Acta Universitatis Sapientiae
Agriculture and Environment, **2**, (2010) 23–30

Ear properties of direct seeded sweet corn

Ferenc OROSZ[1]
email: oroszferenc67@gmail.com

Katalin SLEZÁK[2]
email:
katalin.slezak@uni-corvinus.hu

[1]Department of Horticulture,
Faculty of Technical and Human Sciences,
Sapientia University, Tg. Mureş, Romania

[2]Department of Vegetable- and Mushroom Growing,
Faculty of Horticultural Science,
University of Budapest, Budapest, Hungary

Manuscript received 25.03.2010; revised 20.04.2010, accepted; 24.04.2010

Abstract. In our trial we compared the effect of propagation time and floating cover on the growing season on 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 covering and earlier sowing time had favourable influence on ear weight, and ear length. The combination of earlier seeding time and floating cover results 8 days earlier harvest as compared to the traditional technology (P4).

Keywords: growing season, earliness, covering

1 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 sudden and sharp decline, so in 2005 the growing area was "just" 24,000 hectares. After diminishing, the plant returned in rise, in 2006 against over 30,000 hectares.

As early as in the beginning of the 20th century some researchers [3] 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. [6] and [12], 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 [7], [8] 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 studying the effect of different sowing times on maize development authors concluded the following: a 3 weeks lately sowing time delay one week occur of silking time [2].

Several techniques are known in the art for the purpose of early fresh market shipments: seedling growing or direct seeding with temporary plant cover [11], [4]. Direct seeded sweet corn under vlies cover showed earlier ripening and gave better yields in the experiments of [9]. 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 [5]. About the covered early sowing as a technological variation [1] mentioned, that from an early sowed crop, made in first week of April, arranged in twin rows (42 cm) and covered by plastic, we could harvested marketable cobs by the fourth of July.

2 Materials 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 contained in Table 1.

The pH of soil was considered calcareous. The nutrient content of soil 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 was 19.6 cm in the variety comparison trials carried out by the Central Agricultural Office and average ear weight was 245 g [10].

Table 1: Soil analysis results

pH_{H2O}	Salt %	Humus %	K_A	P_2O_5 mg/kg	K_2O mg/kg	$CaCO_2$
8,03	0,035	1,31	< 30	293	205	< 1

The following treatments were applied during the experiment:

P1 = uncovered direct seeded (April 8$^{\text{th}}$)

P2 = covered direct seeded (April 8$^{\text{th}}$)

P3 = covered direct seeded (April 21$^{\text{th}}$)

P4 = the control, uncovered direct seeded (April 21$^{\text{th}}$)

By both sowing times (April 8$^{\text{th}}$ and April 21$^{\text{th}}$) a part of the stand was covered with Novagryl floating row cover having a weight of 19 g/m^2 at the two propagation times in order to enhance earliness. The floating row cover was removed on May 13$^{\text{th}}$. 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 $110 + 40 \times 22$ cm in twin rows. Each plot had an area of 6×7m (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.

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:

- 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 (gram),
- total ear length (cm),
- depth of seeds (mm).

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 [13].

3 Results and discussions

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

Table 2: Day of occurrence of generative phenophases (day of direct seeding or transplanting = 0)

Treatments	Appearance of tassels	Beginning tasseling	50% female flowering	Milky stage
P1 (IV. 8.)	57. day (VI.5)	64. day (VI.12)	71. day (VI.19)	86. day (VII.3)
P2 (IV. 8.)	54. day (VI.2)	57. day (VI.5)	64. day (VI.12)	84. day (VII.1)
P3 (IV. 21)	45. day (VI.5)	55. day (VI.16)	58. day (VI.19)	77. day (VII.7)
P4 (IV. 21) Control	49. day (VI.9)	59. day (VI.19)	61. day (VI.22)	79. day (VII.9)

The growing season, expressed in days, of the treatment P4 (control) which was propagated according to the existing production practice, was earlier with 6 days compared to the data recorded by the National Institute for Agricultural Quality Control. In our case meant that the beginning of harvest was delayed by 8 days, when compared to the treatment P2 and by 2 respectively 6 days compared to the treatments P3 and P1.

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

Analysing the measured data for unhusked ear yield, we saw that the average weight of the ears of the treatment P2 (earlier seeded, covered plants) was significantly (at $p<0.01$ level) higher as compared to the other treatments.

The average unhusked ear weight of the P3 treatment (later seeded, covered plants) was significantly higher (at $p<0.01$ level) compared to the uncovered treatment P1 and higher, but not significantly, compared to P4 treatment.

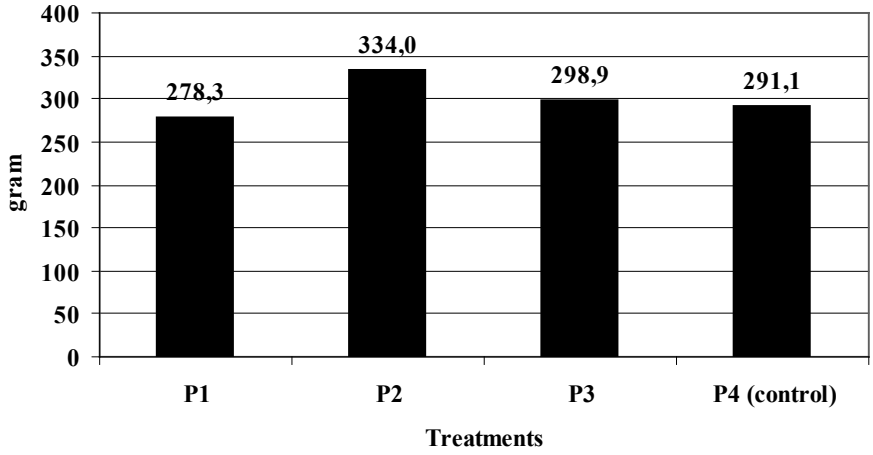

Figure 1: Unhusked ear weight

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

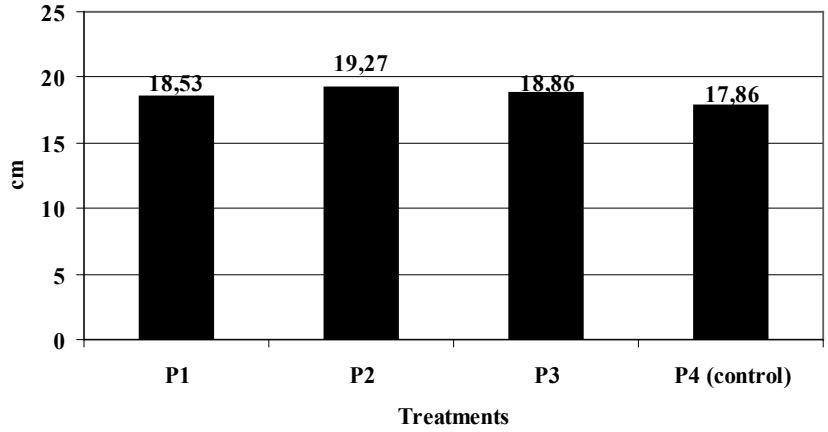

Figure 2: Total ear length

Studying the data of total ear length, we found that the lengths of the later seeded, uncovered (control) treatment P4 were also statistically significantly (at $p<0.01$ level) lower to the sizes of the other treatments (P1, P2 and P3).

The average total ear length of the P2 treatment (earlier seeded, covered plants) was significantly higher (at $p<0.01$ level) compared to the other treatments.

No statistically demonstrable difference was found between the ear length of the treatments P1 and P3.

From customer viewpoint depth of seeds is an important parameter and the measured average results are presented on Figure 3.

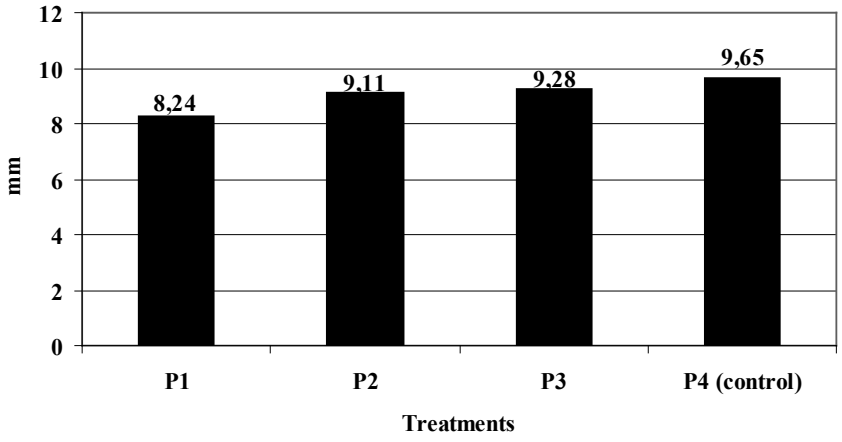

Figure 3: Depth of seed

Analyzing the size (depth) of seeds we observed a statistically demonstrable (at $p < 0.01$ level) difference among control treatment (P4) and other treatments. Seeds depth of earlier seeded, uncovered treatment (P1) was smaller, sustained statistically (at $p < 0.01$ level), compared to the other treatments.

4 Conclusions

The technology with earlier time, direct seeding and floating row cover (P2), in the case of the variety Spirit, resulted 8 days earliness in the total growing period, compared to the uncovered, control treatment (P4), in 2008.

The technology with commonly used time, direct seeding and floating row cover, resulted 2 days earliness in the total growing period, compared to the uncovered, control (P4) treatment, in 2008.

The unhusked ear weight presented the highest results in case of treatment P2 (earlier seeded, covered). In case of later seeded treatments (P3, P4) the results were quite square.

Measuring length of seeds, we observed the same tendency as in case of ear weight. P2 treatment's ear produced the greatest results. From customer viewpoint important parameter, depth of seeds, the later seeded, uncovered treatment P4 presented the better results, in 2008.

References

[1] Aylswirth J. D. (1986), Harvest sweet corn by the fourth, *American Vegetable Grower*, 34 (2), pp. 37-38.

[2] Berzsenyi Z., Ragab A. Y., Dang Q. L. (1998), A vetésidő hatása a kukoricahibridek növekedésének dinamikájára 1995-ben és 1996-ban. *Növénytermelés*, 47 (2), pp. 165-180.

[3] Cserháti S. (1901), Általános és különleges növénytermelés. II. kötet, Magyaróvár, pp. 527.

[4] Hodossi S. (2004), Csemegekukorica. In Hodossi S. - Kovács A. - Terbe I. (szerk.): Zöldségtermesztés szabadföldön. Mezőgazda Kiadó, pp. 340-348.

[5] Hodossi S., Kovács A. (1996), A koraiság javításának jelentősége és lehetőségei a csemegekukorica termesztésben. *Hajtatás, korai termesztés*, 27 (3), pp. 11-13.

[6] I'só I. (1969), Kísérletek a kukorica korai vetésével (1965-1968). In: Kukoricatermesztési kísérletek 1965-1968. (Szerk. I'só I.). Akadémiai Kiadó, pp. 248-255.

[7] I'só I, Szalay D. (1966), Egyedfejlődési vizsgálatok a kukorics vetésidő kísérletekben. In: Kukoricatermesztési kísérletek 1961-1964. (Szerk. I'só I.) Akadémiai Kiadó, pp. 233-239.

[8] I'só I, Szalay D. (1969), Egyedfejlődési vizsgálatok a kukorica vetésidő kísérletekben. In: Kukoricatermesztési kísérletek 1965-1968. (Szerk. I'só I.) Akadémiai Kiadó, pp. 237-247.

[9] Kassel, L. V. G. (1990), Direktaussaat von Zuckermais unter Vlies. *Gemüse*, 26 (7), pp. 350.

[10] Kovács F. (2002), Csemegekukorica. In Füstös Zs. (szerk): Leíró fajtajegyzék, OMMI.

[11] Kurucz M. (1998), Palántázott és takart csemegekukorica. Kertészet és szőlészet, 47 (11), pp. 7.

[12] Pásztor K. (1966), A vetésidő és a vetésmélység hatása a kukorica termésére. In: Kukoricatermesztési kísérletek 1961-1964. (Szerk. I'só I.). Akadémiai Kiadó. Budapest, pp. 240-251.

[13] Vargha A. (2007), Matematikai statisztika. Pólya Kiadó. Budapest.