THE SUMMARY OF THE THESIS

The genetical value of the corn inbred lines is determined by the germplasm source they are extracted from, by the selection methods applied to the successive corn generations as well as of the recombination capacity expressed by the heterozys phenomenon that is shown up.

Within our country, aside the inbred corn hybrids extracted from the local germplasm (corn varieties and corn populations cropped till the introduction of the corn hybrids), foreign, well known companies in corn breeding have introduced their own genetic material.

This situation have determined us to unfold a comparative study of some inbred lines extracted from local germplasm along with inbred lines extracted from European germplasm as well as with American one.

The results of such a study could suggest us the qualitative level of the breeding works in comparison with the one practiced within the European and American centers of corn breeding as well as the genetical qualities of adaptation of the European and American hybrids to the soil and clime conditions from our country.

The biological material that was studied in the present thesis is represented by 6 inbred lines as parental forms for 3 hybrids of each germplasm source wich, in 1995-2000 period research have proven the most suitable for the central and south zone of Oltenia. As control there was used the mother inbred line of the Olt hybrid as the hybrid itself.

We make the statement that these results stay valuable for the biological material that was experimented and the level of the results till 2000 year because in the last time the financial and material means were more and more generous for the European germplasm as well as the qualified personnel and, especially, for the American one and more precarious for the local one.

In actual conditions when we witness climatic significant changes determined by the global warming, we dedicated a large space to the drought resistance of the genetic material.

Because the data on the behavior of the experimented inbred lines and hybrids are get in 3 years (2004, 2005, 2006) we present the rainfall cumulated within the vegetation period at ARDS Simnic within the researching period.

The rainfall curve monthly cumulated in 2004 is overlapped on the average of the zone. This rainfall quantity ensure the obtaining of around 25,0-30,0 q/ha corn grains that is only one third of the genetical potential of this crop.

Consequently, when rainfall is in the average of the zone, the year can be considered dry, as we performed in the present thesis.

In 2005, the sum of the rainfall reached 1000 l/m^2 and determined a yield of 110 q/ha that is close to the genetical potential of the species. As result, the 2005 year can be considered in irrigated conditions.

In 2006, the rainfall were 700 l/m^2 cumulated of the rains during the corn growing season; these rainfalls determined a yield of 55.0 q/ha. This fact make us to consider the 2006 as an favorable year.

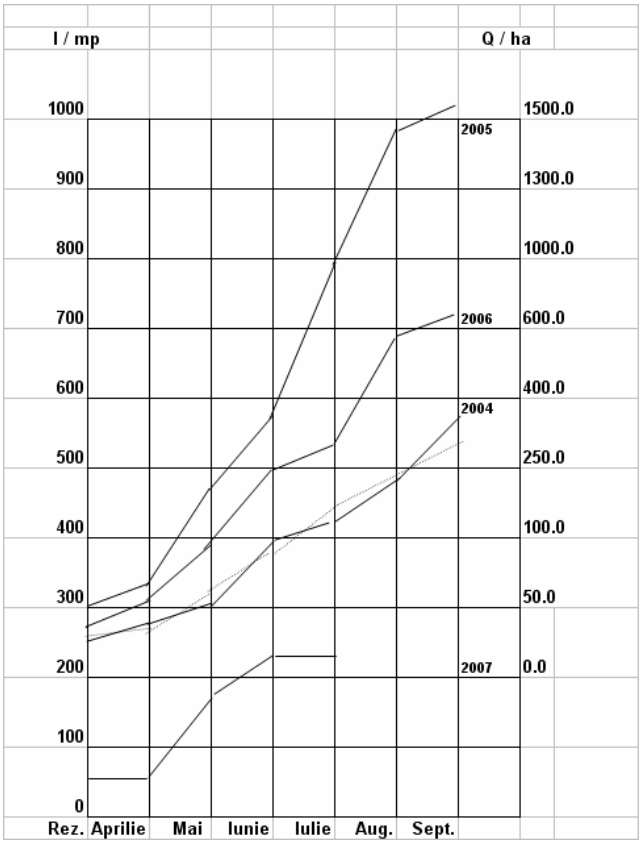

Fig. 5.3.1. Cumulated raind fall within corn growing season at ARDS Şimnic

The 2007 year, as it is shown within the aside graphic has recorded rains within the cold period of the year (October-april) much lower than the average of the zone and the catastrophic drought from may, june and july when there were only 230 l/square meter has conducted to the total compromising of the corn yield. We emphasize the fact that the total loss of the corn yield during these months was due to the frequency of the hot days and tropical nights that happened during july 12-15 day and nights in turn. We can say that the summer of the 2007 year represent a warning for the south part of Romania.

The correlation between the sum of the rainfall and the corn yield show that we are in a zone were the rains are close to the average ensure only a third of the genetical potential of the experimented hybrids. This situation pledges for the amplifying of the corn breeding works in order to adapt them to the drought conditions that are more and more present in our area and the lack of irrigation.

The data from the 6.1. graphic show the good behavior of the inbred local lines in 2004 that was dry. Of the 6 inbred researched lines, 4 have a similar behavior with the control, the inbred line of the Olt hybrid and 2 lines records lower yields in comparison with the control.

The inbred lines extracted from the European germplasm have a high drought sensitivity in 2004. All 6 researched lines give distinct significant yields over the control.

The genetic material extracted from the American germplasm has a better behavior to drought over the European one. Of the 6 inbred lines, three of them give similar yields with the control.

In the climatic conditions of the 2005 year, the more abundant rainfall emphasize the better yielding capacity of the inbred lines that are extracted from the European germplasm, followed by the American ones. The local germplasm are in the third place.

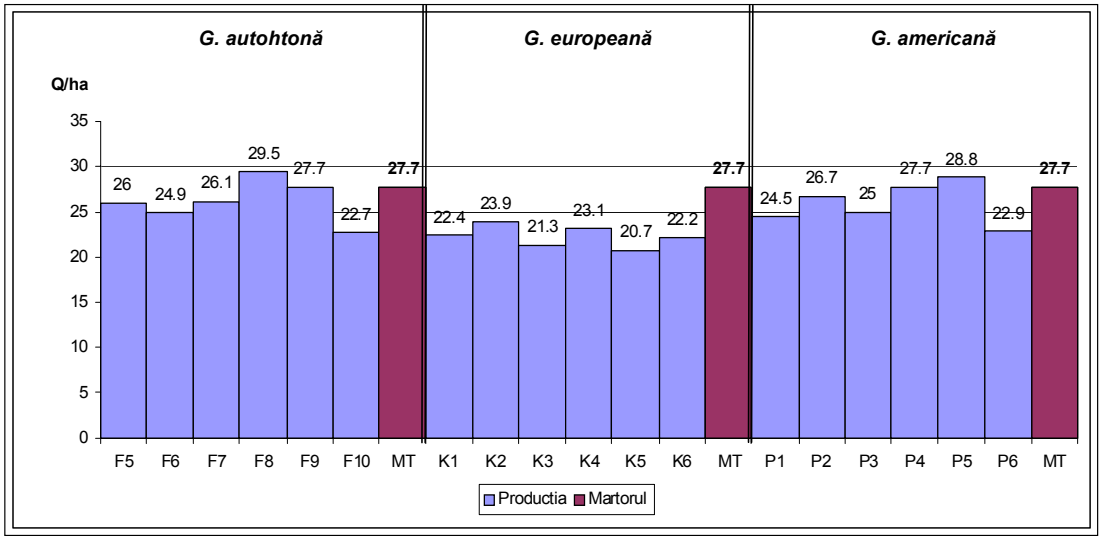

Fig. 6.1. The graphic of the yields given by the corn inbred lines extracted from three germplasm sources in 2004 year that was dry.

This situation is the consequence of the fact that the drought resistance was a major research direction in our country who used in their research the local populations as well as the American ones that have confronted within our climatic area with the phenomenon of incomplete development of the corn grains with the hybrids that were introduced in our zone from 1960 onward.

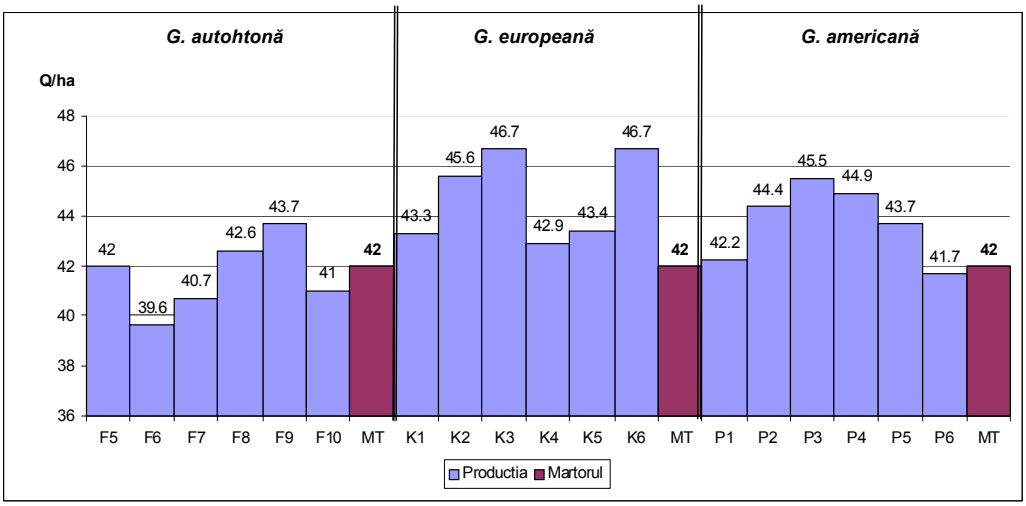

Fig. 6.2. ***The graphic of the yields given by the corn inbred lines extracted from three germplasm sources in 2005 year that was extremely wet***

The value and, especially, the variability of the main characters with the inbred corn lines are very important for the establishing of the genetical purity of the material both for the maintaining plots as well as for the hybridation plots. In our case, the

average of the values for the plant heights and the insertion of the cob is higher with the local germplasm and the MTG is higher with the American and European sources.

Among the main phenotypical traits, the one that confers the drought resistance is the plant proliphycity that with the local source is superior over the European or American.

There is well known that in drought conditions the corn has a lower sterility within the field and, consequently, a better yield.

The indicator of variability (s%) with the main phenotypical studied features is higher with the local source that illustrate the superiority of the foreign material which is paramount for the marketing aspect of the hybrids.

This aspect show the evident superiority of the American breeding research over the European one that slowed down and kept in the Russian concepts after the World war two.

The yielding capacity of the hybrids obtained by direct and reciprocal crossing of the parental lines in 2004 and 2005 that are different as rainfall confirms the behavior of the germplasm sources presented before.

Table 7

The value and the mean variability of the main characters of the inbred lines of the three germplasm sources studies at ARDS Şimnic

Source	Plant height cm		Cob insertion heigh (cm)		Cob weight		MMB g.		Nr. Of cobs at 100 pl.
	$\bar{x} \pm sx$	s%	$\bar{x} \pm s\bar{x}$	s%	$\bar{x} \pm sx$	s%	$\bar{x} \pm sx \cdot s\bar{x}$	s%	
Local	187,8 ± 3,7	6,1	78,6 ± 3,2	6,1	158,4 ± 3,2	5,0	162,1 ± 2,0	4,1	114,2
European	167,0 ± 1,9	2,7	57,2 ± 1,8	2,4	143,1 ± 2,0	2,0	185,2 ± 1,9	2,5	105,4
American	174,4 ± 2,9	2,9	70,4 ± 1,8	3,0	159,6 ± 2,4	2,2	189,2 ± 2,1	2,3	103,6

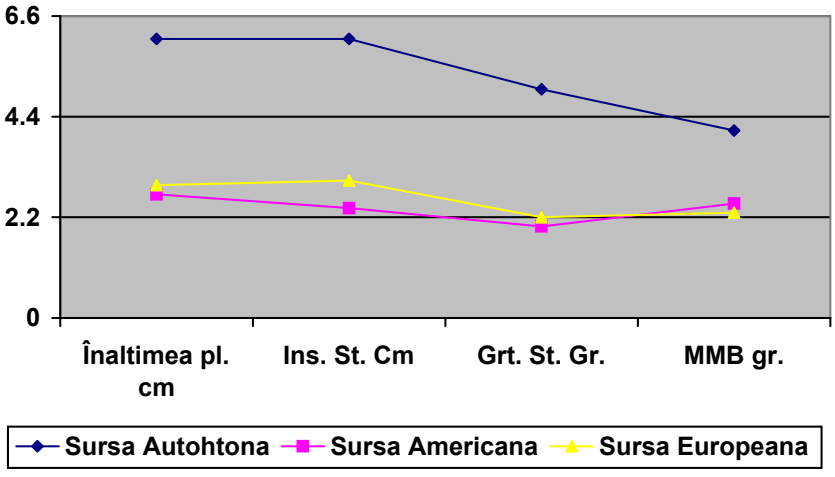

Table 6.2.1

The yields given by the corn hybrids obtained from reciprocal of the inbred lines from the three germplasm sources that were researched at ARDS Simnic in 2004

Source	Hybrid	Formula	Yield in 2004		
			Q/ha	%	S
Local	HSF1	lcF5 × lcF6	32,0	95,5	
	HSF2	lcF6 × lcF5	30,7	91,6	0
	HSF3	lcF7 × lcF8	29,7	88,6	00
	HSF4	lcF8 × lcF7	35,3	105,4	
	HSF5	lcF9 × lcF10	35,2	105,1	
	HSF6	lcF10 × lcF9	31,2	93,1	0
European	HSK1	lcK1 × lck2	28,9	86,3	000
	HSK2	lcK2 × lck1	29,7	88,6	00
	HSK3	lcK3 × lck4	26,5	79,1	000
	HSK4	lcK4 × lck3	24,9	74,3	000
	HSK5	lcK5 × lck6	29,7	88,6	00
	HSK6	lcK6 × lck5	27,6	82,4	000
American	HSP1	lcP1 × lcP2	32,3	96,4	
	HSP2	lcP2 × lcP1	33,0	98,5	
	HSP3	lcP3 × lcP4	33,9	101,2	
	HSP4	lcP4 × lcP3	33,5	100,0	
	HSP5	lcP5 × lcP6	33,7	100,6	
	HSP6	lcP6 × lcP5	32,9	98,2	
	HSOlt (mt)	-	33,5	100,0	

DL 5% = 6,9%; 1% = 9,3%; 0,1% = 12,3%

Table 6.2.2

The yields given by the corn hybrids obtained from reciprocal of the inbred lines from the three germplasm sources that were researched at ARDS Simnic in 2005

Source	Hybrid	Formula	Yield in 2005		
			Q/ha	%	S
Local	HSF1	lcF5 × lcF6	101,5	91,7	00
	HSF2	lcF6 × lcF5	104,0	93,9	0
	HSF3	lcF7 × lcF8	108,6	98,1	
	HSF4	lcF8 × lcF7	99,8	90,1	00
	HSF5	lcF9 × lcF10	113,7	102,7	
	HSF6	lcF10 × lcF9	109,9	99,3	
European	HSK1	lcK1 × lck2	113,7	102,7	
	HSK2	lcK2 × lck1	109,0	98,5	
	HSK3	lcK3 × lck4	116,5	105,2	x
	HSK4	lcK4 × lck3	111,6	100,8	
	HSK5	lcK5 × lck6	116,5	105,2	x
	HSK6	lcK6 × lck5	99,8	90,1	
American	HSP1	lcP1 × lcP2	112,6	101,7	
	HSP2	lcP2 × lcP1	115,0	103,9	
	HSP3	lcP3 × lcP4	119,5	108,0	xx
	HSP4	lcP4 × lcP3	113,7	102,7	
	HSP5	lcP5 × lcP6	114,0	103,0	
	HSP6	lcP6 × lcP5	110,7	100,0	
	HSOlt (mt)	-	110,7	100,0	

DL 5% = 5,2%; 1% = 7,2%; 0,1% = 9,4%

Table 6.2.3

The value of the reproductive heterozys shown by the three germplasm sources in 2006 at ARDS Simnic

Source	Hybrid	Formula	Q/ha F1	Q/ha l.c. mamă	Val. heterozisului	
					Q/ha	%
Local	HSF1	lcF5 × lcF6	53,0	33,8	19,2	36,2
	HSF2	lcF6 × lcF5	52,9	30,2	22,7	42,9
	HSF3	lcF7 × lcF8	57,7	36,2	21,5	37,3
	HSF4	lcF8 × lcF9	49,9	29,9	20,0	40,0
	HSF5	lcF9 × lcF10	53,9	34,9	19,0	35,2
	HSF6	lcF10 × lcF9	48,3	34,0	14,3	29,6
European	HSK1	lcK1 × lck2	51,7	37,0	14,7	28,4
	HSK2	lcK2 × lck1	49,2	34,8	14,4	29,3
	HSK3	lcK3 × lck4	47,8	35,5	12,3	25,7
	HSK4	lcK4 × lck3	53,6	36,9	16,7	31,1
	HSK5	lcK5 × lck6	59,0	34,0	25,0	42,3
	HSK6	lcK6 × lck5	52,0	32,9	19,1	36,7
American	HSP1	lcP1 × lcP2	56,6	34,4	22,2	39,2
	HSP2	lcP2 × lcP1	53,4	32,5	20,9	39,1
	HSP3	lcP3 × lcP4	58,0	38,0	20,0	34,4
	HSP4	lcP4 × lcP3	52,0	35,4	16,8	32,3
	HSP5	lcP5 × lcP6	57,4	34,6	22,8	39,7
	HSP6	lcP6 × lcP5	53,2	37,0	16,2	30,4

For local sources germplasm = $\frac{36,2+42,9+37,3+40,0+35,2+29,6}{6}=36,8\%$

For european sources germplasm = $\frac{28,4+29,3+25,7+31,1+42,3+36,7}{6}=32,2\%$

For american sources germplasm = $\frac{39,2+39,1+34,4+32,3+39,7+30,4}{6}=35,8\%$

Within the 6.2.3.1. table there is shown the calculus of the heterozys value with the hybrids made through the crossing of the inbred lines obtained from three germplasm sources (local, American and European). There can be noticed that the relative value of the heterozys with the hybrids obtained from local germplasm vary between 29.6 and 42.9% with the ones from European germplasm between 25.7 and 42.3% and with the American ones between 32.3 and 39.7%. As a result, the amplitude of the variation of the value of the heterozys is higher with the European and local ones and lower with the American one.

The relative value of the heterozys with the local and American sources is close and with the European one is considerably lower.

If we look at the figures that express the value of the heterozys with each hybrid combination we will notice that the value of the heterozys is lower with the hybrid combinations where the mother inbred lines have a higher yielding capacity.

Table 6.3.1

Maintaining of heterozys in F1, F2, and F3 generations, with syntetics obtained from inbred lines extracted from the three germplasm sources

Specification	2004			2005			2006		
	Q/ha	% F1	S	Q/ha	% F1	S	Q/ha	% F1	S
S. local sint. 1 F1	32,1	100,0		97,6	100,0		47,9	100,0	
S. local sint. 1 F2	30,8	95,8		95,0	97,3		49,0	102,3	
S. local sint. 1 F3	-	-	-	96,6	99,3		46,0	97,7	
S. euorpean sint. 2 F1	26,7	100,0		85,3	100,0		46,0	100,0	
S. euorpean sint. 2 F2	24,8	92,9		84,9	99,5		45,3	98,5	
S. euorpean sint. 2 F3	-	-	-	85,5	100,2		44,8	97,4	
S. american sint. 3 F1	31,0	100,0		97,8	100,0		50,7	100,0	
S. american sint. 3 F2	22,2	71,6	000	69,2	70,7	000	37,3	73,6	000
S. american sint. 3 F3	-	-	-	72,8	74,4	000	36,0	71,0	000
HS Olt mt F1	33,5	100,0		110,7	100,0		52,0	100,0	
HS Olt mt F2	24,1	71,9	000	80,8	73,0	000	38,9	74,8	000
HS Olt mt F3	-	-	-	78,2	70,7	000	37,0	71,7	000

DL 5% = 5,9%; 1% = 8,4%; 0,1% = 11,7%
DL 5% = 6,8%; 1% = 9,2%; 0,1% = 12,0%
DL 5% = 6,0%; 1% = 8,1%; 0,1% = 11,2%

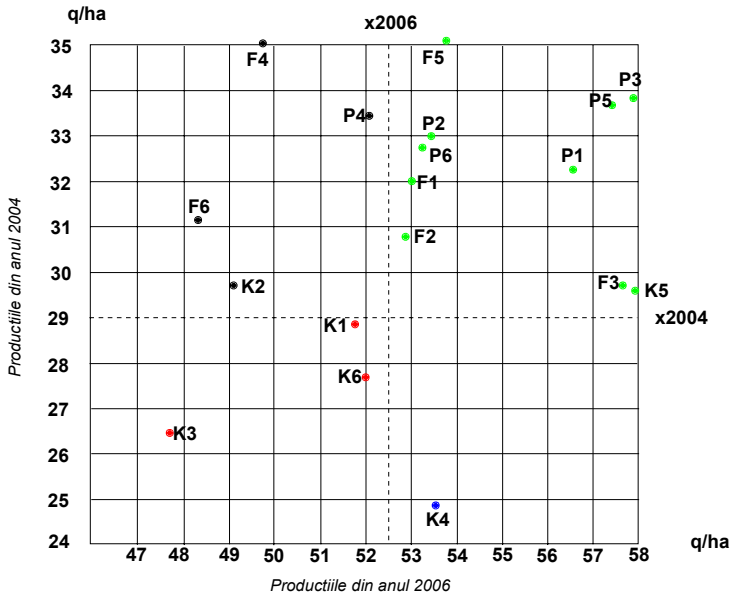

Fig. 6.5.2. ***The dispersion field of hybrid separation after drought behavior by 2004 yields correlated by 2006 ones***

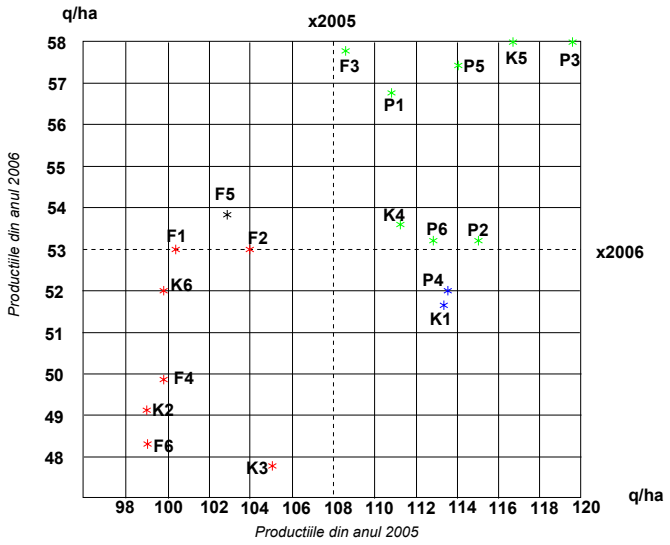

Fig. 6.7.1. ***The dispersion field of hybrid separation with different behaviour in drought conditions***

Following the hybrids formula that have a more pronounced heterozys we can apart inbred lines with a better specific combination. This elite material is represented by the parental lines of the following hybrids HSF2, HSF4 of local source, HSK5, HSK6 of European one and HSP1, HSP2, HSP5 of American one.

As a result, with the studied material represented by the 6 hybrid combinations for each germplasm source, with the local and European ones we find two more pronounced combinations and with the American one, three hybrid combinations with a better specific combination.

The classification of the three germplasm sources after the drought resistance and the yield place the American source on the first place with five hybrids, on the second place the local source with four hybrids and the European source with only one hybrid on the right corner of the dispersion graphic.

Recent information on the corn drought resistance approaching on the American continent shows the main researching directions:

- the testing for drought resistance for a large number of hybrids (thousands)
- the using of molecular breeding and cloning of the drought resistance forms; the transfer of the drought resistance genes.

Transgenic approach that means researches on transferring drought resistance genes from other species by genetic engineering.