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EFFECT OF THE THINNING METHODS ON FLAME SEEDLESS GRAPES
1- YIELD AND FRUIT QUALITY

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ABSTRACT

This study was carried out during two successive seasons 2001 and 2002 on Flame Seedless grapevines grown at a private orchard in Wadi El Faregh Giza governorate, to evaluate yield and fruit quality after the application of five cluster thinning methods (GA_3 at 30 PPM + hand thinning – GA_3 at 30 PPM + thinning by cutting back about 25% from the apical portions of cluster – GA_3 at 30 PPM + thinning by cutting back 33% from the apical portions of cluster – GA_3 at 30 PPM + thinning by removing about 20% from clusters number + shaving – GA_3 at 30 PPM + thinning by removing about 30% from clusters number + shaving, after fruit set. Thinning methods improved yield, physical properties of clusters and berries (weight, size, compactness factor firmness and berry adherence force), chemical properties (TSS-acidity – TSS/acid ratio – total anthocyanin – total sugar and total amino acids). The data revealed that thinning by combined treatment GA_3 at 30 PPM + cutting back about 25% from the apical portions of cluster recorded the best beneficial effect on cluster characteristics of Flame Seedless cv.

INTRODUCTION

Flame Seedlees grape is a seedlees cultivar, the clusters are medium in size with small, bright and red berries (El-Hammady, 1976). It was found that hand thinning plays an important role with some grape varities (Ditillon *et al.*, 1994 and Buchelli & Giannneti 1996). Applications of gibberelic acid or berry thinning are currently used to increase berry size of Flame Seedless grapes. Average berry mass increased by GA_3. So effective berry thinning is vital to minimized berry crack and post harvest decay (Orth, 1990 and Wolf *et al*, 1994).

Berry thinning produce large berries, highest fruit weight, longest pedicels, also fastest ripining, highest TSS and sugar content, the lowest percentage of acidity with some grape varieties (Sanjay & Singh 1995 and Moon & Lee 1996). The goal of this study was to examine the effect of interaction between gibberelic acid (GA_3) and different thinning treatments on yield and cluster quality of Flame Seedless grapes.

MATERIAL AND METHODS

This study was carried out during the seasons of 2001 and 2002 on Flame Seedless grapevines grown at a private orchard in Wadi El Faregh area at Giza governorate The vines were 7 years old, planted at 2x3 m apart and grown in sandy soil under drip irrigation system. The vines chosen for this study were of normal growth and received all the recommended horticultural practices Flame Seedless grapevines were trained to a bilateral

cordon system. Crop load at all vines was adjusted to 23- 28 clusters / vine prior to anthesis during the two seasons, respectively. Forty-two uniformly vines arranged in a randomized complete block design were used. Each treatment consisted of seven vines, where single vine represent one replicate.

The clusters were subject to the following treatments:

1- GA_3 at 30 PPM + hand thinning.
2- GA_3 at 30 PPM + thinning by cutting back about 25% from the apical portions of cluster.
3- GA_3 at 30 PPM + thinning by cutting back about 33% from the apical portions of cluster.
4- GA_3 at 30 PPM + thinning by removing about 20% from clusters number + shaving.
5- GA_3 at 30 PPM + thinning by removing about 30% from clusters number + shaving.
6- Control (without thinning).

Cluster thinning was performed after fruit set. A vine treated with GA_3 at 30 PPM was performed when berries diameter reached about 6 mm and again after 4-5 days. Hand berries thinning were performed when berry diameter reached about 7 mm, using special pruning shears as fallows:

a- The fifth and sixth basal laterals were removed.
b- The end of the cluster was removed so as to have a length of 13-16 cm. While shaving (removing berries from the five basal laterals).

The tested treatments were evaluated through the following measurements:

1-Yield: At harvest time (when colour development accumulated in 80 % of berries / cluster) or when the TSS of the check fruit reached 16-17 % (Ghobrial, G.F. *et al.*, 2001) clusters per vine for each treatment were removed, weighted, then average yield for vine (kg) was calculated.

2-Physical and chemical properties of clusters and berries:

Representative random samples of 14 cluters / each treatment were taken and brought to the laboratory to determine the clusters and berries quality aspects.

Cluster measurements were determined to estimate average cluster weight (g), berry adherence force (g) by using scale and force meter instrument, cluster compactness ratio was calculated by determining no of berries per cluster /cluster lenght according to Winkler *et al.*, (1974). Randomly samples of 100 berries / treatment were used to determine the averages berry length (mm), berry weight (g), volume (cm^3), berry firmmess (g/cm^3) by using scale and force meter instrument and total anthocyanin content in skin of berry (mg/g fw) according to Hisa *et al.* (1965), total soluble sugars according to Smith *et al.*, (1956), and total free amino acids according to Rosin (1957).

Berry juice was used for the determination total soluble solids (TSS) expressed as Brix by using hand refractometer, total acidity percentage according to A.O.A.C (1985), and total soluble solids / acid ratio (TSS / acid).

The data were tabulated and statistically analyzed according to the randomized complete blocks design method (Snedecor Cochran, 1980) the mean values were compared using LSD test at 5% level. The percentages were transformed to the arcsine to find the binomial percentage (Steel and Torrie, 1980).

RESULTS AND DISCUSSION

Yield, cluster weight and compactness:

Data tabulated in Table (1) indicated that all treatments used significantly increased the yield per vine than the untreated ones. Morever, thinning by combined treatment GA_3 at 30 PPM + cutting back about 25% from the apical portions of cluster gave the highest yield / vine (16.83 & 18.67 kg) followed by combined treatment GA_3 at 30 PPM + cutting back about 33% from the apical portions of cluster (16.24 & 17.54 kg) in both study seasons respectively. Similar results were found by Noor, Aldeen (2001), Abd EL-Galil and El –Wasfy (2003) found that thinning improved yield and quality. Thinning by combined treatment GA_3 at 30 PPM + removing about 30% from clusters number + shaving gave lower yield / vine than the control.

Table (1) : Effect of thinning treatments on yield , cluster weight and compactness of Flame Seedless grapes during 2001 -2002

Treatments	Yield / vine (kg)		Cluster weight (g)		Cluster compactness ratio	
	2001	2002	2001	2002	2001	2002
GA_3 at 30 PPM + hand thinning.	14.87	16.72	567.3	602.4	5.73	5.97
GA_3at 30 PPM + cutting back about 25% from the apical portions cluster	16.83	18.67	542.6	593.3	7.63	7.84
GA_3at 30 PPM + cutting back about 33% from the apical portions cluster	16.24	17.54	533.8	574.4	6.45	6.72
GA_3 at 30 PPM + removing about 20%from cluster number + shaving.	12.34	14.53	604.3	663.2	6.27	6.54
GA_3 at 30 PPM + removing about 30%from cluster number + shaving.	11.78	13.26	589.7	643.4	5.94	6.34
Control	13.56	15.46	493.5	507.5	5.56	5.68
LSD at 5% level	0.7435	0.7675	26.34	24.55	1.006	0.9401

This results are in agreement with those obtained by Ditillon *et al.*, (1994), Bucelli & Gianneti (1996), Chio *et al.*, (1997) and Ferree *et al.*, (2003) who stated that thinning by removing some clusters decreased yield / vine.

The average cluster weight was significantly affected by different thinning treatments, combined treatment GA_3 at 30 PPM + removing about 20% from clusters number + shaving gave the high cluster weight (604.3 & 663.2) in both study seasons respectively.

Concerning the effect of thinning on cluster compactness, data in Table (1) indicated that thinning by combined treatment GA_3 at 30 PPM + cutting back about 25% from the apical portions of cluster showed a higher significant effect in cluster compactness compard with the other treatments used.

These results are in agreement with those obtained by Rizk (1998), Abd El-Ghany (2001) and Ferree *et al.*, (2003) who stated that thinning inside the cluster has been found necessary to lighten the cluster and make it less compact .

Berry adherence force, length, weight and size:

Results in Table (2) show that Berry adherence force was not significantly different among all thinning treatments of Flame Seedless cluster in both seasons of study. The average berry length was significantly affected by different thinning treatments. Combined treatment GA_3 at 30 PPM + cutting back about 25% from the apical portions of cluster gave the highest berry length (17.5 & 17.8 mm) followed by GA_3 at 30 PPM + cutting back about 33% from the apical portions of cluster (17.2 & 17.6 mm) in both study seasons respectively.

Moreover, the averages weight and size of 100 berries of Flame Seedless was significantly affected by thinning treatment, combined treatment GA_3 at 30 PPM + cutting back about 25% from the apical portions of cluster significantly increased both berry weight (367.4 & 375.5 g) and size (348.4 & 356.4 cm^3) respectively in both seasons study , while combined treatment GA_3 at 30 PPM + hand thinning and treatment GA_3 at 30 PPM + removing about 30% from clusters number + shaving gave the lowest size berry compared with other thinning treatment. In agreement with the aforementioned results are those obtained by Ditillon *et al.*, (1994) , Abd El-Ghany (2001) , Noor Aldeen (2001) and Ferree *et al* ., (2003) . They reported that berry thinning improved berry quality.

Firmness, total soluble solids, acidity and TSS/acid ratio:

Data in Table (3) revealed that all thinning treatment used significantly higher berry firmness than the control. Combined treatment GA_3 at 30 PPM + cutting back about 25% from the apical portions of cluster gave the highest mean (474.5 & 480.7 g/cm^3) followed by combined treatment GA_3 at 30 PPM + cutting bock about 33% from the apical portions of cluster (462.3 & 472.6 g/cm^3) and combined treatment GA_3 at 30 PPM + removing about 20% from clusters number + shaving (435.6 & 456.2 g/cm^3) in both study seasons respectively.

In addition, combined treatment GA_3 at 30 PPM + cutting back about 25% from the apical portions of cluster gave the highest total soluble solids (18.0 & 17.0 %) compared with control in both study seasons respectively. While combined treatment of GA_3 at 30 PPM + hand thinning treatment gave lower TSS than other thinning treatment. Similar results were found by Ditillon *et al.*, (1994) Abd El-Ghany (2001) and Abd El-Galil and El Wasfy (2003) they reported that berries thinning increase TSS content .

Table (2) : Effect of thinning treatments on berry adherence force , length , weight and size of Flame Seedless grapes during 2001 -2002

Treatments	Berry adherence force (g)		Berry length (mm)		100 Berry weight (g)		100 berry size (cm^3)	
	2001	2002	2001	2002	2001	2002	2001	2002
GA_3 at 30 PPM + hand thinning	294.6	374.4	16.2	16.7	291.2	302.4	297.2	318.3
GA_3at 30 PPM + cutting back about 25% from the apical portions cluster	339.4	424.6	17.5	17.8	367.4	375.5	348.4	356.4
GA_3at 30 PPM + cutting back about 33% from the apical portions cluster	327 3	419.5	17.2	17.6	352.5	363.4	352.3	362.2
GA_3 at 30 PPM + removing about 20%from cluster number + shaving.	318.2	408.5	16.8	17.3	344.5	347.6	337.6	338.5
GA_3 at 30 PPM + removing about 30%from cluster number + shaving.	306.5	396.7	16.6	17.2	326.2	328.3	326.5	324.6
Control	274.7	365.3	16.0	16.4	262.6	286.5	283.2	307.5
LSD at 5% level	68.55	66.84	0.9401	1.015	46.84	44.55	8.173	9.036

Table (3) : Effect of thinning treatments on berry firmness , TSS , acidity and TSS/acid ratio of Flame Seedless grapes during 2001 -2002 seasons

Treatments	Firmness (g/cm^3)		TSS %		Total acidity %		TSS / acidity ratio	
	2001	2002	2001	2002	2001	2002	2001	2002
GA_3 at 30 PPM + hand thinning	414.2	428.2	16.6	16.6	0.772	0.643	21.5	21.53
GA_3at 30 PPM + cutting back about 25% from the apical portions cluster	474.5	480.7	18.0	17.0	0.423	0.458	42.6	37.1
GA_3at 30 PPM + cutting back about 33% from the apical portions cluster	462.3	472.6	17.6	16.6	0.485	0.537	36.3	30.9
GA_3 at 30 PPM + removing about 20%from cluster number + shaving.	435.6	456.2	17.2	16.4	0.583	0.554	29.5	29.6
GA_3 at 30 PPM + removing about 30%from cluster number + shaving.	426.2	437.3	17.0	16.4	0.642	0.626	26.5	26.2
Control	402.2	416.5	16.4	15.8	0.781	0.675	21.0	20.1
LSD at 5% level	3.758	6.676	1.370	0.9401	0.1130	0.1522	11.6425	9.4326

The data also show clearly that combined treatment of GA_3 at 30 PPM + cutting back about 25% from the apical portions of cluster signilicantly decreased total acidity (0.423 & 0.458%) followed by treatment GA_3 at 30 PPM + cutting back about 33% from the apical portions of cluster (0.485 & 0.537%) compard to all treatment in both seasons of study. Similar results were found by Ditillon *et al.*,(1994), Amati *et al.*, (1995) Bucelli and Gianneti (1996) Abd El-Ghany (2001) and Abd El-Galil and El Wasfy (2003) found that berries thinning decreased total acidity.

In general, the effect of the studied treatments on TSS/acid ratio of Flame Seedless exhibited similar trend to that of TSS .

Total anthocyanin, sugars and amino acids:

Data in Table (4) indicated that thinning treatments used significantly increased the total antharyanin in the skin of berries compared with the control. GA_3 at 30 PPM combined with cutting 25% or 33% from the apical portions of cluster gave the highest means (3.14 & 3.56 mg/g) or (3.06 & 3.45 mg/g) followed by combined treatments GA_3 at 30 PPM + removing about 20% or 30% from clusters number + shaving, while GA_3 at 30 PPM + hand thinning gave the lowest means (2.34 & 2.45 mg/g) compared with control in both stud seasons respectively.

Table (4) : Effect of thinning treatments on total anthocyanin , sugars and amino acids of Flame Seedless grapes during 2001 - 2002 seasons

Treatments	Total anthocyanin (mg/g)		Total sugars %		Total amino acids %	
	2001	2002	2001	2002	2001	2002
GA_3 at 30 PPM + hand thinning	2.34	2.45	15.6	15.2	0.042	0.046
GA_3 at 30 PPM + cutting back about 25% from the apical portions of cluster.	3.14	3.56	16.3	16.6	0 078	0.080
GA_3 at 30 PPM + cutting back about 33% from the apical portions of cluster.	3.06	3.45	16.2	16.4	0.072	0.076
GA_3 at 30 PPM + removing about 20%from cluster number + shaving.	2.72	3.12	15.8	15.8	0.059	0.063
GA_3 at 30 PPM + removing about 30%from cluster number + shaving.	2.56	2.87	15.8	15.6	0.056	0.057
Control	2.17	2.24	15.4	15.0	0.030	0.033
LSD at 5% level	0.6352	0.7345	0.652	0.7334	0.3645	0.2573

The data also show clearly that combined treatment of GA_3 at 30 PPM + cutting back about 25% from apical portions of cluster gave high significant total sugar (16.30 & 16.6 %) followed by combined treatment GA_3 at 30 PPM + cutting back about 33% from the apical portions of cluster (16.2 & 16.4 %) while treatment GA_3 at 30 PPM + hand thinning and combined treatments GA_3 at 30 PPM + removing about 30% from clusters number + shaving, compared with untreated vines in both study seasons respectively. Similar results were found by Bucelli and Gianneti (1996), Abd El-Ghany (2001) and

Abd El-Galil and El Wasfy (2003) they reported that cluster thinning treatments gave higher sugar content than the control.

Concerning the effect of thinning treatments on amino acid, there were not significant differences among all treatments compared to the control of Flame Seedless grapes.

From the above mentioned results, it can be recommended that thinning by combined treatment of GA_3 at 30 PPM + cutting back about 25% from the apical portions of cluster recorded the best results with respect to Flame Seedless grapes

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تأثير طرق الخف على العنب الفليم سيدلس

١- تأثير طرق الخف على المحصول وجودة الثمار

عبير تحسين محسن

قسم الفاكهة – كلية الزراعة – جامعة القاهرة

أجرى هذا البحث خلال موسمي ٢٠٠١/٢٠٠٢ على كروم العنب الفليم سيدلس فى مزرعة خاصة بمنطقة الوادي الفارغ بمحافظة الجيزة .

وقد أجرى بعض معاملات الخف بعد العقد ويشمل :

١-رش جبرالين بتركيز ٣٠ جزي فى المليون + خف يدوي .

٢-رش جبرالين بتركيز ٣٠ جزء فى المليون + ازالة ٢٥% من الجزء الطرفي للعنقود .

٣-رش جبرالين بتركيز ٣٠ جزء فى المليون + ازالة ٣٣% من الجزء الطرفي للعنقود .

٤-رش جبرالين بتركيز ٣٠ جزء فى المليون + ازالة ٢٠% من عدد العناقيد الكلي + ازالة الحبات الداخليه علي الاكتاف الخمسة القاعدية.

٥-رش جبرالين بتركيز ٣٠ جزء فى المليون + ازالة ٣٠% من عدد العناقيد الكلي+ ازالة الحبات الداخليه علي الاكتاف الخمسة القاعدية.

وقد أظهرت بعض معاملات الخف الى زيادة المحصول و تحسن الصفات الطبيعية للعنقود والحبات مثل (الطول – الوزن – الحجم – معامل التزاحم بالعنقود – الصلابة – قوة الشد) الصفات الكيميائية (نسبة المواد الصلبة الذائبة –الحموضة – صبغة الانثوسيانين فى جلدة الحبات – السكريات الكلية – الأحماض الأمينية الكلية)

وجد أن معاملة الخف باستخدام رش جبرالين بتركيز ٣٠ جزء فى المليون مع ازالة ٢٥% من الجزء الطرفي للعنقود اعطى أفضل النتائج مع العنب الفليم سيدلس .