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SOME CULTURAL PRACTICES TO HASTEN YIELD AND CLUSTER CHARACTERISTICS OF RED ROUMI GRAPE.

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ABSTRACT

This study was undertaken during the seasons 2004 and 2005 to evaluate the effect of removing 1/3 flower cluster length (about 10 cm of cluster length) at full bloom or trunk girdling immediately after berry set each alone or in combination under bud load of 60 or 80 eyes/vine of Red Roumi grapevine .The data reveal that removing 1/3 flower cluster length or trunk girdling significantly increased the yield per vine. Yet, combined treatment (removing 1/3 flower length with trunk girdling) gave a higher significant yield than those obtained from each alone or the control. The increment in yield was almost higher in vines which having 80 eyes/vine. With regard to effect of cluster shape and berry quality, the data also presented that shortening cluster with trunk girdling gave a higher cluster weight than vine which having 60 eyes/vine. The increase of cluster weight may be due to this treatment produced a higher berry weight and size .Also, combined treatment with removing 1/3 flower cluster length with trunk girdling under 60 eyes/vine increased SSC and SSC/acid ratio and anthocyanin content so, improved the berry quality of the cluster.

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INTRODUCTION

Grapevine (*Vitis vinifera, L.*) considered the first fruit crop grown in the world. The total area in Egypt reached about 154685 faddans with an annual fruit production about 1391749 metric tons according to the last statistics of the ministry of agriculture (2005). Red Roumi grape is one of the most popular late seeded cultivars grown in Egypt, since it marketed from September and December. Its cluster is rather loose due to poor berry set and this is reflected on cluster's shape and poor quality. The berry weight of Red Roumi grape without any treatments is small compared to most other seeded table grape such as Red globe and Ribier. It is widely accented that fruit yield and fruit quality of the grape vine is greatly related to the number of eyes retained after dormant spur pruning. (Al-Saidi & Al-Wan, 1990**,** Hussain. & El Dujaili, 1990 and Murisier & Ziegler, 1991).

Also, some cultural practices are used to improve cluster and berry quality such as cluster thinning and girdling the trunk or canes. During fruit development bunch thinning will depend on initial yield to which bunch thinning occurs and the photosynthetic effectiveness of the leaves supplying the berries with carbohydrates. So, the aim of cluster thinning is to a develop lead so grape maturation may be advanced grape quality improvement (Iland *et. al.,* 1995).Girdling has been used to increase berry size commercially. this producer is performed at berry set (Harrell & Williams , 1987). Alternatively changes in the hermon balance of the vine after girdling may have a role on increasing size (Kriedmann & Lenz, 1972). Girdled grapevines increased ABA concentration in leaves (During, 1978) and may or may not have higher GA3 concentration in fruit above the girdle (Weaver & Pool, 1965) when

compared to control vine. The increase in size due to girdling may result from better carbohydrate nutrition above the girdle as the transport of sugars from leaves to the root system is effectively blocked (Roper & Williams, 1989) and enhance colour and advance ripening (Gonzalo *et al.*1984).

In this respect, this study aimed to evaluate the effect of removing 1/3 flower cluster length at full bloom or trunk girdling immediately after berry set each alone or in combination under bud load 60 or 80 eyes/vine of Red Roumi grapevine .

MATERIALS AND METHODS

This study was carried out during the two seasons of 2004 - 2005 on 15-year old of Red Roumi grapevines at El-Dear village near Aga city, Dakahlia governorate , Egypt to study the effect of removing 1/3 flower cluster length and trunk girdling each alone or in combination under two level of pruning on yield , cluster and berry characteristics . The vines were planted in clay loam soil at 2m between vines and 2.5m between raws using spur pruning under bilateral cordon trellis system leaving two buds per spur.

The orchard was in a good condition and the vines received the normal agricultural practices as in the commercial grape orchards under Dakahlia conditions. Vines were pruned at the end of February as spur pruning by leaving 60 and 80 eyes /vine, 2 eyes per each spur. Whereas, removing 1/3 flower cluster length (about 10 cm of cluster length) was carried out at full bloom stage, but girdling was undertaken immediately after fruit set each alone or combined with removing 1/3 flower cluster length. Experiment design with complete randomized block, since, the vines chosen in three replicates each replicate containing 4 vines presented one of each treatment under the study as shown from Table (1). Harvesting date was estimated when the soluble solids in berry juice of the untreated berries reached about 16 – 18 % according to El.Sese and El-Agamy (1988). Samples of 24 cluster/treatment, 8 clusters for each replicate were harvest and transported to the laboratory of Pomology Depart., Mansoura Univ. to determine yield and cluster weight and compactness coefficient, Since it estimated according to Winkler *et al.* (1974) and Ali *et al.* (2000) using equation:-

$$\text{Cluster compactness} = \frac{\text{No. of berries/clusters}}{\text{Cluster length}}$$

Samples of 50 berries from each replicate were taken to determine average berry weight and size .Whereas, soluble solids content and total acidity were determined in berry juice . Total anthocyanin content was determined in berry skin according to method ascribed by Hsia *et al*. (1965).

The obtained result was statistically analyzed as simple experiment with 3 replicate of each treatment .The obtained data was subjected to analysis of variance according to Snedecor and Cachran (1990).

Table (1): The applied treatments used:

No. of Treatments	Treatments	
1	Control	
2	Pruning at 60 eyes/vine	Removing 1/3 flower cluster length a full bloom
3		Trunk girdling at berry set
4		Shorting cluster + girdling
5	Pruning at 80 eyes/vine	Removing 1/3 flower cluster length a full bloom
6		Trunk girdling at berry set
7		Shorting cluster + girdling

RESULT AND DISCUSSION

These results presented the effect of removing 1/3 flower cluster length at full bloom stage or girdling the trunk immediately after fruit set each alone or in combination under two levels of pruning on yield, cluster characteristics and berry quality of Red Roumi grape.

Yield/vine and per Faddan:

Data from Table (2) presented that the effect of both removing 1/3 flower cluster length and girdling the trunk of Red Roumi grape on yield per vine and per Faddan. From this Table, data showed that the untreated vine gave lower yield per vine (kg) and per Faddan (ton) than those obtained from removing - 1/3 flower cluster length or girdling the trunk each alone or in combination under leaving 60 or 80 eyes/vine. Furthermore, removing 1/3 flower cluster length or girdling the trunk under leaving 80 eyes/vine gave a higher yield than those obtained under leaving 60 eyes /vine.

Moreover, removing 1/3 flower cluster length with girdling the trunk after berry set produced a higher significant yield per vine and per Faddan than those obtained from each alone during the both seasons under the study. Yet, removing 1/3 flower cluster length with girdling the trunk under leaving 80 eyes/vine gave a higher significant yield per vine and per faddan than those obtained from leaving 60 eyes/vine, since, this treatment presented 20.0 kg/vine and 16.0 Ton/Faddan as a mean of two seasons under the study.

Whereas, no significant effect had obtained on yield/vine and per Faddan from removing 1/3 flower cluster length or girdling the trunk after berry set during the both seasons. Thus, these treatments under 80 eyes/vine gave a higher values than those obtained from leaving 60 eyes/vine during the both seasons under the study. That is not astonishing, since, the number of cluster's per vine were almost higher under 80 eyes/vine than those obtained from 60 eyes/vine.

Table (2): Effect of removing 1/$_3$ flower cluster length* and trunk girdling on yield/vine and per faddan of Red Roumi grape.

Treatments		Yield /vine (kg)			Yield/Faddan (Ton)		
		2004	2005	Mean	2004	2005	Mean
Control		13.10	15.40	14.30	10.50	12.30	11.40
Pruning at 60 Eyes/vine	Cluster shorting	14.70	19.20	17.00	11.80	15.40	13.60
	Trunk girdling	14.60	18.90	16.80	11.70	15.10	13.40
	Shorting+ Girdling	16.50	21.70	19.10	13.20	17.40	15.30
Pruning at 80 Eyes/vine	Cluster shorting	15.70	20.10	17.90	12.60	16.00	14.30
	Trunk girdling	15.60	19.60	17.60	12.50	15.60	14.10
	Shorting+ Girdling	17.60	22.40	20.00	14.10	17.90	16.00
L.S.D at 5%		0.430	0.450		0.350	0.360	

In this respect, Keller *et al*. (2004) found that yield generally correlated positively with the number of nodes retained at pruning and number of clusters per shoot, but not with the number of shoots per vine and number of berries per cluster. So, leaving 130 nodes /vine yielded considerably less than 260 nodes/vine. Also, **Peacock** *et al.* (2005) mentioned that girdled Summer Royal table grape in early bloom increased berry set and total yield than the control. Furthermore, Sharma *et al.* (1999) presented that girdling the trunk of Perlette grape produced a higher yield/vine and bunch weight than obtained from berry thinning or the control under leaving 80 bunch/vine.

Cluster weight:

Data from Table (3) show clearly that removing 1/$_3$ flower cluster length or girdling the trunk after berry set each alone on in combination gave a higher significant weight of cluster under leaving 60 or 80 eyes/vine than the control. The effect between removing 1/$_3$ flower cluster length and girdling the trunk was unpronounced under leaving 60 or 80 eyes/vine. Yet, removing 1/$_3$ flower cluster length with girdling the trunk after berry set of Red Roumi grape gave a higher significant values of cluster weight than which carried each alone.

The data also reveal that average cluster weight was almost higher from vine which leaving 60 eyes than those obtained from leaving 80 eyes/vine .With raspect, removing 1/$_3$ flower cluster length with girdling the trunk after berry set under leaving 60 eyes/vine produced a higher significant weight of cluster than under leaving 80 eyes or the control, since, this treatment produced 50.9% higher than the control during both seasons.

Table (3) Effect of Removing 1/$_3$ flower cluster length and Trunk girdling on cluster weight and compactness coefficient of Red Roumi grape.

Treatments		Cluster weight (gm)			Compactness coefficient		
		2004	2005	Mean	2004	2005	Mean
Control		435.30	480.30	457.80	3.4	3.4	3.4
Pruning at 60 eyes/vine	Cluster shorting	585.80	641.20	613.50	4.8	5.1	5.0
	Trunk girdling	583.30	630.30	606.80	3.6	3.9	3.8
	Shorting+ Girdling	659.10	722.20	690.70	5.2	5.4	5.3
Pruning at 80 eyes/vine	Cluster shorting	524.00	572.80	548.40	4.5	4.7	4.6
	Trunk girdling	520.90	558.60	539.80	3.4	3.5	3.5
	Shorting+ Girdling	587.70	638.80	613.30	4.6	4.9	4.8
L.S.D at 5%		14.97	14.13		0.3	0.3	

Similar results were obtained by Roper and Williams (1989) indicated that vine girdling at anthesis stage presented accumulate more carbohydrates than ungirdled vines. Also, the cluster weight was significantly greater by girdling the vines at the same time. Also, Sharma *et al.* (1999) presented that crop load with 40 bunch/vines recorded a significantly better bunch weight than the control or leaving 60 or 80 bunches/vines .Also, the increment in bunch weight could be attributed to the effect of girdling and cluster thinning**.**

Cluster's compactness:

The effects of removing 1/3 flower cluster length or girdling the trunk each alone or in combination on cluster's compactness are presented in Table (3). From this table it is clear that removing 1/$_3$ flower cluster length each alone or with girdling the trunk gave higher compactness coefficient than girdling each alone or the control under leaving 60 or 80 eyes/vine. Whereas, removing 1/$_3$ flower cluster length with girdling the trunk under leaving 60 eyes/vine presented a higher cluster compactness coefficient than the same treatments under leaving 80 eyes/vine or the control. The control presented a lower cluster compactness coefficient.

In this respect, the data presented that girdling the trunk under leaving 80 eyes/vine produced a lower values of cluster compactness coefficient than the other treatments used or the control. Similarly, Zabadal (1992) reported that cane girdling treatment, or thinning may be used to increase cluster compactness and improve berry size on cv. Himrod grapevine. Likewise, Peacock and Michigan (2006) found that girdling Summer Royal at early bloom or one week later increased berry set, but did not affected by girdling one week after berry set.

Berry weight and size:

Data from Table (4) reveal that all treatments used significantly increased the average of berry weight and size than the control under two seasons of this study. Yet, removing 1/$_3$ flower cluster length or girdling the trunk each alone or in combination under leaving 60 eyes/vine gave a higher in berry weight and size than those obtained from the same treatment under leaving 80 eyes/vine.

Table (4) Effect of removing 1/$_3$ flower cluster length and trunk girdling on berry weight and berry size of Red Roumi grape.

Treatments		Berry weight (gm)			Berry size (mm)		
		2004	2005	Mean	2004	2005	Mean
Control		4.7	4.9	4.8	18.0	18.7	18.4
Pruning at 60 Eyes/vine	Cluster shorting	6.0	6.1	6.1	21.90	22.40	22.20
	Trunk girdling	5.9	6.1	6.0	21.30	22.20	21.80
	Thinning+ Girdling	6.3	6.7	6.5	23.90	24.70	24.30
Pruning at 80 Eyes/vine	Cluster shorting	5.7	6.0	5.9	19.70	19.90	19.80
	Trunk girdling	5.7	5.9	5.8	19.50	20.00	19.80
	Thinning + Girdling	6.2	6.4	6.3	21.60	22.40	22.00
L.S.D at 5%		0.2	0.2		0.78	0.70	

In this respect, combined treatments with removing 1/$_3$ flower cluster length or girdling the trunk under leaving 60 or 80 eyes/vine gave a higher significant berry weight and size than those obtained from vines treated each alone or the control. Also, combined treatments with removing 1/$_3$ flower cluster length or girdling the trunk under leaving 60 eyes/vine produced a higher berry weight and size than those obtained under leaving 80 eyes or the control.

Similarly, Freeman *et al.* (1979) found that berry weight was reduced by increasing the level of pruning (No. of nodes/vine). Since, vines had 20 nodes/vine gave a higher weight than leaving 40 or 80 nodes/vine. Furthermore, Dokoozlian *et al.* (1995) found that girdling at berry set significantly increased yield/vine due to its effect on increasing berry weight and size. Also, Carreño *et al.* (1998) found that girdling after berry set gave a significant effect on berry weight and size. Also, Williams *et al.* (2000) found that girdling the trunk or cordon indicated that both girdling treatments increased berry size of Flame seedless grapevine compared to the control.

Soluble Solids content in berry juice:

Data from Table (5) show clearly that both removing 1/$_3$ flower cluster length at full bloom stage or girdling the trunk after berry set gave higher

values of SSC in berry juice than those obtained from the untreated ones. While, the effect between these treatments under leaving 60 or 80 eyes/vine was unpronounced during the two seasons of the study.

Whereas, combined treatments with removing 1/$_3$ flower cluster length with girdling the trunk under leaving 60 or 80 eyes/vine gave a higher pronounced effect of SSC in berry juice.

That is not astonishing, since, removing 1/$_3$ flower cluster length increased the values of SSC than the control, since, these treatments presented a lower berry numbers than the control. Thus, girdling the trunk after berry set increased the accumulation of total carbohydrates in the grapevine and also increased the soluble solids content in berry juice and berry maturity than the control.

Likewise, Sharma *et al.* (1999) mentioned that girdling or berry thinning and crop load management improve the values of SSC significantly in grapevine. Furthermore, Guidoni *et al.* (2002) studied the effect of cluster thinning (removal of 50% of the cluster one month after bloom) and unthinned (control), mentioned that cluster thinning significantly increased the concentration of soluble solids in berry by 7% on Nebbiolo grapevine.

Total acidity:

Data from Table (5) presented the effect of removing 1/$_3$ flower cluster and girdling the trunk on total titratable acidity in berry juice of Red Roumi grape at harvest time .The data reveal that the effect of both removing 1/$_3$ flower cluster or girdling the trunk at berry set each alone presented a some reduction in total titratable acidity in berry juice than the control. Whereas, removing 1/$_3$ flower cluster with girdling the trunk under leaving 60 or 80 eyes/vine reduced the total acidity than those obtained from each alone or the untreated ones , So these treatments under leaving 60 or 80 eyes/vine presented a lower acidity than the other treatments used .

In this respect, Carreño *et al.* (1998) noticed that girdling at the beginning of ripening increased soluble solids, maturity index and color but decreased the titratable acidity .Similar results with the time of girdling were obtained in other varieties.

Table (5): Effect of removing 1/$_3$ flower cluster length and trunk girdling on SSC% and total acidity of Red Roumi grape.

Treatments		SSC %			Total acidity%		
		2004	2005	Mean	2004	2005	Mean
Control		15.60	16.10	15.90	0.660	0.635	0.648
Pruning at 60 eyes/vine	Cluster shorting	16.50	16.90	16.70	0.610	0.605	0.608
	Trunk girdling	16.40	16.80	16.60	0.620	0.620	0.620
	Shorting+ Girdling	16.90	17.20	17.10	0.570	0.550	0.560
Pruning at 80 eyes/vine	Cluster shorting	16.20	16.90	16.60	0.625	0.615	0.620
	Trunk girdling	16.20	16.70	16.50	0.630	0.630	0.630
	Shorting+ Girdling	16.80	17.00	16.90	0.590	0.590	0.590
L.S.D at 5%		0.23	0.22		0.024	0.040	

SSC / acid ratio in berry juice:

From Table (6) it is clear that removing 1/$_3$ flower cluster or girdling the trunk each alone presented a higher soluble solids/ acid ratio in berry juice under leaving 60 or 80 eyes/vine or the other control. Furthermore, removing 1/$_3$ flower cluster with girdling the trunk under leaving 60 or 80 eyes/vine gave a higher pronounced effect than untreated each alone or the control.

Whereas, removing 1/$_3$ flower cluster with girdling the trunk under leaving 60 eyes/vine gave a higher SSC/acid ratio in berry juice than those obtained under leaving 80 eyes/vine. The obtained values of SSC/acid ratio from removing 1/$_3$ flower cluster or girdling the trunk under leaving 60 or 80 eyes/vine was almost unpronounced. Yet, it always higher than the control. The increment from removing 1/$_3$ flower cluster and girdling the trunk may be due to their effect on increased the values of SSC in berry juice than the control under the two seasons of study.

Whereas, Tewfik (1987) found that berry quality was not effected expect for SSC: acid ratio which increased with pruning severity, when Red Roumi grapevines which pruned to 4 different pruning severity (30+6, 30+8, 30+10 and 30+12).

Table (6): Effect of removing 1/$_3$ flower cluster length and trunk girdling on SSC acid ratio and anthocyanin.

Treatments		SSC acid ratio			Anthocyanin		
		2004	2005	Mean	2004	2005	Mean
Control		23.6	25.4	24.5	0.420	0.462	0.441
Pruning at 60 Eyes/vine	Cluster shorting	27.1	27.5	27.3	0.840	0.905	0.873
	Trunk girdling	26.5	26.8	26.7	0.818	0.895	0.857
	Shorting + Girdling	29.7	30.9	30.3	0.979	1.015	0.997
Pruning at 80 Eyes/vine	Cluster shorting	25.9	26.6	26.3	0.630	0.725	0.678
	Trunk girdling	26.2	26.4	26.3	0.595	0.675	0.635
	Shorting+ Girdling	28.5	28.7	28.6	0.843	0.975	0.909
L.S.D at 5%		1.073	1.300		0.032	0.039	

Anthocyanin content in berry skin:

It is clear from Table (6) that removing 1/$_3$ flower cluster or girdling the trunk each alone or in combination gave higher values of anthocyanin content under leaving 60 or 80 eyes/vine .Yet, these treatments under leaving 60 eyes/vine were almost higher than those obtained under leaving 80 eyes/vine. So, removing 1/$_3$ flower cluster with girdling the trunk gave higher anthocyanin content than using each alone. The values of anthocyanin in berry skin of Red Roumi grape was almost higher under leaving 60 eyes/vine than those obtained from leaving 80 eyes/vine.

That is no astonishing, since girdling increased the accumulation of total carbohydrates and sugar content in the vine and also in berry juice. The content of anthocyanin is depending on soluble sugar in juice.
In this respect, Ezzahouani and Williams (2001) reported that the girdling at fruit set enhanced fruit coloration of Ruby Seedless grapevine. Also, Brasher *et al.* (2002) indicated that there was an increase in total anthocyanins from fruit thinning at bloom as compared to veraison thinning.

From this study, it could be conclude that pruning Red Roumi grapevine by leaving 60 eyes/vine under spur pruning with 2 eyes per each spur was suitable to obtained a good yield with better cluster and berry quality. Also, removing $1/_3$ cluster length a full bloom with girdling the trunk immediately after fruit set presented a good cluster shape with bigger berry and colour than those obtained from using each alone or the control.

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تأثير بعض المعاملات الزراعية لتحسين المحصول و صفات العناقيد فى العنب الرومى الأحمر.

نبيل رشاد سمره ، غازى إبراهيم البنا ، محمد عبد الرحيم عراقى و تامر الحسينى محفوظ
قسم الفاكهة – كلية الزراعة – جامعة المنصورة

أجريت هذه الدراسة خلال عامى ٢٠٠٤ – ٢٠٠٥لداسة تأثير إزالة ٣/١ العنقود الزهرى (حوالى ١٠ سم من طول العنقود) فى مرحلة إكتمال التزهير و كذا إجراء تحليق للجذع بعد العقد مباشرة كل بمفرده أو معاً تحت ظروف التقليم بترك ٦٠ أو ٨٠ عين على الكرمة لصنف العنب الرومى الأحمر .

لقد أوضحت النتائج أن إزالة ٣/١ طول العنقود الزهرى أو إجراء التحليق لجذع الكرمة أدى لزيادة محصول الكرمات معنوياً بينما إزالة ٣/١ طول العنقود الزهرى مع إجراء التحليق لجذع الكرمات معاً أعطت زيادة مؤكده فى المحصول عن تلك المتحصل عليها عند إجراء كل منهما بمفرده أو الكرمات الغير معاملة . كما أن الكرمات التى ترك عليها ٨٠ عين أعطت محصول أعلى بالمقارنة بتلك المتروك عليها ٦٠ عين و ترجع الزيادة فى المحصول إلى زيادة عدد العناقيد.

أما بالنسبة لتأثير المعاملات على شكل العنقود و خواص الثمار لقد أوضحت الدراسة أن إزالة ٣/١ طول العنقود الزهرى مع إجراء التحليق للجذع تحت ظروف ترك ٦٠عين للكرمة أعطى زيادة فى وزن العنقود نتيجة لزيادة وزن و حجم الحبات كما أدت هذه المعاملة لزيادة التزاحم بالعنقود و بالتالى تحسين شكل العنقود علاوة على زيادة نسبة المواد الصلبة الذائبة و كذا محتوى قشرة الثمار من الأنثوسيانين.