RESEARCH REGARDING THE MAIN P RODUCTION AND QUALITY INDICES OF SOME CORN HYBRIDS CULTIVATED IN THE BANAT AREA

Dorin CAMEN[1], Radu SUMALAN[1], Carmen BEINŞAN[1], Florin VILIGA[1], Laura SUCIU[1], Daniel BRUZNICAN[1]

E-mail: plantphysiology.ro@gmail.com

Abstract

In this paper we have studied the main indices of quality and production of 20 maize hybrids cultivated in climatic conditions specific to the Banat area. For this purpose we have grown in terms of conventional technology the 20 hybrids in comparative production plots of 0.5 ha / hybrid, the experimental field being located in Becicherecul Mic. Through this experiment we determined the following parameters: leaf area, productivity and the amount of starch and protein in beans. Experiments have shown that there are significant genetic differences among the 20 hybrids studied both in terms of quality and productivity. The leaf area was determined using a portable AM-300 scanner, recorded values being between these limits 2680 cm^2/pl and 5877 cm^2/pl, the experience media determined was 3767 cm^2/pl. The determinations were made when the plants were in stage 7.9 according to BBCH decimal unit code. Increased average leaf area / plant is directly influenced by the early stage of studied hybrids, the best results occurring in early hybrids. Regarding production qualities the results pointed out that productivity limits ranged between 10.25 t / ha in early hybrids and 14.87 t / ha for full mid season maturity hybrids. Grain quality was determined using a grain analyzer after NIR method. The main quality attributes tracked were: grain content in starch and protein substances. Thus in terms of starch content best results were obtained in full mid season maturity hybrids (79.47 %) while higher protein content was recorded in short mid season maturity hybrids (10.27 %).

Key words: maize, bioproductivity, leaf area, starch content

Corn is considered the third planet species cultivated after rice and wheat, but its productivity is much higher. It indicated in time the most intense rate of productivity, 5 times in a row in the last 60 years in the United States of America. In fact the U.S. is the largest producer of corn, followed by China, Brazil, Mexico, Argentina, Indonesia, France and South Africa, each with important areas. Corn (*Zea mays* L.) is one of the most valuable cultivated species, with an annual contribution to agriculture by a few billion. The extraordinary versatility and ecological plasticity of this species, associated with a high productive capacity caused its use both in human and animal alimentation and with multiple industrial uses, which led to continuous growth of production areas and productivity. In addition to important contributions in agriculture and economics, the corn is also a model for genetic research, by being the first vegetal species that had a genetic portfolio, originally published by Emerson et al. in 1935.

MATERIAL AND METHOD

The experiment was conducted in conventional technology by application fertilization N_{27} $P_{13,5}$ $K_{13,5}$. we have grown the 20 hybrids in comparative production plots of 0.5 ha / hybrid, the experimental field being located in Becicherecul Mic (tab. 1).

Through this experiment we determined the following parameters: leaf area, productivity and the amount of starch and protein in beans. The leaf area was determined using a portable AM-300 scanner (non-distructive methods), The determinations were made when the plants were in stage 7.9 according to BBCH decimal unit code.

RESULTS AND DISCUSSIONS

Leaf area represent an important physiologic index in some process appreciation: plant growth, photosynthesis etc. The leaf area was determinate in whole plant, the moment of analysis was 7.9 BBCH.

From the results obtained regarding the leaf area was observed that the maize hybrids showed differences between these limits 2680 cm^2/pl and 5877 cm^2/pl, the experience media determined was 3767 cm^2/pl. (*tab. 2*). Measurement of leaf area (LA) is critical to understanding many aspects of crop development, growth, and management. Availability of portable meters to estimate LA non-

---

[1] Banat 's University of Agricultural Science and Veterinary Medicine, Timişoara

destructively has greatly increased our ability to determine this parameter during the cropping season. Increased average leaf area / plant is directly influenced by the early stage of studied hybrids, the best results occurring in early hybrids.

Corn hybrids respond differently to high plant density (Phipps and Weller, 1979; Pinter et al., 1994). Nafziger (1994) suggested that newer hybrids have greater grain yield at higher plant densities than older hybrids. Newer hybrids seem to be more tolerant to plant stress at higher plant density than older hybrids (Tollenaar, 1992).

Regarding production qualities the results pointed out that productivity limits ranged between 10.25 t / ha in early hybrids and 14.87 t / ha for full

mid season maturity hybrids. Grain quality was determined using a grain analyzer after NIR method. The main quality attributes tracked were: grain content in starch and protein substances. Thus in terms of starch content best results were obtained in full mid season maturity hybrids (79.47 %) while higher protein content was recorded in short mid season maturity hybrids (10.27 %) (fig.1). In conclusion, after carrying out the experiments we observed that in terms of both productivity and quality best results were obtained with full mid season maturity hybrids under cultivation conditions in the Banat region.

Table 1

Biological matherial used in experiment

No.	Producer	Hybrid	Group Fao	Precocity
1	Euralis	Garant	300	Timpuriu
2	Euralis	Zodiac	460	Semitardiv
3	Limagrain	3350	360	Timpuriu
4	Limagrain	3475	470	Semitardiv
5	Limagrain	Accaro	470	Semitardiv
6	Maissadour	Clarino	340	Semitimpuriu
7	Maissadour	Mas 37	370	Timpuriu
8	Decalb	DKC 3511	310	Timpuriu
9	Decalb	DKC 4490	360	Semitimpuriu
10	Decalb	DKC 4590	370	Semitimpuriu
11	Decalb	DKC 4964	390	Semitimpuriu
12	Decalb	DKC 4795	410	Semitardiv
13	Decalb	DKC 5170	460	Semitardiv
14	Caussade	CORTI	340	Timpuriu
15	Caussade	REALI	380	Semitimpuriu
16	Pioneer	PR 37 M 34	400	Semitimpuriu
17	Syngenta	SYMBA	290	Timpuriu
18	Syngenta	COBALT	340	Semitimpuriu
19	Syngenta	THERMO	350	Timpuriu
20	Syngenta	PAKO	490	Semitardiv

**a) Variance analysis for leaf area/plant. BBCH 7.9 in studied maize hybrids**

Table 2

Experimental results regarding Leaf Area

Source of variation	SS	DF	MS	F Test
Total	13329753904	62		
Repetitions	83811287	2	41905644	F = 0.39
Hybrids	8935049763	20	446752488	F =4.15**
Erorr	4310892854	40	107772321	

b) The significance of differences between studied maize hybrids concerning leaf area/plant. BBCH 7.9

No.	Hybrid	Leaf area/plant (cm^2)		To experience mean	
		$\overline{x} \pm s_{\overline{x}}$	s%	Relative value (%)	Difference Signifficance
	Exper. mean.	3767+81	3.75	100.00	Control
1	ES GARANT	4995+850	29.48	132.58	12277
2	ES ZODIAC	4506+687	26.42	119.60	7386
3	LG 3350	781+273	60.60	20.73	-29867[00]
4	LG3475	5053+916	31.40	134.12	12856
5	ACARRO	2779+824	51.65	73.76	-9887
6	MAS CLARINO	3952+363	15.93	104.89	1841
7	MAS 37	3502+78	3.90	92.96	-2653
8	DKC 3511	3205+929	50.20	85.08	-5623
9	DKC 4490	1304+323	43.01	34.62	-24635[00]
10	DKC 4590	4625+175	6.57	122.75	8572
11	DKC 4964	3809+67	3.05	101.11	419
12	DKC 4795	3053+289	16.41	81.05	-7141
13	DKC 5170	3912+459	20.35	103.84	1447
14	CAUSSADE CORTI	5877+155	4.58	156.00	21098*
15	CAUSSADE REALI	3229+689	36.97	85.71	-5383
16	PR 37 M 34	4459+68	2.67	118.36	6917
17	SYNGENTA SYMBA	4795+208	7.54	127.28	10277
18	SYNGENTA COBALT	2680+451	29.17	71.14	-10875
19	SYNGENTA THERMO	4168+395	16.43	110.63	4005
20	SYNGENTA PAKO	4664+338	12.57	123.80	8969

LSD $_{5\%}$	LSD $_{1\%}$	LSD $_{0.1\%}$
1712 cm2	2288 cm2	3009 cm2
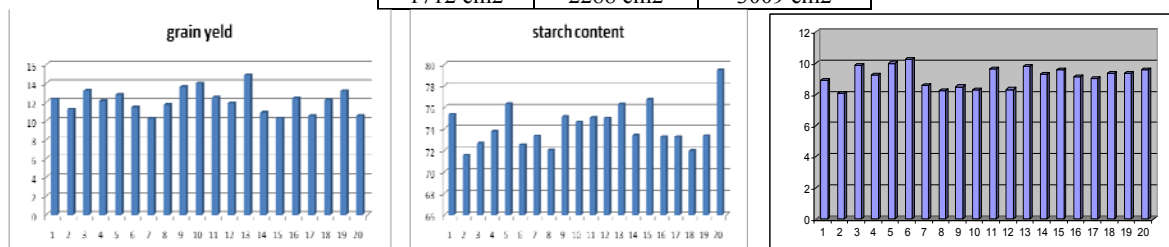
Figure 1 Grain yeld (t/ha) starch and protein content (%) in studied maize hybrids

CONCLUSIONS

Increased average leaf area / plant is directly influenced by the early stage of studied hybrids, the best results occurring in early hybrids.

The maize hybrids showed differences between these limits 2680 cm^2/pl and 5877 cm^2/pl, the experience media determined was 3767 cm^2/pl.

The results pointed out that productivity limits ranged between 10.25 t / ha in early hybrids and 14.87 t / ha for full mid season maturity hybrids. In terms of starch content best results were obtained in full mid season maturity hybrids (79.47 %) while higher protein content was recorded in short mid season maturity hybrids (10.27 %).

ACNOWLEDGEMENTS

BIBLIOGRAPHY

Nagy, J., 1994 - *The effect of fertilization and irrigation on the yield of maize (Zea mays L.) hybrids with varions genotypes*, Unipress, Padova, 421-440.

Nagy, J., 1995 - *Evaluating the effect of fertilization on the yield of maize (Zea mays L.) in different years,* Növénytermelés, 44. 5-6. 493-506.

Nafziger, E., 1994 - *Corn planting date and plant population*, J. Prod. Agric. 7:69–62.

Phipps, R.H., Weller, R.F., 1979 - *The development of plant components and their effects on the composition of fresh and ensiled forage maize*, In. The accumulation of dry matter, chemical composition and nutritive value of fresh maize. J. Agric. Sci. (Camb.) 92:471–483.

Pinter, L., Schmidt, J., Jozsa, S., Szabo, J., Kelemen, G., 1990 - *Effect of plant density on the feed value of forage maize,* Maydica 35: 73–79.

Tollenaar, M., 1992 - *Is low plant density a stress in maize*? Maydica 37:305–311.