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AN ATTEMPT TOWARDS IMPROVING BUNCH QUALITY THROUGH BERRY THINNING AND TRUNK GIRDLING TREATMENTS IN BLACK MONUKKA GRAPE

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ABSTRACT

This study was carried out to disclose the effect of berry thinning and trunk girdling treatments solely or in combination (for improving bunch and berry quality) on the date of harvest, yield, bunch and berry characteristics and vegetative growth of Black Monukka grapevines. Twelve conducted treatments were applied as follows; untreated vines (control), berry thinning (1) (Retention of five shoulders at the base of the bunch with the alternative removal of the branches and removing the terminal quarter of the bunch at 2-3 mm berry diameter) (B_1), berry thinning (2) (The same technique described above berry thinning (1) with the removed portion being increased as to be half of the bunch) (B_2), girdling (1) after fruit set (by removing a narrow ring of the bark (2-3mm entirely around the trunk) (G_1) and girdling (2) at veraison stage (G_2).

The results showed that all conducted treatments were effective in increasing average bunch weight and yield/vine except all (B_2) treatments. Girdling after fruit set alone or in combination with all berry thinning treatments improved physical characteristics of bunches and berries, girdling (2) at veraison stage alone or in combination with all berry thinning treatments increased TSS% of berry juice, TSS/acid ratio, improved berry colouration, while decreased acidity% of berry juice). Combination treatments of thinning, girdling (1) and girdling (2)] had the highest values of morphological and chemical estimates of vegetative growth compared with control. The obtained results revealed the superiority of Berry thinning (1) + Girdling (1) + Girdling (2) treatment owing to it's positive effect on most of the studied characters.

INTRODUCTION

Black Monukka grape is one of the table cultivars; ripens in mid July to late August, seedless, sweet, crisp, purplish-black, tender skin, good for fresh consumption or for production of raisins. The average yield of vines is acceptable, yet the quality of the clusters and berries is not rather good; since this cultivar is characterized by the production of small to medium berries and large and loose bunches which is negatively reflected on the bunch quality (Harry *et al.*, 1991).

Good quality in table grapes represents a combination of medium-sized clusters of uniformly large, perfect berries with colour, pleasant flavour and texture characteristic to the variety (Winkler *et al.*, 1974). Many factors of grape growing enter into the production of quality. Some of these affect the vine and its fruit more directly, such as thinning and girdling (Weaver, 1953).

Thinning has a definite place as a means of improving quality, it is widely practiced for enhancing physical and chemical properties of grapes (El-Banna, 1981; Abd El-Kawi *et al.*, 1984; Chauhan, 1985; Kaps and Cahoon 1989; Pereira, *et al.*, 1989; Dhilon *et al.*, 1992; Sanjay, 1995; Moon and Lee 1996; Echenique *et al.*, 1998; Fayek *et al.*, 2003; Abd El-Hameed and Abo El-Ez 2004 and Omran *et al.*, 2004).

Girdling or ringing has been used commercially to increase the accumulation of carbohydrates in the parts above the wounds. After fruit set, girdling has a positive effect on yield, berry weight and size (Rizk, 1993; Peruzzo, 1994; Dokoozlian *et al.*, 1995; Rizk, 1998; Fayek *et al.*, 2003; Abd El-Hameed and Abo El-Ez, 2004 and Omar and Girgis, 2005) or at veraison stage to enhance development of colour and total soluble solids and therefore hasten maturity (Al Dujaili ،1989; El-Hammady and Abd El-Hamid, 1995; El-Hammady *et al.*, 2000; Fawzi and Eman, 2003 and Omar and Girgis, 2005).

The target of the present study is to disclose the effect of berry thinning and trunk girdling solely or in combination as possible means for improving bunch and berry quality on harvest date, yield/vine, bunch and berry characteristics and vegetative growth of Black Monukka grapevines.

MATERIALS AND METHODS

This investigation was conducted for two successive seasons: (2003 & 2004) in a private vineyard located at El-Khatatba, Menoufiya governorate, on mature Black Monukka grapevines. The chosen vines were ten-year-old, grown in a sandy soil, spaced at 2 X 2.5 meters apart and irrigated by the drip irrigation system, cane-pruned and trellised by the "T" shape system. The vines were pruned during the second week of January with bud load of (60 buds/vine). One hundred and forty four uniform vines were chosen. Each four vines acted as a replicate and each three replicates were treated by one of the following treatments.

Twelve treatments were applied as follows:

1. Control (untreated vines).
2. Berry thinning (1) (Retention of five shoulders at the base of the bunch with the alternative removal of the branches and removing the terminal quarter of the bunch at 2-3 mm berry diameter) (B_1).
3. Berry thinning (2) (The same technique described above berry thinning (1) with the removed portion being increased as to be half of the bunch) (B_2).
4. Girdling (1) after fruit set (by removing a narrow ring of the bark (2-3mm) entirely around the trunk) (G_1).
5. Girdling (2) at veraison stage (G_2).
6. $B_1 + G_1$
7. $B_1 + G_2$

8. $B_2 + G_1$
9. $B_2 + G_2$
10. $G_1 + G_2$
11. $B_1 + G_1 + G_2$
12. $B_2 + G_1 + G_2$

***The following parameters were adopted to evaluate the tested treatments:-**

At veraison stage, two vines were specified for sampling. A representative sample of 20 berries from the apical, middle and basal portions of the bunch was taken from each vine every week. Total soluble solids % (TSS) in berry juice was determined by means of a hand refractometer and total titratable acidity % as tartaric acid was also determined according to the (AOAC 1985). Sampling continued for each treatment till TSS reached about 16-17% according to Tourky *et al.*, (1995).

1. Yield and physical characteristics of bunches:

Yield/vine was determined by multiplying the average number of clusters/vine by the average cluster weight.

Representative random samples of six bunches/vine were harvested at maturity. The following characteristics were determined: average bunch weight (g), bunch width and length (cm), number of berries per bunch and coefficient of bunch compactness, the latter was calculated by dividing number of berries/bunch by the length of the bunch.

2. Physical characteristics of berries:

Berry weight (g), berry size (cm^3), berry dimensions (length and diameter) (cm) and berry firmness and adherence strength (g/cm^3) using Shatilons's instrument were determined.

3. Chemical characteristics of berries :

Total soluble solids in berry juice (TSS) (%) by hand refractometer and total titratable acidity as tartaric acid (%) were measured (AOAC 1985). Hence TSS /acid ratio and total anthocyanin of the berry skin (g/100g fresh weight) were calculated according to Husia *et al.*, (1965).

4-Morphological characteristics of vegetative growth

At growth cessation, the following morphological and chemical determinations were carried out on 4 shoots / the considered vine:

1- Average shoot length (cm).
2- Average shoot diameter (cm).
3- Average number of leaves/shoot.
4- Average leaf area (cm^2) of the apical 5^{th} and 6^{th} leaves using a planimeter.
5-Coefficient of wood ripening was calculated by dividing length of the ripened part by the total length of the shoot according to Bouard (1966).

5- Leaf pigments and percentage of cane total carbohydrates

1-Leaf content of pigments (chlorophyll a, b and carotene) (mg/g fresh weight) of the 5th and the 6th leaves were determined (Westein, 1957).

2-Cane content of total carbohydrates (%) were measured (Smith *et al.*, 1956).

6- Statistical analysis:

The complete randomized blocks design was adopted for the experiment. The statistical analysis of the present data was carried out according to the methods described by Snedecor and Cochran (1972). Averages were compared using the new LSD values at 5% level. Percentages were transformed by the equation prior to the statistical analysis.

RESULTS AND DISCUSSION

• **Dynamics of maturity indices at various dates:-**

Maturity indices (TSS% and acidity%) for berry juice were monitored every week from veraison till 13/7 in the first season and 18/7 in the second one.

TSS %

TSS % of the juice (Figure 1) increased steadily by time elapse throughout the considered sampling dates to reach its peak on Jul 13 & Jul 18 for both seasons, respectively. G_2 treatment either sole or in combination with other treatments reached or approached to 16% only (maturity index described by Tourky *et al.*, 1995), while, control and other treatments approached this percentage in the last sampling date, these results were true for both seasons.

Acidity %

Juice acidity % (Figure 2) decreased gradually by time elapse throughout the considered sampling dates, it is evident that the G_2 treatment either alone or in combination with the other treatments especially B_2+ G_2 treatment in both seasons resulted in the least juice acidity as compared with the other treatments.

These results are in harmony with those obtained by (El-Banna, 1981; Fawzi and Eman 2003 and Fayek *et al.*, 2003)

1. Yield and physical characteristics of bunches

Data in (Table, 1) revealed that all berry thinning treatments either solely or in combination with the other treatments significantly reduced the vine yield except the treatments B_1 + G_1 and B_1 + G_1 + G_2 in both seasons. All remaining treatments were statistically similar to control. Applying girdling in any or both of the considered timings had insignificant effects. The highest effect was obtained from applying both girdling treatments on the same vines followed by the first girdling treatment. As for bunch weight, it was positively affected by the conducted treatments in a similar manner to that of yield per vine.

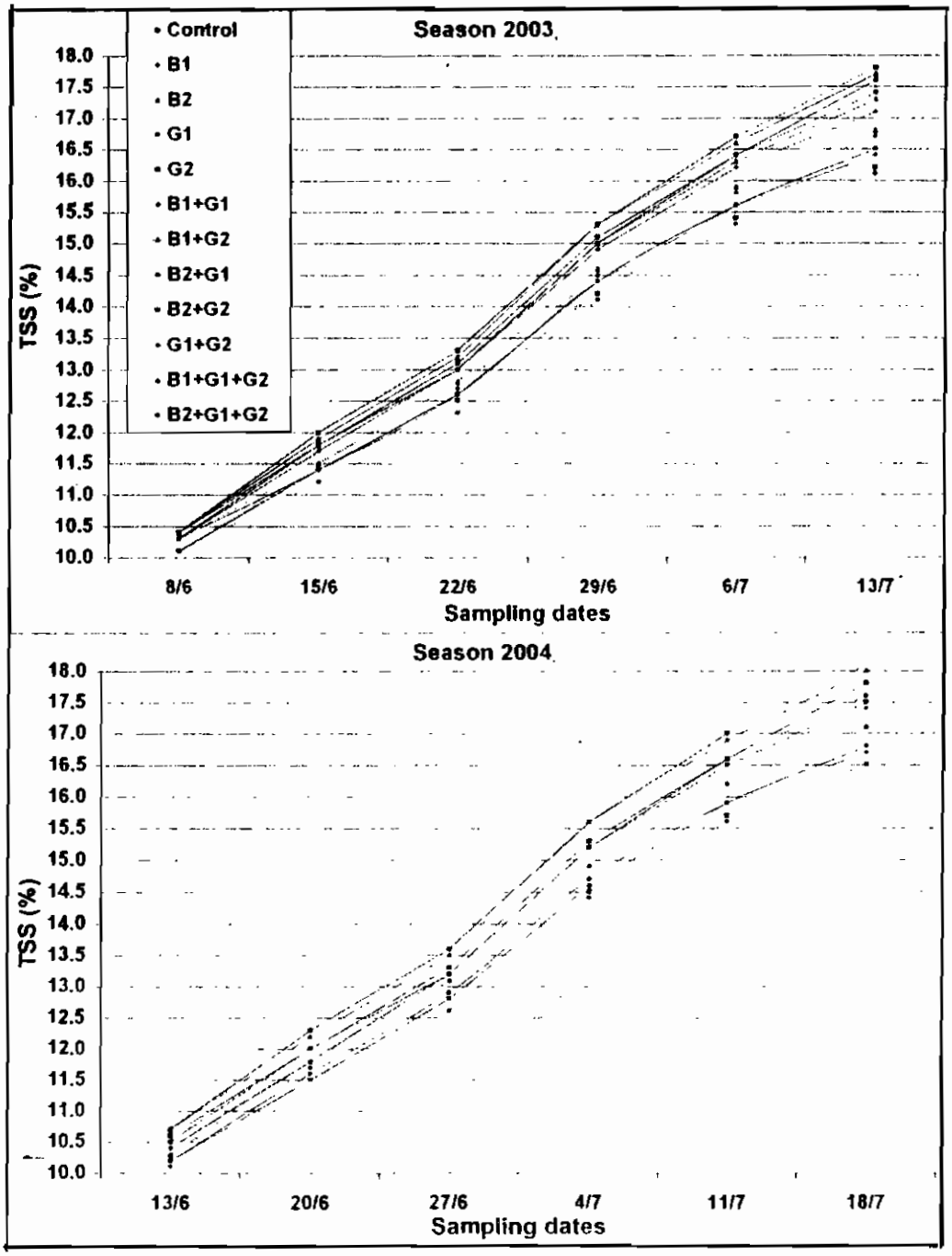

Fig (1): Average weekly TSS (%) in berry juice as affected by different treatments.

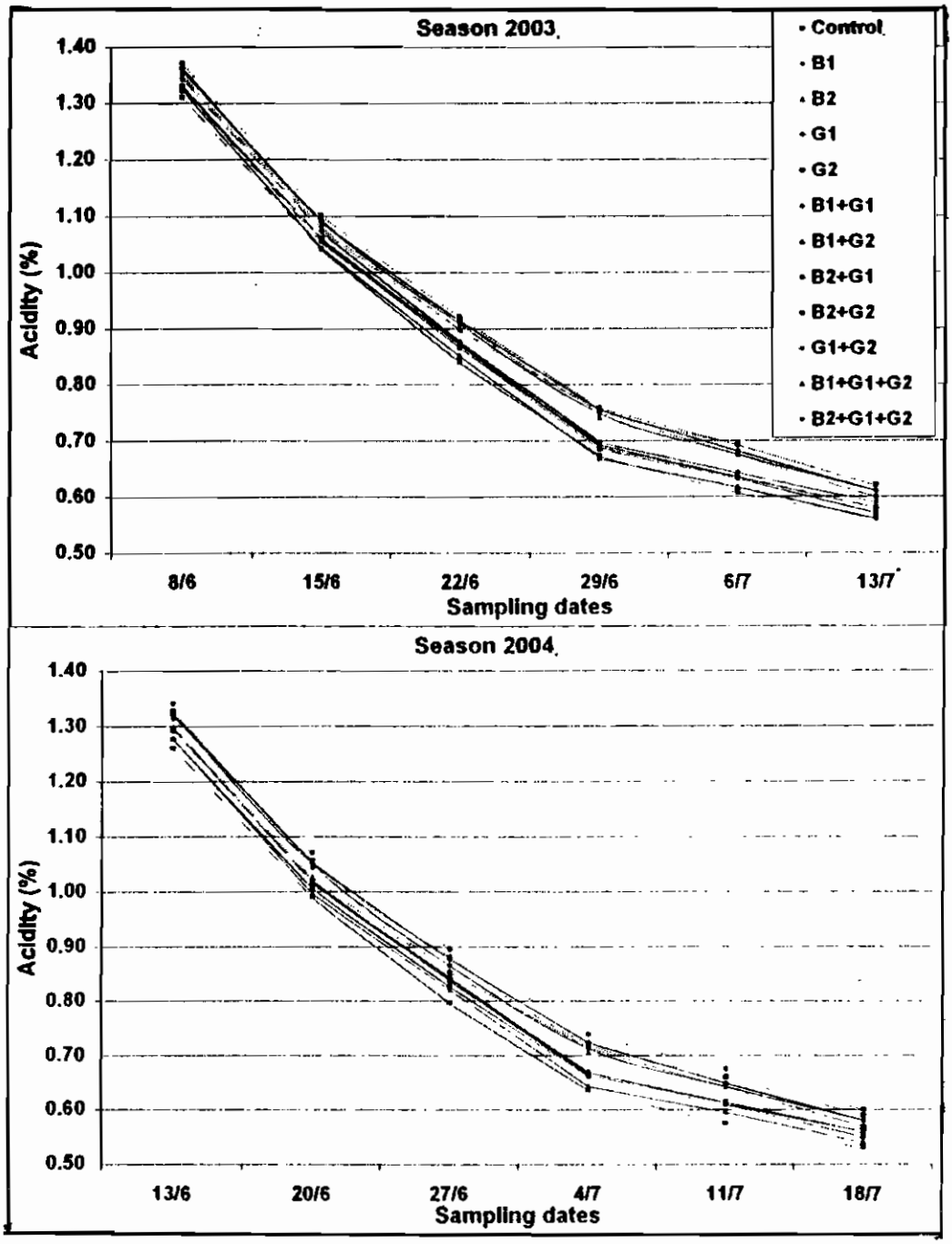

Fig (2): Average weekly acidity (%) in berry juice as affected by different treatments.

Table (1): Effect of different treatments on yield/vine and physical characteristics of bunches in 2003 and 2004 seasons

Caracteristic / Treatment	Yield/vine (kg)		bunch weight (g)		Bunch length (cm)		Bunch width (cm)		No. of berries		Coe. of bunch compactness	
	2003	2004	2003	2004	2003	2004	2003	2004	2003	2004	2003	2004
Control	14.04	13.30	684.8	564.2	33.5	33.2	12.9	12.8	199.7	194.0	5.96	5.84
B1	12.09	11.32	503.7	471.6	26.0	24.8	14.4	14.4	187.7	181.2	6.71	5.50
B2	10.23	9.44	428.4	393.3	18.4	18.2	15.7	18.8	138.3	130.9	6.43	8.06
G1	14.90	14.20	620.6	591.7	33.3	33.1	12.7	12.7	196.3	190.4	5.89	5.75
G2	14.14	13.43	589.1	559.6	33.4	33.2	12.6	12.6	199.0	192.2	5.96	5.79
B1+G1	13.65	12.90	589.3	537.4	25.2	26.0	14.3	14.2	178.0	186.6	6.95	6.75
B1+G2	12.26	11.51	510.8	479.5	25.2	24.7	14.4	14.3	168.3	182.2	6.68	6.67
B2+G1	11.82	11.01	492.3	468.6	18.6	18.8	15.6	15.5	147.0	139.9	8.88	8.43
B2+G2	10.36	9.59	431.8	399.4	18.3	18.3	15.8	16.6	138.8	130.6	6.81	8.00
G1+G2	15.02	14.37	625.9	598.6	33.2	33.0	12.7	12.8	198.0	189.5	5.90	5.74
B1+G1+G2	13.94	13.16	580.7	549.1	25.3	25.1	14.2	14.2	178.3	170.1	6.97	6.75
B2+G1+G2	11.85	11.06	493.7	460.9	18.5	18.5	15.5	18.4	148.0	138.8	8.60	8.41
new L.S.D. at 0.05	1.96	1.93	84.4	82.3	7.4	6.9	1.6	1.5	17.1	13.8	0.71	0.62

With respect to bunch dimensions, bunch length was affected by the degree of cluster tipping; all B_2 treatments either solely or in combination with the other treatments recorded significantly the lowest values in comparison with the other treatments and control in both seasons. Bunch width significantly increased by all thinning treatments either alone applied or combined with other treatments in both seasons as compared to control.

No. of berries per bunch was affected by the conducted treatments. This estimate was found increase significantly by applying both G_1, G_2, G_1+ G_2 treatments and control followed by all B_1 treatments either solely or in combination with other treatments, while B_2 treatments either alone or with other treatments recorded the lowest values in both seasons.

All B_2 treatments either applied alone or in combination with other treatments recorded the highest values of bunch compactness followed by all B_1 treatments either solely or in combination with other treatments, while, control and the remaining treatments resulted in the lowest values of this parameter in both seasons.

Previous investigations ascertained that girdling of the trunk at the fruit set stage increased yield (El-Banna, 1981 and Rizk, 1998). It is evident that girdling increases food reserves in the vines above the girdling point, which affects yield component mainly weight of individual bunches. As for the effect of manual thinning, it was previously El-Hammady *et al.*, (2000) noticed a reduction in total yield and bunch weight as a result of shoulder thinning. The additional effect of girdling and thinning on yield was confirmed by the results of (Abd El-Kawi *et al.*, 1984 and Fayek *et al.*, 2003)

2. Physical characteristics of berries:

Data revealed that all G_1 treatments either applied solely or in combination with other treatments recorded the highest values of berry weight, size, length, diameter, firmness and adherence strength, except for the shape index which was insignificantly affected, G_1 treatments in combination with all thinning treatments were superior to control in both seasons (Table, 2).

These results are in accordance with those obtained by Chauhan, 1985; Kaps and Cahoon 1989; Sanjay, 1995; Moon and Lee 1996 and Echenique *et al.*, 1998 on thinning; and Dokoozlian *et al.*, 1995; Rizk, 1998; Abd El-Hameed and Abo El-Ez 2004 and Omar and Girgis, 2005) on girdling; and (Abd El-Kawi *et al.*, 1984 and Fayek *et al.*, 2003; Abd El-Hameed and Abo El-Ez 2004 and Omran *et al.*, 2004) on girdling and thinning together.

The increase in berry weight and dimensions observed in the applied treatments can be interpreted by the increase in photosynthetic activity of leaves and the immigration of assimilates from leaves to berries which is enhanced (Winkler *et al.*, 1974).

3. Chemical characteristics of berries:

All G_2 treatments either applied alone or in combination with other treatments resulted in the highest significant TSS% of the juice, TSS/acid ratio and anthocyanin content of berry skin and least acidity% of the juice as compared to control and the remaining treatments in both seasons (Table, 3).

Table (2): Effect of different treatments on physical characteristics of berries in 2003 and 2004 seasons

Caracteristic / Treatment	Berry weight (g)		Berry size (cm3)		Berry length (cm)		Berry diameter (cm)		L/D		Firmness (g/cm^3)		Adherence strength (g/cm^3)	
	2003	2004	2003	2004	2003	2004	2003	2004	2003	2004	2003	2004	2003	2003
Control	2.86	2.74	2.73	2.88	2.02	1.93	1.53	1.47	1.32	1.31	290.3	279.0	196.4	188.6
B_1	2.92	2.82	2.81	2.72	2.07	1.96	1.58	1.50	1.31	1.31	296.2	284.1	200.1	189.6
B_2	2.99	2.90	2.87	2.80	2.11	2.02	1.62	1.56	1.30	1.29	302.6	289.9	205.3	194.8
G_1	3.06	2.98	2.96	2.91	2.16	2.09	1.64	1.69	1.32	1.31	310.6	296.6	209.5	200.5
G_2	2.88	2.78	2.78	2.87	2.03	1.93	1.54	1.47	1.32	1.31	291.9	280.3	196.9	186.6
B_1+G_1	3.17	3.08	3.08	2.99	2.19	2.10	1.67	1.50	1.31	1.31	313.7	298.8	212.0	202.6
B_1+G_2	2.95	2.85	2.84	2.78	2.08	1.98	1.59	1.52	1.31	1.30	298.0	285.5	201.3	191.1
B_2+G_1	3.28	3.17	3.16	3.07	2.20	2.12	1.68	1.63	1.31	1.30	318.6	302.4	216.0	206.2
B_2+G_2	3.02	2.94	2.91	2.84	2.11	2.04	1.62	1.58	1.30	1.29	304.6	291.2	208.7	198.9
G_1+G_2	3.11	3.03	2.99	2.93	2.17	2.09	1.66	1.59	1.32	1.31	311.2	298.9	209.6	200.7
$B_1+G_1+G_2$	3.21	3.13	3.09	3.03	2.19	2.11	1.67	1.61	1.31	1.31	314.4	299.1	212.4	203.1
$B_2+G_1+G_2$	3.29	3.21	3.18	3.12	2.21	2.14	1.69	1.64	1.31	1.30	319.2	302.7	216.3	206.6
new L.S.D. at 0.05	0.26	0.24	0.26	0.25	0.10	0.09	0.07	0.06	N.S	N.S	11.3	8.4	8.5	7.6

Table (3): Effect of different treatments on chemical characteristics of berries in 2003 and 2004 seasons

Caracteristic / Treatment	TSS (%)		Acidity (%)		TSS/acid ratio		Anthocyanin (g/100g F.W.)	
	2003	2004	2003	2004	2003	2004	2003	2004
Control	16.2	16.5	0.62	0.59	26.1	28.0	35.5	38.0
B_1	16.7	17.1	0.60	0.57	27.8	30.0	37.9	40.8
B_2	16.8	17.1	0.60	0.57	28.0	30.0	38.1	40.8
G_1	16.1	16.5	0.62	0.60	26.0	27.5	35.3	37.4
G_2	17.6	17.8	0.57	0.55	30.9	32.4	42.0	44.0
B_1+G_1	16.4	16.7	0.61	0.58	26.9	28.8	36.6	39.2
B_1+G_2	17.7	18.0	0.56	0.54	31.6	33.3	43.0	45.3
B_2+G_1	16.5	16.8	0.81	0.58	27.0	29.0	36.8	39.4
B_2+G_2	17.8	18.1	0.56	0.53	31.8	34.2	43.2	46.4
G_1+G_2	17.1	17.4	0.59	0.56	29.0	31.1	39.4	42.3
$B_1+G_1+G_2$	17.3	17.5	0.58	0.56	29.8	31.3	40.6	42.5
$B_2+G_1+G_2$	17.4	17.6	0.58	0.56	30.0	31.4	40.8	42.7
new L.S.D. at 0.05 =	0.9	0.8	0.03	0.04	3.4	3.9	4.3	4.7

The obtained results are in accordance with some previous reports. It was reported that manual thinning was found to increase TSS and provide better subjection to light, essential for anthocyanin synthesis. (Sanjay, 1995; Moon and Lee 1996 and Echenique *et al.*, 1998). Meanwhile, trunk girdling at veraison stage stimulated sugar accumulation that might be involved in athocyanin synthesis. The reports mentioned also that girdling at veraison stage may enhance the development of colour and total soluble solids and therefore hasten maturity (Al Dujaili ،1989; El-Hammady and Abd El-Hamid, 1995; El-Hammady *et al.*, 2000; Fawzi and Eman, 2003 and Omar and Girgis, 2005).

4-Morphological characteristics of vegetative growth

Data in (Table 4) show that most of vegetative growth parameters (shoot diameter, shoot length, number of leaves per shoot, leaf area and coefficient of wood ripening) responded positively to the double combination of thinning treatments with G_1 treatments or the triple combination of thinning treatments with G_1 and G_2 treatments as compared to control and the remaining treatments in both seasons.

The results in this connection are in line with those obtained by Fayek *et al.*, (2003), who reported that shoot length, shoot diameter, number of leaves per shoot and leaf area tended to increase with decreasing the number of berries/cluster of Ruby Seedless grapevines.

5- Leaf pigments and cane total carbohydrate %

All of the determined chemicals (expressed as leaf chlorophyll (a and b) and cane total carbohydrate %) were positively affected by the conducted treatments. The highest significant effects over the control were due to all thinning treatments combined with G_1 and G_2 treatment (Table, 5).

The obtained results are in agreement with those of Coomb (1959) and Singh and Weaver (1976), who found that girdling increased food reserves in the vine. The increase in leaf chlorophyll (a and b) content may cause a higher photosynthetic efficiency which in turn may lead to increasing the accumulation of carbohydrates by the end of the season.

Data illustrated in Figure (3, 4 and 5) indicated the presence of a highly positive correlation between leaf chlorophyll content and total soluble solids of berry juice, between leaf chlorophyll content and anthocyanin content of berry skin and between leaf chlorophyll content and cane content of total carbohydrates in both seasons.

It is apparent that the positive effects of girdling on yield and bunch quality could be ascribed to the enhanced accumulation of natural hormones and carbohydrates in parts above the wounds. The effect of thinning in reducing the competition between fruiting organs for organic and mineral nutrients in favor of enhancing the availability of organic foods for the retained bunches and berries in addition, all thinning and girdling treatments increased leaf pigments through activating photosynthesis process, hence, increasing rate of translocation of assimilated resulting in a better vegetative growth and better bunch and berry quality and finally increasing carbohydrate storage at the end of the season.

Table (4): Effect of different treatments on morphological characteristics of vegetative growth in 2003 and 2004 seasons

Caracteristic / Treatment	Shoot diameter (cm)		Shoot length (cm)		No. of leaves/shoot		Leaf area (cm^2)		Coefficient of wood ripening	
	2003	2004	2003	2004	2003	2004	2003	2004	2003	2004
Control	0.95	0.91	164.8	157.9	28.1	27.3	196.7	193.8	0.83	0.77
B_1	0.98	0.93	170.0	161.4	28.9	28.0	202.3	198.8	0.84	0.78
B_2	1.00	0.94	173.5	164.7	29.9	29.2	209.3	204.4	0.84	0.78
G_1	1.04	0.98	180.4	170.1	31.1	29.9	211.5	209.3	0.85	0.80
G_2	0.96	0.91	166.6	158.6	28.4	27.7	198.8	196.7	0.83	0.78
B_1+G_1	1.07	1.00	185.6	174.3	32.6	30.6	211.9	211.1	0.88	0.80
B_1+G_2	0.99	0.94	171.8	163.1	29.3	28.6	205.1	200.2	0.84	0.78
B_2+G_1	1.08	1.01	187.4	176.9	33.7	31.5	215.7	214.2	0.86	0.81
B_2+G_2	1.01	0.96	175.2	166.6	30.2	29.5	211.4	206.5	0.84	0.79
G_1+G_2	1.05	1.00	182.2	173.5	31.5	30.1	211.1	210.7	0.85	0.80
$B_1+G_1+G_2$	1.07	1.00	186.3	175.6	33.1	30.9	215.2	213.2	0.86	0.81
$B_2+G_1+G_2$	1.08	1.02	188.5	177.6	34.3	32.1	218.1	215.1	0.87	0.82
new L.S.D. at 0.05 =	0.07	0.06	12.3	10.9	3.8	2.6	4.8	6.9	0.03	0.04

Table (5): Effect of different treatments on leaf pigments and cane total carbohydrates in 2003 and 2004 seasons

Caracteristic / Treatment	Chlorophyll (a) (mg/g F.W.)		Chlorophyll (b) (mg/g F.W.)		Carotene (mg/g F.W.)		Total carbohydrates (%)	
	2003	2004	2003	2004	2003	2004	2003	2004
Control	0.49	0.42	0.22	0.19	0.20	0.18	24.3	21.7
B_1	0.54	0.48	0.23	0.20	0.21	0.18	25.1	22.7
B_2	0.58	0.52	0.25	0.21	0.22	0.20	26.2	23.5
G_1	0.65	0.59	0.26	0.23	0.24	0.21	27.2	24.7
G_2	0.52	0.46	0.23	0.19	0.21	0.18	24.7	22.4
B_1+G_1	0.69	0.63	0.26	0.23	0.24	0.22	27.8	25.3
B_1+G_2	0.55	0.48	0.24	0.20	0.21	0.19	25.4	23.1
B_2+G_1	0.72	0.65	0.27	0.24	0.03	0.23	28.9	26.1
B_2+G_2	0.61	0.54	0.25	0.22	0.23	0.20	26.4	23.8
G_1+G_2	0.66	0.60	0.26	0.23	0.24	0.21	27.7	25.1
$B_1+G_1+G_2$	0.71	0.64	0.27	0.24	0.25	0.23	28.4	25.8
$B_2+G_1+G_2$	0.74	0.68	0.29	0.25	0.26	0.23	29.4	26.5
new L.S.D. at 0.05 =	0.11	0.12	0.04	0.03	N.S	N.S	2.6	2.7

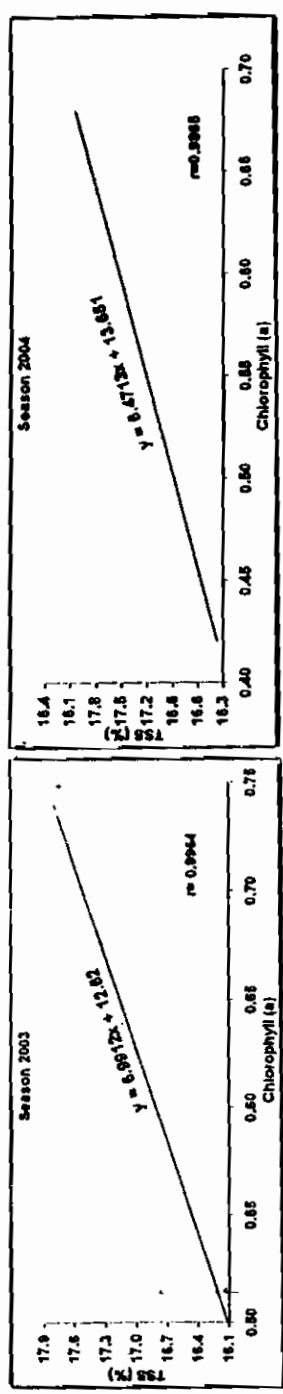

Fig (3): Relationship between chlorophyll (A) and TSS of berry juice

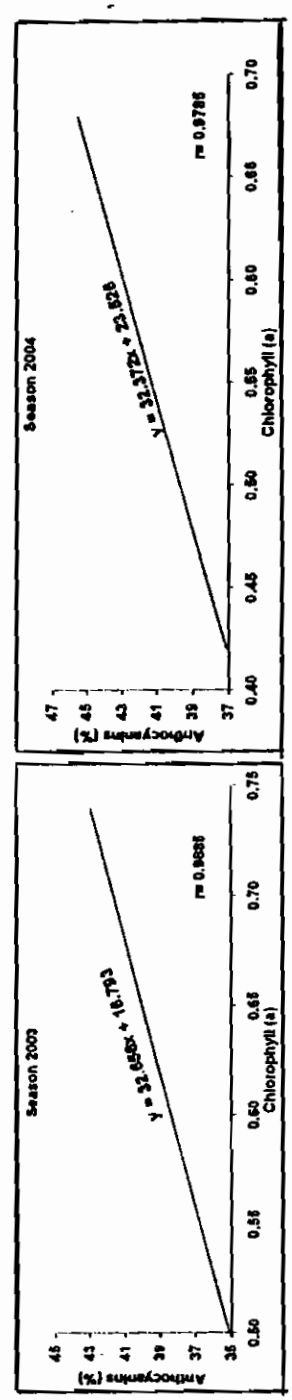

Fig (4): Relationship between chlorophyll (A) and total anthocyanin of berry skin

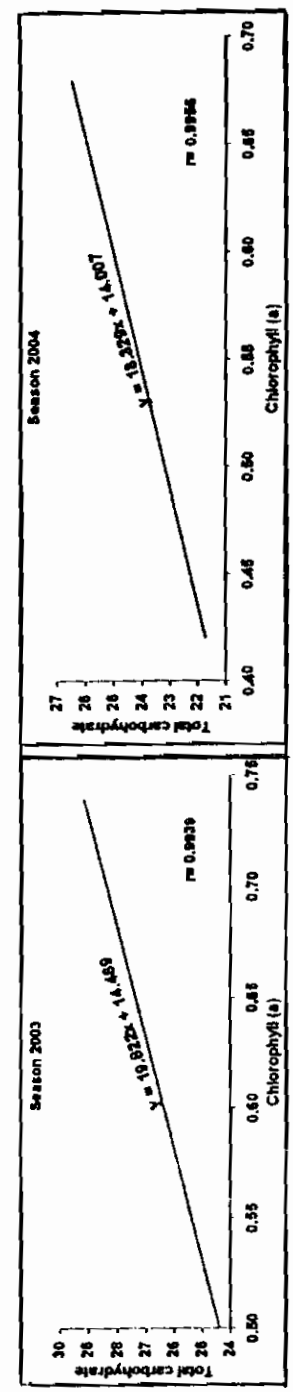

Fig (5): Relationship between chlorophyll (A) and cane total carbohydrates

From the obtained results, it can he concluded that manual thinning (1) + Girdling (1) + Girdling (2) gave the optimum results for vegetative growth, yield and fruit quality of Black Monukka grapevines.

REFERENCES

Abd El-Hameed, H.M. and Abo El-Ez, A.T. (2004): Effect of some thinning, girdling and foliar fertilization treatments on shot berries, yield and quality of Ruby seedless grapevines (*Vitis vinifera* L.). Assiut J. Agric. Sci., 35(3): 23-36.

Abd El- Kawi, A.; G. El Banna and A. Kamel (1984): Effect of GA spray, berry thinning and girdling treatments on yield and fruit quality of Thompson Seedless grape. Agric. Res. Rev., 62 (3A): 29-35.

Al-Dujaili, J.A.H. (1989): The effects of girdling and ethephon treatments on ripening, yield, quality and fruit characteristics of Buhruzy grape cultivar (*Vitis vinifera* L.). Annals Agric.Sci., Fac. Agric., (Cairo), 34(1): 675-687.

Association of Official Agricultural Chemists (1985): Official Methods of Analysis Published by AOAC, Benjamin Franklin Station, Washington DC, USA.

Bouard, J. (1966): Recherches physiologiques sur la vigne et en particulier pour l'aoutment des sarments. Thesis Sc. Nat Bordeaux-France. Pp.34.

Chauhan, V. S. (1985): Effects of thinning on fruit-drop, ripening, fruit quality and yield in Beauty Seedless grapes. Haryana Agric.Univ. J. R., 15(2): 177-180.

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

Dhilon, W. S., A.S. Bindra, S.S. Cheema and S. Sohan (1992): Note on effect of berry thinning on quality of grapes Cv. Perlette. Ind. J. Hort., 49 (1): 50-52.

Dokoozlian, N.; M. Luvisi; M. Moriyama and P. Schrader (1995): Cluster practices improve colour and size of 'Crimson Seedless'. Calif. Agric., 49 (2): 36-39.

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

El-Banna, G. I. (1981): Effect of some cultural treatments on fruit yield and storage life of grape. Ph.D. Thesis, Fac. Agric., Ain Shams Univ. Egypt.

El-Hammady, A.M. and Abd El-Hamid, N. (1995): Effects of GA_3, NAA and cane girdling on yield and quality of "King Ruby" grapevines. Annals Agric. Sci., Ain Shams Univ., Cairo, 40(1): 293-305.

El-Hammady,A A.D.Shaltout; N. Abdel-Hamid; M. El-Sayed (2000): Effect of Sitofex (CPPU) and shoulder thinning on yield and quality of King's Ruby grapes. Arab Univ. J. Agr. Sci., 8:735-754.

Fawzi, M.I.F. and Eman, A.A. Abd El-Moniem (2003): Effect of girdling alone or combined with flower cluster thinning and ethephon application on fruit set, yield and fruit quality of Black Monukka grapes. Arab Univ. J. Sci., Ain Shams Univ., Cairo, 11(2): 733-750.

Fayek M.A.; R.G.Stino and M.A. Abd El-Wahab (2003): Effect of thinning, girdling and Sitofex on Ruby Seedless grapevines. Egypt J. Appl. Sci., 18(2): 262-277.

Harry, A.; Fred J. and P. Elam (1991): Growing quality table grapes in the home garden. University of Califomia pp. (1-30).

Husia, C. L.; B. S. Luh and C. D. Chichester (1965): Anthocyanin in free stone peach. J. Food Science, 30: 5-12.

Kaps, M.L. and Cahoon, G.A. (1989): Berry thinning and cluster thinning influence vegetative growth,yield, fruit composition and net photosynthesis of "Seyval blanc" grapes. J. Amer. Soc. Hort. Sci., 114(1): 20.24.

Moon D.Y. and D.K. Lee (1996): Effects of berry thinning on fruit quality of grape "Fujiminori" in plastic film house. RDA J. Agric. Sci. Hort., 38(1): 683-686.

Omar, A.H. and Girgis, V.H. (2005): Some treatments affecting fruit quality of Crimson seedless grapevines. J. Agric. Sci. Mansoura Univ., 30(8): 4665-4673.

Omran Y.A.; Abd El-Ghany, A.A. and Hanaa El-Helw (2004): Improvement of cluster shape and fruit quality of "Roomy Red" grapevines. Assiut J. Agric. Sci., 35(2): 183-194.

Pereira, F.M.; Martins, F.P. and Banzatto, D.A. (1989): A study of alternative manual technique for berry thinning of Italic (Pirovano-65) grapevines. Cientifica, 17(1): 137-146.

Peruzzo, (1994): Ringing of canes in table grape cultivars. Agropecuaria Catarinense, 7(4): 21-23.

Rizk, M.H.E. (1993): Effect of girdling and some growth regulators on Red Roumi grapes. Ph.D. Thesis, Fac. Agric., Mansoura Univ., Egypt.

Rizk, M.H.E. (1998): Effect of Sitofex, GA_3 and hand thinning on yield and fruit quality of Thompson seedless grapes. J. Agric. Sci. Mansoura Univ., 23(1): 397-404.

Sanjay S. (1995): Ripening and quality of grape (*Vitis vinifera* L.) as affected by cluster thinning. Hort. J., 8(1): 9-15.

Singh, I.S. and R.J. Weaver (1976): Effect of girdling and ethrel treatments on berry weight, colour and quality of Gulabi grape. Ind. J. Hort., 46(1): 19-22.

Smith, F. Gilles, M. A. Hamilton, J. K. and Gedess, P. A. (1956): Colorimetric methods for determination of sugar and related substances Annual Chem., 28: 350.

Snedecor, G. W. and Cochran. W.G. (1972): Statistical Methods . 6th ed, The Iowa State Univ. . Press, Amer., Iowa , U.S.A. , pp. 50

Tourky, M.N., El-Shahat, S.S. and Rizk, M. H. (1995): Effect of Dormex on fruit set, quality and storage life of Thompson seedless grapes (Banati grapes) J. Agric. Sci., Mansoura Univ., 20(12): 5139-5151.

Weaver, R.J. (1953): Thinning and girdling of Red Malaga grapes in relation to berry size, colour and percentage of total soluble solids of fruit. Proc. Amer. Soc. Hort. Sci., 60: 132-140.

Westein, D. V. (1957): Chlorophyll-letale und der submikro skopische formwechsel der plastids, Experimental Cell Research, 12:427.

Winkler, A. J.; J.A. Cook; W. Kliewer and L.A Lider (1974): General Viticulture. Univ. Calif. Press, Barkely and Loss Angeles.

J. Agric. Sci. Mansoura Univ., 31 (10), October, 2006

محاولة لتحسين صفات العنقود باستخدام معاملات خف الحبات وتحليق الجذع فى صنف عنب البلاك مونوكا

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أجرى هذا البحث بهدف دراسة تأثير معاملات خف بعض حبات العنقود وتحليق الجذع سواء منفردة أو مشتركة فيما بينها على موعد الحصاد وكمية المحصول والصفات الطبيعية والكيماوية للعناقيد والحبات بالاضافة إلى الصفات الخضرية والكيماوية للمجموع الخضرى مقارنة بالكنترول لكرمات عنب البلاك مونوكا. وقد تم إجراء إثنتا عشر معاملة وهى الكنترول (كرمات غير معاملة)، الخف اليدوى لحبات العنقود (١) وهو ترك الخمسة أكتاف الأولى وإزالة التفرعات الجانبية الأخرى بالتبادل ثم إزالة الربع الطرفى من العنقود عندما يكون متوسط قطر الحبة ٢-٣مم، الخف اليدوى (٢) بنفس التكنيك السابق ولكن مع إزالة النصف الطرفى من العنقود، التحليق (١) بازالة حلقة كاملة من لحاء الجذع بعرض ٢-٣مم بعد العقد، التحليق (٢) عند بداية طراوة الحبات. وقد استخدمت المعاملات السابقة كل على إنفراد أو فى تراكيب زوجية أوثلاثية.

وقد أشارت نتائج الدراسة إلى أن كل المعاملات كانت فعالة ما عدا كل معاملات الخف (٢) فى زيادة متوسط وزن العنقود وكمية المحصول للكرمة. كما أدت معاملة التحليق بعد العقد سواء منفردة أو مع جميع معاملات الخف إلى تحسين الصفات الطبيعية للعناقيد والحبات. فى حين أدت معاملة التحليق عند بداية طراوة الحبات منفردة أو مع جميع معاملات الخف إلى زيادة نسبة المواد الصلبة الذائبة الكلية ومحتوى قشرة الحبة من الأنثوسيانينات مع إنخفاض الحموضة فى عصير الحبات، وبالاضافة إلى ذلك فقد لوحظ أن المعاملة الثلاثية التى تجمع بين الخف والتحليق عند العقد و التحليق عند بداية طراوة الحبات أعطت أفضل النتائج، وبالنسبة للصفات الخضرية والكيماوية للمجموع الخضرى مقارنة بالكنترول. وعموما فانه يمكن التوصية بتطبيق المعاملة الثلاثية: خف يدوى (١) + تحليق (١) + تحليق (٢) نظرا لنتائجها الإيجابية على كمية المحصول وتحسين الصفات الأساسية المؤثرة على الجودة.