

RESEARCH ON THE BEHAVIOR OF CORN CULTIVATED ON A CHERNOZEM TYPE SOIL FROM BOURENI-BAILESTI AREA- DOLJ COUNTY, ROMANIA, DEPENDING ON AGROFUND

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Abstract

Many factors influence the performance of the agricultural activity within a farm. From this multitude of factors, one of the most important and taken into consideration are the climatic condition and the fertilization plan projected and implemented by the managerial team of the farm. In this matter, this paper presents the experimental results of these factors on the performance of the agricultural output on a specific geographic area in Boureni-Bailesti area in Southern Romania. The experiment has researched the influence of the climatic condition and the fertilizers on the level and the quality of the yields. In this manner, the grain yields have ranged between 8,040 and 10,260 kg/ha, the grain output for 1 kg of fertilizer being between 10.7 and 16.8 kg and the protein content in function of the fertilization was 12.4-12.7%.

Key words: corn, fertilizer, hybrid, protein

INTRODUCTION

In order to ensure the food for the population that is in a constant increase, the agricultural production must keep the rhythm, both in our country and elsewhere [8].

Due to the fact that the increase of the cropping land is no more available, the main purpose of increasing the yield is the outturn [7].

Maize is a top crop in Romania's agriculture with high importance for food security and South West Romania is recognized as an area with high production potential [5]. Varieties, fertilization and irrigation are among the most important technological factors which have to be used and adapted to the local soil and climate conditions in order to increase yields. The literature contains an extensive number of studies regarding the effects of external and internal factors on the agricultural performance of several common crops, depending on: the irrigation system [10], the applied fertilizers in various areas of the globe [3, 9], the applied fertilizers and amendments [4], based on a fertilizer management plan [1].

All these activities show that the importance of the fertilizer plan and the climate factors are key influencers on the yield of the crop production [6], especially on corn.

The present paper is trying to bring a small contribution to the behavior of the corn crop in the climatic conditions of Boureni-Bailesti area from the Southern Oltenia in order to obtain high and constant yields, respectively, of good quality by using fertilizers [2].

The key novel points of this paper are determined by the location of the experiment and the study of the produced quantity combined with the nutrient concentration of the final product.

MATERIALS AND METHODS

The experiment was located on a cambic chernozem from Boureni-Bailesti zone (40 km South-Vest away of Craiova) within the 2017-2019 years being organized after the latin square method.

The experiment has unfolded on the same plot in rainfed conditions using the wheat-corn crop rotation.

The drilling was performed during the second half of the April at 70 cm distance between rows, at 45,000 plants per hectare and the corn hybrid was Olt of the FAO group 450 that is very well adapted in this zone.

The weed control was performed using the Dual preemergent herbicide 1 liter per hectare and Guardian 2.5 liters per hectare (the first one incorporated by a harrow and the second one was left the soil surface) and during the vegetation period there was applied Oltisan at 4-6 leaves of the corn plant, with Oltisan 1 liter per hectare plus Lontrel 0.33 liter per hectare. During the vegetation period there were done 2 mechanical hoeings between rows. The soil type of the experiment was cambic chernozem, with a pH of 6.9-7.1 the humus content was of 3.46-3.72% within the arable layer, 0.183-0.196% total nitrogen, a low phosphorus content – 15 ppm and a high available potash – 240 ppm. The rainfall, the temperature and the air moisture during the experiment have been close to the 60 years average values, (of 525 mm, 10.2°C and 72%).

The experiment has researched the influence of the fertilization on the yield, both quantitatively and qualitatively using, on the 60kg/ha phosphorus background, 10t manure per hectare, different nitrogen fertilizer doses (N₅₀, N₁₀₀, N₁₅₀, N₂₀₀) in comparison with the control variant that was not fertilized by nitrogen yet fertilized by manure and phosphorus.

RESULTS AND DISCUSSIONS

Within the first table there are presented the yielding results, the synthesis of the experimental cycle that show that the yields of the researched variants were between 8,040 kg/ha and 10,260 kg/ha that emphasize the favourable reaction of the Olt hybrid to fertilization.

The applying of the nitrogen fertilizers, on 10t/ha manure and P₆₀ background has determined the increasing of the grain yield by 812 kg/ha and this difference is significant. The doubling of the nitrogen dose to N₁₀₀ has amplified the yield output to 19% and, respectively, that has conducted to a yield of

1,491 kg/ha and this difference is very significant.

Table 1. The synthesis of the yielding results in function of the fertilization recorded at Boureni-Bailesti in the experimental cycle 2017-2019

Variant	Yield Kg/ha	%	Difference	Significance
10t/ha, manure+ N ₀ P ₆₀	8,040	100	-	-
10t/ha, manure+ N ₅₀ P ₆₀	8,852	110	812	x
10t/ha manure+ N ₁₀₀ P ₆₀	9,531	119	1,491	xxx
10t/ha manure+ N ₁₅₀ P ₆₀	9,858	123	1,818	xxx
10t/ha manure+ N ₂₀₀ P ₆₀	10,260	128	2,220	xxx

DL 5%=568 Kg/ha

DL 1%=973 kg/ha

DL 0,1%=1,079 kg/ha

Source: Own results.

Very significant statistically differences have been achieved with the N₁₅₀ variant (23%, of 1,818 kg/ha).

The highest yield has obtained with the variant that received the highest nitrogen dose (N₂₀₀), of 10,260 kg/ha, the yield output being of 28% which meant a very significant difference of 2,220 kg/ha.

Figure 1 presents the grains output per 1 kg of nitrogen active ingredient that was recorded in the experimental cycle 2017-2019 at Boureni-Bailesti. There can be noticed that yield output given by 1kg nitrogen active ingredient was of 16.8 kg grains at N₅₀ dose, 14.98 kg with the N₁₀₀ dose, 12.8 kg at N₁₅₀ dose and of 10.7 kg with the N₂₀₀ dose.

The protein yield of the experimental cycle 2017-2019 is given in the second table.

Within the fertilizer research at 10 t/ha manure + P₆₀ and different nitrogen doses from N₀ to N₂₀₀, the protein yield has ranged between 981 kg/ha (N₀) to 1,305 kg/ha (N₂₀₀). In this way there was recorded an increase by 12 % with the N₅₀ variant, 21 % with N₁₀₀ variant, 26 % with N₁₅₀ variant and 33% with N₂₀₀ variant. The protein differences were significant at the N₅₀ dose level and very significant with the N₁₀₀ – N₁₅₀ – N₂₀₀ doses.

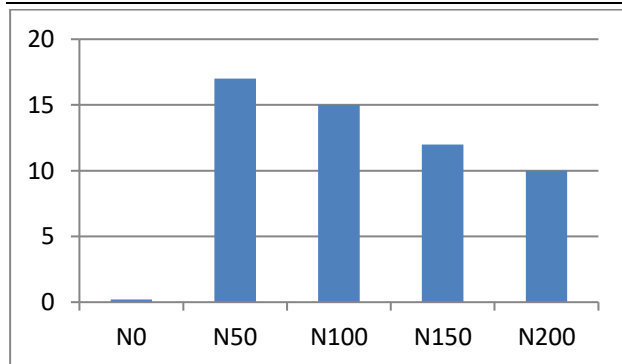


Fig. 1. The grains output per 1 kg of nitrogen fertilizer active ingredient recorded at 2017-2019 experimental cycle

Source: Own results.

Table 2. The protein yield in function of the fertilization doses within the 2017-2019 experimental cycle

Variant	Yield Kg/ha	%	Difference	Significance
10t/ha,manure+N ₀ P ₆₀	981	100	-	-
10t/ha,manure+N ₅₀ P ₆₀	1,098	112	117	x
10t/ha manure+N ₁₀₀ P ₆₀	1,187	121	206	xxx
10t/ha manure+N ₁₅₀ P ₆₀	1,232	126	251	xxx
10t/ha manure+N ₂₀₀ P ₆₀	1,305	133	324	xxx

DL 5% = 88 kg/ha

DL 1% = 124 kg/ha

DL 0.1% = 146 kg/ha

Source: Own results.

The results on the influence of fertilization on the protein content during the 2017-2019 experimental cycle are presented in Figure 2.

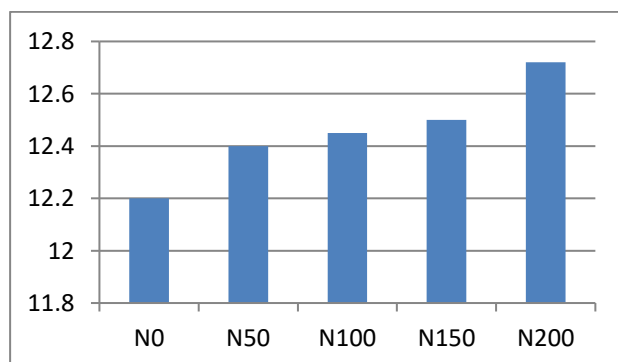


Fig. 2. The result on the influence of fertilization on the protein content during the 2017-2019 experimental cycle

Source: Own results.

At the researched nitrogen doses there was recorded an increase of the protein content from 12.40% (N₅₀) to 12.45% (N₁₀₀), 12.50%

(N₁₅₀) and, respectively, 12.72% with the N₂₀₀ variant.

CONCLUSIONS

By applying nitrogen doses on P₆₀ and 10 t/ha manure background within the experimental field Boureni-Bailesti there were obtained a ten percent output with N₅₀ (8,852 kg/ha with yield difference of 1,491 kg/ha over the control), 19% with the N₁₀₀ dose (9,531 kg/ha with yield difference of 1,491 kg/ha over the control), 23% with the N₁₅₀ dose (9,858 kg/ha with a yield difference of 1,818 kg/ha over the control) and, respectively, of 28% with N₂₀₀ dose (10,260 kg/ha with a 2,220 kg/ha over the control variant).

The grain output per 1 kg Nitrogen active ingredient that was applied on the above background has been of 16.80 kg grains with N₅₀ dose, 14.98 kg with N₁₀₀ dose, 12.80 kg with N₁₅₀ and 10.70 kg with N₂₀₀ dose.

The protein content has increased along with the nitrogen dose from 12.20% (N₀) to 12.72% (N₂₀₀) and the protein yield has increased from 963 kg/ha (N₀) to 1,235 kg/ha (N₂₀₀).

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