

(2) (2) (1)

2008 % 100 75
/ 1.5 1 2009
40
° 1±0
15 % 95-90

(1)

(2)

...

Postharvest Application of Acetic Acid Vapour Improved Quality and Storage Ability of "Baladi" Grape Cultivar During Cold Storage

Y. Sh. Al-Shoffe⁽¹⁾; A. Younes⁽²⁾ and I. Issa⁽²⁾

ABSTRACT

Grape *Vitis Vinifera* L. var. "Baladi" was fumigated with acetic acid at two concentrations 75 and 100 %, during two successive seasons 2008/2009, to study their effect comparing of sulfur dioxide pads and control. However, Sulfur dioxide pads were packed in 40 µm polyethylene bags thickness at two concentrations 1 and 1.5 g/ kg fruit. All treatments were stored at 0 ± 1 C and 90-95% RH for three months, in cooling units of pome and vine research department in Swaida. Chemical and physical properties were assessed every 15 days intervals, and in every time shelf life was measured for three days at room temperature and calculated as total loss %. Acetic acid treatment effected as well as or better than sulfur dioxide pads during cold storage. Which, acetic acid fumigation decreased weight loss %, decay % and berry shatter %, moreover, berry adherence strength (g) and berry firmness (kg/cm²) were increased, but T.S.S %, total acidity % and sugars % have not significant differences comparing to sulfur dioxide fumigation and control. In addition to that, the application of acetic acid increased shelf life in days by decreasing total loss %; also this treatment improved some sensory properties and was satisfied for consumer demand.

Key word: Grape, Acetic acid, Sulfur dioxide fumigation, Post harvest treatments, Quality, Cold storage.

⁽¹⁾ Pome and Vine Research Department, Horticultural Research Management, General Commission for scientific Agricultural research, Syria.

⁽²⁾ Horticulture Department, Faculty of Agriculture, Damascus University, Syria.

(*Vitis vinifera*, L.)

55.7

.(2007

)

336.7

.(Peacock and Smilanick, 1998; crisosto *et al.* 2001)

(*Botrytis cinerea*)

.(Smilanick *et al.*, 1990)

.(Lichter *et al.*, 2002; Yahia *et al.*, 1983)

(Taylor, 1993; Sarig *et al.*, 1996; Lisker *et al.*, 1996; Zoffoli *et al.*, 1999;
Gao *et al.*, 2003)

/ 10

(FDA,1986; Crisosto *et al.*, 1994)

(Sholberg *et al.*, 2000; Moyls *et al.*, 1996)

.(Nursten, 1970)

(Sholberg and Gaunce, 1995)

(Shelf life extension)

(Sholberg *et al.*, 1996) (Moyls *et al.*, 1996)
 (Liu *et al.*, 2002)
 (Sholberg, 1998; Chu *et al.*, 1999, 2001)
 (Sholberg *et al.*, 2000)

%100 75

: -1

(2007)
 2009/2008
 Greasy and Greasy,) %0.34 %17.4 (2009
 % 95-90 ° 1±0
 5 (10×30×40)
 5) (2) (1) :
 (4) (Na₂S₂O₅ 7.5) (3) (Na₂S₂O₅
 (5) 1- 8 % 75
 1- 8 % 100
 90×75×100
 40 (60×40) ° 1±0
 %95-90
 (Shelf life extension)
 90 75 60 45 30 15
 5)
 (

:(Weight loss and spoilage assessment) -2

15 (Weight loss %)

$$100 \times \frac{\text{Weight loss}}{\text{Initial weight}} = \% \text{ (Decay\%)}$$

(Berry shatter%)

(Berry adherence strength)
 (Digital Pocket Scale-Furi-China)
 $\frac{\text{Berry firmness}}{\text{Berry firmness}} \times 100$ (FT 327, Italy)
 .El-Mahdi (1960) (Shelf life extension)

:(Chemical Properties) -3

(Schmidt + Haensch, Germany)
 0.1 20
 .(A.O.A.C,1990)
 50
 .(A.O.A.C.,1975)

:(Hedonic Scale) -4

()
 4 5 5 1
 .(Poste *et al.*, 1991) 1 2 3

:(Statistical analysis) -5

0.05
 MSTATC – ANOVA (Duncan, 1955)
 (2009-2008)

:

:(weight loss) % -1

(1)

% 2.7 2.5 2.2 1.3 0.8 0.4

90 75 60 45 30 15

90

4 3 2 1 % 1.3 1.2 1.2 1.2 2.7

5

(Sholberg *et al.*, 1996)

:(Decay) % -2

(1)

0.65 0.32 0.24 0 0

90 75 60 45 30 15 %0.90

 %75

30 15

75 60 45 5 4 3 2

90

0.90 0.77 0.76 12.7

5 4 3 2 1 %0.93

Sholberg and Gaunce,)

(1995

651 % 89 494 %43

Venditti *et al.*, (Sholberg *et al.*, 1996) ° 5-2

2009

AL-Bachir (1998)

(1)

(%) (%)
% 95-90 ° 1 ± 0

(2009/2008)

| % | | | | | | % | | | | | | المعاملات |
|-----------|-----------|-----------|-----------|------------|------------|----------|----------|----------|----------|----------|-----------|-----------|
| () | | | | | | | | | | | | |
| 90 | 75 | 60 | 45 | 30 | 15 | 90 | 75 | 60 | 45 | 30 | 15 | |
| 12.7 A | 7.83 A | 4.43 A | 1.96 A | 0.77 A | 0.17 A* | 2.7 A | 2.5 A | 2.2 A | 1.3 A | 0.8 A | 0.4 A* | 1** |
| 0.76 B | 0.66 B | 0.55 B | 0.36 B | 0.19 BC | 0.15 A | 1.2 B | 0.9 B | 0.7 B | 0.4 B | 0.2 B | 0.01 B | 2 |
| 0.77 B | 0.66 B | 0.36 B | 0.30 B | 0.40 B | 0.14 A | 1.2 B | 1 B | 0.7 B | 0.5 B | 0.1 B | 0.03 B | 3 |
| 0.90 B | 0.65 B | 0.32 B | 0.24 B | 0 C | 0 B | 1.2 B | 0.9 B | 0.6 B | 0.5 B | 0.3 B | 0.07 B | 4 |
| 0.93 B | 0.65 B | 0.35 B | 0.29 B | 0.01 C | 0 B | 1.3 B | 1.1 B | 0.9 B | 0.6 B | 0.3 B | 0.03 B | 5 |
| 0.46 | 0.22 | 0.22 | 0.13 | 0.32 | 0.06 | 0.52 | 0.51 | 0.50 | 0.46 | 0.36 | 0.21 | L.S.D |

.005

(Na₂S₂O₅ / 1.5) (3) (Na₂S₂O₅ / 1) (2) (1) **
100 (5) 1- 8 % 75 (4)
1- 8 %

:(Berry shatter) % -3

(2)

1.8 1.1 (3)

90 75 60 45 30 15 % 4.5 4.1 3.8 2.9

15

45 (5) %100

1 % 2.9 3.4 3.8 3.1 4.1

60 5 4 3 2

30 %75

(Sholberg *et al.*, 1996)

.494

:(Berry adherence strength) () -4

550

499 509 520 524 (2)

...

90 75 60 45 15:30 468 481
 .%75

90 45 30 %100 75

509 520 478 472 427

5 4 3 2 1 30
 %75

90 75 60

(Sholberg *et al.*, 1996)

(2)

()
) % 95-90 ° 1 ± 0
 .(2009/2008

| % | | | | | | | % | | | | | | | المعاملات |
|-------|-------|-------|-------|-------|-------|-----|------|------|------|------|------|------|-------|-----------|
| () | | | | | | | | | | | | | | |
| 90 | 75 | 60 | 45 | 30 | 15 | 0 | 90 | 75 | 60 | 45 | 30 | 15 | | |
| 290 | 330 | 350 | 419 | 427 | 499 | 550 | 5.2 | 4.9 | 4.1 | 3.5 | 2.3 | 1.2 | 1** | |
| D | D | C | C | C | B* | | A | A | A | A | A | A* | | |
| 357 | 420 | 452 | 462 | 472 | 505 | 550 | 4.1 | 3.9 | 3.1 | 2.5 | 1.7 | 0.8 | 2 | |
| C | C | B | B | B | B | | BC | BC | CD | BC | BC | A | | |
| 362 | 429 | 456 | 471 | 478 | 513 | 550 | 4.5 | 4.1 | 3.8 | 2.9 | 1.8 | 1.1 | 3 | |
| C | BC | B | B | B | AB | | B | B | AB | B | B | A | | |
| 468 | 481 | 499 | 509 | 520 | 524 | 550 | 3.8 | 3.6 | 3.4 | 2.7 | 1.3 | 0.9 | 4 | |
| A | A | A | A | A | A | | C | CD | BC | BC | C | A | | |
| 418 | 443 | 474 | 496 | 509 | 520 | 550 | 3.7 | 3.3 | 2.9 | 2.3 | 1.5 | 0.7 | 5 | |
| B | B | B | A | A | A | | C | D | D | C | BC | A | | |
| 25.54 | 16.92 | 22.58 | 13.65 | 12.86 | 13.19 | | 0.45 | 0.45 | 0.44 | 0.40 | 0.44 | 0.47 | L.S.D | |

.0.05
 (Na₂S₂O₅ / 1.5) (3) (Na₂S₂O₅ / 1) (2) (1)**
 (5) 1- 8 % 75 (4)
 .1- 8 % 100

:(Berry firmness)² / -5
 (3)

² / 1.3 1.3 1.3 1.4 1.6 1.9 2.5 (2)
 90 75 60 45 30 15

2.3 1 1.6 1.6 1.5 1.4 1.5 45 5 4
 (Sholberg *et al.*, 1996)

(² /) (3)

%
 (2009/2008) % 95-90 ° 1± 0

| % | | | | | | | (/) | | | | | | | المعاملات |
|-----------|-----------|-----------|-----------|------------|------------|------|-------|----------|----------|----------|----------|-----------|-----|-----------|
| 90 | 75 | 60 | 45 | 30 | 15 | 0 | 90 | 75 | 60 | 45 | 30 | 15 | 0 | |
| 19.2 A | 17.1 A | 16.1 A | 15.2 A | 14.4 A | 13 A* | 11.7 | 1 A | 1.2 A | 1.3 A | 1.5 A | 1.7 A | 2.1 A* | 2.5 | 1** |
| 15.4 B | 14.9 B | 14.2 B | 13.5 B | 12.7 BC | 12.1 BC | 11.7 | 1.3 A | 1.3 A | 1.3 A | 1.4 A | 1.6 A | 1.9 A | 2.5 | 2 |
| 15.3 B | 14.5 B | 14.3 B | 13.6 B | 12.9 B | 12.3 B | 11.7 | 1.3 A | 1.5 A | 1.4 A | 1.5 A | 1.7 A | 2 A | 2.5 | 3 |
| 14.8 C | 13.8 C | 12.7 D | 12.5 C | 12.3 CD | 12 BC | 11.7 | 1.4A | 1.5 A | 1.5 A | 1.6 A | 1.8 A | 2.1 A | 2.5 | 4 |
| 14.5 C | 13.6 C | 13.1 C | 12.4 C | 12.3 D | 11.9 C | 11.7 | 1.4 A | 1.5 A | 1.6 A | 1.6 A | 1.9 A | 2.2 A | 2.5 | 5 |
| 0.40 | 0.39 | 0.35 | 0.36 | 0.37 | 0.37 | | 0.49 | 0.52 | 0.45 | 0.46 | 0.44 | 0.41 | | L.S.D |

.05
 (Na₂S₂O₅ / 1.5) (3) (Na₂S₂O₅ / 1) (2) (1)**
 (5) 1- 8 % 75 (4)
 1- 8 % 100
 (3) : (Shelf life extension) -6

13.1 12.4 12.3 11.9 11.7 (5)
 90 75 60 45 30 15 % 14.5 13.6
 (5)
 (5) (4) 60 45 30 15
 90 75
 2 1 % 13.8 13.6 14.5 14.9 17.1

:(Total soluble solids) % -1

(4)

(3)

17.9 17.8 17.7 17.5 17.4

90 75 60 45 30 15

% 18.1 18

%17.5 17.8 17.9 17.7 17.7

5 4 3 2 1

(Sholberg et al., 1996)

(4)

% %

) % 95-90 ° 1 ± 0

.(2009/2008

| نسبة الحموض القابلة للمعايرة % | | | | | | | نسبة المواد الصلبة الذاتية الكلية % | | | | | | | المعاملات |
|--------------------------------|------|------|------|------|------|------|-------------------------------------|------|------|------|------|------|------|-----------|
| مدد التخزين المبرد (يوم) | | | | | | | | | | | | | | |
| 90 | 75 | 60 | 45 | 30 | 15 | 0 | 90 | 75 | 60 | 45 | 30 | 15 | 0 | |
| 0.29 | 0.29 | 0.30 | 0.30 | 0.33 | 0.34 | 0.34 | 17.9 | 17.9 | 17.7 | 17.5 | 17.4 | 17.4 | 17.4 | 1** |
| A | A | A | A | A | A* | A | A | A | A | A | A | A* | A | |
| 0.30 | 0.32 | 0.33 | 0.34 | 0.34 | 0.34 | 0.34 | 17.9 | 17.8 | 17.7 | 17.6 | 17.3 | 17.4 | 17.4 | 2 |
| A | A | A | A | A | A | A | A | A | A | A | A | A | A | |
| 0.30 | 0.31 | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 | 18.1 | 18 | 17.9 | 17.8 | 17.7 | 17.5 | 17.4 | 3 |
| A | A | A | A | A | A | A | A | A | A | A | A | A | A | |
| 0.30 | 0.30 | 0.30 | 0.30 | 0.34 | 0.34 | 0.34 | 18 | 17.9 | 17.8 | 17.6 | 17.6 | 17.5 | 17.4 | 4 |
| A | A | A | A | A | A | A | A | A | A | A | A | A | A | |
| 0.29 | 0.31 | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 | 17.8 | 17.6 | 17.5 | 17.5 | 17.4 | 17.4 | 17.4 | 5 |
| A | A | A | A | A | A | A | A | A | A | A | A | A | A | |
| 0.02 | 0.06 | 0.06 | 0.06 | 0.06 | 0.02 | | 0.50 | 0.44 | 0.55 | 0.43 | 0.43 | 0.36 | | L.S.D |

.05

(Na₂S₂O₅ / 1.5)(3) (Na₂S₂O₅ / 1)

(2)

(1) **

(5) 1- 8 % 75

.1- 8 % 100

(4) : (Titratable acidity) % -2
 %
 0.29 0.30 0.30 0.33 0.34
 90 75 60 45 30 15 % 0.29
 % 0.29 0.30 0.30 0.30 0.29
 Pesis and Frenkel,) 5 4 3 2 1
 (1989

(Sholberg *et al.*, 1996)

: (Mono sugars) % -3
 (5) %
 .%15.7
 15.8 15.7 (4)
 90 75 60 45 30 15 %16.1 16.1 16 15.9
 30
 5 4 3 2 1 % 15.7 15.8 15.9 15.7 15.7

%99 ()
 -12 (Winkler *et al.*, 1974) %27

(Sholberg *et al.*, 1996)

(5)

: (Berry appearance) -1

...

3.9 3.6

5 4 3 2

3.5 3.3

:(Berry color) -2

et al., 1996)

(Sholberg

:(Berry firmness) -3

%100

%75

:(Berry juiciness) -4

3.9 4 3.8 3.9 3.7

5 4 3 2 1

%

(5)

) %95-90 ° 1 ± 0

.(2009/2008

| *** (5-1) | | | | | | % | | | | | | | |
|------------|----------|----------|-----------|----------|-----------|-----------|------------|-----------|-----------|-----------|------------|------|-------|
| () | | | | | | | | | | | | | |
| 90 | | | | | | 90 | 75 | 60 | 45 | 30 | 15 | 0 | |
| 3.6 B | 3 B | 3.7 A | 3.5 BC | 4.2 A | 4.3 A | 16 A | 16 AB | 15.9 A | 15.8 A | 15.7 A | 15.7 A* | 15.7 | 1** |
| 3.4 B | 2.9 B | 3.9 A | 3.7 AB | 3.2 B | 3.6 BC | 16 A | 16 AB | 15.9 A | 15.8 A | 15.7 A | 15.7 A | 15.7 | 2 |
| 4.2 A | 1.8 C | 3.8 A | 3.3 CD | 3.5 B | 3.9 AB | 16.3 A | 16.3 A | 16.1 A | 16 A | 15.9 A | 15.7 A | 15.7 | 3 |
| 2.8 C | 4 A | 4 A | 3.1 D | 3.3 B | 3.3 C | 16.1 A | 16.1 AB | 16 A | 15.9 A | 15.8 A | 15.7 A | 15.7 | 4 |
| 3.5 B | 4 A | 3.9 A | 3.9 A | 3.4 B | 3.5 BC | 16 A | 15.8 B | 15.8 A | 15.8 A | 15.7 A | 15.7 A | 15.7 | 5 |
| 0.39 | 0.43 | 0.46 | 0.37 | 0.34 | 0.43 | 0.47 | 0.37 | 0.45 | 0.43 | 0.39 | 0.36 | | L.S.D |

.0.05

(Na₂S₂O₅ / 1.5)

(3) (Na₂S₂O₅ / 1)
(5) 1- 8 % 75

(2)

(1) **

(4)

% 100

=1 = 2 = 3 = 4 = 5

:(Berry taste and flavor) -5

1- 1.5 :(Pedicel color) -6

3 5 1

4

(Sholberg *et al.*, 1996)

(FAO/WHO,1973)

(Sholberg *et al.*, 1996)

(Luvisi *et al.*, 1992)

% 100 75

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