

**Evaluation of some seeded cultivars of grape in different location  
of Kurdistan region, Iraq**

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**Abstract**

This study was carried out during the growing season of 2014 to evaluate four local grape cultivars (Sadani, Rashmiree, Khoshnaw and Doshawi) which were chosen from four different locations (Dukan, Qaradagh, Sharbazhar and Penjwin) in Sulaimani governorate. The aim of this study was to determine the influence of location on quantitative and qualitative characteristics of grape berries. Results indicated that there were differences among locations and cultivars regarding the parameters under taken in this study, Qaradagh location superior in term of weight and size of 100 berries and firmness followed by Dukan which was recorded the highest value for total soluble solids and total acidity percentage but less value was recorded in Sharbazhar and Penjwin respectively. The highest value of berries juice percentage were in Qaradagh but less value was in Sharbazhar.

Rashmiree cultivar was superior over other cultivars in term of weight and size of 100 berries followed by Sadani then followed by Doshawi and khoshnaw cultivar respectively. Khoshnaw cultivar had the highest TSS and was significantly overtopped Rashmiree and Doshawi cultivars respectively, Doshawi cultivar was significantly superior over other cultivars regarding juice percentage and has the maximum value followed by Sadani, the minimum total acidity percentage was recorded with Sadani grape cultivar which was significantly superior only

Doshawi cultivar where registered the highest total acidity percentage. The combination between location and cultivars was significantly affected the parameters undertaken in this study. The combination of Qaradagh + Rashmiree gave the maximum values for nearly all the measured parameters.

Keyword: grape, location, cultivars, Sulaimani.

## **Introduction**

Grape is one of the most important horticultural crops in the world as well as in Iraq and Kurdistan region. There are numerous grape cultivars and clones in the country (3).

According to the latest statistics provided by the Food and Agriculture Organization (5), there are more than 46 varieties of grapes grown in Kurdistan including dessert grapes, varieties that are dried to give currants, Thompson seedless and sultanas and varieties that can be used for the production of juice and wine (6). Kurdistan has the land suitable for these grapes but unfortunately we are heavily dependent on neighboring countries for grapes and their products. The commercial grape cultivars in Kurdistan region are used for fresh consumption as well as processing into such products such as raisins (2,3). Different varieties belonging to the genus *Vitis vinifera*, known as the European grape (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 (6).

Climate has been split into three levels: macroclimate, mesoclimate and microclimate (11), starting with the largest scale, macroclimate (also called regional climate) which is defined as the general climate pattern as may be determined from a central recording station, a scale that could be associated with its tens to hundreds of kilometers (11). Al-Yami (4) Surveyed, evaluated and described grape varieties in Taif region. Their results could be summarized as: Al-Bayadi variety is considered as the main white variety and makes up 90 % of the total area of grapes in Taif, it shows best fruit characteristics. Al-Razqui and Al-Nakheeli grapes are considered secondary varieties. Abdelmegid(1) Evaluated physical grapes characteristics; cluster, berry and sensory characteristics of ten seeded samples of grape which were collected to represent five cultivars

namely; Italian, American, Lebanese, Syrian and Taify from different locations in Taif region namely; Abbasah, Bani Saad, A1-Qaim and A1-Hawiyyah. The result of cluster characters indicated that Italian cultivar clusters were well filled and compacted. As for berry characters, American cultivar had the highest values. Finally, for sensory characters, the American cultivar had the best sensory quality. However, for chemical characters; total soluble solids ( $^{\circ}$ Brix), acidity, titratable acidity,  $^{\circ}$ Brix/titratable acidity ratio and total anthocyanins content were measured. The obtained results indicated that, Taify clones had the highest records for these measurements. Shanmuganathan *et.al.*(14) Investigated the influences of climate and soil components on the production of this vineyard using data gathered from 2011 to 2013. Field monitoring conducted for the years 2011 and 2013 included soil sampling at strategic locations, grape bunch and berry sampling for measuring bunch count, total weight and Brix (sugar) content in berry samples from the same specific sites

for the two grape varieties (*Chardonnay* and *Pinot Noir*) Preliminary results shows a substantial difference between the crops harvested for the studied years, which was an indication of the damage caused by the abnormally severe frost experienced in the region in the beginning of the growing season. It warrants further investigation to understand the influences of topographic features which are either protective or damaging to the vine, especially the young buds.

Therefore; the main objectives of this study was to evaluate, for the first time, in Kurdistan some seeded grape cultivars in different location of Sulaimani governorate and the combination between cultivars and location and to determine the best cultivar for each location.

### **Materials and Methods**

Four seeded cultivars of grapevine were chosen: Sadani, Rashmiree, Khoshnaw and Doshawi table grape cultivars were selected from four different locations in Sulaimani governorate: Dukan,

Qaradagh, Sharbazhar and Penjwin to determine the influence of cultivars and location on quality of berries. The study was carried out in growing season of 2014. Four rain-fed vineyards were chosen from each location to represent the cultivar with three uniform grapevines for each cultivar. The vines were chosen as soon as identical in age (between 12 -14 years) because it's taken from different locations and different vineyards so its difficult to choice vines in same age. All vineyards soil texture were clay loam. The data of temperature and humidity of all location during study period are shown in table (1). The chosen vineyard were experience the same agricultural practice which followed by the farmers of the region. Three replicates for each cultivar were taken. Five clusters from each cultivar were harvested when it reached the maturity stage according to the cultivars and immediately transported to the laboratory, the berries quality in term of weight and size of 100 berries and firmness

were determined, then kept in  $-2^{\circ}\text{C}$  until chemical analysis (TSS, juice percentage and Total acidity percentage), date of fruit harvesting takes place when the berries attain full color stage and the TSS reach 16-17% according to Tourky *et.al.*(13). Data were analyzed by using SAS program (9).

### **Result and Discussion**

Physical characteristics of berries:

Data presented in table (2) shows that grapevine grown in Qaradagh location overtopped other location regarding weight and size of 100 berries which were recorded the highest values (464.70 gm and  $455.40\text{ cm}^2$ ) respectively, followed by Dukan location then Penjwin and Sharbazhar. Concerning the firmness, Qaradagh and Sharbazhar location superior other location were recorded highest values (1.38 and  $1.27\text{ g.cm}^2$ ) respectively, followed by Penjwin then Dukan which had the lowest values (1.00 and  $0.91\text{ g.cm}^2$ ) respectively

**Table 1: Meteorological data of the locations during the study period.**

Location	Dukan		Qaradagh		Sharbazhar		Penjwin	
Month	Max Temp .	Humidity %	Max Temp .	Humidity %	Max Temp .	Humidity %	Max Temp .	Humidity %
January	16.7	65.45	15.9	57.9	13.9	67.9	10.9	67.9
February	19.8	68.75	18.9	60.3	15.9	60.3	11.9	60.3
March	25	58.85	24.2	58.9	18.2	58.9	14.2	58.9
April	31.4	58.3	25.3	53.1	23.3	53.1	25.3	53.1
May	37.4	56.65	30.8	47.2	30.8	47.2	30.8	47.2
June	40.5	38.5	37.2	25	37.2	32	37.2	32
July	46	33.55	45.4	29.3	38.4	29.3	34.4	29.3
August	46.6	28.6	44.0	30.9	40	30.9	38	30.9
Sep.	38.4	43.45	35.7	28	35.7	28	35.7	28
October	34	56.1	32.4	36.2	28.4	46.2	28.4	46.2
Nov.	20.5	62.15	20.23	53.2	20.23	63.2	20.23	63.2
December	21.3	55.55	22.46	41.8	13.4	71.8	13.4	71.8
Average	31.5	52.2	29.4	43.5	26.3	49.1	25.0	49.1
Altitude	800-900 m		700 - 800 m		750- 900 m		more than 1000 m	
Raining	650- 750 (mm/year)		500- 650 (mm/year)		650- 750 (mm/year)		750-1000 (mm/year)	

Rashmiree cultivar superior other cultivars in term of weight and size of 100 berries Where recorded the highest values (388.78 and 381.01) followed by Sadani where recorded

(329.68 and 323.09) then followed by Doshawi and khoshnaw cultivar which recorded the lowest values of weight and size of 100 berries (299.02, 277.33 and 293.05, 271.79)

respectively. For the firmness, the highest value (1.24) was obtained with Sadani cultivar which was significantly overtopped the Rashmiree what had the lowest firmness (1.03).

**Table 2: Effect of location and cultivar on physical characteristics of grape berries.**

Treatment		Weight of 100 berries (g)	Size of 100 berries (cm <sup>2</sup> )	Firmness (g.cm <sup>2</sup> )
Location	Dukan	322.29 b	315.84 b	0.91 b
	Qaradagh	464.70 a	455.40 a	1.38 a
	Sharbazhar	247.66 c	242.71 c	1.27 a
	Penjwin	260.19 c	254.98 c	1.00 b
Cultivars	Sadani	329.68 b	323.09 b	1.24 a
	Rashmiree	388.78 a	381.01 a	1.03 b
	Khoshnaw	277.33 c	271.79 c	1.16 ab
	Doshawi	299.02 c	293.05 c	1.13 ab
Dukan	Sadani	340.55 de	333.74 de	0.82 e
	Rashmiree	395.30 cd	387.40 cd	0.89 de
	Khoshnaw	234.66 fgh	229.97 fgh	0.96 de
	Doshawi	318.63 e	312.26 e	0.99 de
Qaradagh	Sadani	478.00 b	468.44 b	1.64 a
	Rashmiree	618.78 a	606.40 a	1.25 bcd
	Khoshnaw	426.68 bc	418.14 bc	1.53 ab
	Doshawi	335.33 de	328.62 de	1.09 cde
Sharbazhar	Sadani	275.92 e-h	270.40 e-h	1.38 abc

	Rashmiree	248.60 fgh	243.62 fgh	1.01 cde
	Khoshnaw	212.67 h	208.41 h	1.08 cde
	Doshawi	253.45 fgh	248.37 fgh	1.62 a
Penjwin	Sadani	224.27 gh	219.78 gh	1.13 abc
	Rashmiree	292.45 ef	286.60 ef	1.00 de
	Khoshnaw	235.33 fgh	230.62 fgh	1.06 cde
	Doshawi	288.70 efg	282.92 efg	0.81 e

Means with same letter for each factor and interaction are not significantly different at 5% level based on Duncan's Multiple Rang Test.

The combination between location and cultivars significantly affected on the traits undertaken in this study since the combination of Qaradagh + Rashmiree gave the maximum values (618.78 and 606.40) regarding weight and size of 100 berries compared to the minimum values (212.67 and 208.41) were with the combination of Sharbazhar + khoshnaw respectively. The combination of Qaradagh + Sadani registered the maximum value of firmness (1.64) compared to the minimum firmness (0.81) from the combination of Penjwin + Doshawi.

Chemical characteristics of berries:

Data in table (3) clearly indicates that grape which vine grown in

Dukan location superior other location regarding Total soluble solid percentage were recorded the highest value (17.43 Brix), followed by Penjwin location then Qaradagh and Sharbazhar, whereas Qaradagh location overtopped other location about the juice percentage which have the maximum value (66.37) followed by Penjwin, Dukan and Sharbazhar respectively. The lowest total acidity percentage (0.97) was with grape grown in Qaradagh location which was significantly superior only Dukan location where registered the highest total acidity percentage (1.12).

Concerning the differences among the cultivars, table (2) clearly materialize that the Khoshnaw



cultivar had the highest TSS (17.59) and significantly overtopped Rashmiree and Doshawi cultivars which had the lowest values (16.24 and 10.47) respectively. Doshawi cultivar significantly superior than

other cultivars regarding juice percentage and has the maximum value (80.23) followed by Sadani, Rashmiree and khoshnaw which recorded (64.03, 45.25 and 44.83) values respectively.

**Table 3: Effect of location and cultivars on chemical characteristics of grape berries.**

Treatment		TSS (%) or °Brix	Juice percentage (%)	Total acidity (%)
Location	Dukan	17.43 a	56.57 ab	1.12 a
	Qaradagh	14.70 bc	66.37 a	0.97 b
	Sharbazhar	13.70 c	53.17 b	1.03 ab
	Penjwin	15.46 b	58.24 ab	1.05 ab
Cultivars	Sadani	16.97 ab	64.03 b	0.97 b
	Rashmiree	16.24 b	45.25 c	1.07 ab
	khoshnaw	17.59 a	44.83 c	1.03 ab
	Doshawi	10.47 c	80.23 a	1.10 a
Dukan	Sadani	18.76 a	37.99 ef	1.03 ab
	Rashmiree	16.41 abc	74.71 abc	1.20 a
	khoshnaw	16.82 abc	38.59 ef	1.03 ab
	Doshawi	17.72 ab	75.00 abc	1.20 a
Qaradagh	Sadani	18.54 ab	88.33 a	0.87 b
	Rashmiree	14.70 cd	39.13 ef	0.95 ab
	khoshnaw	17.34 ab	49.50 c-f	0.97 ab

	Doshawi	8.19 e	88.53 a	1.09 ab
Sharbazhar	Sadani	13.81 d	68.87 a-d	0.89 a
	Rashmiree	15.99 bcd	28.29 f	1.07 ab
	khoshnaw	17.67 ab	42.83 def	1.05 ab
	Doshawi	7.33 e	72.69 abc	1.13 ab
Penjwin	Sadani	16.82 abc	60.95 b-e	1.10 ab
	Rashmiree	17.85 ab	38.89 ef	1.05 ab
	khoshnaw	18.51 ab	48.41 c-f	1.04 ab
	Doshawi	8.65 e	84.71 ab	0.99 ab

Means with same letter for each factor and interaction are not significantly different at 5% level based on Duncan's Multiple Rang Test.

The minimum total acidity percentage (0.97) was with Sadani grape cultivar which was significantly superior only Doshawi cultivar where registered the highest total acidity percentage (1.10).

Weight and size of 100 berries is indicator of weight of berries, firmness is indicator of thick of skin since berries with high firmness has thick skin which can help the berries to resistance the shipping and transportation for distance locus. TSS, juice percentage and total acidity are parameters of quality of cultivars.

Data in table (2 and 3) indicates that Qaradagh location superior in term weight and size of 100 berries and firmness followed by Dukan then other location, this result may be attributed to that Qaradagh location is characterize by dry weather, high temperature average, Altitude approximately: 700- 800 m above the sea level and rainfall around : 500- 650 mm/ year (table 1), these characteristics may the optimum conditions for growing grape , since Glen *et.al.*(6) state that grape do best under hot, dry long and rainless summer with adequate sunshine. Dukan location, It has higher

temperature and higher humidity than all other location in the summer under taken in this study, Altitude approximately: 800- 900 m above the sea level and rainfall around: 650- 750 mm/year (Agro\_ meteorological station, 2014), it is ordered second followed Qaradagh location in term weight and size of 100 berries, this may be due to the higher humidity percentage since it is near Dukan Dam which may cause to increase the relative humidity so it followed Qaradagh location, grape grown in Dukan has the less firmness because of high relative humidity.

Sharbazar and Penjwin location cultivars have the lowest weight and size of 100 berries, this may be attributed to the climatically condition of these location since Sharbazar is characterize by less temperature than Dukan and Qaradax but higher than Penjwin, high relative humidity than Qaradax only , Altitude approximately: 750- 900 m above the sea level and rainfall around : 650- 750 mm/ year, while Penjwin location is characterize by less temperature than all other locations, high relative humidity,

Altitude approximately: more than 1000 m above the sea level and rainfall around : 750- 1000 mm/ year, these conditions especially low temperature, high relative humidity and high altitudes may the cause of minimum values of weight and size of 100 berries of grape grown in these locations. The lowest firmness of grape may be due to the high relative humidity and high altitude.

Despite the importance of TA to the overall flavor, growers mainly use TSS (sweetness) as an indicator of ripeness and most of the commercial varieties are considered mature when TSS ranges from 15 to 18%. Chemical composition of grapes, similar to other species, is influenced by several factors such as maturity, genotype and growing conditions (8).

## **Conclusion**

This research indicated that obtained physical and chemical characteristics were clear measurement of fruit quality of Sadani, Rashmiree, Khoshnaw and Doshawi grape cultivars. Therefore, it can be recommended to be used as potential

bench marks for fruit quality of local grapes in Kurdistan region and specifically in Sulaimani governorate. 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 Rashmiree cultivars are better candidate for table grapes than other cultivars, whereas the best location for grape cultivation in Sulaimani governorate is Qaradagh followed by Dukan regarding to physical measurements and by analysis of chemical compounds. These examinations of grape parameters remain the most important and easiest means for the identification of grape quality (10).

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تقييم بعض أصناف العنب البذرية في مواقع مختلفة من إقليم كردستان (العراق)

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### المستخلص

اجريت هذه الدراسة خلال الموسم الزراعي 2014 لتقييم اربعة اصناف محلية من العنب (ساداني، رش ميري، خوشناوي ودوشاوي) اختيرت من اربعة مواقع مختلفة (دوكان، قرداغ، شاربازار وبنجوين) في محافظة السليمانية وتحديد تأثير الموقع على كمية ونوعية حبات العنب. اكدت النتائج بان هناك اختلافات بين المواقع والاصناف فيما يتعلق بالصفات المدروسة في هذه الدراسة، موقع قرداغ تفوق في صفات وزن وحجم مئة حبة والصلابة تلتها دوكان والتي سجلت اعلى القيم في النسبة المئوية للمواد الصلبة والنسبة المئوية للحموضة الكلية واقل القيم كانت في شاربازار وبنجوين على التوالي، بينما اعلى قيمة للنسبة المئوية للعصير وجدت في موقع قرداغ واقلها في شار بازار.

صنف رشميري تفوق معنويا على بقية الاصناف فيما يخص وزن وحجم مئة حبة تلتها ساداني ثم دوشاوي وخوشناو على التوالي ، صنف خوشناو سجل اعلى نسبة مئوية للمواد الصلبة الذاتية وتفوق معنويا على اصناف رشميري ودوشاوي على التوالي، صنف دوشاوي تفوق معنويا على بقية الاصناف فيما يخص نسبة العصير واعطت اعلى القيم تلاه صنف ساداني، اقل نسبة مئوية للحموضة الكلية كانت فب صنف ساداني والذي تفوق معنوبا على صنف دوشاوي فقط الذي سجل اعلى نسبة مئوية للحموضة الكلية. التداخل بين الموقع والصنف اثرت معنويا على الصفات المأخوذة في هذه الدراسة حيث ان التداخل بين قرداغ + رش ميري اعطت اعلى القيم تقريبا لجميع الصفات.

كلمات مفتاحيه: أعناب، موقع، أصناف، سليمان