RESEARCH CONCERNING MAIZE CULTIVATION TECHNOLOGY SPECIFIC TO THE PERMANENT VEGETAL COVER SYSTEM IN THE CONDITIONS OF THE WESTERN PLAIN (ROMANIA)

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Abstract. Organic farming is the form of agriculture that relies on techniques such as crop rotation, green manure, compost and biological pest control to maintain soil productivity and control pests on a farm. Organic farming excludes or strictly limits the use of manufactured fertilizers and pesticides, plant growth regulators such as hormones, livestock antibiotics, food additives, and genetically modified organisms. *Organic agriculture is a production system that sustains the health of soils, ecosystems and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. Organic agriculture combines tradition, innovation and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved. In 2010, we organised a bi-factorial trial at the Didactic Station in Timisoara in which we monitored maize yield with permanent vegetal cover technology compared to classical cultivation technology with mineral and organic fertilisation. Results show that there are no statistically ensured yield differences. There were significant differences between expenses and profit levels. Rezults show that in the Banat 's conditions, alternative technological variants are a solution from the point of new of enviromental – friendly agriculture. The technology of cultivation with permanent vegetal cover can be a solution for the cultivation of maize in Western Romania. The results of the present study are part of a research project PN II IDEI Contract nr. 1093/2009, topic code ID_863, financed by the Ministry of Education, Research, Youth and Sport, through the National Council of Scientific Research in Higher Education. The topic of the project is „ Research, fundamenting and elaborating of the technological variant of ecologically planted corn and sunflower ".*

Key words*: agricultural systems, permanent vegetal cover, organic fertilisation, mineral fertilisation, maize*

INTRODUCTION

Intensive agriculture affects the environment, the most well-known impact being that of soil type and fertilisation. In this system, in winter, when there are no winter crops, the land remains uncovered by vegetation, and it is exposed to erosion, structure degradation, as well as to nitrogen loss due to levigation into water tables.

Alternative agricultural systems appeared to correct these lacks and also to ensure high-quality food.

Agricultural systems with permanent vegetal cover is a technological variant little used in Romania though the positive effects on environment and produce quality are easy to understand. This system is part of a wider concept – that of conservative agriculture.

MATERIAL AND METHOD

The trial was set at the Didactic Station in Timisoara (Timis County, Romania) on a cambic chernozem, medium levigated, with medium texture and neuter reaction, and with a humus content of 2.53% in the arable horizon (Figure 1).

From the point of view of the climate, the year 2010 was a very favourable one for maize (Figures 2 and 3) due to the rainfalls during the vegetation period.

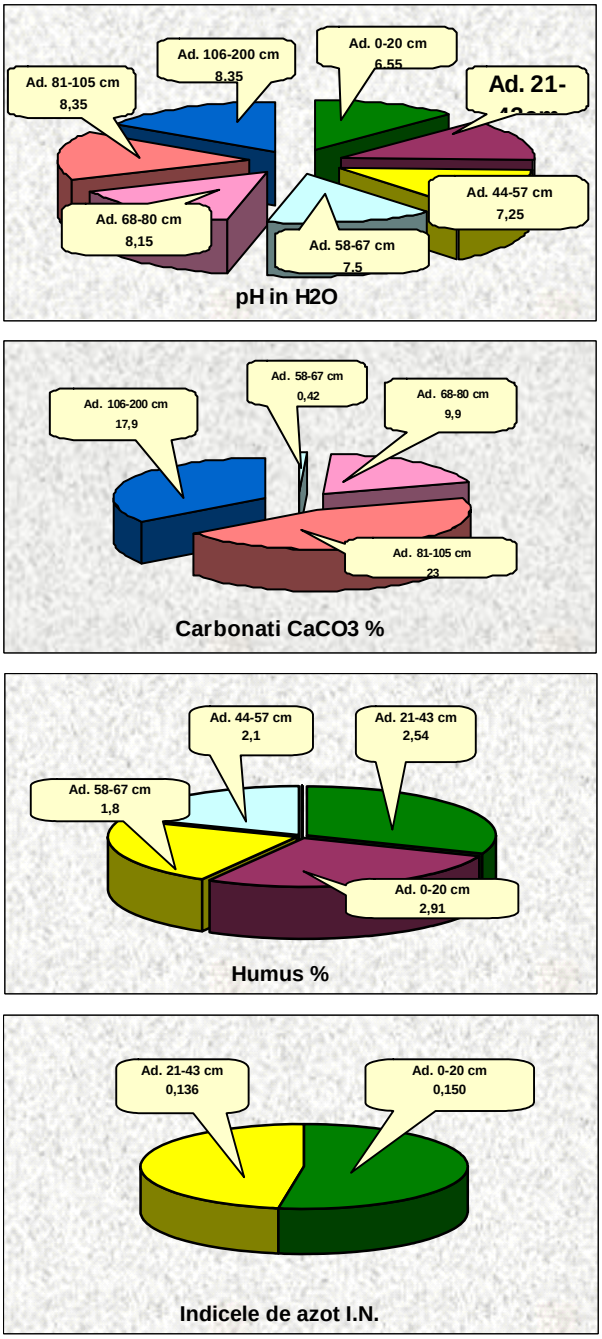


Figure 1. Main chemical features of the cambic chemozem soil, (feebly gleyzed), feebly decarbonated, on loess-like deposits, argilous-dusty/clayish-argilous clay în Timişoara area

The trial was a bi-factorial one with the following factors:

Factor A – agricultural system, a1 – classical; a2 – with permanent vegetal cover.

Factor B – fertilisation, b1 – N_0; b2 – N_{50}; b3 – N_{100}; b4 – N_{150}; b5 – manure 20 t/ha.

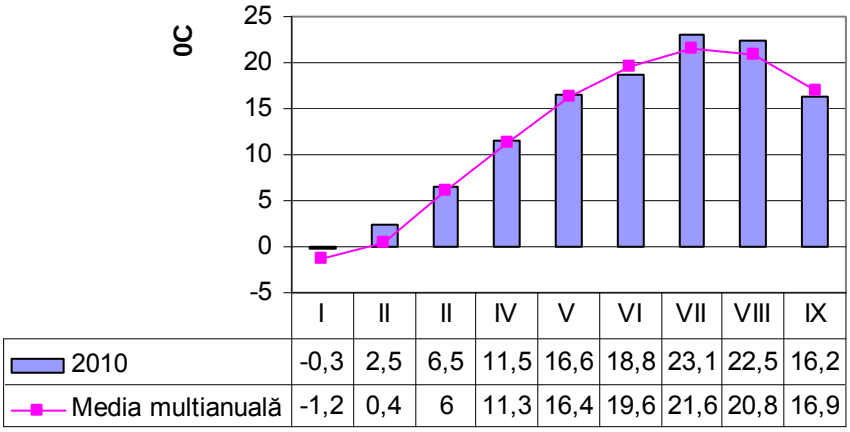
Wheat was the pre-emergent crop. After harvesting, we applied manure in the variant with organic fertilization, and in the classical variant we ploughed 25-28 cm deep in the soil.

In the variant with permanent vegetal cover we prepared the soil for the sowing of the intermediary crop (facelia) with a combinatory to loosen the soil for 30 cm without turning the soil and without mincing or setting the germination bed.

By winter time facelia reached the blooming – first pod formation phase, and a vegetation volume of 16,130 kg/ha.

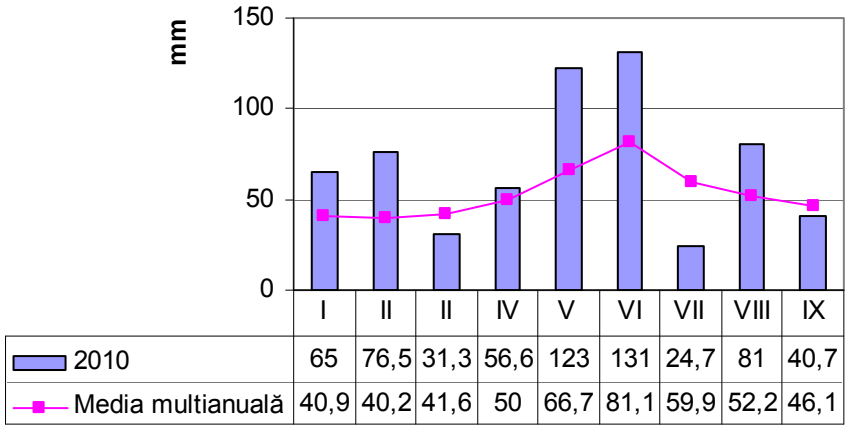
In spring, we applied chemical fertilisers and then we prepared the germination bed by discing the soil twice in both technological variants.

Sowing was done with disc sowers. The hybrid sued was PR35P12.



	I	II	II	IV	V	VI	VII	VIII	IX
2010	-0,3	2,5	6,5	11,5	16,6	18,8	23,1	22,5	16,2
Media multianuală	-1,2	0,4	6	11,3	16,4	19,6	21,6	20,8	16,9

Figure 2. Average monthy temperatures (^{0}C) at the Meteorological Station in Horezu compared to multiannual averages in 2009



	I	II	II	IV	V	VI	VII	VIII	IX
2010	65	76,5	31,3	56,6	123	131	24,7	81	40,7
Media multianuală	40,9	40,2	41,6	50	66,7	81,1	59,9	52,2	46,1

Figure 3. Monts rainfalls (mm) at the Meteorological Station in Timisoara compared to multiannual averages in 2009

RESULTS AND DISCUSSION

During vegetation, we made measurements concerning soil water supply and physical quality indices (apparent density, total porosity, aeration porosity, and structure).

Results will be published at the end of the trial cycle.

The yield, presented in Table 1, points out a few important aspects, as follows:

- on the average, yields with permanent vegetal cover do not differentiate significantly from the classical variant of maize cultivation depending on fertilisation – chemical or organic;
- nitrogen chemical fertilisers were well valorised resulting in statistically ensured yield increases;
- applying 20 t/ha of manure resulted in an increase in yield of over 2,000 kg/ha compared to the variants not fertilised;
- the level of yields in the variants fertilised organically are similar to those obtained through fertilisation with nitrogen at a rate of 70-80 kg/ha of active substance.

Table 1.

Yields results (kg/ha) obtained in the year 2010

A factor - Cultivation system	Factor B – Fertilisation					Average of Factor A			
	N_0	N_{50}	N_{100}	N_{150}	GG 20 t/ha	Yield (kg/ha)	%	Difference (kg/ha)	Significance
Permanent vegetal cover	3,112	4,732	5,787	6,819	5,087	5,107	104	187	
Classical	2,918	4,370	5,537	6,497	5,278	4,920	100	MT	

Average of Factor B

Yield kg/ha	3,015	4,551	5,662	6,658	5,182
%	53	80	100	118	91
Difference	-2,647	-1111	MT	996	-480
Significance	000	0000		XXX	00

DL 5% = 264 kg/ha; DL 1% = 371 kg/ha; DL 0.1% = 487 kg/ha.

CONCLUSIONS

The technology of cultivation with permanent vegetal cover can be a solution for the cultivation of maize in Western Romania.

Due to this technology, yields were not inferior to those obtained through the classical cultivation systems.

Research needs to be resumed and deepened to allow the assessment of the impact on soil and on environment in general as well as economic aspects.

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