



Study on Vegetative Growth and Yield of some Coloured Grapes (*Vitis vinifera* L.) Kurdistan region, Iraq

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Abstract: Seven cultivars of grapevine were chosen in one location from governmental vineyard Kanipanka research station, Sulaimani, Iraq included Khoshnaw, Soorssinaee, Sursnay Jafaran, Hautbar, Ashqarbasha, Shekh-Nuradeen and Black-Sadany, during growing season of 2018 to investigate the differences of vegetative growth and berries quality. 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. Results showed that grapevine cultivars grown in Kanipanka recorded the highest values of leaf area, petiole length and internod length in Hautbar cultivar (129.228 cm², 9.611 cm and 8.444 cm) respectively, Khoshnaw gave the highest Leaf chlorophyll concentration (38.713 SPAD), the highest leaf dry weight and leaf fresh weight was recorded from Ashqar basha cultivar (1.283 g.Leaf-1 and 2.933 g.Leaf-1, Black -Sadany gave the highest shoot length which was 137.667 cm. Comparison the yield characteristics of some grape varieties the highest cluster weight, cluster diameter, cluster length and number of berry/cluster (219.778 g, 15.667 cm, 27.167 cm and 109.667) respectively was obtained in Sursnay Jafaran. While, all the cultivars have no significant difference in terms of number of seed per berry and cluster weight. For the physical characteristics of berries; results showed that Hautbar cultivar superior other cultivars in term of size of 100 berries, weight of 100 berries, berry length, berry diameter and weight of 100 seeds, (411.3 cm³, 434.36 g, 19.953 mm, 17.133 mm, 40.23g) respectively. Soorssinaee and Sursnay Jafaran gave the highest berry diameter too (21.439 and 19.542 mm). Concerning the comparison of chemical characteristics between some local grape varieties in Kanipanka, results illustrate that total acidity was the highest at Black -Sadany which was (1.47 %). Soorssinaee and Hautbar gave the highest total sugar (72.18 and 73.20 %) respectively. The highest TSS recorded from Shekh Nuradeen (18 %), whereas, there is no significant difference between cultivars in terms of juice% and Anthocyanin.

Keywords: Table fruit, Vitaceae, Grapevine, Varieties, Colour, Iraq.

Introduction

Grape (*Vitis vinifera* L.) referred to Vitaceae family. It is distributed between 20-50° and 20-40° North and South latitude respectively .

The fruit has a great nutritional value, as it contains 70-88% water, 15-30% total soluble sugars, 0.5-1.4% organic acid, 0.7- 0.8%

proteins, 0.3-1.0% pectins, 0.3-0.5% minerals, vitamins. C and A in ratios 4-20% and 0.02 - 0.12% respectively, in addition to several micronutrients (Al-Saidi, 2000). The grape has an important influence on the human health due to its high contents of phytonutrients which are active biologically and responsible for berry colors and flavors, in addition to the high content of phenol substances such as resveratol, catechins and anthocyanins (F.D.A, 2006). Grapes are consumed freshly as well as juice, wine, canning, salad and raisin (Hulme, 1971).

It is an important worldwide-grown perennial fruit crop. The species is historically distribution in dry and warm Mediterranean climates but both wine and table grape productions are now extend around the globe (Camargo *et al*, 2012 and Seccia *et al*, 2015).

Growth and development of the vine is modified by environmental condition (Glen and Creasy, 2009). The area occupied by the grape in the world is about (7.586.600) hectares and the total yield annually (68,311,466) tons (F.A.O, 2010), whereas in Iraq the total area is 48000 hectares with the yield 184000 tons (F.A.O, 2008). It is one of the most important fruits in the world and the yield ranked the second after citrus. The number of the cultivated varieties in Iraq mostly in Kurdistan Region is estimated by 70 among 100 varieties widespread in Iraq (Abdul-Qader, 2006). There are more than 700 species and 14000 cultivated varieties in the world (Alleweldt *et al.*, 1990). As well as in Iraq and Kurdistan region exist a numerous grape cultivars and clones in this country (Al-Saidi, 2013), including dessert grapes, varieties that are dried to give currants and sultanas and varieties that can be used for the production of juice and wine (Al-Atrushy, 2009; F.A.O, 2012).

The introduced cultivars should be evaluated and compared by estimating their fertility and fruit quality in order to help the farmers to select which variety will be planted firstly and secondly policy makers to promote the adequate cultivars in terms of adaptability and productivity.

Consequently, this experiment was carried out to compare among some Cultivars of grapevine to determine the best of them for cultivating and using its yield.

Materials & Methods

Seven cultivars of grapevine were chosen in one location from governmental vineyard Kanipanka research station: Khoshnaw, Soorssinaee, SursnayJafaran, Hautbar, Ashqarbasha, Shekh-Nuradeen and Black Sadany, 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 35°22'25'' N and 45°43'25''E and on elevation 582 m above sea level, (Guest, 1966; Agro- meteorological station).

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.

Winter pruning were proceeded in the middle of Februray by leaving 80 eyes /vine on 6 canes having 10 eyes each and 4 fruit spurs having 5 eyes each .This experiment was designed according to Randomized Complete Block Design (Al-Rawi, & Khalafalla, 2000). Data were analyzed by using the experiment consisted of seven

treatments with three replications; one individual vine for each experimental unit, so the numbers of vines used were 21 vines. Data were analyzed by using SAS program (SAS program, 2003).

All vines under taken in this study received the same horticultural practices that usually carried out in the vineyard. Date of fruit harvesting take place when the berries attain full color stage and the TSS reached 16-17%. The chemical and vegetative characteristics tests for all samples were taking place in laboratory of Horticulture-College of Agricultural Sciences. 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.

Parameters measurements

Vegetative growth measurements:

1. Single leaf Area (cm^2):

Leaf Area was estimated by Leaf area meter (AM300 2003. Bio scientific ltd. 129TA.U.K).

2. Leaf fresh weight and Leaf dry weight ($\text{g}\cdot\text{Leaf}^{-1}$):

Leaf fresh weight and Leaf dry weight were determined according to the method described by Al-Sahaf (1989) and Gobara (1998).

3. Shoot length (cm): By using metric tape line.

4. Leaf total chlorophyll (SPAD): It was determined by using a chlorophyll measurement device (Chlorophyll meter, SPAD- 502, Konica Minolta).

5. Internodes length (cm): By using metric tapeline.

6. Petiole length (cm): By using metric tapeline.

Yield and components:

1. Cluster weight (g).

2. Cluster length and diameter (cm).

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

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

5. Number of berries per cluster.

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

7. Number of seed per berry.

8. Weight of 100 seeds.

Chemical characteristics of the Berries:

1. Total Soluble Solids (TSS %): TSS was determined by hand refractometer as described in A.O.A.C. (2004).

2. Total sugar (%): Total sugars were estimated by Lane and Eynon method as described in Joslyn (1970).

3. Total acidity (%): The same method mentioned for TSS was also used for determining TA% (A.O.A.C, 2004).

4. Juice (%): According to Martin *et al.* (1968) and Branas (1974).

5. Anthocyanins ($\text{mg}\cdot 100\text{g}^{-1}$ fresh weight): According to Spayed & Morris (1978).

Results & Discussion:

Data presented in table (1) showed that the highest values of leaf area, petiole length and inter nod length obtained in Hautbar cultivar (129.228 cm^2 , 9.611cm and 8.444 cm respectively, Khoshnaw gave the highest leaf total chlorophyll (38.713 SPAD), the highest leaf dry weight and leaf fresh weight was recorded from Ashqar basha cultivar ($1.283\text{ g}\cdot\text{Leaf}^{-1}$ and $2.933\text{ g}\cdot\text{Leaf}^{-1}$, Black-Sadany gave the highest shoot length which was 137.667 cm .

Data in table (2) clearly indicated that the highest cluster weight, cluster diameter,

cluster length and number of berry/cluster (219.778 g, 15.667 cm, 27.167 cm and 109.667) respectively was obtained in

Sursnay Jafaran cultivars, While, all the cultivars have no significant differences in terms of number of seed/ berry.

Table (1): Comparison the vegetative growth characteristics of some local grapevine varieties (*Vitis vinifera* L.) in Kanipanka.

Cultivars	Leaf area (cm ²)	Total chlorophyll 1 (SPAD)	Leaf dry weight (g.Leaf ⁻¹)	Leaf fresh weight (g.Leaf ⁻¹)	Petiole length (cm)	Inter nod length (cm)	Shoot length (cm)
Khoshnaw	110.437 bc	38.713 a	0.701 cd	2.280 b	4.811 e	3.956 c	64.111 b
Soorssinaee	90.340 d	30.153 c	0.966 a-c	2.197 bc	6.378 d	6.500 b	83.111 b
Sursnay Jafaran	104.302 c	37.333 a	0.768 b-d	2.560 ab	8.744 ab	8.333 a	105.222 ab
Hautbar	129.228 a	35.233 ab	1.052 ab	2.129 bc	9.611 a	8.444 a	104.667 ab
Ashqar basha	120.773 ab	35.507 ab	1.283 a	2.933 a	7.811 bc	6.333 b	64.111 b
Shekh Nuradeen	106.262 c	32.387 bc	0.245 e	1.755 c	5.378 de	4.133 c	57.000 b
Black Sadany	114.753 bc	32.133 bc	0.463 de	2.187 bc	6.644 cd	6.167 b	137.667 a

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 (2): Comparison the yield characteristics of some local grape varieties (*Vitis vinifera* L.) in Kanipanka.

Cultivars	Cluster weight (g)	Cluster diameter (cm)	Cluster length (cm)	Number of berry/ cluster	Number of seed/ berry
Khoshnaw	148.927 ab	8.417 b	16.667 b	71.667 a-c	2.167 a
Soorssinaee	156.433 ab	7.667 b	17.750 b	50.500 c	1.967 a
Sursnay Jafaran	219.778 a	15.667 a	27.167 a	109.667 a	2.600 a
Hautbar	172.547 ab	8.917 b	17.833 b	62.500 bc	2.800 a
Ashqar basha	138.790 b	9.750 b	16.500 b	103.667 ab	2.600 a
Shekh Nuradeen	101.227 b	7.000 b	13.867 b	61.167 bc	2.000 a
Black Sadany	128.588 b	7.917 b	14.417 b	69.667 a-c	3.067 a

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): Comparison the physical characteristics of berries of some local grape varieties (*Vitis vinifera* L.) in Kanipanka.

Cultivars	Size of 100 berries (cm ³)	Weight of 100 berries (g)	Berry Length (mm.)	Berry diameter (mm.)	Weight of 100 Seed (g)
Khoshnaw	233.3 cd	252.16 cd	16.981 b	15.180 b	10.83 bc
Soorssinaee	340.0 ab	368.95 ab	21.439 a	16.423 ab	12.30 bc
Sursnay Jafaran	270.0 bc	294.95 bc	19.542 a	15.234 b	23.07 a-c
Hautbar	411.3 a	434.36 a	19.953 a	17.133 a	40.23 a
Ashqar basha	173.3 d	188.73 d	13.496 c	12.996 c	5.47 c
Shekh Nuradeen	184.0 d	184.20 d	16.949 b	15.416 ab	19.67 bc
Mafane	177.3 d	201.07 d	16.069 b	15.703 ab	26.50 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.

Table (3) showed that Hautbar cultivar superior other cultivars in term of size of 100 berries, weight of 100 berries, berry length, berry diameter and weight of 100 seeds (411.3 cm³, 434.36 g, 19.953 mm, 17.133 mm, 40.23 g) respectively.

Concerning the comparison of chemical characteristics between some local grape varieties in Kanipanka, data in table (4) illustrate that total acidity was the highest in Black Sadany which was (1.47%).

Table (4): Comparison the chemical characteristics of some local grape varieties (*Vitis vinifera* L.) in Kanipanka.

cultivars	Total acidity (%)	Juice (%)	Total sugar (%)	T.S.S (%)	Anthocyanin (g Kg ⁻¹ F.Wt.)
khoshnaw	0.46 d	66.18 bc	16.767 ab	18.728 a	0.834 a
Soorssinaee	1.32 ab	72.18 a	14.000 b	17.860 a	0.778 a
Sursnay Jafaran	0.75 cd	71.39 ab	14.367 ab	16.792 a	0.766 a
Hautbar	1.17 a-c	73.20 a	14.700 ab	18.027 a	0.684 a
Ashqar basha	0.63 cd	71.17 ab	17.533 ab	17.393 a	0.730 a
Shekh Nuradeen	0.91 b-d	65.27 c	18.000 a	19.196 a	0.878 a
Black Sadany	1.47 a	69.70 a-c	17.533 ab	17.426 a	0.940 a

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

Shekh Nuradeen gave the highest total sugar percentage (18.00%). The highest TSS recorded from Shekh Nuradeen (19.196%), but, there is no significant difference between cultivars in terms of juice percentage and Anthocyanin.

It's clear from table (4) that the cultivars under taken in this study were differed from each other in nearly most of parameters investigated, since the Hautbar cultivar superior in most parameters included Leaf area, Size and weight of 100 berries, Berry Length and diameter, Weight of 100 Seed and Total sugar percent, followed by Sursnay Jafaran cultivar superior in cluster weight, Cluster wide and length, Number of berries per cluster Hautbar, followed by Ashqar basha, Black Sadany, Soorssinaee then khoshnaw and Shekh Nuradeen respectively.

The differences among the cultivars in vegetative growth and physical and chemical characteristics may be described to the differences in genotype characteristics for root growth, nutrient absorption efficiency and photosynthesis process (Eryüce & Püskülcü, 1995; Al-Tuhafi, 2004; Al-Atrushy & Zibari, 2012). In addition, the genetic integrity of the plant species might influence particular nutrient uptake efficiency (Plaster, 1997). 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 (Nielsen & Lovell, 2000; Alimam & Al-Saidi, 2003; Khalifa, 2007).

Conclusion

We concluded from this study that the cultivar Hautbar gave the highest values for the vegetative growth and quality characteristics under study while Sursnay Jafaran gave the highest values in the physical characteristics of the cluster. We recommend to study the propagation and cultivation of these varieties in all Iraqi regions. As well as We recommend to study the percentage of fruit shoots, fruiting parameters and the location of the fruit buds on the cane, the type of flowers and fertility of these varieties.

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