

# Investigating the Potential of Sulfur Dioxide (SO<sub>2</sub>) Applications for Decay Control of Brown and Yellow Color Figs

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**Objective** Evaluate decay incidence and phytotoxicity of different SO<sub>2</sub> concentration time (CT) applications on dark and yellow color figs.

## Materials and Methods

Individual trays of 'Brown Turkey' (dark skinned) and 'Kadota' (yellow skinned) figs were sealed in plastic fumigation container systems inside an environmental room at 68°F as described by Palou *et al.* (2002). Sulfur dioxide was applied for different periods of time calculated to result in treatments of 0, 25, 50 and 100 CT (ppm-hr). Actual CT was verified with passive dosimeters tubes placed in the boxes during the fumigation. The three SO<sub>2</sub> fumigation treatments and control were applied to 444 'Brown Turkey' and 520 'Kadota' (one quarter of the total number of fruit per cultivar were used for each treatment). After fumigation, figs were stored at 32°F for 13 days.

Fruit quality evaluations and firmness measurements were done after 6 and 13 days at 32°F and during shelf life up to 4 days at 68°F. Firmness was measured with a Fruit Texture Analyzer (FTA) (Güss, GS.14, Strand, South Africa) with a flat tip and expressed in pound-force (lbf). Firmness was measured on 15 fruit per cultivar after 13 days at 32°F and on 5 fruit per evaluation per shelf life. Fruit quality parameters measured were percent of sound fruit (commercial fruit), percent of fruit with decay, percent of fruit with "off color" (color not typical for the cultivar), percent of fruit with growth cracks, percent of fruit with splits, and percent of fruit with other blemishes. The percent of bleaching per fruit on 'Brown Turkey' was measured after 6 days.

## Conclusions

- The SO<sub>2</sub> treatments increased the percent of bleaching in the fruit (Table 1).
- After cold storage and during shelf life, the 25 ppm-hr treatment produced the highest percent of sound fruit in 'Brown Turkey' and 'Kadota' fig (Table 2, 3).
- In general, firmness was not affected by SO<sub>2</sub> fumigation in 'Brown Turkey' or 'Kadota' (Table 4, 5).

## References

- Palou, L., C.H. Crisosto, D. Garner, L.M. Basinal, J.L. Smilanick, and J.P. Zoffoli. 2002. Minimum constant sulfur dioxide emission rates to control gray mold of cold-stored table grapes. *American Journal Enology and Viticulture* 53(2):110-115.

Table 1. Effect of different concentrations of SO<sub>2</sub> fumigation on the percentage of bleaching of 'Brown Turkey' fig after 6 days.

Treatment <sup>X</sup>	Bleaching (%)
0 ppm-hr	6.1
25 ppm-hr	13.8
50 ppm-hr	10.1
100 ppm-hr	21.8

<sup>X</sup> SO<sub>2</sub> concentration x time

Table 2. Effect of different concentrations of SO<sub>2</sub> fumigation after 6 days at 32°F on the percentage of sound fruit of 'Brown Turkey' fig measured immediately after storage and during shelf life (68°F).

Treatment <sup>X</sup> /Time	Sound <sup>Y</sup> (%)			
	After 6 days at 32°F	6 days at 32°F +1 day at 68°F	6 days at 32°F +3 days at 68°F	6 days at 32°F +4 days at 68°F
0 ppm-hr	91.4	91.4	8.6	5.7
<b>25 ppm-hr</b>	<b>100.0</b>	<b>97.1</b>	<b>42.9</b>	<b>22.9</b>
50 ppm-hr	100.0	94.3	28.6	11.4
100 ppm-hr	97.1	85.7	11.4	5.7

<sup>X</sup> SO<sub>2</sub> concentration x time

<sup>Y</sup> Sound = Commercial fruit.

Table 3. Effect of different concentrations of SO<sub>2</sub> fumigation during 6 days at 32°F on the percentage of sound fruit of 'Kadota' fig measured immediately after storage and during shelf life (68°F).

Treatment <sup>X</sup> /Time	Sound <sup>Y</sup> (%)			
	After 6 days at 32°F	6 days at 32°F +1 day at 68°F	6 days at 32°F	
			+3 days at 68°F	6 days at 32°F +4 days at 68°F
0 ppm-hr	100.0	100.0	50.0	24.1
<b>25 ppm-hr</b>	<b>100.0</b>	<b>100.0</b>	<b>74.1</b>	<b>50.0</b>
50 ppm-hr	100.0	100.0	37.0	25.9
100 ppm-hr	100.0	100.0	53.7	44.4

<sup>X</sup> SO<sub>2</sub> concentration x time

<sup>Y</sup> Sound = Commercial fruit.

Table 4. Effect of different concentrations of SO<sub>2</sub> fumigation after 13 days at 32°F on the firmness and quality of 'Brown Turkey' fig measured immediately after storage and during shelf life (68°F).

Time/ Treatment <sup>X</sup>	Firmness <sup>Z</sup> (lbf)	Sound <sup>Y</sup> (%)	Decay (%)	Off color (%)
After 13 days at 32°F				
0 ppm-hr	1.4	--	--	--
25 ppm-hr	1.3	--	--	--
50 ppm-hr	1.1	--	--	--
100 ppm-hr	1.1	--	--	--
P-value	0.3616	--	--	--
LSD 0.05%	NS	--	--	--
13 days at 32°F+1 day at 68°F				
0 ppm-hr	--	25.6	35.6	22.2
25 ppm-hr	--	28.6	14.3	28.6
50 ppm-hr	--	28.9	15.6	21.1
100 ppm-hr	--	25.6	12.2	46.7
13 days at 32°F+2 days at 68°F				
0 ppm-hr	1.0	7.8	74.4	88.9
25 ppm-hr	1.1	5.7	71.4	88.6
50 ppm-hr	1.1	13.3	71.1	86.7
100 ppm-hr	0.8	14.4	61.1	82.2
P-value	0.1901	--	--	--
LSD 0.05%	NS	--	--	--
13 days at 32°F+4 days at 68°F				
0 ppm-hr	--	0.0	100.0	98.9
25 ppm-hr	--	0.0	100.0	100.0
50 ppm-hr	--	2.2	97.8	97.8
100 ppm-hr	--	5.6	94.4	94.4

<sup>X</sup> SO<sub>2</sub> concentration x time

<sup>Z</sup> 'Brown Turkey' firmness at harvest = 1.8 lb

<sup>Y</sup> Sound = Commercial fruit.

Table 5. Effect of different concentrations of SO<sub>2</sub> fumigation after 13 days at 32°F on the firmness and quality of 'Kadota' fig measured immediately after storage and during shelf life (68°F).

Time/ Treatment <sup>X</sup>	Firmness <sup>Z</sup> (lbf)	Sound <sup>Y</sup> (%)	Decay (%)	Off color (%)
After 13 days at 32°F				
0 ppm-hr	1.8	--	--	--
25 ppm-hr	1.7	--	--	--
50 ppm-hr	1.6	--	--	--
100 ppm-hr	1.6	--	--	--
P-value	0.9348	--	--	--
LSD 0.05%	NS	--	--	--
13 days at 32°F +1 day at 68°F				
0 ppm-hr	--	36.1	0.0	57.6
25 ppm-hr	--	72.2	0.0	27.8
50 ppm-hr	--	74.1	0.0	18.5
100 ppm-hr	--	64.8	0.0	31.5
13 days at 32°F +2 days at 68°F				
0 ppm-hr	1.3 a	34.7	4.9	67.4
25 ppm-hr	1.1 a	59.3	3.7	40.7
50 ppm-hr	0.6 b	59.3	0.0	40.7
100 ppm-hr	0.7 b	57.4	0.0	42.6
P-value	0.0007	--	--	--
LSD 0.05%	0.33	--	--	--
13 days at 32°F +4 days at 68°F				
0 ppm-hr	1.5	11.8	70.1	89.6
25 ppm-hr	1.3	16.7	50.0	83.3
50 ppm-hr	1.2	20.4	51.9	79.6
100 ppm-hr	1.2	16.7	57.4	83.3
P-value	0.8813	--	--	--
LSD 0.05%	NS	--	--	--

<sup>X</sup> SO<sub>2</sub> concentration x time

<sup>Z</sup> 'Kadota' firmness at harvest= 4 lb

<sup>Y</sup> Sound = Commercial fruit.



Fig 1. "Off color" blemish on 'Kadota' fig.