

THE MODIFICATION OF PHYSIOLOGICAL PROCESSES AT THE PARTIZAN CROP HYBRID DEPENDING ON THE DOSES OF NITROGEN AND PHOSPHORUS APPLIED TO THE IRRIGATED AND UN-IRRIGATED SYSTEM

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ABSTRACT

Studies and research in 2011, in this paper, emphasized the importance of knowing the physiological processes that occur in a cycle in corn plants and influence not only production quantity of plants or seeds per hectare but its quality through misuse of the doses of chemical fertilizers, disregarding the needs of existing nutrients in the soil and irrigation system application, which amended soil properties and those related to the application of chemical fertilizers.

The differential administration of nitrogen and phosphorus doses progressively increases as the crop plants but the seeds of corn per unit area, where increasing the physiological processes taking place determine positive results for increasing the plant production and a continuous increase of the production per hectare.

INTRODUCTION

Zea mays is a food, industrial and especially forage plant that represents 80% of cereal production, occupying a large area of arable land in the country. Romania cultivates most corn in Europe even if it has allocated the lowest subsidy, of € 38, per hectare.

Corn kernels contain besides hydrocarbons, vitamins, starch, albumin, amino acids and essential amino acids that are vital to human health. The introduction of maize in the daily diet reduces the risk of heart disease and cancer, and carbohydrates provide energy and do not allow fat deposit.

Also, corn has an effect against stress, effects on the nervous system, muscles, heart and the production of red blood cells.

Because maize culture is the most extended culture in the world, not only in our country, research into discovering new productive and qualitative hybrids have been performed, for human beings, animals and also industry, and different properties and processes were had in view. The present work enumerates some of the physiological processes which take place in the case of Partizan maize hybrid and the interaction between hybrid within the irrigated and non-irrigated crop, as well as the application of NP fertilizers.

MATERIAL AND METHOD

As biological material we used a semilate Partizan hybrid maize, planted in Dobrotesti common, Dolj County, in a polifactorial experience using the method of subdivided parcels where sowing was done at a density of 60 000 plants per hectare, where leaves harvesting was carried out on 16 June to determine the main physiological processes, and the experimental factors were:

Factor A: Partizan hybrid maize;

Factor B: the year 2011;

Factor C: applying the different doses of NP;

Factor D: studying the main physiological processes;

Factor E: irrigated and nonirrigated system;

Work methods utilized for physiological determinations regarding maize plants:

- determination of photosynthesis;
- determination of net effective power of assimilation;
- determination of chlorophyll pigments;
- determination of foliated surface parameter;
- determination of absorption capacity was performed by using the gravimetric method;
- determination of suction force.

RESEARCH RESULTS

For a correct application of chemical fertilizers before sowing there were realized ground measures to avoid excess doses and soil pollution.

After lab determinations of physiological processes which took place in the case of this hybrid in two different systems and after applying different doses of fertilizers, the results were also graphically represented.

Table 1

Chemical properties of the argil chernosiomus from the Dobrotești –Dolj

Genetic horizon	Depth (cm)	Value Ph (H ₂ O)	S.B. m.e/100g	S.H. m.e	Humus %	N total %	P p.p.m.
Ap1	0-25	7,06	24,28	3,49	2,71	0,139	22,4
Ap2	25-34	7,19	26,80	2,30	29,16	0,131	28,0

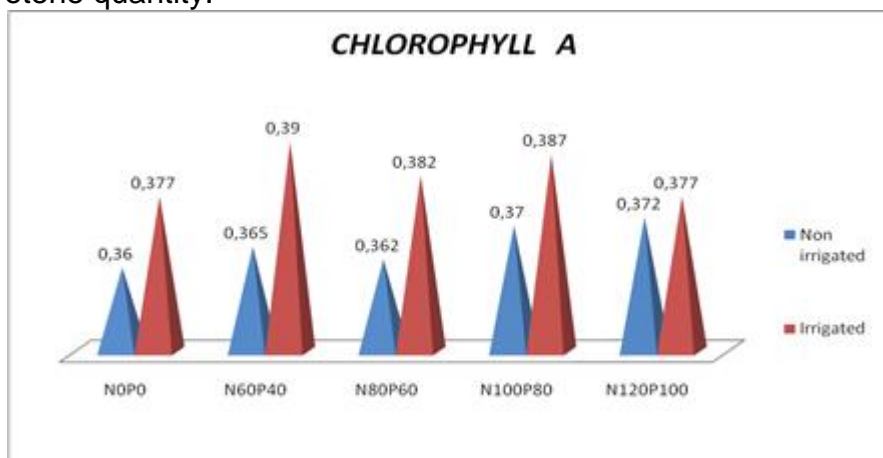
The chlorophyll pigments represented by 'a' and 'b' chlorophyll and carotene are very influenced by irrigated variants compared to non-irrigated ones (graphic 1.)

An increase of the content of chlorophyll 'a' in the case of the irrigated system is noticeable, no matter what dose of fertilizer was applied, significant values are observed when applying N100P80 and N120P100.

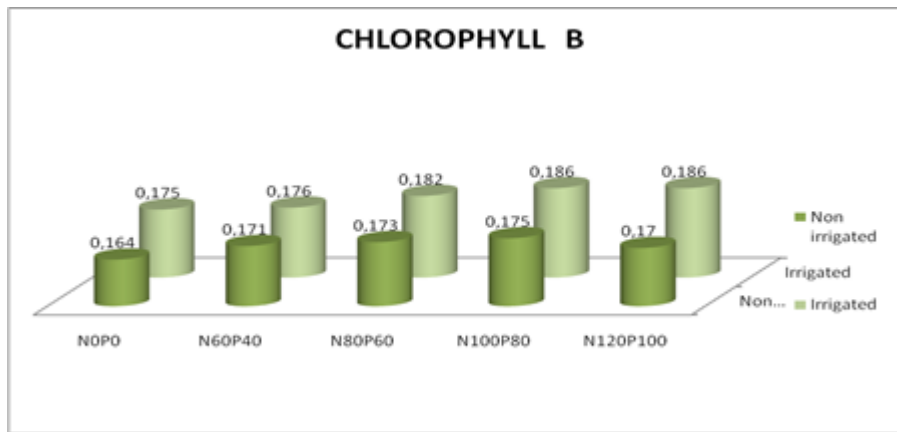
Chlorophyll 'b' has values that have a weak fluctuation no matter what dose of fertilizers was applied, an important factor in this case is the irrigating the area which led to a significant increase of this assimilative pigment.

The content of carotene has significant values towards the control, compared to variants where fertilizers were applied. Irrigating, when applying N100P80 and N120P100, led to an important increase of this pigment.

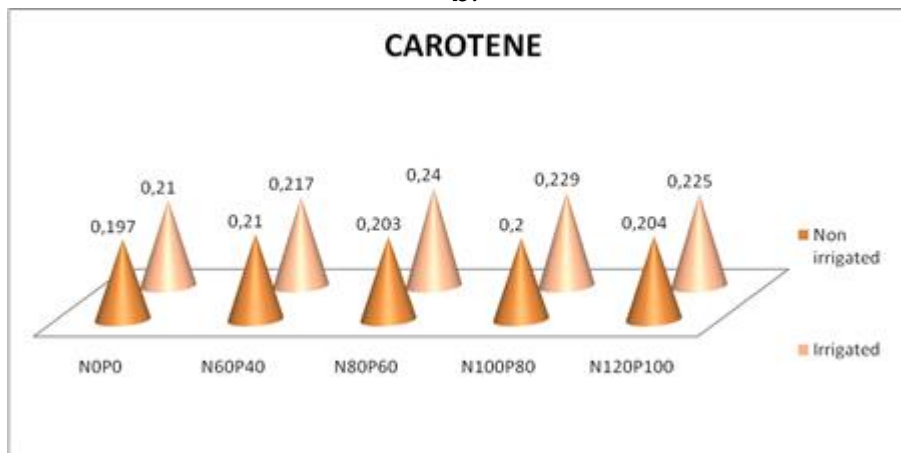
Combined irrigation and applying moderate dose of fertilizers (N100P80) led to a maximum carotene quantity.



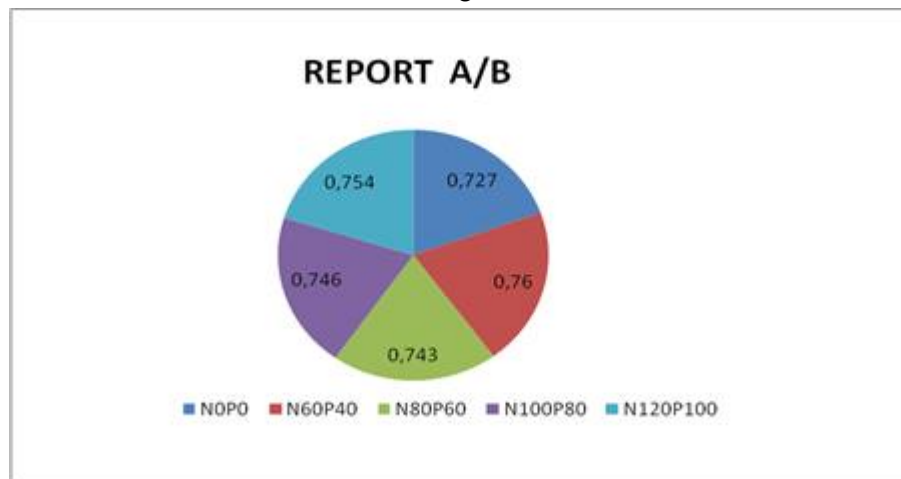
a.



b.

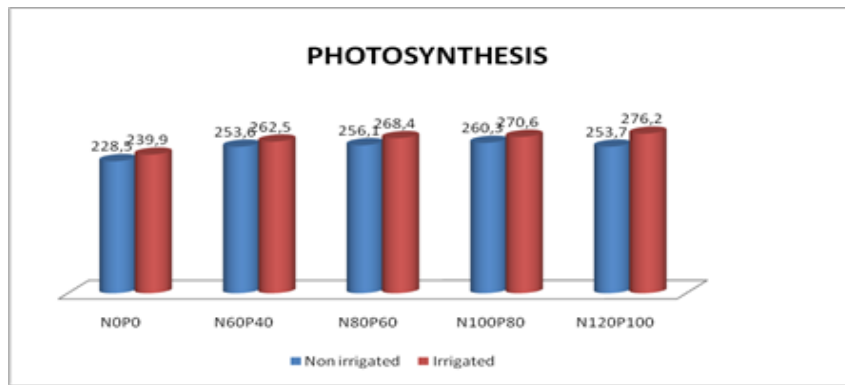


c

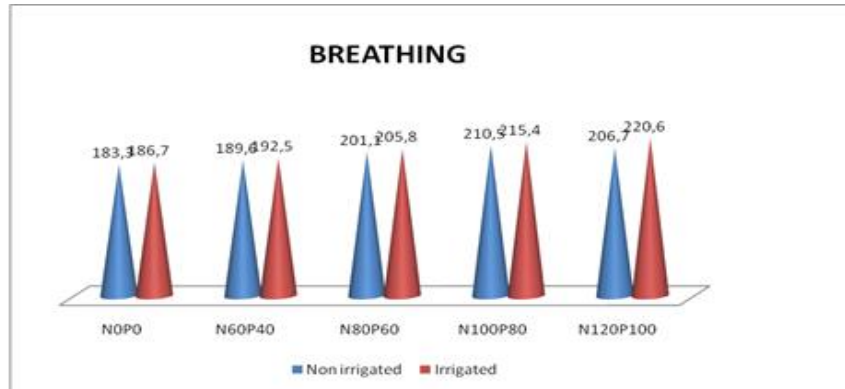


d.

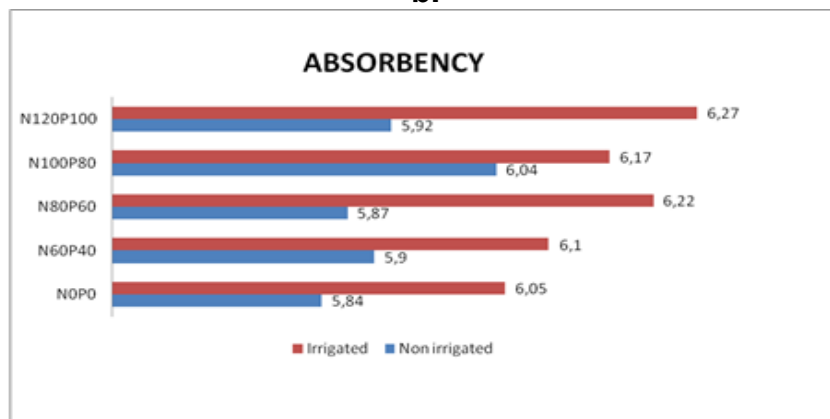
Graphic .1. (a,b,c,d). The influence of the dose of nitrogen and phosphorus to the chlorophyll pigments of Partizan maize hybrid - the 16th of June, 2011 -



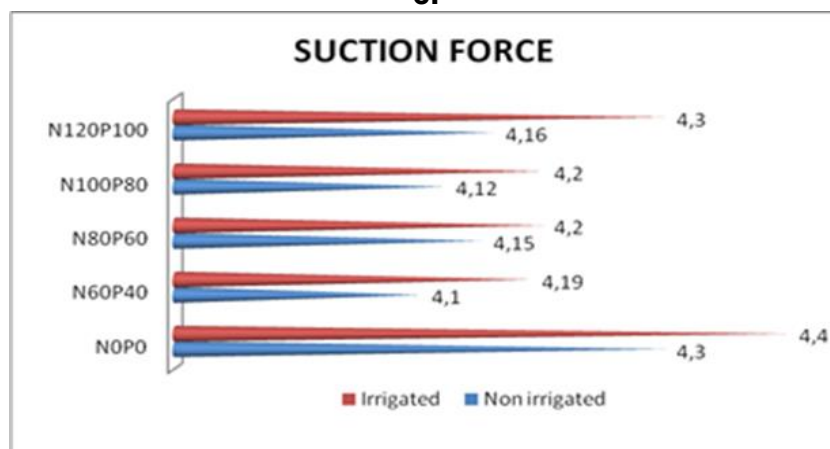
a.



b.



c.



d.

Graphic .2. (a,b,c,d). Influence of the nitrogen and phosphorus doses on some physiological processes on the Partizan corn hybrid – the 16th of June, 2011

Thus, a 20% increase of the photosynthesis intensity towards the control in the case of irrigated variant towards the non-irrigated control is noticeable. The optimum dose, as it is noticed in diagram 2, was recorded in the case of the irrigated variant, when using N120P100, compared to the non-irrigated variant where better results were obtained when applying a dose of N100P80.

Regarding the respiration process, expressed as mg CO₂/100 g.m.v., significant values on June, 16 are ascertain within the irrigated system as well as the non-irrigated system as well, the quantity of eliminated CO₂ being significant in the case of the studied variant. The capacity of absorption, g/H₂O, has minimum values in the case of non-irrigated variants, excepting the N100P80 variant which has the highest value, that is 6.02 g/H₂O. Within the irrigated variants, the difference is important and it is static assured once the content of fertilizer in the case of N120P100 variant increases.

The suction force (diagram 2d), expressed as atmospheres, has a tendency of slow increase in the case of the first non-irrigated variants, after which it starts to increase and it reaches from 4 to 4.16 atmospheres. In the case of variants where irrigation was applied, the most evident suction force was registered when applying a N120P100 dose.

CONCLUSIONS

➤ The studied hybrid acted differently from the culture technology point of view, the registered values from the physiological point of view were different, each of them using the right quantity of fertilizer.

➤ The effects of simultaneously applying variable doses of fertilizers and irrigation were studied and its effect upon the main physiological processes which depend on them.

➤ All analyzed physiological processes lead us to the conclusion that the Partizan hybrid has a high physiologic and biochemical potential, and the acquired information situates it among the most productive hybrids that have been studied.

➤ The combined influence of culture system (irrigated non-irrigated) as well as the applied doses of fertilizers determined, from the quantitative point of view, remarkable differences in the case of all qualitative features of the Partizan hybrid.

➤ We highly recommend Partizan hybrid for production, when using an irrigated system and applying a maximum dose of N120P100 and N100P80 for an economic efficiency.

➤ The combined influence between hybrid and culture technology (irrigation and applying the right dose of fertilizers) determines modifications of the main physiological processes which lead to obtaining maximum production when rationally applying dose of fertilizers.

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