horticulturae

MDPI

Article

Quality Deterioration and Volatile Metabolite Profile of 'Orah' Mandarin during Low-Temperature Storage and Room- temperature Shelf

Ping Liu[1], Zizhen Lin[1], Xiaoxiao Wu[1], Min Ma[2], Chenxi Xu[3], Huimin Fu[1], Xiaobo Peng[1], Chongling Deng[1], Shengqin Ye[1], Hongmei Lu[3], Jinying Wei[1], Jianjun He[1]* and Tao Luo[4,]*

[1] Guangxi Key Laboratory of Germplasm Innovation and Utilization of Specialty Commercial Crops in North Guangxi, Guangxi Citrus Breeding and Cultivation Technology Innovation Center, Guangxi Academy of Specialty Crops, Guilin 541004, China; liupingsmile@126.com (P.L.); lzz18854885308@163.com (Z.L.); 15578386736@126.com (X.W.); fuhuimin@126.com(H.M.); zzqszzzzb@126.com (X.P.); cldeng88168@126.com (C.D.); 13877375937@163.com (S.Y.); karissawjy110@163.com (J.W.)

[2] Guangxi Vocational and Technical College of Agricultural Engineering, Chongzuo 530028, China; 13978829397@163.com

[3] Institution of Fruit Technology Guidance of Guangxi Zhuang Autonomous Region, Nanning 530022, China; xuchenxi2766@126.com (C.X.); lhm2902@163.com (H.L.);

[4] Guangdong Provincial Key Laboratory of Postharvest Science of Fruits and Vegetables, Engineering Research Center of Southern Horticultural Products Preservation, Ministry of Education, College of Horticulture, South China Agricultural University, Guangzhou 510642, China

* Correspondence: jianjunhe@126.com(J.H.); luotao0502@scau.edu.cn (T.L.)

Table S1 Number of metabolites (from each class) that significantly correlated with physiological indicators.

Pairwise comparison	Type	● alcohols	● aldehydes	● esters	● lipids_fatty acyls	● terpenoids	● organic acids	● tetrahydropyran	Total
60DAHvs0DAH	Up-reg.				4				4
	Down-reg.				1	7			8
120DAHvs0DAH	Up-reg.	1			7		1		9
	Down-reg.			1	3	8		2	14
120DAH_7Dvs0DAH	Up-reg.	1	2		6		2		12
	Down-reg.				1	2			3
180DAHvs0DAH	Up-reg.	1			2		3		6
	Down-reg.				3			2	5
120DAHvs60DAH	Up-reg.		2	1	6	2	1		12
	Down-reg.					2			2
180DAHvs120DAH	Up-reg.	2	1	1	6		3		13
	Down-reg.				1				1
120DAH_7Dvs120DAH	Up-reg.				4				4
	Down-reg.				1	7			8

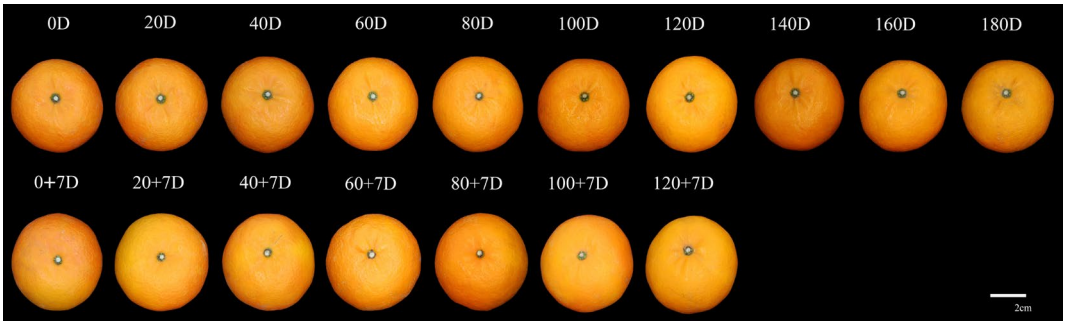


Figure S1 The appearance of 'Orah' mandarin during LTS and 7days of RTS

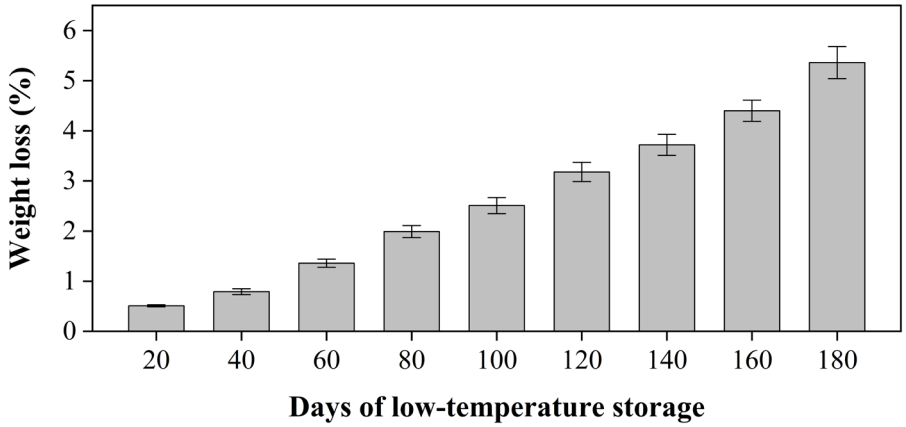


Figure S2 The weight loss of 'Orah' mandarin during LTS

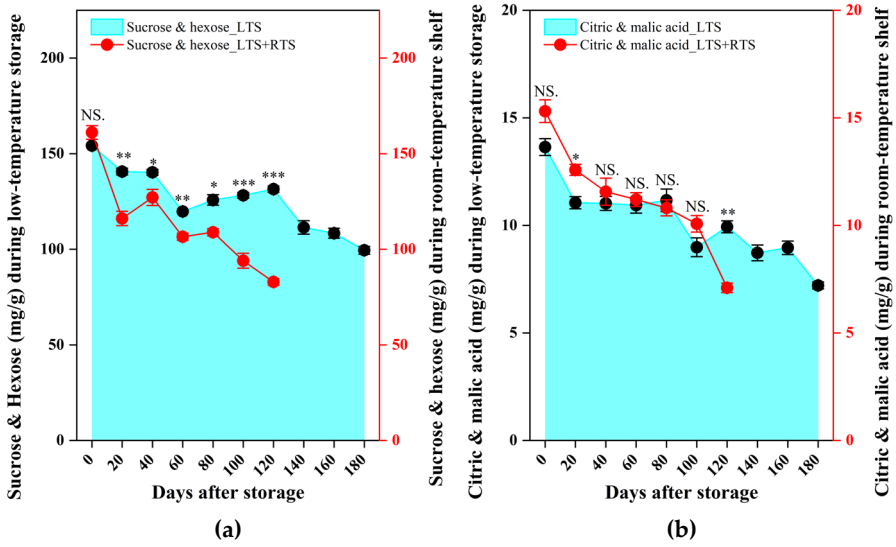


Figure S3. The changes of content of sugars (sucrose & hexose) and organic acid (citric acid & malic acid) of 'Orah' mandarin and the effect of 7-days-room-temperature shelf on them. (**a**) sucrose & hexose; (**b**)citric acid & malic acid. Asterisks indicated significant difference between the LTS and the LTS+RTS at the same time point: *, $p < 0.05$; **, $p < 0.01$; ***, $p < 0.001$.

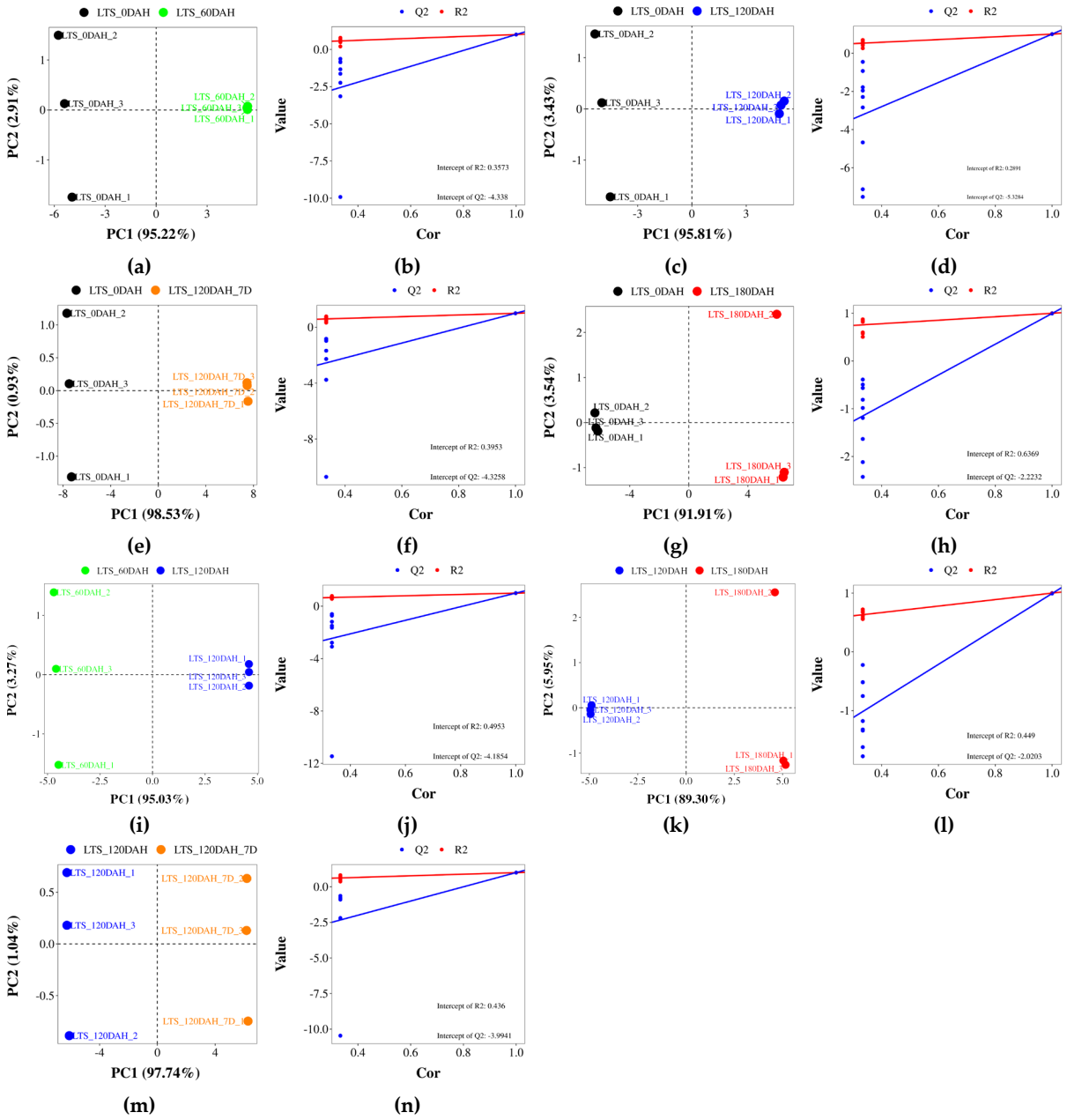
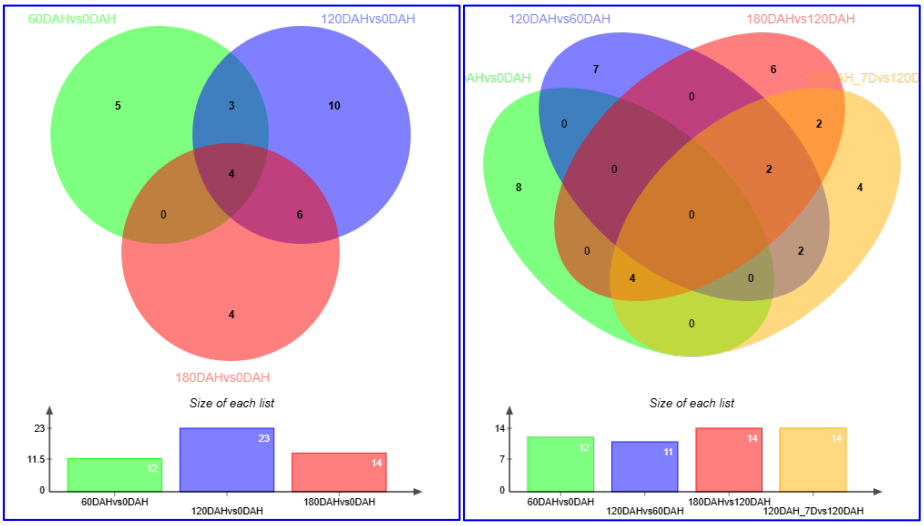


Figure S4. PLS-DA plot and model validation plot of pair-samples. (**a**) PLS-DA plot of LTS_60d vs LTS_0d; (**b**) model validation plot of LTS_60d vs LTS_0d; (**c**) PLS-DA plot of LTS_120d vs LTS_0d; (**d**) model validation plot of LTS_120d vs LTS_0d; (**e**) PLS-DA plot of LTS_120d+7d vs LTS_0d; (**f**) model validation plot of LTS_120d+7d vs LTS_0d; (**g**) PLS-DA plot of LTS_180d vs LTS_0d; (**h**) model validation plot of LTS_180d vs LTS_0d; (**i**) PLS-DA plot of LTS_120d vs LTS_60d; (**j**) model validation plot of LTS_120d vs LTS_60d; (**k**) PLS-DA plot of LTS_180d vs LTS_120d; (**l**) model validation plot of LTS_180d vs LTS_120d; (**m**) PLS-DA plot of LTS_120d+7d vs LTS_120d; (**n**) model validation plot of LTS_120d+7d vs LTS_120d.



(a) **(b)**

Figure S5. Venn analysis of differential accumulated metabolites. (**a**) Venn analysis of differential accumulated metabolites from LTS_60d vs LTS_0d, LTS_120d vs LTS_0d, and LTS_180d vs LTS_0d. (**b**) Venn analysis of differential accumulated metabolites from LTS_60d vs LTS_0d, LTS_120d vs LTS_60d, LTS_180d vs LTS_120d and LTS_120d+RTS_7d vs LTS_120d. Note: LTS_0d represent as 0DAH; LTS_60d represent as 60DAH; LTS_120d represent as 120DAH; LTS_180d represent as 180DAH; LTS_120d+RTS_7d represent as 120DAH_7D.