

## INFLUENCE OF SOWING TIME AND GROWING AREA OF PRODUCTIVE POTENTIAL OF SWEET CORN HYBRIDS

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**Abstract.** The results presented in this paper shows the influence of sowing time on the production potential of same sweet corn hybrids. Planting dates was determined according to experimental variations. For the first sowing time be considered when soil temperature was 8-10°C. The highest yield was recorded in hybrid 702, in all planting dates. Local hybrids were ears of lower size compared with the foreign hybrids, but have made many ears per plant. Foreign hybrids have proved superior to Romanian ones, with larger share of the mass of the cobs without leaves from the total mass of the ears.

**Key words:** *Zea mays*, var. *rugosa* (Bonaf), convar. *Saccharata* Koprn (Sturt.), cob, Luduș, Dâlga.

### Introduction

Sweet corn (*Zea mays* L. *saccharata* Korn) is one of the most popular vegetable crops popular in the United States and Canada [1]. In recent years witnessed a growing spread in the Southern Pacific [2].

States that sweet corn is one of the most popular vegetables in the U.S. market, ranking second in consumption after tomato and seventh as a ratio between all fresh vegetables. [3]

Sweet corn differs from other types of corn by the presence of a gene or genes that alter starch synthesis in endosperm [4].

The edible part of this plant is immature grain consists of endosperm and ovary wall and genes that distinguish the sweet corn by usually corn affects just those tissues (*su1*, *su2*, *ae*, *bt*, *bt2*, *du*, *sh2*, *se*, *sb*, *shz*) Sugar is the main component of taste for sweet corn. Taste is also determined by flavor, especially the bouquet you have sweet corn during boiling.

Sweet corn is a real source of food for the human diet was observed with higher caloric content and high nutritional value compared to regular corn. Used as fresh or preserved, providing a real vitamin, mineral and energy intake, an important source of magnesium (48mg/100g beans). This food is also an important source of micronutrients, a food rich in magnesium (48mg/100 g edible items), usually

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missing from other vegetable. Energy value of sweet corn is 370 kJ, being higher than green peas. The technological maturity, seeds contain 25-27% dry matter, 14-15% carbohydrates, 5-5.5% protein, 0.75% fat, amino acids (tryptophan and lysine), significant amounts of vitamins: C, B complex, PP, E and mineral elements (K, P, Ca, Mg, Fe) [6].

Sweet corn is used in industry as raw material for canned food, but also for fresh market at milk stage, boiled or used for the preparation of different smoothies, gaskets for steaks, compotes, cream of corn soup, sweet corn and cornmeal enter ingredient of many pastries [6] [7].

Sweet corn is one of the most popular vegetables in the U.S. market, ranking second in consumption after tomato and seventh as a percentage between eating raw vegetables [3]. Annually, in the U.S. 226 hectares are planted with sweet corn and turnover resulting from the marketing of the product is over 180 million dollars. This culture is also very popular in Japan, Taiwan, South Korea, which occupies over 20,000 hectares. In Europe, significant areas are cultivated in France (17,100 ha), Italy (4800 ha) and Spain (2,100 ha).

In our country sweet corn began to grow much later and the fact that people used cultivars of corn grain consumption, which is consumed during milk - wax, boiled or fried.

Recently, sweet corn began to be sold in supermarkets as fresh or preserved vegetable and because this product is known and appreciated by customers, explains the need for further studies on the development of technological measures to allow expansion culture in Romania.

The paper presents results on the influence of sowing time and hybrid on productive potential of sweet corn.

### **Material And Methods**

Experience was held in 2011 in two sites: Dâlga, Călărași county, and Luduș, Mureș county. The biological material was represented by two Romanian hybrids: Deliciul verii and Prima and two foreign hybrids: Boston and H 702 (Table 1).

**Table 1** The organization of experience

Experience	Hybrid	Location	Sowing time	Technological features		
				Method	Planting scheme (cm)	Density
Influence of the sowing time on growing and development of some sweet corn hybrids in different locations	Prima Deliciul verii Boston 702	LUDUŞ	I* - 24.IV	sown directly	70/24	60.000
			II - 10.V			
			III - 17.V			
	Prima Deliciul verii Boston 702	DÂLGA	I* - 7. IV			
			II - 19.IV			
			III - 27.IV			

\* sowing when the soil temperature has reached 8 - 10<sup>0</sup> C;

During the experiment, it was realized many observations, measurements and determinations, which were used specific working methods namely:

- Morphometric determinations (plant height, height of the first ear insertion point), on the variants and repetitions. It was made observations and determinations on 10 plants in 4 repetitions.
- Phenological determinations: sowing date, date of emerging, date of anthesis and date of silk emergence.
- Production potential was determined by recording the number of ears formed per plant, their average mass and calculate the average production per plants/ ha, for each variant studied. The results were interpreted statistically by analysis of variance.

The technology used in the experiences was selected from the literature for sweet corn [5,7], except the time of sowing which was differentiated according to experimental variants.

Culture was established by sowing, when the soil temperature has reached 8 to 10<sup>0</sup> C. Density used was 60.000 plants/ha. Sweet corn harvesting occurs when they reach the maturity stage of consumption (milk-wax stage) when the cob is hard, well covered by leaves, and silk became brown and dry.

## Results And Discussion

From meteorological data presented in figure 1, we can see that in Dâlga from november to august there were lowest temperatures in January (- 3,6<sup>0</sup>C) and the warmest period was in July (25<sup>0</sup>C).

Concerning the hydric regime can be observed that the dry month was March (2 mm) and the precipitation was highest in May (98,3 mm). It can be noted that during November 2010 to August 2011 was favorable hydric regime, providing enough water which helped for good soil preparation for sowing in the spring. Although March showed no precipitation, in April, May and June, hydric regime was favorable for growing sweet corn. However, we can see that in the early growing season, temperatures recorded were quite low, causing a slight stress which affected the processes of seed emergence and young plants growth.

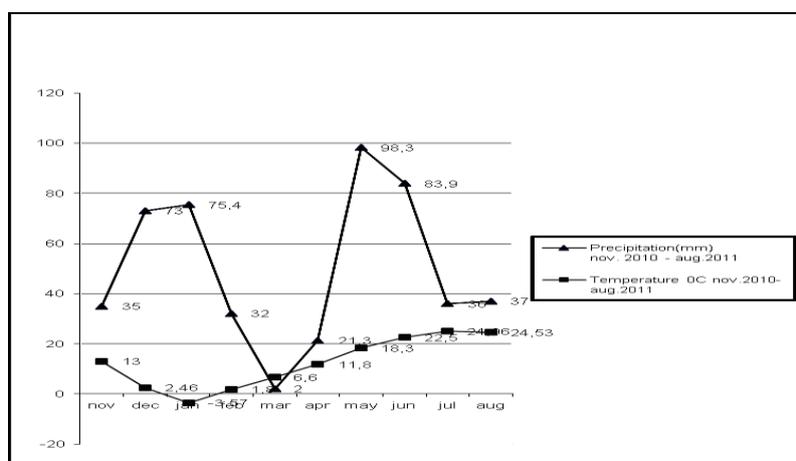


Fig. 1. Weather conditions for Dâlga during nov. 2010-aug. 2011

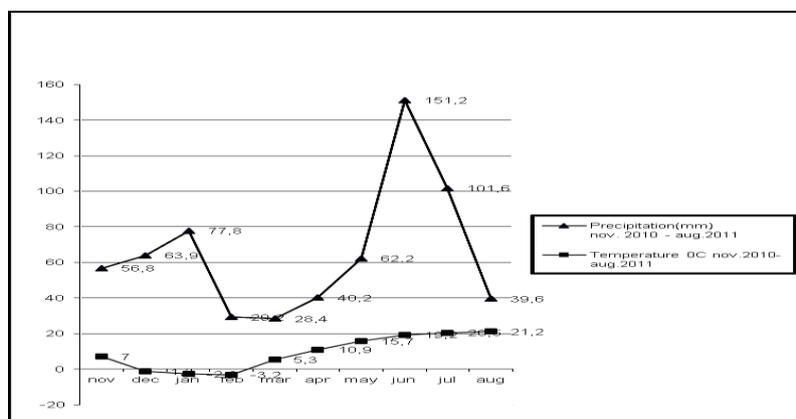


Fig. 2. Weather conditions for Luduș during nov. 2010-aug. 2011

From meteorological data presented in Figure 1.1 it can be seen that in the Luduș area, from November 2010 to August 2011, the lowest monthly average temperatures were registered in February (-3,2 °C) and the warmest period was in August (21,2 °C).

In the hydric regime, we can observe that the month with the lowest precipitation was March (28, 4 mm) and the highest precipitation was in June (151,2 mm). In the hydric regime, we can observe that the month with the lowest precipitation was March (28, 4 mm), and the highest precipitation was in June (151.2 mm). It can be noted so that during November 2010 – January 2011 the hydric regime was favorable for good preparation of soil in the spring for sowing.

As shown in table 2, the climatic conditions of 2011, at Dâlga - Călăraşi, there was an average weight of the ears of 291g (sowing time I), 316g (sowing time II) and 250g (sowing time III). Foreign hybrids had a higher average mass of the ear than Romanian hybrids. The first hybrid was H 702 with 314g (sowing time I), 367g (sowing time II), 282 g (sowing time III), above the average of 8%, 16%, respectively 13%, and the last one was Prima.

Hybrids studied were differentiated by weight components of the ear from the total mass. The foreign hybrids was better than Romanian ones, with higher percentage of the ear without sheets weight from the total weight of the ear (79-80%), with differences of 2 to 3% from the average experience (time I), 80% of the total, with differences 2% from the average experience (time II), 77-79% of the total, with differences of 1-3% from the average experience (time III).

Accordingly, in these hybrids it was found the lowest percentage the ear leaves (sheets, pannus), representing 20-23% by weight, depending on the time compared to 23 to 27% in local hybrids.

**Tabelul 2)** The influence of sowing time on the weight of ears at sweet corn Dâlga 2011

Hybrid	The average weight of ear(g)					The average weight kg/pl.
	Total ear+covering leaves	Of which				
		ear		covering leaves		
g	g	%	g	%		
<b>Time I</b>						
Average	291	226	77	65	23	0.3
Prima	244	180	74	64	26	0.3
Deliciul verii	299	228	76	71	24	0.3
Boston	305	244	80	61	20	0.3
H 702	314	249	79	65	21	0.4
<b>Time II</b>						
Average	316	254	78	64	22	0.4
Prima	266	202	76	44	24	0.3
Deliciul verii	349	270	77	79	23	0.4
Boston	310	249	80	61	20	0.3
H 702	367	294	80	73	20	0.5

Time III						
Average	250	192	76	59	24	0.3
Prima	229	168	74	61	27	0.2
Deliciul verii	247	188	76	59	24	0.3
Boston	243	187	77	56	23	0.3
H 702	282	223	79	59	21	0.3

As shown in Table 3, in the climatic conditions of 2011, the Luduş- Mureş County, there was a total average cobs weight of 323g (time I), 370g (time II) and 355g (time III). Foreign hybrids had a higher average mass of the native ear. The first hybrid was H 702 with 342g (sowing time I), 400g (time II), 390 g (time III), 5.9% above the average, 8, 1%, respectively 9,8%.

Hybrids studied were differentiated by weight components of the ear to its total mass. The foreign hybrids was better than Romanian ones, with higher percentage of the ear without sheets weight from the total weight of the ear (76-79%) of the total weight, with differences of 3% from the average experience (time I).

Hybrids showed a 21-27% share of the ear sheets (time I) of the total mass, with an average of 24%, foreign hybrid H 702 showed the lowest value of 21% and the highest value recorded at Prima, 27%.

**Tabelul 3)** The influence of sowing time on the weight of ears at sweet corn - Luduş 2011

Hybrid	The average weight of ear(g)					The average weight kg/pl.
	Total ear + covering leaves	Of which				
		ear		covering leaves		
g.	g	%	g.	%		
<b>Time I</b>						
Average	323	248	76	76	24	0.3
Prima	300	220	73	80	27	0.3
Deliciul verii	320	240	75	80	25	0.3
Boston	330	250	76	80	24	0.4
H 702	342	270	79	72	21	0.4
<b>Time II</b>						
Average	370	255	69	115	31	0.4
Prima	340	240	71	100	29	0.3
Deliciul verii	360	240	67	120	33	0.4
Boston	380	260	68	120	31	0.4
H 702	400	280	70	120	30	0.5
<b>Time III</b>						
Average	355	275	77	80	23	0.4
Prima	330	250	76	80	24	0.4
Deliciul verii	340	270	79	70	21	0.4
Boston	360	280	78	80	22	0.4
H 702	390	300	77	90	23	0.5

In the experimental conditions at Dâlga, at first sowing time for all hybrids cobs production ranged from 18,472 to 21,817 kg/ha, with an average of 19,907 kg/ha (table 4). Were observed with the highest production values hybrid 702 (21,817 kg/ha), followed by hybrid Prima (20,755 kg/ha).

In the second sowing time cobs production ranged from 19,966 to 28,634 kg/ha, with an average of 23441 kg/ha (table 4). Were observed with the highest production values hybrid 702 (28,634 kg/ha), followed by Deliciul verii (24,703 kg/ha).

In the third sowing time cobs production ranged from 14,820 to 20,280 kg /ha, with an average of 16.488kg/ha. Were observed with the highest production values hybrid 702 (20,280 kg/ha), followed by Deliciul verii (15,540 kg/ha).

**Table 4)** Synthesis of production results in some sweet corn Dâlga 2011

Hybrids	The average production-kg/ha			Signification		
	Time I	Time II	Time III	Time I	Time II	Time III
Average	19907	23441	16488	-	-	-
Prima	20755	19966	14820		0	00
Deliciul verii	18583	24703	15540			0
Boston	18472	20462	15310			00
H 702	21817	28634	20280	*	**	***

DL 5%	1672,8 - 8,40%	3019,9 - 12,88%	705,3 - 4,28%
DL 1%	2774,3 - 13,94%	5008,6 - 21,37%	1169,8 - 7,10%
DL 0,1%	5188,3 26,06%	9366,7 - 39,96%	2187,7 - 13,27%

In the experimental conditions of the Luduş, at first sowing time, cobs production ranged from 19,114 to 21,411 kg / ha, with an average of 20,634 kg / ha (table 5/fig.3). Were observed with the highest production values hybrid 702 (21. 411), followed by Boston (21,038 kg/ha).

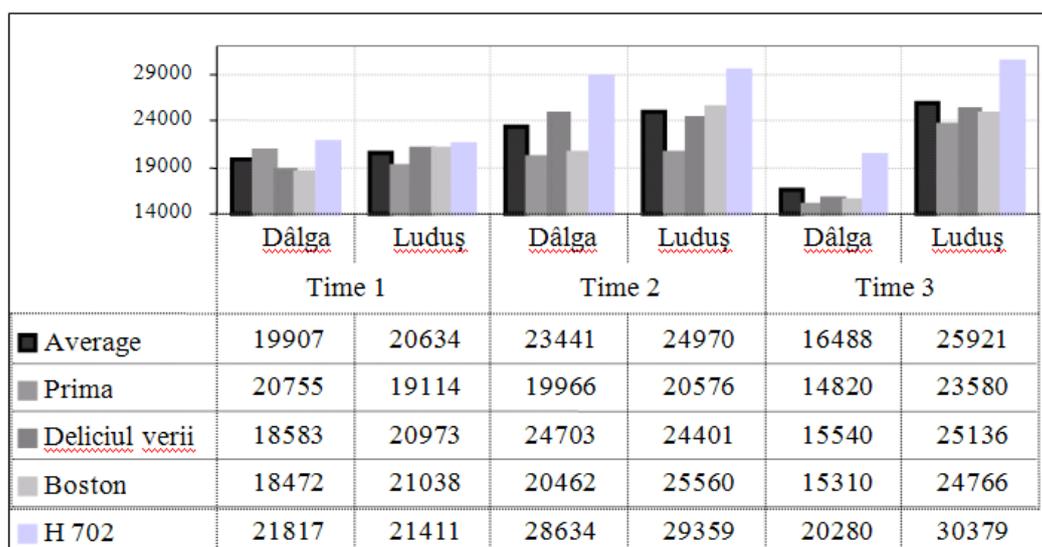
In the second sowing time, cobs production ranged from 20,576 to 29,359 kg/ha, with an average of 24,970 kg/ha. There were observed with the highest production values hybrid 702 (29,359 kg/ha), followed by Boston (25.560 kg/ha).

In the third sowing time, cobs production ranged from 23,580 to 30,379 kg /ha, with an average of 25,921 kg/ha (Table 5/fig. 3). Were observed with the highest production values at hybrid 702 (30,379 kg/ha), followed by Deliciul verii (25,136 kg/ha).

**Tabelul 5)** Synthesis of production results in some sweet corn – Luduș 2011

Hybrid	Producția medie-kg/ha			Semnificatii		
	Time I	Time II	Time III	Time I	Time II	Time III
Average	20634	24970	25921			
Prima	19114	20576	23580	000	000	0
Deliciul verii	20973	24401	25136			
Boston	21038	25560	24766	*		
H 702	21411	29359	30379	**	***	**

DL 5%	383,8 - 1,86%	972,1 - 3,89%	1958,9 - 7,56%
DL 1%	636,6 - 3,09%	1612,3 - 6,46%	3248,8 - 12,53%
DL 0,1%	1190,5 - 5,77%	3015,1 - 12,08%	6075,7 - 23,44%



**Figure 3.** The influence of sowing time on the average weight – Dâlga and Luduș – 2011

## Conclusions

Time of sowing had influence on production and production elements to all sweet corn hybrids in both locations (Dâlga and Luduş).

Planting dates also influenced the average ear weight values.

Number of ears per plant ranged from 1.0 to 1.3 for the two locations.

The data presented in the results shows that there is a direct and inverse relationship between number of ears per plant and size of ears.

Hybrid 702, the latest one, presented higher production than other hybrids, making positive significant to very significant differences depending on planting time and location.

Although Romanian hybrids have been exceeded by foreign hybrids on average ear size and the percentage of ears without sheets, because of the ability to form a larger number of ears per plant, finally they realize good level of production.

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