Effect of direct cover on sweet corn morphology

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Abstract

In our trial we compared the effect of propagation time and floating cover on the growing season on yield and some valuable properties of sweet corn. The following technological variations were compared with the help of the variety Spirit (normal sweet, very early ripening): 1. direct seeded plants with floating cover (with 2 sowing dates); 2. direct seeded plants without cover (with 2 sowing dates). The application of direct seeding and floating covering (P2) early propagation time, increased the earliness by 7 days in respect of the total growing period as compared to the treatment without cover (P1). The covering and earlier sowing time had a negative influence on cob size, but this diminishment did not influence cobs marketability, whereas in case of depth of seeds we observed an positive effect. Covering the seedlings in the early season was clearly beneficial for frost protection, as the floating cover provided protection for plants against mild frost. The combination of earlier seeding time and floating cover results 14 day earlier harvest as compared to the traditional technology (P3).

Key words: sweet corn, propagation time, vlies covering

Introduction

Based on its present growing area, the sweet corn is the vegetable which is grown on the greatest area in Hungary. After dates of Hungarian Fruit & Vegetable Interprofessional Organization in 2003 the growing area was about 38,000 hectares. After 2003 followed a suddenly and sharp decline, so in 2005 the growing area was “just” 24,000 hectares. After diminishing, the crop returned in rise, from 2006 against over 30,000 hectares.

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 (1969) 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.

Also I’só and Szalay (1966, 1969) were studied occur of maize generative phenophases. They concluded, that by earlier sowing germination will be more protracted, but silking and harvesting occur sooner than by lately sowing time. After multi-year trial Berzenyi et al. (1998) have studied the effect of different sowing times on maize development. They concluded the following: a 3 weeks lately sowing time delay one week occur of silking time.

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 vlies cover showed earlier ripening and gave better yields in the experiments of Kassel (1990). The plots under vlies cover reached harvest maturity 12 days earlier as compared to the plots with no cover. In case of direct seeding, as propagation method, another earliness increasing solution is the temporary covering with plastic or vlies, used in different combinations. This method reaches about 7-10 days earliness (Hodossi and
Kovács, 1996). About the covered early sowing as a technological variation Aylswirth (1986) mentioned, that from an early sowed crop, made in first week of April, arranged in twin rows (42cm) and covered by plastic, we could harvested marketable cobs by the fourth of July.

Material and methods

The experiment was set up in 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 from the trial area prior to direct seeding are presented below: pH<sub>H2O</sub> = 8.03; salt(%) = 0.035; humus(%) = 1.31; P<sub>2</sub>O<sub>5</sub>(ppm) = 293; K<sub>2</sub>O(ppm) = 205; CaCO<sub>3</sub> < 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 = uncovered direct seeded (Apr 4th); P2 = covered direct seeded (Apr 4th); P3 = (control), uncovered direct seeded (Apr 19th); P4 = covered direct seeded (Apr 19th).

By both sowing times (Apr 4th and Apr 19th) a part of the stand was covered with Novagryl floating row cover having a weight of 19 g/m<sup>2</sup> at the two propagation times (direct seeding and planting out) in order to enhance earliness. The floating row cover was removed on May 11<sup>th</sup>. 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). The edge was the outer two rows of the 8 rows of the plot, respectively. Number of replications: 4.

Fertilization was done by top dressing with N. No farmyard manure was applied. The area received one herbicide application (May 5<sup>th</sup>, at a dose of Clio 0.15 l/ha+Stomp 3.3 l/ha+Dash 1.1 l/ha) and one mechanical weed control treatment (June 12<sup>th</sup>). A pesticide application took place on May 23<sup>rd</sup>, using Decis (0.15 l/ha). The harvest was carried out in two passes.

During the experiment, we studied plant growth rates and recorded the time of the occurrence of the major phenological stages. For this purpose, we carried out regular observations (every 3 to 5 days) according to the following:
- beginning of seed emergence (appearance of first germs),
- appearance of tassels (in 50% of the plants),
- beginning of tasseling (pollen shed has begun on the axes of tassels),
- 50% silking (silks have reached a length of 2 cm on half of the ears),
- “milky stage” (harvest).

During harvest the ears, together with the husks, were collected from the four central (two 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 ear length (cm), depth of seeds. The treatment P3 was regarded as the control. The time of direct seeding, as commonly used in production, was Apr 20<sup>th</sup>, with no cover.

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

Table 1. is illustrated the times of the appearance of the first seedlings, as well as the number of days elapsed from the date of direct seeding to the different phenological stages.

It can be observed that the time of germination in the treatment sown at the first sowing date and having no cover had 3 days delay as compared to the germination time of the covered treatment. In the case of the plants sown at the second sowing date the emergence was 2 days earlier compared to control treatment.

The absolute growing season (measured in days) was the shortest by P4 treatment respectively 73 days, i.e. the corns became ready for harvest 7 days earlier than those of P3 (control), which were propagated at a time, around Apr 20<sup>th</sup>, and in a way according to the existing practice of production (by direct sowing).

We observed that in case of the early seeded treatment (P2, covered) the tassels appearance was earlier with 3 days as by in the same time seeded (P1, uncovered) treatment. The five days difference between these two
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treatments increased until harvesting to 7 days as earliness. The tassels appearance in case of (commonly
used in production, uncovered) P3 treatment, compared to P4 (in the same time sowed and covered)
treatment, delayed with 10 days. At harvesting time this advantage, in developing, of P4 treatment
diminished to 7 days. The stigma appearance by two weeks later sowed, uncovered P3 treatment occurred 3
days later as in case of early sowed, uncovered P1 treatment.
Compared the harvesting date of P2-P4 treatments we found a 7 days difference, such as in references. One
of the major characteristics in connection with yield rating, unhusked ear weight, are summarised in Figure
1.

Table 1. Time of emergence and the rhythm of generative phenophases (in days)

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Emergence of sowing</th>
<th>Tassels appearance by 50%</th>
<th>Tasseling</th>
<th>Stigma appearance by 50%</th>
<th>Starting harvest</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1 (IV.4)</td>
<td>9. day (IV.13)</td>
<td>51. day (V.25)</td>
<td>54. day (V.28)</td>
<td>64. day (VI.7)</td>
<td>88. day (VII.2)</td>
</tr>
<tr>
<td>P2 (IV.4)</td>
<td>6. day (IV.10)</td>
<td>48. day (V.22)</td>
<td>51. day (V.25)</td>
<td>59. day (VI.2)</td>
<td>81. day (VI.25)</td>
</tr>
<tr>
<td>P3 (IV.19)</td>
<td>control</td>
<td>9. day (IV.28)</td>
<td>54. day (VI.12)</td>
<td>57. day (VI.15)</td>
<td>61. day (VI.19)</td>
</tr>
<tr>
<td>P4 (IV.19)</td>
<td>7. day (IV.26)</td>
<td>44. day (VI.2)</td>
<td>47. day (VI.5)</td>
<td>54. day (VI.12)</td>
<td>73. day (VII.2)</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 as well as to the
treatment P3 (control).
The greatest average unhusked ear weight was measured with by ears of the P2 (earlier sowed, covered)
treatment. Though there was some difference between the plants of the treatments P2 and P3 (control) in
unhusked ear weight, statistically it was not significant.

The average values of total ear length are summarised on Figure 2.
In case of total ear length, the highest values were measured by ears of P4 (later sowed, covered) treatment.
The difference was statistically significant (at p<0.01 level) among the other treatments. Among the other
treatments ear length were measured some differences, but statistically we couldn’t demonstrate any
significance.
From customer viewpoint depth of seeds is an important parameter and the measured average results are
presented on Figure 3.
The greatest average values were measured by the (lately seeded, covered) P4 treatment. The depth of seeds
results by treatment P4 was significantly higher as P3 (control) treatment (at p<0.01 level), as well as higher
than P1 and P2 treatments results but not significantly. The lowest values were measured by P3 (control)
treatment, results which were proved significant (at p<0.01 level), compared to the other treatments.
Conclusions

The technology with earlier time, direct seeding and floating row cover, in the case of the variety Spirit, resulted in 3 day earliness in germination and 7 day earliness in the total growing period, compared to the uncovered treatment, in 2007.

The technology with commonly used time, direct seeding and floating row cover, resulted 2 days earliness in germination and 7 days earliness in the total growing period, compared to the uncovered treatment, in 2007. The unhusked ear weight presented the greatest results in case of early sowed, covered P3 treatment.

In case of ear length, as an important marketable parameter, the effect of floating row covering was ambiguous. The later sowed, covered (P4) treatment has the greatest-, the early sowed, covered (P2) treatment has the smallest average results.

From customer viewpoint important parameter, depth of seeds, the later seeded and covered treatment (P4) presented the better results, in 2007.

References

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