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Genetic Diversity of Some Apples Genotypes in Ex situ Collection

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A B S T R A C T

The apple tree belongs to the Rosaceae family, the Pomoidea subfamily, and the Malus genus. This genus is very reach and in Albania country, wild and cultivation resources. We have authocton germplasm and introduction apples germplasm. The apple tree its typical areas are continental, cold areas. The apple tree is important tree for consummator because have a lot health value. A variation in the qualitative and quantitative was found in the fruit of apple genotype, included in the collection of Gene Bank. In this collection were analyses at all the apples genotype, mainly in the fruit of apples genotype, such is colour fruit, dimension fruit, weight fruit, chemical analyses, etc. Fruit diameter was ranged from 30 to 60 to 70 mm/ length and from 35 to 55 to 75 mm width. The index shape studied for accession varieties ranged from 0.80 mm to 1.09. 3/12, ¼, 2/4, 6/5, 6/11, 6/7, 6/1, 2/3, it had a longer shape compared. The purpose of this study is to characterization and evaluation traits apple which founded in collection of Valias. In this research work was determining morphological diversity for 24 accessions apple. In this research was examined twenty four different apples genotype. Weight depending on the biological characteristics of the variety. The fruit weight is parameters which depending from climatic condition, from technology applied and other serves agrotechnic and productivity of the tree. The weight of accession apples ranged. In this collection domination medium weight fruit. Fruit weight is different between accessions apple which moving 80 to 130, 150, 180, 230 gr to 200, 400, 550 to 700 gr. Weight moving from year to year. Other index of colour fruit which moving from green to light green to yellow to red. Domination character is green fruit colour. Other character is form of fruit which ranged long conic to globose to globose –conic to flat – globose, oblong to ellipsoid and flat. In this collection have diversity of forms apples, this table show this features. Over colour is only for few genotype apples. Red, pink, purple and brown. Type over colour is other trait, is classification on splashed, slighty out, striped mottled. Cluster analyses showed that hight phenotypic varaiation among the apple genotypes investigated. In dendogram created using morphological characteristics of apple genotypes. Those genotypes come to the terms of fruit weight. Significant variation was determinate among the apple genotypes investigated, which can be used in apple breeding programs to improve the desired traits. Morphological characteristics have been affirmed as an important method for identyfing the apple genetic resources.

Introduction

The collection of apple germplasm has been carried out based on studies of genetic resources through - several phases such as exploration in different areas of the country, with different geographical areas and different climatic conditions. Special species such as wild, ½ wild and cultivated have been identified. This genetic material, after it has been taken and documented, has been rooted and planted in the Valias collection, has passed the growth and fruiting phase. This is the purpose of the study to evaluate the special and important features of these accessions. In generally apples genotype are well adapted in this collection and why they ere taken in different geographic, climatic zones.

Materials and Methods

The experiment included 24 old apple accession, are included the collection of Gene Bank. The apple trees were grown in the collection of Gene Bank. The analysis has been carried out during 2019-2022. In this study was analysis some traits for each accession, such are, Location of collection site, Location of collection site, Longitude of collection site, Latitude of collection site, Altitude of collection site,

Collection source, status of sample, number of plant sampled, number of plants collected, type of sample (vegetative, seed, grafting, rooting), nature of vegetative sample (cutting, seed, grafting, rooting, rooted plant, tissue culture, other), virus disease status (virus disease free, virus disease tested, virus disease tested).

Tree vigor's (extremely weak, weak, intermediate, vigor's, extremely, vigor's), Tree habit, extremely upright, upright, spreading/ drooping, weeping, Fruit traits, Fruit size, Fruit shape, Ground color, Over color, Type of over color, weight of fruit, diameter of fruit, color of fruit, % of sugar, etc. The measurements were performed in the collection, sugar was measured with refract meter, statistic analyses.

Results and Discussion

In this Gene Bank contain local varieties which are investigated in orchard or family garden in different zones of Albania country. Those varieties are genetic resources which are evaluation from some researchers of fruit tree and collected and planting in Gene Bank during 2005-2011. During 2019 – 2022 was application the study for characterization of morphological traits and phonological phase for each varieties or accessions. From study some varieties are show interes for some traits and some varieties or sort don't have interes. I think is necessary to genotype analyses from molecular study for determination of link between varieties and selected. The conservation of natural genetic material and individual plants with special or valuable biological and agronomical characters for future plant breeding can be carried out only in suitable genebank (Tibor Zabo, Laszlo)

The index shape studied for accession varieties ranged from 0.80 mm to 1.09. 3/12, ¼, 2/4, 6/5, 6/11, 6/7, 6/1, 2/3, it had a longer shape compared. The purpose of this study is to characterization and evaluation traits apple which founded in collection of Valias. In this research was determining morphological diversity for 24 accessions apple. In this research was examined twenty four different apples genotype. Fruit diameter was ranged from30 to 60 to 70 mm/ length and from 35 to 55 to 75 mm width. Weight depending on the biological characteristics of the variety. The fruit weight is parameters which depending from climatic condition, from technology applied and other serves agrotechnic and productivity of the tree. Fruit weight is different between accessions apple which moving 80 to 130, 150, 180, 230 gr to 200, 400, 550 to 700 gr. Weight moving from year to year. Weight and diameter, size were quantities traits for productivity and marketing aim. The study was analyzed genetic diversity. Is important for this study were is color fruit, forms fruit, taste fruit, over color fruit, seed. When the volume of fruit increase and the weight of fruit must increase. It is reported that the pomological and chemical properties of the

fruit are generally a negative relationship with each other. From study apple genotypes had range seed number, length and width traits ranged from 1.0 to 3.0 number and weight seed ranged 0.01 to 0.03. From table no 1 show other index of colour fruit which moving from green to light green to yellow to red. Domination character is green fruit colour. Other character is form of fruit which moveing long conic to globose to globose –conic to flat – globose, oblong to ellipsoid and flat. In this collection have diversity of forms apples, this table show this features. Over colour is only for few genotype apples. Red, pink, purple and brown. Type over colour is other trait, splashed, slighty out, striped mottled.

Std Error uses a pooled estimate of error variance

From variance analyses of sugar showed distribuded of sugar apple genotypes. The percent of sugar is different in different genotypes apples. This index depends from variety and from maturity time and intensity solar. This trait show a variabile, is qualitative trait. From the analysis of varience it turne out that there is a limit for all accessions which is 8 to 18.1 for lower and 11 to 23 for upper. hetererogenity between genotype apple. F rattio is > F teorik. It is noticed upper and low are in the interval, for sugar index. The data are statistically verified. Error is low 0.9. Within accessiones apple there is genetic diversity. F ratio is 13.

Multivariate, Correlations

The correlations are estimated by REML method

In this scaterplot matrix for two characters no linear relationship. 1

Dendogram apples genotype diameter and weight fruit

Dendogram analyses no 1 for diameter showed that variation among apple genotypes investigated. In dendogram created and using morphological characteristic of apples genotypes divided into two sub –cluster and this sub cluster divided into three groups. The first group for diameter included 6 apple genotypes, the second sub cluster included 6 apple and the third cluster including 12 apple. Dendogram analyses no 2 for weight showed the variation among apple genotypes investigated. In dendogram created and using morphological characteristic of apple genotypes divided into sub cluster and this sub cluster divided in three groups. The first group for weight included 12 apple, the second group included 7 apple and the third group included 5 apple. This show we have a visible and grouped heterogeneity. In this variacion we can be used in apple breeding program to improve the desited characterististies. The first sub-cluster consisted of 6 apple genotypes and this sub – cluster divided into two groups. Cluster analyses showed that hight phenotypic varaiation among the apple genotypes investigated. In dendogram created using morphological characteristics of apple genotypes.

Those genotypes come to the terms of fruit weight. Significant variation was determinate among the apple genotypes investigated, which can be used in apple breeding programs to improve the desired traits. Morphological characteristics have been affirmed as an important method for identifying the apple genetic resources (Kumar *et al.*, 2018; Khadivi *et al.*, 2020). From researcher, component analysis related to fruit in describing the variation among genotypes with apple genetic resources (Hofer *et al.*, 2013; Celik *et al.*, 2018; Khadari *et al.*, 2020). Statistic analyses showed that the morphological characteristics could effectively explain the diversity between the apple genotypes.

In Bank Genetic in Agriculture University of Tirana/ Field Collection founded genetic material for apple resource mainly authocton from different zone in Albania country. From observed and analyses has genetic diversity in form fruit, in color fruit, in over color fruit, in resistance from climatic condition and disease, but have need to selection between genotypes and molecular study for identification common link between them in the feature.

Table.1 Some properties of apple varieties

Accessions	Length fruit/mm	Width fruit/mm	Shape index	Form fruit	Weight fruit/gr	Color fruit
5/1	60	60	1.0	oblate	200	Green to yellow
5/2	50	55	0.90	long-conic	160	Dark green
1/2	40	40	1.0	globose-conic	600	yellow
3/3	70	78	0.89	flat-globose	300	yellow
6/10	30	35	0.85	globose	400	green
11/5	60	60	1.0	conic	400	yellow
5/16	40	45	0.88	ellipsoid	250	green
6/13	30	33	0.90	globose	350	green
2/3	43	40	1.07	conical	500	red
1/a	60	70	0.85	oblong	550	red
1/b	70	75	0.93	flat	350	green
1/c	70	75	0.93	flat	300	White green

Fig.1

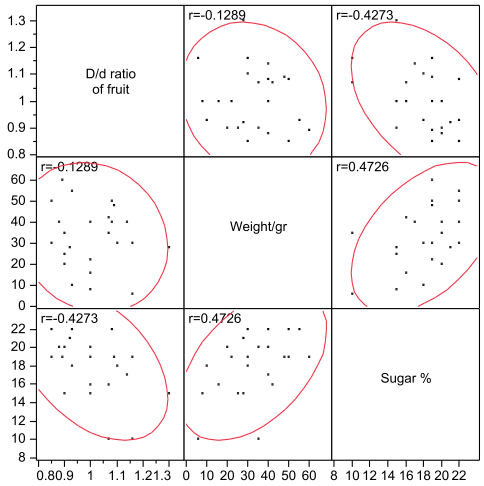


Fig.2

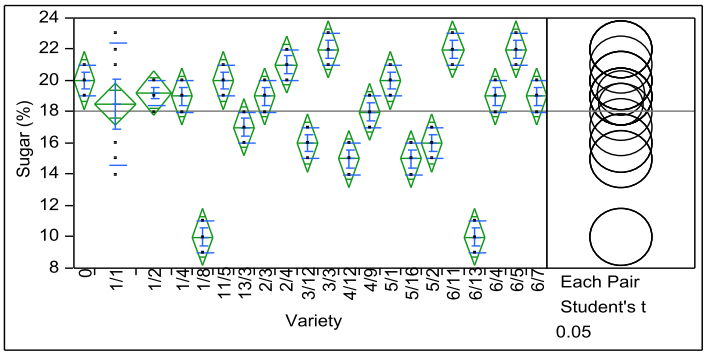


Fig.3

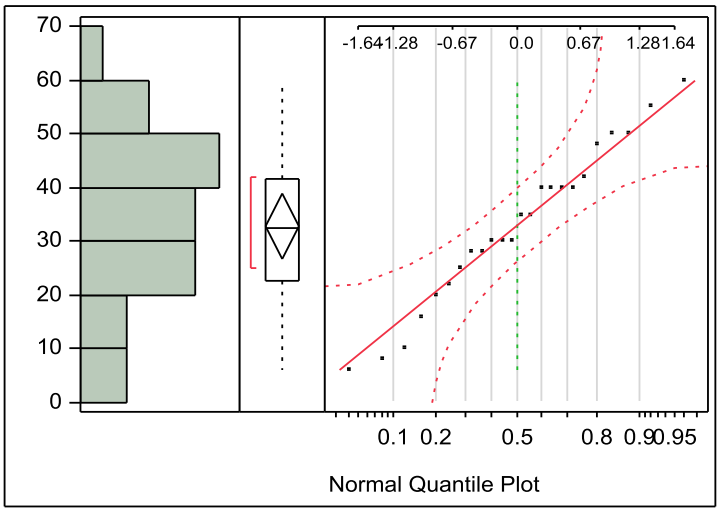


Fig.4

Fig.5

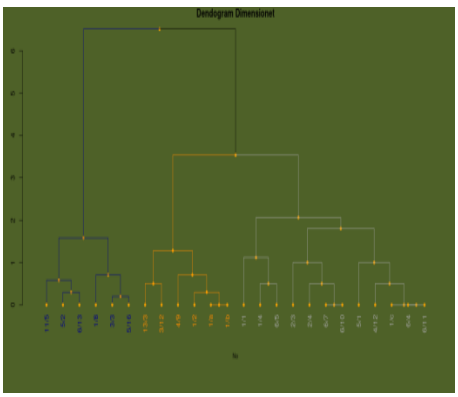
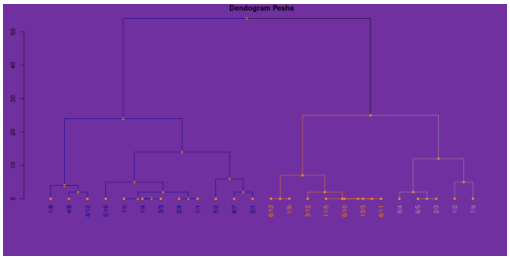


Fig.6



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