

## Effect of post harvest treatments of fungicides, grape guard and their combinations on chemical parameters of grapes stored at ambient conditions

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### ABSTRACT

Studies deal with effect of post harvest treatments of fungicides, grape guard and their combinations on different chemical parameters of grape berries stored at ambient conditions. The post harvest treatments of carbendazim, captan + grape guard and carbendazim + grape guard showed the TSS to the lower side, i.e. 19.05, 20.07 and 20.87%, respectively. However, these treatments did not affect acidity, total sugars and ascorbic acid after 7-10 days of storage of grape.

**Key words :** *Vitis vinifera*, Fungicides, Grape guard, Chemical parameters.

### INTRODUCTION

*Vitis vinifera* (L.) the species of the cultivated varieties of grapes is native of Asia, having originated from caucasus in Russia, Iran, Afghanistan and Asia minor ( Khanduja, 1974). The fresh grape berries are good source of sugars carbohydrates, vitamins, proteins and minerals. They are used for table purpose, wine, juice, raisins and canning fresh as well as dried fruits.

The post harvest losses of fruits and vegetables in India have been reported from 20 to 30 percent (FAO, 1977). Grapes are susceptible to post harvest spoilage because of highly perishable nature. Due to relative soft texture, grape berries are easily affected by temperature, careless handling while harvesting, packaging, transportation and post harvest diseases due to microorganisms . To control post- harvest diseases of grapes the post- harvest treatments of fungicides , grape guard and their combinations are being practiced. Therefore, it was felt necessary to see the effect of post- harvest treatments of fungicides, grape guard and their combinations on chemical parameters of grapes stored in 2 kg CFB boxes at ambient conditions.

### MATERIALS AND METHODS

Grape bunches of equal maturity weighing from 300-700 g were harvested from grape garden and brought into the laboratory. They were given post- harvest treatments as follows:

#### 1) Post - harvest fungicidal treatments and packing

The fungicides namely captan (0.2%), carbendazim (0.1%), mancozeb (0.25%) thiophanate-methyl (0.1%) were weighed as per the concentrations and solutions were prepared in water separately. Then grape bunches weighing 2 kg were dipped for two minutes in the solutions of each of the above fungicides. Then they were dried under shade to remove moistness. The treated grape bunches with each fungicide were packed in 2 kg CFB boxes. Before keeping the treated grape bunches in the box, a colour paper was spread at the bottom then a thin layer of cushioning material was spread in the box and then treated grape bunches were placed over the cushioning material. Again a layer of cushioning material was spread over bunches and remaining colour paper was covered on it and boxes were packed and sealed by silo tape .

#### 2) Post- harvest fungicidal treatments+ grape guard and packing

The fungicides namely captan (0.2%), carbendazim (0.1%), mancozeb (0.25%) thiophanate methyl (0.1%) were weighed as per the concentrations and solutions were prepared in separate buckets and grapes were treated by dipping them in the solutions for 2 minutes. They were dried under shade and packed as described above. But before covering the colour paper over grape bunches treated with above three fungicides, a quick release grape guard

paper was placed in such a way that it's white side remained in contact with grapes and brown side on upper side. Then a colour paper was covered and boxes were packed.

#### 3) Grape guard and packing

In this treatment, only grape bunches weighing 2 kg, without any fungicidal treatments were packed in CFB boxes and a quick release grape guard was placed as described above and boxes were packed.

#### 4) Control and packing

In this treatment, only grape bunches weighing 2 kg were packed, without any fungicidal treatment or use of grape guard. i.e. grape bunches were packed as an absolute control. The grape bunches of all above treatments were packed in 2 kg CFB boxes and stored at ambient conditions by using completely randomized design with three replications.

### Chemical Parameters

The initial chemical status of grape bunches in respect of TSS, acidity, total sugars and ascorbic acid was found out by analysing randomly selected 10 samples of grapes from the lot. The final observations in respect of these chemical parameters i.e. TSS, acidity, total sugars and ascorbic acid were worked out, when each of the treatments showed 10 % weight loss. The intact berries were only selected to estimate the chemical parameters.

#### 1) Total soluble solids(TSS)

The percentage of TSS was determined with the help of Erma Hand Refractometer. Care was taken to wash its prism with distilled water and dried before taking each reading. The brix reading were presented at 20°C temperature by using the reference table given by Lal *et. al.* (1986)

#### 2) Acidity

The acidity of grape berries was determined by titration method (Ranganna, 1979). 10 ml of fruit juice was taken in 50 ml beaker and titrated against 0.1 N NaOH using phenolphthalein indicator. Pink red colour marked the end point of titration. The total percentage of acidity was expressed as tartaric acid. It was computed by using the following formula-

$$\text{Total acidity (\%)} = \frac{\text{Titre} \times \text{Normality of NaOH} \times \text{Volume made up}}{\text{Wt./Vol. of sample taken for estimation} \times \text{Wt./ Vol. taken for titration}} \times \frac{\text{Equivalent weight of acid}}{100} \times 1000$$

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Table 1 : Effect of fungicides, grape guard and their combinations on chemical parameters of grape berries stored in 2 kg CFB boxes at ambient combinations ( 38° C to 42° C)

Sr. No	Treatments	Conc. (%)	TSS (%)	Acidity (%)	Total Sugars (%)	Ascorbic acid mg/100 g	Days of 10% physiological loss in wt. (shelf life)
1.	Captan	0.2	20.30 (26.78)	0.43 (3.76)	17.67 (24.82)	9.6	9
2.	Carbendazim	0.1	19.05 (26.13)	0.46 (3.89)	18.21 (25.24)	10.02	8
3.	Mancozeb	0.25	20.81 (26.63)	0.56 (4.28)	18.57 (25.52)	9.89	9
4.	Thiophanate-Methyl	0.1	21.20 (27.39)	0.44 (3.79)	17.12 (24.41)	9.82	10
5.	Captan + Grape guard	0.2+ G.g.	20.07 (26.57)	0.48 (3.96)	17.08 (24.55)	7.8	8
6.	Carbendazim + Grape guard	0.1+ G.g.	20.87 (26.63)	0.49 (4.01)	17.22 (24.35)	8.39	10
7.	Mancozeb + Grape guard	0.2+ G.g.	20.61 (27.39)	0.46 (3.88)	16.48 (23.71)	9.24	10
8.	Thiophanate Methyl + Grape guard	0.1+ G.g.	21.80 (27.03)	0.53 (4.16)	20.76 (27.09)	9.72	8
9.	Grape guard	--	20.54 (27.43)	0.54 (4.05)	19.19 (25.95)	9.6	9
10	Control	--	21.86 (27.54)	0.48 (5.97)	19.91 (26.49)	9.48	7
	S.E. ±	--	0.35	0.16	1.73	0.45	
	C.D. at 5 %	--	1.03	N.S.	N.S.	N.S.	
	Initial Status		20.03	0.43	16.54	9.86	

Where, G.g. = Grape guard

( Figures in parentheses are arcsin transformed values)

### 3) Total sugars

The total sugar content was determined by the method of Lane and Eynon (1960) by using Fehling reagent A and B with methylene blue as an indicator. Brick red colour marked the end point of titration. The percentage of total sugars was calculated by using following formula :

$$\text{Total sugars ( \% )} = \frac{\text{Fehling factor ( 50 ) X Dilution (250ml)}}{\text{Titre X 50 X Vol. of sample taken for estimation X 1000}} \times 100$$

### 4) Ascorbic acid

The ascorbic acid was determined by using 2,6 dichlorophenol indophenol dye ( A.O.A.C., 1980). The ascorbic acid content was determined by following procedures like standardization of dye (dye factor), preparation of sample, assay of ascorbic acid. The ascorbic acid content was calculated by using following formula:

$$\text{Ascorbic acid (mg/100g)} = \frac{\text{Titre X Dye factor X Vol. Made}}{\text{Aliquot of extract taken for estimation X Vol. of sample taken for estimation}} \times 100$$

## RESULTS AND DISCUSSION

### 1) Total Soluble Solids

The results in respect of the effect of fungicides, grape guard

and their combinations on TSS are presented in Table 1. The results of effect of post harvest fungicidal treatments, grape guard and their combinations on TSS were significant. The treatment carbendazim, captan + grape guard, carbendazim + grape guard, captan and thiophanate methyl + grape guard were significantly superior to the rest of the treatments and control in maintaining the TSS to the lower side. The treatment carbendazim showed lower TSS i.e. 19.05%. It was followed by captan + grape guard (20.07%), captan (20.30%) and carbendazim + grape guard ( 20.87%) as against 21.86% in the control treatment .

During the present studies the average initial TSS was 20.03% and increased to 21.86% in the control after 7 days of storage. The increase in TSS was recorded in all the treatments except carbendazim which ranged from 20.07 to 21.80 %. However, the carbendazim treatment has shown little bit decrease in TSS i. e. 19.05%.

In this respect, the results of effect of post harvest fungicidal treatments, grape guards and their combinations on TSS were significant. The increase in TSS observed may be due to hydrolytic changes brought about by enzyme such as amylases and phosphorylases which degrade starch into soluble sugars during storage. The increase in TSS during storage has been reported by Kumar *et.al.*( 1985), Sandhu *et.al.*( 1990), Ram and Singh (1996).

### 2) Acidity

The results of the post harvest fungicidal treatments, grape guard and their combinations on acidity were not significant (Table

1). It indicated that these treatments did not have significant effect on change in acidity after 10 days of storage. In the present studies the initial acidity was 0.43% which increased upto 0.48 % in the control treatment .The increase in acidity in various fungicidal treatments was ranged from 0.43 to 0.56 %. These results are in agreement with Padule (1990) who reported that the post harvest fungicidal treatments did not have a significant effect on change in acidity after 6-8 days of storage at ambient conditions.

### 3) Total sugars

The results of the effect of post harvest fungicidal treatments, grape guard and their combinations on total sugar were non significant (Table 1). It indicated that these treatments did not have significant effect on change in total sugars after 10 days storage.

In the present studies, the initial average total sugars were 16.54%. It increased in control treatment from 16.54 to 19.91%. The increase in total sugar content in fungicidal treatments, grape guards and their combinations was ranged from 17.08 to 20.76 %. Kumar *et.al.* (1985), Sandhu *et.al.* (1990) and Padule (1990) also found increase in the total sugars during the storage of grapes in CFB boxes. Hulme (1970) reported that the total sugars in the non-climacteric fruits like grape increased initially during storage, however these sugars decreased during prolonged storage.

### 4) Ascorbic Acid

The results of the effect of post harvest fungicidal treatments, grape guard and their combinations on ascorbic acid were non significant (Table 1). It indicated that all the treatments did not have significant effect on change in ascorbic acid contents after 10 days of storage. In the present studies, it is observed that there was slight decrease in ascorbic acid content of all the treatments except carbendazim as compared to the initial average i.e. 9.86 mg/100g. The decrease in ascorbic acid contents in various treatments ranged from 7.8 to 9.82 mg/100g. However, the carbendazim treatment showed the increase in ascorbic acid content i.e. 10.02 mg/100g. At the same Watada *et.al.*(1976) and Salunkhe *et.al.*(1991) reported that the ascorbic acid content of stored fruits generally decreased more rapidly at higher storage temperature.

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