

POMOLOGICAL DIVERSITY OF LOCAL PLUM CULTIVARS

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ABSTRACT

There are tons of plum varieties typically categorized by European, Japanese, hybrid and American types—each with its own advantages. The present paper analyzes and assesses the pomological characteristics of five local plum cultivars (AGB 3232, AGB 3190, AGB 3142, AGB 3227, AGB 3133) at the Gene Bank Collection of Fruit Trees in Valias, Albania, via UPOV Code and plum descriptors. Tree habitat brunches, tree vigor, season of flowering and maturity, fruit size, fruit shape, fruit flesh color, flesh juiciness, sugar/acid ratio, length of fruit stalk, stone size and stone shape were statistically evaluated for the vegetation period 2018-2020. The results reported distinctive characteristics of the cultivars, regardless the similarities in various descriptors. In addition, a considerable polymorphism was found regarding their vegetative period and morphological features of fruit. Moreover, these local plum cultivars are pomologically unique. The present study is a means to address the identification and conservation of genetic resources of fruit species and the establishment of a valuable database with pomological data for scientists and growers. **Keywords:** Albanian plum cultivars; biodiversity; pomological approach

1. INTRODUCTION

Plum is one of the most widespread fruit tree species in Albania. The 2019 Albania plum crop is 40 928 tons. Total 2019 bearing acreage is estimated at 2626, raking second after apple (INSTAT, 2020). There is a long history in the realm of growing plum trees in Albania, and plum crop is important for the market and industrial sector. In addition, the relatively high content of phenols and antioxidants make plums of nutritional benefit for the people (Kim, *et al.*, 2003; Rupasinghe *et al.*, 2006).

The diversity of plum cultivars in Albania was investigated during exploration missions from 2009 to 2014, allowing the registration of 107 local plum cultivars in the database. There are 62 accessions of plum cultivars

conserved at the National Collection of the Albanian Gene Bank, Valias, Albania. They are collected from different areas, and their diversity is expressed by the pomological characteristics that distinguish them. In addition, they represent local genotypes of great interest. The characterization and evaluation of the pomological characteristics of the plum accessions of the National Collection is one of the objectives of Albanian Gene Bank as a first step towards their further identification, removal of possible duplicates and recommendation to the farmers (Hârta *et al.*, 2016; Mičić *et al.*, 2019). Consequently, an investigation was carried out to characterize and evaluate these five local plum accessions: AGB 3232, AGB 3190, AGB 3142, AGB 3227 and AGB 3133.

2. MATERIALS AND METHODS

The present investigation involves AGB 3232, AGB 3190, AGB 3142, AGB 3227, AGB 3133, the five plum accessions planted in 2011 at National Collection of Albanian Gene Bank, Valias, Albania. They were *in situ* investigated from 2009 to 2010. Table 1 reports the collection sites. The plants selected were healthy and in full production. The UPOV Code, plum descriptors and guidelines set by International Board of Plant Genetic Resources were employed during 2018-2020 for the characterization and evaluation of these accessions (Plum Descriptors, 1984). The following phenologic characteristics were determined: the time of beginning of flowering was considered when at least 5% of the flowers bloomed; when at least 80% of the flowers bloomed was recorded as full flowering, and the end of flowering was determined when 90% of the flowers bloomed and corollas began to fall off. The harvest date was determined when the fruits were colored and were soft to be eaten (Funt 1998).

During the vegetative period, the tree vigor and tree habitat brunches were determined. The tree vigor was considered as the overall abundance of vegetative growth (UPOV) (International Bord for Plant Genetic Resources, 1984).

At full maturity when fruit has typical taste, color and firmness the samples of 25 fruits were collected from each accession to be pomologically investigated for the following parameters: fruit weight, fruit shape, skin color, ground color, flesh color, flesh firmness, stone weight (Plum Descriptors, 1984).

A digital scale was used for the weight of each fruit (g) and their stone, and the manual caliber for the size of fruits (mm).

The sweetness of the fruit was measured in juice obtained using a home blender by a refractometer expressed as degrees Brix. The total acidity of the fruit was measured by titration with 0.1 N NaOH.

The overall data were analyzed by one-way analysis of variance (ANOVA). Differences were considered statistically significant at the level of $p < 0.05$.

3. RESULTS

The phenological characteristics of five local plum cultivars conserved in the Albanian Gene Bank were determined based on field observations and the data analyzed showed that these cultivars bloom from 05 March to 24 March. The AGB 3227 has the earliest time of flowering, while AGB 3232, AGB 3190, AGB 3142, AGB 3133 bloom a few days later—and intermediate time for the beginning of flowering. Considered with medium maturity period, the cultivars AGB 3190 and AGB 3142 ripen during July 20-30, while AGB 3232 and AGB 3227 ripen late (15-30 August). The cultivar AGB 3133 is the latest cultivar which fruits are harvested (15-25 September) (Table1). The tree vigor is considered intermediate to AGB 3190, AGB 3142, AGB 3227 and strong to AGB 3232, AGB 3133, while tree habitat branches is spreading to AGB 3190, AGB 3142, AGB 3133 and upright to AGB 3232, AGB 3227.

Table 1 The phenological characteristics of five local plum cultivars

Accession Code	Accession Name (local plum cultivars)	Origin	Time of beginning of flowering	Time of beginning of harvesting
AGB 3232	E kuqja e Elbasanit	Gjinar	5	7
AGB 3190	Çifte e Elbasanit	Karkavec	5	5
AGB 3142	Violet e Gjinarit	Gjinar	5	5
AGB 3227	E verdha e Tiranës	Tiranë	3	7
AGB 3133	E verdha e Pashtreshit	Pashtresh	5	9

Time beginning of flowering: 3=early; 5=intermediate;

Time beginning of harvesting: 5=mid-season; 7=late; 9=extremely late.

All the data showed that there have been similarities in various descriptors, but most of the characteristics are distinctive. The duration of vegetative period and some of morphological features of fruit could be distinguished the most. The analyses of the average fruit weight and fruit size, considered as very important characteristics for commercial market, (Mičić *et al.*, 2019) showed that fruit weight ranged from 16.48 ± 0.254 g (AGB 3232) to 45.32 ± 0.276 g (AGB 3190). The size of fruit is considered extremely small to AGB 3232 and AGB 3142, very small to AGB 3227 and AGB 3133 and small to AGB 3190. The skin color is more diverse. It differs from yellow light to dark as ground color and the over color of the skin is different; pink, red and violet. Flesh firmness is soft to AGB 3133 and AGB 3232 while medium to AGB

3190 and AGB 3142. AGB 3133 has the firmest flesh. Stone weight ranged from 0.74 ± 0.02 to 0.92 ± 0.06 . Regarding the sugar/acid content and eating quality the following cultivars: AGB 3232, AGB 3190 and AGB 3142 (Table 2) were determined on higher level when compared with the others.

Table 2 The pomological characteristics of five local plum cultivars

Accession number	Fruit weight (g)	Fruit size	Fruit shape	Fruit ground color	Fruit over color	Flesh firmness	Stone weight (g)	Eating quality
AGB 3232	26.54±0.320	1	2	3	2	3	0.85±0.03	7
AGB 3190	45.32±0.276	3	2	4	3	5	0.74±0.02	7
AGB 3142	16.48±0.254	1	3	5	4	5	0.83±0.03	7
AGB 3227	23.95±0.234	2	2	3	1	3	0.92±0.06	5
AGB 3133	19.45±0.346	2	3	3	2	7	0.76±0.02	5

fruit size: 1=extremely small; 2=very small; 3=small; fruit shape: 2=rounded; 3=elliptic; fruit ground color: 3= light yellow; 4=yellow; 5=dark yellow; fruit over color: 1=pink; 2=red; 3=red violet; 4= violet; flesh firmness: 3=soft; 5= medium; 7= firm; eating quality:5= fair; 7=good

5. CONCLUSIONS

The characterization and evaluation of pomological characteristics based on UPOV Code and plum descriptors approved by the International Board for Plant Genetic Resources of the local plum cultivars: AGB 3232, AGB 3190, AGB 3142, AGB 3227, AGB 3133 conserved at National Collection, Albanian Gene Bank revealed that these local plum cultivars are unique.

The fruits of these cultivars are extremely small in size and unattractive to the market, but AGB 3232, AGB 3190 and AGB 3142 appear to be of good quality. AGB 3133 has firm flesh. All of them have different and attractive color skin. These local plum cultivars are of local importance and work for genetic improvement must further.

The characterization and evaluation of their pomological characteristics is not only unavoidable for their identification and conservation of fruit tree genetic resources, but also a means to address the establishment of a database with pomological data that could be considered as a valuable source for scientists and growers.

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