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Evaluation and Selection of Some Local Grape Cultivars Grown
in Riyadh Region, Saudi Arabia

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English Summary

Evaluation and Selection of Some Local Grape Cultivars Grown in Riyadh Region, Saudi Arabia.

This investigation was carried out at the Agricultural Research and Experiment Station, at Dierab, College of Agriculture, King Saud University during the 1997 and 1998 seasons.

Ten local grape cultivars were used for evaluation and selection and two introduced were used for comparison. The cultivars were:

(One) Local Cultivars:

- | | | |
|-----------------|----------------|-----------------|
| (1) Taiefy | (2) Des El-Anz | (3) Sherify |
| (4) Hegazy | (5) Shamy | (6) Kamaly |
| (7) Halwany | (8) Egemy | (9) White Shada |
| (10) Roumi Red. | | |

(Two) Introduced Cultivars:

- | | |
|-----------------------|------------|
| (1) Thompson Seedless | (2) Beauty |
|-----------------------|------------|

The main objectives of these investigation were:

- (1) To study the vegetative, flowering and fruiting growth of some local grape cultivars grown in Riyadh region and made detailed variety descriptions for these cultivars.
- (2) To study the genetic relationships among these cultivars using the cluster analysis and detecting the more limiting characters for each cultivar using the principal component analysis.

(3) To select the suitable local grape cultivars grown under Riyadh conditions and gives maximum growth and yield.

Five trees uniform in size and vigor were chosen from each cultivar. Each tree represent one replication. The completely randomized design with five replicates was used.

The following characters were determined:

I – Phenological Data:

This study included the following phenological data:

Bud burst time; flowering date; cluster flower setting; time of coloring and ripening of berries and number of days from flowering to ripening of berries.

II – Morphological Studies:

Morphological characteristics of new shoots; internodes and leaves were determined in all cultivars.

III – Pollen Grain Characteristics

Pollen grain viability percentages, length, diameter and shape of pollen grains were studied.

IV – Yield:

Number of fruit clusters / vine, average weight of fruit cluster and yield (kg/vine) were determined.

V – Fruit Cluster Characteristics:

Length, width and shape of fruit clusters were determined. Number of berries per cluster and berry adherence strength on cluster were also determined.

VI – Physical Properties of Berries:

Physical properties of berries (Color, length, width, shape, weight, size and juice volume) were determined in all cultivars.

VII – Chemical Properties of Berries:

The percentages of total soluble solids, acidity, total soluble solids to acid ratio, pH and moisture percentage were determined in berries of each cultivar.

VIII – Seed Characteristics:

Number of seeds per berry, length, width and shape of seeds were recorded.

All data obtained were subjected to principal component analysis and cluster analysis.

The results obtained can be summarized as follows:

I – Phenological Data:

It was found from the data of bud burst, flowering date, time of cluster flower setting and time of coloring and ripening of berries that, grape cultivars in this study, beginning bud burst from 1 March to 4 April during the two seasons. Therefore, cultivars were divided into three groups:

- a - Early cultivars (1 – 14 March): Thompson Seedless and Beauty.
- b-Medium cultivars (15 – 24 March): Sherify, Hegazy, Shamy, Halwany, Kamaly and White Shada.
- c- Late cultivars (25 March – 4 April): Taiefy, Des El-Anz, Egemy and Roumi Red.

At the same time, the grape cultivars under this study divided into three groups depending upon the time of ripening of berries to:

- a- Early ripening cultivars (20 June – 14 July): Thompson Seedless and Beauty.
- b- Medium ripening cultivars (15 July – 4 August):Sherify, Shamy, Hegazy, Kamaly, Halwany, White Shada and Egemy.
- c- Late ripening cultivars (5 August – 25 August):Taiefy, Des El-Anz and Roumi Red.

Also, the data revealed that, the number of days from flowering to ripening of berries was ranged from 96 – 127 days in the first season, while it ranged from 96 – 122 days in the second season.

II – Morphological Studies:

(1) New shoot characteristics:

It was differed among the cultivars and ranged from purple to green or green with purple color.

(2) Internode Characteristics:

Data showed that, there were significant differences in length and thickness of internodes among all grape cultivars. The length of internode was ranged from 4.81 – 10.16 cm., while thickness of internodes ranged from 0.44 – 0.77 cm in the different grape cultivars. Also, results showed that, White Shada cultivar gave the longer fruiting cane followed by both Sherify and Des El – Anz cultivars, while Beauty cultivar gave shorter fruiting cane followed by Roumi Red cultivar.

White Shada cultivar gave significantly higher pruning weight as compared with other cultivars, while the reverse was true with Beauty cultivar.

(3) Leaf Characteristics:

Significant difference was found among different grape cultivars in length and width of leaf, petiole length and petiole to leaf length ratio. Therefore, the grape cultivars divided into Cordate, Pentagonal, Circular or Wedge shape depending upon the cultivar. Also, the data revealed that, five lobes was found in the leaf of all grape cultivars under study. Meanwhile, the number of teeth in the leaf differed among the cultivars. Leaf area ranged

from 63.94 – 116.70 cm² in the first season, while it ranged from 70.72 to 119.84 cm² in the second season, therefore, grape cultivars can be divided depending upon leaf area to:

a- Small leaf area cultivars (less than 80 cm²): White Shada, Roumi Red and Beauty.

b- Medium leaf area cultivars (from 81 – 100 cm²): Sherify, Hegazy, Shamy, Kamaly and Thompson Seedless.

c- Large leaf area cultivars (more than 100 cm²):Taiefy, Des El-Anz, Halwany and Egemy.

Also, data showed that leaves of Taiefy, Sherify, Hegazy and Shamy have a pubescence, while leaves of the other remained cultivars have no pubescence.

III – Pollen Grain Characteristics:

The percentages of viable pollen grain during both season ranged from 37.97 to 97.50%. Results showed that, both Taiefy and Roumi Red cultivars gave low values of viable pollen grains, while Egemy and Beauty cultivars gave higher pollen grain viability. Also, data revealed that significant differences were found in length and diameter of pollen grains among the different grape cultivars. Pollen grain shape was circular, the length to diameter ratio was ranged from 1.00 – 1.10 in all cultivars.

IV – Yield:

Data revealed that, significant differences were found among grape cultivars in average number of clusters per vine. Halwany cultivar gave the higher average number of clusters per vine (21.50 cluster / vine) as compared with other cultivars, while Egemy, Roumi Red and Beauty gave the lowest number in both seasons. Average weight of cluster ranged from 155 – 359g in 1997 season, while it ranged from 183 – 365g in 1998 season. Kamaly, White Shada and Roumi Red gave highest average weight of cluster, while Sherify, Egemy and Beauty gave the lowest average weight of cluster. Also, the results showed that, Des El-Anz cultivar gave the highest amount of yield per vine (5.29 Kg/vine), followed by Shamy cultivar (5.24 Kg/vine), while Egemy and Beauty cultivars gave the lowest yield per vine (1.62 and 1.65 Kg/vine, respectively) in 1997 season. On the other hand, Halwany cultivar exhibited a high yield per vine (5.92 Kg/vine), followed by Des El-Anz cultivar (5.91 Kg/vine) and Kamaly cultivar (5.84 Kg/vine), while Egemy and Beauty cultivars gave low yield/vine in 1998 season.

V – Fruit Cluster Characteristics:

Significant differences were found in length and width of fruit clusters among grape cultivars under study. Shamy and Halwany cultivars gave the longest fruit cluster, while Sherify and Kamaly cultivars gave the shortest fruit cluster. Also, Taiefy, Shamy and

Halwany cultivars gave the largest width of fruit cluster, while Sherify and Thompson Seedless gave the lowest width of fruit cluster during both seasons. Clear variations in fruit cluster shape were found among the different grape cultivars. Therefore, cultivars under study could be divide into three groups depending on fruit cluster shape to:

- a- Wedged grape cultivars: Taiefy, Thompson Seedless and Beauty.
- b- Cylindrical grape cultivars: Roumi Red, Halwany and Des El – Anz.
- c- Conical grape cultivars: Egemy, White Shada, Sherify, Shamy, Hegazy and Kamaly.

Significant differences were found in berry adherence strength on cluster among the different culivars during both seasons. Data showed that, Roumi Red and White Shada cultivars have a highest berry adherence strength from fruit cluster, while Thampson Seedless have a lowest one. Average number of berries per cluster was highest in Shamy cultivar, while it was lowest in Des El-Anz, Hegazy and Roumi Red cvs.

VI – Physical Properties of Berries:

Results showed that, Taiefy, Des El – Anz, Sherify, Hegazy, Shamy, White Shada and Thompson Seedless cultivars have a white berries color, while Roumi Red, Egemy, Halwany and Kamaly with a red

berries color. The Beauty cultivar have a black berries color. Differences in length, diameter and length/diameter ratio of berry were found in different cultivars, therefore, the cultivars could be divided into three groups depending upon berry shape to:

a- Round grape cultivars (less than 1.20):Taiefy, Shamy, Hegazy, Egemy, Roumi Red and Thompson Seedless.

b- Oval grape cultivars (from 1.21 to 1.50):Sherify, Kamaly, Halwany, White Shada.

c- Elongate grape cultivars (more than 1.50): Des El-Anz.

Results showed that, average weight of berry ranged from 0.83 – 5.14g in the first season, while it ranged from 0.93 – 4.91g in the second season. Also, White Shada cultivar gave the higher significant weight and size of berry as compared with other cultivars, followed by Shamy and Taiefy cultivars, while the introduced cultivars showed less berry weight and size. Therefore, the cultivars divided into three groups depending upon berry size to:

a- Small berry cultivars (less than 1 cm³):Thompson Seedless and Beauty.

b- Medium berry cultivars (from 1 – 3 cm³):Taiefy, Des El-Anz, Sherify, Hegazy, Kamaly, Halwany, Egemy and Roumi Red.

c- Large berry cultivars (more than 3 cm³): Shamy and White Shada.

The results revealed that, Shamy and Taiefy gave the highest juice volume per 100 berries, while Thompson Seedless, and Beauty gave the lowest values, the remainder cultivars gave intermediate values during both seasons.

VII – Chemical Properties of Berries:

The data showed that, berries of Roumi Red, Thompson Seedless and Beauty cvs. contained the highest total soluble solids percentage, while the berries of Hegazy and Shamy cvs. contained the lowest values. Also, berries of Des El-Anz and Kamaly contained the highest percentages of acidity, while the juice of Egemy, Roumi Red and Beauty berries contained the lowest percentages of acidity. Significant differences were found in the ratio of total soluble solids to acidity among all grape cultivars. The juice of Roumi Red, Egemy and Beauty berries contained the highest ratio of total soluble solids to acidity, while Hegazy cultivar gave the lowest ratio. Berries of Shamy and Sherify cultivars contained the highest percentage of moisture, while Taiefy and Halwany cvs. contained the lowest values in both seasons. The pH ranged from 3.50 to 4.73 during both seasons. However, berries of Egemy and Shamy cvs. showed the highest values of pH, while White Shada cultivar gave the lowest values in both seasons.

VIII - Seed Characteristics:

Grape cvs can be divided depending upon average seed number per berry to:

a- Seedless cultivars: Thompson Seedless.

b- Low seeds cultivars (less than 2 seeds/berry): Taiefy and Des El-Anz.

c- Seedy cultivars (more than 2 seeds / berry): Sherify, Hegazy, Kamaly, Halwany, Egemy, White Shada, Roumi Red, Shamy and Beauty.

Results revealed that, White Shada, Taiefy and Kamaly cvs. gave the highest weight of 100 seeds, while Roumi Red and Beauty gave the lowest values in both seasons. Also, White Shada, Hegazy cultivars produced the highest values of seed length, while the reverse was true for Beauty cultivar. At the same time, Egemy and Halwany produced the greatest diameter of seeds, while Sherify and Beauty cvs. produced the smallest seed diameter. The length / diameter seed ratio ranged from 1.27 in Egemy cultivar to 2.32 in Taiefy cultivar in 1997, while it ranged from 1.27 in Egemy cultivar to 2.21 in Des El-Anz in 1998.

Principal Component and Cluster Analysis:

The principal component analysis for the previous data, revealed that there were 11 principal component (PC) representing total variance in all characters studied. Seven components were representing 90% of the total

variations. The first principal component (PC_1), explaining 29.12% of the total variance, is highly correlated with berry characteristics and considered very important component for discrimination and classification of grape cultivars under study. PC_2 , explaining 18.02% of the total variance, is highly correlated with different characteristics. PC_3 , representing 12.67% of the total variance and is correlated with vegetative characteristics of cultivars.

The assessed cultivars were classified by cluster analysis into distinct groups, except between Des Al-Anz and Kamaly cvs., which distinguished in one group with 0.40 degrees of variance. Also, the remain cultivars were classified by cluster analysis in separate groups, and it was found that Thompson Seedless cultivar was more distinguished cultivar with 1.40 degrees of variance. It was also cleared from the determination of weighted means that, the best cultivars grown under Riyadh region, Saudi Arabia are: White Shada, Halwany, Des Al-Anz and Taiefy.