Effects of Cultivation Methods on Sweet Corn Earliness

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Abstract
The trials were carried out to find out how the time of propagation and transplanting influenced the growing season of sweet corn along with some major properties relevant to quality. The following technological variations were compared: transplanted plants with floating row cover (with 2 planting dates); transplanted plants with no row cover; direct seeded plants with no row cover. The transplant growing period reduced the growing period by 16 to 28 days, compared to the technology used in the existing practice of production. Earliness had a negative influence on ear size, nonetheless it is worth while to attempt since the market is not so exacting with new products in the early period.

Key words: sweet corn, seedlings, propagation time, propagation method, agrotec til covering

Introduction
Currently, Hungary is not considered as an influential country of the global market considering the majority of the vegetables. The only exception is the sweet corn. The modern growing system was developed at the middle-end of 80’s. The great break-through happened in the middle of 90’s. 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. With a growing area of over 30,000 hectares Hungary is presently the first in the EU (Tömpe, 2006). Our export is threatened seriously by Thailand with its low prices, which is possible through 3 times pro year harvesting. This threat was limited for the moment with an anti dumping moratorium accepted by EU for five years. The
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abovementioned recession affected not only Hungary but also the holdings of the USA and Western Europe. 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 so as to be 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. Ripening can occur earlier when sowing earlier and using high quality seeds, as compared to normal or late sowing. I'só (1969) after their multi-year sowing date trial, concluded the following: in the case of an earlier sowing seed germination will be more protracted, but from the point of view of ear ripening it was more favourable than late sowing. The greatest influence on early corn development is exerted by moisture and temperature therefore the authors recommended the early sowing on lighter soils. Besides the sowing time is an agro technical element, which doesn’t need additional input, whereas with correct choosing we can obtain safely yield.

According to another solution in use, the seeds are sown in 10 to 14 cm deep seed trenches and the latter are covered with plastic film. The cover is removed 22 to 24 days after sowing. This produces a 4 to 6 days earliness in emergence and 8 to 10 day advantage in growth and development (Hodossi & Kovács, 1996).

The most widespread method is the use seedlings grown in soil blocks (Pereczes, 1999) which can also significantly increase earliness. 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 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 from three to four times greater income (Kurucz, 1998; Pereczes, 1999).

**Material and methods**

The experiments were set up in years 2006 and 2007 on an area equipped for irrigation at the Experimental Farm of the Faculty of Horticulture of the Corvinus University of Budapest. The results of the analysis of the soil sample collected at the beginning of 2006 from the trial area prior to direct seeding are: pH 8.03, salt 0.035%, humus 1.31%, K_2O <30, P_2O_5 293 mg/kg, K_2O 205 mg/kg, CaCO_3 <1%.

The test variety was Spirit, a normal sweet corn with a very early growing period (85 days). The following treatments were applied during the experiment:

- P1 = covered plants grown from transplants (Apr 6th 2006 and Apr 4th 2007),
- P2 = uncovered plants grown from transplants (Apr 20th 2006 and Apr 19th 2007),
- P3 = covered plants grown from transplants (Apr 20th 2006 and Apr 19th 2007),
- P4 = uncovered direct seeding (Apr 20th 2006 and Apr 19th 2007) (Control).

For the purpose of seedling growing, the seeds were sown on March 16th and March 30th in 2006 and March 13th and March 30th in 2007, in trays with rigid walls. For growing the seedlings we used a commercial mix made of white peat 10-20 mm, PG Mix 1 kg/m3 + micro nutrients, bentonite 40 kg/m3, pH 5.5-6.5. The seedlings were grown for 3 weeks in both cases and were planted out at the 3 to 4 leaf phenological stage. At the two propagation times the treatments P1 and P3 were covered with Novagryl floating row cover, having a weight of 19 g/m², (using the small tunnel technique) in order to enhance earliness. The floating row cover was removed on May 16th in 2006 and May 11th in 2007.

The cornstand was created at a spacing of (110+40)x22 cm in twin rows. Each plot had an area of 6x7 m. The edge was the outer twin rows of the 4 twin rows of the plot. There were 4 replications. Fertilization was done by top dressing with N. Farmyard manure was not applied.

In the application of the N top dressing rates (34% ammonium nitrate), in 7-8 leaves and tasseling stages, we were careful not to apply an active ingredient dose of over 50 kg/ha in order to prevent salt damage.

During the experiment, near the harvesting time, we studied some important valuable properties. During harvest the ears, together with the husks, were collected from the two central twin rows. After that, 20 ears of average appearance were selected from each row and the following measurements were carried out: unhusked ear weight (grams), total length (cm).
The statistical analysis of the results was carried out by using the programme MiniStat 3.3. 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, 2000).

**Results and discussion**

Harvesting time in the experimental years is represented in Table 1. The absolute growing season (measured in days) was the shortest in the treatments P2 and P3, merely 67, respectively 63 days, i.e. the corns became ready for harvest 16, respectively 17 days earlier than those of P4 (control), which were propagated at a time, around Apr 20th, and in a way according to the existing practice of production (by direct seeding).

Though the absolute growing season measured in days was 10, respectively 4 days longer (77 days) in the treatment P1, of early planting and provided with floating row cover, as compared to the treatments P2 and P3, at the same time, as planting was carried out 14, respectively 15 days earlier, the result was that it was the cobs from these corn plants that we managed to put first on the market.

One of the major characteristics in connection with yield rating, husked ear weight, are summarised in Figure 1.

**Table 1. Time of sweet corn harvesting**

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Year 2006</th>
<th>Year 2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>June 22 (77)</td>
<td>June 11 (67)</td>
</tr>
<tr>
<td>P2</td>
<td>June 26 (67)</td>
<td>June 22 (63)</td>
</tr>
<tr>
<td>P3</td>
<td>June 26 (67)</td>
<td>June 22 (63)</td>
</tr>
<tr>
<td>P4</td>
<td>July 12 (83)</td>
<td>July 9 (80)</td>
</tr>
</tbody>
</table>

Analysing the data measured for unhusked ear yield, we saw that the average weight of the ears of the treatment P1 was significantly (at p<0.01 level) lower as compared to the treatments P2 and P3, as well as to the treatment P4 (control).

The greatest average unhusked ear weight was measured with the ears of the control treatment P4. Though there was some difference between the plants of the treatments P2 and P3 in unhusked ear weight, statistically this was not significant.

The data concerning, an important characteristics for market appeal (total ear length) are contained in Figure 2. When studying the data relative to total ear weight, we found that the lengths of the direct seeded (control) treatment P4 were also statistically significantly (at p<0.01 level) superior to the sizes of the transplanted treatments (P1, P2 and P3).

The length of the earlier transplanted treatment P1 was also significantly (at p<0.01 level) inferior to the ear length of the latter transplanted treatments (P2 and P3).

No statistically demonstrable difference was found between the ear length of the treatments P2 and P3.

![Figure 1. Unhusked ear weight (g)](image-url)
Conclusions

Based on the 2006 and 2007 year’s results of the experiments, the following conclusion can be made:

The growing season was significantly reduced in the transplanted treatments compared to the direct seeded (control) treatment. Harvest time occurred in 2006 with 20 days, and in 2007 with 28 days earlier in the case of the treatment of early transplanting and with floating row cover (P1), with 16 days in 2006 and 17 days in 2007 earlier in the case of the treatments of later transplanting and with and without cover (P2 and P3). At the same time the floating row cover did not produce any shortening in the growing season in the treatments P2 and P3.

From the results of the total ear length, which is an important characteristic for market appeal, we concluded that the statistically significantly greatest ears were collected from the direct seeded (control) treatment P4. The average ear length of the early transplanted treatment P1 was significantly inferior compared to the other treatments. There was no significant difference in total ear length between the 2 treatments (P1 and P3) which were transplanted two weeks later.

References


