THE BEHAVIOUR OF MAIZE CROP UNDER DIFFERENT TREATMENTS FROM THE LACU SARAT TRIAL PLOT, BRAILA

COMPORTAREA CULTURII DE PORUMB LA DIFERITELE VARIANTE DE TRATAMENT DIN CADRUL CÂMPULUI EXPERIMENTAL LACU SĂRAT, BRĂILA

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Abstract *The maize is a plant with a good resistance to drought and heat, with a good adaptability to different climatic conditions, but it is affected by a number of diseases and pests. Being a weeder plant, it leaves the land clean of weeds and constitutes a good previous crop for many plants, it makes good use of mineral and organic fertilizers, and it reacts very strong to irrigation. In the natural background conditions on the trial plot, and taking into account the improvement scheme, the maize was sowing in the first two years of experimentation (1998-1999, 1999-2000), achieving high yields. The main purpose of the research was to pursue the influence of agrofitotechnical measures on soil and yields for the main field crops in the trial plot Lacu Sarat, Braila county, and, in this paper the behaviour of the maize crop has been observed.*

Key words: trial plot, maize crop, treatment of variant

Rezumat *Porumbul este o plantă cu rezistenţă bună la secetă şi căldură, cu o bună adaptabilitate la diferite condiţii de climă şi este afectat de un număr redus de boli şi dăunători. Fiind o plantă prăşitoare, lasă terenul curat de buruieni şi constituie o bună premergătoare pentru multe plante, valorifică bine îngrăşămintele organice şi minerale, şi reacţionează foarte puternic la irigaţii. Pe fondul condiţiilor naturale ale câmpului experimental şi a schemei de ameliorare, porumbul a fost semănat în primii doi ani de experimentare (1998-1999, 1999-2000), obţinându-se producţii ridicate. Scopul principal al cercetărilor a fost acela de a urmări influenţa unor măsuri agrofitotehnice asupra solului şi producţiei la principalele culturi de câmp în condiţiile câmpului experimental Lacu Sărat, Brăila, iar în lucrarea de faţă s-a urmărit comportamentul culturii de porumb.*

Cuvinte cheie: câmp experimental, cultura de porumb, variantă de tratament

INTRODUCTION

Maize (*Zea mays*) is one of the most valuable crops due to its high productivity and the multiple uses of its production in human foodstuff, in husbandry and in the industry. In Romania country grain maize has, among other crops, the most important place.

Maize is a heat-loving plant and prefers fertile and deep soils. The highest yields are obtained on different types of chernozems, reddish preluvosoils and

rich alluvial soils, especially those in the Danube River Plain. Maize is not demanding special previous crops and can be cultivated, with good results, after almost all crops. The highest yields are obtained when maize follows a crop which is harvested in early summer, such as leguminous plants cultivated for their beans, then fodder plants, fall and spring strawy small grains (Muntean şi colab., 2003). Strawy small grains, especially winter wheat, are the most often used as previous crops for maize, the wheat-maize rotation representing large tracts of land covered by the two crops in our country.

The present paper aims to present the experimental findings for maize crop in the Lacu Sarat trial plot which is sited in Eastern Romanian Plain, called Braila Plain or Northern Baragan (Posea, 1989; Geografia României, 2005).

MATERIAL AND METHODS

Lacu Sarat trial plot is sited in a depresionary area which accumulates ground waters from neighbouring higher areas, this phenomenon also being the cause of soil degradation processes by salinization and recurrent water excess. Surface deposits are made of loess and the texture varies from loamy-sandy to loamy-clayey. On the bottom of the valley, where the trial plot is sited, ground waters reach levels of less than 2 m and in some parts less than 1 m depth. Trial plot was located on slightly-moderately salinized a chernozem (SRTS, 2003). As far as climate is concerned, the trial plot is sited in the dry steppe (Bogdan Octavia, 1999), characterized by hot and dry summers, with a mean multiannual temperature of 10.9^{0}C, precipitations of 452 mm annually, potential evapotranspiration of 705 mm and a climatic water deficit of 345 mm (Braila Weather Facility).

The natural conditions of the trial plot were the basis for the layout for several treatments: horizontal drainage, deep loosening, ameliorative irrigation, organic fertilization, chemical fertilization, soil tillage with soil material inverting, soil tillage without soil material inverting (paraplow) and mulching (table 1).

Table 1

Improvements applied to Lacu Sarat trial plot, Braila

Treatments of variant	Treatments										
	Drainage			Deep loosening	Ameliorative irrigation	Fertilization		Soil tillage		Mulching	Amendment
	high intense (20 m)	moderately intense (40 m)	no drainage			organic	chemical	with soil material inverting	without soil material inverting (paraplow)		
V_1	✓			✓	✓	✓	✓		✓		✓
V_2	✓			✓	✓		✓		✓		✓
V_3	✓			✓	✓		✓	✓			✓
V_4	✓				✓		✓		✓		✓
V_5	✓			✓			✓		✓		✓
V_6	✓			✓			✓		✓	✓	✓
V_7		✓		✓	✓		✓		✓		✓
V_8			✓	✓	✓		✓		✓		✓
V_{8a} (Benchmark)			✓				✓	✓			

V_1 - Drainage with 20 m between the drains + Deep loosening + Ameliorative irrigation + Organic fertilization + Chemical fertilization + Paraplow + Amendment;

V_2 - Drainage with 20 m between the drains + Deep loosening + Ameliorative irrigation + Chemical fertilization + Paraplow + Amendment;

V_3 - Drainage with 20 m between the drains + Deep loosening + Ameliorative irrigation + Chemical fertilization + Soil tillage with soil material inverting + Amendment;

V_4 - Drainage with 20 m between the drains + Ameliorative irrigation + Chemical fertilization + Paraplow + Amendment;

V_5 - Drainage with 20 m between the drains + Deep loosening + Chemical fertilization + Paraplow + Amendment;

V_6 - Drainage with 20 m between the drains + Deep loosening + Chemical fertilization + Paraplow + Mulching + Amendment;

V_7 - Drainage with 40 m between the drains + Deep loosening + Ameliorative irrigation + Chemical fertilization + Paraplow + Amendment;

V_8 – No drainage + Deep loosening + Ameliorative irrigation + Chemical fertilization + Paraplow + Amendment;

V_{8a} **(**Benchmark) - No drainage + Chemical fertilization + Soil tillage with soil material inverting + Amendment.

After applying ameliorative technologies in 1998, the trial plot was cultivated in 1999 with next crops: maize, sunflower, sorghum and Sudan herb and in 2000 with maize, sunflower, wheat and Sudan herb.

The four crops were sown at a right angle, so that each crop goes through the eight plots with treatments.

It has to be said that all technological components (plant species, fertilization, sowing, weed control) were of ameliorative nature.

Provided that this paper only presents maize behaviour, the technological cultivation characteristics are as follows:

- seedbed preparation was carried out by plowing with U 650 + paraplow and disc harrowing with U 650 and HD 3,4 (the second time with uncoupled harrows);
- a cultivar with middle-late ripening – Opal - was used, requiring a sum of thermic units between 1400 and 1500^0C to reach ripening;
- sowing was done at the temperature of 8^0C in sol at the sowing depth of 10 cm, with a density of 75000 germinable seeds/ha, and the interrow distance of 70 cm;
- fertilization was done by applying 600 kg/ha ammonium sulphate, which provides 120 kg N/ha for the V_2 - V_{8a} treatments and 300 kg/ha ammonium sulphate, which provides 60 kg N/ha for the V_1 treatment, on which manure (60 t/ha manure) was applied when preparing the seedbed;
- weed control was done by applying 2,5 l Guardian/ha when preparing the field, with surface incorporation and 1 l Oltisan extra/ha in the growing season, in the 3-4 leaves stage of dicotyledonous weeds, together with a mechanical weeding;
- in order to control diseases and pests, maize seeds were treated with Furadan 28 l/ha;
- harvesting was done by hand on the treatments, at a 25 – 28% grain moisture and then the yield was weighed for each treatment.

RESULTS AND DISCUSSIONS

The production results for the studied maize crop trial plot in the 1998 – 1999, 1999 – 2000 agricultural years, are presented in figure 1.

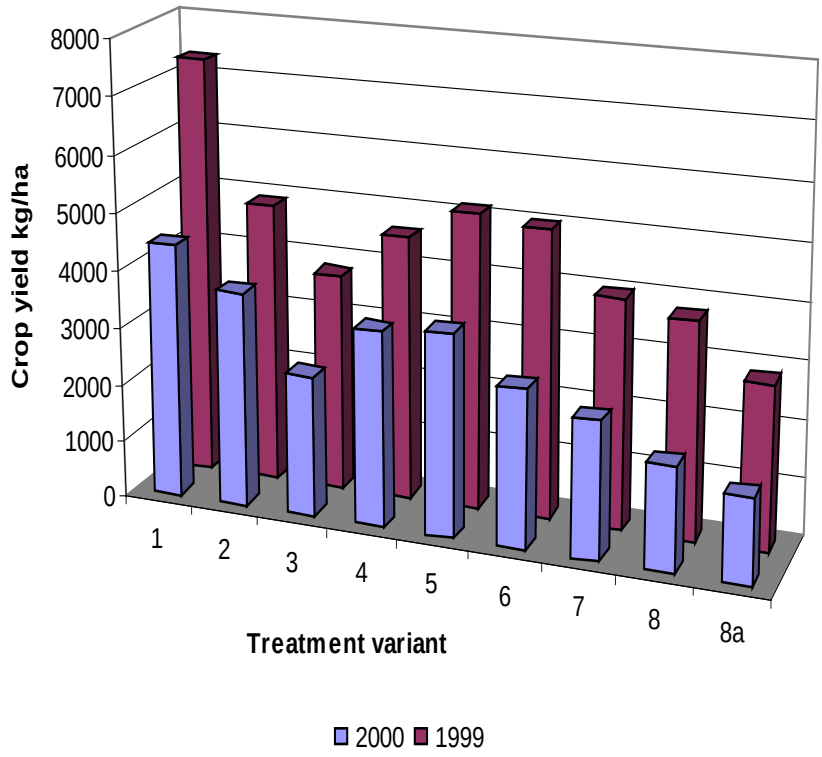

Fig. 1. Yield obtained for maize crop

In the first trial year the yield varied from 7330 kg/ha for V_1 where the manure was applied and 2866 kg/ha for V_{8a} which is considered the benchmark variant, and in the second year from 4437 kg/ha for V_1 where the manure was applied and 1460 kg/ha for V_{8a} considered the benchmark variant.

The obtained yields are presented both in absolute and in relative values (% of the benchmark treatment = 100), which in the trial context can be considered V_{8a} (no drainage + chemical fertilization + soil tillage with soil material inverting + amendment) which undergone the least ameliorative tillage, the actual benchmark (with no improvement) treatment missing. It can be seen that the best yields were obtained for the treatments with a distance of 20 m between drains and with soil tillage with soil material inverting (Cotet Valentina, 2008).

Taking into consideration how maize responded under the treatments, it can be said that the highest relative yields were obtained for V_1, V_2, V_5, V_4, V_6, with values between about 200 and 280%; under the other treatments the relative yield was between 128 and 182% (fig. 2).

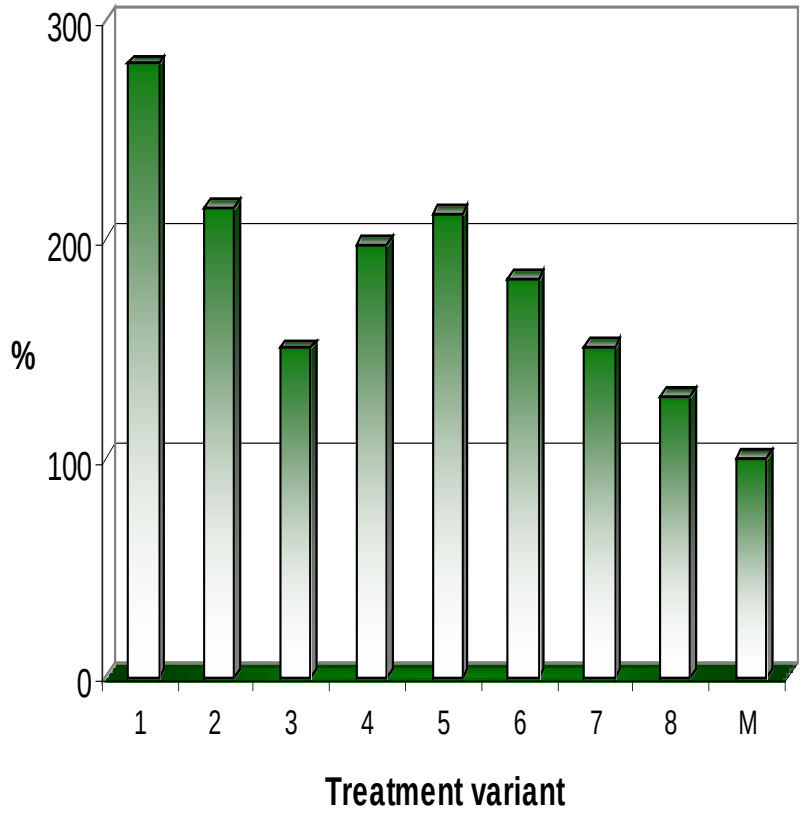

Fig. 2. Variation of mean relative maize yield (M = 100) under different treatments

CONCLUSIONS

1. Maize responded well under most treatments, the yields being similar to the ones obtained under irrigation and fertilization.

2. The highest yield was for V_1, this treatment having the following improvements: drainage with 20 m between drains + deep loosening + ameliorative irrigation + organic fertilization + chemical fertilization + paraplowing + amendment.

3. Comparing the yields obtained in the trial plot with the ones obtained Braila-county-wide, it can be noticed that, even given the conditions of Lacu Sarat trial plot, the mean maize yields under irrigation and fertilization were 134% of the county average of 3056 kg/ha. With no irrigation and drainage (the reference treatment), the maize yield reaches only 71% of the corresponding average in Braila county.

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