

# Effects of Delayed Cooling on Two Fresh Fig Cultivars

**Stephanie Dollahite, Vanessa Bremer, Gayle M. Crisosto, Carlos H. Crisosto, Ed Stover, and Louise Ferguson**

## Executive Summary

- Initial weight loss was reduced by delayed cooling period, for ‘Brown Turkey’ and ‘Kadota’ figs.
- Market life of ‘Brown Turkey’ and ‘Kadota’ figs was reduced by delayed cooling period.

## Materials and Methods

‘Brown Turkey’ and ‘Kadota’ figs were used to evaluate the effect of delayed cooling before cold storage on fruit quality. 440 ‘Brown Turkey’ and 596 ‘Kadota’ figs were used in this test. For each cultivar, one third of the fruit was stored at 32°F immediately after harvest (0 HD), one third of the fruit was delayed 3 hours at ambient outdoor temperature before storage at 32°F (3 HD), and one third of the fruit was delayed 6 hours (6 HD).

Weight loss measured on the first day (after 3 hours for 0 HD and 3 HD, and after 6 hours for 6 HD) and after 6 and 12 days at 0°C. Firmness and fruit quality parameters were evaluated after 6 and 17 days storage at 32°F and up to 4 days shelf life at 68°F after each storage period. Firmness was measured with a Fruit Texture Analyzer (FTA) (Güss, GS.14, Strand, South Africa) with a flat tip and expressed in pounds (lb). Firmness was measured on 20 fruit per cultivar after 6 days of storage and on 5 fruit per evaluation during shelf life; and 30 fruit per cultivar after 17 days of storage and on 15 fruit per evaluation during shelf life.

Fruit quality parameters measured were percent sound fruit (commercial fruit), percent fruit with decay, percent fruit with off color (color not typical for the cultivar), percent fruit with growth cracks, percent of fruit with splits, and percent of fruit with blemishes.

## Results

Initial weight loss was higher for the delayed cooling periods, 6 HD losing around 5.9% weight, 4.8% for 3 HD, and 0.6% for 0 HD (Fig. 1, 2).

Weight loss during cold storage was highest for 6 HD, intermediate for 3 HD, and lowest for 0 HD, for ‘Brown Turkey.’ A similar trend was displayed by ‘Kadota,’ although the final weight loss of 3 HD and 6 HD was not significantly different. This trend was consistent with in initial weight losses recorded for each treatment. It appears that the rate of weight loss was similar for all treatments during cold storage (Fig. 1, 2).

Firmness of both cultivars tended to decrease slightly with increased delayed cooling period. In 'Brown Turkey' after 17 days at 32°F +1 day at 68°F, and in 'Kadota' after 6 days at 0°C, 0 HD was significantly firmer than 6 HD, while in the other evaluations, there was not a statistically significant difference (Table. 1-4).

In both cultivars, 0 HD tended to produce a higher percent of sound fruit during cold storage life. After 6 days of storage at 0°C, 0 HD had a higher percent of sound fruit and 6 HD had a higher percent of fruit with decay, off color, growth cracks, splits and blemishes for 'Kadota,' although the lower percent with splits was 6 HD and the higher percent with splits was 0 HD, for 'Brown Turkey' (Tables 5-8).

In general, shorter periods of delayed cooling tended to produce a higher percent of sound fruit during shelf life. After 17 days of storage at 32°F +1 day at 68°F, 6 HD had a lower percent of sound fruit for 'Brown Turkey.' For 'Kadota,' after 17 days of storage at 0°C, 3 HD had a higher percent of fruit with off-color and after one day at 68°F, although 6 HD had the lower percent of off- color fruit. A slight difference from the general trend was found after 17 days of storage at 32°F +3 days at 68°F, 0 HD had a lower percent of fruit sound and higher of decay for 'Kadota' (Tables 5-8).

## **Conclusions**

- Initial weight loss was higher for the delayed cooling periods.
- Weight loss once the fruit is stored at 32°F increased proportionately, according to previous losses, for the three treatments.
- Firmness tended to decrease with increased delayed cooling period.
- In general, shorter periods of delayed cooling tended to produce a higher percent of quality fruit during storage life and shelf life.

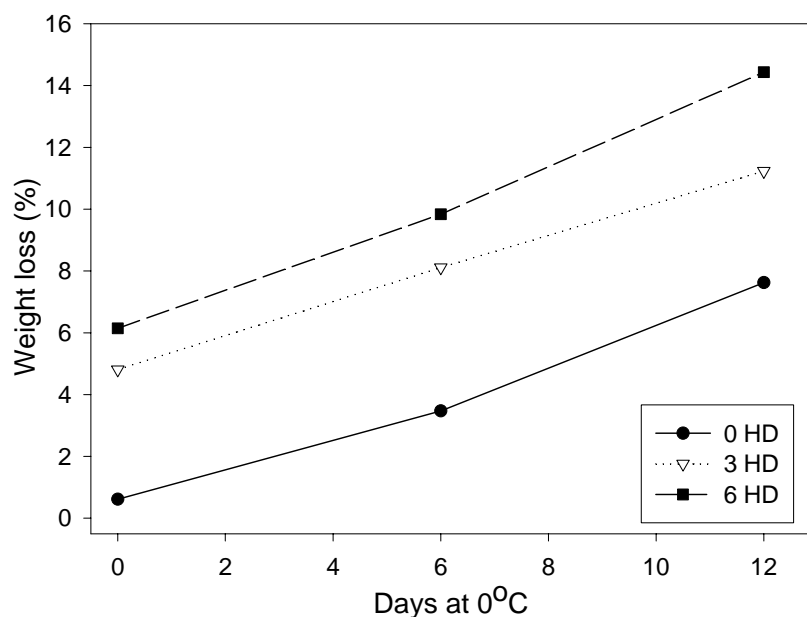


Fig 1. Effect of delayed cooling on weight loss of 'Brown Turkey' fig.  
 Treatments: 0 HD = no delayed cooling, stored immediately at 32°F, 3 HD = 3 hours in the sun before storage at 32°F, 6 HD = 6 hours in the sun before storage at 32°F.

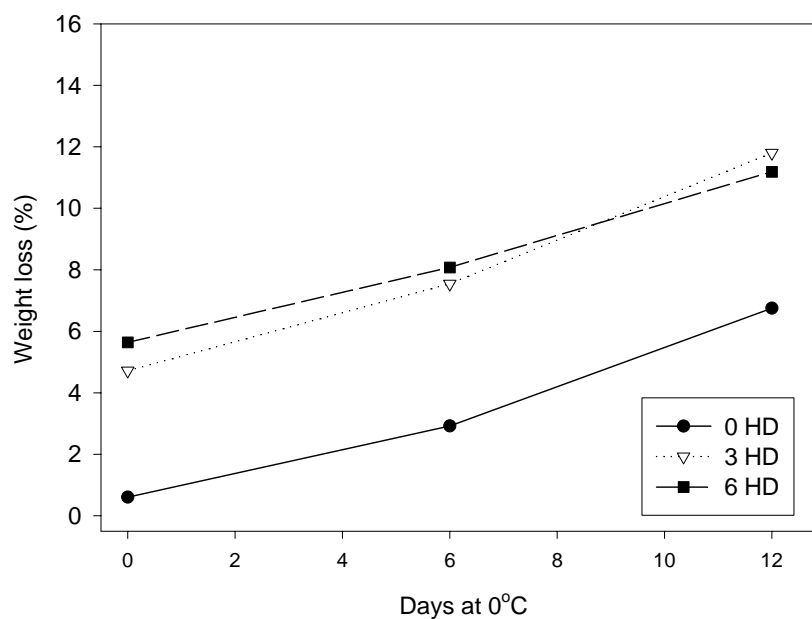


Fig 2. Effect of delayed cooling on weight loss of 'Kadota'.  
 Treatments: 0 HD= no delayed cooling, stored immediately at 32°F, 3 HD= 3 hours in the sun before storage at 32°F, 6 HD= 6 hours in the sun before storage at 32°F.

Table 1. Effect of delayed cooling on the firmness of ‘Brown Turkey’ figs measured immediately after 6 days of storage at 32°F and during shelf life (68°F).

Treatment <sup>z</sup> /Time	Firmness (lb) <sup>x</sup>		
	6 days at 0°C	6 days at 32°F +2 days at 68°F	6 days at 32°F +4 days at 68°F
0 HD	2.0	1.0	1.2
3 HD	2.0	1.0	1.0
6 HD	1.5	1.1	0.9
P-value	0.0749	0.8872	0.0955
LSD 0.05%	NS	NS	NS

<sup>z</sup> 0 HD= no delayed cooling, stored immediately at 32°F, 3 HD= 3 hours in the sun before storage at 32°F, 6 HD= 6 hours in the sun before storage at 32°F.

<sup>x</sup> ‘Brown Turkey’ firmness at harvest= 2.9 lb

Table 2. Effect of delayed cooling on the firmness of ‘Kadota’ figs measured immediately after 6 days of storage at 32°F and during shelf life (68°F).

Treatment <sup>z</sup> /Time	Firmness (lb) <sup>x</sup>		
	6 days at 0°C	6 days at 0°C +2 days at 68°F	6 days at 0°C +4 days at 68°F
0 HD	3.7 a	1.3	1.2
3 HD	3.0 ab	1.1	1.2
6 HD	2.4 b	0.9	1.1
P-value	0.0272	0.1976	0.9551
LSD 0.05%	1.0	NS	NS

<sup>z</sup> 0 HD = no delayed cooling, stored immediately at 32°F, 3 HD = 3 hours in the sun before storage at 32°F, 6 HD = 6 hours in the sun before storage at 32°F.

<sup>x</sup> ‘Kadota’ firmness at harvest = 3.3 lb

Table 3. Effect of delayed cooling on the firmness of ‘Brown Turkey’ figs measured immediately after 17 days of storage at 32°F and during shelf life (68°F).

Treatment <sup>z</sup> /Time	Firmness (lb) <sup>x</sup>		
	17 days at 0°C	17 days at 32°F +1 day at 68°F	17 days at 32°F +3 days at 68°F
0 HD	1.6	1.8 a	1.3
3 HD	1.5	1.5 ab	1.1
6 HD	1.0	1.2 b	1.0
P-value	0.912	0.0378	0.1332
LSD 0.05%	NS	0.4	NS

<sup>z</sup> 0 HD = no delayed cooling, stored immediately at 32°F, 3 HD = 3 hours in the sun before storage at 32°F, 6 HD = 6 hours in the sun before storage at 32°F.

<sup>x</sup> ‘Brown Turkey’ firmness at harvest = 2.9 lb

Table 4. Effect of delayed cooling on the firmness of ‘Kadota’ figs measured immediately after 17 days of storage at 32°F and during shelf life (68°F).

Treatment <sup>z</sup> /Time	Firmness (lb) <sup>x</sup>		
	17 days at 0°C	17 days at 0°C +1 day at 68°F	17 days at 0°C +3 days at 68°F
0 C	2.0	2.0	1.1
3 HD	3.0	2.8	1.6
6 HD	2.6	2.9	1.4
P-value	0.4098	0.3711	0.1182
LSD 0.05%	NS	NS	NS

<sup>z</sup> 0 HD = no delayed cooling, stored immediately at 32°F, 3 HD = 3 hours in the sun before storage at 32°F, 6 HD = 6 hours in the sun before storage at 32°F.

<sup>x</sup> ‘Kadota’ firmness at harvest = 3.3 lb

Table 5. Effect of delayed cooling on quality of 'Brown Turkey' fig measured immediately after 6 days of storage at 32°F and during shelf life (68°F).

Time/Treatment <sup>z</sup>	Sound (%)	Decay (%)	Off Color (%)	Growth Cracks (%)	Splits (%)	Blemishes (%)
6 days at 32°F +1 day at 68°F						
0 HD	85.0	0.0	7.5	0.0	7.5	10.0
3 HD	87.5	0.0	7.5	7.5	2.5	20.0
6 HD	75.0	0.0	7.5	5.0	0.0	17.5
6 days at 32°F +2 days at 68°F						
0 HD	70.0	30.0	15.0	0.0	12.5	17.5
3 HD	87.5	0.0	12.5	7.5	5.0	20.0
6 HD	75.0	5.0	22.5	5.0	0.0	17.5
6 days at 32°F +4 days at 68°F						
0 HD	27.5	45.0	72.5	0.0	12.5	17.5
3 HD	20.0	47.5	80.0	7.5	5.0	20.0
6 HD	12.5	57.5	82.5	5.0	0.0	17.5

<sup>z</sup> 0 HD = no delayed cooling, stored immediately at 32°F, 3 HD = 3 hours in the sun before storage at 32°F, 6 HD = 6 hours in the sun before storage at 32°F.

Table 6. Effect of delayed cooling on quality of 'Kadota' fig measured immediately after 6 days of storage at 32°F and during shelf life (68°F).

Time/Treatment <sup>z</sup>	Sound (%)	Decay (%)	Off Color (%)	Growth Cracks (%)	Splits (%)	Blemishes (%)
6 days at 32°F +1 day at 68°F						
0 HD	100.0	0.0	0.0	0.0	8.0	18.0
3 HD	98.0	0.0	2.0	2.0	10.0	10.0
6 HD	40.0	0.0	22.0	14.0	22.0	24.0
6 days at 32°F +2 days at 68°F						
0 HD	100.0	0.0	14.0	0.0	8.0	18.0
3 HD	66.0	0.0	34.0	2.0	10.0	10.0
6 HD	40.0	8.0	54.0	14.0	22.0	24.0
6 days at 32°F +4 days at 68°F						
0 HD	44.0	18.0	56.0	0.0	8.0	18.0
3 HD	26.0	36.0	66.0	2.0	10.0	10.0
6 HD	18.0	60.0	76.0	14.0	22.0	24.0

<sup>z</sup> 0 HD = no delayed cooling, stored immediately at 32°F, 3 HD = 3 hours in the sun before storage at 32°F, 6 HD = 6 hours in the sun before storage at 32°F.

Table 7. Effect of delayed cooling on quality of 'Brown Turkey' fig measured immediately after 17 days of storage at 32°F and during shelf life (68°F).

Time/Treatment <sup>z</sup>	Sound (%)	Decay (%)	Off Color (%)	Growth Cracks (%)	Splits (%)	Blemishes (%)
17 days at 0°C						
0 HD	100.0 a	0.0	0.0	6.7	2.2	18.9 b
3 HD	100.0 a	0.0	17.8	5.6	7.8	40.0 a
6 HD	82.2 b	3.3	23.3	11.1	7.8	36.7 a
P-value	0.0023	0.1252	0.1028	0.1518	0.2056	0.0014
LSD 0.05%	8.0	NS	NS	NS	NS	8.0
17 days at 32°F +1 day at 68°F						
0 HD	78.9 a	16.7	25.6	6.7	2.2	18.9 b
3 HD	75.6 a	15.6	15.6	5.6	7.8	40.0 a
6 HD	53.3 b	18.9	13.3	11.1	7.8	36.7 a
P-value	0.0061	0.8237	0.1772	0.1518	0.2056	0.0014
LSD 0.05%	13.1	NS	NS	NS	NS	8.0
17 days at 32°F +2 days at 68°F						
0 HD	17.3	72.0	20.0	8.0	2.7	22.7 b
3 HD	30.7	60.0	16.0	6.7	9.3	48.0 a
6 HD	22.7	65.3	13.3	13.3	9.3	44.0 a
P-value	0.4420	0.3892	0.5725	0.1517	0.2056	0.0014
LSD 0.05%	NS	NS	NS	NS	NS	9.6
17 days at 32°F +3 days at 68°F						
0 HD	0.0	100.0	21.3	8.0	2.7	22.7 b
3 HD	1.3	96.0	22.7	6.7	9.3	48.0 a
6 HD	4.0	90.7	17.3	13.3	9.3	44.0 a
P-value	0.5330	0.0898	0.5235	0.1517	0.2056	0.0014
LSD 0.05%	NS	NS	NS	NS	NS	9.6

<sup>z</sup> 0 HD = no delayed cooling, stored immediately at 32°F, 3 HD = 3 hours in the sun before storage at 32°F, 6 HD = 6 hours in the sun before storage at 32°F.

Table 8. Effect of delayed cooling on quality of ‘Kadota’ fig measured immediately after 17 days of storage at 32°F and during shelf life (68°F).

Time/Treatment <sup>z</sup>	Sound (%)	Decay (%)	Off Color (%)	Growth Cracks (%)	Splits (%)	Blemishes (%)
17 days at 0°C						
0 HD	82.6	0.8	12.9 b	6.1	3.8	11.4
3 HD	90.2	0.0	41.7 a	5.3	2.3	12.9
6 HD	87.9	0.0	61.0 b	6.8	4.6	11.4
P-value	0.2692	0.4219	0.0104	0.7706	0.8537	0.8386
LSD 0.05%	NS	NS	20.0	NS	NS	NS
17 days at 32°F +1 day at 68°F						
0 HD	58.3	18.9	39.4 a	6.1	3.8	11.4
3 HD	57.6	18.9	45.5 a	5.3	2.3	12.9
6 HD	59.9	8.3	22.0 b	6.8	4.6	11.4
P-value	0.9878	0.2026	0.0167	0.7706	0.8537	0.8386
LSD 0.05%	NS	NS	14.3	NS	NS	NS
17 days at 32°F +2 days at 68°F						
0 HD	8.6	55.6	74.4	6.8	4.3	12.8
3 HD	27.4	39.7	51.1	6.0	2.6	14.6
6 HD	25.6	42.7	44.4	7.7	5.1	12.8
P-value	0.1112	0.0819	0.1291	0.7792	0.8621	0.8186
LSD 0.05%	NS	NS	NS	NS	NS	NS
17 days at 32°F +3 days at 68°F						
0 HD	1.7 b	94.0 a	83.8	6.8	4.3	12.8
3 HD	11.2 a	79.3 b	77.7	6.0	2.6	14.6
6 HD	12.8 a	68.4 b	73.5	7.7	5.1	12.8
P-value	0.0499	0.0038	0.6208	0.7792	0.8621	0.8186
LSD 0.05%	9.15	11.0	NS	NS	NS	NS

<sup>z</sup> 0 HD = no delayed cooling, stored immediately at 32°F, 3 HD = 3 hours in the sun before storage at 32°F, 6 HD = 6 hours in the sun before storage at 32°F.