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„ON FARM" CONSERVATION OF SOME MAIZE RACES IN BUCOVINA

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Abstract: *Submontane and mountain area is a very heterogeneous eco-geographic space, where maize during about 360 years, underwent an ample diversification process, under the pressure of natural evolution factors and selection carried out by man-forming locale maize populations, genetically distinct and well adapted to local ecological conditions.*
It is obvious that this long period has favored an active genetic process of population formation, stopped in 1957-1962 by very quick introduction in Romania, of more than 90% of maize cultivated area of corn hybrid seeds [1].
At present people cultivate maize locale landraces only in Submontane and mountain areas of the Carpathian Mountain countries. These old varieties have some valuable features (e.g. earliness, resistance to cold and prolificacy, high nutritive elements content) [2].
The study of 17 maize accessions coming from Bucovina, for evaluation of genetic erosion level during 30 years, were accomplished, through utilization of biometrical descriptors.
The accession collected in 2002, has the higher values at the descriptors: plant height, insertion height of the main ear, and panicle length then the values of descriptors of the Hanganesc race.
The analyzed maize accessions are coming from 4 villages: Brosteni, Vama, Vatra Moldovitei and Frumosu. These villages are situated at very different altitudes, from 529m to 639m. In these locations two races were identified: Hanganesc and Moldovenesc.

Key words: *eco-geographic space, locale landraces, genetic erosion, biometrical descriptors*

Introduction

It is recognized that a collection value is given by the level of its utilization not by the number of the accessions. Although the sharing of benefits through their redistribution is important, more direct ways of making benefits are needed, such a wider evaluation enhancement and utilization of local germless.
In Romania the local PGR are utilized, directly-through the conservation and utilization of local varieties by farmers from the mountain areas, and indirectly-through their utilization in the plant breeding programs. In the sub mountain and mountain areas maize old landraces can meet to 800-900 m elevation. Here maize represents a traditional food for people and an important animal fodder where during about 350 years, underwent an ample diversification process, under the pressure of evolution natural factors and selection carried out by man-forming locale maize populations, genetically distinct and well adapted to local ecological conditions.
It is obvious that this long period has

favored an active genetic process of population formation, stopped in 1957-1962 by the very quick introduction, of more than 90% of maize cultivated area of corn hybrid seeds [1].
At present people cultivate maize locale landraces only in Submontane and mountain areas of the Carpathian Mountain countries. These old varieties have some valuable features (e.g. earliness, resistance to cold and prolificacy) [2].
The maize breeding programs by heterozis capitalization between the inbred lines leaded to the realization of some maize performance hybrids, but the initial germplasm sources represented by the old varieties were neglected.
Being convinced that a collection value is given by the level of its utilization the maize resources could be utilized, both directly through the conservation of farmer's locale maize varieties and indirectly- in an intermediate stage when are used by plant breeders to develop new hybrids or to broaden the base of plant maize breeding regional program for the cold and wet areas [3].

Materials and methods

The study of 17 accessions of maize landraces coming from Bucovina mainly for evaluation of their genetic erosion was accomplished through utilization of the biometrical descriptors (plant height, panicle length, number of braches on category I, number of braches on category II, total number of the leaves, number of the leaves of the lower ear, insertion height of the main ear, maximum diameter of the stem, ear length, number of kernel rows, grain length, 1000 kernel weight).
The analyzed maize landraces accessions coming from 4 villages (Broşteni, Vama, Vatra Moldoviţei şi Frumosu - county Suceava) situated at different altitudes, from 442 m to 639 m. In the targeted villages two maize races were identified: Hanganesc and Moldovenesc.
The 17 maize landraces were collected during 30 years (1970 – 2000). In 2007 all accessions were sown and studied in the experimental field of the Suceava Gene Bank.

Results and disscussion

All data were analyzed separately, as follows:

1. The accessions originated from Broşteni area

The studied accessions were collected in the years: 1970, 1971, 1990 and 1995. All accessions belong to the race Hăngănesc.
Table no. 1 shows the values of descriptors which describe the race Hanaganesc in comparison to values which we obtained in the experimental field in 2007 at the four accessions which belong to the same race, collected in different years, coming from Brosteni, county Suceava.

Table 1

The middle values of the descriptors which determine the specific traits of the Hanaganesc race at 4 maize landraces coming from Village Brosteni, county Suceava

Descriptors	**The specific traits of the Hanganesc race**	**Accessions name**			
		Broşteni 244	**Brosteni 247**	**Brosteni 9**	**Brosteni 14**
Collecting data		**1970**	**1971**	**1990**	**1995**
Plant height (cm)	**132-172**	151.0	175.7	185.2	201.1
Panicle length (cm)	**25.5**	27.5	29	29.4	33.1
No. of branches on category I	**8.8**	8	7.66	15.1	9.1
No. of branches on category II	**1.7**	1.2	1	2.7	2
Total numbers of the leaves	**8.3**	6.5	7.83	9.5	9.1

Number of the leaves of the lower ear	**4**	3.5	4	5.3	4.9
Insertion height of the main ear (cm)	**44.0**	43.5	51.66	69.9	69.4
Maximum diameter of the stem (mm)	**14.3**	14.20	13.96	16.13	16.33
Ear length (cm)	**11.5**	12.15	11.15	12.93	12.70
No. of kernel rows	**12-18**	13	16.3	17.2	15.8
Grain length (mm)	**7.8**	7.83	8.14	9.39	8.87
Grain width (mm)	**6.2**	6.42	6.63	6.64	7.2
1000 kernel weight (g)	**150-191.6**	150	170	176	212

If we analyze the data from the above table we can say that the accession collected in 1995 shows higher values in comparison to the accession collected in 1970. After 25 years (1970-1995), the values of plant and ear descriptors grow up. Through modification of these traits, the accession collected in 1995 has values of biometrical descriptors very different in comparison to the values of descriptors of the Hanaganesc race. These differences demonstrate the fact that the genetic erosion was manifested at high level in this village, explained by the fact that this village is situated at 600 m altitude, and the hybrids are not cultivated in this region.

2. The accessions originated from Frumosu area

The 6 accessions were collected in the 6 different years (1971, 1972, 1973, 1988, 1995, and 2002). Also, all accessions belong to Hanganesc race like the samples originated from Brosteni village.

The next table presents values which describe the Hanganesc race in comparison to the values of registered descriptors at 6 local maize landraces which belong to the same race, coming from Frumosu village, county Suceava.

Table 2

The middle values of the descriptors which determine the specific traits of the Hanganesc race at 6 maize landraces coming from Village Brosteni, county Suceava

Descriptors	**The specific traits of the Hanganesc race**	**Accession name**					
		Frumosu 161	**Frumosu 406**	**Frumosu 162**	**Frumosu 15**	**Frumosu 26**	**Frumosu 32**
Collecting data		**1971**	**1972**	**1973**	**1988**	**1995**	**2002**
Plant height (cm)	**132-172**	149.7	175.1	153.7	169.5	192.1	215.7
Panicle length (cm)	**25.5**	25.6	31.8	26.7	32.8	34.1	36
No. of branches on category I	**8.8**	10.2	11.5	8.2	9.1	6.2	10.7
No. of branches on category II	**1.7**	0.6	2.5	1.8	1.7	0.3	0.8
Total numbers of the leaves	**8.3**	7.9	8	7.7	8.6	8.1	8.2
Number of the leaves of the lower ear	**4**	3.5	4.1	3.5	3.4	3.2	4.8
Insertion height of the main ear (cm)	**44.0**	41.5	50.7	35.9	48.7	54.3	61.4
Maximum diameter of the stem (mm)	**14.3**	13.95	18.45	16.64	16.64	17.75	19.67
Ear length (cm)	**11.5**	11.43	13.13	9.85	12.53	12.77	12.30
No. of kernel rows	**12-18**	16.8	14.8	15.8	14.00	18.00	17.25

Grain length (mm)	**7.8**	8.53	9.08	8.39	9.23	8.77	8.5
Grain width (mm)	**6.2**	6.83	7.61	7.11	8.04	7.25	7.01
1000 kernel weight (g)	**150-191.6**	162	195	197	200	208	204

The data from table 2 show that the accessions collected in the years 1995 and 2002 have higher values of descriptors: plant height and panicle length, in comparison to values of the same descriptors registered at samples collected in 1971, 1972 and 1973.

After 30 years the values of plant, ear and kernel descriptors experienced a slight increase in comparison to values of same descriptors at samples collected in the year 1971.

According to the obtained results, it is noted that the sample collected in 2002 has slightly increased values in comparison to values of same descriptors at samples collected in 1972 and 1973, which shows that the area Frumosu had a genetic erosion of this race, but not as strong as in the area Broşteni.

3.The accessions originated from Vatra Moldovitei area

The analyzed accessions were collected in years 1972, 1985 and 1989. All accession belongs to the Moldovenesc race.

The below table shows the descriptors which describe the Moldovenesc race in comparison to the values registered at three maize accessions which belong to the same race coming from Vatra Moldovitei village

Table 3

The middle values of the descriptors which determine the specific traits of the Moldovenesc race at 3 maize landraces coming from Village Brosteni, county Suceava

Descriptors	**The specific traits of the Moldovenesc race**	**Accession name**		
		Vatra Mold. 423	**Vatra Mold. 2**	**Vatra Mold. 427**
Collecting data		**1972**	**1985**	**1989**
Plant height (cm)	**185.6**	171.3	160.5	165.5
Panicle length (cm)	**28.9**	30.12	27.4	28.4
No. of branches on category I	**15.7**	8.25	4.5	8.7
No. of branches on category II	**0.9**	0.6	0.6	0.37
Total numbers of the leaves	**8.7**	8.0	7.0	7.76
Number of the leaves of the lower ear	**4.8**	3.2	3.1	3.7
Insertion height of the main ear (cm)	**46.4**	46.1	35.6	38.2
Maximum diameter of the stem (mm)	**17.4**	16.03	15.63	17.56
Ear length (cm)	**16.7**	14.73	10.79	12.73
No. of kernel rows	**14.2**	15.5	14.2	13.8
Grain length (mm)	**8.2**	7.36	8.13	8.01
Grain width (mm)	**7.1**	7.52	7.64	6.61
1000 kernel weight (g)	**220**	206	178	188

The data from above table emphasize the following aspects:

- the maize accession collected in the year 1972 had similar traits with the Moldovenesc race, but, after 17 years, the traits of this race modified very significantly, the grain length and grain width are lower than of the Moldovenesc race, and the 1000 kernel weight of this accession is similar to 1000 kernel weight of the Hanganesc race.
- after 17 years is it possible to make an impurification of the Moldovenesc race with the other two races: Hăngănesc and Cincantin, because the plant height, insertion height of the main ear and ear length have the lower values than the

values of the same descriptors of Moldovenesc race.
In future, due to modification of these characteristics it is possible for this race to disappear from this village, being replaced by sub race Hăngănesc/Moldovenesc

4. The accessions originated from Vama area

The analyzed maize landraces were collected in 4 different years (1972, 1985, 1988, and 2002). Like the samples originating from Broşteni and Frumosu, all studied accessions belong to Hanganesc race.
Table 4 emphasizes all descriptors which describe the Hanganesc race in comparison to the values of descriptors at the four maize landraces which belong to the same race, originated from Vama village, county

Table 4

The middle values of the descriptors which determine the specific traits of the Hanganesc race at 4 maize landraces coming from Vama village, county Suceava

Descriptors	**The specific traits of the Hanganesc race**	**Accession name**			
		Vama 404	**Vama 10**	**Vama 19**	**Vama 1**
Collecting data		**1972**	**1985**	**1988**	**2002**
Plant height (cm)	**132-172**	156.75	108.2	169.66	181.4
Panicle length (cm)	**25.5**	26.75	28.57	28.0	31.7
No. of branches on category I	**8.8**	8.5	3.87	5.60	6.4
No. of branches on category II	**1.7**	1.6	1.56	1.7	1.6
Total numbers of the leaves	**8.3**	6.62	7.57	7.33	7.9
Number of the leaves of the lower ear	**4**	2.8	3.7	3.66	3.8
Insertion height of the main ear (cm)	**44.0**	37.5	39.7	42.3	51.9
Maximum diameter of the stem (mm)	**14.3**	17.5	14.9	19.1	15.79
Ear length (cm)	**11.5**	11.9	12.03	12.5	11.83
No. of kernel rows	**12-18**	16.5	16.85	15.3	18.4
Grain length (mm)	**7.8**	7.9	8.1	8.06	8.13
Grain width (mm)	**6.2**	6.8	6.6	7.1	6.8
1000 kernel weight (g)	**150-191.6**	180	160	188	180

The data recorded in the above table highlight the following aspects:
- The accession collected in 2002, has higher values of the descriptors: plant height, insertion height of the main ear, and panicle length than the values of descriptors of the Hanganesc race. After 30 years the descriptors: ear length, grain length, grain width and 1000 kernel weight have the same values.

The accession collected in year 2002 shows the typical traits of the Hanganesc race. Also this accession is similar to the accession collected in 1972

Conclusions

By analyzing the genetic erosion of maize local landraces, one can draw the following conclusions:
1. The characteristics of race Hanganesc have changed strongly in the area Broşteni to a lesser extent in the area Frumosu whereas in the area of Vama the characteristics remained unchanged after 30 years from the first collections, especially the descriptors regarding grain and ear.

2. The race Moldovenesc underwent significant changes in the area Vatra Moldovitei, at present is in danger of extinction and will soon be replaced by the sub race Hanganesc/ Moldovenec.

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