

Article

Supplementary Materials: Extending Shelf Life and Maintaining Quality of Tomato Fruit by Calcium Chloride, Hydrogen Peroxide, Chitosan, and Ozonated Water

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Table S1. Effect of treatments, storage period, and their interactions on physical and chemical parameters.

Weight loss (%)	0 + 2	7 + 2	14 + 2	21 + 2	28 + 2	Average
Chitosan	0.02 ± 0.009 j	0.16 ± 0.017 j	3.8 ± 0.044 ij	12.9 ± 0.021fg	20 ± 0.015 de	7.376 d
Calcium chloride	0.18 ± 0.022 j	0.6 ± 0.077 j	4.6 ± 0.073 ij	10.2 ± 0.035 fg	22.6 ± 0.60 bc	7.636 d
Hydrogen peroxide	0.41 ± 0.845 j	0.65 ± 0.929 j	5.6 ± 0.872 i	16.2 ± 0.657 ef	26.5 ± 1.054 bc	9.872 c
Ozonated water	0.41 ± 1.514 j	0.8 ± 1.681 j	7.5 ± 1.642 hi	20.2 ± 2.599 d	28.2 ± 1.66 b	11.422 b
Control	0.67 ± 0.721 j	4 ± 1.856 ij	11.2 ± 0.289 gh	23.9 ± 2.315 cd	33.2 ± 1.53 a	14.594 a
Average	0.338 e	1.242 d	6.54 c	16.68 b	26.1 a	
Firmness (kg/cm ²)	0 + 2	7 + 2	14 + 2	21 + 2	28 + 2	Average
Chitosan	5.5 ± 0.057 a–c	5.3 ± 0.088 b–e	4.5 ± 0.115 f–h	3.9 ± 0.057 jk	3.8 ± 0.088 kl	4.6 b
Calcium chloride	5.9 ± 0.176 a	5.6 ± 0.088 ab	4.9 ± 0.152 d–f	4.3 ± 0.033 h–j	4.1 ± 0.145 h–j	4.96 a
Hydrogen peroxide	5.7 ± 0.088 ab	5.6 ± 0.208 ab	4.2 ± 0.033 h–k	3.9 ± 0.103 jk	3.3 ± 0.218 m	4.54 b
Ozonated water	5.3 ± 0.24 b–e	5.1 ± 0.145 c–e	3.8 ± 0.152 kl	3.1 ± 0.26 mn	2.7 ± 0.202 no	4.0 c
Control	4.8 ± 0.202 e–g	4.6 ± 0.233 f–h	3.4 ± 0.151 lm	3.1 ± 0.284 mn	2.3 ± 0.120 o	3.64 d
Average	5.44 a	5.24 a	4.16 b	3.66 c	3.24 c	
TSS (°Brix)	0 + 2	7 + 2	14 + 2	21 + 2	28 + 2	Average
Chitosan	3.7 ± 0.058 i	5.7 ± 0.088 a–d	5.9 ± 0.176 ab	6.1 ± 0.102 a	5.4 ± 0.033 cd	5.36 a
Calcium chloride	3.6 ± 0.019 i	4.8 ± 0.463 e–h	5.3 ± 0.454 c–e	5.9 ± 0.318 ab	5.1 ± 0.273 d–f	4.94 b
Hydrogen peroxide	3.6 ± 0.029 i	4.6 ± 0.163 f–h	5.1 ± 0.203 d–f	5.8 ± 0.088 ab	4.6 ± 0.120 f–h	4.74 b
Ozonated water	3.4 ± 0.059 i–k	4.5 ± 0.098 f–h	4.9 ± 0.090 e–h	4.5 ± 0.067 f–h	3.1 ± 0.139 jk	4.08 c
Control	3.4 ± 0.119 i–k	4.4 ± 0.236 h	4.4 ± 0.143 gh	3.9 ± 0.208 hi	3 ± 0.525 k	3.82 d
Average	3.54 d	4.8 b	5.12 a	5.24 a	4.24 c	
L* value	0 + 2	7 + 2	14 + 2	21 + 2	28 + 2	Average
Chitosan	50.2 ± 0.809 a	45.1 ± 0.674 b	40.7 ± 0.684 d–f	36.8 ± 0.395 g–i	36.5 ± 1.453 g–j	41.86 a

Calcium chloride	45 ± 0.839 b	40.7 ± 1.619 d–f	39.2 ± 0.980 e–g	34.2 ± 1.019 h–k	32.8 ± 1.349 kl	38.38 b
Hydrogen peroxide	43.9 ± 1.635 bc	41.3 ± 1.055 c–e	36.6 ± 1.05 g–j	34.5 ± 0.855 h–k	32.9 ± 0.282 kl	37.84 b
Ozonated water	43.2 ± 0.519 bc	37.2 ± 1.22 gh	33.7 ± 0.90 i–l	32.4 ± 2.052 kl	31.2 ± 0.552 l	35.54 c
Control	44.6 ± 0.674 b	41.3 ± 0.37 c–e	38 ± 0.945 fg	32.7 ± 1.071 kl	31.5 ± 1.00 l	37.62 b
Average	45.38 a	41.12 b	37.64 c	34.12 d	32.98 d	
a* value	0 + 2	7 + 2	14 + 2	21 + 2	28 + 2	Average
Chitosan	5.5 ± 0.730 q	7.5 ± 0.643 pq	14.4 ± 1.30 l–n	16.2 ± 0.751 j–l	24.6 ± 1.73 d–g	13.64 d
Calcium chloride	8.7 ± 1.01 o–q	14.5 ± 1.23 l–n	16.5 ± 0.69 j–l	18.5 ± 1.56 i–k	27.9 ± 1.96 b–d	17.22 c
Hydrogen peroxide	10.5 ± 1.914 n–p	19.9 ± 1.50 h–j	22.6 ± 2.05 f–h	25.1 ± 1.409 d–f	30.2 ± 0.527 bc	21.66 b
Ozonated water	13.5 ± 1.728 l–n	21.1 ± 2.08 g–i	23.2 ± 0.84 e–h	25.8 ± 1.650 d–f	30.9 ± 0.677 b	22.9 b
control	12.1 ± 1.26 m–o	25.9 ± 1.09 d–f	26.4 ± 0.876 c–e	28.1 ± 1.06 b–d	35.6 ± 1.33 a	25.62 a
Average	10.06 d	17.78 c	20.62 b	22.74 b	29.84 a	
b* value	0 + 2	7 + 2	14 + 2	21 + 2	28 + 2	Average
Chitosan	35.8 ± 1.93 a	32.2 ± 2.0 a–c	30.1 ± 0.147 b–d	24.4 ± 0.085 gh	22.1 ± 0.542 hi	28.92 a
Calcium chloride	30.5 ± 0.313 g–i	26.6 ± 3.4 d–g	24.1 ± 1.219 g–i	23.8 ± 1.478 g–i	24.1 ± 0.674 g–i	25.82 bc
Hydrogen peroxide	29.8 ± 1.27 b–d	29.6 ± 1.56 b–d	23.8 ± 1.295 g–i	23.2 ± 1.283 g–i	21.3 ± 1.55 hi	25.54 bc
Ozonated water	29.5 ± 1.11 b–d	25.3 ± 0.90 e–h	24.8 ± 0.113 gh	22.5 ± 2.142 hi	21.3 ± 1.20 hi	24.68 c
Control	30.2 ± 0.49 b–d	29.1 ± 0.10 b–e	28.5 ± 0.60 c–f	23.9 ± 0.462 g–i	20.1 ± 0.80 i	26.36 b
Average	31.16 a	28.56 b	26.26 b	23.56 c	21.78 c	
CI	0 + 2	7 + 2	14 + 2	21 + 2	28 + 2	Average
Chitosan	6.0 ± 0.846 j	10.1 ± 1.23 i	21.2 ± 1.45 g–i	30.1 ± 0.84 d–f	40.8 ± 3.0 bc	21.6 d
Calcium chloride	12.2 ± 1.765 i	23.5 ± 3.78 f–h	28.8 ± 1.48 e–g	35.9 ± 2.57 cd	46.1 ± 1.95 b	29.3 c
Hydrogen peroxide	15.1 ± 3.38 i	27 ± 4.14 d–g	37.6 ± 2.9 cd	42.6 ± 1.49 bc	49.7 ± 0.89 b	34.4 b
Ozonated water	19.3 ± 2.68 hi	34.4 ± 3.96 cd	40.5 ± 0.89 bc	46.5 ± 2.65 b	52.8 ± 0.317 a	38.7 a
Control	16.7 ± 1.44 hi	32.3 ± 0.68 de	35.8 ± 1.85 cd	46.6 ± 1.71 b	55.3 ± 0.84 a	37.3 a
Average	13.9 e	25.4 d	32.8 c	40.3 b	48.9 a	
Titrateable acidity (%)	0 + 2	7 + 2	14 + 2	21 + 2	28 + 2	Average
Chitosan	0.48 ± 0.024 k–n	0.55 ± 0.018 f–k	0.69 ± 0.003 bc	0.79 ± 0.002 a	0.65 ± 0.006 cd	0.632 a
Calcium chloride	0.46 ± 0.035 l–n	0.52 ± 0.61 i–m	0.63 ± 0.007 c–e	0.73 ± 0.013 ab	0.56 ± 0.006 e–j	0.58 b
Hydrogen peroxide	0.43 ± 0.039 n	0.51 ± 0.009 i–m	0.61 ± 0.036 d–g	0.63 ± 0.022 c–f	0.49 ± 0.031 j–n	0.534 c

Ozonated water	0.43 ± 0.011 n	0.53 ± 0.013 h–l	0.57 ± 0.014 e–i	0.60 ± 0.011 d–h	0.53 ± 0.024 h–l	0.532 c
Control	0.42 ± 0.014 n	0.52 ± 0.023 i–m	0.57 ± 0.029 e–i	0.55 ± 0.013 g–k	0.45 ± 0.023 mn	0.502 c
Average	0.444 d	0.526 c	0.614 b	0.66 a	0.536 c	
Ascorbic acid (mg/g)	0 + 2	7 + 2	14 + 2	21 + 2	28 + 2	Average
Chitosan	0.248 ± 0.019 a	0.229 ± 0.02 b	0.212 ± 0.004 c	0.200 ± 0.003 cd	0.177 ± 0.005 h–l	0.2132 a
Calcium chloride	0.199 ± 0.006 c–e	0.197 ± 0.002 c–f	0.190 ± 0.002 d–h	0.186 ± 0.001 e–i	0.166 ± 0.006 k–o	0.1876 b
Hydrogen peroxide	0.192 ± 0.006 d–h	0.191 ± 0.001 d–g	0.183 ± 0.003 f–j	0.169 ± 0.004 j–n	0.164 ± 0.003 l–o	0.1798 c
Ozonated water	0.194 ± 0.002 d–g	0.189 ± 0.001 g–k	0.173 ± 0.003 i–m	0.159 ± 0.002 m–o	0.156 ± 0.005 no	0.1742 d
Control	0.198 ± 0.002 c–e	0.188 ± 0.007 d–h	0.172 ± 0.005 i–m	0.157 ± 0.001 no	0.152 ± 0.003 o	0.1734 d
Average	0.2062 a	0.1988 b	0.186 c	0.1742 d	0.163 e	
Lycopene (mg/g)	0 + 2	7 + 2	14 + 2	21 + 2	28 + 2	Average
Chitosan	0.04 ± 0.007 o	0.05 ± 0.008 no	0.06 ± 0.003 mn	0.07 ± 0.002 l	0.17 ± 0.017 de	0.078 d
Calcium chloride	0.07 ± 0.010 lm	0.08 ± 0.006 kl	0.10 ± 0.002 ij	0.12 ± 0.001 gh	0.18 ± 0.002 cd	0.11 c
Hydrogen peroxide	0.07 ± 0.010 lm	0.08 ± 0.015 kl	0.11 ± 0.006 hi	0.13 ± 0.001 fg	0.17 ± 0.001 de	0.112 c
Ozonated water	0.08 ± 0.009 kl	0.09 ± 0.014 jk	0.14 ± 0.007 f	0.16 ± 0.002 e	0.22 ± 0.007 b	0.138 b
Control	0.10 ± 0.008 ij	0.13 ± 0.017 fg	0.16 ± 0.011 e	0.19 ± 0.018 c	0.34 ± 0.023 a	0.184 a
Average	0.072 d	0.086 d	0.114 c	0.134 b	0.216 a	
Total sugar (mg/100g)	0 + 2	7 + 2	14 + 2	21 + 2	28 + 2	Average
Chitosan	0.71 ± 0.025 k–m	1.4 ± 0.021h	3.6 ± 0.021 a	3.6 ± 0.012 a	2.8 ± 0.009 cd	2.422 a
Calcium chloride	0.63 ± 0.005 lm	1.3 ± 0.018 hi	3.4 ± 0.131 a	3.1 ± 0.032 b	2.5 ± 0.028 e	2.186 b
Hydrogen peroxide	0.62 ± 0.021 lm	1.1 ± 0.055 ij	3.1 ± 0.009 b	2.7 ± 0.135 de	2.2 ± 0.002 fg	1.944 c
Ozonated water	0.56 ± 0.102 m	0.95 ± 0.172 jk	2.8 ± 0.166 cd	2.5 ± 0.242 e	1.6 ± 0.161 h	1.682 d
Control	0.54 ± 0.115 m	0.91 ± 0.052 j–l	2.4 ± 0.004 ef	2 ± 0.086 fg	1.1 ± 0.070 ij	1.39 e
Average	0.612 e	1.132 d	3.06 a	2.78 b	2.04 c	