

Supplementary materials

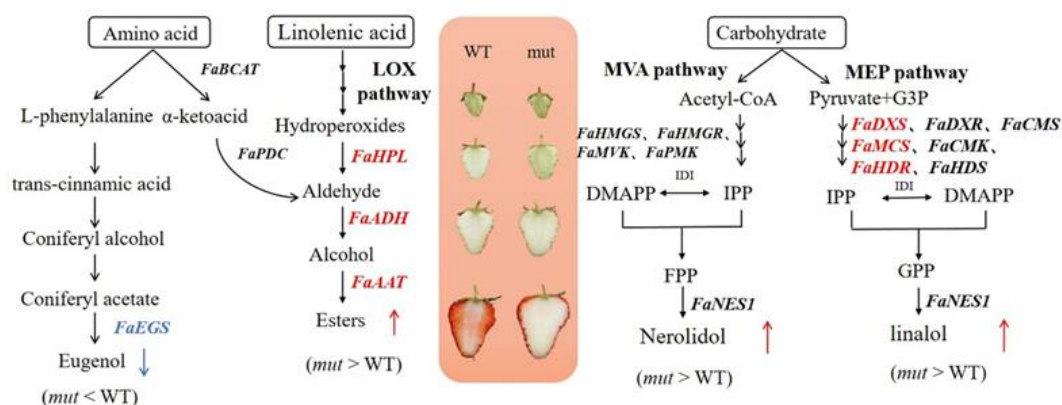


Figure S1. Overview of differential volatile compounds and possible key genes responsible for the differential volatile compounds between 'Benihoppe' and 'Xiaobai'. The blue arrow represents decreased volatile compounds in the red fruit stage of 'Xiaobai' compared with 'Benihoppe' and the blue font represents the gene may result in decreased volatile compounds in the red fruit stage of 'Xiaobai'. The red arrow represents increased volatile compounds in the red fruit stage of 'Xiaobai' compared with 'Benihoppe' and the red font represents the genes may result in increased volatile compounds in the red fruit stage of 'Xiaobai'.

Table S1. Primers used for gene expression analysis.

Primer Names	Primer Sequence (5'-3')
<i>FaACX1</i> -qPCR-F	CAAACAAGGTTCACTCGCCA
<i>FaACX1</i> -qPCR-R	CGCCTCCTCGTAAAGTTTCG
<i>FaACX2</i> -qPCR-F	ACTGCTCGATGGGAAAGTGA
<i>FaACX2</i> -qPCR-R	CAGCTCGAGAACTTGCATCC
<i>FaACX4</i> -qPCR-F	GCAACAAAGGTGGAAGGAGG
<i>FaACX4</i> -qPCR-R	TCCATTTTGAACCATGCGCA
<i>FaFAD2</i> -qPCR-F	GTCCCTTGTTGGTGGTGAAC
<i>FaFAD2</i> -qPCR-R	AAGGCTCCTCTCAACCAGTC
<i>FaFAE4</i> -LIKE-qPCR-F	AATGGGGTGTAGTGCTGGAG
<i>FaFAE4</i> -LIKE-qPCR-R	CGACGCCTATCCAATGACTT
<i>FaFAH1</i> -qPCR-F	GCCCCACTTTTATTGCCACA
<i>FaFAH1</i> -qPCR-R	CGACTCACCTCACCTCTTT
<i>FaPXG</i> -qPCR-F	CTTTGGCAACATCAGCAAAA
<i>FaPXG</i> -qPCR-R	CAAGAGCTCGACATCCAACA
<i>FaPXG4</i> -qPCR-F	TTTCATCAAGCATGCACACA
<i>FaPXG4</i> -qPCR-R	GCTCCCATCGTAGACAGCTC
<i>FaCYP1</i> -qPCR-F	TAGGGTAGTGGGAGTCGACA
<i>FaCYP1</i> -qPCR-R	GCTCCACTTGTTGACATGCA
<i>FaEH2</i> -LIKE-qPCR-F	GTGCTTTTCTGTCATGGATT
<i>FaEH2</i> -LIKE-qPCR-R	CCAAAAGGCCAACAACATCT
<i>FvLOX1</i> -qPCR-F	GGGAGTCCAGACAAAGGTGA
<i>FvLOX1</i> -qPCR-R	TTCAAGTTTGCGGCTCTTCC
<i>FvLOX2</i> -qPCR-F	AGAGTGTGCTGACTATCCCG
<i>FvLOX2</i> -qPCR-R	GGAATCCGGTGAGCTCGATA
<i>FaLOX3</i> -qPCR-F	TTGGGAGGCTAAAGGGAGTG
<i>FaLOX3</i> -qPCR-R	AAATTCGTCATCTCGCAGCC
<i>FaLOX5</i> -qPCR-F	GAAGAGCTCCGCAATGAAGG
<i>FaLOX5</i> -qPCR-R	GGCCACATCAGGGTTAGTCT
<i>FaLOX6</i> -qPCR-F	GAAGTAGCTAGGCCGGTTCAT

<i>FaLOX6-qPCR-R</i>	GCAAGGCTTTCAACTTCCCA
<i>FaHPL-qPCR-F</i>	AACGCATTTGGTGGTTTCTC
<i>FaHPL-qPCR-R</i>	GTTGAGCCGGAGTGTTCAT
<i>FaADH-qPCR-F</i>	GAACCCCAAAGACCACAAGA
<i>FaADH-qPCR-R</i>	AAGAACAGCAACACCCCAAC
<i>FaAAT1-qPCR-F</i>	GCAATCGGTGTCTTCGTCTC
<i>FaAAT1-qPCR-R</i>	ATCTCTCGGTGGGAAAAGCA
<i>FaAAT2-qPCR-F</i>	GGCTCTGATGGCATTCTTGG
<i>FaAAT2-qPCR-R</i>	GGACCGTTGCACCATAGTTC
<i>FaAAT-qPCR-F</i>	TGCTTTTCCCACCGAGAGAT
<i>FaAAT-qPCR-R</i>	AAACCAGTGACGGCATGAAC
<i>FaPDC-qPCR-F</i>	CACCTCCACCGTTCAAACT
<i>FaPDC-qPCR-R</i>	GAGGTGGTCAAGAAGGGTCA
<i>FaPDC1-qPCR-F</i>	TGCCTTTTGTGCTGAGATTG
<i>FaPDC1-qPCR-R</i>	TTGCTAGGCCTACGAGGAAA
<i>FaBCAT2-qPCR-F</i>	CAACGGCCGGGACTATACTA
<i>FaBCAT2-qPCR-R</i>	AACAGTTTGGGCACCTGTTC
<i>FaPAL1-qPCR-F</i>	GCTGAGCAACACAACCAAGA
<i>FaPAL1-qPCR-R</i>	GTCTCTCTGGCCACTTTACT
<i>FaPAL2-qPCR-F</i>	AGTCTCACACTCTGCCTCAC
<i>FaPAL2-qPCR-R</i>	AGGCAAGCAGGGAGTAATGT
<i>FaEGS1a-qPCR-F</i>	GGTTGAGCCGGCTAAATCTG
<i>FaEGS1a-qPCR-R</i>	TGTAGGTGCCAATGTCGTCT
<i>FaEGS2-qPCR-F</i>	GCAGAGAAGTTGAGGCATCG
<i>FaEGS2-qPCR-R</i>	TTAAGGTTCTCGGGTCGTCC
<i>FaDXS-qPCR-F</i>	CACAAAGACCACCCCTCCT
<i>FaDXS-qPCR-R</i>	ACAACACCAAGGCTTGATCC
<i>FaDXR-qPCR-F</i>	AGCAAATGAAAAGGCTGTGG
<i>FaDXR-qPCR-R</i>	CGTGCCCACAAATCATAGTG
<i>FaMCS-qPCR-F</i>	CCCAGAACCAAACCCCTACT
<i>FaMCS-qPCR-R</i>	CCACCACACAATGAAGCAAC
<i>FaCMS-qPCR-F</i>	GCAGCTGTACTAGGCGTTCC
<i>FaCMS-qPCR-R</i>	ACAGGATGTGGAAGGTGCTC
<i>FaCMK-qPCR-F</i>	AAGTGCCTACAGGAGCAGGA
<i>FaCMK-qPCR-R</i>	CAAAGGGTACAGGTGGAGGA
<i>FaHDS-qPCR-F</i>	GATAGACGCGCACAGTTTGA
<i>FaHDS-qPCR-R</i>	CTCGCAAATTCAAATGCAGA
<i>FaHDR-qPCR-F</i>	GGTGTTCCGGAAGAATCTCA
<i>FaHDR-qPCR-R</i>	TCTGGCCTCGTAAGCAATCT
<i>FaHMG-CoA-qPCR-F</i>	TGGTTCAACTGCAACCATGT
<i>FaHMG-CoA-qPCR-R</i>	CCTCCATACCTGTGCTCCAT
<i>FaHMGR2-qPCR-R</i>	ATAGCCCACTGGCATTTCAC
<i>FaHMGR2-qPCR-R</i>	ATAGCCCACTGGCATTTCAC
<i>FaMVK-qPCR-F</i>	GGAAGTCAAAGCCAGAGCAC
<i>FaMVK-qPCR-R</i>	GTTGATGGGTTGGGAACATC
<i>FaPMK-qPCR-F</i>	CCGAGGAATCAAATGGAGAA
<i>FaPMK-qPCR-R</i>	CAAAACCACTGCCCACTTTT
<i>FaCCD1-qPCR-F</i>	ATGCTTGGGAGGAAGAGGAC
<i>FaCCD1-qPCR-R</i>	TCTGTGTTGCTAGACCGGTT
<i>FaCCD4-qPCR-F</i>	GCAGGATGTACGGTGAGGAT
<i>FaCCD4-qPCR-R</i>	GATGTCCAGCTCAGACGACA
<i>FaNES1-qPCR-F</i>	AGTATTGTGTCTGCCCGTGA
<i>FaNES1-qPCR-R</i>	CCTTCTGTACCTAGCTGCGA

Table S2. Relative contents of volatile components in four developmental stages of ‘Benihoppe’ (WT).

Aroma components	RI	Classification	WT -Green	WT -White	WT -Turn	WT -Red
Methoxypropanol	1131	Alcohols	0.00390±0.00155 ab	0.00020±0.00029c	—	—
Pentyl alcohol	1256	Alcohols	0.00200±0.00047 c	0.00310±0.00037c	0.00830±0.00125a	0.00890±0.00012a
2-Heptanol	1327	Alcohols	0.00680±0.00066 c	0.00380±0.00073cd	0.00620±0.00026cd	0.01910±0.00050b
cis-2-Pentenol	1309	Alcohols	0.00810±0.00041 a	0.00350±0.00016c	0.00500±0.00042b	0.00390±0.00004c
Hexanol	1356	Alcohols	0.09440±0.00200 a	0.00800±0.00126g	0.01340±0.00104de	0.03720±0.00168b
cis-3-Hexenol	1371	Alcohols	0.01590±0.00034 a	0.00100±0.00008e	0.00100±0.00007e	0.00110±0.00011e
trans-2-Hexenol	1324	Alcohols	0.00260±0.00038 b	0.00200±0.00033b	0.00290±0.00044b	0.00670±0.00016b
cis-2-Hexenol	1398	Alcohols	0.05490±0.00113 a	0.00550±0.00246de	0.00790±0.00070cd	0.01910±0.00075b
1-Heptanol	1460	Alcohols	0.00160±0.00008 b	0.00070±0.0001e	0.00170±0.00003b	0.00280±0.00005a
2-Ethyl-1-hexanol	1489	Alcohols	0.01260±0.00032 a	0.01140±0.0007a	0.00910±0.00038b	0.00880±0.00032b
3-Ethyl-4-methylpentanol	1500	Alcohols	0.00030±0.00002 b	0.00010±0.00001b	0.00030±0.00003b	0.00030±0.00003b
1-Octanol	1557	Alcohols	0.00210±0.00003 e	0.00220±0.00023de	0.00450±0.00026c	0.00790±0.00029bc
trans-2-Octenol	1616	Alcohols	0.00100±0.00006 e	0.00120±0.00008de	0.00220±0.00005c	0.00230±0.00023bc
Nonanol	1654	Alcohols	0.00070±0.00005 b	0.00080±0.00014b	0.00070±0.00006b	0.00110±0.00013a
1-Dodecanol	1404	Alcohols	0.00020±0.00004 c	0.00010±0.00004c	0.00060±0.00037ab	0.00030±0.00008bc
2-methyl-5-Hepten-1-ol	1730	Alcohols	—	—	—	0.00050±0.00002b
Acetic acid	1449	Acid	0.00160±0.00029 b	0.00080±0.00011b	0.00130±0.00027b	0.00360±0.00039b
Isobutyric acid	1557	Acid	0.00030±0.00003 cd	0.00020±0.00002de	0.00030±0.00001cd	0.00290±0.00019b
Butanoic acid	1574	Acid	0.00020±0.00008 c	0.00010±0.00001c	0.00070±0.00008c	0.02650±0.00249b
Methylethylacetic acid	1658	Acid	0.00060±0.00041 c	0.00010±0.00003c	0.00380±0.00006c	0.08650±0.00634a
Hexanoic acid	1762	Acid	0.01700±0.00897 d	0.00290±0.00076d	0.05340±0.00323cd	1.10860±0.07603b
trans-3-Hexenoic Acid	1909	Acid	—	—	—	0.00050±0.00008b
Heptylic acid	1947	Acid	0.00020±0.00002 c	0.00010±0.00002c	0.00030±0.00001c	0.00200±0.00022b
trans-2-Hexenoic acid	1933	Acid	0.00180±0.00020 bc	0.00070±0.00011c	0.00140±0.00024c	0.00290±0.00024b
Octanoic acid	2052	Acid	0.00210±0.00112 c	0.00050±0.00011c	0.00320±0.00019c	0.11210±0.01241b
Nonanoic acid	2155	Acid	0.00070±0.00005 b	0.00040±0.00006b	0.00030±0.00005b	0.00100±0.00014b
trans-2-Octenoic acid	2182	Acid	—	—	—	—
Ethyl butyrate	1039	Ethyl esters	0.00150±0.00047 b	0.00090±0.00042b	0.00360±0.00060b	0.12780±0.00642b
Ethyl 2-methylbutyrate	1062	Ethyl esters	—	—	—	0.00090±0.00007b
Ethyl isovalerate	1093	Ethyl esters	—	—	—	0.00740±0.00035b
Ethyl pentanoate	1140	Ethyl esters	—	—	—	0.00150±0.00002b

Ethyl hexanoate	899	<i>Ethyl esters</i>	0.00210±0.00138 b	0.00060±0.00015b	0.00180±0.00052b	0.06790±0.00463b
Ethyl 2-hexenoate	1343	<i>Ethyl esters</i>	—	—	—	—
Ethyl 3-hydroxyhexanoate	1677	<i>Ethyl esters</i>	—	—	—	—
Methyl acetate	848	<i>acetate esters</i>	0.00650±0.00026f	0.00720±0.00079f	0.14610±0.01222d	0.33920±0.00789a
Ethyl Acetate	764	<i>acetate esters</i>	0.00790±0.00076 b	0.00760±0.0007b	0.01330±0.00139b	0.02590±0.00071b
Isopentyl acetate	1136	<i>acetate esters</i>	—	—	0.00820±0.00080c	0.03110±0.00203b
isopentenyl acetate	1249	<i>acetate esters</i>	—	—	—	0.00350±0.00007b
2-Heptyl acetate	1380	<i>acetate esters</i>	—	—	—	0.00110±0.00014b
Hexyl acetate	1299	<i>acetate esters</i>	0.00040±0.00012 d	0.00040±0.00006d	0.00970±0.00227cd	0.06900±0.00463b
trans-3-Hexenyl acetate	1306	<i>acetate esters</i>	—	0.00040±0.00004c	0.00050±0.00007c	0.00300±0.00013a
trans-2-Hexenyl acetate	1337	<i>acetate esters</i>	0.00030±0.00007 e	0.00030±0.00005e	0.01040±0.00173d	0.10870±0.00485a
Methyl butyrate	945	<i>other esters</i>	—	—	0.01760±0.00229d	0.45720±0.01131a
Methyl isopentanoate	1019	<i>other esters</i>	—	—	0.00180±0.00028d	0.03310±0.00151b
Propyl isovalerate	1167	<i>other esters</i>	—	—	—	—
Methyl hexanoate	1197	<i>other esters</i>	0.00120±0.00070 d	0.00040±0.00004d	0.00330±0.00109d	0.36510±0.01481b
Butyl butylate	1240	<i>other esters</i>	—	—	—	0.00500±0.00095b
Isoamyl butylate	1263	<i>other esters</i>	—	—	—	0.00410±0.00040b
Methyl 2-hexenoate	1272	<i>other esters</i>	0.00090±0.00013 cd	0.00080±0.0001cd	0.00150±0.00016c	0.00490±0.00025b
Hexyl butyrate	1417	<i>other esters</i>	0.00050±0.00012 b	0.00030±0.00004b	0.00060±0.00007b	0.00050±0.00012b
trans-2-Hexenyl Butyrate	1476	<i>other esters</i>	—	—	0.00030±0.00002c	0.00120±0.00008b
Octyl isovalerate	1654	<i>other esters</i>	—	—	—	—
p-Xylene	870	<i>Benzene and volatile phenols</i>	0.00760±0.00042 cd	0.00420±0.00080de	0.01230±0.00289b	0.01870±0.00178a
Styrene	1264	<i>Benzene and volatile phenols</i>	0.00080±0.00005 bc	0.00050±0.00009c	0.00080±0.00007bc	0.00180±0.00098b
Benzaldehyde	1523	<i>Benzene and volatile phenols</i>	0.00310±0.00066 c	0.00180±0.00018c	0.00580±0.00074c	0.01390±0.00065b
Clorius	1590	<i>Benzene and volatile phenols</i>	—	—	0.00040±0.00001c	0.00070±0.00002b
Benzeneacetaldehyde	1574	<i>Benzene and volatile phenols</i>	0.00340±0.00028 b	0.00040±0.00005c	—	—
Acetophenon	1652	<i>Benzene and volatile phenols</i>	0.00080±0.00005 b	0.00060±0.00006bc	0.00030±0.00002d	0.00050±0.00004cd
Ethyl benzoate	1671	<i>Benzene and volatile phenols</i>	—	—	—	—
Benzyl acetate	1727	<i>Benzene and volatile phenols</i>	—	—	0.00030±0.00001cd	0.00140±0.00005b
Naphthalene	1744	<i>Benzene and volatile phenols</i>	0.00630±0.00020 b	0.00370±0.00039cde	0.00320±0.00031de	0.00540±0.00062bc
Methyl salicylate	1675	<i>Benzene and volatile phenols</i>	0.00130±0.00022 d	0.00030±0.00005e	0.00060±0.00001e	0.00360±0.00019b

2-Methylnaphthalene	1839	<i>Benzene and volatile phenols</i>	0.00200±0.00007 b	0.00110±0.00011cd	0.00100±0.0001cd	0.00160±0.00025bc
Benzyl alcohol	1883	<i>Benzene and volatile phenols</i>	0.00180±0.00016 a	0.00030±0.00002d	0.00100±0.00008bc	0.00190±0.00014a
Phenylethyl Alcohol	1920	<i>Benzene and volatile phenols</i>	0.00130±0.00013 a	0.00020±0.00002d	0.00040±0.00004cd	0.00100±0.00011b
Benzenol	2012	<i>Benzene and volatile phenols</i>	0.00030±0.00003 c	0.00020±0.00001d	0.00030±0.00001c	0.00040±0.00001b
Ethyl cinnamate	2145	<i>Benzene and volatile phenols</i>	0.00070±0.00025 b	0.00020±0.00006b	0.00030±0.00008b	0.00300±0.00026b
Cinnamyl acetate	2192	<i>Benzene and volatile phenols</i>	—	—	—	—
Eugenol	2160	<i>Benzene and volatile phenols</i>	—	—	—	0.00050±0.00003a
Pentanal	982	<i>aldehydes and ketone</i>	0.00410±0.00015 e	0.00420±0.00050e	0.01530±0.00173c	0.03050±0.00085b
Ethyl vinyl ketone	1410	<i>aldehydes and ketone</i>	0.00480±0.00021 e	0.01060±0.00122e	0.08180±0.00825a	0.04820±0.00186c
Hexanal	1041	<i>aldehydes and ketone</i>	0.55010±0.09598 bc	0.35450±0.05897d	0.74080±0.03536a	0.62290±0.03214ab
trans-2-Pentenal	1173	<i>aldehydes and ketone</i>	0.01130±0.00252 de	0.00920±0.00028e	0.02320±0.00174b	0.01710±0.00184c
3-Hexenal	853	<i>aldehydes and ketone</i>	0.02410±0.00301 bc	0.01320±0.00240ef	0.02810±0.00295ab	0.01670±0.00214de
Isobutyl ketone	1207	<i>aldehydes and ketone</i>	0.00590±0.00020 ab	0.00470±0.00072bc	0.00450±0.00082bc	0.00640±0.00083a
Heptanal	1187	<i>aldehydes and ketone</i>	0.00360±0.00029 cd	0.00250±0.00039d	0.00520±0.00026c	0.01430±0.00151b
trans-2-Hexenal	1329	<i>aldehydes and ketone</i>	0.03680±0.00097 a	0.01600±0.00230de	0.02810±0.00218b	0.01690±0.00081d
2-Hexenal	1220	<i>aldehydes and ketone</i>	1.51500±0.03934 a	0.74210±0.088970e	1.21590±0.05420b	0.89540±0.03303cd
3-Octanone	1281	<i>aldehydes and ketone</i>	0.00070±0.00004 cd	0.00060±0.00011cd	0.00200±0.00055c	0.00750±0.00027b
Octanal	1280	<i>aldehydes and ketone</i>	0.00110±0.00014 c	0.00110±0.00014c	0.00180±0.00009c	0.00430±0.00021b
1-Octene-3-one	1438	<i>aldehydes and ketone</i>	0.00080±0.00001 d	0.00120±0.00024d	0.00550±0.00077b	0.00400±0.00018c
cis-2-Heptenal	1323	<i>aldehydes and ketone</i>	0.00380±0.00016 d	0.00500±0.00066d	0.01360±0.00111b	0.01190±0.00018bc
Sulcatone	1333	<i>aldehydes and ketone</i>	0.00160±0.00006 e	0.00140±0.00010e	0.00370±0.00048c	0.00530±0.00013b
Nonanal	1386	<i>aldehydes and ketone</i>	0.00050±0.00006 c	0.00040±0.00008cd	0.00050±0.00008c	0.00090±0.00007b
Sorbaldehyde	1411	<i>aldehydes and ketone</i>	0.01470±0.00064 a	0.00690±0.00088de	0.01070±0.00026c	0.00740±0.00007d
trans-2-Octenal	1428	<i>aldehydes and ketone</i>	0.00100±0.00013 d	0.00160±0.00022d	0.00910±0.00045b	0.00920±0.00012b
trans-2-trans-4-Heptadienal	1494	<i>aldehydes and ketone</i>	0.01080±0.00018 c	0.00620±0.00053f	0.01330±0.00121b	0.00760±0.00022e
Decanal	1504	<i>aldehydes and ketone</i>	0.00050±0.00010 c	0.00040±0.00013c	0.00030±0.00008c	0.00100±0.00025b

Camphor	1516	aldehydes and ketone	0.00120±0.00002a	0.00040±0.00003f	0.00090±0.00003c	0.00060±0.00002e
trans-2-Nonenal	1679	aldehydes and ketone	0.00050±0.00003de	0.00040±0.00007de	0.00120±0.00020cd	0.00240±0.00006b
Cucumber aldehyde	1589	aldehydes and ketone	0.00120±0.00009d	0.00080±0.00007de	0.00270±0.00031c	0.00250±0.00012c
trans-2-Decenal	1206	aldehydes and ketone	0.00040±0.00005cd	0.00030±0.00010cd	0.00040±0.00007cd	0.00080±0.00006b
trans, trans-2,4-Nonadienal	1703	aldehydes and ketone	0.00060±0.00002cd	0.00050±0.00003de	0.00150±0.00055b	0.00160±0.00012b
1-Pentene-3-ol	1162	Isoprenoids	0.01170±0.00155a	0.00690±0.00066cd	0.01010±0.00115ab	0.00840±0.00039bc
β-Myrcene	1170	Isoprenoids	—	—	—	—
D-Limonene	1203	Isoprenoids	—	—	0.00050±0.00007c	0.00250±0.00020b
β-Ocimene	1246	Isoprenoids	—	—	0.00030±0.00004c	0.00200±0.00014b
Dihydrolinalool	1255	Isoprenoids	0.00250±0.00020b	0.00160±0.00024cd	0.00080±0.00027e	0.00190±0.00013bc
cis-Linalool oxide	1441	Isoprenoids	0.00010±0.00005f	0.00010±0.00000f	0.00090±0.00007b	0.00070±0.00004c
Morillool	1452	Isoprenoids	0.01440±0.00021e	0.01940±0.00204d	0.03260±0.00139c	0.03700±0.00132b
trans-Linalool oxide	1464	Isoprenoids	0.00020±0.00003e	0.00020±0.00001e	0.00210±0.00029b	0.00180±0.00009bc
Linalol	1527	Isoprenoids	0.00150±0.00009e	0.00130±0.00005e	0.02070±0.00154d	0.14690±0.00638b
Levomenthol	1651	Isoprenoids	0.00120±0.00016b	0.00080±0.00006cd	0.00070±0.00010d	0.00110±0.00013bc
Farnesene	1749	Isoprenoids	0.00040±0.00009b	—	—	0.00050±0.00002b
α-Terpineol	1697	Isoprenoids	0.00030±0.00004c	0.00020±0.00001c	0.00080±0.00031c	0.00330±0.00046b
Bisabolene	1792	Isoprenoids	—	—	—	—
Nerylacetone	1865	Isoprenoids	—	0.00010±0.00001bc	0.00040±0.00003bc	—
Bisabolol	2207	Isoprenoids	—	—	—	—
β-Damascenone	1808	Isoprenoids	0.00510±0.00071a	0.00410±0.00014ab	0.00390±0.00401ab	0.00370±0.00061ab
Nerolidol	1961	Isoprenoids	—	—	—	0.00620±0.00014b
1-p-Menthen-9-al	1212	Isoprenoids	0.00040±0.00002de	0.00010±0.00004e	0.00060±0.00021d	0.00190±0.0002b
2-Pentylfuran	1231	furan	0.00550±0.00011bc	0.00410±0.00053bc	0.00890±0.00552b	0.01070±0.00095b
Furfural	1472	furan	0.00200±0.00003a	0.00170±0.00016b	0.0002±0.00007e	0.0002±0.00002e

Note: different letters represent comparison of the same volatile components in four periods of ‘Benihoppe’ (WT, Table S2) and somaclonal mutant ‘Xiaobai’ (*mut*, Table S3)

Table S3. Relative contents of volatile components in four developmental stages of somaclonal mutant ‘Xiaobai’(*mut*).

Aroma components	RI	Classification	<i>mut</i> - Green	<i>mut</i> - White	<i>mut</i> - Turn	<i>mut</i> - Red
Methoxypropanol	1131	Alcohols	0.00490±0.00036a	—	0.00260±0.00045b	0.00330±0.00029b
Pentyl alcohol	1256	Alcohols	0.00060±0.00003d	0.00550±0.00057b	0.00600±0.00008b	—
2-Heptanol	1327	Alcohols	0.00310±0.00059d	0.00680±0.00116c	0.00640±0.0011cd	0.06240±0.00296a
cis-2-Pentenol	1309	Alcohols	0.00260±0.00004d	0.00510±0.00018b	0.00350±0.00017c	0.00370±0.00028c
Hexanol	1356	Alcohols	0.01190±0.00032ef	0.01880±0.00038c	0.01480±0.00075d	0.00950±0.00032fg
cis-2-Hexenol	1371	Alcohols	0.00580±0.00026b	0.00320±0.00002c	0.00160±0.00006d	0.00110±0.00003e
trans-2-Hexenol	1324	Alcohols	0.00180±0.00016b	0.00200±0.00022b	0.00210±0.00048b	0.01840±0.00619a
cis-2-Hexenol	1398	Alcohols	0.00900±0.00039c	0.01760±0.00031b	0.01660±0.00065b	0.00370±0.00009e
1-Heptanol	1460	Alcohols	0.00050±0.00004f	0.00110±0.00004d	0.00130±0.00013c	0.00290±0.00019a

2-Ethyl-1-hexanol	1489	Alcohols	0.01000±0.00015b	0.01210±0.00037a	0.00890±0.00060b	0.01280±0.00103a
3-Ethyl-4-methylpentanol	1500	Alcohols	0.00010±0.00001b	0.00010±0.00001b	0.00020±0.00003b	0.00090±0.00026a
1-Octanol	1557	Alcohols	0.00070±0.00002f	0.00310±0.00016a	0.00330±0.00044d	0.00960±0.00042b
trans-2-Octenol	1616	Alcohols	0.00020±0.00002f	0.00320±0.00010a	0.00150±0.00019d	0.00260±0.00011b
Nonanol	1654	Alcohols	0.00030±0.00007c	0.00110±0.00010a	0.00060±0.00011b	0.00130±0.00005a
1-Dodecanol	1404	Alcohols	0.00030±0.00013bc	0.00020±0.00007c	0.00020±0.00007c	0.00080±0.00006a
2-methyl-5-Hepten-1-ol	1730	Alcohols	—	0.00020±0.00037b c	0.00010±0.00001c	0.00160±0.00001a
Acetic acid	1449	Acid	0.00190±0.00025b	0.00100±0.00014b	0.00120±0.00037b	0.06710±0.00715a
Isobutyric acid	1557	Acid	0.00020±0.00006cd e	—	0.00050±0.00008c	0.00630±0.00021a
Butanoic acid	1574	Acid	0.00010±0.00005c	0.00010±0.00002c	0.00110±0.00035c	0.04120±0.00155a
Methylethylacetic acid	1658	Acid	0.00040±0.00029c	0.00020±0.00002c	0.00500±0.00130c	0.06850±0.00123b
Hexanoic acid	1762	Acid	0.00870±0.00622d	0.01290±0.00088d	0.19810±0.05991c	3.44940±0.17479a
trans-3-Hexenoic Acid	1909	Acid	—	—	0.00020±0.00002b	0.00290±0.00079a
Heptylic acid	1947	Acid	0.00010±0.00003c	—	0.00050±0.00011c	0.00650±0.00159a
trans-2-Hexenoic acid	1933	Acid	0.00050±0.00003c	0.00160±0.0001bc	0.00150±0.00042bc	0.00500±0.00139a
Octanoic acid	2052	Acid	0.00080±0.00054c	0.00110±0.00009c	0.00710±0.00168c	0.34080±0.07633a
Nonanoic acid	2155	Acid	0.00060±0.00014b	0.00040±0.00011b	0.00050±0.00012b	0.00280±0.00109a
trans-2-Octenoic acid	2182	Acid	—	—	0.00030±0.00015b	0.00110±0.00014a
Ethyl butyrate	1039	Ethyl esters	0.00130±0.00013b	0.00220±0.00038b	0.01000±0.00171b	4.42160±0.25362a
Ethyl 2-methylbutyrate	1062	Ethyl esters	—	—	—	0.13210±0.01056a
Ethyl isovalerate	1093	Ethyl esters	—	—	0.00110±0.00025b	1.08430±0.08662a
Ethyl pentanoate	1140	Ethyl esters	0.00040±0.00003b	0.00060±0.00003b	0.00100±0.00012b	0.03730±0.00254a
Ethyl hexanoate	899	Ethyl esters	0.00050±0.00014b	0.00080±0.00003b	0.00680±0.00190b	5.86450±0.43765a
Ethyl 2-hexenoate	1343	Ethyl esters	—	—	—	0.08150±0.00574a
Ethyl 3-hydroxyhexanoate	1677	Ethyl esters	—	—	—	0.00420±0.00060a
Methyl acetate	848	acetate esters	—	0.05670±0.00121e	0.16890±0.01664c	0.24010±0.00803b
Ethyl Acetate	764	acetate esters	0.01590±0.00057b	0.01530±0.00075b	0.02000±0.00218b	3.74560±0.16729a
Isopentyl acetate	1136	acetate esters	—	—	0.00610±0.00103c	0.06060±0.00428a
isopentenyl acetate	1249	acetate esters	—	—	0.00020±0.00002c	0.00660±0.00037a
2-Heptyl acetate	1380	acetate esters	—	—	—	0.01140±0.00119a
Hexyl acetate	1299	acetate esters	—	0.00120±0.00013d	0.01500±0.00450c	0.10420±0.01036a
trans-3-Hexenyl acetate	1306	acetate esters	—	0.00110±0.00008b	0.00050±0.00012c	0.00310±0.00066a
trans-2-Hexenyl acetate	1337	acetate esters	—	0.00070±0.00002e	0.02250±0.00542c	0.07020±0.00486b
Methyl butyrate	945	other esters	—	0.00420±0.00028d	0.06070±0.00970c	0.42760±0.02008b
Methyl isopentanoate	1019	other esters	—	—	0.01420±0.00302c	0.07080±0.00488a
Propyl isovalerate	1167	other esters	—	—	—	0.00520±0.00042a
Methyl hexanoate	1197	other esters	0.00040±0.00022d	0.00380±0.00008d	0.04810±0.01455c	0.52780±0.03324a
Butyl butylate	1240	other esters	—	—	—	0.01570±0.00172a
Isoamyl butylate	1263	other esters	—	—	0.00020±0.00005c	0.00710±0.00089a
Methyl 2-hexenoate	1272	other esters	0.00040±0.00001d	0.00080±0.00016c d	0.00150±0.00022c	0.01000±0.00076a
Hexyl butyrate	1417	other esters	0.00020±0.00008b	0.00050±0.00009b	0.00040±0.00012b	0.00110±0.00034a
trans-2-Hexenyl Butyrate	1476	other esters	—	—	—	0.00160±0.00026a
Octyl isovalerate	1654	other esters	—	—	0.00007±0.00004b	0.00010±0.00006a
p-Xylene	870	Benzene and volatile phenols	0.00170±0.00007e	0.00910±0.00049b c	0.00810±0.00235bc d	0.01880±0.00208a
Styrene	1264	Benzene and volatile phenols	0.00030±0.00003c	0.00110±0.00006b c	0.00100±0.00013bc	0.00710±0.00068a
Benzaldehyde	1523	Benzene and volatile phenols	0.00150±0.00018c	0.00350±0.00021c	0.01130±0.00080b	0.13330±0.00444a
Clorius	1590	Benzene and volatile phenols	—	—	0.00030±0.00003d	0.00130±0.00006a
Benzeneacetaldehyde	1574	Benzene and volatile phenols	0.00060±0.00002c	0.00050±0.00004c	0.00040±0.00003c	0.00440±0.00028a
Acetophenon	1652	Benzene and volatile phenols	0.00050±0.00003cd	0.00030±0.00002d	0.00060±0.00005bc d	0.00510±0.00027a

Ethyl benzoate	1671	<i>Benzene and volatile phenols</i>	0.00010±0.00002b	—	—	0.01450±0.00057a
Benzyl acetate	1727	<i>Benzene and volatile phenols</i>	0.00010±0.00007e	0.00010±0.00002d _e	0.00040±0.00003c	0.00630±0.00024a
Naphthalene	1744	<i>Benzene and volatile phenols</i>	0.00220±0.00008e	0.00420±0.00052c _d	0.00390±0.00057cd _e	0.01320±0.00160a
Methyl salicylate	1675	<i>Benzene and volatile phenols</i>	0.00030±0.00007e	0.00050±0.00001e	0.00210±0.00025c	0.01020±0.00052a
2-Methylnaphthalene	1839	<i>Benzene and volatile phenols</i>	0.00080±0.00004d	0.00120±0.00012c _d	0.00110±0.00013cd	0.00380±0.00052a
Benzyl alcohol	1883	<i>Benzene and volatile phenols</i>	0.00090±0.00025bc	0.00080±0.00002c _d	0.00140±0.00052ab	0.00130±0.00018ab _c
Phenylethyl Alcohol	1920	<i>Benzene and volatile phenols</i>	0.00060±0.00015c	0.00030±0.00001c _d	0.00060±0.00021c	0.00050±0.00009cd
Benzenol	2012	<i>Benzene and volatile phenols</i>	0.00010±0.00001e	0.00030±0.00002c _d	0.00030±0.00006c	0.00080±0.00005a
Ethyl cinnamate	2145	<i>Benzene and volatile phenols</i>	0.00020±0.00007b	0.00020±0.00003b	0.00100±0.00017b	0.10050±0.01574a
Cinnamyl acetate	2192	<i>Benzene and volatile phenols</i>	0.00020±0.00006b	—	—	0.00080±0.00027a
Eugenol	2160	<i>Benzene and volatile phenols</i>	—	—	0.00030±0.00007b	0.00010±0.00005c
Pentanal	982	<i>aldehydes and ketone</i>	0.00130±0.00002e	0.00910±0.00044d	0.01510±0.00216c	0.03470±0.00156a
Ethyl vinyl ketone	1410	<i>aldehydes and ketone</i>	0.00130±0.00004e	0.02130±0.00044d	0.05790±0.00531b	0.05350±0.00377bc
Hexanal	1041	<i>aldehydes and ketone</i>	0.09210±0.00119e	0.68160±0.01742a _b	0.46200±0.08023cd	0.69380±0.04251a
trans-2-Pentenal	1173	<i>aldehydes and ketone</i>	0.00530±0.00018f	0.01340±0.00090d	0.01960±0.00102c	0.02890±0.00109a
3-Hexenal	853	<i>aldehydes and ketone</i>	0.00320±0.00032g	0.03180±0.00113a	0.02020±0.00148cd	0.00960±0.00074f
Isobutyl ketone	1207	<i>aldehydes and ketone</i>	0.00300±0.00006d	0.00480±0.00012b _c	0.00380±0.00038cd	0.00710±0.00040a
Heptanal	1187	<i>aldehydes and ketone</i>	0.00060±0.00006e	0.00380±0.00020c _d	0.00450±0.00095c	0.01770±0.00035a
trans-2-Hexenal	1329	<i>aldehydes and ketone</i>	0.00360±0.00013f	0.03420±0.00038a	0.02060±0.00198c	0.01270±0.00142e
2-Hexenal	1220	<i>aldehydes and ketone</i>	0.21820±0.00509f	1.45460±0.04182a	0.94960±0.10100c	0.79340±0.037550d _e
3-Octanone	1281	<i>aldehydes and ketone</i>	0.00020±0.00005d	0.00100±0.00017c _d	0.00150±0.00037cd	0.02040±0.00139a
Octanal	1280	<i>aldehydes and ketone</i>	0.00050±0.00009c	0.00120±0.00013c	0.00170±0.00033c	0.01000±0.00138a
1-Octene-3-one	1438	<i>aldehydes and ketone</i>	0.00030±0.00002d	0.00500±0.00012b _c	0.00540±0.00132b	0.00800±0.00048a
cis-2-Heptenal	1323	<i>aldehydes and ketone</i>	0.00030±0.00001e	0.01350±0.00024b	0.01030±0.00151c	0.02150±0.00086a
Sulcatone	1333	<i>aldehydes and ketone</i>	0.00040±0.00004f	0.00260±0.00016d	0.00340±0.00028c	0.00970±0.00059a
Nonanal	1386	<i>aldehydes and ketone</i>	0.00030±0.00002d	0.00050±0.00008c _d	0.00050±0.00004cd	0.00130±0.00020a
Sorbaldehyde	1411	<i>aldehydes and ketone</i>	0.00280±0.00009f	0.01210±0.00020b	0.00780±0.00076d	0.00580±0.00021e
trans-2-Octenal	1428	<i>aldehydes and ketone</i>	0.00030±0.00003d	0.00530±0.00022c	0.00640±0.00136c	0.03540±0.00236a
trans-2-trans-4-Heptadienal	1494	<i>aldehydes and ketone</i>	0.00050±0.00002g	0.01520±0.00033a	0.00920±0.00058d	0.00940±0.00034d
Decanal	1504	<i>aldehydes and ketone</i>	0.00040±0.00004c	0.00050±0.00023c	0.00050±0.00014c	0.00170±0.00030a

Camphor	1516	aldehydes and ketone	0.00020±0.00001g	0.00100±0.00004c	0.00070±0.00007d	0.00110±0.00004b
trans-2-Nonenal	1679	aldehydes and ketone	0.00010±0.00002e	0.00140±0.00012c	0.00120±0.00036cd	0.01220±0.00091a
Cucumber aldehyde	1589	aldehydes and ketone	0.00010±0.00002e	0.00420±0.00023b	0.00280±0.00061c	0.01310±0.00095a
trans-2-Decenal	1206	aldehydes and ketone	0.00020±0.00001d	0.00050±0.00004b c	0.00050±0.00006cd	0.00230±0.00029a
trans, trans-2,4-Nonadienal	1703	aldehydes and ketone	—	0.00110±0.00011b c	0.00090±0.00009cd	0.00450±0.00026a
1-Pentene-3-ol	1162	Isoprenoids	0.00370±0.00020e	0.01080±0.00005a	0.00590±0.00091d	0.00700±0.00036cd
β-Myrcene	1170	Isoprenoids	—	—	—	—
D-Limonene	1203	Isoprenoids	—	—	0.00070±0.00008c	0.00590±0.00013a
β-Ocimene	1246	Isoprenoids	—	—	0.00040±0.00006c	0.00550±0.00012a
Dihydrolinalool	1255	Isoprenoids	0.00150±0.00046cd e	0.00170±0.00036c d	0.00120±0.00008de	0.00500±0.00032a
cis-Linalool oxide	1441	Isoprenoids	—	0.00020±0.00002e	0.00050±0.00005d	0.00130±0.00006a
Morillol	1452	Isoprenoids	0.00490±0.00017f	0.04400±0.00131a	0.02250±0.00254d	0.03880±0.00100b
trans-Linalool oxide	1464	Isoprenoids	—	0.00070±0.00003d	0.00150±0.00023c	0.00400±0.00013a
Linalol	1527	Isoprenoids	0.00060±0.00006e	0.00450±0.00036e	0.03630±0.00550c	0.52800±0.00819a
Levomenthol	1651	Isoprenoids	0.00070±0.00018d	0.00090±0.00018c d	0.00070±0.00006d	0.00260±0.00012a
Farnesene	1749	Isoprenoids	—	—	0.00020±0.00006c	0.00640±0.00006a
α-Terpineol	1697	Isoprenoids	0.00010±0.00001c	0.00030±0.00005c	0.00100±0.00007c	0.01440±0.00155a
Bisabolene	1792	Isoprenoids	—	—	—	0.00100±0.00013a
Nerylacetone	1865	Isoprenoids	0.0001±0.00004bc	0.0003±0.00003bc	0.00040±0.00007b	0.00200±0.00039a
Bisabolol	2207	Isoprenoids	—	—	—	0.00180±0.00063a
β-Damascenone	1808	Isoprenoids	0.00030±0.00005b	0.00710±0.00057a	0.00470±0.00036a	0.00610±0.00054a
Nerolidol	1961	Isoprenoids	—	—	0.00100±0.00029b	0.14740±0.01521a
1-p-Menthen-9-al	1212	Isoprenoids	0.0000±0.00001e	0.00070±0.00005d	0.00120±0.00004c	0.00580±0.00031a
2-Pentylfuran	1231	furan	0.00040±0.00002c	0.00650±0.00100b c	0.00460±0.00073bc	0.06460±0.00455a
Furfural	1472	furan	0.00140±0.00008c	0.0002±0.00001e	0.0002±0.00002e	0.00070±0.00006d

Note: different letters represent comparison of the same volatile components in four periods of 'Benihoppe' (WT, Table S2) and somaclonal mutant 'Xiaobai' (*mut*, Table S3)

Table S4. The proportion of nine categories of volatile compounds in four developmental stages of fruit between 'Benihoppe' (WT) and somaclonal mutant 'Xiaobai' (*mut*).

	WT-Green	WT-White	WT-Turn	WT-Red	mut-Green	mut-White	mut-Turn	mut-Red
Alcohols	8.21%	3.34%	2.38%	2.33%	11.67%	3.07%	2.92%	0.56%
Acid	0.97%	0.44%	2.43%	26.18%	2.97%	0.66%	9.06%	16.61%
esters	0.85%	1.44%	8.20%	32.24%	4.31%	3.38%	15.82%	70.45%
Benzene and volatile phenols	1.17%	1.05%	1.00%	1.05%	2.27%	0.85%	1.37%	1.34%
aldehydes and ketone	87.01%	90.60%	82.86%	33.74%	75.67%	89.04%	67.34%	7.52%
Isoprenoids	1.50%	2.68%	2.79%	4.23%	2.71%	2.73%	3.28%	3.26%
furan	0.30%	0.44%	0.34%	0.21%	0.41%	0.26%	0.20%	0.27%

(The esters in Table S4 included the ethyl esters, acetates, and other esters)

Table S5. The ratio of volatile substances contents in ‘Benihoppe’ (WT) and somaclonal mutant ‘Xiaobai’ (*mut*) in four developmental stages.

	Green mut/WT	White mut/WT	Turn mut/WT	Red mut/WT
Alcohols	0.25	1.83	1.10	1.12
Acid	0.54	2.98	3.33	2.96
Ethyl esters	0.57	2.40	3.55	56.57
acetate esters	1.05	4.75	1.24	7.29
other esters	0.38	5.81	4.99	1.23
Benzene and volatile phenols	0.34	1.59	1.23	5.93
aldehydes and ketone	0.15	1.96	0.73	1.04
Isoprenoids	0.32	2.03	1.05	3.60
furan	0.24	1.18	0.52	5.99

Table S6. The unique volatile components in ‘Benihoppe’ (WT).

Period	The volatile components	classification
Green	Methyl acetate	acetate esters
	Hexyl acetate	acetate esters
	trans-2-Hexenyl acetate	acetate esters
	trans, trans-2,4-Nonadienal	aldehydes and ketone
	cis-Linalol oxide	Isoprenoids
	trans-Linalool oxide (furanoid)	Isoprenoids
White	Farnesene	Isoprenoids
	Methoxypropanol	Alcohols
	Isobutyric acid	Acid
	Heptylic acid	Acid
Turn	trans-2-Hexenyl Butyrate	other esters
Red	Pentyl alcohol	Alcohols

Table S7. The unique volatile components in somaclonal mutant ‘Xiaobai’ (*mut*).

Period	The aroma components	classification
Green	2-methyl-5-Hepten-1-ol	Alcohols
	Ethyl pentanoate	Ethyl esters
	Ethyl benzoate	Benzene and volatile phenols
	Benzyl acetate	Benzene and volatile phenols
	Cinnamyl acetate	Benzene and volatile phenols
	Nerylacetone	Isoprenoids
White	2-methyl-5-Hepten-1-ol	Alcohols
	Ethyl pentanoate	Ethyl esters
	Methyl butyrate	other esters
	Benzyl acetate	Benzene and volatile phenols
Turn	Methoxypropanol	Alcohols
	2-methyl-5-Hepten-1-ol	Alcohols
	trans-3-Hexenoic Acid	Acid
	trans-2-Octenoic acid	Acid
	Ethyl isovalerate	Ethyl esters
	Ethyl pentanoate	Ethyl esters
	isopentenyl acetate	acetate esters
	Isoamyl butylate	other esters
	Octyl isovalerate	other esters
	Benzeneacetaldehyde	Benzene and volatile phenols
	Eugenol	Benzene and volatile phenols
	Farnesene	Isoprenoids
Red	Nerolidol	Isoprenoids
	Methoxypropanol	Alcohols

trans-2-Octenoic acid	<i>Acid</i>
Ethyl 2-hexenoate	<i>Ethyl esters</i>
Ethyl 3-hydroxyhexanoate	<i>Ethyl esters</i>
Propyl isovalerate	<i>other esters</i>
Octyl isovalerate	<i>other esters</i>
Benzeneacet aldehyde	<i>Benzene and volatile phenols</i>
Ethyl benzoate	<i>Benzene and volatile phenols</i>
Cinnamyl acetate	<i>Benzene and volatile phenols</i>
Bisabolene	<i>Isoprenoids</i>
Nerylacetone	<i>Isoprenoids</i>
Bisabolol	<i>Isoprenoids</i>

Table S8. Principal component load matrix of volatile compounds.

Categories	PC1	PC2
Alcohols	0.14890665	-0.65112885
Acid	0.37975818	0.06789272
Ethyl esters	0.37326131	0.09826685
Acetate esters	0.38004148	0.08590762
Other esters	0.33377753	0.02145567
Benzene and volatile phenols	0.38012223	0.04543039
Aldehydes and ketone	0.06851612	-0.74088228
Isoprenoids	0.38290603	0.04746335
Furan	0.37768129	0.02649001