

THE BEHAVIOR OF SOME NEW CORN HYBRIDS, CULTIVATED IN BRAILA COUNTY

Aurica SOARE, Gheorghe VOICU

Brăila Engineering Faculty, 29 Calea Călărășilor Street, Brăila, Phone/Fax: 0239612572, “Dunărea de Jos” University from Galați, 47 Domnească Street, cod 800008, Galați, Phone: 0336130108, Fax: 0236461353

Corresponding author e-mail: aurica.soare@gmail.com

Abstract

This paper deals with the behaviour of 35 corn hybrids in 2010 crop, hybrids created by ISTA (Istituto Sementi e Technologie Agro-alimentari) Italy, hybrids which were cultivated for the first time in Braila county. Out of these hybrids, 22 belong to FAO 300-400 group, 11 hybrids belong to FAO 400-500 group and 2 hybrids belong to FAO 500 group. The results obtained were compared with the ones of the aboriginal hybrid, Olt, considered as control hybrid. The experiment was performed in Albina village, Braila county, on a typical chernozem soil with physical and chemical characteristics which are favourable to the growth and development of corn plants, area which is characterized by a semi-draughtly steppe climate, the main limitative factor being the water. Each hybrid was sowed in two repetitions, the second one being placed randomisedly, the length of a repetition plot being 12 m, thus it results an area of 8.4 m² for each repetition and an area of 588 m² for the entire allotment. For the hybrids analyzed and the control hybrid, there are determined productivity elements (number of corn grains/cob, average weight of the corncobs, weight of the corn grains/cob), the yielding, hectolitre mass (MH), the mass of 1000 grains (MMB) and finally, the productions obtained, all these being expressed at 15% humidity. The production of the control hybrid was 0.86 kg/m², and this production was outrun by 6 hybrids: PR36B08 (0.87 kg/m²), RM10-IVS-3 (0.92 kg/m²), RM10-IVS-7 (0.90 kg/m²), RM10-IVS-9 (0.90 kg/m²), ISH 303 (0.89 kg/m²), ISH 508 (0.91 kg/m²). Based on the results presented, it can be concluded that out of the hybrids analyzed, best behaved the following hybrids from class FAO 300-400: RM10-IVS-3, RM10-IVS-9, PR36B08, RM10-IVS-7, ISH303, from class FAO 400-500, best behaved the following hybrids: RM10-IVS-21, RM10-IVS-22 and from class FAO 500, ISH 508 hybrid.

Keywords: phenophase, corncob, yielding, production, productivity elements.

INTRODUCTION

Corn occupies third place between plants cultivated in the world, in what concerns the area, following to wheat and rice and the second place in what concerns the productivity, following to wheat. The area cultivated with corn at world level in 2010 was 161.90 mil ha with an average production of 5215 kg/ha. In Europe, the area cultivated with corn also in 2010 was 14.11 mil ha, with an average production of 6064 kg/ha.

In the European Union, Romania occupies first place in what concerns the area cultivated with corn, holding almost 30% from total area of 8.6 million hectares.

In our country, the area cultivated with corn in 2010 was 2.09 mil ha, with an average production of 4317 kg/ha.

MATERIAL AND METHOD

The experience was placed within the range of Albina locality, Brăila county, on a typical chernozem type of soil, with physical and chemical characteristics which are favourable to the growth and development of corn plants, area which is characterized by a semi-draughtly steppe climate, the main limitative factor being the water.

Selecting corn hybrids could be an important instrument in weeds management for corn farmers [1].

The preliminary plant was autumn wheat, plant considered as being a good precedential for corn crop. This rotation wheat-corn is quite frequent, taking into consideration that these crops are basic crops' structure.

The rotations that involve also green crops are much more persistent as compared with the actual rotations on a short time [5].

The preparation of the seedbed was done by using the disk harrow, followed by working with the perpendicular combiner on the direction of seeding, during the day previous to the seeding day.

The seeding was performed in equidistant rows, at the distance of 70 cm between rows and 18 cm between grains on a row, resulting a density of 7.8 germinable seeds/m², at the depth of 7 cm.

The seeding was done during the optimum period, on 15.04.2010. At the same time with the seeding, there were applied also complex dressings, with the ratio 18:46:0 in dosage of 120 kg/ha.

The optimum density of the plants for the maximum corn production per area unit is different from one corn hybrid to another, following to the interactions between the hybrid and different densities [2].

The springing occurred between 29–30 April, the average density at springing being 6.5-7 plants/m².

Each hybrid was sowed in two repetitions, the second repetition being placed randomisedly, the length of a repetition plot being 12 m, thus it results an area of 8.4 m² for each repetition and an area of 588 m² for the entire allotment.

The average density at harvest was 5 plants/m². The harvesting was done on 9th September 2010.

The delays at harvesting should be avoided, especially when there are used hybrids with low resistance at dropping [3].

The production potential can be increased through extending the period of blooming and of physiological maturity, maintaining constant the vegetation period by complete interception of the radiations in the blooming period [4].

For the hybrids analysed and the control hybrid (Olt), there are determined productivity elements (number of corn grains/cob, corncobs, weight of the corn grains/cob), the yielding, hectolitre mass (MH), the mass of 1000 grains (MMB) and

finally, the productions obtained, all these being expressed at 15% humidity.

RESULTS AND DISCUSSIONS

The behaviour of the hybrids analysed was appreciated based on the results obtained at the determinations performed on the productivity elements and quality indices. The hybrids analysed are part of different FAO groups, as it is presented in table 1.

Table 1. The hybrids analysed, with their classification in FAO groups

No.	Hybrid	FAO Class	No.	Hybrid	FAO Class
1	PR36B08	300-400	19	RM10-IVS-17	300-400
2	RM 10-IVS-1	300-400	20	RM10-IVS-18	300-400
3	RM10-IVS-2	300-400	21	RM10-IVS-19	300-400
4	RM10-IVS-3	300-400	22	ISH404	300-400
5	RM10-IVS-4	300-400	23	RM10-IVS-20	400-500
6	RM10-IVS-5	300-400	24	RM10-IVS-21	400-500
7	RM10-IVS-6	300-400	25	RM10-IVS-22	400-500
8	RM10-IVS-7	300-400	26	RM10-IVS-23	400-500
9	RM10-IVS-8	300-400	27	ISH403	400-500
10	RM10-IVS-9	300-400	28	RM10-IVS-24	400-500
11	RM10-IVS-10	300-400	29	RM10-IVS-25	400-500
12	ISH303	300-400	30	RM10-IVS-26	400-500
13	RM10-IVS-11	300-400	31	RM10-IVS-27	400-500
14	RM10-IVS-12	300-400	32	RM10-IVS-28	400-500
15	RM10-IVS-13	300-400	33	SHOP4	400-500
16	RM10-IVS-14	300-400	34	ISH507	500
17	RM10-IVS-15	300-400	35	ISH508	500
18	RM10-IVS-16	300-400	36	OLT - control	400-500

The results obtained regarding the number of grains and the number of grains per cob at the hybrids analysed are presented in Figure 1 and 2.

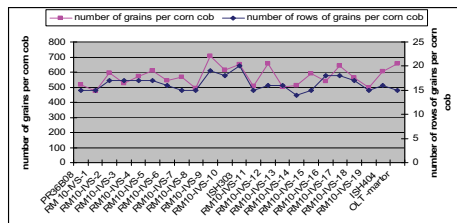


Fig. 1. The results on the number of grains and number of rows per cob hybrids from FAO 300-400 group analysed

The number of grains per cob was the smallest for *RM10-IVS-23* hybrid (392 grains), between 400-500 grains for 3 hybrids: *RM10-IVS-1*, *RM10-IVS-8*, *RM10-IVS-19*, between 500-600 grains for 18

hybrids: *RM10-IVS-13*, *RM10-IVS-11*, *RM10-IVS-14*, *PR36B08*, *RM10-IVS-3*, *RM10-IVS-16*, *RM10-IVS-6*, *RM10-IVS-21*, *RM10-IVS-18*, *RM10-IVS-26*, *RM10-IVS-7*, *RM10-IVS-4*, *RM10-IVS-24*, *RM10-IVS-27*, *RM10-IVS-15*, *ISH403*, *RM10-IVS-2*, *ISH507*, between 600-700 grains for 11 hybrids: *ISH404*, *RM10-IVS-5*, *RM10-IVS-10*, *RM10-IVS-28*, *RM10-IVS-17*, *RM10-IVS-25*, *RM10-IVS-20*, *SHOP4*, *ISH303*, *RM10-IVS-12*, *RM10-IVS-22* and over 700 grains per cob for 2 hybrids: *RM10-IVS-9* and *ISH508*.

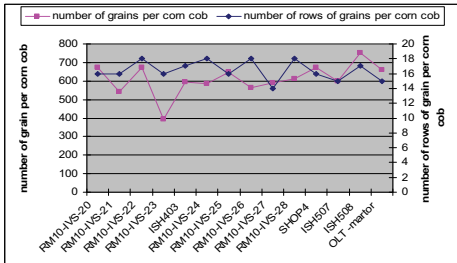


Fig. 2. The results on the number of grains per cob and number of rows in groups to analyze FAO 400-500 and 500 hybrids

As compared with the control sample, it is observed that it was outrun by 3 hybrids: *RM10-IVS-25*, *RM10-IVS-20* from FAO 400-500 group and *ISH508* from FAO 500 group.

Average number of grains rows per cob was 14 for 2 hybrids, 15 for 9 hybrids, 16 for 8 hybrids, 17 for 7 hybrids, 18 for 7 hybrids, 19 for one hybrid and 20 for one hybrid, it results that for most of hybrids, the number of grains rows per cob was between 15-18.

For the hybrids analysed, it was established the average weight of the cobs and the average weight of the grains per cob, the results being represented graphically in figures 3 and 4. The weight of the grains per cob varied within quite large limits, between 92.49 – 221.57 g. There were distinguished *ISH508* (190.79 g) and *SHOP4* (221.57 g) hybrids. For any of the hybrids, the grains' weight did not exceed *Olt* control hybrid grains' weight (230.52 g), *PR36B08* 168.79 g). Out of FAO 300-400 class, there were distinguished *RM10-IVS-3* (170.34 g) and *PR36B08* (168.79 g) hybrids.

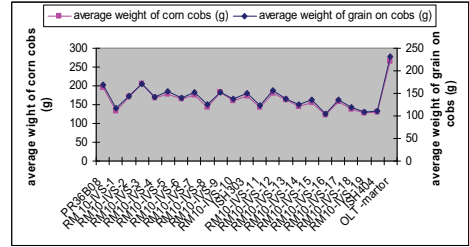


Fig. 3. The results of the average weight of cobs and grains hybrids from FAO 300-400 group analysed

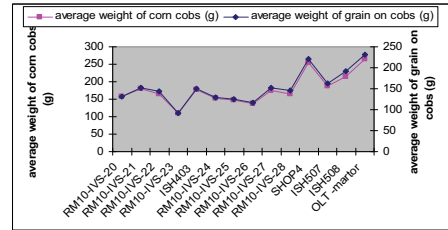


Fig. 4. The results of the average weight of cobs and grains hybrids from FAO 400-500 and 500 groups analysed

Out of FAO 400-500 class, it was distinguished *SHOP4* (221.57 g) hybrid, and out of FAO 500 class, it was distinguished *ISH508* (190.79 g) hybrid.

In the figures 5 and 6, there are represented the results obtained regarding the mass of 1000 grains (MMB) and grains production in t/ha at 15% humidity for the hybrids analyzed.

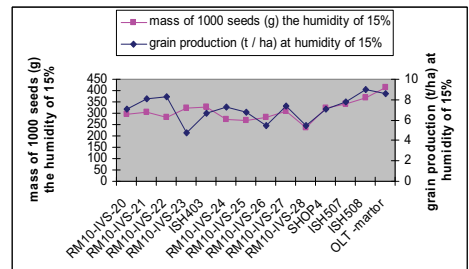


Fig. 5. Mass of 1000 seeds and productions obtained hybrids from FAO 300-400 group analysed

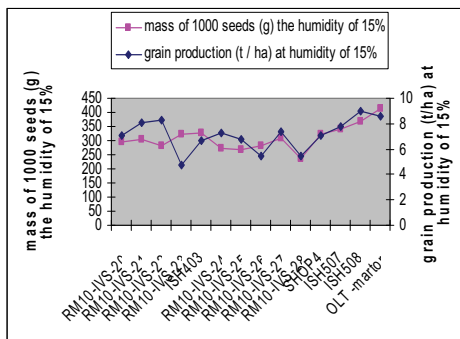


Fig. 6. Mass of 1000 seeds and productions obtained for the hybrids from FAO 400-500 and 500 groups analysed

The production of control hybrid was 8.56 t/ha, and this production was outrun by 6 hybrids: PR36B08 (a plus of 0.1 t/ha), RM10-IVS-3 (a plus of 0.63 t/ha), RM10-IVS-7 (a plus of 0.41 t/ha), RM10-IVS-9 (a plus of 0.48 t/ha), ISH 303 (a plus of 0.36 t/ha), ISH 508 (a plus of 0.47 t/ha).

The mass of 1000 grains (MMB) varied between 238.03-368.72 g; it should be mentioned that for any of the hybrids analysed, the MMB did not exceed the MMB achieved by the control hybrid (414.68 g). MMB had values bellow 300 g for the majority of the hybrids, as follows: RM10-IVS-28, RM10-IVS-16, ISH404, RM10-IVS-25, RM10-IVS-24, RM10-IVS-22, RM10-IVS-18, RM10-IVS-19, RM10-IVS-15, RM10-IVS-10, RM 10-IVS-1, RM10-IVS-2, RM10-IVS-3, RM10-IVS-4, RM10-IVS-5, ISH303, RM10-IVS-11, RM10-IVS-17, RM10-IVS-20, RM10-IVS-26 and values of over 300 g for the hybrids: PR36B08, RM10-IVS-6, RM10-IVS-7, RM10-IVS-8, RM10-IVS-9, RM10-IVS-12, RM10-IVS-13, RM10-IVS-21, RM10-IVS-14, RM10-IVS-23, ISH403, RM10-IVS-27, SHOP4, ISH507, ISH508.

In what concerns the production obtained, it varied within quite large limits, between 4.7-9.1 t/ha, productions bellow 5.0 t/ha were obtained for one single hybrid RM10-IVS-23; productions between 5.0-6.0 t/ha were obtained for 5 hybrids: RM10-IVS-8, RM10-IVS-16, RM10-IVS-19, RM10-IVS-26, RM10-IVS-28; productions between 6.0-7.0 t/ha were obtained for 5 hybrids: RM10-IVS-1, RM10-IVS-18, ISH404,

ISH403, RM10-IVS-25, productions between 7.0-8.0 t/ha were obtained for 10 hybrids: RM10-IVS-5, RM10-IVS-10, RM10-IVS-11, RM10-IVS-14, RM10-IVS-20, RM10-IVS-24, RM10-IVS-27, SHOP4, ISH507, RM10-IVS-15, productions between 8.0-9.0 t/ha were obtained for 11 hybrids: PR36B08, RM10-IVS-2, RM10-IVS-4, RM10-IVS-6, ISH303, RM10-IVS-12, RM10-IVS-13, RM10-IVS-17, RM10-IVS-7, RM10-IVS-21, RM10-IVS-22 and productions over 9.0 t/ha were obtained for 3 hybrids: RM10-IVS-9, ISH508, RM10-IVS-3.

In figures 7 and 8, there are presented the results obtained regarding the ratio per cob and hectolitre mass for the hybrids analysed.

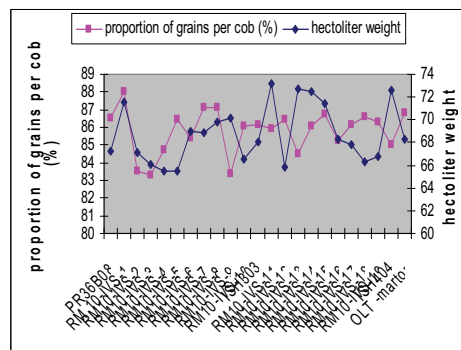


Fig. 7. The ratio of grains per cob and hectolitre mass for the hybrids from FAO 300-400 group analysed

The yield had values that varied between the limits 83.33-88.46%, a yield bellow 85% was obtained for 10 hybrids: RM10-IVS-3, RM10-IVS-9, RM10-IVS-2, RM10-IVS-20, RM10-IVS-23, RM10-IVS-21, RM10-IVS-24, RM10-IVS-13, RM10-IVS-4, ISH404, between 85.0-86.0% for 6 hybrids: RM10-IVS-16, ISH403, RM10-IVS-25, RM10-IVS-26, RM10-IVS-11, RM10-IVS-6, between 86.0-87.0% for 13 hybrids: PR36B08, RM10-IVS-5, RM10-IVS-10, ISH303, RM10-IVS-14, RM10-IVS-12, RM10-IVS-15, RM10-IVS-17, RM10-IVS-18, RM10-IVS-19, RM10-IVS-22, RM10-IVS-27, ISH507, between 87.0-88.0% for 4 hybrids: RM10-IVS-7, RM10-IVS-8, RM10-IVS-28, SHOP4, over 88% for 2 hybrids: RM10-IVS-1, ISH508.

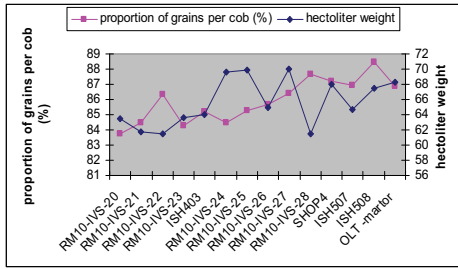


Fig. 8. The ratio of grains per cob and hectolitre weight group for the hybrids analyzed, FAO 400-500 and 500

Higher values of the yield as against the control hybrid (86.94%) were obtained for the hybrids: RM 10-IVS-1 (88.05%), RM10-IVS-7 (87.09%), RM10-IVS-8 (87.09%), RM10-IVS-28 (87.67%), SHOP4 (87.17%), ISH507 (86.96%), ISH508 (88.46%).

It was calculated Pearson correlation coefficient between yield and the diameter of the corn cob, the values obtained being -0.481 in case of the hybrids from FAO 300-400 group and -0.492 in case of the hybrids from FAO 400-500 and 500 groups; the values obtained show that for the tardy hybrids, the yield is more strongly negatively influenced by the diameter of the corn cob. The correlations between yield and corn cob's diameter are graphically represented in the figures 9 and 10.

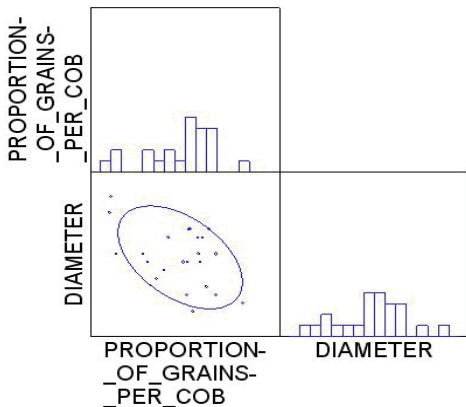


Fig. 9. The correlation between yield and corn cob's diameter for the hybrids from FAO 300-400 group

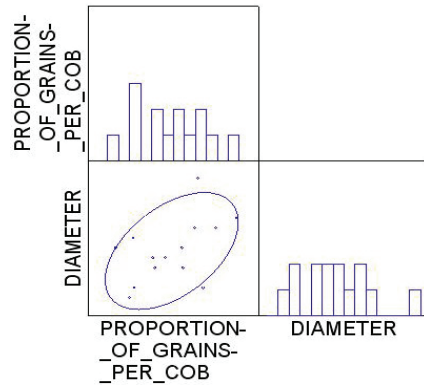


Fig. 10. The correlation between yield and corn cob's diameter for the hybrids from FAO 400-500 and 500 groups

It was calculated Pearson correlation coefficient between the mass of 1000 grains and the production obtained, the values obtained being 0.313 in case of hybrids from FAO 300-400 group and 0.527 for the hybrids from FAO 400-500 and 500 groups; the values obtained show that between those two variables there is a positive correlation, a correlation higher in case of more tardy hybrids.

The graphic representation of the correlation between those two variables is given in figures 11 and 12.

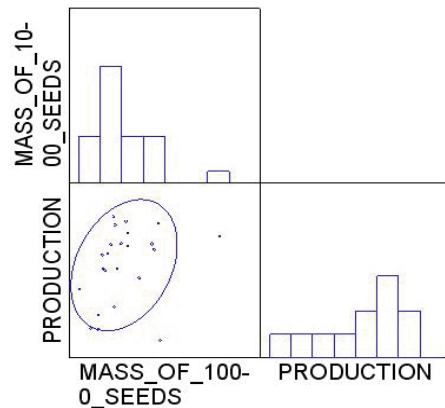


Fig. 11. The correlation between the mass of 1000 grains and the production for the hybrids from FAO 300-400 group

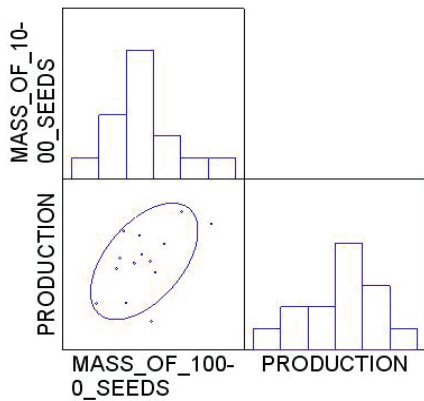


Fig. 12. The correlation between the mass of 1000 grains and the production for the hybrids from FAO 400-500 and 500 group

CONCLUSIONS

Based on the results presented, it can be concluded that out of the hybrids analyzed, best behaved the following hybrids from class FAO 300-400: RM10-IVS-3, RM10-IVS-9, PR36B08, RM10-IVS-7, ISH303, from class FAO 400-500, best behaved the following hybrids: RM10-IVS-21, RM10-IVS-22 and from class FAO 500, best behaved ISH 508 hybrid.

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