTCTTT CCTCTCCCCTAGTGATCTAGCCTCTCAGCTTCCGACCAAG AACCCCGAAGCTCCGGTCATGCTCGACCGTATGCTTCGCC TTCTGGCCAGCTACTCCATTCTAACCTGCTCATTGCGTAC GCTTCCGGACGGCAAAGTTGAGAGGCTCTACTGTTTGGG ACCTGTGTGTAAGTTCTTGACCAAGAATGAAGATGGCGT CTCTATTGCTGCTCTCTGCCTCATGAACCAGGACAAGGTC CTCGTCGAGAGCTGGTATCATTGAAGGATGCAGTTCTTG ATGGTGGGATTCCATTAAACAAGGCCTATGGCATGACTGC ATTTGATTACCATGGAAGTACCCTAGATTCAACAAGGTC TTCAACAAGGGAATGGCTGACCACTCCACCATTACCATG AAGAAAATCCTTGAGACTTACAAAGGCTTCGAGGGCCTC AAATCCATCGTTGATGTCGGTGGCGGCACCGGAGCTGTG GTGAACATGATCGTTTCCAAGTACCCTTCGATCAAGGGCA TCAACTTCGACTTGCCTCATGTTATCGAAGATGCTCCTCA ATATCCTGGTGTTCAACACGTTGGAGGGGACATGTTTGTA AGTGTACCAAAGGGAAATGCAATTTTCATGAAGTGGATA TGTCACGACTGGAGTGACGAGCATTGCATAAAATTCTTG AAGAAGTCTACGCTGCGCTTCCAGACGATGGCAAAGTG ATTCTTGCTGAGTGCATTCTTCCTGTTGCACCAGACACTA GCCTTGCCACCAAGGGAGTTGTCCATATGGATGTGATCAT GTTGGCGCACAACCCTGGCGGCAAAGAGAGGACGGAGC AGGAATTTGAAGCCCTGGCTAAGGGTTCTGGATTCCAAG GCATTGCGGTCTGCTGTGATGCTTTCAACACCTATGTCAT TGAGTTTCTTAAGAAGATCTGAAACCCAGCTTTCTTGTAC AAAGTGGTcccc |
| FaASa1-RNAi | FaASa1 RNAi construct | GGGGACAAGTTTGTACAAAAAAGCAGGCTTCGACGAGAA GCAGTGCGCCGAACACATAATGCTGGTGGACTTAGGACG CAACGATGTTGGGAAGGTCTCAAAGTCTGGCTCTGTTAA GGTGGACAGGTTAATGGACATAGAACGCTACTCGCACGT CATGCATATCAGCTCTACGGTCAACCCAGCTTTCTTGTAC AAAGTGGTCCCC |
| pk7_2,071_R | pK7GWIWG2 primer set2 | CGTGTTTGCAGGTCAGCTTG |
| pk7_2,550_F | pK7GWIWG2 primer set2 | AACTCAGCACACCAGAGCAT |
| pk7seq1F1 | pK7GWIWG2 primer set1 | TGCAGGTCACTGGATTTTGGT |
| pk7seq1R1 | pK7GWIWG2 primer set1 | GACGTAAGGGATGACGCACA |
| pMDC32_F | pMDC32 primer | GGATCCCCGGGTACCGGGCC |
| pMDC32_R | pMDC32 primer | TGTTTGAACGATCGGGGAAATTCGAGCTCC |
| FaOMT FWD Set 2 | FaOMT qPCR primer | GGCCAGCTACTCCATTCTAAC |
| FaOMT REV Set 2 | FaOMT qPCR primer | CTTACACACAGGTCCCAAACA |

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|---------------|---------------------------|-------------------------------|
| FaASa1-F-Set1 | FaASa1 qPCR primer | CCT CGG TTG AGA AAG CGT ATA A |
| FaASa1-R-Set1 | FaASa1 qPCR primer | GAC TGA AAG CAC CTG GAG AAA |
| FaOMT01_F | HRM marker for mesifurane | CTCGACCTCTTGGAGATCAT |
| FaOMT01_R | HRM marker for mesifurane | GAAGCTGAGAGGCTAGATCA |

Table S3. Counts of different types of structural variations (SVs) relative to the PHASE1 haplotype of FaRR1.

| Haplotype | Translocation | Deletion | Interspersed duplication | Tandem duplication | Insertion | Inversion |
|-----------|---------------|----------|--------------------------|--------------------|-----------|-----------|
| PHASE2 | 1728 | 15136 | 29 | 81 | 14570 | 30 |
| BEA | 6042 | 23093 | 55 | 86 | 24015 | 60 |
| F12 | 4482 | 27737 | 68 | 89 | 27717 | 51 |
| WONG | 4082 | 28042 | 81 | 77 | 28118 | 53 |

Table S4. Narrow-sense heritability estimates and SNP-based heritability estimates. h2g is the SNP-based estimate.

| Volatile name | V(SNP) | V(G2) | V(e) | Vp | h2g | V(G2)/Vp | SE_V(SNP) | SE_V(G2) | SE_V(e) | SE_Vp | h2 | ratio(h2g/h2) |
|--|--------|-------|------|-------|------|----------|-----------|----------|---------|-------|------|---------------|
| Pentanal | 0.27 | 0.31 | 0.13 | 0.72 | 0.38 | 0.44 | 0.11 | 0.09 | 0.03 | 0.08 | 0.81 | 0.46 |
| Butanoic acid, 1-methylhexyl ester | 3.08 | 1.09 | 1.98 | 6.15 | 0.50 | 0.18 | 0.78 | 0.62 | 0.25 | 0.59 | 0.68 | 0.74 |
| Methyl thiolacetate | 2.28 | 5.63 | 7.32 | 15.23 | 0.15 | 0.37 | 2.95 | 3.19 | 1.04 | 1.67 | 0.52 | 0.29 |
| Propanoic acid, ethyl ester | 1.59 | 3.87 | 1.85 | 7.31 | 0.22 | 0.53 | 1.05 | 1.06 | 0.28 | 0.74 | 0.75 | 0.29 |
| Butanoic acid, methyl ester | 0.49 | 0.49 | 0.34 | 1.33 | 0.37 | 0.37 | 0.22 | 0.19 | 0.06 | 0.15 | 0.74 | 0.50 |
| 2-Hexanone | 1.31 | 1.57 | 0.98 | 3.86 | 0.34 | 0.41 | 0.74 | 0.71 | 0.22 | 0.48 | 0.75 | 0.45 |
| Methyl Isobutyl Ketone | 0.74 | 1.50 | 0.70 | 2.94 | 0.25 | 0.51 | 0.54 | 0.53 | 0.15 | 0.35 | 0.76 | 0.33 |
| Propanoic acid, 2-methyl- | 4.13 | 1.63 | 1.25 | 7.01 | 0.59 | 0.23 | 1.11 | 0.74 | 0.24 | 0.75 | 0.82 | 0.72 |
| 2-Pentenal, (E)- | 0.97 | 0.41 | 2.01 | 3.39 | 0.29 | 0.12 | 0.63 | 0.60 | 0.27 | 0.36 | 0.41 | 0.70 |
| 2-Butenoic acid, methyl ester, (E)- | 0.52 | 0.61 | 0.65 | 1.77 | 0.29 | 0.34 | 0.33 | 0.32 | 0.11 | 0.20 | 0.64 | 0.46 |
| Hexane, 2,3-dimethyl- | 5.53 | 1.23 | 2.33 | 9.09 | 0.61 | 0.14 | 1.24 | 0.81 | 0.33 | 0.91 | 0.74 | 0.82 |
| Butanoic acid, 2-methyl-, methyl ester | 0.44 | 0.32 | 0.97 | 1.73 | 0.26 | 0.18 | 0.35 | 0.33 | 0.14 | 0.19 | 0.44 | 0.58 |
| Methyl isovalerate | 0.62 | 0.30 | 0.39 | 1.31 | 0.47 | 0.23 | 0.25 | 0.22 | 0.07 | 0.15 | 0.70 | 0.67 |
| Butanoic acid, ethyl ester | 0.00 | 1.40 | 1.12 | 2.52 | 0.00 | 0.56 | 0.48 | 0.55 | 0.18 | 0.30 | 0.56 | 0.00 |
| Hexanal | 0.29 | 0.15 | 0.06 | 0.50 | 0.57 | 0.31 | 0.08 | 0.06 | 0.02 | 0.06 | 0.88 | 0.65 |

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|-----------------------------------|------|------|------|-----------|----------|------|------|------|------|------|----------|------|
| Acetic acid, butyl ester | 0.90 | 0.42 | 0.71 | 2.03 | 0.4 4 | 0.21 | 0.40 | 0.38 | 0.12 | 0.23 | 0.6 5 | 0.68 |
| Methyl valerate | 3.98 | 7.04 | 3.68 | 14.6 9 | 0.2 7 | 0.48 | 2.42 | 2.00 | 0.63 | 1.57 | 0.7 5 | 0.36 |
| Butanoic acid, 3-methyl- | 0.37 | 1.80 | 2.82 | 4.99 | 0.0 7 | 0.36 | 0.83 | 0.91 | 0.35 | 0.51 | 0.4 3 | 0.17 |
| Butanoic acid, 2-methyl- | 0.36 | 0.63 | 0.19 | 1.18 | 0.3 0 | 0.54 | 0.19 | 0.17 | 0.04 | 0.13 | 0.8 4 | 0.36 |
| 3-Hexenal | 7.01 | 5.97 | 4.32 | 17.3 0 | 0.4 1 | 0.35 | 2.26 | 1.65 | 0.64 | 1.73 | 0.7 5 | 0.54 |
| 2-Hexenal, (E)- | 0.24 | 0.21 | 0.08 | 0.53 | 0.4 5 | 0.39 | 0.09 | 0.07 | 0.02 | 0.06 | 0.8 4 | 0.54 |
| 2-Propanol, 2-methyl- | 0.80 | 1.89 | 1.50 | 4.20 | 0.1 9 | 0.45 | 0.77 | 0.85 | 0.28 | 0.52 | 0.6 4 | 0.30 |
| 2-Hexen-1-ol, (E)- | 1.27 | 1.95 | 1.03 | 4.26 | 0.3 0 | 0.46 | 0.83 | 0.76 | 0.18 | 0.46 | 0.7 6 | 0.40 |
| 1-Hexanol | 0.00 | 4.18 | 1.16 | 5.34 | 0.0 0 | 0.78 | 0.82 | 0.94 | 0.23 | 0.63 | 0.7 8 | 0.00 |
| 1-Butanol, 3-methyl-, acetate | 0.71 | 0.36 | 0.36 | 1.43 | 0.4 9 | 0.25 | 0.27 | 0.23 | 0.07 | 0.17 | 0.7 5 | 0.66 |
| 1-Butanol, 2-methyl-, acetate | 3.05 | 3.76 | 1.47 | 8.28 | 0.3 7 | 0.45 | 1.32 | 1.02 | 0.27 | 0.85 | 0.8 2 | 0.45 |
| 2-Heptanone | 0.46 | 0.89 | 0.39 | 1.73 | 0.2 6 | 0.51 | 0.30 | 0.26 | 0.08 | 0.20 | 0.7 7 | 0.34 |
| Butanethioic acid, S-methyl ester | 2.94 | 7.74 | 7.38 | 18.0 6 | 0.1 6 | 0.43 | 2.96 | 2.99 | 0.98 | 1.85 | 0.5 9 | 0.28 |
| Butanoic acid, propyl ester | 2.80 | 5.31 | 3.20 | 11.3 1 | 0.2 5 | 0.47 | 1.77 | 1.71 | 0.46 | 1.14 | 0.7 2 | 0.35 |
| 2-Heptanol | 0.26 | 0.50 | 0.38 | 1.13 | 0.2 3 | 0.44 | 0.19 | 0.19 | 0.06 | 0.12 | 0.6 7 | 0.34 |
| Pentanoic acid, ethyl ester | 2.21 | 1.11 | 1.28 | 4.61 | 0.4 8 | 0.24 | 0.62 | 0.48 | 0.17 | 0.45 | 0.7 2 | 0.67 |
| Heptanal | 0.12 | 0.13 | 0.06 | 0.31 | 0.3 8 | 0.42 | 0.06 | 0.05 | 0.01 | 0.04 | 0.8 1 | 0.47 |
| Methyl propionate | 1.23 | 3.22 | 2.20 | 6.64 | 0.1 8 | 0.48 | 1.14 | 1.13 | 0.34 | 0.71 | 0.6 7 | 0.28 |

| | | | | | | | | | | | | |
|---|------|------|------|-----------|----------|------|------|------|------|------|----------|------|
| Acetic acid, pentyl ester | 5.31 | 1.83 | 2.24 | 9.39 | 0.5 7 | 0.20 | 1.47 | 1.01 | 0.36 | 0.98 | 0.7 6 | 0.74 |
| Hexanoic acid, methyl ester | 0.36 | 0.41 | 0.23 | 1.00 | 0.3 6 | 0.41 | 0.18 | 0.15 | 0.05 | 0.12 | 0.7 7 | 0.47 |
| S-Methyl 3-methylbutanethioate | 3.42 | 1.21 | 2.57 | 7.20 | 0.4 7 | 0.17 | 1.56 | 1.27 | 0.37 | 0.77 | 0.6 4 | 0.74 |
| 2,3-Butanediol, 2,3-dimethyl- | 1.98 | 2.61 | 0.49 | 5.09 | 0.3 9 | 0.51 | 0.76 | 0.54 | 0.14 | 0.53 | 0.9 0 | 0.43 |
| Propanoic acid, 2-methyl-, 2-methylpropyl ester | 0.58 | 0.15 | 1.86 | 2.59 | 0.2 2 | 0.06 | 0.43 | 0.46 | 0.21 | 0.25 | 0.2 8 | 0.79 |
| 2-Heptenal, (Z)- | 0.22 | 0.17 | 0.10 | 0.49 | 0.4 6 | 0.35 | 0.08 | 0.07 | 0.02 | 0.05 | 0.8 0 | 0.57 |
| Hexanoic acid | 0.55 | 0.63 | 1.02 | 2.19 | 0.2 5 | 0.29 | 0.42 | 0.44 | 0.16 | 0.26 | 0.5 4 | 0.47 |
| 2-Hexenoic acid, methyl ester | 1.90 | 0.60 | 0.32 | 2.82 | 0.6 7 | 0.21 | 0.49 | 0.31 | 0.09 | 0.32 | 0.8 9 | 0.76 |
| Benzaldehyde | 0.27 | 0.40 | 0.55 | 1.22 | 0.2 2 | 0.33 | 0.22 | 0.23 | 0.08 | 0.13 | 0.5 5 | 0.40 |
| Acetic acid, methyl ester | 1.28 | 0.74 | 0.60 | 2.62 | 0.4 9 | 0.28 | 0.44 | 0.36 | 0.11 | 0.29 | 0.7 7 | 0.63 |
| 2,3-Octanedione | 7.03 | 2.18 | 3.36 | 12.5 6 | 0.5 6 | 0.17 | 2.15 | 1.57 | 0.56 | 1.38 | 0.7 3 | 0.76 |
| .beta.-Myrcene | 0.25 | 0.28 | 0.28 | 0.82 | 0.3 1 | 0.34 | 0.16 | 0.15 | 0.05 | 0.09 | 0.6 5 | 0.47 |
| Butanoic acid, butyl ester | 0.86 | 1.08 | 1.43 | 3.37 | 0.2 6 | 0.32 | 0.66 | 0.70 | 0.23 | 0.39 | 0.5 7 | 0.44 |
| Hexanoic acid, ethyl ester | 0.55 | 2.39 | 2.94 | 5.88 | 0.0 9 | 0.41 | 1.17 | 1.32 | 0.43 | 0.66 | 0.5 0 | 0.19 |
| Octanal | 0.13 | 0.07 | 0.13 | 0.33 | 0.3 9 | 0.22 | 0.07 | 0.07 | 0.02 | 0.04 | 0.6 2 | 0.64 |
| Acetic acid, hexyl ester | 0.36 | 0.24 | 0.54 | 1.14 | 0.3 2 | 0.21 | 0.23 | 0.21 | 0.08 | 0.13 | 0.5 2 | 0.61 |
| 2-Hexen-1-ol, acetate, (Z)- | 0.16 | 0.42 | 0.38 | 0.96 | 0.1 7 | 0.44 | 0.21 | 0.20 | 0.07 | 0.11 | 0.6 0 | 0.28 |
| Hexanoic acid, 1-methylethyl ester | 1.37 | 0.88 | 1.09 | 3.34 | 0.4 1 | 0.26 | 0.63 | 0.54 | 0.21 | 0.41 | 0.6 7 | 0.61 |

| | | | | | | | | | | | | |
|--|------|------|------|-----------|----------|------|------|------|------|------|----------|------|
| 2,3-Butanedione | 1.10 | 1.20 | 0.38 | 2.68 | 0.4 1 | 0.45 | 0.43 | 0.32 | 0.09 | 0.29 | 0.8 6 | 0.48 |
| Butanoic acid, 3-methylbutyl ester | 6.31 | 0.74 | 2.41 | 9.46 | 0.6 7 | 0.08 | 1.29 | 0.81 | 0.35 | 0.95 | 0.7 5 | 0.90 |
| Mesifurane | 4.29 | 0.86 | 0.47 | 5.63 | 0.7 6 | 0.15 | 0.98 | 0.70 | 0.18 | 0.66 | 0.9 2 | 0.83 |
| 1-Octanol | 4.36 | 1.77 | 1.23 | 7.35 | 0.5 9 | 0.24 | 1.09 | 0.67 | 0.23 | 0.76 | 0.8 3 | 0.71 |
| cis-Linaloloxide | 0.13 | 0.85 | 0.86 | 1.84 | 0.0 7 | 0.46 | 0.37 | 0.42 | 0.14 | 0.22 | 0.5 3 | 0.13 |
| Linalool | 0.13 | 0.35 | 0.51 | 0.98 | 0.1 3 | 0.35 | 0.19 | 0.20 | 0.07 | 0.11 | 0.4 8 | 0.27 |
| Nonanal | 0.18 | 0.19 | 0.12 | 0.49 | 0.3 7 | 0.39 | 0.08 | 0.07 | 0.02 | 0.06 | 0.7 6 | 0.49 |
| Octanoic acid, methyl ester | 0.55 | 0.10 | 0.79 | 1.45 | 0.3 8 | 0.07 | 0.29 | 0.28 | 0.12 | 0.17 | 0.4 5 | 0.84 |
| Octanoic acid | 2.79 | 2.79 | 3.94 | 9.52 | 0.2 9 | 0.29 | 1.75 | 1.61 | 0.53 | 0.99 | 0.5 9 | 0.50 |
| Acetic acid, phenylmethyl ester | 0.65 | 0.07 | 0.56 | 1.28 | 0.5 1 | 0.06 | 0.28 | 0.23 | 0.10 | 0.16 | 0.5 7 | 0.90 |
| 2-Octenoic acid, methyl ester, (E)- | 1.96 | 6.16 | 4.03 | 12.1 6 | 0.1 6 | 0.51 | 2.09 | 1.87 | 0.64 | 1.33 | 0.6 7 | 0.24 |
| Ethyl Acetate | 4.84 | 3.87 | 8.72 | 17.4 3 | 0.2 8 | 0.22 | 3.38 | 3.24 | 1.23 | 1.92 | 0.5 0 | 0.56 |
| Benzoic acid, ethyl ester | 1.62 | 4.55 | 3.03 | 9.20 | 0.1 8 | 0.49 | 1.37 | 1.44 | 0.45 | 0.97 | 0.6 7 | 0.26 |
| Hexanoic acid, butyl ester | 0.49 | 0.80 | 1.38 | 2.67 | 0.1 8 | 0.30 | 0.54 | 0.58 | 0.20 | 0.30 | 0.4 8 | 0.38 |
| Butanoic acid, hexyl ester | 0.33 | 0.96 | 1.33 | 2.61 | 0.1 3 | 0.37 | 0.50 | 0.55 | 0.19 | 0.29 | 0.4 9 | 0.25 |
| Propanoic acid, 2-methyl-, hexyl ester | 0.24 | 7.16 | 4.80 | 12.2 0 | 0.0 2 | 0.59 | 1.97 | 2.39 | 0.70 | 1.32 | 0.6 1 | 0.03 |
| Butanoic acid, 3-hexenyl ester, (E)- | 0.00 | 0.37 | 0.78 | 1.14 | 0.0 0 | 0.32 | 0.18 | 0.22 | 0.09 | 0.12 | 0.3 2 | 0.00 |
| Butanoic acid, 2-hexenyl ester, (E)- | 0.61 | 6.06 | 3.50 | 10.1 7 | 0.0 6 | 0.60 | 1.66 | 1.61 | 0.49 | 1.04 | 0.6 6 | 0.09 |

| | | | | | | | | | | | | |
|--|-------|------|-----------|-----------|----------|------|------|------|------|------|----------|------|
| Octanoic acid, ethyl ester | 3.10 | 0.36 | 12.8 8 | 16.3 4 | 0.1 9 | 0.02 | 2.46 | 2.67 | 1.36 | 1.50 | 0.2 1 | 0.90 |
| Acetic acid, octyl ester | 0.90 | 0.48 | 0.67 | 2.05 | 0.4 4 | 0.23 | 0.45 | 0.44 | 0.13 | 0.25 | 0.6 7 | 0.65 |
| Butanoic acid, 1-methylpropyl ester | 0.81 | 1.37 | 1.54 | 3.72 | 0.2 2 | 0.37 | 0.72 | 0.68 | 0.24 | 0.42 | 0.5 9 | 0.37 |
| .alpha.-Terpineol | 0.07 | 0.65 | 0.93 | 1.65 | 0.0 4 | 0.40 | 0.33 | 0.34 | 0.12 | 0.17 | 0.4 4 | 0.09 |
| Isopropyl acetate | 0.81 | 1.12 | 1.73 | 3.66 | 0.2 2 | 0.30 | 0.69 | 0.72 | 0.24 | 0.39 | 0.5 3 | 0.42 |
| 2-Decenal, (E)- | 0.03 | 1.25 | 0.80 | 2.08 | 0.0 2 | 0.60 | 0.38 | 0.42 | 0.13 | 0.24 | 0.6 2 | 0.03 |
| Methyl anthranilate | 13.06 | 0.25 | 3.53 | 16.8 5 | 0.7 8 | 0.01 | 3.22 | 2.31 | 0.77 | 2.01 | 0.7 9 | 0.98 |
| Hexanoic acid, hexyl ester | 2.19 | 1.11 | 1.86 | 5.15 | 0.4 2 | 0.22 | 1.09 | 0.96 | 0.31 | 0.60 | 0.6 4 | 0.66 |
| Butanoic acid, phenylmethyl ester | 3.08 | 0.24 | 2.40 | 5.72 | 0.5 4 | 0.04 | 1.24 | 1.05 | 0.41 | 0.70 | 0.5 8 | 0.93 |
| Butanoic acid, octyl ester | 1.53 | 0.48 | 1.79 | 3.80 | 0.4 0 | 0.13 | 0.84 | 0.81 | 0.30 | 0.46 | 0.5 3 | 0.76 |
| Decanoic acid, ethyl ester | 4.68 | 4.14 | 6.96 | 15.7 8 | 0.3 0 | 0.26 | 2.60 | 2.33 | 0.86 | 1.58 | 0.5 6 | 0.53 |
| Butanoic acid, 1-methyloctyl ester | 6.25 | 2.00 | 2.17 | 10.4 1 | 0.6 0 | 0.19 | 1.48 | 0.94 | 0.34 | 1.05 | 0.7 9 | 0.76 |
| Butanoic acid, 2-methyl-, octyl ester | 6.41 | 0.00 | 5.78 | 12.1 9 | 0.5 3 | 0.00 | 2.06 | 1.59 | 0.71 | 1.26 | 0.5 3 | 1.00 |
| Butanoic acid, 3-methyl-, octyl ester | 8.93 | 0.00 | 3.54 | 12.4 7 | 0.7 2 | 0.00 | 2.61 | 2.02 | 0.65 | 1.55 | 0.7 2 | 1.00 |
| (E)-.beta.-Famesene | 1.50 | 0.00 | 1.16 | 2.66 | 0.5 6 | 0.00 | 0.58 | 0.49 | 0.17 | 0.31 | 0.5 6 | 1.00 |
| 2-Pentanone | 0.33 | 0.55 | 0.22 | 1.10 | 0.3 0 | 0.50 | 0.16 | 0.14 | 0.04 | 0.12 | 0.8 0 | 0.37 |
| 2(3H)-Furanone, 5-hexyldihydro- | 0.51 | 1.91 | 1.03 | 3.46 | 0.1 5 | 0.55 | 0.61 | 0.65 | 0.18 | 0.39 | 0.7 0 | 0.21 |
| Propanoic acid, 2-methyl-, nonyl ester | 1.02 | 0.00 | 1.78 | 2.80 | 0.3 6 | 0.00 | 0.66 | 0.63 | 0.24 | 0.31 | 0.3 6 | 1.00 |

| | | | | | | | | | | | | |
|----------------------------|------|------|------|-----------|----------|------|------|------|------|------|----------|------|
| .alpha.-Farnesene | 1.60 | 0.00 | 0.92 | 2.52 | 0.6 3 | 0.00 | 0.52 | 0.44 | 0.15 | 0.31 | 0.6 3 | 1.00 |
| Nerolidol | 3.22 | 0.15 | 1.81 | 5.18 | 0.6 2 | 0.03 | 0.93 | 0.66 | 0.26 | 0.56 | 0.6 5 | 0.96 |
| Hexanoic acid, octyl ester | 2.76 | 0.00 | 3.96 | 6.72 | 0.4 1 | 0.00 | 1.57 | 1.52 | 0.59 | 0.79 | 0.4 1 | 1.00 |
| Butanoic acid, decyl ester | 4.87 | 6.12 | 5.32 | 16.3 1 | 0.3 0 | 0.38 | 3.15 | 2.85 | 0.82 | 1.76 | 0.6 7 | 0.44 |
| .gamma.-Dodecalactone | 2.80 | 0.15 | 1.80 | 4.75 | 0.5 9 | 0.03 | 0.98 | 0.79 | 0.27 | 0.53 | 0.6 2 | 0.95 |
| Hexanoic acid, decyl ester | 1.08 | 2.95 | 6.64 | 10.6 7 | 0.1 0 | 0.28 | 2.05 | 2.30 | 0.85 | 1.12 | 0.3 8 | 0.27 |

Table S5. Significant GWAS signals for 36 volatiles. Lead snp name, position, allele frequency, effect and p-value were provided. p-values were generated from fastGWA.

| Volatile name | CHR | Lead SNP | POS | A1 | A2 | N | AF1 | SNP effect | SE | P value | logP |
|--|-----|--------------|----------|----|----|-----|------|------------|------|----------|------|
| Pentanal | 2A | AX-184916449 | 4676907 | 1 | 2 | 305 | 0.31 | -0.30 | 0.07 | 1.53E-05 | 4.82 |
| Pentanal | 2D | AX-184236819 | 10221718 | 1 | 2 | 305 | 0.57 | 0.32 | 0.07 | 1.14E-05 | 4.94 |
| Pentanal | 7A | AX-184422639 | 22238419 | 1 | 2 | 305 | 0.19 | 0.36 | 0.08 | 1.44E-05 | 4.84 |
| Methyl thiolacetate | 5D | AX-184745816 | 6575906 | 2 | 1 | 305 | 0.15 | -1.97 | 0.36 | 3.57E-08 | 7.45 |
| Butanoic acid, methyl ester | 7A | AX-184130769 | 1632082 | 1 | 2 | 305 | 0.62 | -0.35 | 0.08 | 5.01E-06 | 5.30 |
| Methyl Isobutyl Ketone | 6D | AX-184609583 | 11381341 | 2 | 1 | 305 | 0.26 | -0.53 | 0.12 | 1.84E-05 | 4.74 |
| 2-Butenoic acid, methyl ester, (E)- | 6C | AX-184264907 | 30894962 | 2 | 1 | 305 | 0.47 | 0.54 | 0.08 | 1.30E-10 | 9.89 |
| Butanoic acid, 2-methyl-, methyl ester | 2A | AX-184097686 | 228453 | 2 | 1 | 305 | 0.25 | 0.67 | 0.12 | 1.35E-08 | 7.87 |
| Methyl isovalerate | 3B | AX-166512380 | 23691025 | 1 | 2 | 305 | 0.26 | 0.46 | 0.09 | 1.23E-07 | 6.91 |
| Acetic acid, butyl ester | 6A | AX-184534745 | 16383672 | 1 | 2 | 305 | 0.33 | 0.44 | 0.09 | 5.79E-07 | 6.24 |
| Butanoic acid, 2-methyl- | 1A | AX-166510620 | 11148339 | 1 | 2 | 305 | 0.12 | 0.60 | 0.13 | 3.01E-06 | 5.52 |
| Butanoic acid, 2-methyl- | 4C | AX-184067957 | 22121742 | 2 | 1 | 305 | 0.24 | 0.49 | 0.11 | 6.76E-06 | 5.17 |
| Butanoic acid, 2-methyl- | 4A | AX-184726549 | 19529346 | 2 | 1 | 305 | 0.49 | 0.37 | 0.08 | 2.97E-06 | 5.53 |
| 2-Hexenal, (E)- | 3D | AX-184092518 | 16931748 | 2 | 1 | 305 | 0.17 | -0.33 | 0.07 | 3.71E-06 | 5.43 |
| 2-Hexenal, (E)- | 4A | AX-166513835 | 12791803 | 1 | 2 | 305 | 0.08 | -0.40 | 0.08 | 4.73E-07 | 6.33 |

| | | | | | | | | | | | |
|------------------------------------|----|--------------|----------|---|---|-----|------|-------|------|----------|-------|
| 2-Hexenal, (E)- | 6D | AX-184879320 | 7673491 | 2 | 1 | 305 | 0.05 | -0.51 | 0.12 | 1.25E-05 | 4.90 |
| 2-Hexenal, (E)- | 7B | AX-184972204 | 16854781 | 2 | 1 | 305 | 0.22 | 0.27 | 0.06 | 1.04E-05 | 4.98 |
| 1-Butanol, 2-methyl-, acetate | 3D | AX-184426501 | 11425915 | 2 | 1 | 305 | 0.05 | 1.67 | 0.33 | 3.40E-07 | 6.47 |
| Propanoic acid, butyl ester | 6B | AX-184265153 | 10678869 | 2 | 1 | 305 | 0.45 | -0.71 | 0.16 | 6.27E-06 | 5.20 |
| Propanoic acid, butyl ester | 6D | AX-184751966 | 5088264 | 1 | 2 | 305 | 0.31 | 0.85 | 0.17 | 4.46E-07 | 6.35 |
| 2,3-Butanediol, 2,3-dimethyl- | 3D | AX-184531309 | 21335396 | 1 | 2 | 305 | 0.08 | -1.16 | 0.27 | 1.41E-05 | 4.85 |
| 2,3-Butanediol, 2,3-dimethyl- | 4C | AX-184815712 | 10550780 | 1 | 2 | 305 | 0.05 | 1.29 | 0.30 | 1.73E-05 | 4.76 |
| 2,3-Butanediol, 2,3-dimethyl- | 6D | AX-184172795 | 6201021 | 1 | 2 | 305 | 0.52 | 0.68 | 0.14 | 5.66E-07 | 6.25 |
| 2-Hexenoic acid, methyl ester | 2A | AX-184091701 | 7446 | 1 | 2 | 305 | 0.52 | 0.38 | 0.08 | 2.65E-06 | 5.58 |
| Acetic acid, methyl ester | 7B | AX-184266735 | 9032057 | 1 | 2 | 305 | 0.12 | -0.61 | 0.14 | 1.25E-05 | 4.90 |
| Hexanethioic acid, S-methyl ester | 6A | AX-184027711 | 29081592 | 1 | 2 | 305 | 0.11 | 1.12 | 0.19 | 8.58E-09 | 8.07 |
| .beta.-Myrcene | 3C | AX-184437681 | 128733 | 1 | 2 | 305 | 0.28 | -0.37 | 0.05 | 1.29E-12 | 11.89 |
| Acetic acid, hexyl ester | 6A | AX-166515537 | 22440908 | 2 | 1 | 305 | 0.26 | -0.39 | 0.07 | 1.34E-07 | 6.87 |
| 2-Hexen-1-ol, acetate, (Z)- | 3C | AX-184217772 | 29038836 | 1 | 2 | 305 | 0.63 | 0.29 | 0.06 | 7.14E-07 | 6.15 |
| Hexanoic acid, 1-methylethyl ester | 5D | AX-166506622 | 20940820 | 1 | 2 | 305 | 0.21 | -0.70 | 0.16 | 1.01E-05 | 5.00 |
| Hexanoic acid, 1-methylethyl ester | 7B | AX-166508559 | 8401319 | 1 | 2 | 305 | 0.10 | -0.87 | 0.19 | 3.77E-06 | 5.42 |
| 2,3-Butanedione | 3D | AX-184415957 | 29117708 | 2 | 1 | 305 | 0.06 | -1.20 | 0.25 | 2.13E-06 | 5.67 |
| 2,3-Butanedione | 3C | AX-184067403 | 12072211 | 1 | 2 | 305 | 0.14 | 0.65 | 0.15 | 1.53E-05 | 4.82 |

| | | | | | | | | | | | |
|---------------------------------------|----|--------------|----------|---|---|-----|------|-------|------|----------|-------|
| 2,3-Butanedione | 4C | AX-184815712 | 10550780 | 1 | 2 | 305 | 0.05 | -1.22 | 0.25 | 1.30E-06 | 5.89 |
| 2,3-Butanedione | 7C | AX-184527729 | 2310186 | 2 | 1 | 305 | 0.19 | -0.67 | 0.15 | 9.06E-06 | 5.04 |
| 2,3-Butanedione | 7A | AX-166516897 | 22364008 | 2 | 1 | 305 | 0.23 | 0.76 | 0.16 | 1.71E-06 | 5.77 |
| Mesifurane | 1C | AX-184139720 | 1160408 | 1 | 2 | 305 | 0.46 | 1.01 | 0.12 | 6.10E-17 | 16.21 |
| 1-Octanol | 3C | AX-123366959 | 1678855 | 2 | 1 | 305 | 0.67 | -0.90 | 0.21 | 1.16E-05 | 4.93 |
| 1-Octanol | 4C | AX-184208242 | 9140556 | 2 | 1 | 305 | 0.40 | 0.97 | 0.22 | 1.33E-05 | 4.87 |
| Linalool | 3C | AX-123363744 | 125170 | 2 | 1 | 305 | 0.20 | -0.60 | 0.09 | 1.12E-11 | 10.95 |
| Acetic acid, octyl ester | 6A | AX-166515537 | 22440908 | 2 | 1 | 305 | 0.26 | -0.57 | 0.10 | 3.02E-09 | 8.52 |
| .alpha.-Terpineol | 3C | AX-123363744 | 125170 | 2 | 1 | 305 | 0.20 | -0.67 | 0.12 | 1.26E-08 | 7.90 |
| Methyl anthranilate | 2C | AX-184466211 | 23060214 | 1 | 2 | 305 | 0.46 | -1.92 | 0.38 | 5.09E-07 | 6.29 |
| Methyl anthranilate | 2A | AX-184097686 | 228453 | 2 | 1 | 305 | 0.25 | 2.09 | 0.40 | 2.23E-07 | 6.65 |
| Methyl anthranilate | 5A | AX-166505348 | 4145467 | 1 | 2 | 305 | 0.07 | -3.16 | 0.61 | 1.81E-07 | 6.74 |
| Methyl anthranilate | 5C | AX-184878777 | 2055082 | 2 | 1 | 305 | 0.53 | 1.85 | 0.30 | 5.80E-10 | 9.24 |
| Methyl anthranilate | 7C | AX-184857983 | 4634089 | 2 | 1 | 305 | 0.11 | 2.44 | 0.49 | 5.08E-07 | 6.29 |
| Methyl anthranilate | 7A | AX-184288763 | 23985914 | 1 | 2 | 305 | 0.25 | 2.17 | 0.40 | 5.64E-08 | 7.25 |
| Methyl anthranilate | 7D | AX-166509549 | 5154280 | 1 | 2 | 305 | 0.25 | 1.79 | 0.38 | 1.91E-06 | 5.72 |
| Butanoic acid, 1-methyloctyl ester | 7B | AX-184223504 | 10052903 | 1 | 2 | 305 | 0.22 | 1.36 | 0.27 | 5.52E-07 | 6.26 |
| Butanoic acid, 2-methyl-, octyl ester | 7B | AX-166508524 | 9015349 | 1 | 2 | 304 | 0.32 | 1.28 | 0.25 | 1.79E-07 | 6.75 |

| | | | | | | | | | | | |
|---------------------------------------|----|--------------|----------|---|---|-----|------|-------|------|----------|------|
| Butanoic acid, 3-methyl-, octyl ester | 6A | AX-184550919 | 22695206 | 2 | 1 | 305 | 0.28 | -1.29 | 0.25 | 2.66E-07 | 6.58 |
| Butanoic acid, 3-methyl-, octyl ester | 6D | AX-184255120 | 33017699 | 1 | 2 | 305 | 0.05 | 2.32 | 0.54 | 1.55E-05 | 4.81 |
| (E)-.beta.-Famesene | 3C | AX-184478052 | 1362932 | 2 | 1 | 305 | 0.67 | 0.74 | 0.13 | 2.75E-08 | 7.56 |
| .beta.-Bisabolene | 3D | AX-166521528 | 18358622 | 1 | 2 | 305 | 0.19 | -0.90 | 0.19 | 2.36E-06 | 5.63 |
| .beta.-Bisabolene | 4A | AX-166509829 | 13148265 | 2 | 1 | 305 | 0.05 | 1.35 | 0.31 | 1.26E-05 | 4.90 |
| .beta.-Bisabolene | 4B | AX-123363861 | 5639864 | 1 | 2 | 305 | 0.07 | -1.20 | 0.27 | 8.16E-06 | 5.09 |
| .beta.-Bisabolene | 6D | AX-184432353 | 9708865 | 2 | 1 | 305 | 0.34 | 0.81 | 0.15 | 8.14E-08 | 7.09 |
| .beta.-Bisabolene | 7B | AX-184223504 | 10052903 | 1 | 2 | 305 | 0.22 | 0.82 | 0.18 | 3.83E-06 | 5.42 |
| Nerolidol | 3C | AX-123366959 | 1678855 | 2 | 1 | 305 | 0.67 | 0.73 | 0.17 | 1.47E-05 | 4.83 |
| Hexanoic acid, octyl ester | 6A | AX-166515537 | 22440908 | 2 | 1 | 305 | 0.26 | -0.96 | 0.19 | 8.52E-07 | 6.07 |
| Hexanoic acid, decyl ester | 6A | AX-123358920 | 16899973 | 2 | 1 | 305 | 0.41 | -1.03 | 0.24 | 1.40E-05 | 4.86 |

Table S6. Curated flavor genes previously identified in *Fragaria ×ananas* and novel SVs and eQTL identified in our study.

| Gene name | NCBI Acession | Cama.V1.a2 annotation | F12 annotation | #SV in genic region | #SV in promoter | cis-eQTL(chr_left_right) | number of trans-eQTL |
|---------------|---------------|-----------------------|--|---------------------|-----------------|----------------------------------|----------------------|
| FaLOX5 | XM_004296849 | FxaC_13g32900 | maker-Fvb4-3_F-snap-gene-154.39 | 1 | 1 | | |
| FaFAD1 | KF887973.1 | NA ^a | maker-Fvb3-2_F-augustus-gene-310.138 | 1 | 0 | | |
| FaTA | MK381272 | FxaC_6g06700 | augustus-Fvb2-4_F-processed-gene-48.8 | 0 | 0 | | 3 |
| FanAAMT | NW_004440460 | FxaC_13g05270 | maker-Fvb4-3_F-augustus-gene-25.34 | 0 | 0 | | |
| FaEGS2 | KF562266 | FxaC_5g45350 | maker-Fvb2-2_F-augustus-gene-239.2 | 0 | 0 | | |
| <i>FaEGS1</i> | KF562264 | FxaC_8g06190 | augustus-Fvb2-3_F-processed-gene-10.5 | 0 | 0 | | 1 |
| FaNES1 | AX528996 | NA | maker-Fvb3-3_F-snap-gene-15.128 | 0 | 0 | 3C_F_122499_1593277 ^b | 3 |
| FaAAT2 | JN089766 | FxaC_11g40760 | maker-Fvb3-3_F-augustus-gene-262.52 | 0 | 0 | 3C_24339923_27306666 | 4 |
| FaOMT | JQ322651 | FxaC_28g01250 | maker-Fvb7-4_F-snap-gene-6.24 | 0 | 0 | 7D_8236_3459535 | 3 |
| FaQR | AY048861 | FxaC_21g05310 | maker-Fvb6-2_F-augustus-gene-276.162 | 0 | 0 | | |
| FaGT2 | AY663785 | FxaC_6g04890 | augustus-Fvb2-4_F-processed-gene-35.85 | 0 | 1 | 2B_2839232_2841763 | 1 |
| SAAT | AF193789 | FxaC_26g18860 | maker-Fvb7-3_F-augustus-gene-71.144 | 1 | 0 | | 5 |
| SAAT | AF193789 | FxaC_4g26870 | NA | | | | 11 |

^a Not found in the corresponding genome assembly.

^b Position on F12 haploid assembly (Missing in the reference genome). 3C_F/122499/1593277 represent chromosome ID, left boundary and right boundary of the eQTL.