V- SUMMARY AND CONCLUSION

The objective of this studies to investigate the effect of bud load per vine and bearing unit length (No. of buds/bearing unit) on bud behaviour, growth, productivity and fruit quality of two grapevine cultivars (Flame seedless and Crimson seedless). They were propagated by cutting and grown under drip irrigation system in sandy soil of a private vineyard at El-Khatatba, Menuefyia Governorate, Egypt. They were spaced at (1.5 x 3.0) and (2 x 3) meters, trend according to the bearing unit system and Y shape for both Flame seedless and Crimson seedless, respectively. In this regard, twelve treatments were carried out for each vineyard cultivars during 2005 and 2006 seasons. In Flame seedless cultivar were pruned so as to above 24, 36, 48 and 60 buds/vine x 3 levels of bearing unit length (2, 4 & 6) buds/bearing unit, while Crimson seedless vines were pruned so as to above 48, 60, 72 & 84 buds/vine x 3 levels of bearing unit length (9 ± 1, 12 ±1 and 15 ± 1) buds/bearing unit in both seasons of study to determine the optimum number of buds/vine and bearing unit length which may result in good growth, high yield and excellent quality.

The material of the two seasons investigation was obtained from 72 vines from each vine cultivars under study of about 5 and 7 years old for Flame seedless and Crimson seedless, respectively, equal in vigour. Thus, two experiments were conducted using the complete randomized design, each one was 12 treatments and each treatment with 6 replications, whereas

each was represented by one vineyard during 2005 and 2006 seasons.

Bud burst activity, percentage of vegetative and fruitful buds as well as fruitfulness coefficient were recorded, vegetative growth measurements including current season's shoot length (cm.), shoot diameter (cm.), number of leaves/shoot, leaf area and average yield per vine were also estimated. At harvest time, yield (kg)/vine was recorded and samples of clusters were recorded and samples of clusters were collected for physical and chemical properties.

The derived conclusions could be summarized as follows:-

V-1. Effect of pruning severity and bearing unit length on bud behaviour:

A- Specific effect:

1- Regarding the specific effect of bud load (no. of buds/vine) on bud behaviour, data obtained during both seasons revealed that, a significant decrease in bud burst %, fruitful buds % and fruitfulness coefficient as well as a significant increase in vegetative buds % in both Flame seedless and Crimson seedless during the study.

2- Results also declared that a significant increase in bud burst % and significant decrease in vegetative buds % with increasing bearing unit length in both grape cultivar under study while fruitful buds % was not affected during 2005 and 2006 seasons.

B- Interaction effect:

1- data obtained revealed that specific effect of each investigated factor was directly reflected on its own combinations. Herein, the 24 buds/vine x bearing unit length at 6 buds and 48 buds/vine x bearing unit length at 15 ±1 buds/bearing unit treatments for Flame seedless and Crimson seedless, respectively exhibited statistically the largest values of bud burst %, fruitful buds % and fruitfulness coefficient parameters. Also, the 60 buds/vine x bearing unit length at 2 buds and 84 buds/vine x bearing unit length at 9 ±1 buds/bearing unit treatments declared a significant increase in vegetative buds % in both Flame seedless and Crimson seedless, respectively during the two seasons of study.

2- on the contrary, the least values of the investigated bud behaviours (bud burst %; fruitful buds % and fruitfulness coefficient) were 60 buds/vine x bearing unit length at 2 or 4 or 6 buds/bearing unit and 84 buds/vine x bearing unit length at 9 ±1 or 12 ±1 or 15 ±1 buds/bearing unit treatments declared a significant decrease for "Flame seedless and Crimson seedless", respectively. Also, 24 buds/vine x bearing unit length at 2 or 4 or 6 buds/bearing unit and 48 buds/vine x bearing unit length at 9 ±1 or 12 ±1 or 15 ±1 buds/bearing unit treatments gave the least values of vegetative buds % in both Flame seedless and Crimson seedless, respectively during the two seasons of study.

V-2. Effect of pruning severity and bearing unit length on vegetative growth:

A- Specific effect:

1- There were a gradual decrease in shoot length, shoot diameter, number of leaves/shoot and leaf area in both cvs. during the study. However, both Flame seedless and Crimson seedless produced the largest shoots, thicknest shoot diameter, largest number of leaves/shoot and lowest value of leaf area under 24, 36 and 48 buds/vine followed by 60 buds/vine, followed in a decreasing order by 48, 60 and 72 buds/vine while 84 buds/vine appeared to be less effective in this concern in both cultivars, respectively, during the two seasons of study.

2- Increasing bearing unit length decreased shoot length, shoot diameter, number of leaves/shoot and leaf area in both Flame seedless and Crimson seedless during 1 ^{8} and 2^{-d} seasons.

B- Interaction effect:

1- Data obtained revealed that specific effect of each investigated factor was directly reflected on its own combinations. Herein, bud load (no. of buds/vine) at 24 buds/vine x bearing unit length at 2 buds/bearing unit and 48 buds/vine x bearing unit length at 9 ±1 buds/bearing unit treatments exhibited statistically the largest values of various vegetative growth parameters in both Flame seedless and Crimson seedless, respectively during the two seasons of study.

2- On the contrary, the least values of the investigated vegetative growth measurements were always in concomitant to those vines bud load at 60 buds/vine x bearing unit length at 6

buds/bearing unit and 84 buds/vine x bearing unit length at 6 buds/bearing unit treatments in both Flame seedless and Crimson seedless, respectively, whereas the severest decrease was detected during the two seasons of study. However, other combinations were in between the aforesaid 2 extremes.

V-3. Effect **of pruning severity and** bearing unit length on **yield and quality:**

V-3.1. Effect on **productivity.**

V-3.1.1. Total yield.

A- Specific effect:

Data obtained displayed that total yield/vine a number of clusters/vine and weight of yield/vine as kg responded specifically to each of the two investigate factors (no. of buds/vine and no. of buds/bearing unit) and both followed the same trend. The obtained results revealed that total yield (as kg/vine and no. of cluster/vine) being progressively increased with both number of buds/vine and number of buds/bearing unit increased in both Flame seedless and Crimson seedless during the two seasons of study.

B- Interaction effect:

The interaction effect of combinations between the two investigated factors i.e., number of buds/vine and number of buds/bearing unit, data obtained revealed that the highest value of both total yield (kg)/vine and number of cluster/vine were found by bud load/vine at 60 buds/vine x bearing unit length at 6

buds/bearing unit and 84 buds/vine x bearing unit length at 15 ±1 buds/bearing unit in both Flame seedless and Crimson seedless, respectively during the two seasons of study while the reverse was detected by those vines of Flame seedless bud load at 24 buds/vine x bearing unit length at 2 buds/bearing unit and Crimson seedless bud load at 48 buds/vine x bearing unit length at 9 +1 buds/bearing unit during the two seasons of study. However, other combinations were in between the aforesaid two extremes.

V-3.1.2. Cluster characteristics.

Data obtained during both seasons regarding cluster weight, cluster volume, cluster length and width cluster compactness and number of berries/cluster of two grape cultivars in response to specific and interaction effects of bud load/vine and bearing unit length (no. of buds/bearing unit) and their possible combinations revealed that the results could be summarized as follows:

A- Specific effect:

Referring the specific of bud load (no. of buds/vine) and bearing unit length (no. of buds/bearing unit), data obtained during both seasons revealed that cluster weight, volume, cluster length and cluster width gradually decreased significantly with increasing bud load (no. of buds/vine) and bearing unit length (number of buds/bearing unit) in both Flame seedless and Crimson seedless while the reverse was found with number of berries/cluster and cluster compactness during the two seasons of study.

B- Interaction effect:

1- Regarding the interaction effect of various combinations between two investigated factors bud load/vine (no. of buds/vine) and bearing unit length (no. of buds/bearing unit), data obtained during 2005 and 2006 experimental seasons revealed that specific effect of each investigated factor was directly reflected on its own combinations. Herein, bud load/vine at 24 buds/vine x bearing unit length at 2 buds/bearing unit and 48 buds/vine x bearing unit length at 9 ±1 buds/bearing unit treatments had the highest values of cluster weight (gm.), cluster volume, cluster length and cluster width, while 60 buds/vine x bearing unit length at 6 buds/bearing unit and 84 buds/vine x bearing unit length at 15 ±1 buds/bearing unit had the least value in this concern during the two season of study.

2- Obtained results revealed that bud load at 60 buds/vine x bearing unit length at 2 buds/bearing unit and 48 buds/vine x bearing unit length at 9 ±1 buds/bearing unit treatments had the highest value of number of berries per cluster and cluster compactness while the reverse was markedly with 24 buds/vine x bearing unit length at 6 buds/bearing unit and 48 buds/vine x bearing unit length at 15 ±1 buds/bearing unit treatments in both Flame seedless and Crimson seedless, respectively during the study. In addition, other combinations were in between the abovementioned two extremes.

V-3.1.3. Physical properties:

A- Specific effect:

In this regard, specific and interaction effects of bud load/vine of both Flame seedless and Crimson seedless and

bearing unit length (no. of buds/bearing unit) and their combinations on physical properties of berries (berry weight (gm.), berries weight/cluster (gm.), berry length & width (cm.), juice weight of 100 berries, berry juice %, berry firmness (g.)/berry, berry adherence (gm.), shot berries/cluster %, tours thickness (cm.), peduncle thickness (cm.) and burch length (cm.)) were investigated during both 2005 and 2006 experimental seasons.

1- Regarding the specific effect of bud load (no. of buds/vine), data obtained during both seasons revealed that, a significant decrease in berry weight (gm.), berries weight/cluster, berry dimensions, juice weight of 100 berries, berry juice %, berry firmness, berry adherence strength, tours thickness, peduncle thickness and burch length) all being progressively depressed by all used bud load/vine, but the depressive effect was more pronounced with the highest buds/vine (60 buds and 84 buds/vine in both Flame seedless and Crimson seedless, respectively). In addition, results also declared a significant increase in shot berries/cluster % with increasing bud load (no. of buds/vine) in both grapevines cultivar during the two seasons of study.

2- With respect to the specific of bearing unit length (no. of buds/bearing unit), data obtained displayed that increasing bearing unit length (no. of buds/bearing unit) showed a significant decrease berry weight, berries weight/cluster, berry length, berry width, juice weight of 100 berries, berry juice %, tours thickness and shot berries/cluster %, while berry firmness,

berry adherence strength, was increased. On the other hand both peduncle thickness and burch length was not affected with bearing unit length in both Flame seedless and Crimson seedless during the two seasons of study. In addition other combinations were in between the aforesaid two extremes.

B- Interaction effect:

1- Data obtained revealed that the specific effect of each investigated factor was directly reflected on its own combinations. Herein, berry weight, berries weight/cluster, berry dimensions, weight of 100 berries and juice weight % was increased 24 buds/vine x bearing unit length at 2 buds/bearing unit and 48 buds/vine x bearing unit length at 9 ±1 buds/bearing unit while the lowest values was found by 60 buds/vine x bearing unit length at 4 or 6 buds/bearing unit and 84 buds/vine x bearing unit length at 12 ±1 or 15 ±1 buds/bearing unit in both Flame seedless and Crimson seedless, respectively during the study. However, other combinations were in between the two extremes.

2- Results also declared a significant increase berry firmness, berry adherence strength and tours thickness with bud load at 24 buds/vine x bearing unit length at 2, 4 or 6 buds/bearing unit and 60 or 48 buds/vine x bearing unit length at 12 ±1 or 15 ±1 buds/bearing unit treatments in Flame seedless and Crimson seedless, respectively. On the contrary, the least values were coupled with bud load at 60 buds/vine x bearing unit length at 2 or 4 or 6 buds/bearing unit and 84 buds/vine x bearing unit length at 12 ±1 or 15 ±1 buds/bearing unit

treatments for the same cultivars, respectively during the study. In addition, other combinations were in between the aforesaid two extremes.

3- The interaction effect of combinations between two investigated factors i.e., bud load/vine and bearing unit length (no. of buds/bearing unit), data obtained revealed that the highest values of shot berries/cluster % were found by bud load at 60 buds/vine x bearing unit length at 2 buds and 84 buds/vine x bearing unit length at 9 ±1 buds/bearing unit treatments in both Flame seedless and Crimson seedless, respectively while the reverse was detected by bud load at 24 buds/vine x bearing unit length at 6 buds/bearing unit and 48 buds/vine x bearing unit length at 15 +1 buds/bearing unit treatments in both two cultivars during the two seasons of study. In addition, other combinations were in between the aforesaid two extremes.

4- Obtained results revealed that peduncle thickness and burch length each followed its own trend regarding the response to interaction effect of two investigated factors. Herein, the lowest level of peduncle thickness associated with the lowest burch length from one hand was always in concomitant to the bud load at 24 buds/vine x bearing unit length at 2, 4 or 6 buds/bearing unit and 48 buds/vine x bearing unit length at 9 +1 or 12 ±1 or 15 ±1 buds/bearing unit treatments in both Flame seedless and Crimson seedless, respectively. The reverse (lowest value of both peduncle thickness and burch length) was markedly coupled with bud load at 60 buds/vine x bearing unit length at 2 or 4 or 6 buds/bearing unit and 84 buds/vine x bearing unit length at 9 ±1 or 12 +1 or 15 +1 buds treatments in both Flame seedless and Crimson seedless, respectively during the two seasons of study. Other combinations were in between regarding the response of the aforesaid two extremes.

V-3.1.4. Chemical properties:

A- Specific effect:

1- As for the specific effect of bud load (no. of buds per vine), results also declared a significant decrease in TSS %, TSS/acid ratio, total sugars % and total anthocyanin %, all being progressively depressed by increasing bud load/vine in both Flame seedless and Crimson seedless during the two seasons of study. On the contrary, increasing bud load (no. of buds/vine) increased significantly value of titratable acidity % during in both grape cultivars during the two seasons of study.

2- Results also declared a significant increase in both total sugars % and total anthocyanin % with increasing bud load/vine in both Flame seedless and Crimson seedless, while both TSS, titratable acidity % and TSS/acid ratio was not affected with increasing bud load/vine during the two seasons of study.

B- **Interaction effect:**

1- Data obtained revealed that the specific effect of each investigated factor was directly reflected on its own combinations. Herein, bud load at 24 buds/vine x bearing unit length at 4 or 6 buds/bearing unit and 84 buds/vine x bearing unit length at 12 ±1 or 15 ±1 buds/bearing unit treatments increased significantly TSS, TSS/acid ratio, total sugars and total anthocyanin and decrease titratable acidity in berries of both Flame seedless and Crimson seedless, respectively. In addition, increasing bud load (no. of buds/vine) 60 buds/vine x bearing unit length at 2 or 4 or 6 buds/bearing unit and 84 buds/vine x bearing unit length at 9 ±1 or 12 ±1 buds/bearing unit exhibited the largest value of acidity and lowest values of TSS, TSS/acid ratio, total sugars and total anthocyanin in both grape cultivars during the two seasons of study.