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EVALUATION OF SOME WHITE MAIZE (*Zea mays L.*) LANDRACES FOR MORPHOLOGICAL EAR PARAMETERS IN DIFFERENT LOCALITY IN KOSOVO

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Abstract

Information on the local populations is essential in crop improvement. The objectives of the experiment were to evaluate some local maize landraces in farmers fields and to determined diversity for morphological ear parameters. The our expedition during the year 2008 was observe and identify five locations at the different part of Kosova; Podujevë-L1, Sllatinë-L2, Klinë-L3, Ferizaj-L4 dhe Fushë Kosovë-L5. The experimental design was based on Split-Plot methods. This study shows significant variability and diversity between landraces for ear parameters. Following the analysis of variance (ANOVA) and comparisons based on the least significant difference (LSD), the results indicate tha the best (higher) average value for EW (214.96 g), EL (18.78 cm), RNE (11.6), KW (43.36 g) and GYE (190.54 g) was obtained at the Locality 4 (L4). In relation to the agronomic characteristics and statistical data there was higher significantly different at p=0.01. A certain level of diversity was found in plant and ear parameters will be needed in the future for a complete characterization.

Key words: Maize landraces, locality, ear parameters.

INTRODUCTION

Maize is one of the most important crops. The species was introduced in the national cultivation system approximately four centuries ago growth mainly for human consumption. Genotypes of landraces for long time have been exposed to the complex factors of the environment and human factors, for consequence they are characterised by genetic variability which has passed through the process of natural selection, Fetahu and Aliu, (2007). Plant genetic diversity of crops and their wild relatives are important sources of variability for breeding purposes (Gutierrez, L et al., 2006).Diversity and variability existing of maize landraces, is great opportunity to use them as based resources or material on the program of genetic

improvement of plants, but also a source of food and welfare of humanity. According to data from FAO (1998) cited by Borner A. (2008), so far with the maize landraces approximately 261 584 accessions are registered. Before 55-years in Kosovo with the maize landrace were planting 100% of surfaces, while currently planting only 8.42%, while other surfaces were sowing the hybrid maize (Fetahu et al, 2005). It is estimated that only 2% of the maize germ plasma is utilised in breeding programs and an important fraction is cultivated and conserved by small landholder farmers (Valdemar, 2004). These landraces were maintained by farmers as open-pollinated populations and thus each of them represented collection highly heterozygous and heterogeneous plants. Most of the genetic variability is represented within and between landraces maintained by the traditional family farming system (Valdemar, 2004). The genetic diversity of maize landraces is, therefore the most immediately useful part of maize biodiversity (Lucchini et al., 2003). However more consistent agronomic and genetic knowledge about these collections is still lacking and it is a serious limitation to utilizing managing and conserving the landraces maize gene pool (Nuss et al., 1993). The development of modern plant breeding techniques has greatly facilitated wider use of a wealth of diversity from many sources including landraces, and especially, has allowed food production to keep up with population growth (Wood and Lanne, 1999). The aim of this research was to assess the diversity and variability of maize landraces in different localities for the biometric parameters of ear and yield. Also, to identify the genotype of landrace with specific characteristics that could use as basic material in the program of developed inbreed lines, and later the creation of new hybrids formula.

MATERIAL AND METHODS

During 2008 year a researcher of the Faculty of Agriculture, University of Prishtina has organized research expedition and collection landrace of white maize in the localities of Kosovo, resources which are part of the gene bank accessions. For analysis of genotypes and collected landraces, we are used standard methods and comparative statistics to determine the diversity and genotype variability expressed in different localities. Genotype of maize landraces were collected and researched on five (5) different localities of Kosovo: Podujevo-L1, Sllatine-L2, Klinë-L3, Ferizaj-L4 and Fushë Kosovë -L5. Altitudes of locations were different from 414 until 617m.a.s.l, which are located in the north-eastern and central Kosovo, where production of grain is concentrated. The model of research and interpretation for the results obtained was Split-plot method with research formula: localities x parameters x replications (L-5 x P-6 x R-5) = 150 combinations. For maize landraces, the average effect of the experimental reaction of genes is calculated according to linear equalizer $\mu=\sum ig/n + \sum gl/n$. Where; ig = average amount for all genotype in a locality, gl = average value for all locations, n=frequency of occurrence and $\sum$= total sum.

Statistical Analysis

Statistical analysis of data on genotype and the maize landraces was carried out with the software MINITAB 14, and significant differences were determined by LSD test for level of probability P< 0.05 and 0.01. For the definition and identification similarities of the maize landraces genotypes is made a dendrogram Cluster analysis. Whereas the correlation between the parameters investigated was calculated according to Pearson's

RESULTS AND DISCUSSION

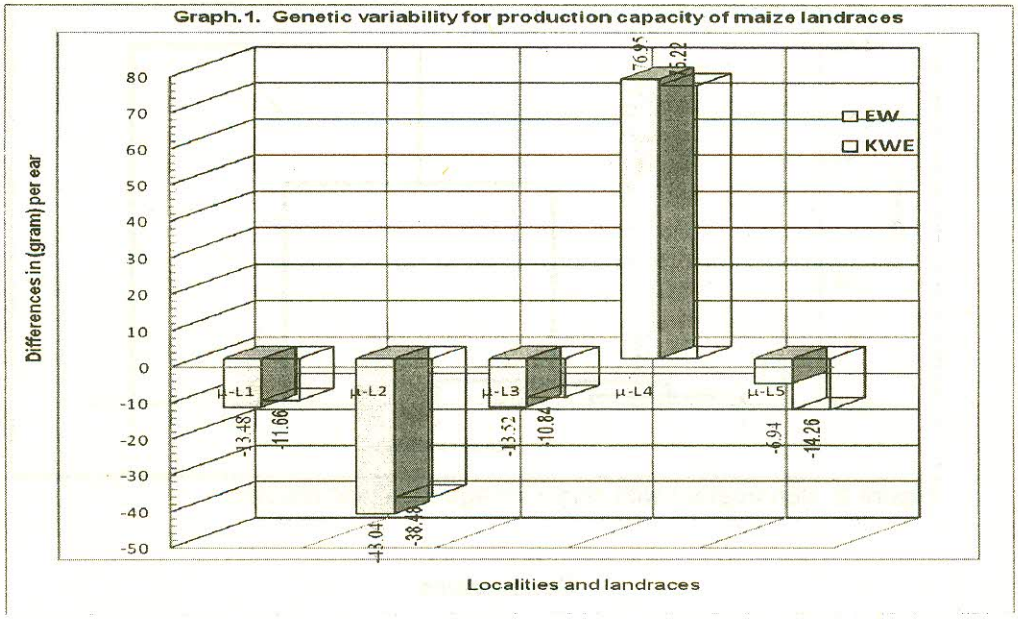
Ear weight (EW), express production and reproduction capacity of the maize genotypes cultivated in different conditions; agro ecology of localities, applied agro technique from planting till botanical mature. Environmental conditions, genotype and agro technique determine production capacity and the value of one or more of the maize genotype (Fetahu, 2007). Production capacity of the genotype landraces in different localities was different while ear weight realized was determined by genetic potential, agro ecological terms, the applied agro technique, and ways traditions of the farmers in production and cultivation. Experimental average of gene effects maize landraces in five investigated locations had value μ = 137.99 g. Genotype landraces of the maize, which was collected in those localities are of type (*Zea mays var. semidentata,*L.), but with different parameters and ability of production. Higher average ear weight had the genotype landrace from the locality Ferizaj-L4 with genotype value XL4g4 = 214.91g, while the lowest average ear weight had genotype of landraces originated from locality Sllatine-L2, with genotype value XL2g2 = 94.96g /ear. Genotype landraces from the locations XL4g4 and XL2g2 were different for 120g/ear or 86.96%, over and under the value μ. Variability in general and differences between the genotypes of landraces XL4g4 and XL2g2, could include the effects of all factors, which for long time have had an impact on genotype and which can be grouped as effects: genotypes, agro ecology, agro techniques, tradition and way of cultivation of landraces in those localities. From all localities, landrace originated from locality L4, were with higher genotype weight of ear XL4g4 = 214.96 g / ear, while the difference was over the value of μ for +120 g or 86.81%, and landrace originated from location L2 was with lower ear weight XL2g2 = 94.96g /ear, the difference was below the value of μ for -43.04 or 31.18%. Differences of genotype values between landraces from locations were higher significant different for level of p = 0.01. Value of the coefficient variation was 32.79%, and the standard deviation was with value ±45.2. Genotype of landraces from L1 and L3, were almost completely identical and without significant differences between them. Average values and other details are presented in tab.1.

Table.1. Genotype values of ear and yield of some of the maize landrace in different location in Kosovo

Populations / Locality	Ear length	Number /ear		Weight /ear		Yield
		row	grains	ear	grains	t/ha
L_1	15.02	10.00	29.80	124.52	103.66	4.86
L_2	17.28	8.40	34.80	94.96	76.84	3.60
L_3	16.92	10.40	36.20	124.48	104.48	4.90
L_4	18.78	11.60	39.80	214.91	190.54	7.77
L_5	18.10	8.40	34.60	131.06	101.06	4.74
μ	17.22	9.76	35.04	137.99	115.32	5.18
LSD 0.05	*1.99*	*1.81*	*4.76*	*40.69*	*23.99*	*0.9*
0.01	*2.74*	*2.5*	*6.56*	*56.06*	*33.06*	*1.21*

Ear length, this parameter has a direct impact on production capacity and reflects in the amount of realized yield for the ear and in the cumulative way for unit area. Such phenomenon, as in other cases and to the maize is hereditary as quantitative trait from parents to offspring (Aliu, 2006). Average effects of gene μ, for the ear length were with value 17.22cm. From collected landraces, genotype with the maximum ear length, were those with treatment XL4g4 = 18.78cm, while the minimum ear length of treatment were XL1g1 = 15.02cm and the difference between them was +3.76 cm or 21.83%, with higher significant on level p= 0.01. Such treatments compared to the value μ, the differences were +1.56 cm or 9% over the value μ and was not significant, while the difference of -2.20cm or 12.8% under the average value of the gene effects was significant to LSD-test. The value of the correlation factor for length and weight ear was not with high value (r = 0.56), according to Pearson's, while the coefficient variation had value 8.28%, and standard deviation value 1.42. Number of rows per ear, this feature is determined by genetic factors and not by the environment and agro technique. From research of genotype of maize landraces in different localities, it is determined that the average effects of genes were with value μ = 9.76 row/ ear. Landrace from the location L4 had the largest number of rows than in the localities L2 and L5. Genotype value of landraces was XgL4 = 11.6 and XgjL2 and L5 = 8.40 row / ear, this differ for 3.2 rows / ear, or 32.78%. Those differences are genotype and are high significant for value p=0.01. Average value landrace of the location L4 had significant difference to +1.84 / ear or 18% more than the value of μ, while genotypes originated from L2 and L5, differ for 13.83 or 1.36% and are under the value of μ, and differences are not significant. Number of grains within row / ear, conditioning from ear length and grains size, in our research the average value of effects was μ = 35.04. Genotype from form location L4 was with largest number of grains / ear with average genotype value XL4g4 = 39.8, with different value from μ

+4.76 or 13.58% more grains within row/ ear. With the smaller number of grains per ear was genotype from L1 with genotype value XL1g4 = 29.8 grains, with different values of μ for -5.24 or 14.95% less grains per row/ ear. Differences for the genotype values from researched localities were highly significant and significant for LSD criteria. Maximal difference and common variability was found between genotypes XL4g4, respectively XL1g1 for 10, with genetic variation 28.53%. Grains weight per ear, to the maize populations, in different localities was very emphatic variable. Genotype with greater weight were the location L4, with genotype value XL4g4 = 190.54 g/ear, difference over the value of μ for +74.96 g / ear, or 65.60%. Population with the lowest weight was the from location L2, with genotype value XL2g2 = 76.84 g/ear, difference under the value of μ for -38.22 g/ear, or 33.21%, in both cases, differences were high significant and present variability between the landraces investigated in different localities. Differences in values between the genotype and localities were +113.7 g / ear, or 98.81%, difference high significant on level of $P_{0.01}$. The value of the correlation factor according to Pearson's for the weight of grains per row in the ear was with low value r = 0.67.



Yield, aim of the maize cultivation is yield, while the purpose and use of researched landraces in localities is different. Realized yield per plant or per unit area, is very complex quantitative indicators, which express the cumulative reports and correlative effects of different factors: genes, environment, agro technique, tradition and cultivation purposes. In our research, population from L4, was with average genotype value XL4g4 =7.77 t/ha had the highest productivity in relation to all other genotypes, with difference of +2.6 t / ha or 50.29% over the value of μ. Population

originating from L2, with genotype value XL2g2 = 3.60 t / ha, was with lowest yield and was below the value of μ for -1.57 t/ha or 30.36%. Populations genotype differences for the average maximum and minimum values between different localities was +4.17 t / ha or 80.65%, high and high significant differences and genotype distance for criterion LSD = 1.21 and level P = 0.01. All genotype values for the population yield were significant different in relation to population from L2. The value of the average effects of genes for yield was μ = 5.17/ha, which represents a high potential for population production, which may be good basis for continuation of research work in characterization and their use valuation and production. In Fig. 2 is presented dendrogrami with distance according Eucledian-it, for all maize population that were researched, from this is noted that the population from locations (L1 and L3) are ranked in same group, and population from localities (L5 and L2) are ranked in the second group but connection with the first group, and population from locality L4 is separated as a group in itself with significant differences. Results are presented in Figure 2.

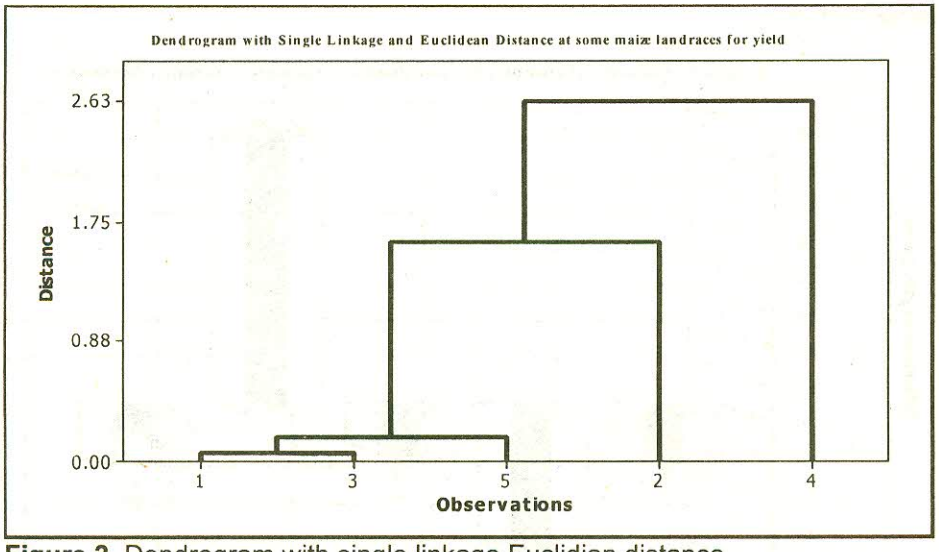


Figure.2. Dendrogram with single linkage Euclidian distance

Conclusions

On the basis of maize researches populations for the ear genetic variability and production may concludes: Populations from various locations in Kosovo were with variability, and are type of (*Zea mays var semidentata*, L). Values of biometric features were with significant differences for ear parameters and production capacity of genotypes. Variability of maize landraces, realized yield per units is great opportunity for the creation and development of inbreed lines to produce hybrid maize. The researched landraces will be a contribution of the Bank of Geneva on Kosovo, for storage and use of genetic resources of maize.

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