

Study the vegetative growth and yield of some grapes varieties (*Vitis vinifera* L.).

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Abstract

This study was carried out in Sulaimani governmental during 2018 growing season to study the vegetative growth and yield characteristic of seven cultivars of grapevine. The seven cultivars were selected in one location from Kanipanka research station vineyard: Des Alnnaz, Rumaibiaz, Bedank, Bol-mazw, Mirani, Reshe Baba and Sadane. The chosen vines were 15 years old, grown in a silty-clay soil, spaced at 2 x 3 meters apart, and irrigated by the drip irrigation system; the vines were trained by bilateral horizontal cordon on T-Trellis system. Therefore, the experiment consisted of seven treatments with three replications; one individual vine for each experimental unit and applied as simple experiment by using (RCBD) design, so the numbers of vines used were 21 vines. Results indicated that Bedank cultivar superior other cultivars in term of leaf area, total chlorophyll, leaf fresh and dry weight, Petiole length, Inter nod length and shoot length. According to yield characteristics Des Alannz and Sadane gave the highest cluster wide and cluster length, Bedank cultivar gave the highest cluster weight and Number of berry/ cluster. Mirane cultivar significantly superior other cultivars regarding the size and weight of 100 berries, berry diameter, weight of 100 seed. Concerning the chemical characteristics of grape Mirane cultivar where registered the highest total sugar percent, total soluble solids and juice density, Bedank gave the highest juice percentage, results illustrate that total acidity was the lowest at Rumaibiaz.

Keywords: *grapevine, cultivar, Des Alnnaz, Sadane, Sulaimani.*

Introduction

The grape (*Vitis vinifera* L.) is an important and an economic project for the farmers among the horticultural crops grown worldwide. It is one of the oldest plants known to man and grows virtually in every country of the world (4 and 7).

Viticulture in Kurdistan assumes an important position in horticultural crop according to its area, production, value addition and job creation in both rustic and urban areas, among all the horticultural crops, grapes have received a special importance in view of its value addition into raisins (4). Grapes in Kurdistan are used table grape, to produce syrup, raisins, vinegar, fresh grape juice, and alcoholic drinks (23).

There are more than 100 cultivars of grapes grown in Iraq including dessert grapes, varieties that are used as table grape or may be dried to give currants and raisin and varieties that can be used for the production of juice and wine. We have a suitable land for these grapes yet regrettably we are heavily depending on the neighboring countries for grapes and their products, as a result of the Insert of new varieties by the agricultural circles and by some growers, the number of cultivars has increased to more than 100 cultivars (2, 4 and 8).

There are significant differences in the rate of rainfall in the province of Kurdistan and record average between 328 mm in Khanaqin, more than 702 mm in Zakho, 969 in Rawanduz, 1008 in Akra and 1263 in the Penguin. There are also

many springs and water canals that can be used for establishment of irrigated vineyards (24).

Different varieties belonging to the genus *Vitis vinifera*, known as the European grape or the grape of the old world, are the most widely grown grape fruit in Iraq. Since the vine is a perennial plant, it exists under a set of varying conditions and, in a vineyard setting, the plants experience variation through both space and passage of time.

Growth and development of the vine (and thus composition of the fruit) is modified by environment (3 and 12).

The main aim of this study was to evaluate some grapevine cultivars in Sulaimani governorate then to determine the best cultivar for location.

Materials and Methods

Seven cultivars of grapevine were chosen in one location from governmental vineyard Kanipanka research station: Des Alnnaz, Bedank, Bol-mazw, Mirane, Reshe Baba and Sadane, during growing season 2018 to investigate the differences of vegetative growth and berries quality.

The vineyard was locate in Kanipanka research station, 35 km east of Sulaimani governorate, Kurdistan region-Iraq, between the latitude 35°22'25'' N latitude and 45°43'25''E and on elevation 582 m above sea level (12) and according to the Agro- meteorological station, Directorate of Agricultural Research in Sulaimaniyah Governorate.



The chosen vines were 15 years old, grown in a silty-clay soil, spaced at 2 x 3 meters apart, and irrigated by the drip irrigation system; the vines were trained by bilateral horizontal cordon on T-Trellis system. The experimental vines were chosen to be uniform as possible in vigor (measurement of trunk diameter at 30 cm above the ground) and similar in size. Therefore, the experiment consisted of seven treatments with three replications; one individual vine for each experimental unit and applied as simple experiment by using (R.C.B.D) design, so the numbers of vines used were 21 vines (5). Data were analyzed by using SAS program (21).

All vines under taken in this study received the same horticultural practices that usually carried out in the vineyard. Five clusters from each cultivar were harvested and immediately transported to the laboratory, the berries quality in term of weight and size of 100 berries, then kept in -2°C until chemical analysis. Date of fruit harvesting place when the berries attain full color stage and the TSS reached 14-16%. The chemical and vegetative characteristics tests for all samples were taking place in in laboratory of Horticulture- College of Agricultural Sciences.

Parameters measurements

Vegetative Growth Measurements:

1. Single leaf Area (cm^2): Leaf Area was estimated Leaf area meter (AM300 2003. Bio scientific ltd. SG129TA.UK).
2. Leaf chlorophyll concentration: It was determined by using a chlorophyll measurement device (Chlorophyll meter, SPAD- 502, Konica Minolta).
3. Leaf fresh weight and Leaf dry weight (g. Leaf^{-1}): Leaf fresh weight and Leaf dry weight were determined according to the method described by Al-Sahaf (6) and Gobara(13).
4. Petiole length (cm): by using metric tapeline line.
5. Internodes length (cm): by using metric tapeline.
6. Shoot length (cm): by using metric tape.

Yield and Components:

1. Cluster weight (g).
2. Cluster wide (diameter) and length (cm).
3. Number of berries per cluster.
4. Number of seed per berry.

Physical characteristics of berries:

1. Size of 100 berries (cm^3): By using a graduated cylinder contained water to determine the berries volume.

2. Weight of 100 berries (g): By using an electronic balance.

3. Length and Diameter of berry (mm): It was determined by electronic vernier.

4. Weight of 100 seeds.

5. Juice Density (D): According to Otopeanu, *et. al.* (20).

6. Juice (%): According to Branas (9).

Chemical Characteristics of the Berries:

1. Total acidity (%): The same method mentioned for TSS was also used for determining TA% according to A. O. A. C (1).

2. Total sugar (%): Total sugars were estimated by Lane and Eynon method as described in Joslyn (16).

3. Total Soluble Solids (TSS %): TSS was determined by hand refract meter as described in A. O. A. C(1).

Results

Data presented in table (1) shows that grapevine cultivars grown in Kanipanka location recorded the highest values of leaf area (178.470 cm²), total chlorophyll (41.753), leaf fresh and dry weight (3.686 and 1.513 g.Leaf⁻¹), petiole length (11.757 cm), internodes length (13.411 cm) and shoot length (157.223 cm) in Bedank variety. Mirane gave the highest petiole length and shoot length (11.567 and 150.777 cm).

Table 1: Comparison the vegetative growth characteristics of some local grapevine varieties in Kanipanka.

Cultivars	Parameters						
	Leaf area (cm ²)	Total chlorophyll (SPAD)	Leaf fresh weight (g.Leaf ⁻¹)	Leaf dry weight (g.Leaf ⁻¹)	Petiole length (cm)	Inter nod length (cm)	Shoot length (cm)
Des Alnnaz	105.998 c	36.740 ab	1.613 d	0.644 bc	7.987 b	8.611 bc	88.777 b
Rumaibiaz	109.488 c	37.627 ab	3.017 a-c	0.921 b	6.653 b	6.322 cd	63.890 bc
Bedank	178.470 a	41.753 a	3.686 a	1.513 a	11.757 a	13.411 a	157.223 a
Bol-mazw	133.962 bc	31.160 b	2.593 b-d	0.646 bc	8.000 b	5.944 d	64.000 bc
Mirane	160.063 ab	36.880 ab	3.353 ab	0.757 bc	11.567 a	9.422 b	150.777 a
Reshe Baba	104.005 c	30.833 b	1.905 d	0.456 c	6.277 b	4.133 d	53.557 c
Sadane	100.837 c	32.133 b	2.119 cd	0.527 bc	5.310 b	4.056 d	40.777 c

Means within a column followed with the same letters are not significantly different from each other according to Duncan multiple ranges test 5% level.

Data in table (2) clearly indicates that grapevine cultivars grown in Kanipanka have the highest cluster wide and cluster length (14.250 cm and 24.083 cm) in Des Alnnaz and (13.667 cm and 22.333 cm)

Sadane. Bedank gave the highest cluster weight and number of berry/cluster (258.395 g and 94.500). Number of seed/ berry was highest in Mirane cultivars which was (3.667).

Table 2: Comparison the yield characteristics of some local grape varieties in Kanipanka.

Cultivars	Parameters				
	Cluster weight (g)	Cluster wide (diameter) (cm)	Cluster length (cm)	Number of Berry/ Cluster	Number of seed/ berry
Des Alnnaz	182.493 b	14.250 a	24.083 a	63.000 a-c	2.300 b-d
Rumai abiaz	227.250ab	10.000 cd	22.783 a	82.000 ab	2.700 bc
Bedank	258.395 a	13.333 ab	20.417 ab	94.500 a	2.533 b-d
Bol-mazw	183.835 b	8.000 e	16.667 b	74.000 a-c	2.167 cd
Mirane	175.662 b	9.667 de	17.000 b	44.667 c	3.667 a
Reshe Baba	165.653 b	11.667 bc	20.833 ab	51.400 bc	3.200 ab
Sadane	99.749 c	13.667 a	22.333 a	43.333 c	1.633 d

Means within a column followed with the same letters are not significantly different from each other according to Duncan multiple ranges test 5% level.

Table (3) shows that Mirane cultivar superior other cultivars in term of size of 100 berries, weight of 100 berries, berry diameter and weight of 100 seeds (366.67 cm³, 390.280 g, 17.58 mm and 34.000 g).

Des Alnnaz gave the highest berry length (22.933 mm).

Concerning the comparison of chemical characteristics between some local grape varieties in Kanipanka,

Table 3 : Comparison the physical characteristics of berries of some local grape varieties in Kanipanka.

Cultivars	Parameters				
	Size of 100 berries cm ³	Weight of 100 berries (g)	Berry Length (mm)	Berry diameter (mm.)	Weight of 100 Seed (g)
Des Alnnaz	297.33 bc	294.107 bc	22.933 a	15.46 b	13.667 bc
Rumaiabiaz	241.33 cd	276.813 b-d	18.100 c	15.7ab	29.100 ab
Bedank	266.67 cd	279.573 b-d	19.967 bc	16.25ab	5.367 c
Bol-mazw	264.00 cd	250.040 cd	17.733 c	16.57ab	31.467 ab
Mirane	366.67 a	390.280 a	21.100 ab	17.58 a	34.000 a
Reshe Baba	336.00 ab	323.040 b	21.700 ab	16.76ab	37.067 a
Sadane	226.67 d	230.200 d	17.933 c	16.01ab	25.400 ab

Means within a column followed with the same letters are not significantly different from each other according to Duncan multiple ranges test 5% level.

Data in table (4) illustrate that Total sugar percent was the highest at Rumi abiaz (16.328 %) and the lowest total acidity

(0.436 %). Mirane gave the highest total sugar percentage, TSS and juice density (16.083 %, 23.313 %, 1.205). The highest

juice percentage recorded from Bedank (67.126 %). Reshe Baba recorded the

highest total acidity (1.816 %).

Table 4: Comparison the chemical characteristics of some local grape varieties in Kanipanka.

Cultivars	Parameters				
	Total acidity (%)	Total sugar percent %	Total Soluble Solids %	Juice density (D)	Juice percentage(%)
Des Alnnaz	1.053 ab	12.189 b	13.650 d	1.100 b	69.466 cd
Rumai abiaz	0.436 b	16.328 a	20.930 b	1.117 b	67.126 d
Bedank	0.763 b	13.414 ab	21.103 b	1.104 b	80.326 a
Bol-mazw	0.581 b	13.606 ab	17.550 c	1.087 b	78.291 ab
Mirane	1.744 a	16.083 a	23.313 a	1.205 a	72.300 b-d
Reshe Baba	1.816 a	15.033 ab	19.457 b	1.175 a	74.694 a-c
Sadane	0.944 ab	13.738 ab	17.290 c	1.028 c	76.518 ab

Means within a column followed with the same letters are not significantly different from each other according to Duncan multiple ranges test 5% level.

Discussion

It's clear from table 1- 4 that Bedank cultivar was overtopped the other Cultivars regarding all vegetative growth characteristics, cluster's weight, number of berries per cluster and juice percentage, followed by Mirane cultivar which outperformed in the traits of shoot length, number of seed/ berry, size and weight of 100 berries, berry diameter, weight of 100 Seed, total acidity (%) total Soluble Solids % and Juice density, Des Alnnaz, superiority in traits of cluster wide, cluster length and berry Length. The differences among the cultivars in vegetation growth and physical and chemical of grape characteristics may be ascribed to the differences in genotype characteristics for root growth, nutrient absorption efficiency and photosynthesis process(10). In addition, the genetic integrity of the plant species might influence particular nutrient uptake efficiency(18). Then these differences in nutrient uptake efficiency between cultivars may cause differences in vegetation growth characteristics.

Also, the differences in growth vigor between the cultivars may be attributed to the response of different cultivars to the local environmental condition according to the genetic variation between the cultivars (11, 14 and 19).

Conclusions

The data in table 1-4 indicated that obtained physical and chemical characteristics were clear measurement of fruit quality of Bedamk, Mirane, Des Alnnaz, Reshe Baba, Rumaiaabiaz, Sadane and Rumaiaabiaz grape varieties respectively. Therefore, it can be recommended to be used as potential bench marks for fruit quality of local grapes in Sulaimani governorate and specifically in Kanipanka area. Furthermore, according to the measured parameters, different cultivars showed different response to berries quality and chemical composition in these locations. Therefore, it can be concluded that Bedamk, Mirane varieties are better candidate for table grapes than other varieties. These examinations of grape

parameters remain the most important and easiest means for the identification of grape quality (22).

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