

## **SWEET CORN GROWING PERIOD AND MORPHOLOGICAL PROPERTIES IN WET YEAR**

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### **Abstract**

Experiment aims to investigate shortening of sweet corn growing period with application of some technological elements: propagation time, propagation method, floating row cover. The chosen variety was a conventional sweet corn hybrid, very early ripening 'Spirit'. The following growing technologies were compared: 1. Plants transplantation with floating row cover, 2. direct sowing of plants with floating row cover, 3. direct sowing of plants with no row cover (regarded as control).

The transplanted plants had shorter growing period by 13 days, compared to direct sowed covered treatment and were 17 days earlier harvested than control. Interaction of growing technology and plants covering had also favourable effect on some important morphological properties of ears such as weight of husked and unhusked ears, ear length, ear diameter, length of kernel and number of kernels.

**Key words:** earliness, sweet corn, transplantation, fleece covering.

### **Introduction**

Currently, Hungary is not considered as an influential country of the market considering the majority of the vegetables. The only exception is the sweet corn. Although the yield fluctuated, the growing area have grown continuously, in 2002 we gone before French and Hungary became the European leader in sweet corn growing. The impulsive force of great growth, was the canning and freezing industry. Based on its present growing area, the sweet corn is the vegetable which is grown on the greatest area in Hungary and after the sudden and sharp decline in 2003 this plant returned in a rise after 2006. According to the Hungarian Interprofessional Organization for Fruit and Vegetables and Product Board, with a growing area of over 30,000 hectares Hungary is presently the first in the EU. In the case of the former, however, the increase in fresh consumption partly counterbalanced the rate of decrease. In order to promote fresh consumption, as well as to maintain and increase the sweet corn exports, it is necessary to promote investigations able to ensure a further increase in the growing area and yields of sweet corn with the help of the experiences. Of the production technology elements, a number of researchers studied or are currently studying the sowing time of sweet corn. Early sowing is also recommended by Aldrich (1970) for the reason that the roots will penetrate deeper this way, from where they can get water even in periods of drought. The more intensive vegetative growth also takes place during the period of shorter daytime and this way the plants will be smaller and will be less prone to lodge. Several techniques are known in the art for the purpose of early fresh market shipments: seedling growing or direct seeding with temporary plant cover (Kurucz 1998; Hodossi 2004). Direct seeded sweet corn under fleece cover showed earlier ripening and gave better yields in the

experiments of Kassel (1990). The plots under fleece cover reached harvest maturity 12 days earlier as compared to the plots with no cover. Besides, a greater number of missing plants was observed in the plots with no cover. As a result of the greater plant number and the better ear set per plant yields were much higher in the plots with fleece cover. The most widespread method of seedling production is the use of soil blocks (Pereczes, 1999) which can also significantly increase earliness. According to the trials of Kurucz (1998) seedling growing advanced harvest by 2 weeks. According to Hodossi (2004) 10 to 12 day earliness can be achieved by planting seedlings grown in soil blocks and 6 to 8 day earliness by seedlings grown in trays. The measurements of Kassel (1990) revealed that the ears of direct seeded corn plants under floating row cover could be harvested 10 days earlier as compared to the plots planted with seedlings and having no cover. The combined application of seedling growing and floating row cover can advance harvest by three weeks as compared to the traditional technology and can give farmers a three to four times greater income (Kurucz, 1998; Pereczes, 1999).

### **Materials and methods**

The experiments were set up in 2010 on an area equipped for irrigation at Voivodeni, 10 km SW from town of Reghin, Mures County, Romania. Conventional, reliable and sufficiently known among growers sweet corn variety, Spirit, was used as a reference variety in the variety comparison trials of the Central Agricultural Office. Hybrid has short growing period of 85 days and yellow kernels. Average height of plants is 159 cm, average ear height is 37 cm, ear length 19.6 cm and average ear weight is 245 g. The variety was granted official recognitions in 1988 and has been the dominant variety of the early ripening category till now. In the year prior to the experiment the area was under cabbage.

The following treatments, each with four replications, were applied during the experiment:

P1 = Plants transplantation with floating row cover, (May 9<sup>th</sup> 2010)

P2 = direct sowing of plants with floating row cover (May 9<sup>th</sup> 2010)

P3 = direct sowing of plants with no row cover (May 9<sup>th</sup> 2010) (Control)

For the frame structure of the treatments with cover we used Ø 4.2 mm zinc coated wire coils. The fleece, 60 cm in width, was stretched over a small tunnel of 40 cm in height and then its edges (25-25 cm, respectively) were covered with soil using a hoe and the its ends were tied to the stakes hammered down. The construction of the frame structure and the setting out of the fleece cover were carried out at the same day as direct seeding and out planting.

For the purpose of seedling growing, the seeds were sown on first decade of April 2010, in trays with rigid walls having 7x7 cm size. For growing the seedlings, commercial mix made of white peat 10-20 mm, PG Mix 1 kg/m<sup>3</sup> + micro nutrients, bentonite 40 kg/m<sup>3</sup>, pH 5,5-6,5 was used. The seedlings were planted out at the 3 to 4 leaf phenological stage. At the two propagation times the treatments P1 and P2 were covered with Novagryl floating row cover, having a weight of 19 g/m<sup>2</sup>, (using the small tunnel technique) in order to enhance earliness. The stand was created to contain 60,607 plants per hectare, according to the recommendations of the owner of the variety, at a spacing of 110+40x22 cm in twin rows. Each plot had an area of 6x7m (8 parallel rows and 30 seeds sown in each row). Sowing depth was 3 cm. The edge was the respective outer rows of the 4 twin rows of the plot.

On 24<sup>th</sup> October 2009, 35 t/ha of farmyard manure was worked into the soil with ploughing on area. Nitrogen fertilizer (60 kg/ha) was applied on two occasions, at the 6-7 leaf stage and

at tasseling, in the form of top dressing. The fertilizer application was worked into the soil with a rotary hoe.

Ears were harvested together with the husks, from the two central twin rows. Twenty ears were selected from each row and the following measurements were carried out:

- weight of unhusked and husked ears (g),
- total ear length (cm),
- ear diameter (mm),
- length of kernels (mm),
- number of kernels.

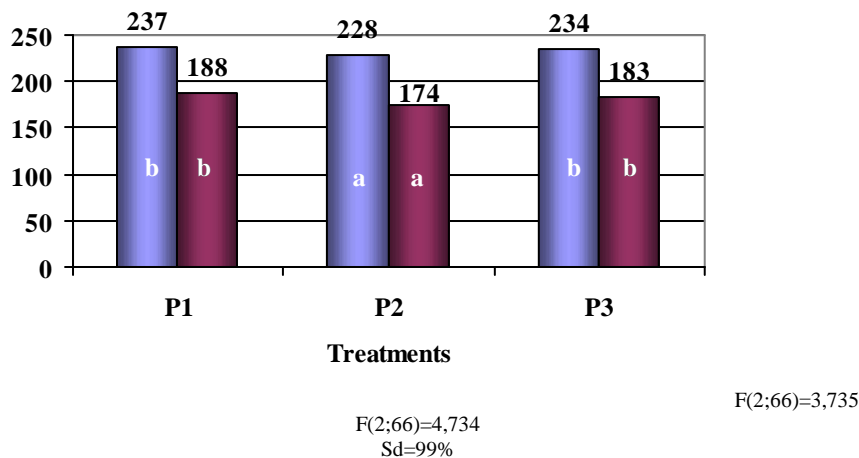
The statistical analysis of the results was carried out by using the programme *RopStat 1.1*. When the standard deviations were identical the mean values were compared by pairs using the *Tukey-Kramer* test, while in the case of the non identical standard deviations the means were compared using the *Games-Howell* test (Vargha, 2007).

*Meteorological conditions.* Under climatic conditions of the Mures County, Romania, the most important requirement for early sweet corn varieties are short growing period and high tolerance to ground frosts in late spring. In wet year 2010, precipitation sum was 85 mm higher from April to July in comparison with multiyear average. Especially wet was period January – March with 75 mm more precipitation than multiyear average, which postponed the direct sowing and out planting from the end of April to beginning of May.

### Results and discussion

According to obtained results, harvesting time (measured in days) was the shortest in the treatments P1 and P2, merely 69, respectively 82 days, i.e. the corns became ready for harvest 17, respectively 13 days earlier than those of P3 (control).

Results of the one of the major characteristics in connection with yield rating, unhusked and husked ear weight, are summarised in Figure 1.

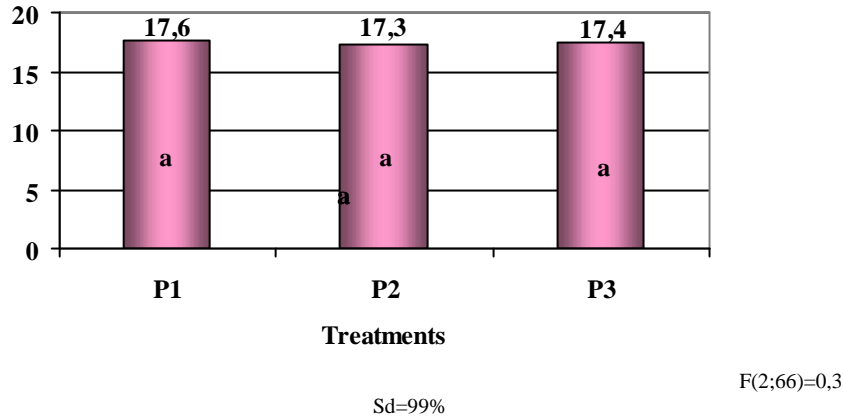


**Fig. 1.** Unhusked and husked ear weight (g).

Analysing the data measured for unhusked ear yield, it is noticeable that the average weight of the ears of the transplanted, covered treatment P1 was significantly (at  $p < 0.01$  level) higher as compared to the sowed, covered treatment P2. Though there was some difference between the plants of the treatments P1 and uncovered, sowed, control treatment P3 in unhusked ear

weight, statistically this was not significant. In case of husked ear weight the same tendencies were observed as in case of unhusked ear weight.

The data concerning, an important characteristics for market appeal (total ear length) are contained in Figure 2.



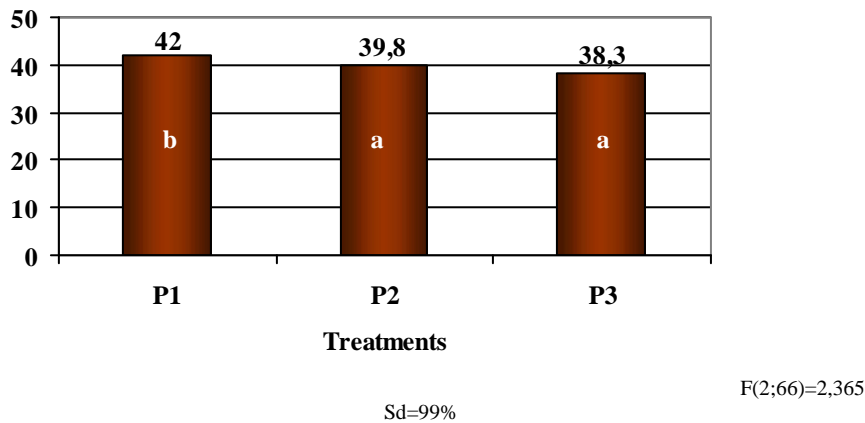
**Fig. 2.** Total ear length (cm).

The length of the covered transplanted treatment P1 was longer compared to the ear length of the uncovered and covered, sowed treatments (P2 and P3).

No statistically demonstrable difference was found between ear lengths of all treatments.

Total ear length not achieved average ear length 19.6 cm as measured in the variety comparison trials.

Other important characteristics for market appeal (total ear diameter), is presented in Figure 3.

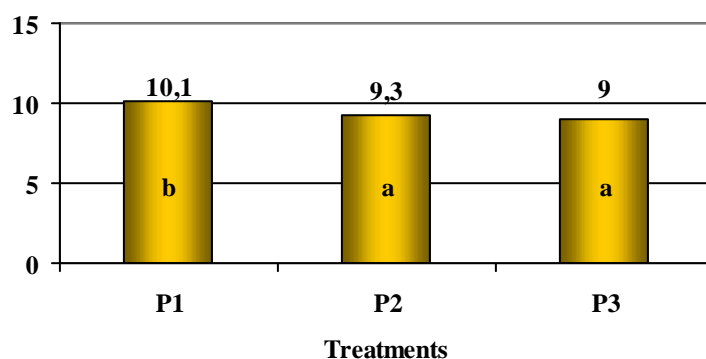


**Fig. 3.** Total ear diameter (mm).

Fleece covering had positive influence on total ear diameter. The measured values were higher in case of covered treatments P1 and P2 compared to uncovered, control treatment P3.

The total ear diameter of transplanted, covered treatment P1 was significantly (at  $p < 0.01$  level) higher as compared to the sowed, covered and uncovered treatments P2 and P3.

Length of seeds is an important characteristic for yield quantity is presented on Figure 4.



F(2;66)=8,445

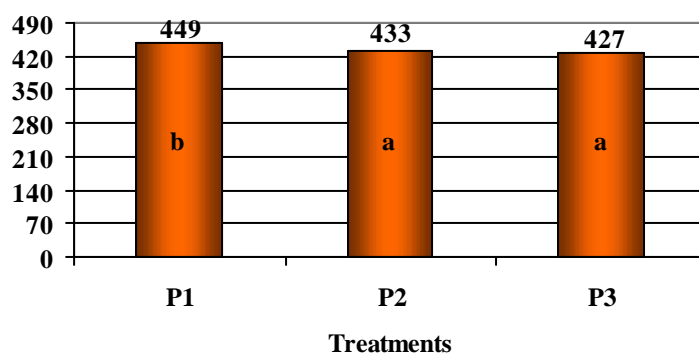
Sd=99%

**Fig. 4.** Length of seeds (mm).

Favourable influence of fleece covering is observed in case of seeds length. The measured values were higher in case of covered treatments P1 and P2 compared to uncovered, control treatment P3.

The total ear diameter of transplanted, covered treatment P1 was significantly (at  $p < 0.01$  level) higher as compared to the sowed, covered and uncovered treatments P2 and P3.

Number of seeds is also an important characteristic for yield quantity is presented on Figure 5.



F(2;66)=2,392

Sd=99%

**Fig. 5.** Number of seeds (pieces).

Analysing the data number of seeds, I observed that average number of seeds the transplanted, covered treatment P1 was higher as compared to the sowed, covered and uncovered treatments P2 and P3 (control). In case of this morphological parameter the statistical programme could not demonstrate significantly difference.

### Conclusions

Based on the results of the 2010 year experiment, the following conclusions can be made:

The growing period was significantly shortened with transplantation of sweet corn plants compared to direct seeded. Harvest time occurred 17 days earlier in the case of transplantation and floating row cover application compared to direct sowed, uncovered, treatment, and 13 days earlier compared to direct sowed, covered treatment. At the same time the floating row

cover produce 4 days shortening in the growing season between P2 (direct sowing of plants with floating row cover) and P3 (direct sowing of plants with no row cover) treatments.

The fleece covering had favourable effect on studied morphological characteristics of plants that are transplanted and floated with row cover.

In case of direct sowed treatment (P2) the effect of covering had positive effect on total diameter of ears, number of seeds and length of seeds.

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