

**STUDIES ON FLOWERING DYNAMIC; DROP AND BUD BEHAVIOR  
IN SOME SEEDLESS GRAPE CULTIVARS  
BY**

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**ABSTRACT**

This investigation was carried out in a private vineyard in El-Dakahlia Governorate on 4 table seedless grape cultivars namely: Perlette, Flame seedless; Thompson Seedless and King's Ruby. Vines chosen for carrying out this investigation were seven years old grown in a clay loamy soil, irrigated by drip system and trained to the bilateral cordon.

The study included dynamics of cluster flowering per day and per hour; drop of floral buttons, flowers and berries in addition to bud (eye) behaviour.

The obtained results showed that the percentage of flowering per day increased sharply reaching its maximum in the second, third or fourth day depending on the cultivars and seasons of investigation, after which a sharp decrease occurred in the subsequent days.

The highest percentage of flowering per hour was obtained at 9.A.M after which a sharp decrease occurred reaching its minimum at 11.A.M. As for percentage of total drop it is obvious that King's Ruby cultivar accounted for the highest values of this estimate; followed by Flame seedless and Thompson seedless. Thompson seedless had the highest percentage of drop of floral buttons followed by Flame seedless while King's Ruby had the highest percentage of flowers drop. With regard to drop of berries it can be shown that Perlette had the highest percentage. King's Ruby had the highest values of fruitful buds, whereas Perlette and Flame seedless had considerably smaller values.

**INTRODUCTION**

Flowering represents one of the most important phases in the annual growth cycle of the vine. During the flowering period and under favourable weather conditions pollination and fertilization take place successfully resulting in the formation of normal berries. During the same period, the following crop is ensured since the primordia of the flower cluster are formed inside the eye (winter bud).

Studying dynamics of flowering in different cultivars acquires its importance from the fact that this helps in determining the suitable time for

carrying out some horticultural practices especially those dealing with spraying clusters with GA<sub>3</sub> for thinning purposes.

However, the studies concerning dynamics of flowering in Egypt are quite limited. Under favourable conditions blooming of the cluster extends over a week or more. (Winkler 1974).

Fawzi (1974), working on "Bolgar: cultivar mentioned that the flowering period of the cluster was 8-10 days. He found that flowering per day reached its maximum in the third day after which a sharp decrease was observed till the end of flowering. As for flowering per hour, it was shown that it attained its maximum at 8-10 A.M. followed by a sharp decrease reaching its minimum at 2p.M.

The same author working on Thompson seedless cultivar in 1984 found that flowering period of the cluster was 10-11 days. Percentage of flowering per day was very low at the first day of flowering then increased gradually reaching its maximum in the third or fifth day after which a sharp decrease occurred. Maximum flowering occurred at 8-10 A.M.

More rare are the studies related to floral buttons, flowers and berries drop. However, some of these researches were focused on studying total drop indirectly through the determination of berries set. Mikhilovetsh 1988 mentioned that percentage of normal drop for flowers and berries ranged between 41 and 69 according to grape varieties and added that this percentage had no negative effect on the yield. No studies were available concerning the drop of floral buttons, flowers and berries separately.

Vine productivity greatly depends on bud behaviour. This agrobiological character was the subject of many studies. Kamel et al., (1965), Fawzi (1966) and Capellini & Monastra (1974)

The present investigation aimed at studying dynamics of flowering, drop of floral buttons, flowers and berries of the cluster in addition to bud behaviour in four seedless grape cultivars; Perlette, Flame seedless, Thompson seedless and King's Ruby.

## **MATERIAL AND METHODS**

This investigation was conducted in a private vineyard situated in El Dakahlia Governorate on four table seedless grape cultivars namely Perlette, Flame seedless, Thompson seedless and King's Ruby. The study extended for two successive seasons: 2001 and 2002. The vines chosen for this study were 7-year old, uniform in vigour, grown in a clay loamy soil spaced 2.5x3 apart, irrigated by the drip irrigation system and trained to the bilateral cordon method.

The study comprised dynamics of flowering cluster, drop of floral buttons, flowers and berries separately and bud behaviour.

The complete randomized design with three replications was employed, where each replicate was represented by four vines. Thus 12 healthy uniform vines were carefully selected from each cultivar.

**A- Dynamics of cluster flowering:**

For studying this point 12 clusters from each cultivar (four clusters per each vine) borne on moderate growing shoots were labelled taking into account that all sides of the vine were represented as possible.

As blooming time approached, the work started on each cluster by gently picking up opened flowers by means of a special forceps with the right hand, while putting the cluster in a horizontal position on the palm of the left hand. The excised flowers were counted every hour starting from 7 A.M. till 11 A. M. The counting continued till the end of flowering:

- Percentage of flowering per day was calculated by dividing number of excised flowers in a given day by total number of flowers counted during the flowering period multiplied by 100.
- Percentage of flowering per hour was calculated by dividing excised flowers at a given hour for all days of flowering by total number of excised flowers multiplied by 100.

**B- Total drop and drop of floral buttons, flowers and berries:**

- For studying this point, 12 clusters for each cultivar (four clusters per each vine) were caged in perforated paper bags before bloom and after berry set. the bags were taken to the laboratory where the dropped floral buttons, flowers and berries were counted individually after which the total drop was calculated, number of remained berries on each cluster was also counted.
- Percentage of total drop was calculated by dividing number of (dropped floral buttons + flowers + berries) by number of (remained berries on the cluster + number of dropped floral buttons, flowers and berries) multiplied by 100.
- By the same method percentage of drop for each of floral buttons, flowers and berries was carried out.

**C- Bud behaviour:**

12 vines from each Cultivar were chosen for studying bud behaviour in four cultivars: Perlette, Flame seedless, Thompson seedless and King's Ruby. During the spring of each season, the work began on each vine by counting number of bursted buds, number of fruitful buds and number of clusters.

Percentage of bud burst was calculated by dividing average number of bursted buds by total number of buds left on the vine at pruning multiplied by 100.

Percentage of fruitful buds was calculated by dividing average number of fruitful buds by number of bursted buds multiplied by 100.

Fertility coefficient was calculated by dividing number of clusters per vine by number of buds left on the vine at pruning according to Bessis (1965).

#### Statistical analysis:

Data obtained during both seasons were subjected to the statistical analysis using the new L.S.D. for comparing means at 5% level according to Snedecor and Cochran (1980).

## RESULTS AND DISCUSSION

### Dynamics of flowering:

As shown in Figure (1) flowering per day followed nearly a stable trend in all varieties regardless of some fluctuations which could be attributed to the effect of temperature and humidity prevailing during the flowering period (Winkler, 1974). In all varieties, the first day in which counting of flowers began was characterized by having a low percentage of flowering. The least values were observed in Perlette and King's Ruby Seedless varieties. However, the percentages were relatively higher in Flame Seedless and Thompson seedless varieties. Percentage of flowering per day increased sharply reaching its maximum in the second, third or fourth day depending on the varieties and seasons of the investigation after which a sharp decrease occurred in the subsequent days. At the end of flowering period percentage of flowering reached its minimum.

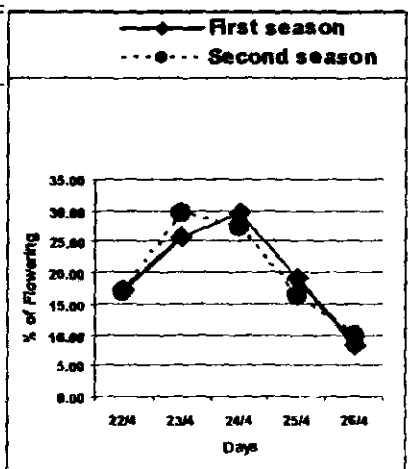
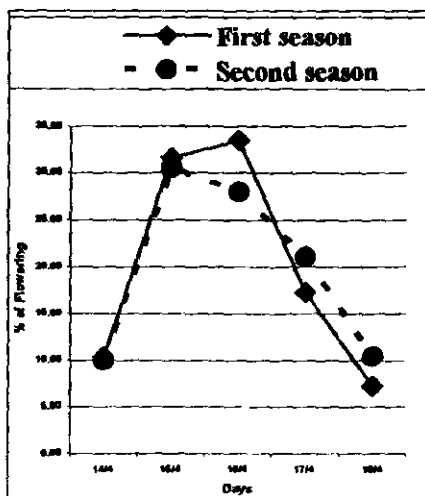
Flowering period of the cluster was found to be 5 days for the two early-ripening varieties: Perlette and Flame seedless. The same result is also valid for Thompson seedless and King's Ruby only in the first season. Moreover, in the second season, the period extended to 6 and 8 days for Thompson Seedless and King's Ruby, respectively.

The stability of the flowering period indicates that it can be considered as an agrobiological characteristic for a given variety.

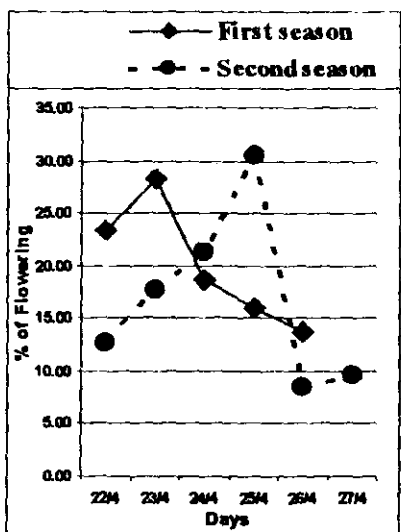
As for percentage of flowering per hour, data illustrated in Fig. (2), indicated that a similar trend to that of daily flowering percentage was also detected. Herein, the highest percentage was obtained at 9 A.M. after which a sharp decrease occurred reaching its minimum at 11 A.M. It is worthy to note that the increase or decrease in the percentage of flowering per hour was different in the four grape cultivars under study. The highest percentage was found in Perlette cultivar followed by Flame seedless, especially in the first season, whereas the least percentage was recorded for King's Ruby and Thompson seedless cultivars.

Thus, it can be concluded that Early-ripening cultivars are characterized by having higher peak of flowering percentages per hour in comparison with medium-ripening ones.

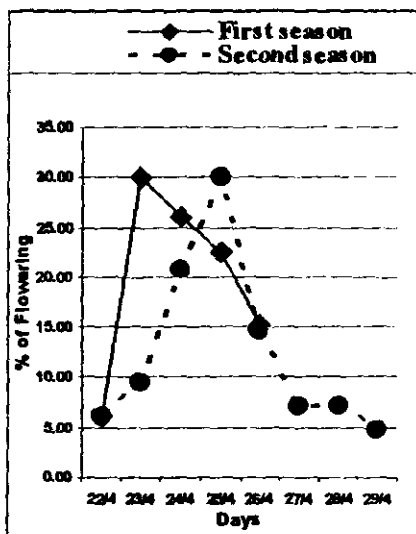
The obtained results in this respect are in line with those obtained by Fawzy (1974), Fawzy *et al.*, (1984).



**Perlette**



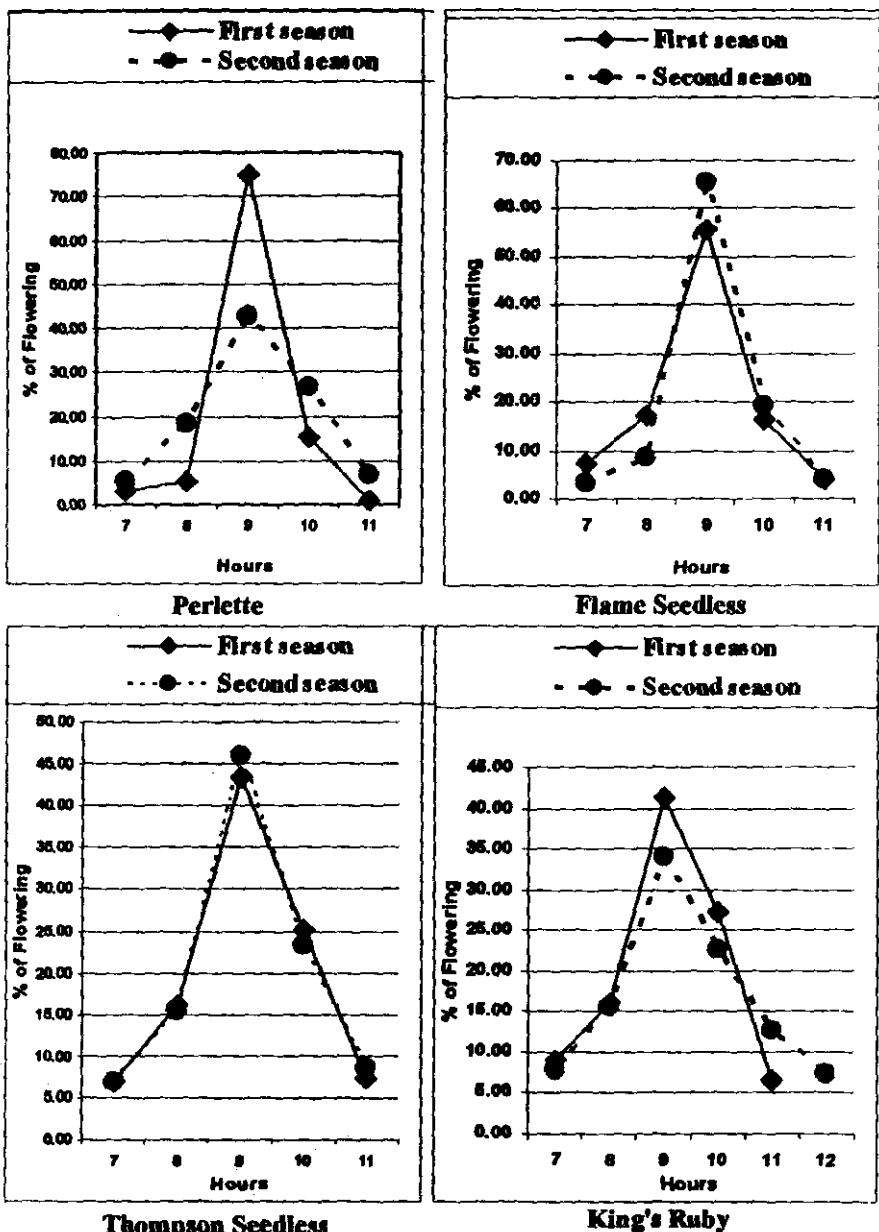
**Flame Seedless**



**Thompson Seedless**

**King's Ruby**

**Fig (1): Percentage of flowering per day in some table seedless grape cultivars**



Thompson Seedless  
 King's Ruby  
 Fig (2): Percentage of flowering per hour in some table seedless grape cultivars.

**Total drop and drop of floral buttons, flowers and berries:**

Data shown in Table (1), revealed that the highest percentage of drop in all cultivars was recorded for flowers followed by those of berries and floral buttons, respectively. Cultivars under study differed significantly in this respect.

Concerning percentage of total drop it is obvious that King's Ruby cultivar accounted for the highest values of this estimate, followed by Flame Seedless and/or Thompson seedless between which no significant differences could be detected especially in the 1<sup>st</sup> season. The lowest percentage of total drop was recorded for Perlette cultivar in both seasons of the study. As for drop of floral buttons, it can be noticed that Thompson seedless had the highest percentage, followed by Flame seedless cultivar. The least percentage of drop was found in King's Ruby and Perlette as arranged in a descending order. Differences between the four grape cultivars were significant during the seasons of study.

As for the drop of flowers, it is apparent that King's Ruby cultivar had the highest percentage followed statistically in a descending order by Flame seedless, Perlette and Thompson seedless. With regard to percentage of berries drop it can be shown that Perlette had the highest percentage followed in a descending order by Thompson seedless; King's Ruby and Flame seedless cultivar which accounted for the least percentage of berries drop.

The obtained results in this respect are in agreement with those found by (Miklalovtsh 1988).

**Table (1): Drop percentage of floral buttons; flowers and berries in some Table seedless grape cultivars.**

Stages Cultivars	2001			2002		
	Drop % of Floral buttons	Drop % of flowers	Drop % of berries	Drop % of Floral buttons	Drop % of flowers	Drop % of berries
Perlette	0.34	44.47	9.25	0.25	52.71	4.69
Flame seedless	3.34	54.22	1.67	5.00	55.70	2.72
Thompson seedless	5.63	48.21	4.75	7.42	47.98	3.67
Ruby seedless	1.69	72.13	5.24	1.77	74.31	2.17
New L.S.D. 0.5%	0.43	2.61	0.75	0.63	3.72	0.73

**Bud behaviour:**

As shown in Table (2), King's Ruby and Flame seedless cultivars had the highest percentage of bud burst, whereas Thompson seedless had the lowest one, Perlette was in between. In the second season, percentage of bud burst was the highest in King's Ruby cultivar which differed significantly than the other

cultivars. It is worth mentioning that percentage of bud burst was slightly higher in the second season in Perlette and King's Ruby cultivars, while it was sharply decreased in Flame seedless cultivar. Thompson seedless showed a slight decrease in the second seasons.

**Table (2): Bud behaviour of some table seedless grape cultivars.**

Bud behaviour Cultivars	Season 2001			Season 2002		
	% Bud burst	% fruitful buds	Fertility coefficient	% Bud burst	% fruitful buds	Fertility coefficient
Perlette	77.00	45.67	0.37	80.67	48.67	0.40
Flame seedless	97.00	45.00	0.46	83.33	35.67	0.42
Thompson seedless	62.9	46.15	0.29	59.37	56.00	0.33
King's Ruby	95.00	70.33	0.72	97.33	93.33	0.97
New L.S.D. at 0.5 %	3.57	14.86	0.06	3.91	14.43	0.07

The seasonal variation of bud burst in the different cultivars under investigation may be attributed to the effect of weather elements especially temperature.

As for the percentage of fruitful buds, it is obvious from the data of the same table that King's Ruby ranked first since it had statistically the highest values of this parameter in both seasons. However, Perlette, Flame seedless and Thompson seedless had considerably lower percentages of fruitful buds. No significant differences were found between the three later cultivars in the 1<sup>st</sup> season, while in the 2<sup>nd</sup> one Thompson seedless cv. exceeded significantly Flame seedless in this concern.

It is worthy to note that King's Ruby, Perlette and Thompson seedless cultivars had relatively higher percentages of fruitful buds in the second season over the analogous values in the first season. Such increase was slight in both Perlette and Thompson seedless while it was remarkably higher in King's Ruby. In addition, percentage of fruitful buds in Flame seedless cv. was sharply decreased in the second season.

This result may be attributed to the fact that Flame seedless vines are greatly sensitive to crop bearing i.e. the relatively high crop in a year is followed by a lower yield in the second one. Percentage of fruitful buds in King's Ruby cultivar increased sharply in the second season though its vines were highly cropped in the preceding season. This result can be ascribed to the high bearing capacity of this cultivar since in addition to the high fertility of its primary buds in the eye, the less developed reserve buds are also highly fertile. As far as fertility coefficient is concerned, it is apparent that it had the same trend previously shown with the percentage of fruitful buds.



The results in this connection are in accordance with those obtained by (Kamel *et al.*, 1965), (Fawzi, 1966), (Capellini and Monastra, 1974), (Abd El-Kawi and El Yami 1992 a), (Sourour and Osman, 1993), (Marwad *et al.*, 1994) and (Abd -El-Aal, 1996).

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دراسات علي ديناميكية التزهير والتساقط وسلوك العيون  
في بعض أصناف العنب اللابذرية

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معهد بحوث البساتين - مركز البحوث الزراعية

أجريت الدراسة في مزرعة خاصة بمحافظة الدقهلية علي أربع أصناف  
عنب لابذرية وهي البرليت والفليم سيدلس والطومسون سيدلس والكنج روبي.  
أجريت التجربة علي أشجار عمر 7 سنوات نامية في تربة طميية وتروى  
بنظام الري بالتنقيط ومرباه بنظام الكردون المزوج ، شملت الدراسة ديناميكية تزهير  
العناقيد يومياً وكل ساعة وتساقط كل من الأزهار الزهرية والأزهار والحببات بالإضافة  
إلى سلوك العيون.

أظهرت الدراسة ان النسبة المئوية للتزهير اليومي تزداد زيادة واضحة  
وتصل إلى قمة التزهير في اليوم الثاني أو الثالث أو الرابع وذلك باختلاف الصنف  
والموسم وبعد ذلك يحدث انخفاض واضح في النسبة المئوية للتزهير ، وأعلى نسبة  
تزهير تحدث خلال اليوم في الساعة التاسعة صباحاً بعدها يحدث انخفاض واضح  
يصل إلى الحد الأدنى الساعة الحادية عشر صباحاً ، كما أن أعلى نسبة تساقط كلي  
تحدث في الصنف الكنج روبي يليه الفليم سيدلس والطومسون سيدلس.

وقد وجد أن اعلي نسبة تساقط للأزهار الزهرية تحدث في الصنف كنج  
روبي يليه الفليم سيدلس ثم الطومسون سيدلس وأقلها مع البرليت بينما أظهر الصنف  
كنج روبي أعلى نسبة تساقط في الأزهار أما الصنف البرليت فقد أظهر اعلي نسبة  
تساقط في الحبات ، وبالنسبة للصنف الكنج روبي فقد أعطى أعلى معامل خصوبة يليه  
البرليت والفليم سيدلس.