Yield of early sweet corn

Ferenc OROSZ\textsuperscript{1,2}, Katalin SLEZÁK\textsuperscript{2}

\textsuperscript{1}University of Sapientia, Faculty of Technical and Human Sciences, Department of Horticulture, 540485, Targu Mureș/Corunca, Șos. Sighișoarei 1C, Romania, (e-mail: oroszferenc67@gmail.com)
\textsuperscript{2}Corvinus University of Budapest, Faculty of Horticultural Science, Department of Vegetable and Mushroom Growing, Ménessi u. 44, 1118 Budapest, Hungary

Abstract

The trial was carried out with the aim to find out how the time of propagation and transplanting influence the growing season of sweet corn along with some major properties relevant to quality. The following technological variations were compared with the help of the variety ‘Spirit’ (normal sweet, very early ripening): transplanted plants with floating row cover (with early planting date), direct seeded plants with no row cover with 2 seeding dates; early, direct seeded plants with row cover. The 21 day transplant growing period reduced the growing period by 20 days, compared to the technology used in the existing practice of production and by 6 and 8 days compared to early seeded, covered and not covered treatments, respectively. The covering in the case of early, direct seeded treatment produced favorable effect on ear weight and length compared to not covered seeded treatments.

Key words: growing season, earliness, seedlings, fleece covering.

Introduction

Currently, Hungary is not considered as a major country on the markets of most vegetables in terms of quantity. The only exception is the sweet corn. 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 30000 hectares, Hungary is presently the first in the EU (Tömpe 2006). Production is mostly carried out in accordance with the demands of the processing industry and foreign buyers in the framework of the so-called systems of production on order. The exact timing, which is based on the knowledge of the growing period of the cropped variety, is an essential element in production, being indispensable for ensuring an adequate product quality and for making an efficient use of processing capacities.

Considering the production technology elements, a number of researchers studied or are currently studying the sowing time of sweet corn. As early as in the beginning of the 20\textsuperscript{th} century some researchers (Cserháti, 1901) highlighted the importance of the sowing date. Ripening can occur earlier when sowing earlier and using high quality seeds as compared to normal or late sowing. I’só (1969b) and Pásztor (1966), 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 fruit maturing it was more favourable than late sowing. The greatest influence on early corn development is exerted by moisture and temperature, therefore early sowing is recommended on lighter soils. 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 less prone to lodge. Several techniques with the purpose of early fresh market shipments are known: seedling growing or direct seeding with temporary plant covering (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 better.
higher in the plots with fleece cover. According to another solution in use, the seeds were sown in 10 to 14 cm deep seed trenches and latter were covered with floating row cover. The cover was removed 22 to 24 days after sowing. In that case, earlier emergence by 8 to 10 day and advantage in growth and development was occurred (Hodossi and Kovács, 1996).

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 trial was carried out with the aim to find out how the time of propagation and transplanting influence the growing season of sweet corn along with some major properties relevant to quality.

Material and methods

The experiment was set up in 2008 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 shown in Table 1.

<table>
<thead>
<tr>
<th>pH (H2O)</th>
<th>Salt, %</th>
<th>Humus, %</th>
<th>Kα</th>
<th>P2O5, mg kg⁻¹</th>
<th>K2O, mg kg⁻¹</th>
<th>CaCO₃, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.3</td>
<td>0.035</td>
<td>1.31</td>
<td>&lt;30</td>
<td>293</td>
<td>205</td>
<td>&lt;1</td>
</tr>
</tbody>
</table>

The pH-value of soil was considered as calcareous. The nutrient content in nitrogen was low, in phosphorus very good and in potash good.

The test variety was 'Spirit', a normal sweet corn with a very early growing period (85 days). Average plant height is 159 cm, ear height is 37 cm, average ear length is 19.6 cm and average ear weight is 245 g, on the base of variety trials carried out by the Central Agricultural Office (Kovács 2002).

The following treatments were applied during the experiment (with the date of planting or seeding):

P1 = covered plants grown from transplants (Apr 8)
P2 = uncovered plants grown from seeds (Apr 8)
P3 = covered plants grown from seeds (Apr 8)
P4 = uncovered direct seeding, control (Apr 21)

For the purpose of seedling growing, the seeds were sown on March 16 in trays with rigid walls. For seedling growing a commercial mix (white peat 10-20 mm, PG Mix 1 kg m⁻³ + micro nutrients, bentonite 40 kg m⁻³, pH 5.5-6.5) was used. The seedlings were grown for 3 weeks and were planted out at the stage of 3 to 4 leaves. At the two propagation times the treatments P1 and P3 were covered with Novagryl floating row cover, having a weight of 19 g m⁻² (using the small tunnel technique) in order to enhance earliness. The floating row cover was removed on May 13.

The corn stand was created to contain 60607 plants per hectare, according to the recommendations of the owner of the variety, at a spacing of 110 × 40 × 22 cm in twin rows. Each plot had an area of 6 × 7 m (8 parallel rows and 30 seeds sown in each row). Number of replications: 4. No farmyard manure was applied, and fertilization was done by top dressing with N. In order to avoid salt damage, N was applied as 34% ammonium nitrate in the dose less than 50 kg ha⁻¹.

During the experiment, plant growth rates were studied and the time of the occurrence of the major phenological stages was recorded. For this purpose, regular observations (every 3 to 5 days) were carried out:

- tassels appearance (by 50% of the plants),
- beginning of tasseling (pollen shed has begun on the axes of tassels),
- 50% female flowering (silks have reached a length of 2 cm on half of the ears),
- milk stage (harvest).
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During the harvest, the ears together with the husks, were collected from the two central twin rows. After that, 20 representative ears from each row were selected and the following measurements were carried out:

- un-husked ear weight (g),
- total ear length (cm).

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).

Results and discussion

The occurrence of the different phenological stages is illustrated by Table 2.

Table 2 Days of occurrence of generative phenophases (the day of direct seeding or transplanting = 0)

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Appearance of tassels</th>
<th>Beginning of tasseling</th>
<th>50% female flowering</th>
<th>Milk stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1 (Apr 8)</td>
<td>46 (May 24)</td>
<td>49 (May 27)</td>
<td>52 (May 30)</td>
<td>72 (Jun 19)</td>
</tr>
<tr>
<td>P2 (Apr 8)</td>
<td>57 (Jun 5)</td>
<td>64 (Jun 12)</td>
<td>71 (Jun 19)</td>
<td>86 (Jul 3)</td>
</tr>
<tr>
<td>P3 (Apr 8)</td>
<td>54 (Jun 2)</td>
<td>57 (Jun 5)</td>
<td>64 (Jun 12)</td>
<td>84 (Jul 1)</td>
</tr>
<tr>
<td>P4 control, (Apr 21)</td>
<td>49 (Jun 9)</td>
<td>59 (Jun 19)</td>
<td>61 (Jun 22)</td>
<td>79 (Jul 9)</td>
</tr>
</tbody>
</table>

The growing season of the treatment P4 (recommended according to the existing practice of production) was in accordance with the data recorded by the National Institute for Agricultural Quality Control. The beginning of harvest was delayed by 20 days, when compared to the treatment P1 and by 6 and 8 days when compared to the treatments P2 and P3, respectively.

The unhusked ear weight, one of the major yield parameters, is illustrated in Figure 1.

The data concerning, an important characteristics for market appeal (total ear length) are shown in Figure 2. Studying the data of total ear length, it was found that the lengths of the latter, direct seeded treatment P4 (control) were also significantly lower (at p<0.01 level) than the lengths obtained at the other treatments (P1, P2 and P3). The average total ear length of the P3 treatment (covered plants grown from seeds) was significantly higher (at p<0.01 level) compared to the other treatments. No difference was found between the ear length of the treatments P1 and P2.
Conclusions

Based on the results obtained in one-year experiment, it can be concluded that the growing season was significantly reduced in the transplanted treatments compared to the later and direct seeded (control) treatment. Harvest time occurred 20 days earlier in the case of the treatment of early transplanting and with floating row cover (P1), while 12 and 14 days earlier in case of the treatments of early, direct seeded, without covered P2 and P3 treatments, respectively. At the same time, the floating row cover did not produce any important shortening in the growing season between treatments P2 and P3. The ear length of the early transplanted treatment P1 was significantly superior compared to the control treatment (P4), but the longest ears were collected from the earlier seeded, covered (P3) treatment. The covering in case of direct seeded treatment P3 produced favourable effect on length of ears.

References


Cserháti S. (1901): Általános és különleges növénytermelés. II. kötet, Magyaróvár, 527.


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