

EVALUATION OF SOME NEWLY-INTRODUCED GRAPE CULTIVARS UNDER EGYPTIAN CONDITIONS WITH SPECIAL STRESS ON SOME MORPHOLOGICAL CHARACTERISTICS

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ABSTRACT

The present investigation was carried out for two successive seasons 2003 and 2004, with the aim of evaluating four grape cultivars, two seedless: Crimson and Fantasy, and two seeded: Christmas Rose and Red Globe. These cultivars were grown in a private vineyard at El-Sadat region -Monofia governorate, Egypt.

Morphological studies included: time of bud burst, growing shoots, growing tip, internodes, leaves, tendrils, flowering time, bunches and berries, seeds, TSS, acidity, TSS/acid ratio, ripening date and bud fertility.

All studied cultivars were characterized by good vegetative growth and bunch quality. The average bunch weight was medium in Crimson and Fantasy cvs., big in Christmas Rose cv., while, it was very big in Red Globe cv. Berry weight and size were large for all cultivars except Red Globe cv. which was very large. Berry shape was cylindrical in Crimson and Fantasy cultivars, obovoid in Christmas Rose and rounded spherical in Red Globe cv. Berry colour was bright red in Crimson seedless cv., light red in Christmas Rose, bright pinkish red in Red Globe while, in Fantasy it was bluish black. Crimson was found to be the highest vigorous cultivar, while the Red Globe was the lowest vigorous one. Ripening date of Crimson occurred in the first week of Aug., while in Christmas Rose it took place through the first week of Sept., for Fantasy it occurred at the last week of Aug. Coefficient of bud fertility increased gradually from the basal buds to the middle buds of the cane where it reached its maximum then decreased gradually towards the distal buds in all studied cultivars.

From the foregoing results, it can be recommended to prune Crimson and Fantasy cultivars according to cane pruning system while Christmas Rose and Red Globe cultivars can be pruned according to spur pruning system.

INTRODUCTION

The total grape area in Egypt reached 160005 Feddans with a production of 1391749 Tons according to the latest statistics of Ministry of Agriculture (2005). Twenty five years ago most of the grape area has been occupied by two main cultivars: Thompson seedless and Roumi Ahmer besides a small area cultivated with some local cultivars. In 1981 Ministry of Agriculture through the Agriculture Development system project A.D.S. introduced some new table grape cultivars which have been planted in different growing regions both in Delta and desert areas; these cultivars were found to have different morphological characteristics and bunch quality.

The morphological examination of some grapevine parameters remains the most important and easiest means for identification of grape species, varieties and clones (Schneider, 1996).

Cultivars can be characterized by several methods: (i) Morphological description of parts of the plant (woody shoot, leaves, bunches, etc.) at different phenological stages (oiv, 1984). (ii) Morphometry based on the measurement of parameters of plant organs (leaves, bunches, berries) (Galet, 1952; Cabello *et al.*, 1993). (iii) Analysis of biochemical compounds either quantitatively or qualitatively.

Pervious trials dealt with the description and evaluation of grape cultivars Olmo (1946), Kamel (1964), Winkler *et al.*, (1965), Brooks and Olmo (1972), Watt (1983), Walker and Boursiquote (1992), Abd El-Kawi and El-Yam (1992 a, b and c), Abd El-Fatah and Kastor (1993 a and b), Morrison (1994), Tourky *et al.*, (1995), El Sharkawy (1995), Fawzy (1998), Aisha *et al.*, (1998) and Marwad (2002 a and b).

The purpose of present study was to evaluate four grape cultivars namely: Crimson seedless, Fantasy seedless, Christmas rose and Red Globe grape cultivars under Egyptian conditions, with special stress on some morphological characteristics which may serve in distinguishing between these cultivars.

MATERIALS AND METHODS

This work was conducted for two seasons: 2003 & 2004 on six years old grapevines of Crimson seedless, Christmas Rose, Red Globe and Fantasy seedless. Vines were grown in a private vineyard situated El-Sadat region -Monofia governorate, Egypt.

Two of these cultivars were seeded: Christmas Rose and Red Globe and the other two were seedless: Crimson and Fantasy. The vines of each cultivar were nearly uniform, in vigour planted in a sandy soil spaced 3x3 m apart and irrigated by the drip irrigation system. Vines were supported by the Spanish parron system and pruned according to the mixed system to (12 canes and 6 spurs/vine). Three replicates for each cultivar were taken where each replicate consisted of three vines. The ampelographic studies carried out according to the international Ampelographic Registered Schedule (Cosmo, *et al.*, 1958).

***The following characteristics were studied:**

- Time of bud burst.
- Growing shoots (Hairs – Colour)
- The growing Tip (Hairs – Shape)
- Internodes (Length – Thickness)
- Leaf: (Leaf shape - leaf surface - leaf colour - leaf pigments - leaf thickness - leaf pubescence - leaf lobes - leaf sinuses (depth and form) - petioler sinus (type-length-shape) - leaf margin (tooth size - apical tooth - teeth number - type of margin).
- Tendrils: (sequence – tip – length – colour - form).
- Time of bloom.
- Bunches: (Bunch weight - bunch length - bunch width - bunch shape - bunch density - bunch peduncle - number of berries/bunch).

- Berries: (Berry size - berry weight - berry shape - berry colour - berry length - berry diameter - berry shape).
- Seeds: (Average seed number per berry - Average weight of 100 seeds).
- Total soluble solids (TSS).
- Acidity (grams of tartaric acid/100 ml juice).
- TSS/acid ratio.
- Ripening date.
- Bud fertility: (50 buds for each node position (1 to 10) were examined to determine coefficient of bud fertility which was calculated by dividing average number of bunches per vine by the total number of buds/vine for the studied cultivars according to (Prasad and Pandey, 1969).

Statistical analysis:

The completely randomized design was adopted for this investigation. The obtained data were statistically analyzed according to Snedecor and Cochran (1990). The new LSD values at 5% level was taken as a measure for comparing between means of treatments..

RESULTS AND DISCUSSION

Data concerning the evaluation and the morphological description of the studied cultivars are presented in Tables (1 & 2) and illustrated in Figures (1, 2, 3, 4 & 5).

• Bud burst:

Bud burst of crimson seedless cv. occurred in the last week of March, Red Globe cv. in the first week of April, whereas, Christmas Rose. and Fantasy cvs. in the took place second week of April.

• Growing shoots:

Growing shoots of the studied cultivars were glabrous accompanied by green with purple colour over nodes except Christmas Rose which was cob-webby and green with purple colour over nodes.

The above results are in line with Breider (1950).

• Growing tip:

In (1950) Breider classified the growing tip into downy, cob-webby or glabrous.

The growing tip of Crimson seedless, Christmas Rose and Red Globe had cob-webby hairs with straight form while in Fantasy it had glabrous hairs and straight form.

• Internode:

Length of the internode for all studied cultivars was long (more than 7 cm) and the internode in all cultivars was thick (more than 5 mm).

Berg (1959) classified internode length as follows: Short (less than 5cm), Medium (5-7 cm) and long (more than 7 cm).

• Tendrils:

According to Kolenti (1946) tendrils were classified into continuous or discontinuous and intermittent.

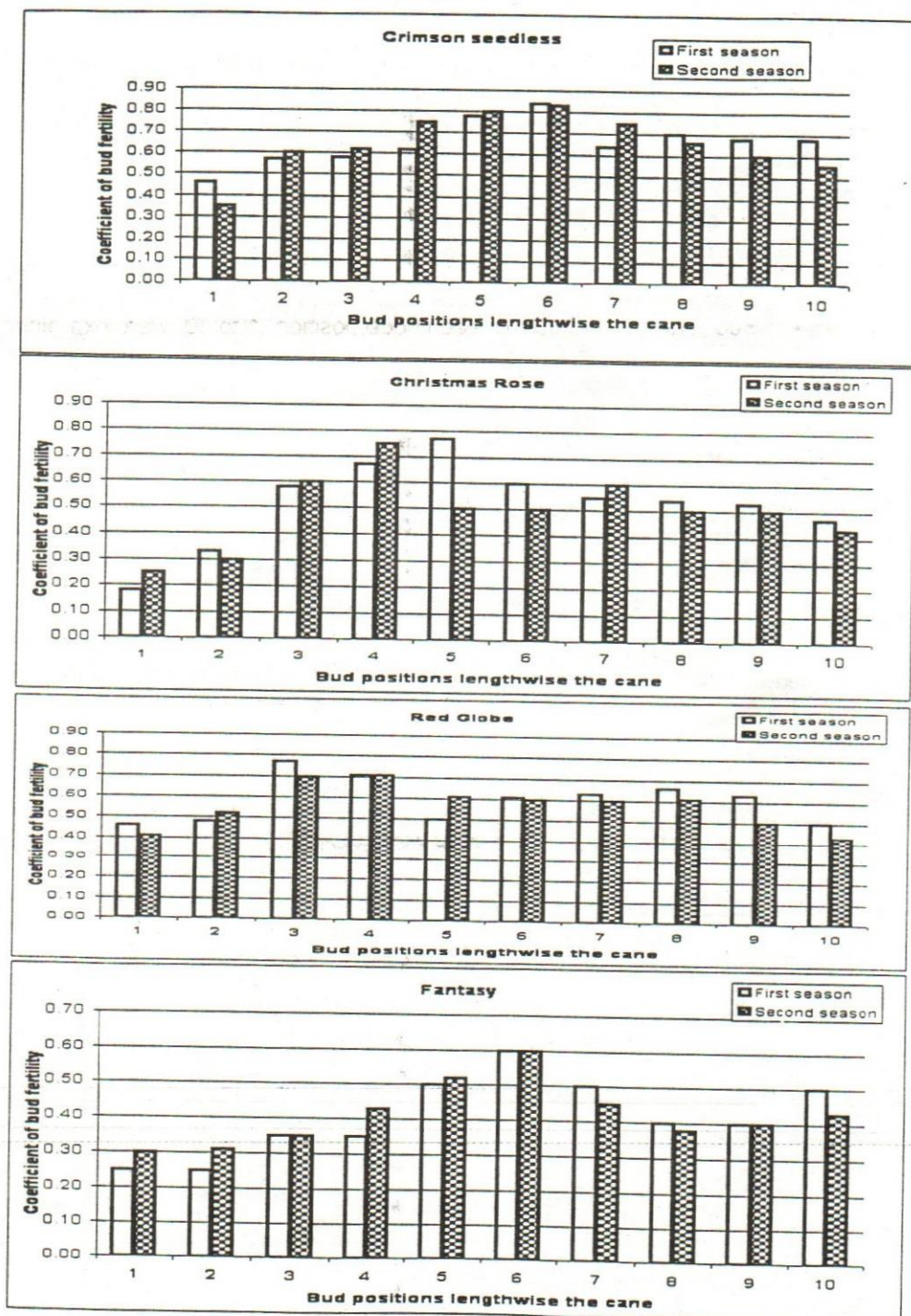


Fig (1): Coefficient of bud fertility in different grape cultivars during 2003 and 2004 seasons

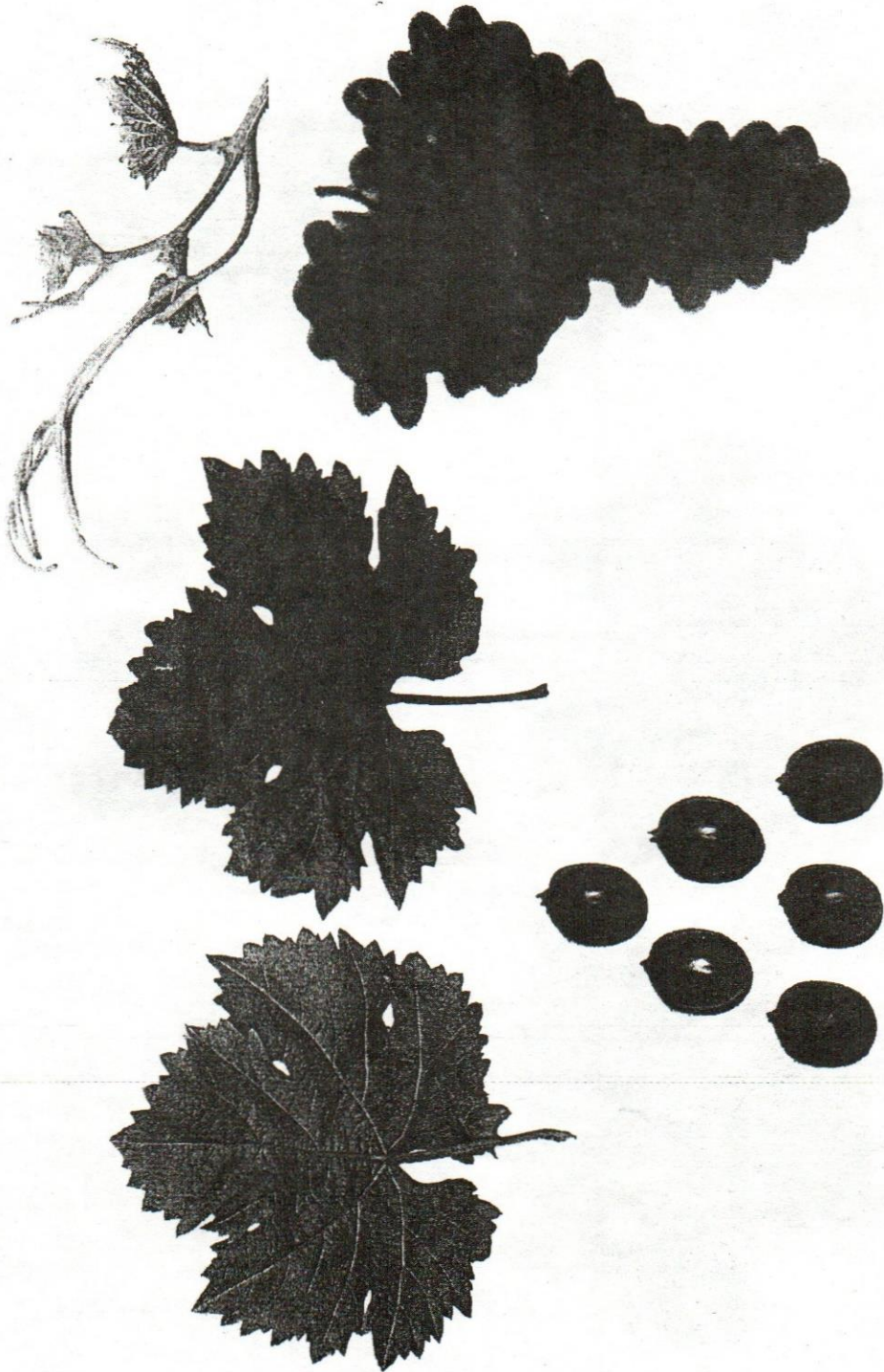


Fig (2): Shoot tip, leaves, bunch and berries for Crimson Seedless Cv.

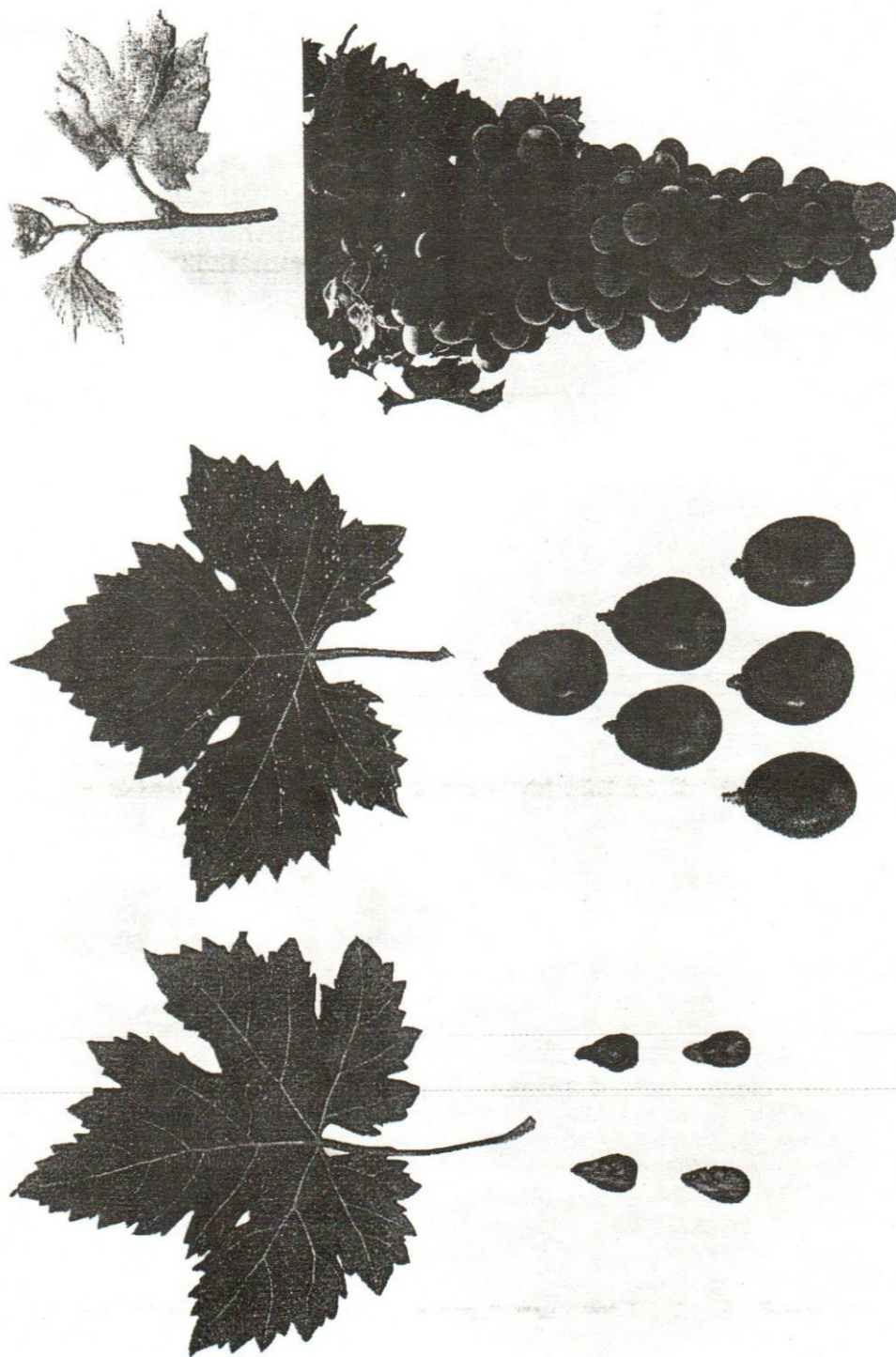


Fig (3): Shoot tip, leaves, bunch, berries and seeds of Christmas Rose Cv.

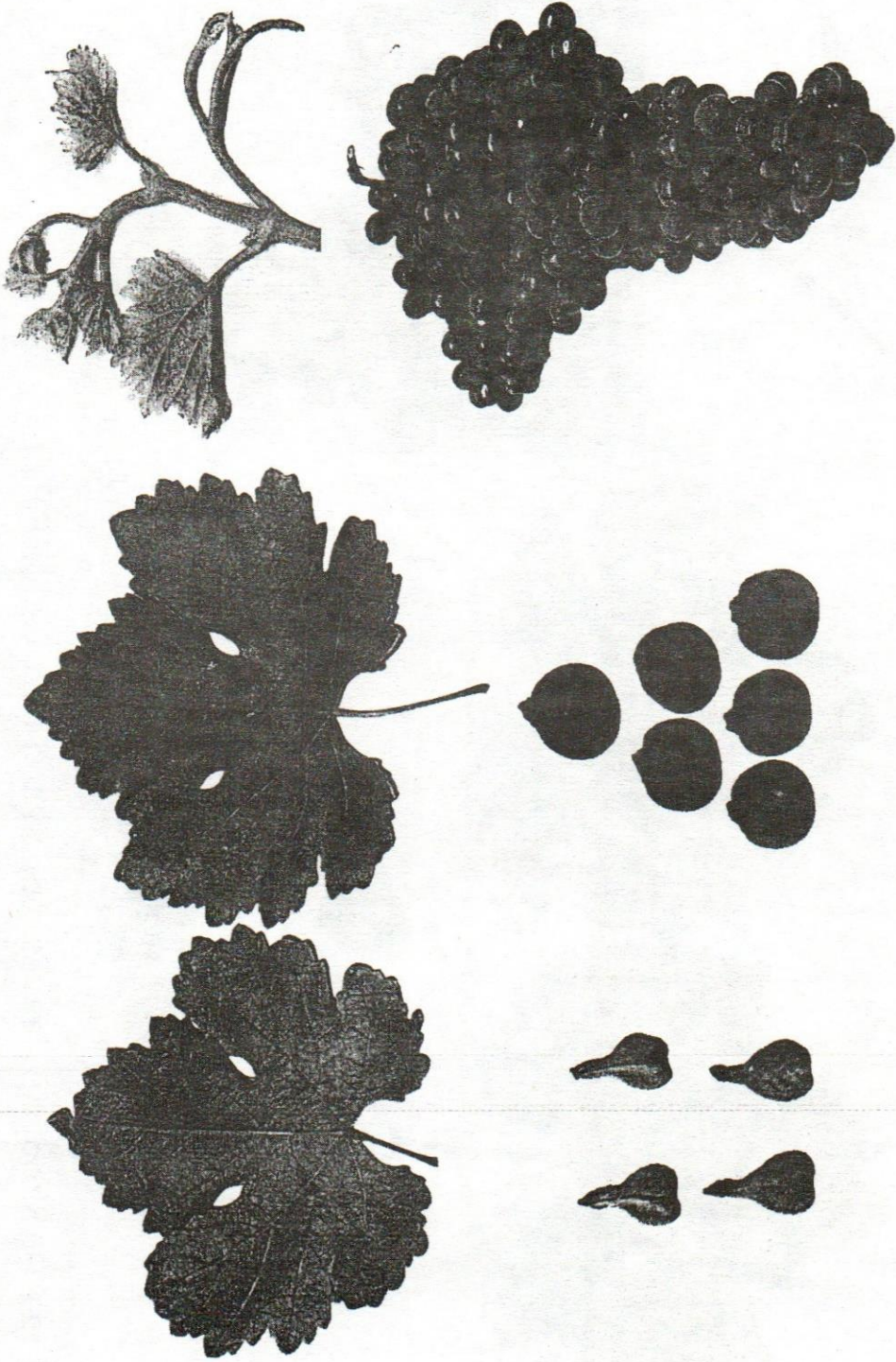


Fig (4): Shoot tip, leaves, bunch, berries and seeds for Red Globe Cv.

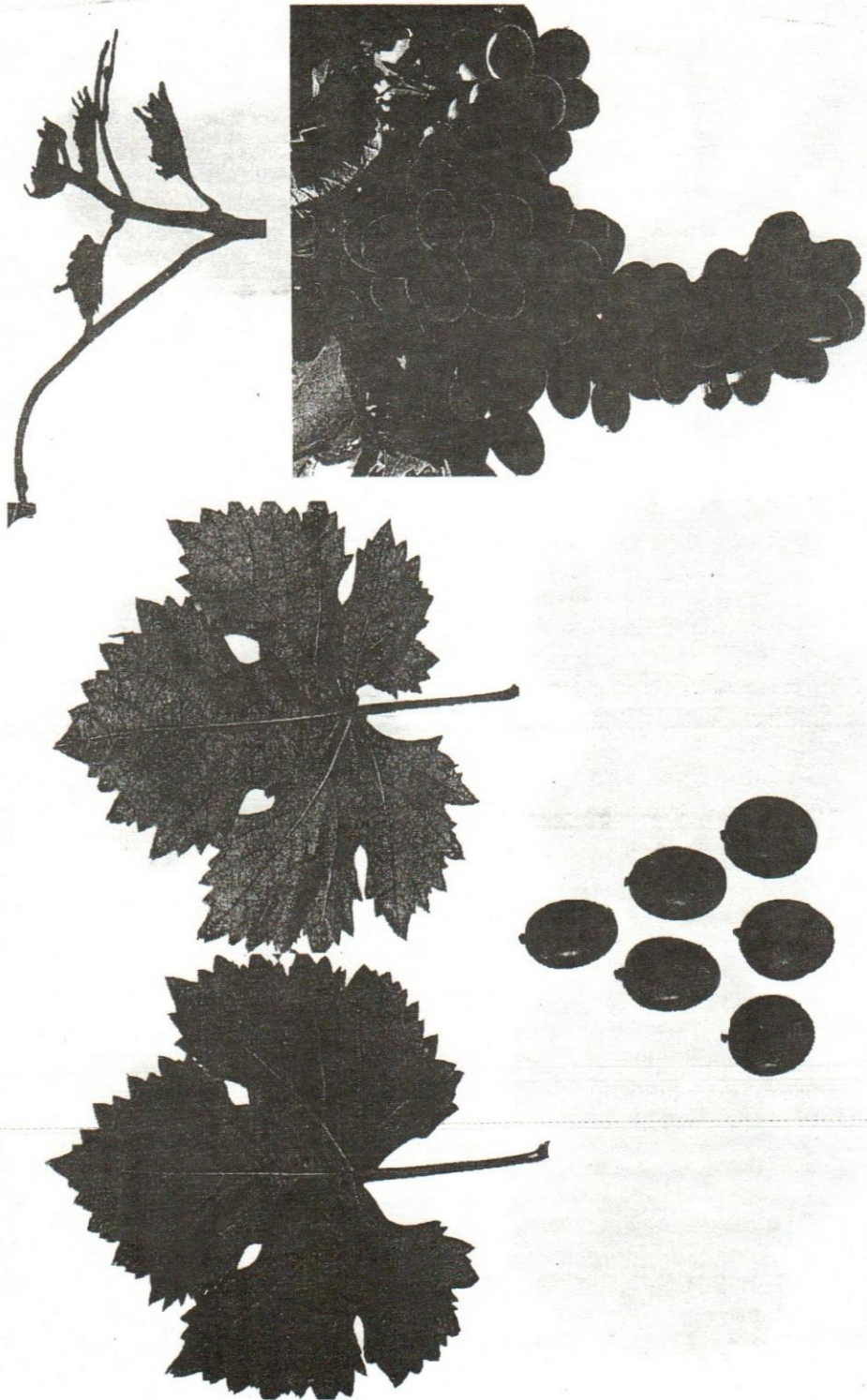


Fig (5): Shoot tip, leaves, bunch and berries for Fantasy Cv.

Tendrils of Crimson Seedless, Red Globe and Fantasy cvs. were intermittent while in Christmas Rose they were discontinuous.

Tip of tendrils in Christmas Rose and Red Globe was tri-fid, in Crimson Seedless tri-fid and some times di-fid and in Fantasy tri-fid and some time terra-fid.

The four cultivars had long tendrils with green colour.

• **Leaf:**

- **Leaf size and shape:**

All cultivars had a large leaf area (more than 125 cm²) with orbicular shape except Crimson seedless which showed a reniform shape.

Singh and Singh (1940) classified leaf shape to 3 groups orbicular, cuneiform and cordate.

- **Leaf surface, colour and pigments:**

The studied cultivars showed a smooth leaf surface with yellowish green colour at the lower surface. The pigments were concentrated only at the petiole joint to the leaf in Christmas Rose cultivar only but the three other cultivars Crimson Seedless, Red Globe and Fantasy were without pigments.

Leaf thickness and pubescence:

Leaf of Fantasy cultivar was thick, but in the other three cultivars it was medium. Leaves of all cultivars were glabrous i.e. (with no pubescence). Watt (1983) was the first to apply pubescence and colour of the lower surface of the leaf for distinguishing between grape cultivars of Punjab.

- **Leaf lobes:**

Number of lobes number in all cultivars under studied was 5.

- **Leaf sinuses:**

According to Kolenti (1946), leaf sinuses are different in number, depth and form as follows: depth (shallow, medium and deep) and form (closed, perforate, narrow and wide).

Sinuses in Christmas Rose were shallow in depth, when folding the lobe, the sinus reached less than one third of the way to petiole, while in Crimson and Red Globe cvs. were medium in depth reaching half of the way to the petiole. In Fantasy cultivar it was deep.

As for the form of sinuses it was closed in Crimson, Red Globe and Fantasy cvs. Whereas in Christmas Rose cv. it was perforate..

• **Petiole sinus:**

Redrigues (1959) classified the type of petiole sinus as closed, narrow, medium and wide.

The Petiole sinus of Crimson and Fantasy cvs. was narrow, medium in Christmas Rose cv. and wide in Red Globe cv. As for the ratio between petiole to length of leaf P/L it was long (more than 0.8) in Crimson Seedless, Red Globe and Fantasy cvs. (0.94, 0.90 and 0.92) respectively while, it was medium in Christmas Rose cv. (0.76). Petiole sinus of the studied cultivars was U shaped except Fantasy cv. where it was V-U shaped.

• **Leaf margin:**

The ratio between length and breadth (L/B) of the leaf tooth had 3 categories: narrow, medium and

broad.

L/B in Red Globe cv. was broad i.e. breadth was more than length. In Crimson Seedless, Christmas Rose and Fantasy it was medium i.e. breadth was equal to length.

The apical tooth of all studied cultivars was pointed.

Teeth number of Crimson Seedless Christmas Rose, Red Globe and Fantasy cultivars was many (76.6, 73.4, 76.6 and 84.4) respectively.

The types of margin in all studied cultivars were irregularly dentate.

• **Time of bloom:**

Data of Table (1) show that flowering time in Crimson Seedless cv. occurred in the last week of April, in Red Globe cv. in the second week of May, whereas in Christmas Rose and Fantasy cultivars it took place in the second week of May.

• **Bunches:**

As shown in Tables (1 and 2), it is clear that average bunch weight in Crimson and Fantasy cultivars was medium, in Christmas Rose cv. big, while, in Red Globe cv. it was very big.

Bunch length of all studied cultivars was very long (more than 24 cm). As for bunch width and number of berries per bunch it can be noticed that Crimson seedless recorded the lowest values of bunch width with the highest values of number of berries per bunch in both seasons.

Bunch shape of Crimson seedless and Fantasy cultivars was conical with shoulders and it was conical in Christmas Rose cv. while, Red Globe cv. it was with shoulders. Bunches of all studied cultivars were well-filled except Red Globe cv. where they were compact. Peduncle of bunches of Crimson seedless, Christmas Rose, Red Globe and Fantasy cultivars were long (3.7, 4.38, 4.5 and 3.75) respectively.

• **Berries:**

Data of Tables (1 and 2) clearly show that the average berry size and weight of all studied cultivars was large except Red Globe cv. where it was very large in the two seasons of the study..

Berry shape of Crimson seedless and Fantasy cultivars was cylindrical, while in Christmas Rose it was obovoid (Tear drop) and was rounded spherical in Red Globe cv.

Berry colour of Crimson seedless cv. was bright red, light red in Christmas Rose and bluish black in Fantasy cv.

• **Seeds:**

Crimson seedless and Fantasy were seedless cultivars while Christmas Rose and Red Globe were seeded cultivars with medium of weight seeds (3.9g/100 berry, 3.5g/100 berry and the seed number was many (4&3.2) respectively. (Tables 1,2).

In (1938) Bioletti classified the average number of seeds per berry as (a) Few seeds: less than 2 seeds/berry, (b) Many seeds: more than 2 seeds/berry.

Table (1): Description and evaluation of Crimson Seedless, Christmas Rose, Red Globe and Fantasy grape cultivars:

Cultivars		Crimson seedless	Christmas Rose	Red Globe	Fantasy
Characters					
Time of bud burst		Last week of March	Second week of April	First week of April	Second week of April
Growing shoots:	Hairs	Glabrous	Cob-webby	Glabrous	Glabrous
	Colour	Green with purple colour over nodes	Green with purple colour over nodes	Green with purple colour over nodes	Green with purple colour over nodes
Growing tip:	Hairs	Cob-webby	Cob-webby	Cob-webby	Cob-webby
	Shape	Straight	Straight	Straight	Straight
Internodes:	Length	Cob-webby	Cob-webby	Cob-webby	Cob-webby
	Shape	straight	straight	straight	straight
Tendrils:	Sequence	Intermittent	Discontinuous	Intermittent	Intermittent
	Tip	di-tri-fid	Tri-fid	Tri - fid	Tri-tetra-fid
	Length	Long (15 cm)	Long (16.5cm)	Long(17.0cm)	Long (14.3 cm)
	Colour	Green	Green	Green	Green
Leaf:	Leaf size	Large	Large	Large	Large
	Leaf shape	Reniform	Orbicular	Orbicular	Orbicular
	Leaf surface	Smooth	Smooth	Smooth	Smooth
	Leaf colour	Yellowish green	Yellowish green	Yellowish green	Yellowish green
	Leaf pigments	Without pigment on veins	Pigment only on the petiole joint to leaf	Without pigment on veins	Without pigment on veins
	Leaf Thickness	Medium	Medium	Medium	Thick
	Leaf pubescence	Glabrous	Glabrous	Glabrous	Glabrous
	Leaf lobes	5 lobes	5 lobes	5 lobes	5 lobes
	Leaf sinuses				
	Depth	Medium	Shallow	Medium	Deep
	Form	Closed	Perforate	Closed	Closed
	Petiole sinus	Narrow	Medium	Wide	Narrow
	Petiole P/L	Long (0.94)	Medium (0.76)	Long (0.90)	Long (0.92)
	Petiole shape	U-shaped	U-shaped	U-shaped	V-U-shaped
Leaf Margin	Teeth size	Medium	Medium	Broad	Medium
	Apical tooth	Pointed	Pointed	Pointed	Pointed
	Tooth number	Many (76.6)	Many (73.4)	Many (76.6)	Many (84.4)
	Type of margin	Irregularly dentate	Irregularly dentate	Irregularly dentate	Irregularly dentate
Time of bloom		Last weeks of April	The second third week of May	The first week of May	The second week of May
Bunches	Bunch weight	Medium	Big	Very big	Medium
	Bunch length	Long	Very long	Very long	Very long
	Bunch shape	Conical with shoulder	Conical	Conical shoulder	Conical with shoulder
Bunch density	Well filled	Well filled	Compact	Well filled	
Peduncle	(3.7) Long	(4.38) Long	(4.5) Long	(3.75) Long	
Berries	Berry size	Large	Large	Very large	Large
	Berry weight	Large	Large	Very large	Large
	Berry shape	Cylindrical	Obovoid (Tear drop)	Rounded spherical	Cylindrical
	Berry colour	Bright red	Light red	Bright pinkish red	Bluish black
Seeds	Seed number/berry	Seedless	Many (3.2)	Many (4.0)	Seedless
	Seed weight	-	Medium (3.9g/100 berry)	Medium (3.5g/100 berry)	-
Ripening date		First week of August	First week of September	Second week of August	Last week of August

Table (2): Some physical and chemical characteristics of bunches and berries and weight of prunings per vine of Crimson seedless, Christmas Rose, Red Globe and Fantasy grape cultivars in 2003 and 2004 seasons

Characteristics Cultivars	First season											Second season																
	Bunch weight (g)	Bunch length (cm)	Bunch width (cm)	Bunch shape	No. of berries per bunch	Berry weight (g)	Berry Size (cm ³)	Berry length (cm)	Berry diameter (cm)	Berry shape	TSS (%)	acidity (%)	TSS/acid ratio	weight of Pruning (kg/vine)	Bunch weight (g)	Bunch length (cm)	Bunch width (cm)	Bunch shape	No. of berries per bunch	Berry weight (g)	Berry Size (cm ³)	Berry length (cm)	Berry diameter (cm)	Berry shape	TSS (%)	acidity (%)	TSS/acid ratio	weight of Pruning (kg/vine)
Crimson seedless	575.3	25.0	15.0	1.67	140.2	4.00	3.37	2.30	1.60	1.44	16.7	0.75	22.3	5.71	547.0	27.0	16.1	1.69	132.1	4.14	3.80	2.46	1.70	1.45	16.5	0.75	22.0	6.14
Christmas Rose	798.1	28.0	16.1	1.75	110.3	7.10	6.60	2.80	1.90	1.47	17.0	0.70	24.3	4.32	794.2	29.1	16.5	1.76	114.9	6.95	6.50	2.80	1.90	1.47	16.9	0.68	24.9	4.55
Red Globe	1200.0	30.1	19.1	1.58	133.0	9.00	8.50	2.65	2.35	1.13	16.5	0.75	22.0	2.50	1033.3	31.0	20.0	1.55	117.1	8.80	8.50	2.65	2.45	1.08	16.5	0.75	22.0	2.46
Fantasy	670.3	27.0	17.0	1.59	120.0	5.48	5.00	2.82	1.73	1.63	18.0	0.60	30.0	3.70	690.2	27.0	16.1	1.69	120.6	5.66	5.00	2.80	1.75	1.60	17.5	0.66	26.5	4.10
New LSD at 5%	74.3	3.1	2.8	0.09	23.8	1.71	1.60	0.21	0.29	0.24	1.4	0.11	7.6	1.13	81.7	3.4	2.5	0.07	17.1	1.12	0.90	0.18	0.34	0.19	0.9	0.08	4.3	1.29

- **Ripening date:**

Data presented in Tables (1 and 2) obviously show that Crimson seedless ripened in the first week of Aug., Red Globe in the second week of Aug., Fantasy in the last week of Aug. while, Christmas Rose ripened in the first week of Sept. As for TSS, acidity and TSS/acid ratio, it can be noticed that the highest TSS was shown in Fantasy cv. with the lowest percentage of acidity. No significant differences could be detected between the other three cultivars. The same results was observed in TSS/acid ratio in both seasons.

The results in this respect were in line with those of many investigations working on different cultivars (Ismail, 1989, Tourky *et al.*, 1995; Fawzy, 1998; Aisha *et al.*, 1998 and Marawad 2002 a&b).

- **Weight of prunings:**

Weight of prunings can be adopted as a good indicator for vine vigour. Data in Table (2) show that Crimson seedless cv. had the highest values of this estimate in the two seasons of the study. Red Globe cv. had the lowest values, while, Christmas Rose and Fantasy cvs. were in between in this connection.

It seems evident on account of these results that vines of Crimson seedless cv. had the highest vigour, whereas those of Red Globe cv. had the lowest vigour, Christmas Rose and Fantasy cvs. vines were characterized by having moderate vigour.

In this respect, (Marawad 2002 a&b) working on some seedless and seeded cultivars showed that the heaviest prunings resulted from Black Monukka and Black Rose cvs. while the lightest pruning were obtained in Fiesta and Gold cvs.

- **Bud fertility:**

It is important to determine coefficient of bud fertility for each bud position as to help for the choice of the suitable training and pruning system for each cultivar.

Fig (1) show that percentage of bud fertility increased gradually from the basal buds up to the middle buds of the shoot where it reached its maximum then decreased gradually towards the distal buds, the highest coefficient of bud fertility for Crimson and Fantasy cvs. was at the 6th node, while in Christmas Rose cv. it was at the 4th & 5th nodes and in Red Globe cv. it was at the 3rd & 4th nodes.

From the above results, it can be recommended to prune Crimson and Fantasy cultivars according to cane pruning system while Christmas Rose and Red Globe cultivars can be pruned according to spur pruning system.

In this respect, Bessins (1965), Licul (1969), Monastra (1971), Abd el-Kawi and El-Yami (1992a) and Aisha *et al.*, (1998) found that the fruitfulness of buds increased from the basal sector to the distal bud position on the canes.

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تقييم بعض أصناف العنب المستوردة حديثا تحت الظروف المصرية مع التركيز
بصفة خاصة على الصفات المورفولوجية لهذه الأصناف
عائشة صالح عبد الرحمن جاسر
قسم بحوث العنب - معهد بحوث البساتين - مركز البحوث الزراعية بالجيزة - مصر

أجرى هذا البحث خلال موسمى ٢٠٠٣، ٢٠٠٤ لتوصيف وتقييم أربعة أصناف من العنب
هى الكريسون سيدلس والكريسماس روز والرد جلوب والفانتازى وقد كانت هذه الأصناف
منزوعة بأحد المزارع الخاصة بمدينة السادات - محافظة المنوفية - مصر.
وقد شملت الدراسة التوصيفية: ميعاد تفتح البراعم - الأفرع والقلم التامية - السلاميات -
الأوراق - المحاليق - ميعاد التزهير - العناقيد والحببات والبذور - المواد الصلبة الذائبة الكلية -
الحموضة - نسبة المواد الصلبة الذائبة الكلية إلى الحموضة - ميعاد النضج - خصوبة البراعم.
وقد أظهرت الدراسة نجاح هذه الأصناف تحت الظروف المصرية حيث أعطت نمو قويا
وجودة عالية للعناقيد والحببات، وكان وزن العنقود فى صنفى الكريسون سيدلس والفانتازى
متوسطا بينما كان كبيرا فى صنف الكريسماس روز وكان كبيرا جدا فى صنف الرد جلوب. وكان
حجم ووزن الحببات كبير فى جميع الأصناف باستثناء صنف الرد جلوب كان كبير جدا. وكان شكل
الحبة إسطوانى فى صنفى الكريسون سيدلس والفانتازى وبيضاوى مدبب فى صنف الكريسماس
روز بينما كان مستديرا فى صنف الرد جلوب. وكان لون الحبة أحمر زاهيا فى صنف الكريسون
سيدلس وأحمر فاتحا فى صنف الكريسماس روز وأحمر قرمزيا زاهيا فى صنف الرد جلوب وفى
صنف الفانتازى كان اللون أسودا مشوبا بزرقة. ويعتبر الكريسون سيدلس والفانتازى من
الأصناف عديمة البذور أما الكريسماس روز و الرد جلوب فهى أصناف بذرية، وقد لوحظ أن
كرمات صنف الكريسون سيدلس تتميز بأنها قوية النمو أما كرمات صنف الرد جلوب فتموها
منخفض. وقد لوحظ أيضا زيادة معامل الخصوبة فى البراعم تدريجيا من القاعدة حتى وسط الفرع
ثم حدوث إنخفاض فى إتجاه قمة الفرع فى جميع الأصناف.
وقد أظهرت النتائج أن نظام التقليم المناسب لأصناف الكريسون والفانتازى هو التقليم
القصبي بينما أصناف الكريسماس روز والرد جلوب يناسبها التقليم الدبرى.