

RESEARCHES ON THE BEHAVIOR OF ACTUAL CORN HYBRIDS AT DIFFERENT PLANTING DATES

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ABSTRACT

The knowledge and application of quantitative and qualitative means of increasing corn production is a major concern of growers and researchers in the field.

One of the main factors of increased production in corn is planting dates. Planting at the optimum time favors emergence, growth and development of plants.

The purpose of this paper is to analyze the behavior of current corn hybrids at different planting dates, based on a polyfactorial field experience with hybrids of three maturity groups and 4 planting dates. Thus, observations were made during the vegetation period, like: the appreciation of emergences, cold spring resistance, plants condition and uniformity. The yield obtained was analyzed according to planting dates and hybrids.

The results highlights the importance of following optimum planting date of corn, which is different depending on: soil temperature, location, soil water reserve, disease and pest pressure, weed pressure, used hybrid, tillage system, etc.

The results obtained from the field experience demonstrates the superior production capacity of current hybrids, this is due to the progress in breeding and selection of new corn hybrids.

Keywords: planting dates, actual corn hybrids

INTRODUCTION

Production potential is determined by three components: production potential on plant, tolerance to biotic and abiotic factors and response to inputs (VOICHIȚA HAȘ et al., 2008).

One of the main factors of increased production of corn is planting dates. Planting at the optimum time favors emergence, growth and development of plants.

In corn, if planting is performed in optimal time, solar energy can be used in advance, ground water is used better, growth and development starts earlier, in the end, to achieve higher production. The efficiency of this technology element is evident by increased production and additional energy, even more, respecting the optimal planting date does not require additional expenditures.

Planting dates should take into account: the soil water supply, disease and pest pressure, weed pressure and the used hybrid. Optimum planting time in spring is when in the soil, at 7 am, at the depth of planting is recorded a temperature of 8-10 °C and the trend is of heating (AXINTE et al., 2006; BÎLTEANU, 2003; ROMAN et al., 2011).

Each day of delay after the optimum time can bring production minuses as drought and heat can catch plants in flowering time.

Optimal planting times depend on the location, tillage system and vegetal wastes (NAFZIGER, 1994; SWANSON and WALLACE, 1996).

In an experience, HERBEK et al. (1986) showed that in no-tillage system (the vegetal wastes are on the soil surface) optimal planting time is 14 days later than the conventional system (the vegetal wastes are incorporated).

CIRILO and ANDRADE (1994) found that early planted corn has a lower efficiency

use of solar energy from emergence until silking time; this may explain the reduced production at the corn planted before the optimum time.

In a study conducted by RYAN et al. (2011) it was found that corn yield and net return to seed cost were not affected when planting was delayed 2 weeks, but was 15 % lower when planting was delayed 4 weeks.

Yield loss due to late planting was associated with a 7% decrease in kernel weight and no change in kernels per square meter.

MATERIAL AND METHOD

The field experience was polyfactorial, the studied factors were: the hybrid (3 maturity groups) and planting dates (4 periods). The experience has been located by randomized block method.

The hybrid (three maturity groups): H1 – DKC 3511 (RM 85); H2 – DKC 4590 (RM 95); H3 – DKC 4795 (RM 97).

RM = relative maturity and express the number of days from emergence to black point appearance on kernel. The black point is usually installed when the corn kernels reach about 35% humidity, when the exchange of substances between plant and kernels are decreasing then interrupt.

In our experience we used three control hybrids, one for each of the three analyzed hybrids. Were chosen as control hybrids, each corresponding market leaders from the same maturity groups (hybrids recorded the highest sales).

B. Planting time (4 periods):

The first planting date was established taking into account the specific climatic conditions of 2011. From April 10 to 16 there were registered very low temperatures compared to the multiannual average, around 0°C. Also in this period, the precipitations were very high, which made impossible the seedbed preparation and planting.

Thus, the first planting time was on 20.04.2011 and the others at intervals of 7 days (27.04.2011, 04.05.2011, 11.05.2011).

The corn technology was the conventional one.

Observations were made during the vegetation period, like:

- ✓ **the appreciation of emergences** (Marks from 1 to 9, at 10-12 days after the latest hybrid emergence: 1 - no plot gaps, 5-50% gaps, 9-no plant).
- ✓ **cold spring resistance** (marks from 1 to 9, 1 very good, 9 very weak);
- ✓ **plants condition** (marks from 1 to 9, 1 very good, 9 very weak);
- ✓ **uniformity** (marks from 1 to 9, 1 very good, 9 very weak, noted immediately after tassel appearance, depending on plant height, leaf length and width, cobs shape, silk color, etc.)

RESULTS

Siretel commune is located in the NE part of Romania, along the river Siret (*Figure 1*).

The commune presents a moderate temperate climate. In winter the average temperature falls through -3 °C and in summer reach 22-24 °C.

Average annual rainfall is approx. 550 mm and favors the development of crops. Winds characteristic for this region are from the directions N, N, and S, SE.

The river network of Siretel commune is the river Siret and Sirețel brook.

Groundwater is retained in permeable underground deposits. Medium depths for these groundwater varies between 3-20 m, and sometimes water comes to surface as springs. Soils are gray of forest.

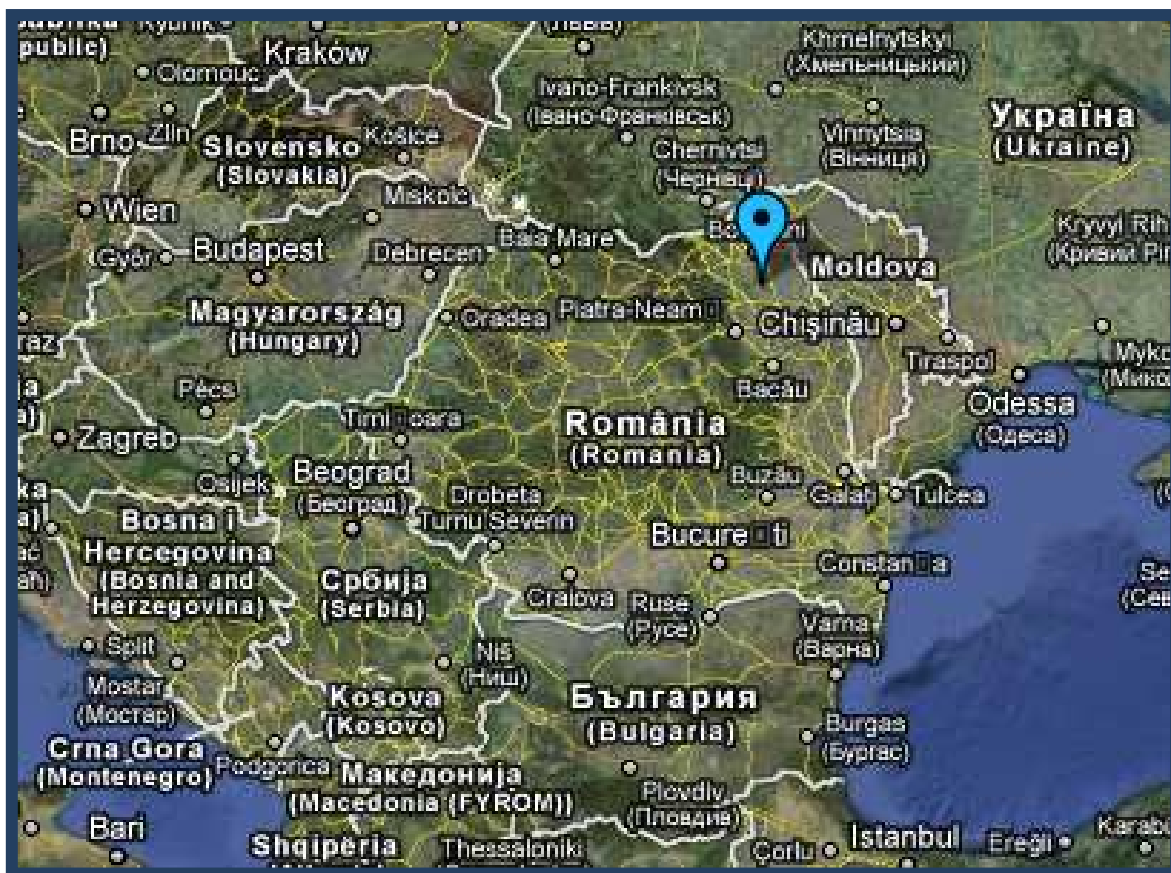


Figure 1. The location of field experience

The year 2011 presented some climate features in the location of experimental field, namely: at the beginning of the planting, between 15- 20 April were recorded very low temperatures (0-2°C), followed by an enough period of time (close to mid-May), when temperatures were below thermal threshold of 10 °C.

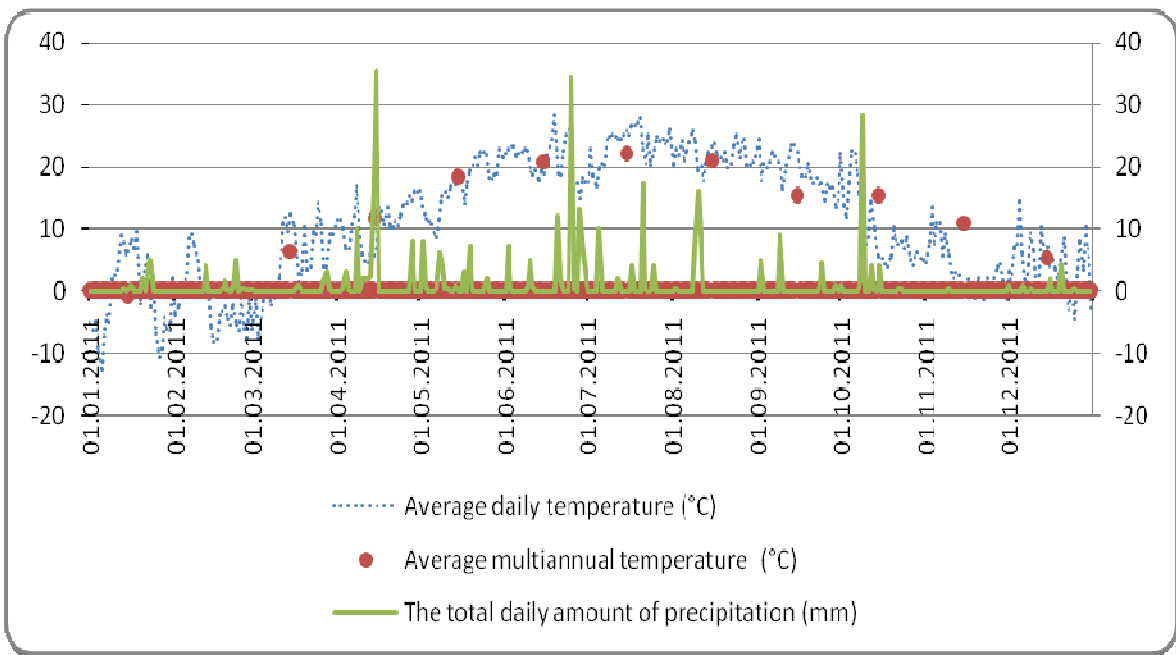
Rainfall amounts were very large (during April - May 2011, of 117.2 mm), which made impossible seedbed preparation and planting earlier than April 20 to 25. In the growing season, rainfall and especially their distribution, was consistent with the need for water of corn plants (*Figure 2*).

For the observations during the growing season, generally **the best marks** were obtained by hybrids grown under planting time 4, followed by the planting time 3, and the worst of those cultivated in first planting time.

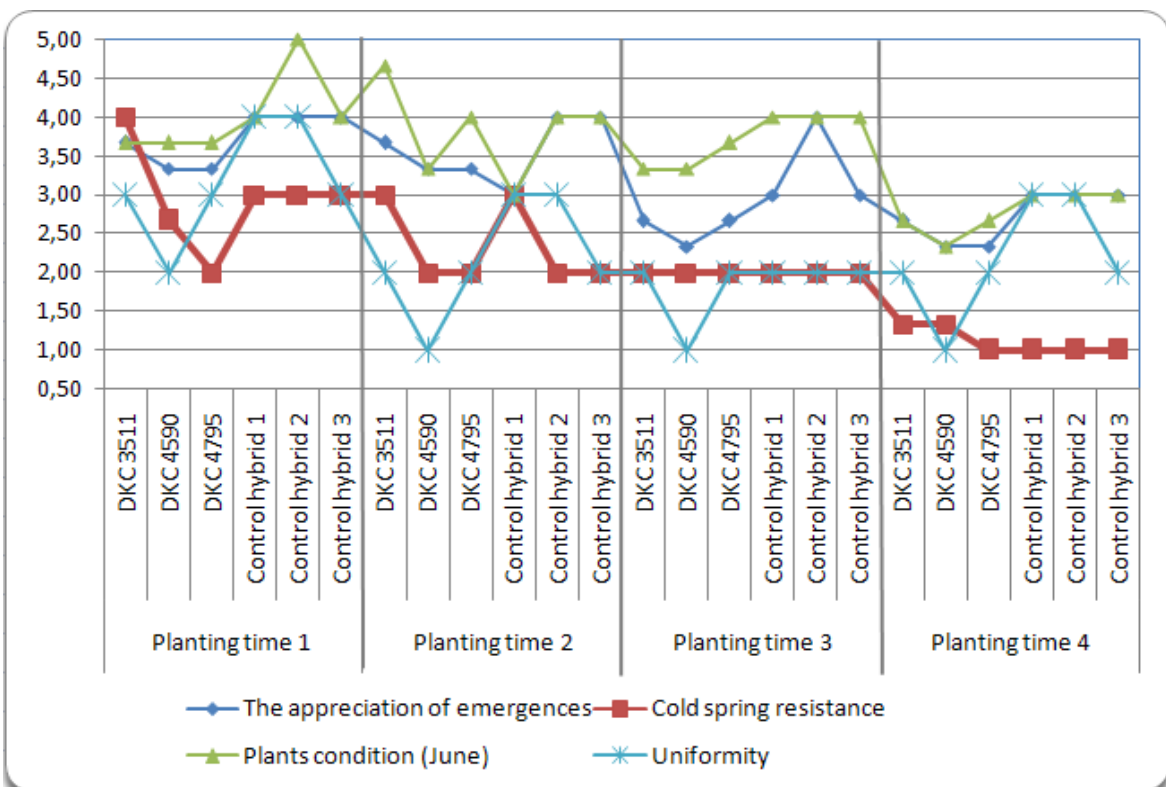
The best marks for **the emergence appreciation** were recorded in hybrid DKC 4795.

Analyzing **cold spring resistance** of the 3 hybrids, it was found that was lower at DKC 3511 hybrid and the highest at DKC 4795 hybrid. DKC 4590 hybrid had an average resistance, comparable to that of control hybrids.

General plants condition was the best on hybrids grown in planting time 4. Hybrid DKC 4590 is highlighted with the best marks at **uniformity observations** in all four planting dates (*Figure 3*).



**Figure 2. Climate data recorded at Iasi Weather Station
(Source: www.freemeteo.com)**



**Figure 3. The behavior of corn hybrids during the growing season
(marks from 1 to 9: 1 very good, 9 very weak)**

Analyzing the hybrids based on planting dates and obtained production, it was found that they had a different behavior from a hybrid to another.

Thus, DKC 3511 hybrid recorded the highest production when it was planted in the

planting time 3.

DKC 4590 hybrid had small variations in production according to planting time. However in the 2nd planting time it reached the highest level of production.

DKC 4795 hybrid recorded the lowest production variations depending on time of planting, giving it a **very high plasticity**. The highest productions were recorded when it was planted in the first period.

In terms of productions recorded at the control variants were revealed: Control Hybrid 1 recorded a declining production from planting time 1 to planting time 4. Control Hybrid 2 production has increased from planting time 1 to planting time 2, with a slight decrease in planting time 3 and reaching a maximum period of production in planting time 4.

Control Hybrid 3 recorded increasing production from planting time 1 to planting time 4.

Comparing productions registered at analyzed hybrids with variants control (market leaders) it was found that productions are clearly in favor of current hybrids, which have a superior capacity of production against control hybrids. This is naturally due to progress in breeding and selection of new corn hybrids (*Figure 4*).

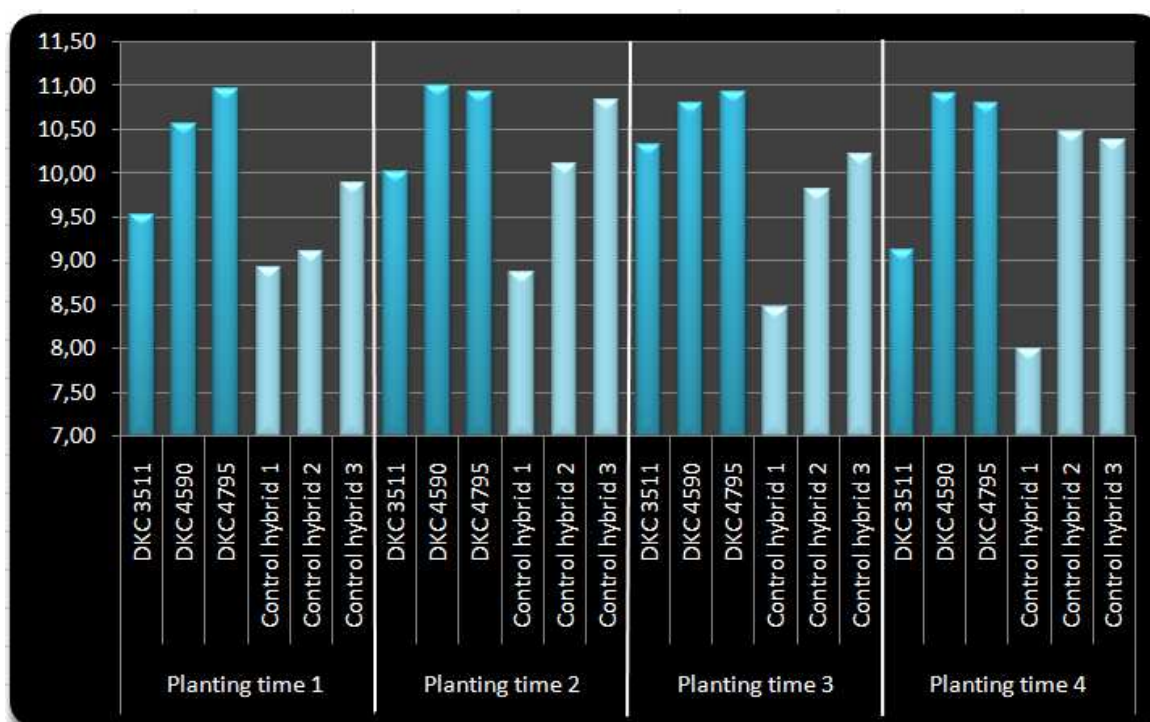


Figure 4. The average production of studied corn hybrids (t/ha)

CONCLUSIONS

1. The optimum planting times for corn, is different depending on: soil temperature, location, soil water reserve, the pressure of pests and diseases, weed pressure, the used hybrid, tillage system, etc.
2. **For the observations during** the growing season (emergence appreciation, resistance to cold spring, plant condition and uniformity), the best marks were obtained by hybrids grown under planting time 4, followed by the planting time 3, and the worst of those cultivated in first planting time.

3. Tested hybrids behaved differently depending on planting dates. On average, the highest productions were recorded in planting time 2 and planting time 3.
4. The hybrid DKC 4795 recorded the lowest production variations depending on planting time, giving it a very high plasticity. The highest productions were recorded when it was planted in the first period.
5. Looking at the average production, the high production capacity is observed at current hybrids, this is due to the progress in breeding and selection of new corn hybrids.

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