

THE INFLUENCE OF TECHNOLOGY MEASURES ON THE REDUCING EFFECT OF DROUGHT AT MAIZE CROP

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Abstract

The climate phenomena of drought, aridity and desertification are increasingly present more often and continues to worsen as a result of the negative effects that technological progress intensively exerts on environment, especially on the climate. The present work aims to determine the influence of soil tillage, plant density and hybrid used on the diminishing effect of drought by maize crop with the intention of finding the best option to work. The associated influence of the soil tillage, plant density and hybrid used on the production of maize determined the highest yields by performing the combinator on the soil tillage, as basic tillage, using a density of 55,000 plants / ha and using hybrid PR36V52. Replacement the combinator tillage with plowing or direct seeding determined to obtain lower production up to 2000 kg/ha regardless of the hybrid used. In similar climatic conditions of agriculture in 2013, recording a poor distribution of rainfall, accompanied by a high temperature control throughout the growing season will mark the achievement of normal production the maize crop, between 5005 - 7950 kg/ha and the average production recorded a value of 6652 kg/ha.

Key words: drought, plant density, soil tillage

INTRODUCTION

The general picture of the effects of drought, outlined very clearly in recent years has undergone major changes as a result of increasing global climate change. To establish sustainable farming conservation tillage is necessary especially in the arid areas of the world. The minimum tillage and direct seeding are some of the methods that farmers apply recently for a long-term farming with minimum fuel cost (Kosutic et al, 2005). [4] The other experimental results showed that yield performance between conventional method and reduced tillage were not significant (Akbarnia et al, 2010). [1] One of the most important negative consequences of modern agricultural production is the soil physical degradation, which is caused to intensive tillage practices (Hamza and Anderson, 2005, Rusu et al., 2006). [3, 6] Compaction causes deterioration of soil physical properties, evidenced by increasing the penetration resistance, high specific resistance to soil tillage operations and soil structure stability, with direct impact on yield

and production costs (Botta et al., 2007, 2008) [2]. Liebig et al. (2004) made a research in which they examined interactive effects of tillage, crop sequence, and cropping intensity on soil quality indicators for two long term cropping system experiments. [5] Replacing the soil plowing with discing tillage to base depth of 10-12 cm over 1-2 years did not significantly affect the production (Sin și colab., 1986). [7]

MATERIALS AND METHODS

The experiments were designed to determine the influence of soil tillage, plant density and hybrid maize production on soil and climate conditions in the South of Romania.

To determine the optimal technology for growing maize hybrids was watched react differently to different methods of tillage and density and the interaction of these factors. It was also watched hybrids behaved in terms of quality indicators.

Observations and measurements were conducted during 2013 and graduations following factors:

- soil basic work: a1 - plowing + disc + combinator + planting, a2 - combinator + planting, a3 - Direct planting
- Plant density: B1 55 000 plants / ha, b2 - 65,000 plants / ha
- Hybrid Corn: c1 - Olt, c2 - Mostistea, c3 - PR36V52

Experience has been placed in a uniform field in terms of fertility and microrelief on chernozem soil class. Module type two-factor experiment was arranged after the subdivided parcels method in three repetitions.

RESULTS AND DISCUSSIONS

The effect of soil tillage on corn production in the conditions of 2013 is presented in Table 1. The data showed that the highest yield of 7431 kg / ha was obtained as the result of using on the soil the combinator. Replacing it with the plowing soil tillage caused decreased production of 677 kg / ha, the difference is significant. Also, the work of seeding directly applied as a technological component compared with the combinator + planter resulted a decrease of production with 2020 kg / ha, the difference being highly significant.

Table 1. Analysis of variance to experience regarding the influence of tillage, density and the variety on the production of maize in 2013

Variant	SS	DL	S ²	F _C	Ft		Significance
A	38034600	2	19017300	85.1	6.94	18.00	**
E _A	893438	4	223359				
B	5121422	1	5121422	137.1	5.99	13.74	**
A X B	466886	2	233443	6.25	5.14	10.92	*
E _B	224088	6	37348				
C	642673	2	321336	6.27	3.40	5.61	**
A X C	121742	4	30435	0.64	2.78	4.22	
B X C	61610	2	30805	0.64	3.40	5.61	
AXBXC	18773	4	4693	0.10	2.78	4.22	
E _C	1146964	24	47790				

Source: Own calculations.

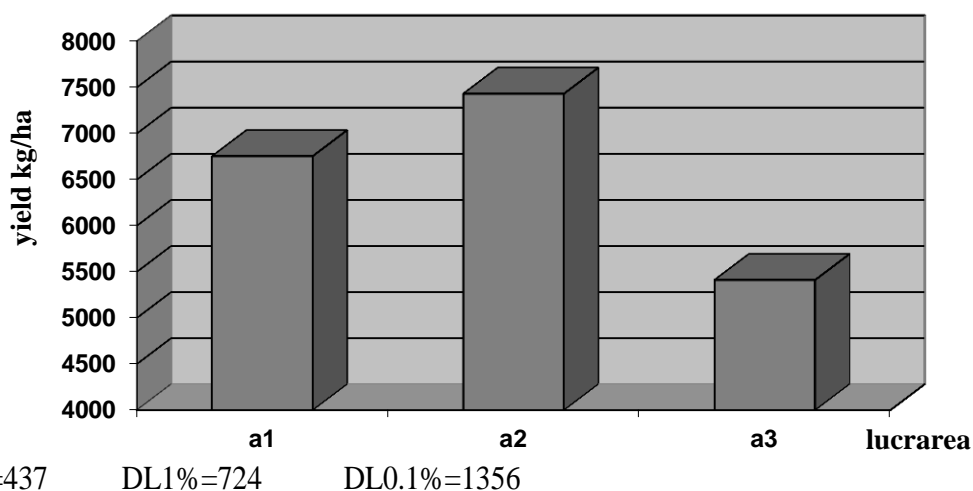


Fig.1. The influence of soil tillage on the production of maize (kg/ha) in 2013

Own calculation and design

The influence on the production of maize hybrid in terms of 2013 is shown in Table 2.

The data show a differentiation of hybrids that reflect their biological peculiarities, especially those related to adaptation to climatic conditions.

In terms of 2013, the hybrid Mostiștea obtained a production of 6,556 kg/ha,

compared with hybrid PR36V52, which won 6,652 kg/ha and the hybrid control Olt obtained 6,388 kg / ha. The difference of 168 or 264 kg/ha between the two hybrids and control variant are very significant.

Table 2. The influence of hybrid on maize production (kg/ha) in 2013

Variant	Yield (kg/ha)	%	Differences (kg/ha)	Significance
C1-Olt	6,388	100	Mt	
C2-Mostiștea	6,556	103	168	
C3-PR36V52	6,652	104	263	**
	DL5%=150	DL1%=204	DL0.1%=273	

Source: Own calculations.

The influence of soil associated to the tillage and to the production of corn hybrids under the conditions of 2013 is shown in Figure 2. From the data presented it appears that the highest yields were obtained by using as basic tillage the combinator before planting, regardless of hybrid use. Replacing the combinator tillage with autumn plowing +

disc + combinator or direct seeding, resulted a lower yields obtained with 800 -2,040 kg/ha hybrid Mostiștea, and 695 -2,074 kg/ha hybrid PR36V52.

When making multiple comparisons between variants of soil tillage and the hybrid used results the same superiority options.

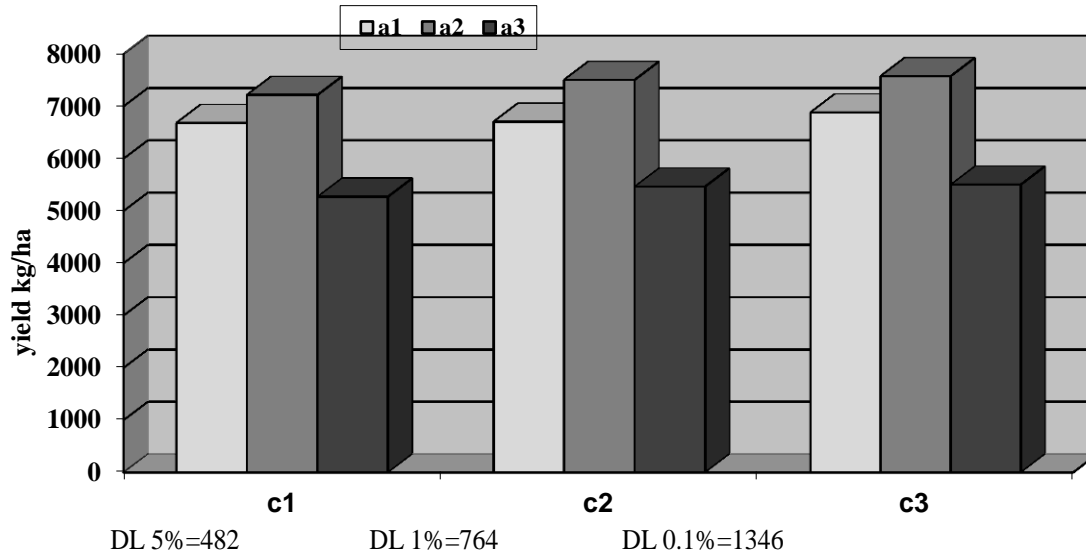


Fig.2. The influence of soil tillage on the production of maize depending on the hybrid
Own calculation and design.

Comparing averages graduations factor A - tillage, amid using two densities, which is studied in three hybrids: the highest yields were obtained using the combinator variant soil tillage and using the density of 55,000 plants per (7,580 kg/ha, 7,950 kg/ha, respectively 8,026 kg/ha).

By performing basic tillage by plowing Autumn + disk + Combinator using a density

of 55,000 plants/ha, in terms of 2013, the average yields obtained was 6,860 kg / ha for hybrid Mostiștea, 7,130 kg / ha on hybrid PR36V52, compared to control Olt hybrid with 6,850 kg/ ha (Fig.3.)

Agricultural year in 2013, even records a high thermal conditions during the growing season will mark the achievement of normal maize production (5,553-8,026 kg/ha).

The experimental data on the influence of basic soil tillage and plant density on yield of maize highlight the major role of these factors (Table 3).

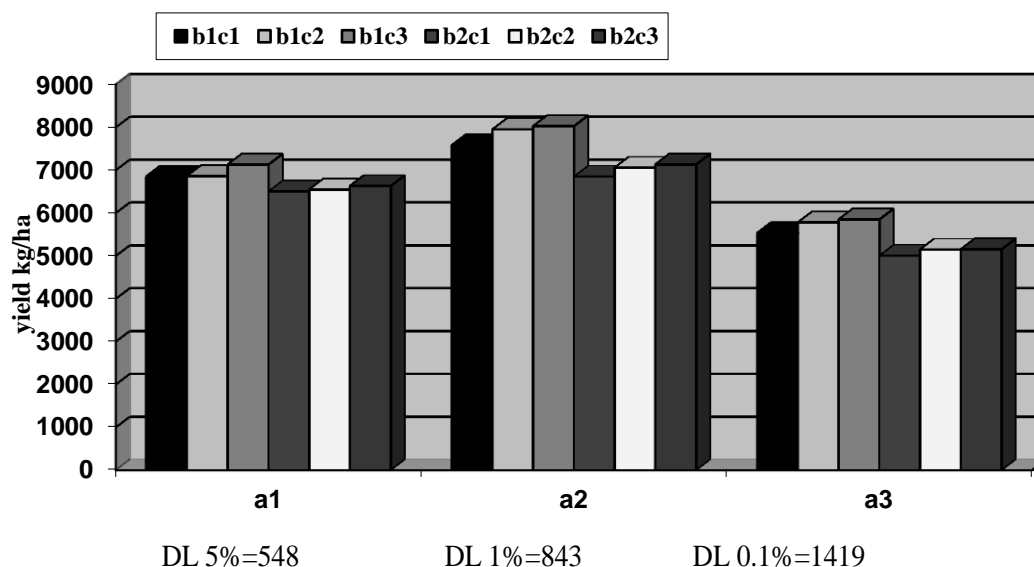


Fig.3. The influence of soil tillage on the production of maize depending on density and hybrid
Own calculation and design.

Table 3. Summary data regarding the influence of soil tillages, density and the hybrid on the production of maize

	Variant	C1-Olt	C ₂ -Mostiștea	C3 – PR36V52	Yield (kg/ha)
A ₁ -plow + disk+combinator	b ₁ -55.000 pl/ha	6,853	6,860	7,130	6,948
	b ₂ -65.000 pl/ha	6,506	6,546	6,630	6,561
A ₂ -combinator+planting	b ₁ -55.000 pl/ha	7,580	7,950	8,026	7,852
	b ₂ -65.000 pl/ha	6,850	7,056	7,123	7,010
A ₃ -direct planting	b ₁ -55.000 pl/ha	5,533	5,780	5,850	5,721
	b ₂ -65.000 pl/ha	5,006	5,146	5,153	5,102
Average yield		6,388	6,556	6,652	6,532

Source: Own calculations.

Table 4. Interaction factors

Interaction factors	DL Values		
	5%	1%	0.1%
Comparison between variants of tillage	437	724	1,356
Comparison of density variations	128	195	313
Comparison of the hybrid variations	150	204	273
Comparison between tillage variants at the same density	465	761	1,400
Comparison between variants of the same version on hybrid density	215	303	433
Comparison between variants of the same ground work on hybrid version	482	764	1,346
Comparison between tillage variants at the same density and hybrid	548	843	1,419

Source: Own calculations.

CONCLUSIONS

In normal conditions, but at high temperatures, maize culture technology in the studied variants consists in the preparation of the seed bed by using the combinator before

planting, with a density of 55,000 plants/ha using the hybrid PR36V52 or Mostiștea.

If the maize crop is planting directly in similar climatic conditions of 2013 will lead to a decline in production, irrespective of the genetic value of hybrid use. The experimental results on the influence of

the basic tillage of the soil, and plant densities, and the hybrid corn on yield used to show the importance of these factors.

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