# INFLUENCE OF THE NITROGEN AND PHOSPHORUS DOSES ON SOME PHYSILOGICAL PROCESSES OT THE CROP HYBRID OLIMP

## INFLUENȚA DOZELOR DE AZOT ŞI FOSFOR ASUPRA UNOR PROCESE FIZIOLOGICE LA HIBRIDUL DE PORUMB OLIMP

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**Abstract.** *The present work enumerates some of the physiological processes which take place in the case of Olimp maize hybrid and the interaction between hybrid within the irrigated and non-irrigated crop, as well as the application of NP fertilizers.*
**Key words:** *physiological processes, respiration, transpiration, photosynthesis, assimilation, carotene, hybrid*

**Rezumat.** *Studiul a fost efectuat pe un hibrid de porumb Olimp, la aparitia celor 8 frunze complet formate, cultivat în N-V judetului Dolj, la Sarbatoarea, pe un sol faeoziom, in sistem neirigat, dupa o cultura premergatoare de grau in anul 2004 si s-au efectuat analize fiziologice, in scopul semnalarii modificarilor intervenite in compozitia chimica a plantelor la aplicarea diferitelor doze de NP.*
**Cuvinte cheie:** *procese fiziologice, respirație, transpirație, fotosinteză, asimilație, caroten, hibrid*

## INTRODUCTION

In our country, the maize crop (culture) occupies an important area of the arable land and it represents one of the main cereal crops because of its importance in nourishment, feeding the animals and in industry.

The demographic growth of the population as well as the animal effectives imposed an extension of crop areas and a growth of production/ area; these two aspects were possible by an intensification of maize crop by using chemical fertilizers and irrigation systems.

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 Olimp 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

The study was performed using an Olimpia maize hybrid, when the 8 full-grown leaves became visible and this hybrid was cultivated in the north-western part of Dolj District, at Sarbatoarea, on chernozem, and both irrigated and non-irrigated

systems were a used, after a precursory wheat culture in 2004, and physiological analysis were performed in order to point out the changes of the chemical composition of plants when applying different dosage of NP. Analysis were performed by using variants disposed in four repetitions having as an example one row graduated multi-staged plots of land method. The sowed area of the variant is of 22.4 m², and its density is of 50,000 plants/hectare. Analyses of soil were effectuated at 0-25 cm and 23-34 cm. depth.

*Table 1*

**Chemical properties of the argic chernosiomus from the Sărbătoarea-Dolj**

| Orizontul genetic | Adâncime a (cm) | Valoarea Ph ($H_2O$) | S.B. m.e/100g | S.H. m.e | Humus % | N total % | P p.p.m. | K p.p.m. |
|---|---|---|---|---|---|---|---|---|
| Ap1 | 0-25 | 7,01 | 24,36 | 3,42 | 2,79 | 0,140 | 22,6 | 166,7 |
| Ap2 | 25-34 | 7,18 | 26,84 | 2,31 | 29,19 | 0,132 | 28,1 | 172,8 |

## FIELD RESEARCH METHOD

Establishing an optimum fertilization system which positive influences the quantity and the quality of the culture and which implies an improving of the soil fertility potential represents an important way of increasing the economic efficiency. The influence of chemical fertilizers upon the maize culture is related to physiological processes which take place at a plant level in certain moments of its growth.

The experiment has in view two important factors:

Factor **A**: irrigating system

B1 – irrigated

B2 – non-irrigated

Factor **B**: applying the dosage of fertilizer

Within the experimental filed an important moment was followed, respective the 8 full-grown leaves phase, and lab tests were kept in order to perform physiological determinations.

*Table 2*

**Influence of the nitrogen and phospoorus on some physiological processes of the crop hybrid Olimp, moment I, 20 june non irrigated system 2005**

| Varianta | Fotosinteza mgCO/cm$^2$ | Respirația mgCO$^2$/100g m.v. | Capacitatea de absorție g apă | Forța de sucțiune atm | Pigmenții clorofilieni | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Clorofila A mg/dm$^2$ | Clorofila B mg/dm$^2$ | Caroten mg/dm$^2$ | Totalmg/dm$^2$ |
| $N_0P_0$ | 228,7 | 183,5 | 5,88 | 4 | 0,362 | 0,169 | 0,198 | 0,729 |
| $N_{60}P_{40}$ | 253,4 | 189,7 | 5,93 | 4,1 | 0,368 | 0,172 | 0,2 | 0,74 |
| $N_{80}P_{60}$ | 256,5 | 201,3 | 5,86 | 4,12 | 0,367 | 0,174 | 0,204 | 0,745 |
| $N_{100}P_{80}$ | 260,8 | 210,4 | 6,02 | 4,12 | 0,371 | 0173 | 0,201 | 0,745 |
| $N_{120}P_{100}$ | 253,4 | 206,5 | 5,94 | 416 | 0,376 | 0,171 | 0,206 | 0,752 |

*Table 3*

**Influence of the nitrogen and phospoorus on some physiological processes of the crop hybrid Olimp, moment I, 20 june irrigated system 2005**

| Varianta | Fotosintezamg$CO_2$/cm$^2$ | Respirația mg$CO^2$/100g m.v. | Capacitatea de absorție g apă | Forța de sucțiune.atm | Pigmenții clorofilieni | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Clorofila A mg/dm$^2$ | Clorofila B mg/dm$^2$ | Caroten mg/dm$^2$ | Totalmg/dm$^2$ | |
| $N_0P_0$ | 239,7 | 186,5 | 6,01 | 4,1 | 0,375 | 0,176 | 0,211 | 0,762 | |
| $N_{60}P_{40}$ | 262,4 | 192,3 | 6,1 | 4,18 | 0,38 | 0,178 | 0,218 | 0,776 | |
| $N_{80}P_{60}$ | 268,3 | 205,4 | 6,21 | 4,2 | 0,386 | 0,181 | 0,22 | 0,787 | |
| $N_{100}P_{80}$ | 270,5 | 215,7 | 6,15 | 4,2 | 0,388 | 0,187 | 0,227 | 0,802 | |
| $N_{120}P_{100}$ | 276,8 | 220,4 | 6,23 | 4,26 | 0,379 | 0,185 | 0,224 | 0,788 | |

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 where also graphically represented.

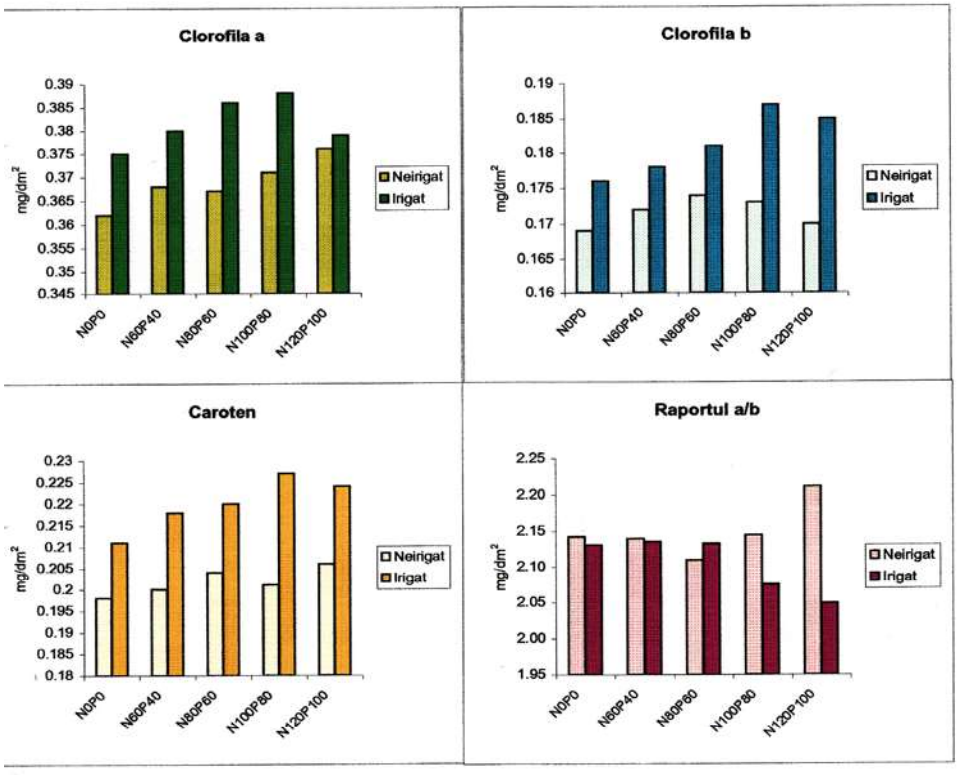


**Fig. 1** - Influence of the nitrogen and phosphorus doses on some physiological processes ot the crop hybrid Olimp- moment I- year 2005

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

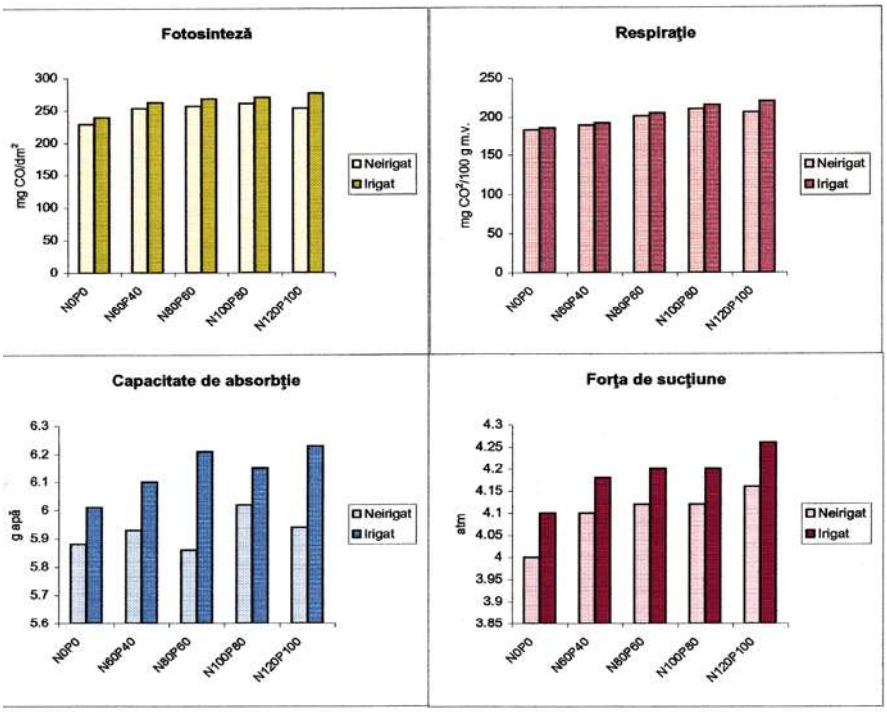


Fig. 2 - Influence of the nitrogen and phosphorus doses on some physiological processes ot the crop hybrid Olimp- moment I-year 2005

The evolution of photosynthesis (Fig. 2 and 3) expressed by mg CO/dm² that was determined in the first moment, that is the 8 full-grown leaves, has an important increase when comparing the non-irrigated and the irrigated variants, and also within the same variant.

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, 20 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 (Fig. 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 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.
- 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 Olimp 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 Olimp hybrid.
- We highly recommend Olimp hybrid for production, when using an irrigated system and applying a maximum dose of N120P100 and N100P80 for an economic efficiency.

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