

THE INFLUENCE OF DIFFERENT QUANTITIES OF PHOSPHORUS ON THE INTENSITY OF PHOTOSYNTHESIS AND RESPIRATION TO MAIZE

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The improvement of agricultural production is a problem that concerns many specialists and some international specialized organizations which have in view to ensure the food necessities for the continuously growing population of the world.

The studies done by FAO in this area pointed out the interrelation between the consumption of fertilizers and the production per hectare.

The results of the research in this field have shown that the rational use of fertilizers in accordance with soil reserves, mineral needs of plants and climate results in large and constant harvest.

On these aspects in concerned also this paper which presents the results on the influence of different quantities of phosphorus, as the quantity of nitrogen and potassium (N_{100} ; K_{80}) is constant, on the intensity of photosynthesis and respiration to maize plants.

MATERIAL AND METHOD

The experiments have been performed at the Experimental Center for Irrigated Cultures Mihail Kogălniceanu Tulcea District, on a fair soil, formed from loess or loess deposits, with an average trophicity slight alkaline, with a good nitrification capacity and a low hummus content.

To obtain good crops on fair soils, which are poorly supplied with nutritive substances, it is recommended to use moderate quantities of natural and chemical fertilizers.

The experiment have been done with maize plants Kind HD₁₂₀ and the different ways of fertilize with phosphorus are the following:

$$V_1 - N_0 P_0 K_0$$

$$V_2 - N_{100} P_0 K_{80}$$

$$V_3 - N_{100} P_{40} K_{80}$$

$$V_4 - N_{100} P_{80} K_{80}$$

$$V_5 - N_{100} P_{160} K_{80}$$

$$V_6 - N_{100} P_{160} K_{80}$$

The intensity of photosynthesis and respiration has been determined to the plants in these cases in the following phases of vegetation: 7-8 leaves; blossoming fertilization and milky grain, using the Warburg method modified by N. Sălăgeanu (1963) for analysis of aërie plants.

The analysis been performed at an intensity of light of 8500 Lx and a temperature of 30°C.

RESULTS AND DISCUSSION

The results are presented in Fig. 1, which includes four graphs, one for each analyzed phase of vegetation.

Each graph is made of four curves representing the intensity of apparent photosynthesis - $F_s(a)$ -; the intensity of respiration - R -; the intensity of real photosynthesis - $F_s(r)$ - and the ratio between photosynthesis and respiration - F_s/R -.

The analysis of these data shows that the intensity of apparent and real photosynthesis has increased with the increasing of the quantity of phosphorus until it reached P_{120} quantity to which the intensity of the process was the highest, - then at P_{160} a slight diminution of the intensity of photosynthesis has been recorded, with the exception of 7-8 leaves phase to which the highest values of the intensity of photosynthesis have appeared at P_{160} .

Analyzing the variation of the intensity of photosynthesis in different phases of vegetation it can be observed that the highest values appeared during the phase of fertilization and the lowest ones during that of milky grain.

The relative high levels of real photosynthesis in the phase 7-8 leaves are due to the low consumption related to the respiration that has the lowest levels during this phase (under $1 \text{ cm}^3\text{CO}_2/\text{dm}^2/\text{h}$). This fact has also determined the high values (higher than those of real photosynthesis) of the ratio photosynthesis/respiration.

During blossoming the intensity of photosynthesis has increased slowly depending on the quantity of phosphorus and the intensity of respiration has been more intensely influenced, fact that has determined an increase of the ratio photosynthesis/respiration, the values being usually lower than these of real photosynthesis.

During the phase milky grain the intensity of photosynthesis has slightly decreased while the intensity of respiration has increased and consequently, the ratio photosynthesis/respiration has decreased.

Further analysis of these data shows that despite the fact that intensity of photosynthesis had the highest values at P_{120} , its increase compared with the case of plants in the variant with P_{80} was little; that is why it seems that

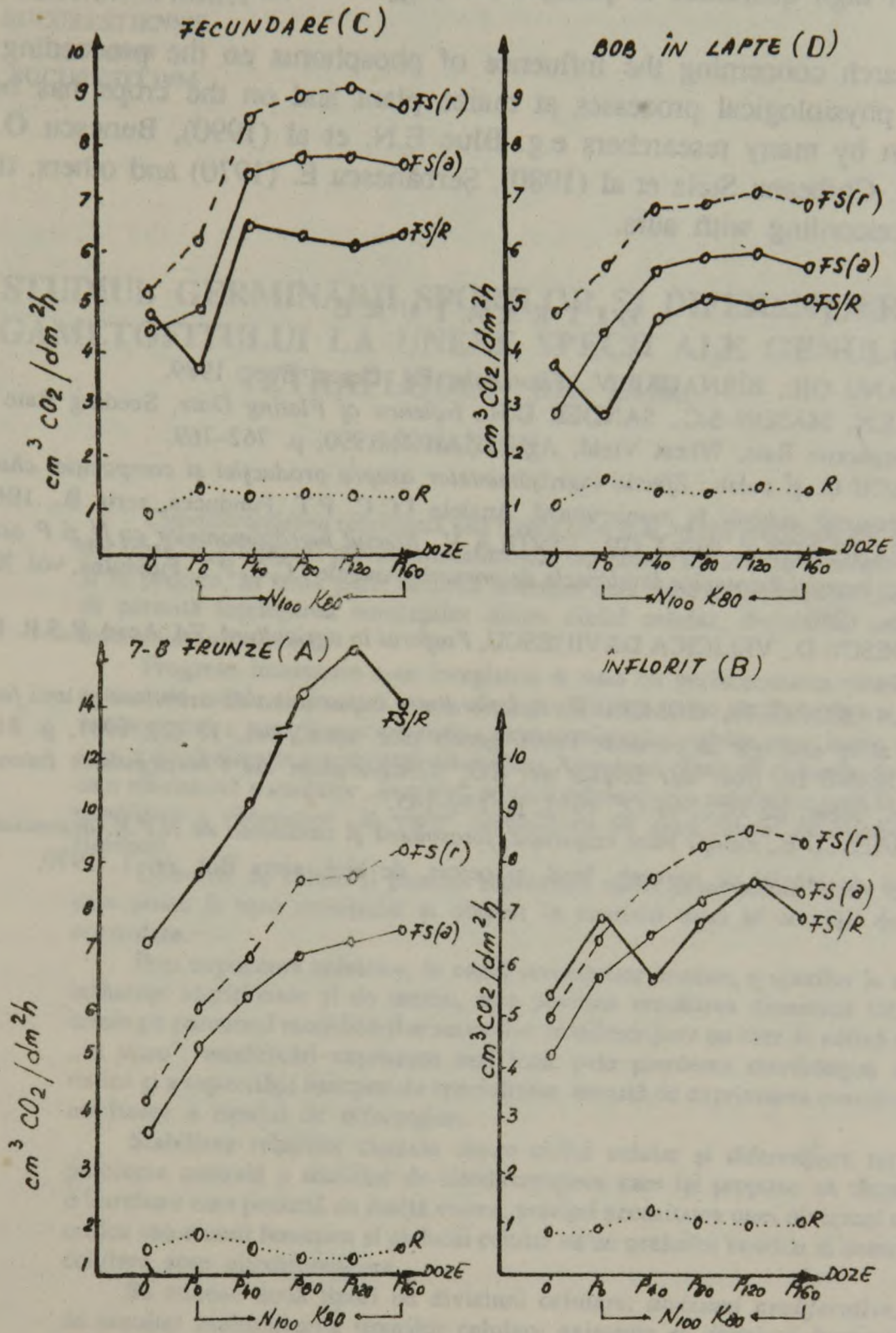


Fig. 1. The influence of different quantities of phosphorus on the intensity of photosynthesis and respiration to maize plants, Kind HD₁₂₀. Fs(a) = apparent photosynthesis; Fs(r) = real photosynthesis; R = respiration; Fs/R = ratio between real photosynthesis and respiration; A = phase 7-8 leaves; B = phase of blossoming; C = phase of fertilization; D = phase of milky grain.

the use of high quantities of phosphorus (P_{120} and P_{160}) in production is not justified.

Research concerning the influence of phosphorus on the proceeding of different physiological processes at maize plant and on the crops has been carried on by many researchers e.g. Blue E.N. et al (1990), Bunescu O. et al (1969), Corbeanu Stela et al (1980), Șerbănescu E. (1970) and others, their results concurring with ours.

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