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Comparison of Ampelographic Characteristics of Some Important Grape Varieties are Grown in The Aegean Region, Rootstock and Clones

[a]Yıldız DİLLİ*, [a]Akay ÜNAL, [a]Metin KESGİN, [a]M. Sacit İNAN, [b]Gökhan SÖYLEMEZOĞLU
[a]Viticulture Research Station, Manisa, Turkey
[b]Department of Horticulture, Faculty of Agriculture, University of Ankara, Ankara, Turkey
*Corresponding author: yildiz.dilli@gthb.gov.tr

Abstract

Viticulture is the oldest culture on earth as a branch of agriculture and conserves its importance and constitutes one of the most common culture areas in the northern and southern hemisphere. Determination of genetic resources or improved them or the definition and classification of new varieties in all of the grape growing countries different methods have been used by different researchers. In this study, importance grape varieties which are grown in Aegean Region and rootstocks and clones selected by Manisa Viticulture Research Station were morphologically characterized and ampelographic differences and similarities among them were investigated. A total of 14 grape cultivars (Çal Karası, Yuvarlak Çekirdeksiz), rootstocks (41 B, 420 A) and clones were morphologically characterized and investigated ampelographic differences and similarities among them. Çal Karası grape variety which was a standart raisin and wine grape variety of Aegean Region in Turkey and Yuvarlak Çekirdeksiz which was one of the most important raisin grape varieties of this region. Phenological development and characteristics in Minimal Descriptor List for Grapevine Varieties (TTSM) related to shoot, leaf, inflorescence, bunch, berry and seeds which are present in all kind and clone OIV, UPOV and IBPGR lists, were examined for a period of three years. It was found that there were differences among clones of Çal Karası and Yuvarlak Çekirdeksiz varieties dates of bud burst-veraison with leaf-cluster characteristics. Besides amphelographic differences between clones of 41 B and 420 A were determined.

Keywords: *Vitis* vinifera L., Çal Karası, Yuvarlak Çekirdeksiz, Amphelography, Clone

Introduction

Turkey has one of the most suitable climate conditions for growing grapes in the world. Viticulture has taken an important place in the nutrition of public and social life in our country and always has an important effect on national economy.

Turkey is ranked sixth and fifth in terms of grape production and growing area respectively. According to 2011 statistical data 4.296.351 tons grapes have been produced in 472.545 ha vineyard area in Turkey (FAO, 2012).

Turkey is very rich in grapevine gene sources because of its geographical closeness to areas where grapes were born and have developed.

The preservation of genetic diversity is important and necessary due to danger of extinction of genetic resources. Therefore, genetic characterization of such grapevine cultivars is important for developments in grape breeding.

The aim of this study was morphologically characterized and investigated ampelographic differences and similarities among importance grape varieties which are grown in Aegean Region and rootstocks and clones. This research was carried out during 2009-2011 vegetation period under Manisa conditions.

Materials and Methods

Plant Material

A total of 14 grape cultivars (*Vitis vinifera* L.), rootstocks and clones were morphologically characterized and investigated ampelographic differences and similarities among them. It was carried out with important grape varieties which are grown in Aegean Region; Çal Karası and Yuvarlak Çekirdeksiz grape varieties and 7 number clones selected by Manisa Viticulture Research Station. Widespread planting rootstock for lime soils; 41B and 420A American rootstocks and 4 number clones.

Ten vines per clones of cultivars were selected for study. The vines were 17 years old and

cultivated under the same growing conditions using rootstock 5 BB with the spaces 2.75 x 2.00 m.

Yuvarlak Çekirdeksiz Grape Variety

It is one of the most important raisin of Manisa and its surroundings. The clone selection of Yuvarlak Çekirdeksiz was carried out by Manisa Viticulture Research Station. It was founded that 5 and 8 numbered clones were best in terms of yield per vine.

It was determined that 8 numbered clone had an advantage about the large berry and cluster, the balanced growth, the number of berry at 100 g raisin than other clones (Yılmaz et al., 1997).

Çal Karası Grape Variety

It is a standard raisin and wine grape variety of Aegean Region, Denizli-Çal surroundings in Turkey.

The clone selection of Çal Karası was carried out by Manisa Viticulture Research Station. At the end of this study, according to the values of total point, five clones were selected, the best clones were 1 for wine and raisin, 12 for must, 18 and 29 for wine and 10 cluster and berry properties, stability (Kader et al., 2004).

41B and 420A Rootstocks

Different resistant rootstocks which adapted to the soil and climate conditions of Turkey and showed good affinity to native varieties are recommended for the plantings.

Clone selection studies were carried out on 41B and 420A as widespread planting rootstock for lime soils by Manisa Viticulture Research Station.

41B and 420A rootstocks's 13 numbered clone has shown the most cutting number and graftable cutting number(Kader et al., 1999).

Methods

Descriptors for Grapevine (*Vitis* spp.) (GENRES 081 1997) and the Office International de la Vigne et du Vin (OIV) Descriptor List for Grape Varieties and Vitis species (OIV, 2001) were used for ampelographic characterization of cultivars, rootstocks and clones. Descriptors used in this study and their OIV-IPGRI codes are presented in Table 1. All measurements were made at different times during the growth cycle.

Shoots were investigated when they were 10 - 30 cm long, the mature leaf descriptions were obtained berry set to veraison on leaves above the cluster within the medium third of shoot. Average of all bunches of 10 shoots were measured at maturity. The berry characteristics were observed in the medium scope of bunches and woody shoots were analyzed after fall of the leaves (Table 1).

Mean values of OIV characters were transformed to numerical scales according to international descriptors.

The resulting raw data were analysed in NTSYSpc 2.02k software (Rohlf, 2000) using a distance matrix.

The clustering dendrogram to diagnose discrimination between genotypes was drawn with Unweighted Pair Group of Arithmetic average (UPGMA) using SAHN module (Rohlf, 2000).

Results and Discussion

Amphelographic characters showed differences among the studied clones of varieties and rootstocks.

Hairs on leaves and tips shoot, discrimination of grape varieties is considered to be a very important characteristic (Dilli and Kader, 2005). Density of prostrate hairs on tips of young shoot (004) varied among the analyzed in clones of rootstocks. Prostrate hair was dense in 41B 8 young shoot tips, while the others had different types from medium to very dense hairs (Table 2).

41B clones also differed in terms of shoot attitude (006), varying horizontal to semi-drooping habit. Colours of the dorsal side of indernodes (007) among the 420A 13 were mostly red others were red striped (Table 3).

Colour on young leaves has been varied among Çal Karası clones.

Definitions relevant to mature leaves have been generally approved as powerful way of identifying grapevine genotypes (Ateş et al., 2011). Shape of teeth of mature leaf varied among the analyzed in clones of cultivars. They differed varying both sides straight -both sides convex -mixed shape. The leaves with five lobes is a major type among most of Turkish grapes. General shapes of petiole sinus (079) varied in cultivar and rootstocks of clones.

Bunch, berry and must characteristics have particular importance in quality assessment of table grapes.

Variability was determined among the studied of cultivars among clones relevant to measurements on bunches, berries, must and time of ripening.

8 numbered clone of Yuvarlak Çekirdeksiz was also suitable table grape with its larger bunches, berry and loose density. At the result; It which were suitable raisin and table grape were determined.

Table 1. Descriptor list in the study.

No	OIV Code	Vine Part	Descripton of Character
1	1	Young shoot	Form of tip
2	3	Young shoot	Anthocyanin colouration on prostrate of tip
3	4	Young shoot	Density of prostrate hairs on tip
4	5	Young shoot	Density of erect hairs on tip
5	6	Shoot	Attitude (habit)
6	7	Shoot	Color of dorsal side of internodes
7	8	Shoot	Color of ventral side of internodes
8	12	Shoot	Erect hairs on internodes
9	16	Shoot	Number of consecutive tendrils
10	17	Shoot	Length of tendrils
11	51	Young leaf	Colour of young leaf upper surface
12	53	Young leaf	Density of prostrate hairs between veins
13	56	Young leaf	Density of erect hairs on main veins
15	66	Mature leaf	Length of blade
16	67	Mature leaf	Shape of blade
17	68	Mature leaf	Number of lobes
18	068-1	Mature leaf	The depth of the upper lateral sinus
19	69	Mature leaf	Colour of mature leaf upper surface
20	70	Mature leaf	Anthocyanin colouration of main veins on upper side of blade
21	74	Mature leaf	Profile of blade in cross section
22	75	Mature leaf	Blistering of upper side of blade
23	76	Mature leaf	Shape of teeth
24	77	Mature leaf	Size of teeth in relation to blade size
25	78	Mature leaf	Ratio length/width of teeth
26	79	Mature leaf	Opening/overlapping of petiole sinus
27	80	Mature leaf	Shape of base of petiole sinus
28	081-2	Mature leaf	Tooth at petiole sinus
29	82	Mature leaf	Opening/ overlapping of upper lateral sinus
30	84	Mature leaf	Density of prostrate hairs between veins
31	86	Mature leaf	Density of prostrate hairs on veins
32	87	Mature leaf	Density of erect hairs between veins
33	90	Petiole	Density of prostrate hairs on petiole
34	91	Petiole	Density of erect hairs on petiole
35	92	Petiole	Length
36	93	Mature leaf	Length of petiole relative to main vein

Table 1. *(continued)*

No	OIV Code	Vine Part	Descripton of Character
37	151	Inflorescence	Sex of flower
38	202	Bunch	Size
39	204	Bunch	Density
40	206	Bunch	Length of peduncle
41	221	Berry	Size
42	223	Berry	Shape
43	225	Berry	Skin colour
44	228	Berry	Thickness of skin
45	231	Berry	Flesh colour
46	232	Berry	Juiciness of flesh
47	235	Berry	Firmness of flesh
48	236	Berry	Color of skin
49	240	Berry	Separation from pedicel
50	241	Berry	Formation of seed
51	301	-	Time of bud burst
52	303	-	Start of berry ripening (verasion)=
53	503	Berry	Single berry weight
54	505	Berry (Must)	Sugar content (%)
55	506	Berry (Must)	Total acid content
56	102	Woody shoot	Structure of surface
57	103	Woody shoot	Main colour

Table 2. Ampelographic characters of grapevine cultivars and clones

OIV Code	Çal K	Çal K 1	Çal K 10	Çal K 12	Çal K 18	Çal K 29	Yuvarlak Ç 5	Yuvarlak Ç 8
001	5	5	4	4	4	4	4	4
003	3	1	3	1	3	3	1	1
004	7	7	7	7	7	7	3	3
005	1	1	1	1	1	1	3	3
006	3	3	3	3	3	3	3	3
007	2	2	2	2	2	2	2	2
008	2	2	1	1	1	1	1	2

Table 2. *(continued)*

012	1	1	1	1	1	1	1	1
016	1	1	1	1	1	1	1	1
017	7	7	7	7	7	7	7	5
051	3	2	3	3	2	2	1	1
053	9	9	9	9	9	9	1	1
56	1	1	1	1	1	1	1	1
065	5	7	7	5	7	7	7	5
066	2	2	2	2	2	2	2	2
067	3	3	3	3	3	3	3	3
068	3	3	3	3	3	3	3	3
068-1	5	3	3	3	3	3	5	5
069	4	4	4	4	4	4	5	5
070	3	1	1	1	3	3	1	1
074	5	5	5	5	5	5	5	5
075	3	3	5	5	5	3	1	1
076	5	2	5	2	5	2	3	5
077	7	7	7	7	7	7	7	7
078	5	7	7	7	5	5	7	7
079	4	3	4	4	4	3	6	5
080	2	2	2	2	2	2	3	2
081-2	1	1	1	1	1	1	1	1
082	3	1	3	2	1	1	1	1
084	5	5	5	5	5	7	1	1
086	3	3	3	3	3	5	1	1
087	1	1	1	1	1	1	1	1
090	1	1	1	1	1	1	1	1
091	0	0	1	1	1	1	1	1
092	5	5	5	5	5	5	3	3
093	5	5	5	5	5	7	3	3
102	3	3	3	3	3	3	3	3
103	2	2	2	2	2	2	2	2
151	3	3	3	3	3	3	3	3
039	3	5	5	3	3	5	7	9
204	8	5	5	7	7	7	5	3
206	1	3	3	1	1	1	1	3
221	5	5	5	5	5	7	5	5
223	7	7	7	7	7	7	3	3
225	4	4	5	4	5	4	1	1
228	5	5	5	5	5	5	5	5
231	1	1	1	1	1	1	1	2
232	2	2	2	2	2	2	2	2
235	2	2	2	2	2	2	2	2
236	1	1	1	1	1	1	1	1
240	2	2	2	2	2	2	2	3
241	3	3	3	3	3	3	2	2
503	5	5	5	5	3	3	3	3
505	7	7	7	7	7	7	7	7
506	5	5	3	3	5	3	3	3

Table 3. Ampelographic characters of rootstocks and clones

OIV Code	41 B	41 B 8	41 B 13	420 A	420 A 13	420 A 19
001	4	4	4	3	3	3
003	1	1	1	5	5	5
004	9	7	9	5	5	5
005	9	7	9	5	5	5
006	5	7	5	7	7	7
007	2	2	2	2	3	2
008	2	2	2	1	1	1
009	2	2	2	3	3	3
010	3	3	3	3	3	3
012	1	1	1	1	1	1
016	1	1	1	1	1	1
017	1	5	1	5	5	5
051	2	2	2	2	2	2
053	5	7	7	1	1	5
56	1	1	1	5	5	5
065	3	1	3	5	3	3
066	2	2	2	2	2	2
067	1	1	1	1	1	1
068	2	2	2	3	2	2
068-1	5	5	5	5	5	5
069	4	4	4	4	4	4
070	0	0	0	0	0	0
074	5	5	5	2	2	2
075	1	1	1	5	5	1
076	3	3	3	3	3	3
077	5	5	5	5	5	5
078	5	5	5	5	5	5
079	2	3	2	2	2	2
080	2	2	2	2	2	2
081-2	1	1	1	1	1	1
082	1	1	1	1	1	1
084	3	3	3	1	1	1
086	5	5	5	3	3	3
087	3	5	3	3	3	3
090	5	3	5	1	1	1
091	1	1	1	3	3	3
092	3	3	3	3	1	1
093	1	3	3	3	3	3
102	3	3	3	3	3	3
103	3	3	3	3	3	3
151	4	4	4	1	1	1

Cluster analysis of the cultivar, rootstock and clones

Two main groups appeared in the dendrogram. Many sub-groups were observed in Group A that includes grape varieties and clones of them. On the other hand, clones 8 and 13 of 41 B, and clones 13 and 19 of 420 A, one of the rootstocks, appeared in Group B. The first group (A) is composed of clones of Çal Karası. Clone 29 of Çal Karası diverged with a private branch at around 0.85 similarity level.

Clones of Yuvarlak Çekirdeksiz grouped together in an associate sub cluster (A2). With respect to the ampelographic characters, especially more differences were observed among the clones of rootstocks. Genetic differences were determined between 41 B and 420 A at 0.39 similarity level. It also proves the discriminative potentials of the descriptor parameters employed in this study.

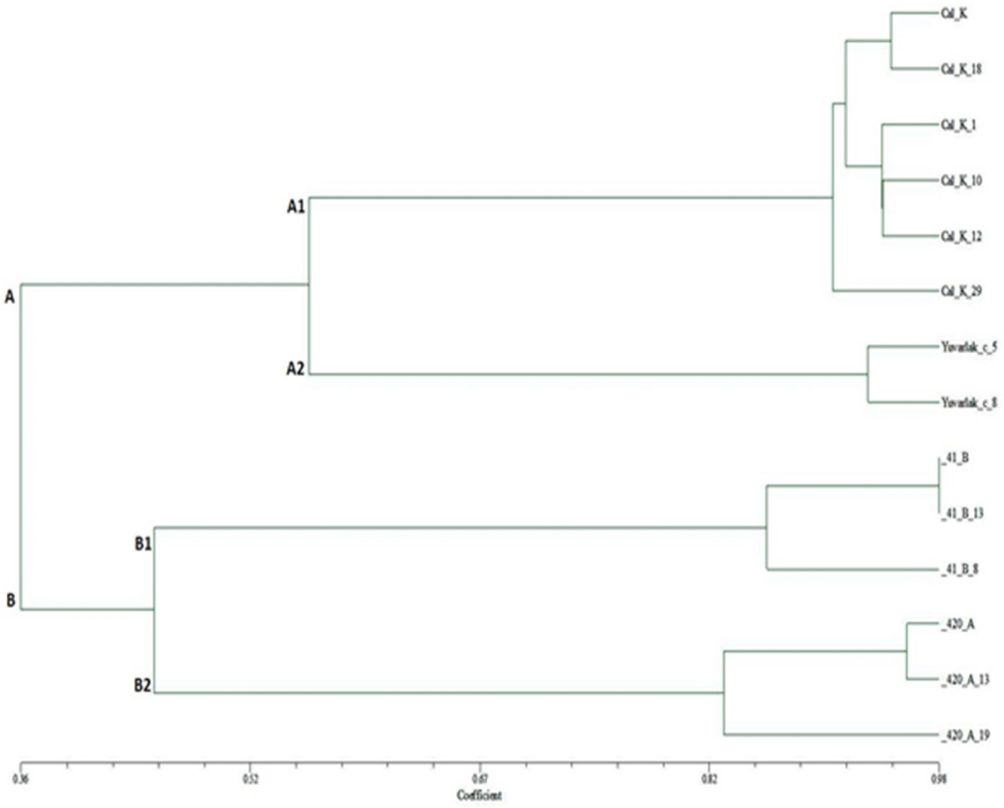

Figure 1. Dendrogram representing ampelographic relationships among cultivars, rootstocks and clones.

Ampelographic differences were observed between 41B 8 and 41B, in the same way the 420A 19 from 420A rootstock.

Conclusion

A total of 14 clones of grape cultivars (*Vitis vinifera* L.) and rootstocks belong to Çal Karası grape variety which was a standart raisin and wine grape variety of Aegean Region in Turkey. Yuvarlak Çekirdeksiz which was one of the most important raisin grape varieties of this region.

Clones of 41B, 420A were characterized.

It was found that there were differences among clones of Çal Karası and Yuvarlak Çekirdeksiz varieties dates of bud burst-veraison with leaf-cluster characteristics. Amphelographic differences between clones of 41 B and 420 A were determined.

Clones of varieties and rootstocks were taken under protection with this study. Also the information in the obtained database can be used legal protection. Registration application of clones was applied. Registration process continues.

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