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Research Article

THE STUDY OF DIFFERENT TREATMENTS EFFECT ON THE AMOUNT OF VITAMIN C IN OVERCOMING THE GRAPEVINE BUDS DORMANCY

***Arezo Naderi**
M.Sc. in Horticulture, Karaj branch, Islamic Azad University, Karaj, Iran
**Author for Correspondence*

ABSTRACT

The effects of chemical dormancy-breaking substances have long been specified and the application of these substances has been common in many subtropical areas of the world where there is no adequate winter chilling to bud burst. Although, grapevine as a fruit that is grown in subtropical areas does not have a high chilling requirement, its fulfillment is crucial to release bud dormancy and grow optimally. Therefore, it is necessary to consider the effect of chemical dormancy–breaking substances on this yield. In this experiment, the effects of dormex in three concentrations of 3%, 5% and 7% and volk oil in three concentrations of 3%, 5% and 7% as two chemical bud dormancy-breaking substances have been evaluated in a split-plot experiment on some qualitative and quantitative properties of Sultani cultivar grapevine such as vitamin C yield. Results indicated that the highest amount of vitamin C belonged to the grapevines treated with 7% volk oil which was about 4.59 m/g in 100 m/L extract and the lowest amount of vitamin C belonged to the bushes treated with 3% volk oil. Results showed that the highest amount of vitamin C belonged to the grapevines treated with 7% dormex which was about 4.93 m/g in 100 m/L extract. Therefore, the highest amount of vitamin C belonged to the grapevines treated with 7% volk oil and 7% dormex.

Keywords: *Dormex, Volk Oil, Different Treatments, Vitamin C, Bud Dormancy of Grapevine*

INTRODUCTION

Grapevine (vitis vinifera) from the vitaceae family is regarded as one of the most important horticultural crops of the world. The production of grapevine and products drawn from it is important in Iran. The cultivation of this crop has ancient history and during the past two decades, the under cultivation level of this crop is rapidly increasing. The growing enhancement of grapevine in the form of fresh grapes or its ancillary products has led to conduct comprehensive studies in relation to the improvement of farming systems, eugenic, feeding and its quantitative and qualitative enhancement.

Grapevines are one of the most valuable medicinal fruit and a rich source of anti-oxidant and anti-cancer compounds which contains vitamins B1, B2 and C, iron, phosphorus, iodine, calcium, sulfur and malic acid. New research shows that grapevine is anti-virus and due to a large amount of polyphenols and tannins compounds is anti-tumor as well. Grape berry and seed extract is a rich source of an antioxidant with the name of proantocianidine that by boosting the immune system could be useful against the skin cancer. Grape seed oil contains negligible amounts of cholesterol. Grape is so useful in the treatment of blood disorders, constipation, kidney, lung, cardiovascular and mental disease. The nutritional value of grapes is as following table (Marandi, 2007).

Soluble solids, mineral and organic substances such as soluble salts of sodium, potassium, calcium, iron, phosphorus and iodine are within the fruits that due to the dominance of sugar percentage than the other substances, the percentage of soluble solids can be partly attributed to the percentage of fruit sugar (Zahedi, 2010).

Soluble solids in the grape are an important part of the total solids of fruit that comprise mostly of sugars and are very important in determining the taste of grapes (Rahemi et al., 2004).

In conducted studies on grapes treated with dormex in the Nile Delta also became clear that application of

dormex as a chemical bud dormancy-breaking substance significantly increased the amount of soluble substance in the grape juice extract (effect of hydrogen Cyanamid (dormex) on bud).

The application of dormex in concentrations of 1 to 5 percent on 5th and 20th Jan led to the enhancement of TSS and total sugar. This increase has direct relationship with dormex concentration enhancement while the amount of total acidity is decreased (EL-shazly, 1999). The acidity content in fruits in ripening time can be influential on flavor and fragrance understanding and acceptance by the client. Titratable acidity is a criterion for organic acids of grapevine, and is considered as one of the components of taste (Ahmad, 2012). The percentage of organic acids represents pickle and their concentration, along with sugar (different ratio of acid and sugar) are used as an index in determining the taste. Usually, citric and malic acid are predominant acids of horticultural crops. Other organic acids, which are as predominant acid in some products include oxalic acid in spinach, ISO citric in blackcurrant (Rahemi, 2005). Malic acid and tartaric acid are the main acids of grape and approximately comprise 90% of the total acidity of fruit. Both acids are produced along with a few citric acids and other non-nitrogenous organic acid. The amount of malic and tartaric acid and total acidity has been high before fruit ripening and this concentration reach to the highest level in ripening time and then after ripening their amount will reduce (Siller-Cepeda *et al.*, 1992).

The total acidity has had inverse proportion with enhancement of dormex concentration in treated grapevines and is decreased with acidity concentration rate increasing (EL-shazly, 1999).

In this research, in order to deal with the problems ahead, the dormancy- breaking substances are used to overcome bud dormancy in grapevines and application of these substances makes premature crops in subtropical areas and increases the quantity of produced yield as well as the quality of obtained fruit. Thereby use the maximum potential of the plant for production.

MATERIALS AND METHODS

In this experiment, the native cultivar with local name of yellow Sultani is used. Grapevines were selected from the gardens of Ghazaviyeh area which is located 15 km south of Ahwaz, near the Karun River. In experiment time, 84 numbers of 25 years old trees were selected from garden. The maintenance method and harvest procedures and feeding were like other grapevine bushes of that vineyard and any special care and feeding were not done on the under treatment grapevine bushes. Also, the pruning method of grapevine bushes was done as the conventional method of site namely maintaining about 75 buds on grapevine bushes. This experiment was conducted as split plot in the form of a randomized complete block design with three replicates and each replicate including 7 treatments and two samples of the grapevine bushes in each treatment.

The split plot design was applied because this experiment aimed to evaluate the impact of both time and treatment factors. In this design, each main plot was divided into several plots or sub-plots and levels associated with the second factor were randomly distributed between sub-plots of the main plot. Therefore, every main plot plays block role for sub-factor levels. In this design, the accuracy of estimating mean of factor levels which is placed in the main plot is low and often the comparison accuracy of mean of factors levels' effects is enhanced in subplots and the existence of interactive effect between two factors causes the comparison of experimental treatments effects to be checked carefully in the subplots. In conducted pilot design, time as the first factor was placed in the main plots and treatments in sub-plots. The first time of experiment was one month before the normal bud burst which was equal to 26th Jan and the second time, two weeks before flowering and bud opening namely 11th Feb. It is worth mentioning that the tested grapevine bushes were pruned in the first week of Jan and bud burst time refers to the fuzz and inflation stage of buds.

The tested treatments contained treatment with dormex in three levels of 3% and 5% and 7% and volk oil in three levels of 3% and 5% and 7% and control. At spraying time all the bushes were properly sprayed with prepared solution of treatments and control bushes were sprayed with distilled water.

Table 1: Treatments used in this study

T1	D3	D3	D2	D2	V3	V3	V1	V1	D1	D1	S	S	V2	V2	Column 3
T2	D1	D1	V3	V3	S	S	V2	V2	D2	D2	D3	D3	V1	V1	
T2	V1	V1	V3	V3	D3	D3	S	S	D1	D1	V2	V2	D2	D2	Column 2
T1	D2	D2	V2	V2	V3	V3	D1	D1	D3	D3	S	S	V1	V1	
T2	S	S	D1	D1	V1	V1	V2	V2	D2	D2	V3	V3	D3	D3	Column 1
T1	D2	D2	V2	V2	D3	D3	S	S	V1	V1	V3	V3	D1	D1	

T1 = Treatment at the first time T2 = Treatment at the second time S= control
D1= 3% Dormex D2= 5% Dormex D3= 7% Dormex
V1= 3% Volk oil V2 = 5% Volk oil V3 = 7% Volk oil

Measuring the Amount of Vitamin C

The concentration of ascorbic acid in 5 mL grape juice extract was estimated 2-6 dichloro phenol Indophenol by using reanimation method. This method is based on this principle that ascorbic acid with blue color makes Indophenol colorless. Vitamin C is extracted in the presence of meta-phosphoric acid solution. Acidic state of solution prevents the ascorbic acid oxidation at high pH and makes the reaction possible. The procedure is in this way that 5 cc of the extract was combined with 5 cc meta-phosphoric acid and then Indophenol solution was added drop by drop until the color change appeared and fixed then the amount of Indophenol was recorded and vitamin C was calculated by using the following formula.
Sample rate * F * consumed Indophenol volume = m/g of vitamin C in 100 m/L fruit juice
F-factor is equal to mg of ascorbic acid for per 1 m/L consumed Indophenol.

Data Analysis

Table 2: Variance analysis of vitamin C

Source	df	VIT C
Time	2	0.11 ns
Date of treatment	1	0.26 ns
Treatment	6	10.05**
Date and treatment effect	6	2.74**

**indicate significant difference at 5%; ** indicate significant difference at 1%; ns indicates no significant difference*

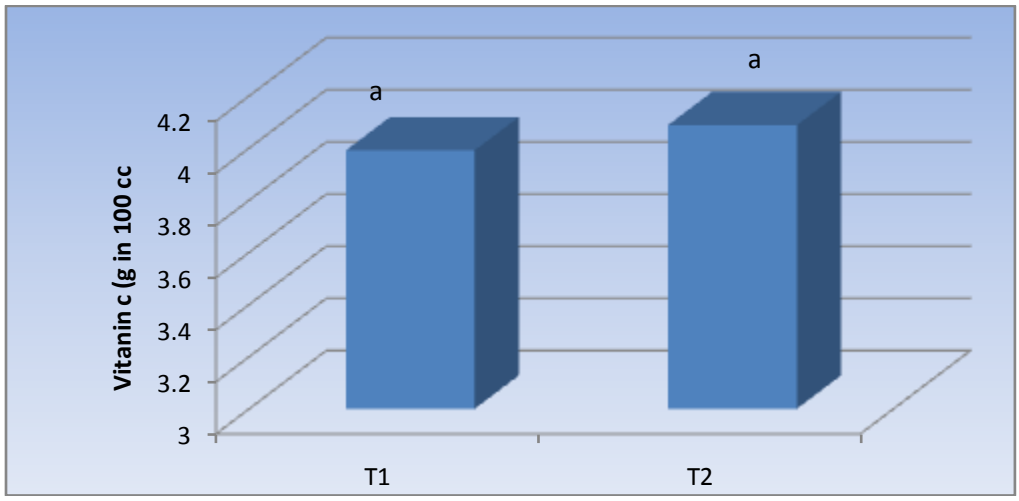

Figure 1: The comparison of the mean amount of vitamin C in both times

Columns with common letters have no significant difference with each other

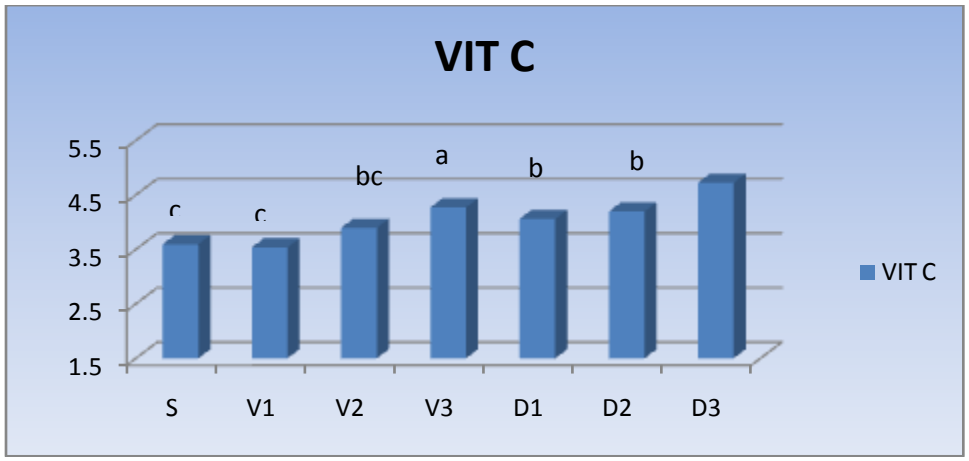

Figure 2: The comparison of the amount of vitamin C in the different treatments

Graphs with common letters are not significantly different.

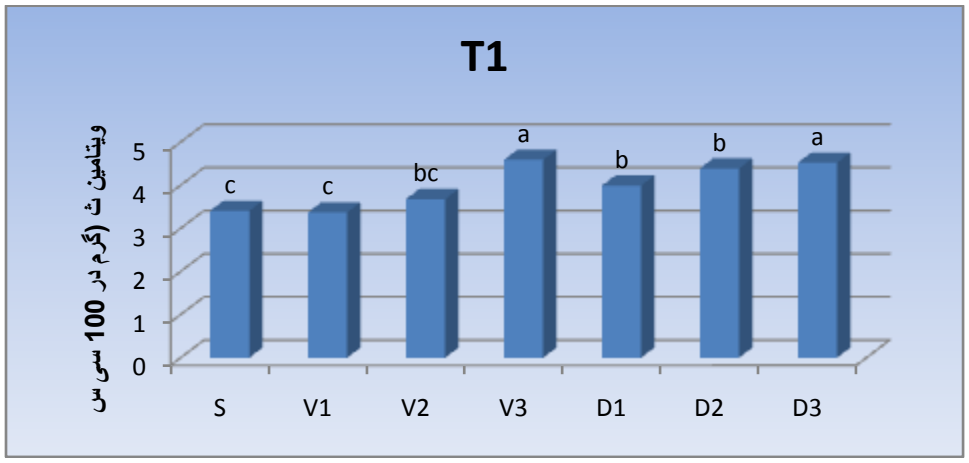

Figure 3: The comparison of the amount of vitamin C in the different treatments in the first time

Columns with common letters do not differ significantly.

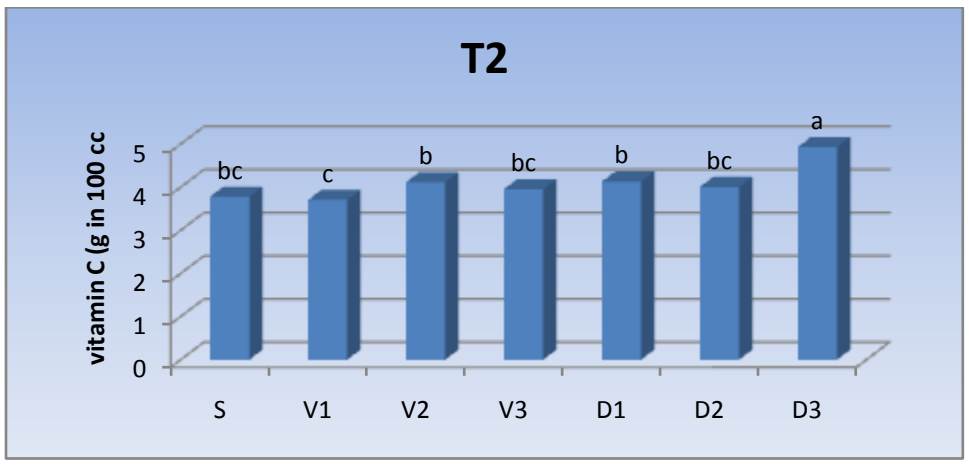

Figure 4: The comparison of the amount of vitamin C in the different treatments in the second time

Graphs with common letters are not significantly different.

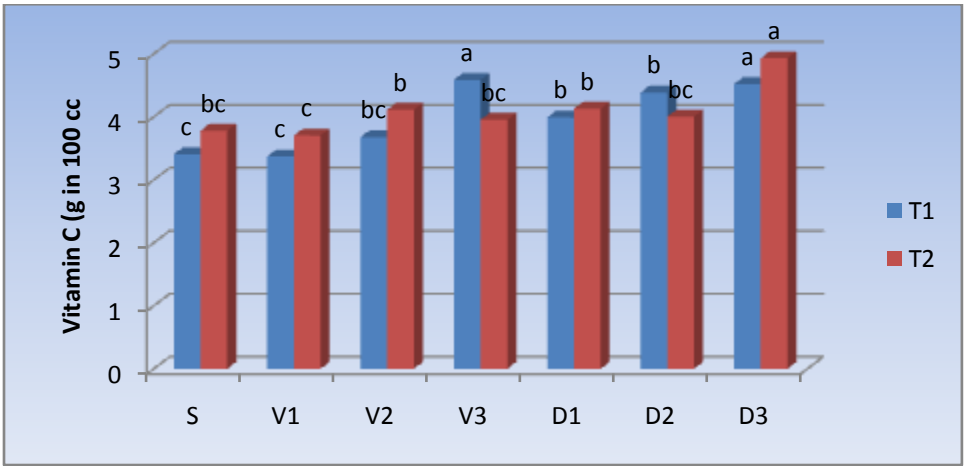

Figure 5: The comparison of the amount of vitamin C in the different treatments in both first and second time

RESULTS AND DISCUSSION

Results showed no significant difference between various replicates. Also, there was no significant difference between the mean amount of vitamin C in the two times T1 and T2, but various treatments showed a great difference between each other. Treatment and time had no interactive effect on each other (table 2, Figure 1). Although, the mean of various treatments in the first and second time had no significant difference with each other, the mean amount of vitamin C in the second time was more than the first time. Results demonstrated that the highest amount of vitamin C belonged to the grapevine bushes treated with 7% dormex which was about 4.73 mg in 100 m/L extract and then 7% volk oil with 4.27 mg in 100 mL extract and then 5% dormex which was about 4.20 mg in 100 ml extract. The lowest amount of vitamin C belonged to the bushes treated with 3% volk oil with mean amount of vitamin C about 3.54 mg in 100 ml extract (Figure 2).

Results showed that the highest amount of vitamin C belonged to the grapevines treated with 7% dormex which was about 4.59 m/g in 100 m/L extract and the lowest amount of vitamin C belonged to the bushes treated with 3% volk oil (Figure 3).

Results indicated that the highest amount of vitamin C referred to the grapes treated with 7% dormex which was about 4.93 mg in 100 mL extract and the lowest amount of vitamin C referred to the bushes treated with 3% volk oil which was about 3.70 mg in 100 mL extract (Figure 4).

Therefore, the general results showed that the highest amount of vitamin C belonged to the grapes treated with 7% volk oil and 7% dormex.

REFERENCES

Ahmad O (2012). Effect of foliar spraying with GA_3 and /or sitofex on bud behaviour, vegetative growth, yield and cluster quality of Thompson seedless grapevines. *Journal of American Science*.

EL-shazly SM (1999). Effect of hydrogen Cyanamid (dormex) spray on bud behaviour, growth, yield, fruit quality and leaf mineral composition of Thompson seedless grapevine. *Alexanderia Journal of Agricultural Research*.

Eshghi S, Rahemi M and Karami A (2010). *Overcoming Winter Rest of Grapevine Grown in Subtropical Regions Using Dormancy-Breaking Agents* (Shiraz University Publication).

Jalili Marandi R (2007). *Tiny Fruits* (Urmia Jihad University Press).

Rahemi M and Asghari H (2004). Effect of hydrogen cyanamide (dormex), volk oil and potassium nitrate on bud break, yield and nut characteristics of pistachio (*Pistacia vera* L.). *The Journal of Horticultural Science and Biotechnology* **79** 823-527.

Rahemi M (2005). After harvest physiology (An introduction to the physiology and displacement of fruits, vegetables and ornamental plants) (Shiraz University Press).
Rahemi M (2007). *Physiology of Fruit Trees* (Mashhad Jihad University Press).
Siller-Cepeda H, Fuchigami LH and Chen TH (1992). Hydrogen Cyanamid –induced bud break and phytotoxicity in Red heaven peach buds. *HortScience* **27** 874-876.
Zahedi M (2010). Investigating the pre-harvest effect of gibberellic acid and ethephon on qualitative characteristics of grapevines, Master's thesis, Department of Horticulture, Islamic Azad University, Science and Research Department.