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EFFECT OF CROP LOAD ON CRIMSON SEEDLESS GRAPES:
B) EFFECT OF BERRY THINNING

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ABSTRACT

A study was conducted in 2002and 2003 to disclose the effect of berry thinning on yield, physical and chemical characteristics of clusters and berries of Crimson Seedless grapevines. The vines were 5-year-old grown in a private vineyard. The treatments were applied as follows: 8, 9, 10 shoulders per cluster and control.

The results showed that the quality of Crimson Seedless grapes could be easily improved by berry thinning. However, vines thinned with leaving eight shoulders per cluster can be recommended as the best effective treatment. The decrease in the yield obtained from this treatment could be compensated by improving physical properties of berries as well as achieving a higher percentage of TSS, better colouration and a lower percentage of acidity in the juice.

INTRODUCTION

Berry thinning consists of removing parts of clusters after shatter of impotent flowers (Combe, 1959, 1962). Winkler et al, (1974) mentioned that the increase in berry weight in Tokay variety is greatest when the thinning is done immediately after berry set. The greater effectiveness of the early thinning (after set) arises from the fact that it coincides with the still – active cell division in the pericarp of the berries coincides with the rapid normal berry growth, and with the summer maximum content of carbohydrates in the shoot (Combe 1960). Uniformity of coloring in the Tokay variety (Winkler, 1930) and Red Malaga (Weaver, 1952, Weaver and Mc Cune, 1959) is enhanced by berry thinning at any time up to the beginning of ripening.

Berry weight increased by berry thinning (Dhillon et al 1992, Shehata and El Barbary 1996 and Abd El Wahab 2000).

Nick Dokoozlian et al (1993) reported that in Crimson seedless variety large, heavily shouldlerd clusters should be tipped to 5 – 6 rachis laterals or cluster branches following fruit set. Many clusters may set too many flowers resulting in tight bunches with small berries at harvest. Berries with shoulders should be removed from the compact regions of well-set cluster to reduce cluster tightness. They also mentioned that 1996 in Autumn Royal variety untipped clusters may weigh up to 4 pounds at harvest, making them difficult to harvest and pack. Cluster tipping is therefore used to reduce cluster size and decrease crop load.

Some berry thinning or shoulder removal may also, be necessary if berry set is excessive. The cluster tipped to 7 or 8 shoulders typically weigh between 2.0 to 2.5 pounds at harvest.

Berry thinning enhanced ripening and improved fruit quality (Winkler et al (1974), Chouhan (1985) and Sanjay (1995).

Reducing berries/cluster increased soluble solids and anthocyanine concentration in grape berries (Weaver (1953), Winkler et al (1974), Kaps and Cahoon (1989), Sanjay (1995), Shehata and El Barbary (1996), Echenique et al (1998) and Abd El Wahab (2000) and reduced acidity Sanjay (1995).

The purpose of the present study is to disclose the effect of berry thinning as a possible means for improving bunch and berry quality on yield/vine, bunch and berry characteristics of Crimson Seedless grapevines.

MATERIAL AND METHODS

This study was carried out during 2002 and 2003 seasons on Crimson seedless grapevines in a private vineyard located in El-Nubariya-region, El-Behera governorate.

The vines were five years old, supported by gable system. Distance was 1.5 m between vines and 3 m between rows. Sixty uniform Crimson seedless vines grown in a sandy soil were chosen (4 treatments x 3 replicates x 5 vines per replicate). Each vine was pruned to six canes of 10 buds each. The design was randomized complete blocks. All vines were similar in vigor .and received the same cultural practices already applied in the vineyard. The treatments were 8 shoulders/ clusters, 9 shoulders/ cluster, 10 shoulders/ cluster and control.

At harvest time, when bunches attained their technical ripening phase (Halime, 1981), representative samples of bunches were taken to the laboratory for physical and chemical analysis which included the following parameters:

Yield/vine (kg), average cluster weight (g), cluster dimension (length and width in cm), berry weight (g) and berry size (cm^3). Percentage of total soluble solids determined by a hand refractometer, total acidity % (expressed as g. tartaric acid/100 juice) according to the procedures out lined in A.O.A.C. (1969), TSS / Acid ratio and total anthocyanin at O .D 530 nm were calculated (Hisa et al., 1965) .

The statistical analysis of the present data.

Mean separation was determined using Duncan s test (Snedecor and Cochran, 1980).

RESULTS AND DISCUSSION

1. Yield/vine and cluster characteristics

Yield/vine:

Data in Table (1) show that yield/ vine was higher in unthinned vines (control) in the two seasons of the investigation. However, significant differences were found among the treatments. The highest values were shown unthinned vines where the yield/vine amounted to (13.92 & 13.03 Kgs) while, the 8 shoulders / cluster treatment gave the lowest values (11.60 & 11.85 kegs) in the two seasons respectively.

Table (1): Yield and cluster characteristics of Crimson seedless grapevines in 2002 and 2003 seasons as affected by different treatments

Characteristics / Treatments	Yield / vine (kg)		Cluster weight (g)		Cluster length (cm)		Cluster width (cm)	
	2002	2003	2002	2003	2002	2003	2002	2003
8 shoulders/cluster	11.60 c	11.85 c	388.33 c	395.00 c	18.33 b	17.20 b	17.26 a	17.00 a
9 shoulders/cluster	12.15 b	12.33 b	405.00 b	413.33 b	18.63 b	18.00 b	16.90 ab	16.26 ab
10 shoulders/cluster	12.50 ab	12.75 ab	416.60 b	425.00 ab	19.26 b	18.16 b	16.50 b	16.16 b
Control (Unthinned clusters)	12.90 a	13.03 a	430.00 a	434.33 a	21.16 a	20.50 a	15.16 c	15.16 c

These results are in agreement with those obtained by Kaps and Cahoon (1989) who stated that berry thinning reduced total fruit yields and unthinned vines had the greatest yield while, Sanjay (1995) mentioned that berry thinning increased the yield/vine in Perlette cv.

Cluster weight:

Cluster weight was significantly and greatly decreased in the berry thinned vines as compared to the unthinned ones (control) (Table1). Maximum values of cluster weight were obtained with the control at the two seasons of the investigation. Results showed, no significant differences in cluster weight for 9 and 10 shoulders/cluster thinned treatments, while the treatment 8 shoulders/cluster showed the lowest cluster weight. These results are in parallel with those obtained by: Dhillon Et Al (1992) and Moon and Lee (1996) who stated that berry thinning decreased weight of the cluster. Sanjay (1995) on the contrary mentioned that Perlette cluster weight was increased by berry thinning.

Cluster dimensions:

As shown in Table (1), cluster length was significantly increased in the unthinned vines (control). The results showed no significant differences in cluster length for vines thinned to 8, 9 and 10 shoulders/ cluster.

2. Physical berry characteristics

Berry weight and size:

As shown in Table (2), berry weight and size were significantly increased in 8 and 9 shoulders/ cluster treatment in comparison with 10 shoulders/cluster treatment and control. The heaviest and largest berries were produced by cluster thinning to 8 shoulders/ cluster.

The increase in berry weight and size arises from the fact that the still-active cell division in the pericarp of the berries coincides with the rapid normal berry growth, and with the summer maximum content of carbohydrates in the shoot. These results are in agreement with those obtained by Kaps and Cahoon (1989), Dhillon et al. (1992), Shehata and El-Barbary (1996) and Abd El-Wahab (2000), and who mentioned that berry thinning/cluster increased the individual berry weight.

Berry dimensions:

Berry dimensions as expressed by berry height and diameter were also significantly increased in 8 shoulders/ cluster treatment as compared with the other treatments and control, Table (2). It is interesting to note that the great increase in berry dimensions was achieved by the higher intensity of berry thinning. These results could be explained by the beneficial effect of berry thinning/cluster that coincides with the still active cell division in the pericap of the berries with the rapid normal berry growth, and with the summer maximum content of carbohydrates in the shoots. These results are in line with those obtained by Winkler (1953, 1962), Howell et al (1987), Clark et al (1989), Rizk and Hassan (1996) and Rizk-Alla (2006) who cleared out that berry dimensions were maximum in vines where thinning was carried out.

Table (2): Physical berry characteristics of Crimson seedless grapevines in 2002 and 2003 seasons as affected by different treatments

Characteristics / Treatments	Weight of 100 berries (g)		Size of 100 berries (cm 3)		Berry length (cm)		Berry diameter (gm)	
	2002	2003	2002	2003	2002	2003	2002	2003
8 shoulders/cluster	416.67 a	433.33 a	395 a	398 a	2.53 a	2.55 a	1.63 a	1.76 a
9 shoulders/cluster	411.67ab	415.00 a	387 b	389 b	2.44 ab	2.51 ab	1.48 b	1.68 b
10 shoulders/cluster	388.33 bc	388.33 b	373 c	375 c	2.40 ab	2.43 bc	1.66 b	1.60 c
Control (Unthinned clusters)	371.67 c	378.33 b	372 c	373 c	2.36 b	2.35 c	1.46 b	1.55 c

3. Chemical berry characteristics:

Data presented in Table (3) indicate that all berry chemical characteristics; i.e. total souble solids%, TSS/Acid ratio and anthocyanin contents of berry skin were significantly increased by berry thinning treatments except for acidity which was decreased by berry thinning treatments.

Treatment 8 shoulders/cluster increased TSS% significantly than the other treatments. Berry thinning reduced the number of berries/cluster without any change in the number of leaves. With increase the number of leaves to cluster ripening was accelerated with Echenique et al (1998) and Abd El-Wahab (2000).

From the obtained results, it can he concluded that the quality of Crimson Seedless grapes could be easily improved by berry thinning. However, vines thinned with leaving eight shoulders per cluster can be recommended as the best effective treatment. The slight decrease in the yield obtained from this treatment could be compensated by improving physical properties of berries as well as achieving a higher percentage of TSS, better colouration and a lower percentage of acidity in the juice.

Table (3): Chemical berry characteristics of Crimson seedless grapevines in 2002 and 2003 seasons as affected by different treatments

Characteristics / Treatments	TSS (%)		acidity (%)		TSS/acid ratio		Anthocyanin (mg/100g F.W.)	
	2002	2003	2002	2003	2002	2003	2002	2003
8 shoulders/cluster	20.60 a	20.10 a	0.55 c	0.56 c	36.32 a	35.67 a	0.606 a	0.586 a
9 shoulders/cluster	19.50 ab	19.90 a	0.57 b	0.57 b	34.39 b	34.50 a	0.550 ab	0.560 ab
10 shoulders/cluster	19.23 b	19.20 b	0.56 b	0.58 ab	33.42 b	32.71 b	0.525 b	0.533 bc
Control (Unthinned clusters)	17.56 b	17.20 b	0.59 a	0.60 a	29.58 c	30.03 c	0.464 c	0.513 c

REFERENCES

Abd El-Wahab, M.A. (2000): Effect of thinning, girdling and CPPU on improving quality characters of Ruby seedless grapevines – M.SC. Thesis, Fac. Agric. Cairo univ.

A.O.A.C., (1969): Official methods of analysis 10 ed. Association official Agricultural chemistry, Washington. DC.

Chouhan, V.S. (1985): Effect of thinning on fruit drop, ripening, fruit quality and yield in banaty seedless grapes. Haryona Agricultural university journal research, 15 (2): 177 – 180 (Hort – Abst. 56:5950).

Clark, J.R., Fernandez, G.E. and Dombek, D.G. (1989):.Flower cluster thinning of Mars and Vines grapes. Arkansas farm Res., 38: 3-11.

Coombe, B.G. (1959): Fruit set and development in seeded grape varieties as affected by defoliation, topping, girdling and other treatments. Amer. Jour. End. Vitic., 10:85 – 100.

Coombe, B.G. (1960): Relationship of growth and development to change in sugars, auxins, and gibberellin in fruit of seeded and ssedless varieties of Vitis vinifera L. J Hort. Sci., 37: 1-15.

Coombe, B.G. (1962): The effect of removing leaves, flowers and shoot tips on fruit set in vitis vinifera L. J.Hort.Sci., 37: 1 – 15.

Dhillon, W.S., Bindra, A.S.; chevma, S.S and sohan singh (1992): note on effect of berry thinning on quality of grapes cv. Perlette. Indian journal of Horticulture, 49 (1): 50 – 52 (Hort. Abst.; 64: 9380).

Echenique, B.M.; Witkowski, P.F; Cerutti, F.M. and Ferragut, A.J. (1998): Effect of different berry thinning methods on the quality of table grape cultivar Patagonia. Agro-Ciencia, 14 (1): 5 – 11 (Hort.Abst. 68:4843).

Hisu, C.L.; B.S. Luh and C.D. chechester (1965): Anthocyamin in free stone peaches. J. food sci., 30:5 – 12.

Howell, G.S., T.K.Manfield and J.A.Wolpert (1987): Influence of training system, pruning severity and thinning on yield, vine size and fruit quality of Vidal Blank grapevines. Am. J. of Enol. And Vitic. 38(2) 105-109.

Kaps, M.L. and Cahoon, G.A. (1989): berry thinning and cluster thinning influence vegetative growth, yield, fruit composition and set, photosynthesis of seyval Blanc grapes. Journal of American society for Horticulture science, 114 (1): 20 – 24 (Hort. Abst. 59: 4700).

Moon, D.Y. and Lee, D.K (1996): Effect of berry thinning on fruit grape Fuujiminon in plastic film house. RDA journal of Agriculture science, Horticulture, 38 (1) : 683 – 686 (Hort. Abst., 67:4820)

Nick, K.D; B. Peacock and D. Luvisi (1993): Crimson seedless production practices. Uni. Of Cal. Cooperative Extension Fresno.

Nick, K.D., D.Luvisi, B.Peacock and R. Neja (1996): Cultural practices for Black Emerald table grapes. Uni. of Cal. Cooperative Extension, Fresno.

Nick, K.D; D.Luvisi; M.Moryana and P.scharder (1996): Influence of cultural practices on the berry size and composition of Red Globe table grapes. Uni. of Cal. Cooperative Extension, Fresno.

Nick, K. D; B. Peacok; D. Luvisi and Vasquez (2000): Cultural practices for Autumn Royal Table grapes. Uni. of Cal. Cooperative Extension, Fresno.

Risk, I. A. and F. F. Hassan (1996): Influence of cluster thinning on yield and bunch quality of Thompson seedless grapevines. Fourth Arabic Con. For Horticultural Crops. Minia.

Rizk-Alla, M.S. (2006): effect of levels and time of thinning at various stages of fruit development on yield and bunch quality of crimson seedless grapevines. Egypt. J. of Appl. Sci., 21 (3).

Sanjay S. (1995): Ripening and quality o grape (vitis vinifera L.) as affected by cluster thinning. Horticultural jurnal, 8(1): 9 – 15 (Hort.Abst. 66:301).

Shehata, M.M and El. Barbary, O.M (1996): Effect of pre-bloom gibberellic acid application and after shattering cluster tipping on the quantity and quality of flame seedless table grapes. Alexandria journal of agricultural research, 41 (3): 214 – 256 (Hort.Abst, .67:9368).

Snedocor, G.W. W.G. Cachran (1980): Statistical methods 7 ED. Iowa state wni. Press, U.S.A.

Weaver,R.J (1953): thinning and girdling of Red Malaga grapes in relation to size of berry, color and percentage of total solube solids of fruits. Proc. Amer. Soc. Hort. Sci., 60:132 – 140.

Weaver, R. and S.B. Mc Cune (1959a): Girdling; its relation in carbohydrate nutrition and development of Thompson seedless, Red Malaga and Ribier grapes. Hilgradia, 28:421-435.

Winkler, A.J. (1930): berry thinning of grapes. California Agr. Exp. Sta. bull. 492: 1 – 22.

Winkler, A.J; A.J. Cook; W.M. kliewer and L.A. Lider (1974): General Viticulture. Uni. of California press London pp – 710.

تأثير حمولة المحصول على عنب الكريمسون سيدلس
ب) تأثير خف الحبات

فيكتور حبيب جرجس

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أجرى هذا البحث خلال موسمي ٢٠٠٢ ، ٢٠٠٣ بهدف دراسة تأثير معاملات خف بعض حبات العنقود على كمية المحصول والصفات الطبيعية والكيماوية للعناقيد والحبات مقارنة بالكنترول لكرمات عنب الكريمسون سيدلس. والكرمات نامية في احدى المزارع الخاصة وعمرها خمسة سنوات. تم إجراء المعاملات بترك عدد مختلف من الأكتاف: ٨، ٩، ١٠ أكتاف لكل عنقود بالاضافة إلى الكنترول.

أشارت نتائج الدراسة إلى أن جودة عنب الكريمسون يمكن تحسينه من خلال عملية خف الحبات حيث يمكن التوصية بترك ثمانية أكتاف لكل عنقود وأن حدوث انخفاض في المحصول يمكن تعويضه من خلال تحسين الصفات الطبيعية للحبات بالاضافة إلى زيادة نسبة المواد الصلبة الذائبة الكلية في عصير الحبات والحصول على أفضل درجة تلوين للحبات كما إنخفضت الحموضة في عصير الحبات.