REACTION TO NITROGEN FERTILIZATION OF A SUGAR MAIZE ASSORTMENT

REACȚIA LA FERTILIZARE A UNUI SORTIMENT DE HIBRIZI DE PORUMB ZAHARAT

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Abstract. *The authors present in this paper a synthesis of results of the experimental cycle 2004-2006, a period characterised by very different climate conditions and that points out the good behaviour of all experimental hybrids. Experimental results point out the favourable reaction of the hybrids to mineral fertilisation, average yield reaching over 10,000 kg/ha of ears harvested at the "milk-wax" maturity period. Optimal sowing density for this crop as shown by experimental data is 65,000 plants/ha.*

Rezumat. *Lucrarea prezintă sinteza rezultatelor din ciclul experimental 2004-2006, perioadă caracterizată prin condiții climatice foarte diferite și care pune în evidență buna comportare a tuturor hibrizilor experimentați. Rezultatele experimentale evidențiază reacția favorabilă a hibrizilor la aplicarea fertilizării minerale, producțiile medii situându-se la peste 10.000 kg/ha ştiuleți recoltați la maturitatea ,,lapte ceară". De asemenea densitatea optimă de semănat pentru această cultură după cum rezultă din datele experimentale este de 65.000 plante/ha.*

Key words*: sweet maize, fertilising, "milk-wax" maturity*
Cuvinte cheie: *porumb zaharat, fertilizare, maturitate lapte ceară*

INTRODUCTION

The Banat area in which research was carried out is favourable to sweet maize cultivation. Sweet maize is a plant cultivated on larger and larger areas the last decade due to the ever larger demands on the market both from consumers and processing and wrapping firms. Valorising climate and soil potential of the area is only possible through the cultivation of hybrids adapted to the area that has both a high-yielding potential and high-quality features (high sugar content). Establishing the optimal mineral fertilising level and recommended sowing densities is also very important in achieving high yields.

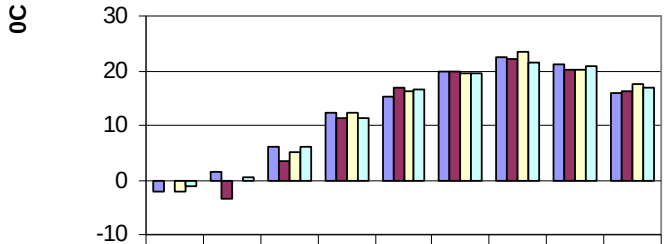
MATERIAL AND METHOD

The experimental field was set on a cambic, moist phreatic (weakly gleyed), weakly decarbonated chernozem set on loess deposits, clay loamy-dusty/clayey-loamy within the Didactic Station of the Agricultural and Veterinary University of the Banat in Timişoara. The experiment was of the tri-factorial type, organised after the subdivided plot method with three replications, with the following graduation of experimental factors: factor A – agro-fund with three graduations of the nitrogen dose (N_0, N_{100}, and N_{150}) on a constant fund of $P_{100}K_{100}$; factor B – the hybrid cultivated, with 5 graduations (Dulcin, Delicios, Deliciu, Estival, and Spirit); factor C – plant density per ha, with 2 graduations (45,000 pl/ha and 65,000 pl/ha). Winter wheat was the pre-emergent plant.

RESULTS AND DISCUSSION

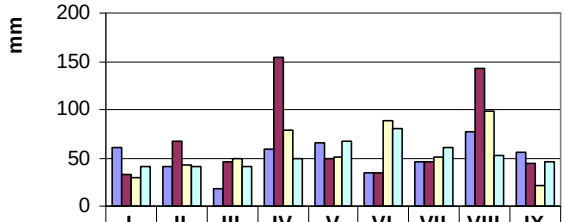
Figures 1 and 2 present monthly temperatures and rainfall during the experimental cycle 2004-2006 compared with multi-annual averages recorded at the Meteorological Station in Timişoara.

Data show that the Timişoara area, located in the Timişului Plain (Western Romania) benefits from climate favourable conditions for the cultivation of sweet maize. To also note that even in dry years in this crop yields can benefit cultivators, as these hybrids have a shorter vegetation period and valorise water accumulated in the soil during winter and from spring rainfall.



	I	II	III	IV	V	VI	VII	VIII	IX
Anul 2004	-2,2	1,5	6	12,2	15,2	20	22,5	21,2	15,8
Anul 2005	0	-3,3	3,4	11,4	16,8	19,7	22,1	20,3	16,1
Anul 2006	-2	0	5	12,4	16,2	19,5	23,6	20,1	17,5
Media multianuala	-1,2	0,4	6	11,3	16,4	19,6	21,6	20,8	16,9

Fig.1 Average monthly temperatures (^{0}C) at the Meteorological Station in Timişoara between 2004 and 2006 as compared to multi-annual averages



	I	II	III	IV	V	VI	VII	VIII	IX
Anul 2004	60	40,3	18	59,1	66,2	34,8	45,2	76,9	55,6
Anul 2005	32,3	67,8	45,5	154	49,8	35,1	45,2	142	44,3
Anul 2006	30	42	49	78,8	50,2	87,8	50,4	98	21
Media multianuala	40,9	40,2	41,6	50	66,7	81,1	59,9	52,2	46,1

Fig. 2 Monthly rainfalls (mm) at the Meteorological Station in Timişoara between 2004 and 2006 as compared to multi-annual averages

Table 1 shows ear yield harvested upon milk maturity, depending on the hybrid, fertilising level, and plant density per ha, during the experimental period of time.

Table 1

Synthesis of crops results obtained in Timisoara area in experimental cycle 2004-2006

Factor A Griffons	Factor B Hybrid	Factor C Density		Average factor A			
		45000	65000	Crop (kg/ha)	%	Difference (kg/ha)	Significance
$N_0P_{100}K_{100}$	Dulcin	9054	10322	9395	100		
	Delicios	9519	10838				
	Deliciul	9355	8774				
	Estival	8493	9282				
	Spirit	8317	9001				
$N_{100}P_{100}K_{100}$	Dulcin	9749	12341	10732	114	1337	xxx
	Delicios	10650	12834				
	Deliciul	9882	11699				
	Estival	9353	10905				
	Spirit	9247	10691				
$N_{150}P_{100}K_{100}$	Dulcin	12348	13887	12259	130	2864	xxx
	Delicios	12777	14948				
	Deliciul	10901	12877				
	Estival	10421	12462				
	Spirit	9914	12054				

DL 5 % = 493 kg/ha;
DL 1 % = 625 kg/ha;
DL 0.1 % = 890 kg/ha

Average factor C

Specification	45000	65000
Crop (kg/ha)	9779	11316
%	100	116
Difference (kg/ha)		1537
Significance		xxx

DL 5 % = 786 kg/ha;
DL 1 % = 1083 kg/ha:
DL 0.1 % = 1451 kg/ha.

Average factor B

Dulcin	Delicios	Deliciul	Estival	Spirit
11258	11942	10748	10152	9757
100	106	95	90	87
	684	-510	-1106	-1501
	xx	0	000	000

DL 5 % = 411 kg/ha;
DL 1 % = 695 kg/ha;
DL 0.1 % =856 kg/ha.

Analysing harvest data shows that by applying 100 kg of nitrogen fertiliser on a constant fund of $P_{100}K_{100}$, yield increased with 14%. The difference in yield of 1,337 kg/ha is statistically ensured as very significant.

Therefore, the highest ear yield (harvested upon milk maturity) was in the variant fertilised with $N_{150}P_{100}K_{100}$, i.e. 12,259 kg/ha. The yield increase of 30% and, subsequently, the difference in yield of 2,864 kg/ha, recorded compared to the control variant ($N_0P_{100}K_{100}$) are statistically ensured as very significant.

As for the plant density per ha, we can see that experimental hybrids can be sown at higher densities, yield obtained in the variant sown with 65,000 plants/ha being 16% higher than the one obtained when sown with 45,000 plants/ha. In this case too, the difference in yield of 1,537 kg/ha is statistically ensured as very significant.

As far as experimental hybrids are concerned, we can see that compared to the Dulcin control hybrid, only a single hybrid yielded more (the Delicios hybrid – 11,942 kg/ha), the other experimental hybrids yielding -510 kg/ha (Deliciu), -1,106 kg/ha (Estival), and -1,501 kg/ha (Spirit) less.

The difference in yield of 684 kg/ha yielded by the Delicios hybrid compared to that of the Dulcin control is statistically ensured as very significant.

CONCLUSIONS

Analysing yield data from the experimental field in Timişoara we can say that sweet maize find very good favourability conditions in the Banat area even with no irrigation at all when there is lack of rainfall, conditions evenly distributed during the vegetation period April-July).

Nitrogen fertilisers increased the yield, the doses we recommend ranging between N_{100} and $N_{150}P_{100}K_{100}$, which proves the good valorising potential of the experimental hybrids.

The sowing density we recommend is 65,000 plants/ha, and the hybrids we recommend are Delicios and Dulcin, but newer hybrids as Estival and Spirit can also benefit cultivators.

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