Biological Forum – An International Journal **7**(1): 1806-1810(2015)

ISSN No. (Print): 0975-1130
ISSN No. (Online): 2249-3239

The Effects of Meta B Sodium Sulfite Sheets on the System of Decay Control of Sahebi and La'al dried raisins in Cold Store

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(Received 06 May, 2015, Accepted 07 June, 2015)
(Published by Research Trend, Website: www.researchtrend.net)

ABSTRACT: In order to study the effects of sheets containing Meta B sodium sulfite on the system of decay control of la'al and Sahebi dried raisins, in 2010 this research based on a completely random design was conducted in the cold store of Vocational Training Center of Shirvan in 3 repetitions and 3 courses of treatment as a factorial test. The harvest of grapes was done on September 11. After precooling and separating the contaminated, rotten, and infected berries, some sheets of grape guards with Meta B sodium sulfite at 7%, 10% and 13% concentration were placed in the bottom and middle of every box containing 5 kg of grapes. Boxes were carried to the cold store in zero temperature at relatively 90% and 95% of humidity and kept there for 12 weeks. Once every 4 weeks some samples were randomly chosen and their characters like peduncle length, length and width bunch, length and width of berry, mean weight of berry, and bunch weight were measured. At the end of the 12th week the remaining sulfur of the samples was measured.
Results of this research indicated that the percentage of fungal infection and decay percentage were significantly decreased by using sheets of Meta B sodium sulfite. It was also shown that using these sheets could prevent bunches from weight loss. Findings in this research reveal that sodium Meta B sulfite sheets of 13% led to a better maintenance of qualitative and quantitative characters of grapes. And by the end of storage period the residual sulfite was within the standard range and the maintenance of these characters in Thompson seedless dried grapes was better than Sahebi and la'al ones.

Key word: grape, fungi infection, decay control, Meta B sodium sulfite

INTRODUCTION

Grape is one of the most important Garden products in Iran and world and all commercial varieties in Iran are like this kind. According to the 2005 World Food grocery, the area under cultivation is 7320445 Hectare that is Seventh place in the world in Iran. Grape production in the world is about 66413393 Ton with operation average 9072 Kilogram that Iran is in Sixth place because of 2/8 million Ton production. In addition, according to the published statistics by Ministry of agriculture in 1380, Fars by having 26 percent and Khorasan with19 percent of the area's vineyards are in first and second level respectively. But in terms of the rate of production, Khorasn has the highest production among Iran's Provinces. Fungal diseases of crops after harvest are the most important factor in degradation and corruption and economically, losses due to disease is very important. The economic value of losses after harvesting fruit is more than harvesting in gardens, because for the cost of post-harvest losses of fruits, the cost of harvesting, transporting and keeping should be added to garden fee. In fact, more money is spent for post-harvest fruits than fruits in garden.

Todays, the releasing sheets of sulfur dioxide gas have been used for controlling the fungal decay, reducing browning of wood cluster and increasing the storage life of the grapes in springhouse and during the transporting. Ruby grape is one of the fresh grapes that has been grown in North Khorasn. Since ruby grape has large juicy and good taste grain, its price is high. Sahebi grape is also expensive because of marketability and high quality and raisin grapes are seedless. Sharayie et al (1383) used grippe guard sheet with concentrations of 4, 7 and 10% sodium sulfite in two rows and in bottom and middle of box for keeping grapes in fridge. Their results indicated that rot and fungal infection was decreased because of using these sheets and the amount of Vitamin C was increased because of sodium metabi sulphite. The remaining amount of sulfur dioxide was standard.

Chink reported that using the releasing sheets of sulfur dioxide in boxes prevents the mushroom growing and changing color of wood cluster.

Winker and colleagues reported that the using of sulfur dioxide in the cold storage of grapes controls gray mold rot, Alternaria and disinfects sores caused during picking and packing entirely.

The purpose of this study was to increase preserving ruby grapes with standard characters, to reduce decay fungi and also prevents the boosting remaining sulfite in fruit.

MATERIALS AND METHODS

For planning, a vineyard in Were village Shirvan city was selected. In 20 Shahrivar 1389, harvest was done in the morning and then was sent to the shade. For 6 to 24 hours were kept in 4 to 5 C. immediately after harvest, Fungal contamination of fruits, berry rot, peduncle length, cluster length and width, length and width of the cubes, the average weight of a berry, cluster weight were measured. Before inserting in boxes, dirty green and mashed bean/ grain were arranged in terms of size and density.

Boxes and refrigerator were disinfected before using. The sheets and plates containing the meta sodium sulfite with 13, 10, 7% concentration were inserted in two rows at the bottom of the boxes in Absorb Pood paper.

5kg grapes were placed in each plastic box. Attendance boxes were kept in zero degrees Celsius and relative humidity of 90% during 12 weeks and every 4 weeks they were randomly sampled and tests were done in accordance with the following methods:

-To calculate the weight of clusters, one cluster had been selected from each testing unit and was put in perforated freezer bag and then in the boxes. In the process of measuring, the clusters characteristics were recorded.

-To calculate the contamination of beans/ grains, 30 grains or beans had been selected from each testing unit according to their symptoms of yeast infection and the number of unclean beans/grains.

-Measuring the remained sulfite of fruits was done by oxidation titration method - Rehabilitation

At the end of the storing period, the remained sulfite (So3-2) of fruits was measured by indirect method of iodiometry (iodiometric). Finally, the result of measuring was analyzed and estimated by MSTAT-C computer software.

Table 1: Quantity Properties of freshly harvested grapes (average 30 clusters).

Bean weight	Cluster weight	Bean/grain width cm	Bean/grain length cm	Cluster width cm	cluster length cm	Peduncle length cm	The percentage of bean/grain's rot	The percentage of fungal infection	Quantity property / number
375/2	184	1/30	1/50	11/34	22/68	3/18	1	1	raisin
212/3	381	1/81	1/96	10/44	23/25	5	2	2	Ruby
273/2	471	1/68	2/33	13/26	13/26	3/25	2	2	Sahebi

Table 2: Analysis of evaluating variance in test.

Changes sources	Freedom degree	Fresh grapes rot "percent"	the beans decay after the Week 4 "percent"	the beans decay after the Week 8 "percent"	the beans decay after the Week 12 "percent"	Weight loss after 12 weeks 'percent'	Remained sulfite after 12 weeks
%CV		26.19	18.86	7.39	6.83	6.12	2.62
Test error	24	0.320	0.01	0.528	1.11	0.51	0.01
number ×density	6	0.07^{ns}	0.00^{ns}	526.13^{**}	712.76^{**}	17.69^{**}	1.21^{**}
Numbers	2	1.68^{**}	0.69^{**}	546.58^{**}	778.03^{**}	45.52**	12.84^{**}
density	3	0.12^{ns}	0.04^{*}	2692.07^{**}	5783.63^{**}	813.26**	42.97^{**}

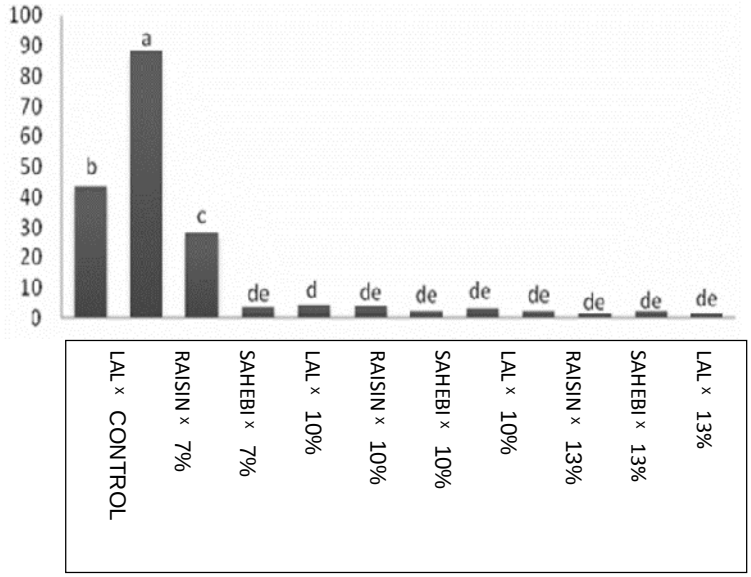
RESULTS AND DISCUSSION

A. Percentage of decay

The results of statistical analysis showed that independent effect of sodium meta-B sulfite sheets and the type on decay percentage in 1% probability was meaningful. Polar effects of density and the types on the grapes qualitative and quantitative characteristics concerning the median comparison was the most percentage of decay in the type Sahebi with the instance care was acquired 33/88 and the lowest percentage of decay in the type Keshmeshi in the treatment 13% of solution of sodium meta-b sulfite-B was acquired 33/1. These findings corresponds with a report by Palo and colleagues Sharayei who reported that using Grip Guard sheets reduce fungal infection and bean decay. Ooztork also said that when reported when the gripe guard sheets are placed inside the grape box, released the sulfur dioxide which prevent fungal growth, especially botrytis protects the green color. Consider that the gripe guard clusters release sulfur dioxide which causes to disinfect beans and controls the fungus that act even in low temperature of refrigerator.

Table 3: Comparing the average effects of different concentrations of Meta-b sodium Sulfite with the kind on qualitative and quantitative properties.

4.70 -d	3.34 -g	1.66 -de	1.00- d	0.65- bcd	1.73- a	ruby×13%
6.75 -b	7.02 -f	2.33- de	1.00- d	0.80- abc	1.56 -a	sahebi×13%
7.69 -a	1.43 -h	1.33 -e	1.00 -d	0.33 -d	1.13- a	raisin×13%
3.37- f	10.18 -e	2.33-de	1.00 -d	0.66-bc	1.73- a	ruby×10%
4.78- d	7.97 -f	3.00 -de	1.33 -d	0.96 -ab	1.63 -a	sahebi×10%
6.21- c	2.40 -gh	2.33- de	1.00 -d	0.50 -cd	0.96 -a	raisin×10%
2.47- g	9.81 -e	4.00 -de	1.33- d	0.73 -abc	1.86- a	ruby×7%
3.88- e	12.40- d	4.33-d	1.66- d	1.03 -a	1.67 -a	sahebi×7%
4.54- d	10.54- e	3.66-de	1.33-d	0.50 -cd	1.43 -a	raisin×7%
1.03-i	22.68 -c	28.33-c	23.33-b	0.68-cd	2.10-a	ruby×Shahed
1.20 -hi	27.93 -a	88.33-a	66.33-a	0.95-ab	1.90-a	Sahebi*Shahed
1.34 -h	25.48 -b	43.67-b	17.67-c	0.50 -cd	1.03-a	raisin×shahed
- %1	- %1	%1	%1	%1	%1	Quality and quantity
Remained sulfite after 12 weeks	Weight loss after 12 weeks 'percent'	the cubes decay after the12 Week "percent"	the cubes decay after the 8 Week "percent"	the cubes decay after the Week 4 "percent"	Fresh grapes rot "percent"	density ×number



Grains Rottenness

B. Weight Loss Percent

Loss weight showed when comparing to Shahed that the independent effect of meta-b sodium sulfite density and the type was meaningful in loss weight in probability of 1%.

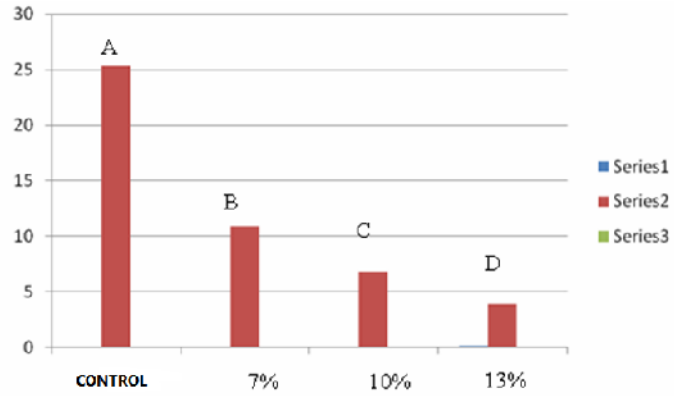
The most average of loss weight in the grape type Sahebi was 27/93 and the least amount of loss weight in the grape type Keshmeshi with plates with concentration of 13% was 1/43%.

The research results of Dong showed that weight loss in cover treatment of grape cultivars Sultani in non-perforated sheets with Grip Guard sheets was significantly less than the perforated one. Dolati Bane reported that weight loss of fruit during storage is due to loss of water. This finding corresponds with their results.by considering that fruit cells have breathing activity, some of fruit water uses in this activity. On the other hand more water voided from the fruit and increases the loss weight.

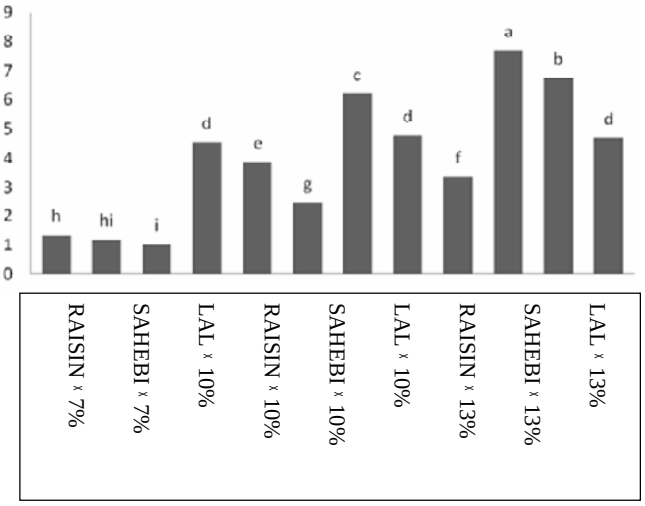
C. Remaining of Sulfite in Fruit

The results of statistical analysis showed that independent effect of sodium sulfite meta-B sheets and the type on the amount of remaining of beans in 1% probability was meaningful at the end of the storage.

The most amount of remaining of sulfite in the grape type Keshmeshi was 7/69 with treatment of sheets of sulfite meta-b with the concentration of 13% and the least amount of it in the grape type Laal Shahed with plates was 1/3%. It was not higher than the standard in all of the treatments.



The weight loss



Sulfite residues in fruit

The remaining amount of sulfite in terms of PPM is one in million. It's allowed amount in the grape is 10 ppm. The Sharayei research results showed that by increasing the concentration of sodium sulfite sheets containing the meta-b sodium sulfite, the remaining amount of grapes increases [5]. Dolati Bane reported in comparison 1 with 2 sheets of Grip Guard and the perforated coverage and no perforated treatment and 2sheets of gripe guard, the amount of sulfite is increased due to increased concentration of sulfite dioxide. The results of their research correspondes with the ir researches. Amount of sulfite residues in the grape Depends on the concentration and the type of grip guard sheets that its increase creates a bitter taste in the fruit.

The results showed that the sodium sulfite meta-b sheets are able to control fungal decay of grape during storage in refrigerator. Treating the grape with the sheets containing meta-b sodium sulfite causes to safe physical features of bunch and decreased the loss weight in comparison with the Shahed treatment .by using the different concentrations of sheets containing meta-b sodium sulfite, the remaining of sulfite was lower than the standard 10ppm at the end of the storage period and the flavor of grape has not changed. The overall result is that the type Keshmeshi was the best type because it retains the important features like physical features and has less weight reduction that was important commercially and using the concentration of 13% in sheets containing meta-b sodium sulfite causes better retaining of these features. Also, the sheet of solution meta-b sodium sulfite with concentration of 13% was the best treatment.

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