Research Journal of Agricultural Science, 42 (4), 2010

# QUANTIFYING SOME PRODUCTIVITY ELEMENTS IN REACHING YIELDING POTENTIAL IN SIX PIONEER MAIZE HYBRIDS UNDER THE IMAPCT OF SOWING DENSITY IN THE SOIL AND CLIMATE CONDITIONS OF THE ARADULUI PLAIN (SEMLAC, ARAD COUNTY)

**Sorin LUCA, Valeriu TABARA**

***Banat's University of Agricultural Sciences and Veterinary Medicine, Faculty of Agricultural Sciences, Timisoara, Calea Aradului no. 119, RO-300645, Romania***
*Corresponding author: sorin_luca82@yahoo.com*

***Abstract:*** *Of world production of corn about 6 to 10% is used in various industries. Thus maize is processed wet, dry and fermentative. By all these methods, from corn to obtain some basic products that are used to obtain more than 3500 products with uses in a man but also in animal nutrition. Variability of chemical composition of maize grain is given by the combined actions of the following factors: soil, climate, agricultural technique, local conditions of nutrition, conditioning and storage. The present study proposes to examine the production quality hybrid maize seeds from 6 to determine optimum sowing density. Experience was located on a typical mold soil in the territory Plain Arad, Şemlac. In terms of physical characteristics, soil that was placed experience, providing favorable conditions for growing the plant Zea mays. Bifactorial experience is that factor analysis, factor I is the biological material certified corn hybrids, Pioneer brand: Pr37M34, Pr36R10, Pr37N01, Florencia, Pr35F38, Pr35T06 - hybrids of groups FAO 450-500, and factor II is given sowing densities: 40,000 plants / ha, 55,000 plants / ha, 70,000 plants / ha. The main physico indicators of the 6 grains of corn hybrids were determined in laboratory discipline Plant Growing: "Testing of the seed and plant material".The Correlations were established between the physical evidence and density studied hybrids of maize plants. As the sowing density of three variants applied hybrids take the study as influencing indices of maize, but differently. Results of this study are part of a doctoral program, with the theme: "Research on the influence of sowing density on production and its quality from 6 corn hybrids, climatic conditions of Plain Arad" scholarship program funded by the European Social din Pilot Program Fund to support research doctoral scholars, under contract POSDRU/6/1.5/2 USAMVB Timisoara, under the distinguished University Professor Dr. Valeriu Tabară*

***Key words:*** *corn hybrids, Plant density, Weight,*

## INTRODUCTION

Maize shares the largest of the cultivated land in Romania, particularly on family farms. Knowing and applying the ways of increasing yield in maize is of particular importance for cultivators. Valorising at the highest the biological potential of maize hybrids requires it to be studied at avrious sowing densities under optimal technological conditions if we need not to have a negative impact on its yielding abilty.

The goal of this paper was to persent the quantification of certain productivity elements in six Pioneer maize hybrids under the impact of sowing density in the soil and climate conditions of the Aradului Plain (Semlac, Arad County).

## MATERIAL AND METHOD

The data generated by the experimental results of the present doctoral study – covering a period of three years – will be disseminated among those interested in maize

cultivation. Experimental data are orientative since they have been obtained during the first experimental year (2009).

In order to test in the field Pionerr maize hybrids, we set, in the Aradului Plain at Semlac (Arad County), a bi-factorial trial whsoe experimental factors were as follows: Factor A – six Pioneer maize hybrids – Pr37M34, Pr37N01, Pr36R10, Pr35F38, Florencia, and Pr35T06; Factor B – maize plants sowing density, with three graduations: 40,000 plants/ha, 55,000 plants/ha, 70,000 plants/ha. Harvesting the maize hybrid crops was done upon technical maturity.

Valorising at its best the biological potential of some simple maize hybrids requires their study at optimal sowing densities to prevent a negative imapct on the crop yielding potential (FASOULA & FASOULA 2002).

Optimising sowing density to obtain maximal kernel yields per area unit differs from one maize hybrid to another due to the significant interaction between hybrid and sowing density (FARNHAM 2001; WIDDICOMBE &THELEN 2002; TOKATLIDIS *et al*. 2005). Sowing density also has an impact on plant evenness on a plot (TOKATLIDIS *et al*. 2005).

## RESULTS AND DISCUSSION

The analysis of the results of the studied productivity elements in the six Pioneer maize hybrids in the experimental year 2009 is presented in Figures 1-9.

Kernel yield

The variation of the maize kernel yield in the six Pioneer maize hybrids under the impact of sowing density is as follows: according to the graph presented in Figure 1, we can see that at a sowing density of 40,000 plants/ha, the maize hybrid FLORENCIA resulted in the highest yield of maize kernels (90.01%), showing a good adaptation to low sowing density yield. The next high averages of the maize kernel yields were in the maize hybrids Pr35F38 (85.86%) and Pr35T06 (84.38%). Some of these values of the yields are arther good.

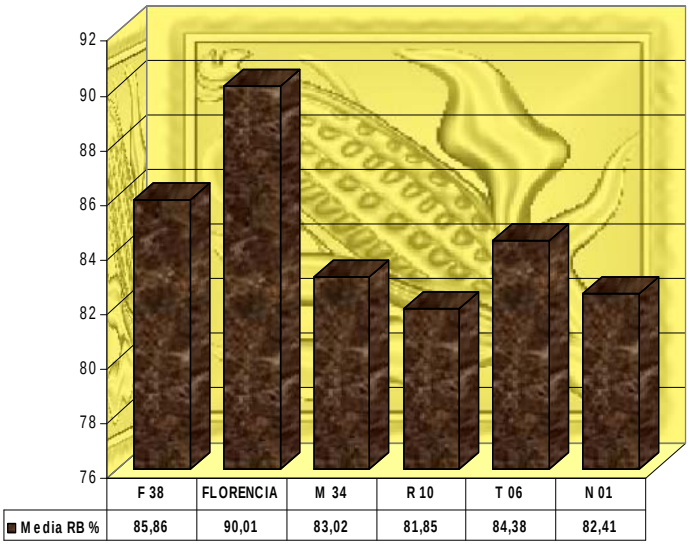


Fig. 1. Variation of the maize kernel yield in the six Pioneer maize hybrids at a sowing density of 40,000 plants/ha (Aradului Plain, Semlac, Arad County – Experimental year 2009)

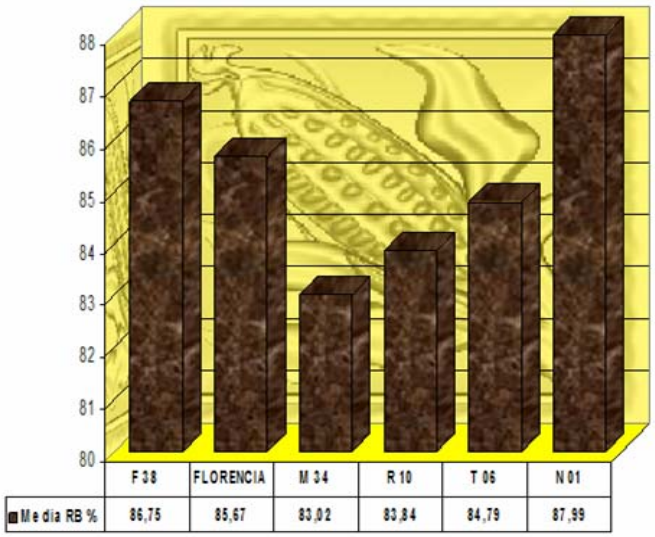


Fig. 2. Variation of the maize kernel yield in the six Pioneer maize hybrids at a sowing density of 55,000 plants/ha (Aradului Plain, Semlac, Arad County – Experimental year 2009)

As far as the variation of the number of plants/ha – 40,000 plants/ha, 50,000 plants/ha, and 70,000 plants/ha – the average of the kernel maize yield in the six studied Pioneer maize hybrids, the weight quality indicator had no signfiicant oscillations since its values were good.

The best average values of the kernel maize yield depending on plant density per ha was when sowing density was 55,000 plants/ha, followed by a sowing density of 40,000 plants/ha and by 70,000 plants/ha.

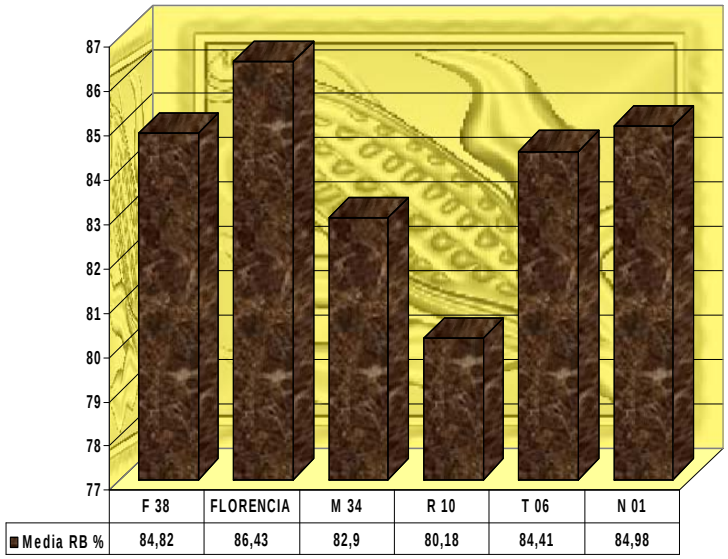


Fig. 3. Variation of the maize kernel yield in the six Pioneer maize hybrids at a sowing density of 70,000 plants/ha (Aradului Plain, Semlac, Arad County – Experimental year 2009)

Weight of kernel maize cobs

The variation of the average weight of kernel maize cobs in the six Pioneer maize hybrids under the impact of sowing density in the soil and climate conditions of the Aradului Plain (Semlac, Arad County) is as follows: for a plant density of 40,000 plants/ha the highest value was in the maize hybrid Pr37M34 (203.84 g), followed by the maize hybrid Pr37N01 (189.61 g) and by the mazie hybrid Pr36R10 (187.76 g) (Figure 4).

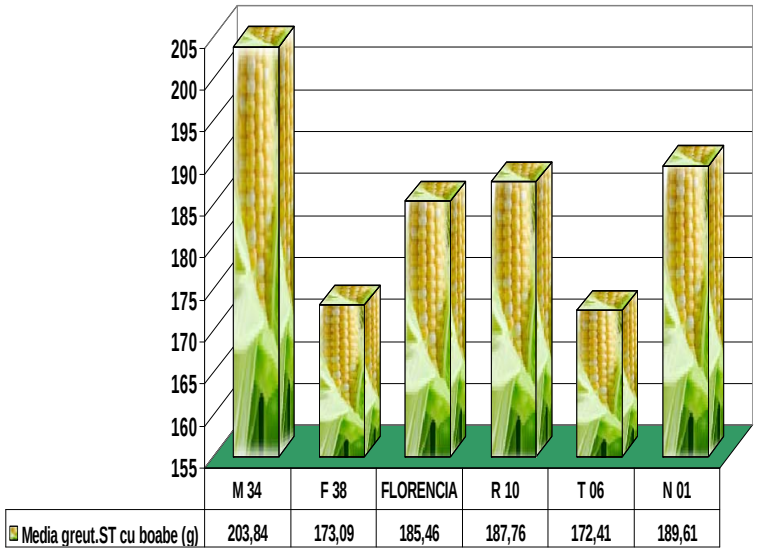


Fig. 4. Variation of the average weight of the kernel maize cob in the six Pioneer maize hybrids for a plant density of 40,000 plants/ha

For a maize plant density of 55,000 plants/ha, the average variation of the weight of the kernel maize cob is shown in Figure 5. The highest average value of the weight of krnel maize cob was in the maize hybrid Pr35T06 (172.41 g), followed by the maize hybrid Pr37N01 (139.47 g) and by the maize hybrid Pr37M34 (126.01 g).

Figure 6 shows the variation of the average weight of the kernel maize cob in the six Pioneer maize hybrids for a plant density of 70,000 plants/ha.

At this plant density, the highest average weight was in the maize hybrid Pr36R10 (183.75 g), followed by the maize hybrid Pr37N01 (162.38 g) and by the maize hybrid Pr35F38 (158.97 g).

We can say that the highest value of the average weight of the kernel maize cob depending on the interaction of the factors hybrids x density was in the maize hybrid Pr37M34 (203.84 g) for a plant density of the palnts of 40,000 plants/ha.

Kernel weight

The variation of the average weight of the maize cob kernels in the six Pioneer maize hybrids unde rthe impact of plant density in the soil and climate conditions of the Aradului Plain (Semlac, Arad County) is as follows: Figure 7 shows graphically the average variation of the maize cob kernels for a plant density of 40,000 plants/ha. We can see that of the six Pioneer maize hybrids under study, the average of the weight of maize cob kernels is the highest in the maize hybrid Pr37M34 (169.11 g).

To note that, according to data colected during vegetation, this maize hybrid matured and ripened earlier than other Pioner maize hybrids studied.

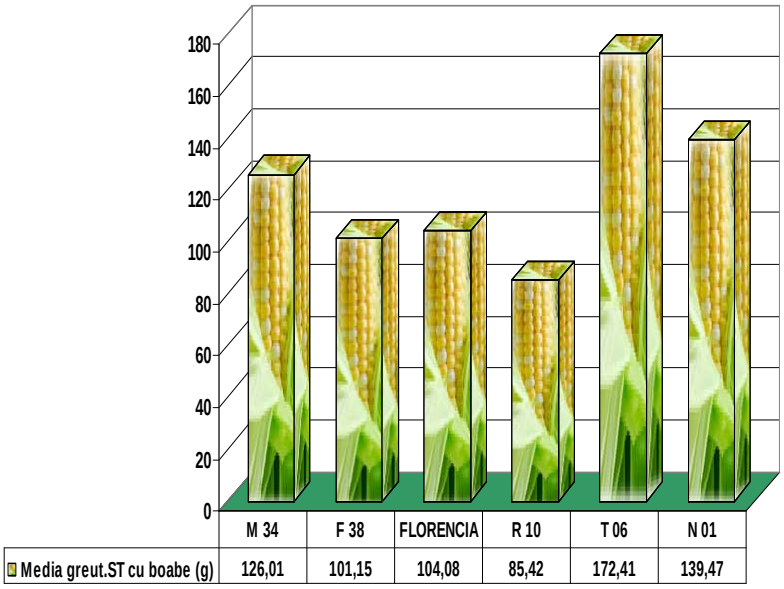


Fig. 5. Variation of the average weight of the kernel maize cob in the six Pioneer maize hybrids for a plant density of 55,000 plants/ha

Florencia is the Pioneer maize hybrid that ranked 2nd from the point of view of the average weight of maize cob kernels when sowed at a plant density of 40,000/ha (165.97 g). The maize hybrid Pr37N01 yielded an average weight of maize cob kernels of 155.48 g. We can say that in the six Pioneer maize hybrids, the average of the weights of the maize cob kernels did not vary widely: 169.11 g – 145.51 g.

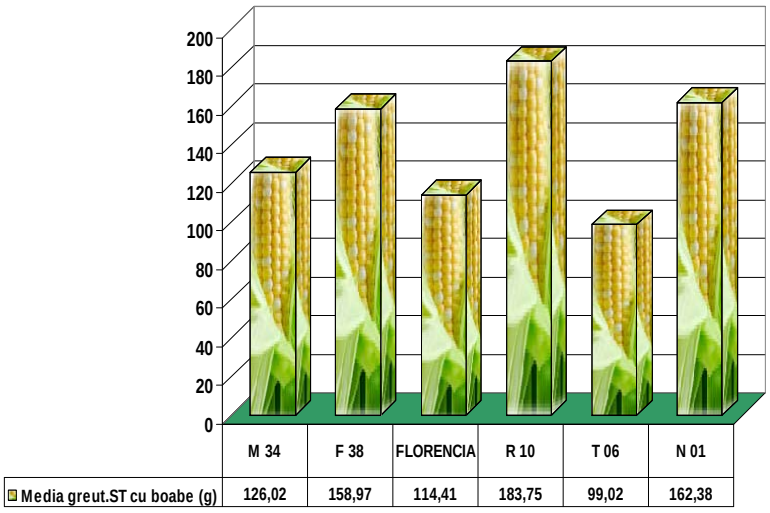


Fig. 6. Variation of the average weight of the kernel maize cob in the six Pioneer maize hybrids for a plant density of 70,000 plants/ha

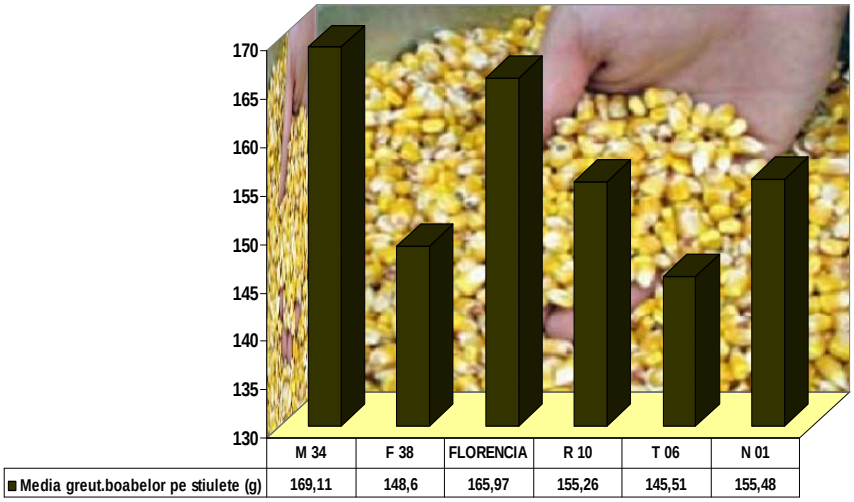


Fig. 7. Variation of the average weight of maize cob kernels in the six Pioneer maize hybrids for a plant density of 40,000 plants/ha

In Pioneer maize hybrids sowed at a plant density of 55,000 plants/ha (Figure 8), the maize hybrid Pr35F38 raeched the highest value of the average of the weight of maize cob kernels (158.97 g), followed by the maize hybrid Pr36R10 (154.16 g) and by the maize hybrid Pr37M34 (102.73 g).

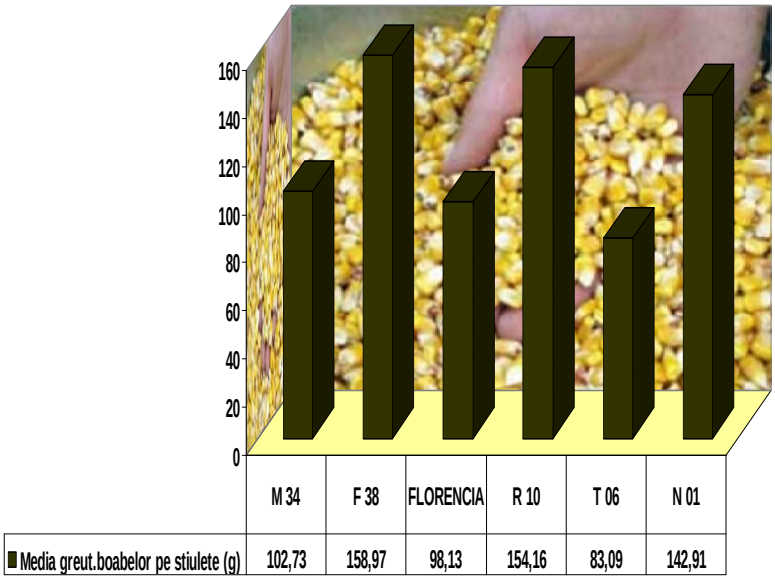


Fig. 8. Variation of the average weight of maize cob kernels in the six Pioneer maize hybrids for a plant density of 55,000 plants/ha

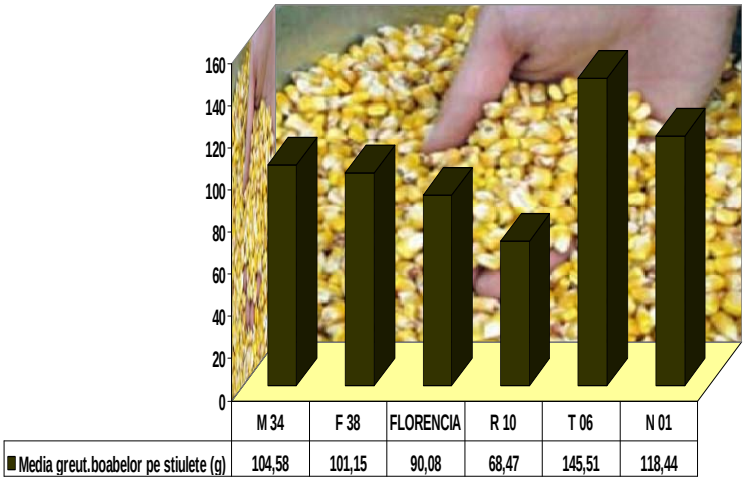


Fig. 9. Variation of the average weight of maize cob kernels in the six Pioneer maize hybrids for a plant density of 70,000 plants/ha

Figure 9 shows the variation of the average weight of maize cob kernels in the six Pioneer maize hybrids for a plant density of 70,000 plants/ha. The highest average value of the weight of maize cob kernels was in the maize hybrid Pr35T06 (145.51 g), followed by the maize hybrid Pr37N01 (118.44 g) and by the maize hyrbid Pioneer Pr35F38 (104.58 g).

## CONCLUSIONS

Analysing experimental data in the agricultural year 2009, we can say that most a large part of the material we studied resulted in high values of certain productivity elements.

The best average values of maize kernels yields depending on the interaction of the factors hybrids x plant density was when sowing 55,000 plants/ha (85.34%), followed by 40,000 plants/ha (84.58%) in the maize hybrid Florencia, and by 70,000 plants/ha (83.95%).

The highest value of the average weight of the kernel cob depending on the interaction of the factors hybrids x density was in the maize hybrid Pr37M34 (203.84 g) for a palnt density of 40,000 plants/ha.

Among the six Pioneer maize hybrids sowed at a plant density of 55,000 plants/ha, the maize hybrid Pr35F38 shares the highest value of the average of the weight of cob kernels (158.97 g), followed by the maize hybrid Pr36R10 (154.16 g) and by the maize hybrid Pr37M34 (102.73 g).

## BIBLIOGRAPHY

1. FARNHAM, D.E., 2001 - Row spacing, plant density, and hybrid effects on corn kernel yield and moisture. Agronomy Journal, 93: 1049-1053
2. FASOULA, V.A, FASOULA, D.A., 2002 - Principles underlying genetic improvement for high and stable crop yield potential. Field Crops Research, 75: 191-209.
3. TOKATLIDIS, I.S., KOUTROUBAS, S.D., 2004 - A review of maize hybrids' dependence on high plant populations and its implications for crop yield stability. Field Crops Research, 88: 103-114
4. TOKATLIDIS, I.S., KOUTSIKA-SOTIRIOU, M., TAMOUTSIDIS, E., 2005 - Benefits from using maize density-independent hybrids. Maydica, 50: 9-17.

5. TROYER, A.F., 2001 - Temperate corn – Background, behaviour, and breeding. CRC Press Boca Raton London, New York, Washington, D.C.
6. WIDDICOMBE,W.D., THELEN, K.D., 2002 - Row width and plant density effects on corn kernel production in the northern Corn Belt. Agronomy Journal, 94: 1020-1023.