RESEARCH ON THE BEHAVIOR OF SOME CORN HYBRIDS UNDER THE INFLUENCE OF TECHNOLOGICAL COMPONENTS IN THE CONTEXT OF SUSTAINABLE AGRICULTURE

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Abstract

Previous research results show that along with the increase of agriculture mechanization and fertilization degree, the number and type of works applied to the soil can be adapted and changed without reducing the yield. Replacing soil plowing with a disc-harrow ploughing as basic work to the depth of 10-12 cm, for a 1-2 years period, didn't significantly affected the level of corn production (Sin G. t al, 1986). Research conducted in Romania (Tomoroga P. et al, 1980), also confirmed by the results obtained abroad (Campbel M.R. et al, 1995), haven't established direct relations between the tillage systems and the ertilization mode for the main crop plants. Other studies states that soil tillage and crop fertilization are technological components of a great importance, especially in the dry areas from Romania.

Key words: corn hybrids, technological components, sustainable agriculture

In the context of sustainable agriculture, Draghici I., 2006, provides a series of information regarding the ecological resources and the increase yield technologies, in order to establish the density of plants and the fertilization system. As regards the global climate change, the results obtained by Srivastava A. et al, 2010, and by Byjesh K. et al, 2010, show us the importance of establishing some crop strategies, by making a proper selection of the cultivated species. They recommended new hybrids adapted to the drought conditions.

MATERIAL AND METHOD

The experiments were aimed mainly at increasing corn productivity in the soil and climate conditions from the South part of the country. To determine the optimal technology of corn cultivation, it was investigated how this crop reacts to different tillage methods, on different agrofunds, with different hybrids, as well as the interaction of all these factors. It was also observed how the corn crop behaved in terms of quality indicators. Observations and measurements were carried out in 2013, in Calarasi County, with the following factors and graduations:

- basic work of the soil: a1 – autumn plowing, a2 – spring plowing, a3 – disking;
- fertilization with nitrogen and phosphorus: b1 – unfertilized, b2 – $N_{120}P_{70}$;
- corn hybrid: c1 – Partizan, c2 – Opal, c3 - Mostiştea

The experience was placed on a field with evenly characteristics from the fertility and microrelief point of view, on a soil which fall within the chernozems type. Experimental model was a trifactorial one, disposed according to the subdivided parcels method in three rehearsals.

RESULTS AND DISCUSSIONS

Using disking as basic work determines an average yield of 7351 kg/ha, compared to the autumn plowing, which can provide an average production of 5221 kg/ha or to the spring plowing, which brings obtains only 4666 kg/ha (*table 1*). Analyzing the hybrids, the yield increase is statistically ensured in favor of Mostistea hybrid, but it can be cultivated either of the studied hybrids, depending in the concrete conditions from each agricultural exploitation. Obtaining a corn production of over 7300 kg/ha is possible by applying a dose of fertilizer of $N_{120}P_{70}$. Non-application of chemical fertilizers leads to yield reductions of 500-1260 kg/ha.

Comparing the graduations averages it follows that 1000 grain weight (TGW) of corn is influenced by soil tillage and crop fertilization. So that the highest TGW values were obtained in the disking soil version, on a background of fertilization with $N_{120}P_{70}$, to which the TGW average was of 299.0 g for Mostistea hybrid, compared to 287 g for Partizan hybrid. On the other hand, by using autumn plowing of soil as basic work, but also the fertilization with the same

dose of $N_{120}P_{70}$, the TGW values were of 264 g for Mostistea hybrid, 260 g for Partizan hybrid and 256 g for Opal hybrid (*figure 1*).

From the analysis of the studied factors interaction it results a decrease in the TGW values for all three hybrids in the versions autumn plowing and spring plowing, compared to the control version (disking as basic work) with values that are statistically assured. Regarding the hybrids, although the yield increase is statistically assured, the difference is relatively small, so that any of the three hybrids can be taken in culture.

Table 1

Associated influence of soil works, of fertilization and of hybrid on the corn yield (kg/ha)

Version		Hybrid C1	C2	C3	Average yield
A1	B1	4043	4093	4193	4110
	B2	5043	5426	5193	5221
A2	B1	4086	4123	4273	4161
	B2	4676	4603	4720	4666
A3	B1	6040	6096	6133	6090
	B2	7303	7333	7418	7351
Average yield		5199	5279	5322	5266

DL (P 5%) - 280.1 DL (P 1%) – 404.1 DL (P 0.1%)- 606.2

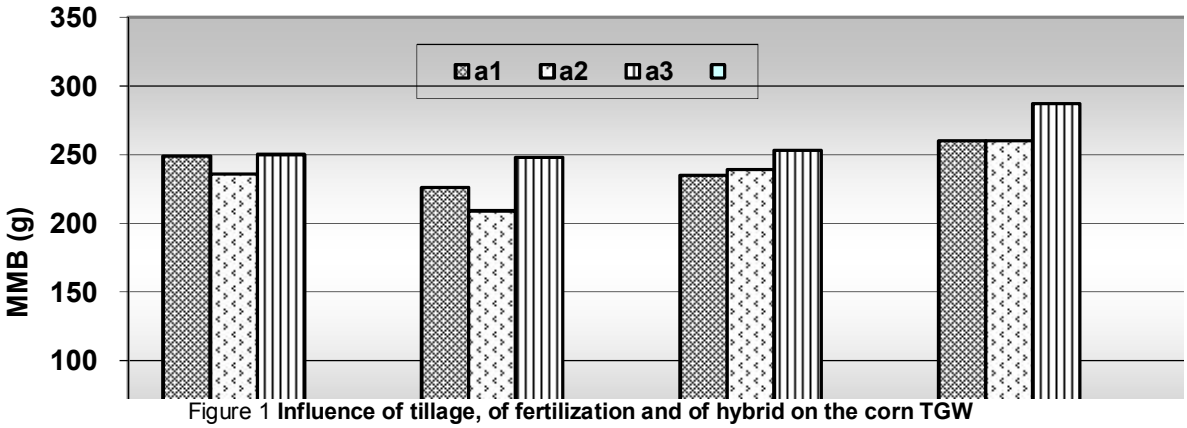

Figure 1 **Influence of tillage, of fertilization and of hybrid on the corn TGW**

Similar, the results achieved on the hectoliter mass (HM) for the corn crop shows that the highest values were obtained in disking and fertilizing variant, with 73 kg for Partizan hybrid, 73.5 kg for Opal hybrid and 75 kg for Mostistea hybrid. In the version with spring plowing and fertilization with $N_{120}P_{70}$, in the experimental period conditions, the average of HM values was of 73 kg to Partzan hybrid, 72 kg to Opal hybrid and 74 kg to Mostistea hybrid. For the autumn plowing variant, also fertilized with the $N_{120}P_{70}$ dose, the average of obtained HM values was of 72 kg to Partzan hybrid, 73 kg to Opal hybrid, compared to 74 kg to Mostistea hybrid (*figure 2*).

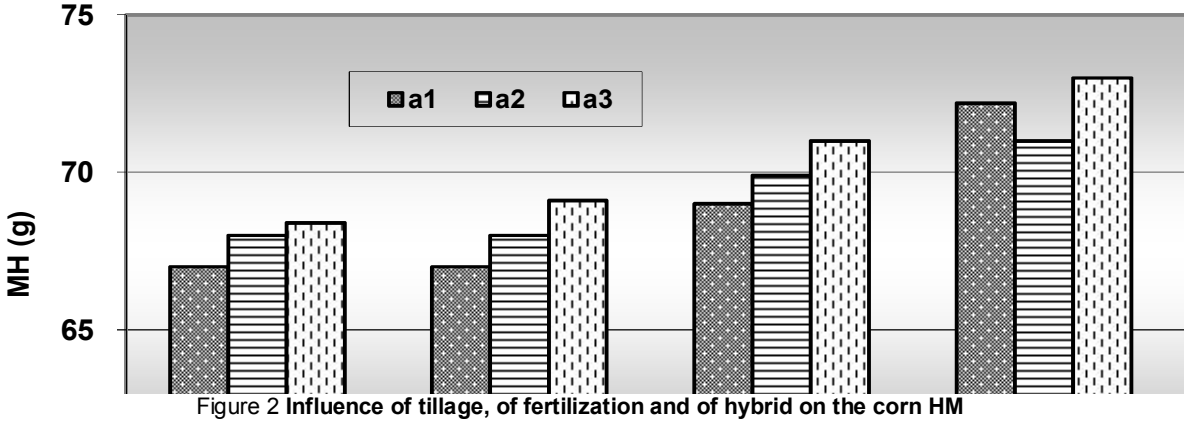

Figure 2 **Influence of tillage, of fertilization and of hybrid on the corn HM**

From the analysis of the studied factors interaction its noticed a decrease in the HM values for all three hybrids (Partizan, Opal and Mostistea) in the versions autumn plowing and spring plowing, compared to the control version (disking) with values that are statistically assured as significant and very significant. As for the hybrids reaction to the studied factors interaction, there is a similar behavior of the three hybrids, the level of MH values being close.

CONCLUSIONS

In the conditions of the year 2013, basic work of soil by disking caused a better exploitation of corn crop fertilization with the dose of $N_{120}P_{70}$ kg/ha, yield increases being very significant compared to other versions of soil tillage.

Replacing the soil work with the disk, as basic work, with autumn plowing or spring plowing, has led to the production losses of 1000-3000 kg/ha, while the application of NP fertilization contributed to yield increase with 600-1400 kg/ha.

Corn crop technology consists in seedbed preparation after performing the disking as basic work of the soil, crop fertilization with $N_{120}P_{70}$ and cultivation of one of the studied hybrids.

Quality indices register variations depending on the used technology and on the climatic conditions of the agricultural year. Therefore, TGW can overcome 300 g when fertilization with $N_{120}P_{70}$ is applied and disking is used as basic work, and HM varies between 71 and 75 kg, as well when the $N_{120}P_{70}$ fertilization is made.

REFERENCES

Antohe I., 2007- *Realizari in ameliorarea sorgului la Fundulea*, Analele INCDA Fundulea, vol. LXXV:

Byjesh K., Kumar S. N., Aggarwal P. K., 2010 - *Simulating impacts, potential adaptation and vulnerability of maize to climate change in India. Mitigation & Adaptation* Strategies for Global Change: 15(5): 413-431.

Campbell M.R., Pollack L.M., White P.J., 1995 - *Genetic variation for starch thermal and functional properties among non mutant maize in breds.* Cereal Chemical, 72: 281-286

Draghici I., 2006 - *Implicatiile fertilizarii cu fosfor şi azot asupra sorgului pentru boabe, cultivat pe soluri nisipoase. In: Lucr. Simp.: Managementul nutrienţilor pentru imbogatirea calitatii culturilor si conservarea solului*

Sin G., Ionita S., Draghicioiu V., Bondarev I., Nicolae H., Boruga I., - 1986. *Posibilitati de reducere a lucrarilor solului pentru culturile de grau, porumb si floarea soarelui.* Probleme de agrofitotehnie teoretica si aplicata, nr.3

Srivastava A., Naresh Kumar S., Aggarwal P. K., 2010 - *Assessment on vulnerability of sorghum to climate change in India.* Agriculture, Ecosystems & Environment: 138(3-4): 160-169

Tomoroga P., Sarpe N., Badut I., 1980 - *Efectul remanent al erbicidelor asociate aplicate la porumbul irigat.*