

GENETIC DIVERSITY OF FIG VARIETIES IN EX SITU CONSERVATION

Tatjana Koka(j)

Agriculture University of Tirana/ Institute of Plant Genetic Resources

ABSTRACT

This study is application in collection of germplasm field on Agriculture University of Tirana, in some varieties figs. For each tree are analyses leaves, fruits, approximately 10 leaves for varieties tree and 10 fruits for varieties. In this collection founded varieties figs from different sort which were study before years ago in situ, origin country. During this study we can observed diversity leaves forms on different varieties tree. Form of leave moving from spatulate, linear, latate and lyrate. Diversity we can observed the shape which range from truncate, cordate, calcarate and decurrent. For each variety is analyses parameters leaf according IPGRI descriptor. For each trait has classify, which analyzed for each accession. In this study were analyzed qualitative and quantities traits. In this study were analyses diameter of leaves (width length), length of petiol, length of neck of leaves and weight of fruits, etc. Each accession has status biological, history of plant use, method propagation there is realized statistical for at all parameters. From analyzed resulted large diversity of fig accession traits and those accessions are grouped in three groups which link for similar an. The first group exposed link between accessions for some character, in this group has more link, no 01 link with number 09 with 01, and with 02; 05 with 012; 06 with 07; 013 with 08. The numbers of leader such are 1, 5, 6, 10 etc are leader for those character and those character are dominant which show diversity of accession. The sinus indexes is very important element. The quality character is leaves and fruit which are very important for classification traits and exposed genetic diversity and quantitative character are weight of tree, which are productivity trait.

Keywords: sample, lobes, leaves, analysis, petiol, dendogram.

INTRODUCTION

Albania country has favorable climatic conditions for fresh fig production. Fig leaves can be differentiated by form, size, sinuses, surface, texture, petiole, etc. Fig leaves are petiolate; large is 3-7 lobed. Although varying considerably throughout the season leaves have deeper sinuses and narrower lobes than fruiting leaves. Between the lobes are the five sinuses: two upper, two lower, and petiole sinus. The edible fig (*Ficus carica* L) cultivated in the Mediterranean basin, products the best quality fruits since ancient times. Fig tree usually are vegetative propagated, probably utilizing the same propagation material in different areas of Albania country and collected for planting in UBT collection (germplasm field). The morphological traits often are influenced by environmental factors. Varietal identification is necessary for germplasm collections, in every time using morphological descriptors acc Base on the deduction of

polymorphism by assaying subsets of the total amount of DNA sequence variation in a genome, several molecular technologies are available and can be classified into two groups (B. Khadari, J.P. Roge).

MATERIALS AND METHOD

The study was conducted during 2016 – 2017, was carried out in the germplasm of 15 fig cultivars with three trees for each varieties. The analyses were carried out of 10-20 leaves for 15 fig cultivars. The observed were made on all collected leaves for the following character: Forms leaves, Number of lobes, Shape of lobes, Shape of leaf base, leaf length, leaf width, leaf area (LXW), Leaf margin, density of hairs (spicules on leaf upper surface), (spicules on lower surface). Leaf venation, leaf color, petiole length, petiole color, type leaf. Is carried out statistical analysis for variation and diversity character. At all study realized in Valias collection, UBTirane and for genotype analyses molecular is to refer before study, because in situ study is link ex situ study.

RESULTS AND DISCUSSION

From study, were observed and analyse germplasm field of UBT founded varieties fig with large variability on forms leaves. We observed different leaves, 10 leaves for each variety for some character. One character which analyse is leaf length which varied from 14.0 cm to 20.0 cm. Its blade size was also large from 18.5 to 20.0 cm. Stalk length is in range from 4.5 to 10.5 cm. Other character which is the number of main lobes which is varied from three to five lobed leaves and only one has 7 varieties. Forms of leaves (from Condit, 1947), we can founded diversity from type A to type G, founded 5 varieties types G, 4 varieties types B, 2 varieties type E, 2 varieties type F, one varieties type D and one varieties type A. Shape of leaf base varied between truncate to cordate, 6 varieties cordate, 5 varieties decurrently, 2 calcarate and one truncate. The parameters of ratio LL X LW moving 170.8; 231.0 to 414.0 cm. Petiole length moving 5.0 cm to 7.0 and to 9.0 cm. Density of hear moving from none to sparse and intermediate, dense of leaf upper surface and low surface don't founded for 15 accession. The most frequent petiole color was green.

Tab no 1: Indexes of leaves fig for collection germplasm ex situ

No	LL/cm	LW /cm	LLxLW	No of lobes	Type of leaves	Shape of leaf base	Leaf stalk length	Petiole e length/cm	Density of hear
1.	19.0	18.5	351.5	3	E	cordate	6.6	6.5	none
2.	19.5	19.2	374.4	3	G	decurrently	7.0	7.0	none
3.	150	15.5	232.5	5	G	decurrently	7.8	5.0	sparse

4.	16.0	16.5	264.0	7	A	calcarate	5.5	6.0	intermediate
5.	19.0	20.0	380.0	5	G	decurently	8.0	9.0	sparse
6.	20.0	19.0	380.0	5	D	calcarate	6.6	6.0	intermediate
7.	19.0	16.5	313.5	5	G	decurently	6.7	9.0	intermediate
8.	17.0	14.0	238.0	3	B	cordate	7.5	6.0	intermediate
9.	20.0	19.0	380.0	3	F	truncate	6.1	6.5	none
10.	14.0	12.2	170.8	5	E	cordite	7.9	6.0	sparse
11.	15.0	14.0	210.0	5	B	cordite	6.6	5.0	sparse
12.	21.0	19.0	399.0	5	B	cordite	6.5	8.0	intermediate
13.	23.0	18.0	414.0	7	G	decurently	4.5	7.0	sparse
14.	15.0	14.0	210.0	5	F	truncate	9.5	6.0	intermediate
15.	15.0	15.4	231.0	3	B	cordate	10.5	5.0	intermediate

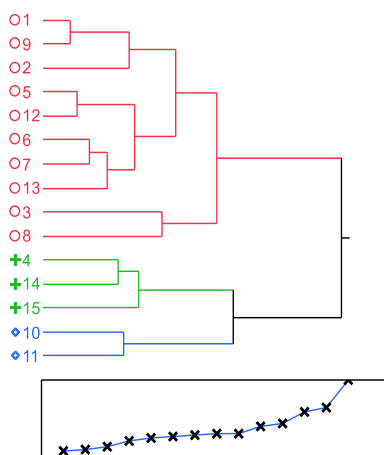
For at all index we applicated statistical analysis to verification statistical similary of character accession. From statistical analysis cluster variety is group accession in three groups. You can observed link one accession by other accession, link of character between there and distance of accession character between there.

Hierarchical Clustering

Method =

War

Dendrogram



Clustering History

Number of Clusters	Distance	Leader	Joiner
14	0.484879873	1	9
13	0.594754460	5	12
12	0.798004456	6	7
11	1.111620413	6	13
10	1.300695333	4	14
9	1.393160712	10	11
8	1.489857821	1	2
7	1.587540605	5	6
6	1.668723370	4	15
5	2.065863034	3	8
4	2.307710288	1	5
3	3.021051708	1	3
2	3.304895497	4	10
1	5.170970776	1	4

You can observed link one accession by other accession, link of character between there and distance of accession character between there. 1 is link 9, 9 is link with 2, 5 is link 12, 6 with 7 and 7 with 13, 3 with 8, for first group, and for second group 4 with 14 and 15, for third group 10 with 11. The distance similarly is large of number 1, number 3, and number 4 and is small of number 12, number 13 and number 14. The numbers of leader such are 1, 5, 6, 10 1etc are leader for those character and those character are dominant which show diversity of accession. Those

characters are link and with some factors such is productivity of tree, land condition, solar exposure and other service agriculture.

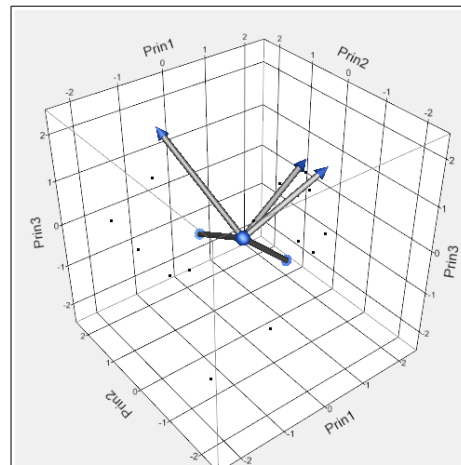
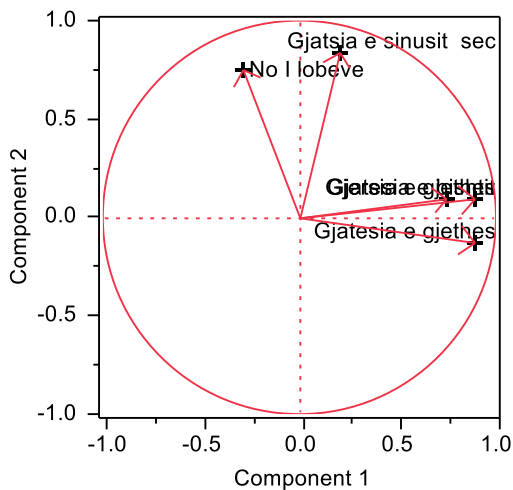
**Multivariate
Principal Components / Factor Analysis
Principal Components: on Correlations**

Number	Eigenvalue	Percent	Percent	Cum Percent
1	2.2806	45.611		45.611
2	1.2885	25.771		71.382
3	0.7948	15.896		87.278
4	0.4924	9.849		97.127
5	0.1437	2.873		100.000

Eigenvectors

Length leave	0.59439	-0.11787	0.36163	-0.03014	0.70790
Width leave	0.58997	0.08406	0.32756	-0.31494	-0.66211
Length leave	0.49442	0.08080	-0.48344	0.70694	-0.12462
Sinuse length sec	0.14026	0.73375	-0.44334	-0.44780	0.21182
No of lobe	-0.18577	0.65888	0.57590	0.44678	-0.00948

Loading Plot Scatter plot 3D



The sinus length is index's which help in analysis statistical diversity of leaves genotypes.

Table no 2: Index's of leaves fig for collection germplasm ex situ

Variable	Fruit length /mm	Fruit /width mm	Neck length cm	Fruit skin	Maturity time
1	45	45	3	black	June/August
2	28	33	2	green	August
3	40	40	2.2	light green	August
4	50	45	2	black	June/August
5	40	40.2	2.5	green	August
6	50	50	1.5	dark green few brown	August
7	45	50	0.4	black	August
8	35	40	5	green	August
9	40	45	3	green	August
10	40.5	25	8	violet	August
11	50.5	50	0	black	September
12	30	40	0.6	brown to green	September
13	48	41	1.5	light green	August
14	35	30	1.2	light green	August
15	30	30	0.5	dark green	August
16	45	45	1	red	August

The fruit shape is very important for packing and transportation. The most of genotypes have fruit shape different range to ovale forms, oblate, spheric pyriform and turbiniform. In generally dominate traits spheric, oblate and ovale forms. In this study, the fruit skin color ranged from yellow to dark green, light green, violet and to black, dominate the green color and black color. The internal color ranged from white to light brown, pink, dark pink, red and dark red, dominate internal red and dark red color. The cavity fruit ranged from none to very small to medium and

large, dominate medium cavity fruit. The amount seed traits ranged none to low, medium and high and dominate medium to low. The other traits is flavor, characteristic very important for quality fruit and for consume fresh which ranged neutral, little flavor, aromatic and strong were different flavor. The harvest time for each genotype was in August to September especially for second crops which ripening on June and August. The ripening time is characteristic for market consume. The different ripening time help to longer market for different sort figs.

The present study indicates that even genotypes with diverse geographic origin exhibit high diversity genetic for some traits mainly leaves and fruit traits. The some traits such as color fruit, plant vigor, number of leaf and lobe per shoot, form of leaf is very important for genotypes selection by grower and breeders (Papadopoulos et al 2002). At all characteristics of genotypes in this collection are scientific verify with origin which collected genetic material. Genotypes with similar origin were clustered in the same groups. From the molecular analysis that is made in situ for these clusters, clusters are made similar to features, not in all the features but in particular traits. Despite the geographic extent, a variety in the North West of the country and the other in the south of our country. Those are genetically link to each other, Italian variety is introduction variety but link with Cingell variety is traditional variety and have other link with Roshnik and this is traditional variety for dry but link for some character, for the colour of the fruit and the pedicel colour. The Tragjas variety link with Morait variety for the color of the pedicel, the destination fruit, the maturity time and change in the color of the fruit and the productivity, or Italian variety link with Cingell variety but Cingell link with Roshnik variety, so for all other accessions. Some varieties which are identification have same name but have different character for example in color of fruit, such is Cerlin of white and Cerlin of black, or , Cipull of white and Cipull of red to black but have same neck fruit, is long.

○

Materials		
Denominations and provenance (in brackets)		
ALLANHR (T)	BRADASHESH (T)	BULL (T)
CERLINE (T)	CINGELL (Cingell)	DEMBAK (T)
BRAZH (T)	DYMZEK	LASHITE BARBIDE (B) (Antique white)
LASHITE Lg (B) (Antique black)	ITALIAN	KALLAMAT (V)
KRAPIS (T)	MELACAK (S)	MORAIT (V)
PATLINGHAN (S)	PERIBIKULI (B)	PESHANAK (V)
ROSHNIK (B)	ROTLAR (T)	SHQAV (Shqav)
STAMBOLLI (B)	TIVARAS (S)	TRAGJAS (V)
VANLINO (B)		

Legend: B= Bernit, D = Delvina, S= Slikodra, T= Tirana, V= Vlora



Figure no 1: Genotype fruit figs diversity in collection of UBT (IRGJB)

CONCLUSION

In the gene bank (collection of fruit tree) founded a large number of figs germplasm which founded in our country, in situ with different traits and same traits and now are in the ex situ. Founded varieties with different destinations such is consume destination, for dry destination and industry destination. In the feature the study will deepen in the chemical analyses for each varieties and recommendation production.

ACKNOWLEDGMENT

I thanks at all collaborator which contribution for realize of this figs collection, specialist in experimental base EDE, farmers in situ, worker in Screen house of UBTirane and researcher of IRGJB (Gene Bank).

REFERENCES

- [1] Aksoy, U and D Anac, 1990. Effects of Potassium and Calcium on the Quality of the Fig Sarilop Fruit. XXIII Int Horticultural Congres August 27 September 1, 1990 Italy.
- [2] Allem, A. (1997) Roadside habitats: a missing link in the conservation agenda. The Environmentalist 17, 7 – 10.
- [3] A. Belaj, Z Satovic, H. Ismaili, Dh Panajoti, L Rallo, I Trujillo , 2003. RAPD genetic diversity of Albanian olive germplasm and its relationships with other Mediterranean countries. Euphtica 130; 387 – 395.

- [4] **Biale, J, B (1960)**. The postharvest biochemistry of tropical and subtropical fruits. *Adv. Fd. Res* 10:293-3 54.
- [5] **Condit, I.J. (1955)**. Fig varieties- A Monograph, Hilgardia, Vol 23.
- [6] **FAO, 1990**. Guidelines for soil Profile Description, 3rd edition (revised), Food and Agriculture Organization of the United National, International Soil Reference Information Centre, Land and Water Development Division FAO, Rome.
- [7] **H Ismaili, A Dervishi, P Cakirri, 2017**. Some phyto regulators to increase the fertility of the olive flowers, 2017. *A.J.SCI.O*, Vol 4((3): 3-16.
- [8] **Byers, R. E. Dostal, H. C. and Emerson, F. H (1969)** The postharvest biochemistry of tropical and subtrropical fruits. *Adv. Fd Res* 10: 293 – 354.
- [9] **El – Gooran M A and Sommer NF (1981)**. Efects of modified atmospheres on postharvest pathogens of fruits and vegetables. *Horticultural Review* 3, 412 -468.
- [10] **Gasgil, N, and Anac, 1993**. Sesonal Variations of Plant Nutrients in the Leaf, Blade, Petiol and Shoots of Fig, Ege University Graduate School.
- [11] **Malewar, G.U. and N.S. Jadhav, 1979**. Evaluation of Nutritional Status of Different Orchard of Marathwada Region by Leaf and Soil Analysis. *Journal of Maratwada Agric Univ India*, 4 (3): 312-314.
- [12] **Maxie, E, C, and Crane, J. C, (1968)** Effect of ethylene on growth and maturation of the fig, *Ficus carica L*, *FRUIT. Proc. Am.Soc. hort. Sci*, 92: 255-267.
- [13] **Oguzhan C, A.A.Polat**, Effects of genotype and harvest year on phytochemical and fruit quality properties of Turkish fig genotypes, *Spanish Jornal of Agricultural Research*, 2012, 10/4, 1048-1058.
- [14] **Puech, A.A. Rebeiz, C. A, and Crane, J**, The effect of 2 – chloroethyl phosphonic acid o pigment changes in the " Mission " fig fruit (Abstr). *Plant Physiol.* 47, Suppl. 15p., 1971.
- [15] **R. L. and Nikolls, AO. (1989)**: Efficiency in conservation evaluation: scoring versus iterative approaches. *Biological Conservation* 50; 199-218.
- [16] **Steiner, W.E, R.H.Rieker, and R. Battaglia 1988**. Aflatoxin contamination in dried figs. Distribution and associatiog with fluorescence. *J.A gric Food Chem*. 36;88-91.
- [17] **Shirazi A and Cameron A. C. (1992)** – Controlling relative humidity in modified
- [18] **Times, E.C. and L.S.Olive.1948**. Two interesting leaf spots of fig. *Phytopathology* 38: 707-715.

[19] **Vaughan, D.A and Sitch, L.A. (1991).** Gene flow from the jungle to farmers. *BiScience* 41, 22-28.

[20] **Warner, R.M. 1961.** Fig research, *Calif. Fig. Inst.* 14(3): 1-2.

[21] **Wilson, P, Gibbons, D, Margules, C, Rebeyl, A, Hmphries, C, and Pressey, R (1996).** A comparison of richnes hotpots, rarity hotspots and complementary areas for conserving diversity of British birds. *Conservation Biology* 10, 155 – 174.

[22] **Zagory D, and Kader A, A (1988)** – Modified atmosphere packaging of fresh produce. *Food Technology*, 42, 70 – 77.

[23] **Zroni, M, Ben – Yehoshua, S and Galil, J (1970).** Relation between fruit (Syconum) development and ethylene emanation in *Ficus sycomorus* L. XVIII Int Hort Cong 1: 129