

( )

# THE EFFECT OF UV-C LIGHT ON DECAY CONTROL AND POSTHARVEST QUALITY OF TOMATO FRUITS

( / / / ) UV-C

/ UV-C

C TSS TA pH UV-C

(TSS/TA= / ) UV-C

(TSS/TA= / )

L\* UV-C

(% / ) /

(% / )

UV-C :

.C

( )

( )

/ / :

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) UV-C / / /  
 ( /  
 ( UVX-254 nm UVX)

UV-C

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MT-99, ) TSS  
 (CR-400 b\* a\* L\* (0~90%Brix  
 pH. (Arctan b\*/a\*)  
 pH= / / (TA) pH  
 C  
 = % = % = % = % = % = % = % ) :  
 ( % = % = %  
 / / / ) UV-C  
 ( ) ( )  
 MSTATC SAS

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UV-C %  
 ( % ) / /  
 / ( % )  
 ( % ) ( % )

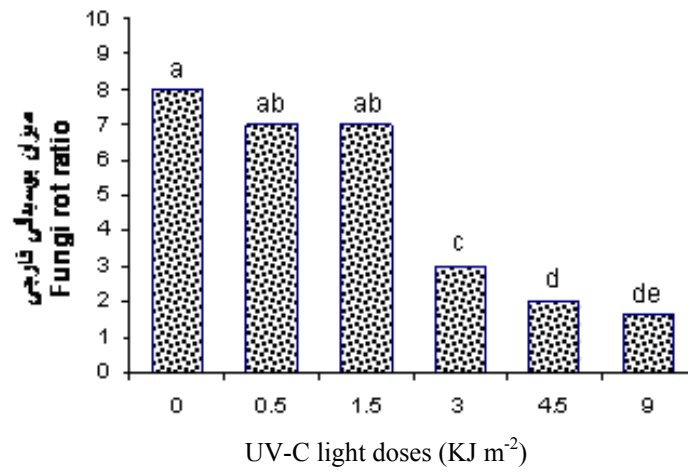


Fig. 1. Effect of different doses of UV-C light on tomato fruit rot at the end of storage period.

UV-C

UV-C	pH	pH	pH
0	4.2	4.2	4.2
0.5	4.2	4.2	4.2
1.5	4.2	4.2	4.2
3	4.2	4.2	4.2
4.5	4.2	4.2	4.2
9	4.2	4.2	4.2

UV-C	TA	TA	TA
0	0.8	0.8	0.8
0.5	0.8	0.8	0.8
1.5	0.8	0.8	0.8
3	0.8	0.8	0.8
4.5	0.8	0.8	0.8
9	0.8	0.8	0.8

UV-C	(TA)	(TA)	(TA)
0	0.8	0.8	0.8
0.5	0.8	0.8	0.8
1.5	0.8	0.8	0.8
3	0.8	0.8	0.8
4.5	0.8	0.8	0.8
9	0.8	0.8	0.8

UV-C	(TSS)	(TSS)	(TSS)
0	1.2	1.2	1.2
0.5	1.2	1.2	1.2
1.5	1.2	1.2	1.2
3	1.2	1.2	1.2
4.5	1.2	1.2	1.2
9	1.2	1.2	1.2

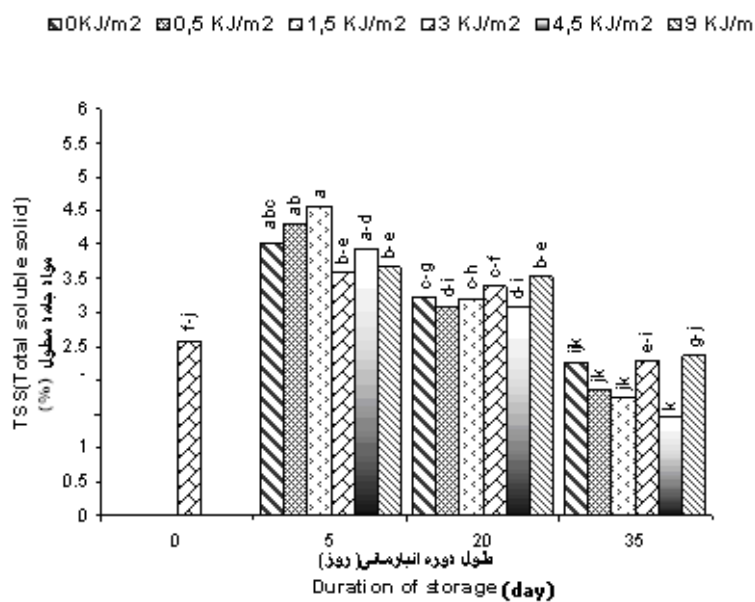


Fig. 2. Effect of UV-C light treatment on tomato fruit TSS during storage period.

TSS UV-C

(TSS/TA)

( )

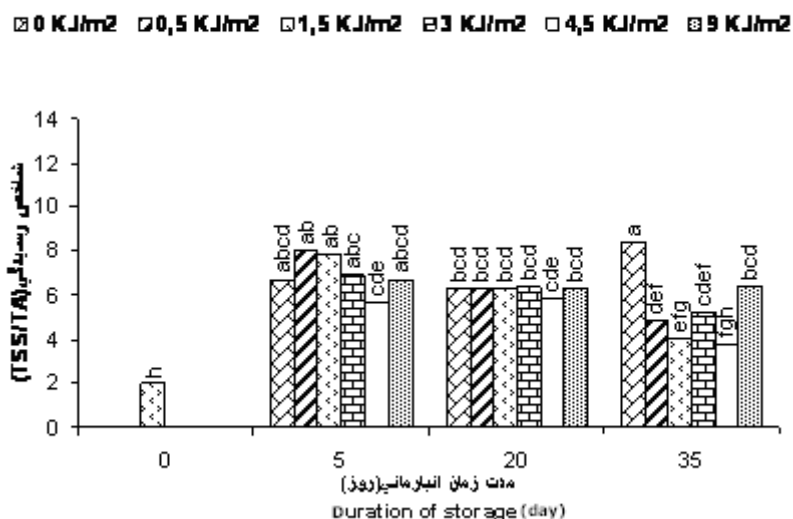


Fig. 3. Effect of UV-C light treatment on tomato fruit ripening index (TSS/TA) during storage period.

(TSS/TA)

UV-C

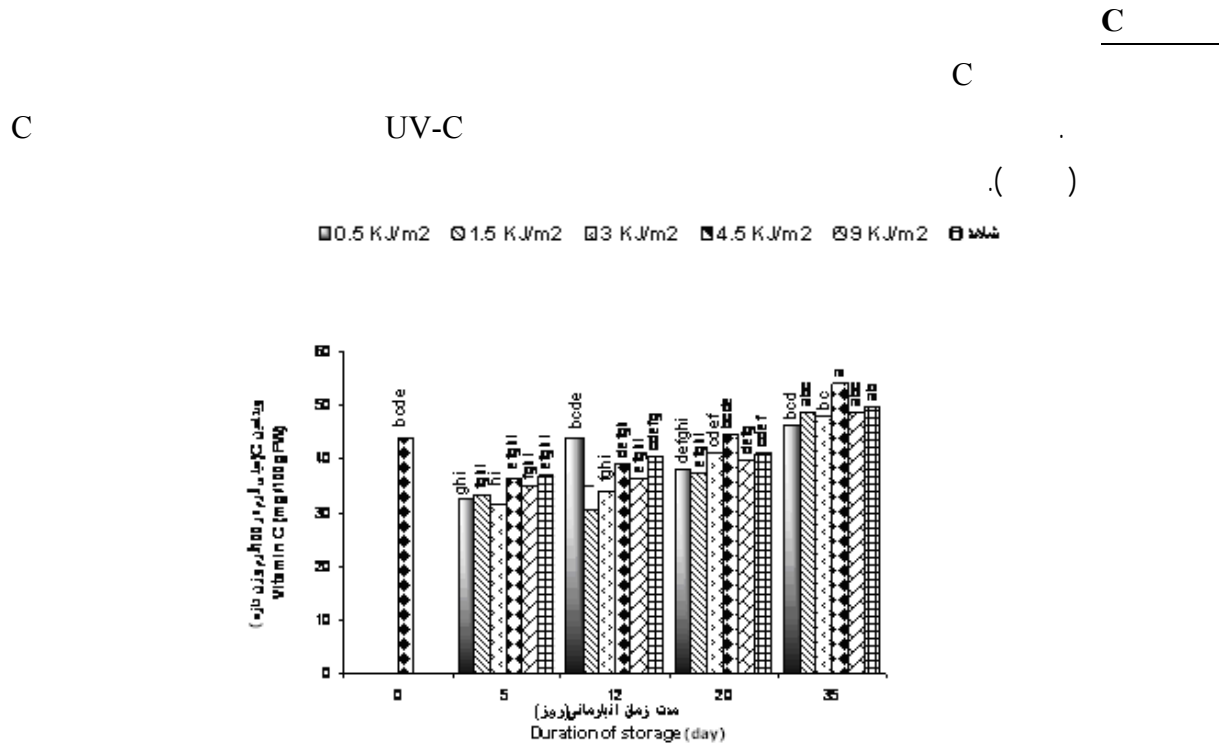


Fig. 4. Effect of UV-C light treatment on tomato fruit vitamin C during storage period.

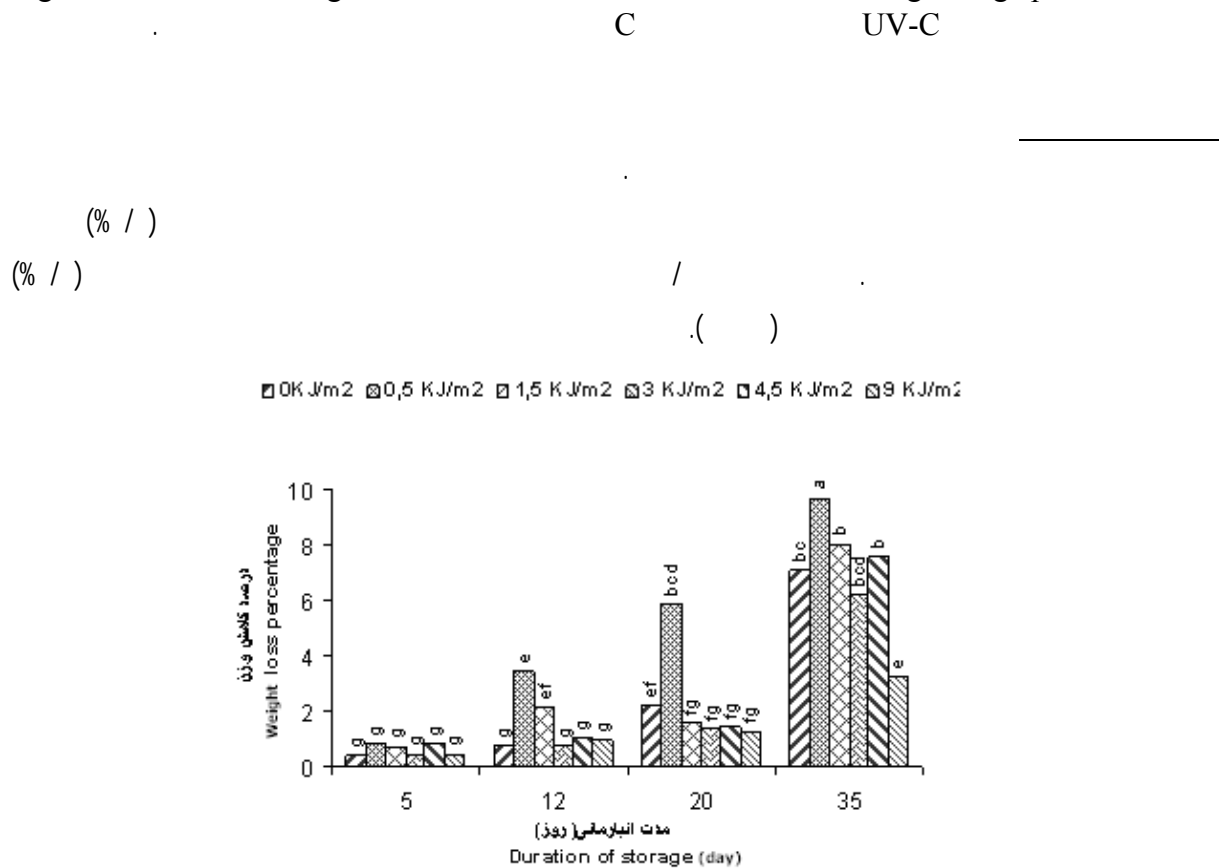


Fig. 5. Effect of UV-C light on tomato fruit weight loss during storage period.

UV-C

(L\*) UV-C  
 ) /  
 ) / / ( / / /  
 . a\* UV-C .( ) ( / /  
 )  
 a\* ( ) ( a\*  
 / /  
 / b\* UV-C  
 ( / / ) b\*  
 ( / / / / / / )  
 UV-C .( )  
 UV-C  
 UV-C  
 ( ) ( ) ( )  
 UV-C ( )  
 : UV-C  
 pH UV-C  
 TA / / pH  
 ( )  
 pH  
 .( )

Hue a\*, b\*, L\*,

UV-C

Table 1. The effect of UV-C on a\*, b\*, L\* and Hue angle indices of tomato fruit during storage period.

Parameter	Treatment (Kj m <sup>-2</sup> )	( )				
		At harvest	5	12	20	35
<b>L*</b>	0	39.6def <sup>†</sup>	40.67cde	40.5cde	40.48cde	38.87def
	0/5	42.37abc	39.02def	40.24cdef	40.13cdef	41cde
	1.5	41.33bcd	39.14def	38.43ef	40.13cdef	40.81cde
	3	43.7ab	39.41def	39.5def	40.27cdef	39.59def
	4.5	44a	39.17def	40.67cde	39.61def	38.8def
	9	40.07cdef	39.27def	40.4cdef	38.94def	37.7f
	<b>a*</b>	0	27.86ab	29.2a	29.8a	29.86a
0.5		27.3ab	26.82ab	27.07ab	28.39ab	27.87ab
1.5		30a	25.87abc	26.9ab	27.28ab	28.07ab
3		31a	26.97ab	25.85abc	26.53ab	25.4abc
4.5		29.54a	27.6ab	28.99a	25abc	24.12bc
9		29.5a	29.8a	25.9abc	19.51cd	21.98c
<b>b*</b>		0	25.35cdef	26.03cdef	26.5bcde	26.22cde
	0.5	28.8abc	24.57def	23.97efg	25.05cdef	27.73abcd
	1.5	26.5bcde	23.85def	24.07efg	25.36cdef	25.57cdef
	3	30a	24.89def	23.87efg	25.28cdef	23.67ef
	4.5	23.32efg	24.07def	29.7ab	25.9cdef	22.1g
	9	26.93bcde	23.47efg	25cdef	24.65def	19.99gh
	<b>Hue</b>	0	44.2a	43.67a	41.67a	45.33a
0.5		44.03a	41.13a	41a	42.17a	41.33a
1.5		44.23a	42.33a	41a	42.17a	42.17a
3		43.3a	41a	42.67a	41.67a	40a
4.5		44.23a	41.17a	42.33a	44a	40.67a
9		43.03a	41.1a	42a	41.17a	40.17a

† Means followed the same letter are not significantly different at 5% level using DMRT.

%

†



TSS

( )

TSS

TSS

( )

UV-C ( ) ( )

C

UV-C

UV-C C

( ) C ( )

C

(DHA) (RAA)

( )

/ (% / )

( ) (% / )

( )

UV-C (L\*)

L\* / /

L\* / UV-C

/

( ) ( / )

b\* a\* UV-C

( ) b\* a\*

UV-C

UV-C

## REFERENCES

2. Adrian, M., P. Jeandet, A.C. Douillet-Breuil, L. Tesson and R. Bessis. 2000. Stilbene content of mature *Vitis vinifera* berries in response to UV-C elicitation. *Agr. Food Chem.* 48:6103-6105.
3. Charles, M.T., S. Kalantari, R. Corcuff and J. Arul. 2005. Postharvest quality and sensory evaluation of UV-Treated tomato fruit. *Acta Hort.* 682:537-542.

4. Costa, L., R.A. Vicente, P.M. Civello, A.R. Chaves and G.A. Martinez. 2006. UV-C treatment delays postharvest senescence in broccoli florets. *Postharvest Biol. Technol.* 39:204-210.
5. Dhallewin, G., M. Schira, M. Pala and S. Ben-Yehoshua. 2000. Ultraviolet-C irradiation at 0.5  $\text{kJ/m}^2$  reduces decay without causing damage or affecting postharvest quality of 'Star Ruby' grapefruit (*C. paradise* Macf.). *Agr. Food Chem.* 48:4571-4575.
6. Douillet-Breuil, A.C., P. Jeandet, M. Adrian and R. Bessis. 1999. Changes in phytoalexin content of various *Vitis* Spp. in response to Ultraviolet-C elicitation. *Agr. Food Chem.* 47:4456-4461.
7. Fonseca, J.M and J.W. Rushing. 2006. Effect of Ultraviolet-C light on quality and microbial population of fresh-cut watermelon. *Postharvest Biol. Technol.* 40:256-261.
8. Gonzalez-Aguilar, G.A., R. Zavaleta-Gatica and M.E. Tiznado-Hernandez. 2007. Improving postharvest quality of mango 'Haden' by UV-C treatment. *Postharvest. Boil. Technol.* 45:108-116.
9. Hagen, S.F., G.I.A. Borge, G.B. Bengtsson, W. Bilger, A. Berge, K. Haffner and K.A. Solhaug. 2007. Phenolic contents and other health and sensory related properties of apple fruit (*Malus domestica* Borkh, cv. Aroma): Effect of postharvest UV-B irradiation. *Postharvest. Boil. Technol.* 45:1-10.
10. Lu, J.Y., C.M. Stevens, V.A. Khan, M. Kabwe and C.L. Wilson. 1991. The effect of ultraviolet irradiation on shelf-life and ripening of peaches and apples. *Food Quality,* 14: 299-305.
11. Marquenie, D., C.W. Michiels., A.H. Geeraerd., A. Schek., C. Soontjens., J.F. Van Impe and B. M. Nicolai. 2002. Using survival analysis to investigate the effect of UV-C and heat treatment on storage rots of strawberry and sweet cherry. *Food Micro.* 73:187-196.
12. Mercier, J., M. Baka, B. Reddy, R. Corcuff and J. Arul. 2001. Shortwave ultraviolet irradiation for control of decay caused by *Botrytis cinerea* in bell pepper: Induced resistance and germicidal effects. *J. Amer. Soc. Hort. Sci.* 126:128-133.
13. Mercier, J., D. Roussel, M.T. Charle and J. Arul. 2000. Systemic and local response associated with UV-C and pathogen-induced resistance to *Botrytis cinerea* in stored carrot. *J. Amer. Phytopathol. Soc.* 90:981-986.
14. Panhwar, F. 2006. Postharvest technology of fruits and vegetables. Retrieved from: <http://www.eco-web.com/editorial/060529.html>.
15. Shama, G. 2007. Process challenges in applying low doses of ultraviolet light to fresh product for eliciting beneficial hormitic responses. *Postharvest Boil. Technol.* 44:1-8.

16. Shishon, B.Y., V. Rodov, J. Jin Kim and S. Carmeli. 1992. Preformed and induced antifungal materials of citrus fruits in relation to the enhancement of decay resistance by heat and ultraviolet treatments. *Agr. Food Chem.* 45:1217-1221.
17. Stevens, C.M., V.A. Khan, J.Y. Lu., C.L. Wilson, E. Chalutz, S. Droby, M.K. Kabwe, Z. Haung, O. Adeyeye, L.P. Pusey and A.Y.A. Tang. 1999. Induced resistance of sweet potato to *Fusarium* root rot by UV-C hormesis. *J. Crop Protec.* 18:463-470.
18. Wright, K.P. and A.A. Kader. 1997. Effect of slicing and controlled-atmosphere storage on the ascorbate content and quality of strawberries and persimmons. *Postharvest Boil. Technol.* 10:39-48.