ISSN 1110-0419

Annals Of Agric. Sc., Moshtohor,
Vol. 46(3): Ho. 407-418, (2008).

GROWTH, YIELD AND FRUIT QUALITY OF TWO GRAPE CVS. IN RESPONSE TO BUD LOAD AND FRUITING UNITS LENGTH
1- EFFECT OF DIFFERENT LEVELS OF BUD LOAD AND FRUITING UNIT LENGTH ON BUD BEHAVIOUR, GROWTH AND YIELD OF "FLAME SEEDLESS" AND "CRIMSON SEEDLESS"

BY

Khamis, M.A.* and Nasef, A.A**

* Dept. of Horticulture, Fac. of Agric., Moshtohor, Benha Univ.

** Hort. Traning Cen. Ministry of Agric

ABSTRACT

This investigation was carried out in a private vineyard at El-Khatatba region, Minufyia Governorate during both 2005 and 2006 seasons to study the effect of different levels of buds load and fruiting units length on bud behaviour, some vegetative growth measurements and yield of two grapevine cultivars i.e., (Flame seedless and Crimson seedless). Obtained data revealed that a close relationship between pruning severity (number of buds/vine and number of buds/cane) from one hand and most of investigated parameters. However, increasing both buds load/vine and fruiting units length (number of buds per cane) exhibited a higher significant bud burst %, bud fertility %, fruitfulness coefficient number of cluster per vine and yield. On the other hand, increasing bud loads per vine (number of buds/vine) and fruiting units length (number of buds/cane) resulted in decreased all studied vegetative growth measurements (shoot length, shoot diameter, number of leaves/shoot and leaf area) for both "Flame seedless" and "Crimson seedless" grape vine cultivars during the two experimental seasons.

INTRODUCTION

Grape is considered as one of the most popular and favourite fruit crops in Egypt; it ranks second after citrus crop concerning the acreage and consumption rates Grape acreage in Egypt exhibited a remarkable increase in the last decade reaching 160005 feddans with a productive average of 144624 feddans producing 1391749 tons. The average yield was 9.62 tons/feddans according to the statistics of Ministry of Agriculture published in 2005.

Among the horticultural practices carried out in vineyards; winter pruning is considered the most important one through which grape production can be increased.

The production of grapes in Egypt increased as a new varieties became known and culture practices post harvest handling as well as a new marketing methods utilized in the new reclaimed areas in the Egyptian deserts particularly the early ripening cultivars such as "Flame seedless", "Superior" and "Early Superior".

In Egypt, information concerning pruning of Flame seedless and "Crimson seedless" cultivars seems to be quite limited. Some grape growers adopted cane training system as appropriate method for training this cultivars with the purpose of obtaining the highest yield without taking into account the negative effect of this yield on the size and quality of both bunches and berries.

Therefore, some attempts were done in this respect by several investigators Al-Rawi and Al-Doori (1977), Morris and Cawthon (1980), Pondev (1984), Rizk *et al.* (1994), Sommer (1995), Ibrahim *et al.* (1996), Rizk (1996), Abd El-Wahab (1997), on some deciduous fruits.

The present work was planned and carried out to study the effect of different cane lengths and bud load on growth and yield of both "Crimson seedless" and "Flame seedless" cultivars. The ultimate target of this investigated is to determine the appropriate cane length which can be recommended for each cultivar under cane pruning system.

MATERIALS AND METHODS

The present investigation has been undertaken during the two successive growing seasons of 2005 and 2006 in a private vineyard at El-Khatatba region, Minufiya Governorate, Egypt on "Flame seedless" and Crimson seedless" grapevines. These vines were propagated by cuttings and growing in a sandy soil and drip irrigation systems was used Vines were 7 and 5 years old, spaced at (1.5 x 3.0) and (2.0 x 3.0) meters for "Flame seedless" and "Crimson seedless, respectively.

In December 2004 vines were carefully selected to be healthy, nearly uniform in vigour as possible and receiving regularly the same horticultural practices. Then, vines were arranged in a randomized design, however, every treatment replicated six times whereas each replicate was represented by a single vine.

Vines were trained according to the Y system for both studied cultivars. During the first week of January and second week of February, both "Flame seedless" and Crimson seedless" cultivars were pruned in both seasons of study, respectively to investigate the effect of different buds load and fruiting units length on bud behaviour, vegetative growth and yield of two grape vine cultivars. Thus, the experiments in this study conducted were as follows:

Twelve of pruning treatments were carried out and each treatment replicated six times for both "Flame seedless" and "Crimson seedless" cvs. Four bud load/vine were carried out as 24, 36, 48 and 60 buds per vine and adjusted number of buds/spure was 2, 4 and 6 buds. Consequently the number of bearing units per an individual vine ranged from 4-30 ones per vine this was observed in the "Flame seedless" cv. Moreover, four bud load/vine were carried out as 48, 60, 72 and 84 buds/vine and adjusted number of buds/cane was (9 ± 1), (12 ± 1) and (15 ± 1) buds. Thus the fruiting canes left per each vine ranged from 5-9 canes/vine for "Crimson seedless".

The vines of the two experiments were subjected to the following estimation:

1- Bud behaviour:

Dormant buds per vine were watched at weekly intervals all along the bursting period. Number of the bursted buds and cluster/each vine were recorded then the percentage were calculated according to Bessis (1960) during both seasons of study. Also, number of vegetative buds and number of fruitful buds were counted and the percentages were calculated in relation to the total number of the bursted buds according the following equations:

$$*\text{Bud burst}(\%) = \frac{\text{Number of bursted buds}}{\text{Total number of buds}} \times 100$$

$$*\text{Bud fertility}(\%) = \frac{\text{Number of clusters/ine}}{\text{Total number of buds}} \times 100$$

$$*\text{Fruitfulness}(\%) = \frac{\text{Number of fruitfu buds}}{\text{Number of bursted buds}} \times 100$$

In addition, coefficient of fruitfulness was calculated by dividing the total number of clusters per vine over the total number of fruitful shoots per vine. Moreover, the percentage of bursted buds at each position (node) lengthwise the cane was calculated. Also, the percentage of fertile buds at the aforementioned position lengthwise the cane was calculated in relation to the number of bursted buds in each position.

2- Vegetative growth:

Ten vegetative growth and ten fruitful shoots were labeled per vine, just after growth commencement of each seasons, to be measured at growth cessation, the ultimate shoot length (gained growth), basal shoot diameter, number of leaves / shoot and the average leaf area of the basal. 5th, 6th and 7th leaves were measured using planimeter.

3- Yield per vine:

Average number of cluster and weight of yield per vine in kg. was determined at harvest time. That is on the first week of June and on late of August for both Flame seedless and Crimson seedless, respectively in two seasons.

- Statistical analysis of the date:

All data obtained during two seasons of the present investigation were statistically analyzed using the analysis of variance method according to (Snedecor and Cochran. 1980). In addition, significant differences among means were distinguished according to the Duncan's multiple range test (Duncan, 1955) whereas capital and small letters were used for differentiating the values of specific and *interaction* effects of the investigated factors, respectively.

RESULTS AND DISCUSSION

1- Effect of bud load/vine and fruiting unit length (No. of buds/ cane) on bud behaviour of both "Flame seedless" and "Crimson seedless" grapevines:

Data in Tables (1 and 2) show that the bud behaviour measurements expressed as bud burst (%), vegetative buds (%), fruitful buds (%) and fruitfulness coefficient in response to four levels of bud load/vine (24, 36, 48 & 60) and (48, 60, 72 & 84) combined with three levels of cane length (2, 4 & 6) and (9 ±1, 12 ±1 & 15 ±1) number of buds/vine on Flame seedless and Crimson seedless, respectively.

1.1-Effect on bud burst percentage:

A- Specific effect:

Concerning the specific effect of the two factors involved in this study i.e., bud load/vine and fruiting unit length the (No. of buds/cane) on bud burst percentage, data obtained in Tables (1 and 2) clearly show that a significant gradual decrease in bud burst percentage with increasing number of buds/vine from (24 to 60) and from (48 to 84) in both Flame seedless and Crimson seedless, respectively during 2005 and 2006 seasons.

The present results are in harmony with those mentioned by Tafazoli (1977), Pondev (1984) and Abd El-Baki (2003) they revealed that the percentage of developing buds was in a negative correlation with number of buds left after pruning.

With respect to the specific effect of cane length (No. of buds/ cane), it was quite clear that (2) and (9 ±1) buds/cane recorded the least percentage of bud burst in both "Flame seedless" and "Crimson seedless" during the two seasons of study, respectively. Thus, it could be disclose that the over length of cane (6 buds/cane for Flame seedless and 15 ±1 buds/ cane for Crimson seedless), resulted in an increase in bud burst behaviour. Moreover, treatments of 4 buds/cane for Flame seedless and 12 ±1 cane/buds for Crimson were in between the aforesaid two extremes, however no significant differences were detected between the treatments (2) and (4) buds/cane for Flame seedless and (9 ±1) and (12 ±1) buds/cane for Crimson seedless. These results in most cases are in partial agreement with those found by Al-Rawi and Al-Doori (1977), Fawzi *et al.*, (1984), Rizk *et al.*, (1994), Rizk (1996) and Ansam (2002) all indicated that the percentage of bursted bud of "Thompson seedless" grape was increased by increasing cane length from 12 up to 18 buds/cane and from 8 to 12 buds/cane for "Deslains" grape cv.

B- Interaction effect:

Tables (1 and 2) revealed that there were a significant variation resulted by different combinations between number of buds/ vine and cane length (No. of buds/cane). Anyhow, 24 buds/vine x length of cane (6 buds) for "Flame seedless" and 48 buds/vine x cane length (15 ±1 buds) for "Crimson seedless" treatments showed the highest bud burst (%) as compared with those of other combinations. On the other hand, 60 buds/vine x cane length (2 or 4 or 6 buds) for "Flame seedless" and 84 buds/vine x cane length (9 ±1 or 12 ±1 or 15 ±1 buds) for "Crimson seedless" treatments showed the lowest bud burst percentage during two seasons of study. In addition, other combinations were in between the aforesaid two extremes.

Table (1): Response of bud behaviour measurements (percentage of bud burst , vegetative buds, fruitful buds and fruitfulness coefficient) to different levels of both bud load/vine and fruiting unit length on "Flame seedless" grapevines during 2005 and 2006 seasons.

Cane length (No. of buds/cane) / No. of buds/vine	Bud burst (%)			Mean*	Vegetative buds (%)			Mean*	Fruitful buds (%)			Mean*	Fruitfulness coefficient			Mean*
	2	4	6		2	4	6		2	4	6		2	4	6	
	1st season 2005															
24	63.87c	65.93b	68.00a	**65.93A**	4.11e	4.11e	3.97e	**4.07C**	95.89a	95.89a	96.03a	**95.93A**	1.00e	1.00e	1.00e	**1.00D**
36	56.87d	57.35d	57.83d	**57.35B**	5.96c-e	4.45e	3.66e	**4.69C**	94.04a-c	95.55a	96.34a	**95.31A**	1.22d	1.21d	1.20d	**1.21C**
48	50.73e	51.10e	51.47e	**51.10C**	6.93cd	6.01c-e	5.09de	**6.01B**	93.07bc	93.99a-c	94.91ab	**93.99B**	1.45c	1.43c	1.41c	**1.43B**
60	45.03f	45.03f	46.61f	**45.56D**	13.06a	9.39b	8.09bc	**10.18A**	91.91cd	90.61d	86.04e	**89.82C**	1.86a	1.72b	1.60b	**1.73A**
Mean**	**54.13B**	**54.85B**	**55.98A**		**7.52A**	**5.99B**	**5.20C**		**93.75A**	**94.01A**	**93.33A**		**1.38A**	**1.34B**	**1.30C**	
	2nd season 2006															
24	64.55c	68.00b	70.10a	**67.55A**	4.23c	4.17c	2.03d	**3.48C**	96.97a	95.83b	95.77b	**96.19A**	1.00e	1.01e	1.00e	**1.00D**
36	54.88e	57.35d	58.80d	**57.01B**	4.65c	4.65c	4.62c	**4.64B**	95.38b	94.80b	95.35b	**95.18B**	1.26d	1.24d	1.21d	**1.24C**
48	48.85f	48.85f	49.23f	**48.98C**	5.37c	5.14c	5.05c	**5.18B**	94.65b	94.86b	94.63b	**94.71B**	1.70b	1.57b	1.51c	**1.59B**
60	43.77g	44.40g	45.03g	**44.40D**	12.92a	12.25a	10.97b	**12.05A**	89.03c	87.75d	87.08d	**87.95D**	1.86a	1.85a	1.81a	**1.84A**
Mean**	**53.01C**	**54.65B**	**55.79A**		**6.79A**	**6.55B**	**5.67C**		**94.00A**	**93.31A**	**93.21A**		**1.45A**	**1.42B**	**1.38C**	

Table (2): Response of bud behaviour measurements (percentage of bud burst , vegetative buds, fruitful buds and fruitfulness coefficient) to different levels of both bud load/vine and fruiting unit length on "Crimson seedless" grapevines during 2005 and 2006 seasons.

Cane length (No. of buds/cane) / No. of buds/vine	Bud burst (%)			Mean*	Vegetative buds (%)			Mean*	Fruitful buds (%)			Mean*	Fruitfulness coefficient			Mean*
	9 ± 1	12 ± 1	15 ± 1		9 ± 1	12 ± 1	15 ± 1		9 ± 1	12 ± 1	15 ± 1		9 ± 1	12 ± 1	15 ± 1	
	1st season 2005															
24	86.12b	87.02b	88.62a	**87.25A**	56.63g	55.13gh	53.48h	**55.08D**	46.52a	44.87ab	43.37b	**44.92A**	1.12cd	1.12cd	1.11d	**1.11D**
36	80.77d	82.05cd	82.55c	**81.79B**	61.46e	60.05ef	59.13f	**60.22C**	38.54d	39.95cd	40.87c	**39.78B**	1.17ab	1.13cd	1.12cd	**1.14C**
48	76.58e	77.25e	77.93e	**77.26C**	67.11c	65.71cd	64.34d	**65.72B**	32.89f	34.29ef	35.66e	**34.28C**	1.17ab	1.14a-d	1.13cd	**1.15B**
60	73.20f	73.40f	74.20f	**73.60D**	74.18a	72.32b	71.05b	**72.52A**	28.95g	27.68g	25.82h	**27.48D**	1.18a	1.15a-d	1.15a-d	**1.16A**
Mean**	**79.17B**	**79.93B**	**80.83A**		**64.85A**	**63.30B**	**62.00C**		**36.73A**	**36.70A**	**36.43A**		**1.16A**	**1.14B**	**1.13C**	
	2nd season 2006															
24	84.88b	85.47ab	87.03a	**85.79A**	57.02g	55.76gh	54.61h	**55.80D**	45.39a	44.24ab	42.98b	**44.20A**	1.12c-e	1.11e	1.12c-e	**1.12D**
36	79.17d	80.48cd	81.00c	**80.22B**	62.87e	61.32e	59.19f	**61.13C**	37.13d	38.68d	40.81c	**38.87B**	1.18a-d	1.16a-e	1.12c-e	**1.15C**
48	75.22e	75.67e	76.12e	**75.67C**	68.73c	67.29c	64.61d	**66.88B**	31.27f	32.71f	35.39e	**33.12C**	1.19ab	1.18a-d	1.14b-e	**1.17B**
60	72.00f	72.37f	73.00f	**72.46D**	75.98a	73.99b	72.66b	**74.21A**	27.34g	26.01g	24.02h	**25.79D**	1.21a	1.18a-d	1.17a-e	**1.18A**
Mean**	**77.82B**	**78.50AB**	**79.29A**		**66.15A**	**64.59B**	**62.77C**		**35.28A**	**35.41A**	**35.80A**		**1.18A**	**1.16B**	**1.14C**	

* and ** Means refer to specific effect of bud load/vine and fruiting unit length, respectively. Values within the same column or row for any of two investigated factors followed by the same letter/s were not significantly at 5 % level where capital letters, were used for distinguishing specific effect value of each investigated factor but small letters for interaction of their combination.

1.2- Percentage of vegetative buds:

A- Specific effect:

Concerning the specific effect of the different factors involved in this study i.e., bud load/vine and cane length (No. of buds/cane) on the percentage of vegetative buds in relation to the total number of bursted buds, data obtained in Tables (1 and 2) clearly show that pruning both "Flame seedless" and "Crimson seedless" up to 60 and 84 buds/vine, respectively produced the highest vegetative bud percentage during 2005 and 2006 seasons.

Followed in a decreasing order by bud load at 48 and 72 buds/vine for "Flame seedless" and "Crimson seedless", respectively however bud load at 36 and 60 buds/vine came in the third level on vegetative percentage in both "Flame seedless" and "Crimson seedless", respectively, meanwhile the other treatment appeared to be less effective than the abovementioned ones.

Regarding the specific effect of cane length (No. of buds/cane) on vegetative buds (%), data in Tables (1 and 2) revealed that a significant variances in percentage of vegetative buds were obviously detected due to fruiting unit length during this study. Herein, the obtained results revealed that vegetative buds (%) decreased significantly by increasing cane length (No. of buds/cane) in both grapevine cultivars in 2005 and 2006 seasons. Moreover, the most remarkable increase was resulted by the lowest number of buds/cane (2) and (9 ±1) for "Flame seedless" and "Crimson seedless", respectively however, (6) and (15 ±1) buds/cane exhibited the lowest percentage of vegetative buds. Meanwhile, (4) and (12 ±1) buds was intermediate in this respect in both "Flame seedless" and "Crimson seedless", respectively during the two seasons of study.

B- Interaction effect:

Tables (1 and 2) revealed that there were a significant variation resulted by different combinations between bud load/vine and cane length (No. of buds/cane). Anyhow, in "Flame seedless" pruned at 60 buds/vine x cane length at 2 buds/cane and pruning "Crimson seedless" at 84 buds/vine x 9 ±1 buds/cane treatments showed the highest value of vegetative buds (%) as compared with other combinations. On the other hand, pruning "Flame seedless" at 24 buds/vine x 4 or 6 buds/cane and 48 buds/vine x 12 ±1 or 15 ±1 buds/cane for "Crimson seedless" treatments gave the lowest percentage of vegetative buds during 2005 and 2006 seasons. Moreover, other combinations were in between the abovementioned two extremes.

1.3- Percentage of fruitful buds:

A- Specific effect:

Concerning the specific effect of bud load/vine (No. of buds/vine) and cane length (No. of buds/cane) on the percentage of fruitful buds, data obtained in Tables (1 and 2) clearly show that as a general trend the fruitful buds behaviour showed a reversing trend to that found with vegetative buds. In this respect, the treatments of 60 buds and 84 buds/vine in both "Flame seedless" and "Crimson seedless", respectively passessed the lowest percentage of fruitful buds, followed by treatments 48 and 72 buds/vine. Moreover, treatments of bud load at 36/vine in "Flame seedless" and 60 buds/vine in "Crimson seedless" came in the third class, meanwhile, treatments of 24 buds/vine and 48 buds/vine resulted in approached values in both "Flame seedless" and "Crimson seedless", respectively.

These results are in agreement with those reported by Morris and Cawthan (1980) and Abd El-Baki (2003) all they observed an increase in bud fertility when bud number/vine was decreased.

Regarding the specific of cane length (No. of buds/cane) percentage of fruitful buds, data in Tables (1 and 2) it appeared as a general trend, that the fruitful buds behaviour showed a reversing trend to that found with vegetative buds. In this respect, the results indicate also that, there were no significant differences during two seasons between treatments of (2, 4 & 6) and (9 ±1, 12 ±1 & 15 ±1) for "Flame seedless" and "Crimson seedless", respectively.

These results are in agreement with the findings of Fawzi *et al.* (1984), Abd El-Wahab (1997) and Ansam (2002) they reported that the short pruning had no effect on bud fertility.

B- Interaction effect:

With respect to the interaction effect of various combinations between the two investigated factors i.e., bud load (No. buds/vine) and cane length (No. of buds/cane) on percentage of fruitful buds, data in Tables (1 and 2) showed obviously that the variable response during 2005 and 2006 seasons. The highest value of fruitful buds (%) was related to the combination between bud load at 24 buds/vine x cane length at 2 buds and bud load at 48 buds/vine x cane length at 9 ±1 buds/cane, while the least value of percentage of fruitful buds was detected by bud load at 60 buds/vine combined with cane length at 6 buds and bud load at 84 buds/vine x cane length at 15 ±1 buds/cane treatments in both "Flame seedless" and "Crimson seedless" grapevine, respectively during this study. Moreover, other combinations were in between.

1.4- Fruitfulness coefficient:

A- Specific effect:

Concerning the specific effect of bud load per vine, data obtained in Tables (1 & 2) revealed that four investigated bud load (No. of buds/vine) at (24, 36, 48 & 60) and (48, 60, 72 & 84) buds/vine treatments resulted a gradual increase in fruitfulness coefficient value was significantly exhibited with increasing bud load/vine in both "Flame seedless" and "Crimson seedless", respectively during two seasons of study.

This trend could be supported by findings of Pondev (1984) and Abd El-Baki (2003) who reported that the fruiting coefficient was in positive correlation with the number of bud left after pruning.

As for the specific effect of cane length (No. of buds/cane) on fruitfulness coefficient data in Tables (1 and 2), displayed that treatments significantly affected the fruitfulness coefficient throughout the two seasons of study. As a general trend decreasing the number of buds/cane increased the number of clusters produced on the current seasons shoots. Therefore, the treatment of 2 buds/cane and 9 ±1 buds/cane recorded the highest coefficient of fruitfulness in both seasons, followed by 4 buds/cane and 12 ±1 buds/cane, followed by 6 buds/cane and 15 ±1 buds/cane in descending order in both "Flame seedless" and "Crimson seedless", respectively during this study. In this respect Rizk (1996), Abd El-Wahab (1997) and Ansam (2002) they reported that the load of 6 buds/cane excreted the highest fruitfulness coefficient, while the load of 15 buds/cane passessed the lowest fruitfulness coefficient.

B- Interaction effect:

Referring the interaction effect of two investigated factors i.e., bud load/vine and cane length on fruitfulness coefficient value, data obtained in Tables (1 & 2) showed obviously the variable response during 2005 and 2006 seasons. The least value of fruitfulness coefficient was related to the combination between bud load/vine at 24 buds/vine x cane length at 2 or 4 or 6 buds/cane and 48 buds/vine x cane length at 9 ±1 or 12 ±1 or 15 ±1 buds/cane treatments in both "Flame seedless" and "Crimson seedless", respectively. On the contrary, the largest value of fruitfulness coefficient was always in concomitant to the bud load at 60 buds/vine x cane length at 2, 4 & 6 buds/cane and bud load at 84 buds/vine x cane length at 9 ±1 buds/cane treatments in both "Flame seedless" and "Crimson seedless", respectively during two seasons of study. In addition, other combinations were in between the aforesaid two extremes.

2- Effect of bud load/vine and cane length on growth vigour:

2.1-Effect on shoot length (cm.) and shoot diameter (cm.):

A- Specific effect:

Concerning the specific effect of the bud load/vine, data in Tables (3 and 4) clearly show that bud load at 24 buds/vine and 48 buds/vine were the tallest shoots followed by bud load at 36 buds/vine and 60 buds/vine in both "Flame seedless" and "Crimson seedless", respectively. The bud load at 48 buds/vine and 72 buds/vine came in the third class; meanwhile the bud load at 60 buds/vine and 84 buds/vine appeared the shortest shoot length and shoot diameter in both "Flame seedless" and "Crimson seedless", respectively during 2005 and 2006 seasons.

Thus, it could be postulated that the growth reduction due to bud load treatments was directly correlated to the number of buds left after pruning. In other words increasing the bud load/vine decreased the current season's, shoot length and this may be attributed to the competition between the shoots in the treatments of high bud loads. The findings of Pondev (1984), Anderson and Sims (1991) and Abd El-Baki (2003) that increased bud load limited individual shoot growth and reduced annual shoot growth increment, have given support to this view.

With respect to the specific effect of cane length (No. of buds/cane) on shoot length (cm.) and shoot diameter (cm.), data obtained in Tables (3 and 4) showed that cane length at 2 buds/cane and 9 ±1 buds/cane were the tallest and thicknest ones followed in a descending order by cane length and diameter at 4 buds/cane and 12 ±1 buds/cane and 6 buds/cane and 15 ±1 buds/cane in both "Flame seedless" and "Crimson seedless", respectively.

Thus it could be postulated that the growth reduction due to cane length treatments were directly correlated to the number of buds left on the cane after pruning. In other words, increasing cane length decreased the current season's shoot length and this may be attributed to the competition between the shoots in the treatments of high cane length. In this connection, Anderson and Sims (1991), Sommer, (1995), Ibrahim *et al.* (1996), Abd El-Wahab (1997) and Ansam (2002) they noticed that shoot length was positively affected by level of pruning severity.

B- Interaction effect:

Tables (3 and 4) reveals that there were a significant variation resulted by different combinations between bud load/vine and cane length. Anyhow, bud load at 24 buds/vine and cane length at 2 buds/cane and bud load at 48 buds/cane combined with cane length at 9 ±1 buds/cane treatments showed the tallest and greatest shoot diameter as compared with those of other combinations in both "Flame seedless" and "Crimson seedless" cvs. during the two seasons of study. On the other hand, bud load at 60 buds/vine x cane length at 4 or 6 buds/cane and bud load at 84 buds/vine x cane length at 12 ±1 or 15 ±1 buds/cane showed the shortest and lowest value of shoot length and diameter in both "Flame seedless" and "Crimson seedless", respectively. In addition, other combinations were in between the aforesaid two extremes.

2.2-Effect on number of leaves/shoot and leaf area:

A- Specific effect:

Concerning the specific effect of the investigated factors i.e., bud load/vine (No. of buds/vine) and cane length (No. of buds/cane) on average number of leaves/shoot and average leaf area (cm^2), data obtained in Tables (3 and 4) showed that both the number of leaves/shoot and leaf area (cm^2) were decreased significantly by increasing bud load (No. of buds/vine) either compared each other. On the other hand, bud load at 24 buds/vine and 48 buds/vine gave the highest number of leaves per shoot and greatest value of leaf area, followed by second level of bud load/vine at 36 buds/vine and 60 buds/vine in both "Flame seedless" and "Crimson seedless", respectively. The third level of bud load at 48 buds/vine and 72 buds/vine came in the third class in decreasing both the number of leaves/shoot and leaf area, meanwhile the fourth *treatment* (bud load at 60 buds/vine and 84 buds/vine) appeared to be less value effective of number of leaves/shoot and had the least value of leaf area (cm^2) in both "Flame seedless" and "Crimson seedless", respectively during the two seasons of study. These results as a general trend, are in agreement with the conclusion given by Koruza (1986) and Abd El-Baki (2003).

Regarding the specific effect of cane length on both number of leaves/shoot and leaf area ($cm.^2$), data obtained in Tables (3 and 4) showed that both number of leaves/cane and leaf area ($cm.^2$) were negatively correlated with increased the number of buds/cane during the two seasons of study. In other words, all three cane length treatments (2, 4 & 6 buds/cane for "Flame seedless" and 9 ±1, 12 ±1 & 15 ±1 buds/cane for "Crimson seedless"), significantly decreased by cane length increased, however, such decrease was more remarkable with the longest cane (6 & 15 ±1 buds/cane for two cultivars).

Table (3): Response of some growth parameters (shoot length, shoot diameter (cm.), number of leaves/shoot and leaf area) to different levels of both bud load/vine and fruiting unit length on"Flame seedless" grapevine during 2005 and 2006 seasons.

Cane length (No. of buds/cane) / No. of buds/vine	Shoot length (cm.)			Mean*	Shoot diameter (cm.)			Mean*	Number of leaves/shoot			Mean*	Leaf area (cm2)			Mean*
	2	4	6		2	4	6		2	4	6		2	4	6	
	1st season 2005															
24	208.8a	201.8b	193.9c	**201.5A**	1.82a	1.73b	1.63c	**1.73A**	90.50a	80.75b	78.42b	**83.22A**	173.1a	170.1a	164.7b	**169.3A**
36	183.8d	176.1e	166.2f	**175.3B**	1.63c	1.53d	1.52d	**1.56B**	72.75c	71.25c	68.17d	**70.72B**	156.1c	152.9cd	150.9de	**153.3B**
48	154.2g	143.9h	135.3i	**144.4C**	1.49de	1.43ef	1.44ef	**1.46C**	64.58e	61.33f	53.33g	**59.75C**	148.0ef	147.8ef	148.4d-f	**148.0C**
60	126.8j	122.4k	117.1l	**122.1D**	1.40f	1.30g	1.30g	**1.33D**	49.67h	41.83i	35.08j	**42.19D**	147.8ef	144.8f	140.4g	**144.3D**
Mean**	**168.4A**	**161.0B**	**153.1C**		**1.59A**	**1.50B**	**1.47B**		**69.38A**	**63.79B**	**58.75C**		**156.3A**	**153.9B**	**151.1C**	
	2nd season 2006															
24	209.9a	201.8b	195.3c	**202.3A**	1.78a	1.74a	1.61b	**1.71A**	87.92a	82.58b	78.08c	**82.86A**	168.1a	168.3a	162.3b	**166.2A**
36	184.3d	174.6e	165.5f	**174.8B**	1.61b	1.52c	1.52c	**1.55B**	74.50d	68.92e	67.83e	**70.42B**	155.1cd	151.7de	155.7c	**154.2B**
48	155.5g	145.3h	135.1i	**145.3C**	1.50c	1.44d	1.41d	**1.45C**	63.42f	60.92g	54.75h	**59.69C**	148.9ef	148.3ef	148.5ef	**148.6C**
60	126.8j	122.9k	117.5l	**122.4D**	1.39d	1.30e	1.30e	**1.33D**	50.25i	41.67j	35.17k	**42.36D**	147.5fg	144.2g	138.8h	**143.5D**
Mean**	**169.1A**	**161.2B**	**153.3C**		**1.57A**	**1.50B**	**1.46C**		**69.02A**	**63.52B**	**58.96C**		**154.9A**	**153.13B**	**151.33C**	

Table (4): Response of some growth parameters (shoot length, shoot diameter (cm.), number of leaves/shoot and leaf area) to different levels of both bud load/vine and fruiting unit length on "Crimson seedless" grapevine during 2005 and 2006 seasons,

Cane length (No. of buds/cane) / No. of buds/vine	Shoot length (cm.)			Mean*	Shoot diameter (cm.)			Mean*	Number of leaves/shoot			Mean*	Leaf area (cm2)			Mean*
	9 ± 1	12 ± 1	15 ± 1		9 ± 1	12 ± 1	15 ± 1		9 ± 1	12 ± 1	15 ± 1		9 ± 1	12 ± 1	15 ± 1	
	1st season 2005															
48	205.4a	201.3b	195.3c	**200.1A**	1.83a	1.73b	1.67c	**1.74A**	102.4a	95.00b	92.42c	**96.61A**	175.7a	170.7b	167.8c	**171.4A**
60	184.0d	174.3e	164.3f	**174.2B**	1.56d	1.48e	1.42f	**1.49B**	87.17d	82.17e	77.50f	**82.28B**	163.1d	158.0e	151.7f	**157.6B**
72	156.9g	151.6h	148.0i	**152.2C**	1.37f	1.31g	1.28g	**1.32C**	72.58g	66.75h	62.33i	**67.22C**	147.2g	141.5h	137.8i	**142.2C**
84	142.8j	137.0k	129.2l	**136.3D**	1.18h	1.16hi	1.11i	**1.15D**	57.67j	52.33k	49.92l	**53.31D**	130.9j	129.3j	125.4k	**128.5D**
Mean**	**172.3A**	**166.0B**	**159.2C**		**1.49A**	**1.42B**	**1.37C**		**79.96A**	**74.06B**	**70.54C**		**154.3A**	**149.9B**	**145.6C**	
	2nd season 2006															
48	207.3a	200.9b	194.1c	**200.8A**	1.85a	1.76b	1.68c	**1.76A**	104.3a	94.08b	92.33c	**96.92A**	176.8a	170.2b	168.2b	**171.7A**
60	184.4d	174.6e	165.0f	**174.7B**	1.55d	1.48e	1.42f	**1.48B**	86.50d	82.50e	77.25f	**82.08B**	161.8c	157.4d	150.7e	**156.6B**
72	156.6g	152.4h	147.3i	**152.1C**	1.38f	1.29g	1.26gh	**1.31C**	73.50g	67.00h	62.42i	**67.64C**	146.6f	140.6g	138.0h	**141.8C**
84	142.5j	137.8k	127.9l	**136.1D**	1.21hi	1.17ij	1.12j	**1.16D**	57.50j	52.83k	49.75l	**53.36D**	132.3i	128.3j	125.2k	**128.6D**
Mean**	**172.7A**	**166.4B**	**158.6C**		**1.50A**	**1.43B**	**1.37C**		**80.46A**	**74.10B**	**70.44C**		**154.4A**	**149.1B**	**145.5C**	

* and ** Means refer to specific effect of bud load/vine and fruiting unit length, respectively. Values within the same column or row for any of two investigated factors followed by the same letter/s were not significantly at 5 % level where capital letters, were used for distinguishing specific effect value of each investigated factor but small letters for interaction of their combination.

These results as a general trend are in agreement with conclusion given by Sommer, (1995), Ibrahim *et al.* (1996), Abd El-Wahab (1997), Ansam (2002).

B- Interaction effect:

As for the interaction effect of various combinations between two investigated factors i.e., bud load/vine and cane length (No. of buds/cane), data obtained in Tables (3 & 4) showed obviously variable response during 2005 and 2006 seasons. Hence, the most depressive effect on number of leaves/cane was detected by bud load at 60 buds/cane x cane length at 6 buds/cane and bud load at 84 buds/vine x cane length at 15 ±1 buds/cane treatments for "Flame seedless" and "Crimson seedless" grapevine, respectively. The same trend was observed with the leaf area (cm^2), while the lowest value of leaf area was resulted by bud load at 60 buds/vine x cane length at 6 buds/cane and bud load at 84 buds/vine x cane length at 15 ±1 buds/cane treatments for "Flame seedless" and "Crimson seedless", respectively. On the other hand, the highest value of number of leaves/shoot was detected by bud load at 24 buds/vine x cane length at 2 buds/cane and bud load at 48 buds/vine x cane length at 9 ±1 buds/cane treatments. Similar trend was discussed with the abovementioned character was found with the leaf area (cm^2), whereas the highest value of leaf area was obtained by bud load at 24 buds/vine x cane length at 2 buds/cane and bud load at 48 buds/vine x cane length at 9 ±1 buds/cane treatments in both "Flame seedless" and Crimson seedless", respectively during the two seasons of study. Moreover, other combinations were in between in this concern.

3- Effect of bud load and cane length on yield:

3.1-Average yield/vine and number of clusters:

A- Specific effect:

Concerning the specific effect of the two factors involved in this study i.e., bud load/vine and cane length on number of cluster/vine, it is clear from the obtained data (Tables 5 and 6) the average number of clusters/vine of both "Flame seedless" and "Crimson seedless", grapevine was gradually enhanced with increasing the bud load/vine i.e., the load of 60 buds/vine gave the highest significant total number of cluster/vine, followed by the treatments of 48 buds/vine. The 36 buds/vine came in the third class; meanwhile the 24 buds/vine appeared to be less effective than the abovementioned ones.

As for "Crimson seedless", grapevine Table (6), the load of 84 buds produced the highest significant number of clusters in both seasons, followed by the load of 72 buds/vine. The load of 60 buds/vine came in the third class; meanwhile, the load of 48 buds/vine appeared to be less effective than the abovmentioned ones during 2005 and 2006 seasons.

Generally, it is obvious from the abovementioned results that the total number of cluster/vine progressively increased by increasing bud load in both "Flame seedless" and "Crimson seedless" during the two seasons of study.

Regarding the specific effect of cane length (No. of buds/cane) on number of cluster/vine, data obtained in Tables (5 and 6) revealed that increasing cane length from (2 to 4 to 6) for "Flame seedless" and from (9 ±1 to 12 ±1 to 15 ±1) for "Crimson seedless" resulted significantly in increasing number of cluster/vine during the two seasons of study. Similar observations were also, found by Fawzi *et al.* (1984); Rizk *et al.* (1994); Abd El-Wahab (1997) and Ansam (2002).

B- Interaction effect:

With respect to the interaction effect between bud load/vine and cane length (No. of buds/cane) on number of cluster/vine in both two grapevine cultivar under study, data obtained in Tables (5 and 6) declared that the specific effect of each investigated factor was directly reflected on their combinations (interaction effect). Herein, the highest number of cluster per vine was in closed relationship to treatments of 60 buds/vine x cane length at 6 buds/cane and 84 buds/vine x cane length (15 ±1 buds/cane) were statistically the richest in both "Flame seedless" and "Crimson seedless", respectively. On the contrary, the 24 buds/vine combined with cane length at (2 buds/cane) in "Flame seedless" and 48 buds/

vine x cane length at (9 ±1 buds/cane) in "Crimson seedless" had statistically the lowest number of cluster/vine during both seasons. In addition, other combinations were in between the abovementioned two extremes.

3.1-b- Average yield/vine (kg/vine):

A- Specific effect:

Data obtained during both 2005 and 2006 experimental seasons as shown from Tables (5 and 6) declared that the average yield/vine of both "Flame seedless" and "Crimson seedless" cultivars were greatly enhanced with increasing the bud load/vine i.e., the load of 60 buds/vine had statistically the highest value of total yield (kg)/vine followed in a descending order by 48 buds/ vine in "Flame seedless" cultivar. The 36 buds/vine came in the third class; meanwhile, the treatment of 24 buds/vine produced the lowest yield/vine.

As for "Crimson seedless" cv. data in (Table 6) displayed that the load of 84 buds/vine produced the highest significant yield per vine in both seasons followed by the load of 72 buds/vine. The treatment of 60 buds/vine came the third class during the two study of study. However, the treatment of 48 buds/vine recorded the lowest significant yield/vine in both 2005 and 2006 seasons.

Generally, it is obvious from the abovementioned results that the yield/vine progressively increased by increasing bud load. The present findings, go in line with those reported by Clark *et al.*, (1989), Hussain and El-Dujaili (1990) and Abd El-Wahab (1997).

Concerning the specific effect of cane length (No. of buds/cane) on total yield, Tables (5 and 6) displayed that there were a significant differences between all treatments (2, 4 & 6 buds/cane) for "Flame seedless" and (9 ±1, 12 ±1 & 15 ±1 buds/cane) for "Crimson seedless" in the average yield during the two seasons of study. This results disagree with that reported by Lagarda (1986) and Abd El-Wahab (2003), they found that all cane lengths were not effective in average yield/ vine of "Molago Reja" and "King Ruby" grapevine. In addition, Ansam (2002) found that, there were no significant differences between all treatments, in the average yield/ vine of "Superior" cultivar.

Table (5): Influence of different levels of bud load and fruiting unit length on number of clusters/vine and yield (kg/vine) of "Flame seedless" grapevine during 2005 and 2006 season.

Cane length (No. of buds/cane) / No. of buds/vine	Number of Cluster /vine			Mean*	Yield (kg) /vine			Mean*
	9 ± 1	12 ± 1	15 ± 1		9 ± 1	12 ± 1	15 ± 1	
	1st season 2005							
24	13.33i	14.33h	15.00h	**14.22D**	8.86e	9.18de	9.28d	**9.11D**
36	21.50g	22.17fg	22.67f	**22.11C**	12.20c	12.36c	12.51c	**12.36C**
48	29.67e	30.83d	31.67c	**30.72B**	14.27b	14.36b	14.42b	**14.35B**
60	39.67b	40.17b	42.50a	**40.78A**	15.81a	15.90a	16.11a	**15.94A**
Mean**	**26.04C**	**26.88B**	**27.96A**		**12.78B**	**12.95AB**	**13.08A**	
	2nd season 2006							
24	13.50i	14.50hi	14.83h	**14.28D**	9.06e	9.27e	9.37e	**9.23D**
36	21.33g	22.83f	23.67f	**22.61C**	12.05d	12.17cd	12.52c	**12.25C**
48	30.83e	32.17d	33.00d	**32.00B**	14.38b	14.52b	14.58b	**14.50B**
60	41.00c	42.50b	44.33a	**42.61A**	15.92a	16.04a	16.20a	**16.05A**
Mean**	**26.67C**	**28.00B**	**28.96A**		**12.85B**	**13.00AB**	**13.17A**	

* and ** Means refer to specific effect of bud load/vine and fruiting unit length, respectively. Values within the same column or row for any of two investigated factors followed by the same letter/s were not significantly at 5 % level where capital letters, were used for distinguishing specific effect value of each investigated factor but small letters for interaction of their combination.

Table (6): Influence of different levels of bud load and fruiting unit length on number of clusters/vine and yield (kg/vine) of "Crimson seedless" grapevine during 2005 and 2006 season.

Cane length (No. of buds/cane) / No. of buds/vine	Number of Cluster /vine			Mean*	Yield (kg) /vine			Mean*
	9 ± 1	12 ± 1	15 ± 1		9 ± 1	12 ± 1	15 ± 1	
	1st season 2005							
48	13.50h	14.67g	15.33g	**14.50D**	5.75h	6.00g	6.23g	**5.99D**
60	19.83f	20.83e	21.17e	**20.61C**	7.55f	7.80e	7.96e	**7.77C**
72	25.67d	26.17cd	26.83c	**26.22B**	9.40d	9.59cd	9.76c	**9.58B**
84	31.17b	31.83b	33.33a	**32.11A**	10.63b	10.81ab	11.04a	**10.82A**
Mean**	**22.54C**	**23.38B**	**24.17A**		**8.33C**	**8.55B**	**8.75A**	
	2nd season 2006							
48	12.33j	13.33i	14.33h	**13.33D**	5.70j	6.07i	6.26h	**6.01D**
60	18.50g	19.50f	20.50e	**19.50C**	7.33g	7.57f	7.74e	**7.55C**
72	24.50d	25.50c	26.17c	**25.39B**	8.83d	9.00c	9.06c	**8.96B**
84	31.17b	31.67b	32.50a	**31.78A**	9.90b	10.02b	10.19a	**10.04A**
Mean**	**21.63C**	**22.50B**	**23.38A**		**7.94C**	**8.17B**	**8.31A**	

* and ** Means refer to specific effect of bud load/vine and fruiting unit length, respectively. Values within the same column or row for any of two investigated factors followed by the same letter/s were not significantly at 5 % level where capital letters, were used for distinguishing specific effect value of each investigated factor but small letters for interaction of their combination.

B- Interaction effect:

Regarding the interactions effect of the investigated two factors i.e., bud load (No. of buds/vine) and cane length (No. of buds/ cane) on average weight of yield (kg), Tables (5 and 6) showed a considerable and statistical effect in both seasons of study. Herein, the highest total yield was in closed relationship to 60 buds/vine x cane length at 2, 4 and 6 buds/ cane treatment for "Flame seedless" and 84 buds/vine x cane length at 15 ±1 buds/cane treatment for "Crimson seedless" in both seasons.

The least value of yield was exhibited by 24 buds/vine x cane length at 2 bud/cane and 48 buds/vine x cane length at 9 ±1 buds/ cane treatments in both ""Flame seedless" and "Crimson seedless" respectively, during two seasons of study. In addition, other combinations were in between the aforesaid two extremes during 2005 and 2006 seasons.

REFERENCES

Abd El-Baki, M.S.A. (2003): Effect of summer pruning and thinning on growth and fruiting of King Ruby grapes. M.Sc. Thesis., Fac. of Agric. Cairo Univ. Cairo Egypt.

Abd El-Wahab, M.A. (1997): Effect of cane length on bud behaviour, growth and production of "king Ruby" grapevines. M. Sc. Thesis, Cairo University, Egypt.

Al-Rawi, A.K. and Al-Doori, A.H. (1977): Effect of spur and cane length on bud sprouting, flowering and fruiting of some grape cultivars. Punjab Horticultural Journal, 17 (3/4) 109-113. (Hort. Abst, 50: 4108).

Anderson, P.C. and Sims, C.A. (1991): Yield and quality of Vitis hybrid Suwannee as affected by training system and pruning severity. (Hort. Abst, 62: 213).

Ansam, S.A. El., (2002): Effect of cane length on bud behaviour, growth and productivity of "Superior" grapevines. M.Sc. Thesis, Fac. of Agric. Cairo Univ.

Bessis, R. (1960): Sur differents Models D'expression Quantitative Dela fertile. Chezla vigne. Aca. Pp.828-882.

Clark, J.R.; Dombek, D.G. and Fernandez, G.E. (1989): Pruning and thinning effects on "Venus" and " Mars" grapes. In Proceedings of the Annual Meeting-Arkansas State Horticultural Society. Fayetteville, Arkansas U.S.A. No. (109) 162-164. (Hort. Abst. 61: 1038).

Duncan, B.D. (1955): Multiple test range and multiple F tests. Biometries. 11-142.

Fawzi, F.; Bondok, A. Z. and Ghobrial, G. F. (1984): Effect of cane length on bud behaviour and wood ripening of "Thompson seedless" grape variety. Annals Agric. Sci., Fac. Agric., Ain Shams Univ., Cairo, Egypt. 29 (1): 465-74.

Hussain, M.M. and El-Dujaili, J.A.H. (1990): Effect of bud level and training system on yield and quality of Dies El-Anz grape cultivar (*Vitis vinifera*. L.). (Hort. Abst. 62: 6472).

Ibrahim, H.A.; Ihsan, A.S.; Waadallah, A.H. and Jaifer, S. S. (1996): Effect of length and diameter of canes on the yield, physical, mechanical and chemical properties of grape cultivar "Dess Anz"; Mansoura Journal of Agricultural Science. 30 (1) 69-75. (Hort. Abst. 67: 2856).

Koruza, B. (1986): Effect of pruning on leaf area, its assimilating capacity and on the productivity of grapevine (*Vitis vinfera* L. cultivar Sauvignon) in the Vipava viticultural region Kemetijstvo, 45: 103-14. (Hort. Abst. 56: 8702).

Lagarda, M.A. (1986): Effect of pruning length on fruiting in grapevine (*Vitis vinfera* L.) cultivars "Thompson Seedless" and" Malaga Roja" Agriculture tecnica en Mexico, 12(1):39-51. (Hort.Abst. 57: 6302).

Morris, J.R. and Cawthan, D.L. (1980): Yield and quality response of "Concord grapes to training systems and pruning severity in Arkansas, J. Amer. Soc. Hort. Sci., 105 (3): 307-10. (Hort. Abst. 51: 233).

Pondev, K. (1984): Effect of bud load on the productivity and yield of the grapevine cultivar Pamid. (Hort. Abst. 55: 3316).

Rizk, N.A.; Rizk, I.A. and Girgis, V.H. (1994): Effect of cane length on bud behaviour, wood ripening and bunch characteristics in "Thompson seedless" grapevines. Egypt. J. Appl. Sci., 9 (5): 74-89.

Rizk, I. A. (1996): Effect of cane length on bud behaviour and bunch characteristics in "Thompson seedless" cultivar. Egypt. J. Appl. Sci., 11 (7): 220-34.

Snedecor, G.W. and Cochran, W.G. (1980): Statistical Methods. 6th ed. The Iowa state. Univ. Press, Amer, Iowa, U.S.A. PP. 593.

Sommer, K.J. (1995): Mechanized pruning in Australia. KTBL Kuratoriumufur Technik und Bauwesen in der Land wirtschaft KTBL-Schrift No. 364, 23-50. (Hort. Abst. 66: 1237).

Tafazoli, E. (1977): Cane and bud number effect on yield components of non irrigated grapes cv. Yaghooti. . (Hort. Abst. 48: 259).

استجابة النمو والمحصول وجودة الثمار لحمل الكرمات من البراعم وطول وحدة الإثمار لصنفين من العنب.

١- تأثير المستويات المختلفة من حمولة البراعم وطول وحدة الإثمار على سلوك البراعم والنمو والمحصول لصنفى العنب اللابذرى (الفليم والكريمسون)

محمد عبدالوهاب خميس*، عادل عبدالحكيم ناصف**

* قسم البساتين ــ كلية الزراعة بمشتهر – جامعة بنها

** وزارة الزراعة ــ مركز تدريب البساتين ــ مصر.

هذه الدراسة أجريت بمزرعة خاصة تحت ظروف منطقة الخطاطبة محافظة المنوفية خلال عامى ٢٠٠٥، ٢٠٠٦ بهدف دراسة وتقييم تأثير المستويات المختلفة من التقليم من حيث عدد العيون المتروكة على الكرمة وأيضا عدد العيون المتروكة على القصبة وأثر ذلك على سلوك البراعم من حيث نسبة تفتحها وخصوبتها وقياسات النمو الخضرى (طول وقطر النمو – عدد الأوراق – مساحة الورقة) وكذلك على المحصول الناتج على كل من صنفى العنب اللابذرى (الفليم والكريمسون).

وقد أظهرت نتائج الدراسة أن زيادة عدد البراعم المتروكة سواء على الكرمات أو على القصبات أدت إلى زيادة عدد البراعم المتفتحة وكان العكس صحيحاً حيث أدت معاملات التقليم المذكورة إلى نقص القياسات الخاصة بصفات النمو الخضرى وذلك لكلا الصنفين تحت الدراسة.

كذلك أشارت الدراسة إلى وجود ارتباط بين شدة التقليم من ناحية والنسبة المئوية للبراعم المتفتحة حيث لوحظ انخفاض فى نسبة التفتح بزيادة عدد البراعم المتروكة على الكرمات وكذلك على القصبات كما تأثرت خصوبة البراعم وإثمارها بمعاملات التقليم المذكورة.

وأوضحت الدراسة أيضا أن محصول الكرمة سواء كان منسوباً إلى عدد العناقيد لكل كرمة أو وزناً (كجم/كرمة) قد تأثر بالمستويات المختلفة من التقليم المتبعة بالبحث حيث أكدت النتائج المتحصل عليها أن محصول الكرمة وكذلك عدد العناقيد ازداد بزيادة كل من الحمولة البرعمية للكرمة الواحدة وعدد البراعم المتروكة على وحدة الإثمار (القصبة) لكلا صنفى العنب تحت الدراسة خلال موسمى النمو.