RESEARCH ON THE INFLUENCE OF SOME TEHNOLOGICAL ELEMENTS AND THE CLIMATE IMPACT ON CORN PRODUCTION IN THE WESTERN PLAIN OF ROMANIA

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Abstract*. In 2014 and 2015, a threefold experience was organized at the Didactic station of Timisoara in ordewr to study the effect of the rain soil work and sowing season upon the yield in three hibrids from different precocity groups. The two experimental years were different from the climate point of view, the year 2014 being very favourable, while the year 2015 was less favourable for corn production, due to insufficient rain high temperatures in June and July. Soil basic works are one of the factors influencing the level of agricultural production. Soil aeration determine a higher storage capacity of the water as well an intensification of soil microbiological activity which, in its turn, ensures larger amounts of nutrients for the crops.This research has pointed out that in years with deficit of precipitations (2015), scarification determined an increase in yield with about 11% compared to classical tillage. In 2014, when precipitations ensured the necessary water for the crops, the differences between the two variants of soil work were insignificant.Results indicate that land scarification is recommendet in ploughing season, as it determines higher yield in dry years.The alternance of rainy and droughty periods associated with hot temperatures had negative effects mainly during maize fructification. Avoiding the overlapping of hot and dry periods and maize fructification can be done by establishing the sowing period in correlation with the precocity of the maize hybrids.The recomended sowing period is the second decade of April, but in 2015, after the very dry monts June and July, the rainffal in August coincided whiy the fruiting phenophases of the semi-late hibrid Mikado, which was sown in the third period, in this variant, thus determining higher yields compared to those in the first and second period. The yields of the three maize hybrids in 2014 correlated with their vegetation period. In 2015, early hybrids were affected by drought during fructification, while the demi-late Mikado hybrid escaped the drought of the second half of summer (when there were precipitations) and yielded about 50% more than the other hybrids. To note that the 3rd sowing time determined the highest yield in Mikado.*

Key words:*harvest, mayze, hybrids.*

INTRODUCTION

Climate change manifest mainly as uniform distribution of rainfall over long periods whit hot temperatures which the level of agricultural production.

In this context, it has become a necessity to reduce undesured outcomes by means of innovative or adapted tehnologies of crop cultivation.

Retaining water in the soil, sowing in optimal periods so as ensure the growth and development of plants especially phenophases whith water intake during rainy periods, as well as using hibrids with different vegetation periods represent only a few of the possible ways of reducing the negative effects of climate change upon agricultural production.

MATERIAL AND METHOD

In 2014 and 2015, a threefold experience was organised at the Didactic Station of Timisoara on a cambic chernozem type of soil with following experimental factors:

Factor A- the main soil work with gradations
- A1 – ploughing
- A2 – scarification

Factor B- sowing season with gradation
- B1 – period I April IInd decade
- B2 – period II April IIIrd decade
- B3 – period III May Ist decade

Factor C – hybrid (precocity group) with gradation
- C1 – Gavot (FAO 280)
- C2 – Kitty (FAO 490)
- C3 – Mikado (FAO 550)

Table 1.

Climatic data and Maize yield

The average monthly temperatures recorded at the Meteorologic Station of Timisoara in the period 2013, 2014, 2015, compared to multiannual average.

Year	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**	**X**	**XI**	**XII**
2013	1.4	3.9	5.2	13.1	17.9	20.4	23.0	23.9	15.4	12.7	9.0	1.1
2014	3.1	5.7	9.2	12.7	16.2	20.7	22.1	22.1	17.2	12.3	10.8	7.5
2015	2,1	2,9	7,1	11,6	17,7	21,2	24,9	24,5	19,0	10,9	6,7	3,1
Annual averages	-1.2	0.4	6	11.3	16.5	19.6	21.6	20.8	16.9	11.3	5.7	1.4

Table 2.

The average monthly rainffal recorded at the Meteorologic Station of Timisoara in the period 2013, 2014, 2015, compared to multiannual average.

Year	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**	**X**	**XI**	**XII**
2013	54.3	37.1	98.3	32.7	97.0	47.5	24.9	50.9	62.8	55.0	52.0	1.2
2014	41.7	16.7	13.4	41.3	146.8	57.7	120.9	64.2	63.7	83.7	85.2	87
2015	51,4	37,4	33,3	28,1	46,9	61,8	25	111,2	60,5	60,9	48,8	8,7
Annual averages	40.9	40.2	41.6	50	66.7	81.1	59.9	52.2	46.1	54.8	40.6	47.8

The climatic data presented in the tables above indicate the fact that the rainfall in 2014, as well as its distribution during the vegetation period, was optimal given the temperatures close the multiannual averages, whereas during 2015, a moderate rain shortage was recoded in Aprol, May, and June and a severe rain shortage was recorded in July given the excessive temperatures of June and July, which intensified the unfavourable effects of water insufficiency during the fruiting phenophases of earlier corn hybrids.

Rainfall in August saved the later hybrid (Gavot, Kitty, Mikado).

In conclusion, the year 2014 was, from climatic poin of view, a very favourable one, and the year 2015 was favourable for corn production.

Table 3.

Maize yield in 2014

Factor A (soil basic works)	Factor B (sowing)	Factor C (hybrid)			Means of Factor A			
		C1- Gavot	C2- Kitty	C3- Mikado	Yield kg/ha	%	Difference kg/ha	Significance
A1 (ploughing)	B1- time I	7678	8982	10329	8461	100		
	B2- time II	7577	8807	9687				
	B3- time III	6808	7717	8564				
A2 (scarification)	B1- time I	7680	8912	9971	8526	101	65	X
	B2- time II	7750	8980	10072				
	B3- time III	6885	7703	8786				

DL5%=682 DL1%=909 DL0.1%=1194

Means of Factor B				Means of Factor C			
Specification	B1	B2	B3	Specification	C1	C2	C3
Yield	8925	8812	7744	Yield	7396	8516	9568
%	100	99	88	%	100	115	129
Difference kg/ha		-123	-1181	Difference kg/ha	-	1120	2172
Significance			000	Significance		Xxx	xxx

DL5%=482 DL1%=643 DL0.1%=849 DL5%=227 DL1%=303 DL0.1%=398

Table 4.

Maize yield in 2015

Factor A (soil basic works)	Factor B (sowing time)	Factor C (hybrid)			Means of Factor A			
		C1- Gavot	C2- Kitty	C3- Mikado	Yield kg/ha	%	Difference kg/ha	Significance
A1 (ploughing)	B1- time I	4731	4685	6627	4818	100		
	B2- time II	3614	4010	7012				
	B3- time III	2752	2615	7318				

A2 (scarification)	B1- time I	4987	5032	7327	5338	101	520	X
	B2- time II	4032	4314	8006				
	B3- time III	3218	3019	8109				

DL5%=518 DL1%=757 DL0.1%=994

Means of Factor B				Means of Factor C			
Specification	B1	B2	B3	Specification	C1	C2	C3
Yield	5564	5165	4505	Yield	3889	3946	6062
%	100	93	81	%	100	101	156
Difference kg/ha		-399	-1059	Difference kg/ha	-	57	2116
Significance			000	Significance			xxx

DL5%=402 DL1%=535 DL0.1%=703 DL5%=189 DL1%=252 DL0.1%=331

RESULTS AND DISCUSSIONS

In table 3, crop yield in 2014 are presented. It has been shown that a good average yield of 8500 kg/ha was obtained in the experimental field.

In the climatic condition of this year, no differnces were recorded due to the basic work of the soil.

Sowing in the IIen and IIIrd decade of April did not determine significant yield differences. Sowing in the first of May determined a highly significant crop reduction as compared to sowing April.

In very favourable climatic condition, hybrids displayed their yiel potential. Hybrids whit a longer vegetation period produced significantly higher yields as compared to early hybrid. In 2015, the average production in the experimental field was approximately 5100kg/ha (table 4).

In this year, scarification determined an average increase in production of 520 kg/ha at a statistically significant level compared to ploughed variants. This is due to better water accumulation in the soil compared to the ploughed variant, this aspect being very important in drought years Similarly to the year 2014, sowing in April on the experimental field led to an average of very significantly higher yields compared to sowing in early May.

By analyzing the production of the three hybrids in the three sowing periods, it may be see that hybrid Mikado, which grew panicles 30 days later that Kitty and 33 days later than Gavot, achieved grew higher production in the IIIrd period of sowing. This is due to the fact that after the drought in June and July, in Augest it rained 111 L/m2. The aparence of panicles in Mikado took place after about 80 days from sowing, i.e. at the end of July and beginning of August, and thus the fruiting phonophases benefited from the rains in August.

Hybrids Gavot and Kitty, which have phenophases that are sensitive to rainfall deficit in July in the IIIrd sowing period were seriously affected, thus the yield greatly decreasing as compared to sowing in the ist even Iind period for the hybrids Mikado, Gavot and Kitty.

CONCLUSIONS

1) Under climate change with an uneven distribution and unpredictable rainfall, scarification is preferable to plowing.
2) Although sowing in April does not ensure the best yield in all years and all precocity groups, taking into consideration multiannual averages, sowing in the 2II decade of April is recommended.
3) Semi-late hybrids ensure the highest productions in the Western Plain.

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