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EFFECTS OF COPPER AND MANGANESE FOLIAR FERTILIZER TO WINTER WHEAT YIELD ON DIFFERENT NPK LEVEL

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Abstract: *text Wheat is one of the most widely cultivated crop worldwide. One of the most important conditions for successful wheat production is to ensure an adequate supply of macro- mezo- and micronutrients. A small lack of micronutrients often does not cause visible symptoms on the plants however, it can result up to 10-30 % yield loss. The replacement of the necessary micronutrients is most easily achieved by foliar fertilization. A field experiment was conducted at long term fertilization field experiment of Hungarian University of Agriculture and Life Sciences to study the effects of micronutrient foliar fertilizer (copper and manganese) to growth and yield of GK Petur winter wheat cultivar on 4 different NPK levels.. The results showed significant difference among the grain yield of the control (without foliar fertilizer) and copper-manganese foliar fertilization treatments on all NPK levels. The foliar applied micronutrients also increased the yield components of GK Petur, as dry matter, spike number, number of spiklets, seed number per spikes and thousand-seed weight. The research indicated that the foliar fertilizer application of copper-manganese micronutrients could be help to maximize the grain yield of winter wheat.*

• Introduction

Nowadays winter wheat cultivation technology includes foliar fertilization with micronutrients can help to increase the yield and also yield stability. Long-term field experiments are one vital tool for studying the impacts of agricultural management practices on soil properties and crop production.
The objective of this study was to learn more about the effects of micronutrient foliar fertilizer to growth and yield of winter wheat on different NPK level.

• Material and method

The experiment of this study was conducted on four different nutrient level ($N_0P_0K_0$, $N_{60}P_{30}K_{30}$, $N_{120}P_{60}K_{60}$, $N_{180}P_{90}K_{90}$) in long term field experiment of Fülöpszállás, Hungary in the growing season 2019/2020. The montly precipitation data of the experimental period was collected and presented in Figure 1. The precipitation of the growing season (september-june 469mm) was 22% lower than the 30 years average (529mm). Seeds of GK Petur winter wheat cultivar were obtained from Cereal Research Non-Profit Company Szeged, Hungary. The experiment was laid out 20 square meter randomized complete block design in 4 repeats. The foliar application of micronutrients was done at tillering (BBCH29) and stem elongation (BBCH39). Sváb-type cumulative yield production analyis was performed to study the effects of foliar fertilizer treatment on development of the plants.

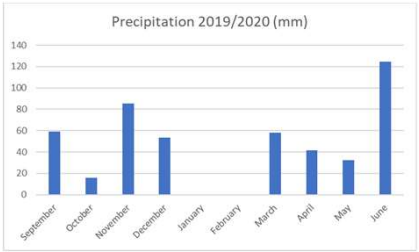

Figure 1. The monthly precipitation (mm) of 2019/2020 growing season

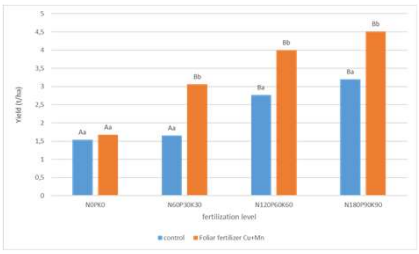

Figure 2. Effect of foliar fertilization on grain yield at different NPK level

• Results and discussions

The average yield was significantly higher at $N_{60}P_{30}K_{30}$, $N_{120}P_{60}K_{60}$, $N_{180}P_{90}K_{90}$ fertilization level in treated plots (Figure 2.).
Based on the results of field experiment, foliar fertilizer seed treatment significantly affect ($p>0.05$) the number of spikes per m^2, the number of spikelets per spike, the number of kernels per spike and the weight of kernels per spike at all fertilization level.
The development phases of the treated plots compared to control are graphically represented on the Figure 3.
A statistically significant positive correlation was found between grain yield and spike number, spiklet number, grain number and grain weight (Figure 4).

• Conclusions

The application of copper+manganese micronutrient foliar fertilizer could be help to increase the grain yield of winter wheat. Applying the obtained results in practice can contribute to the efficiency of wheat production.

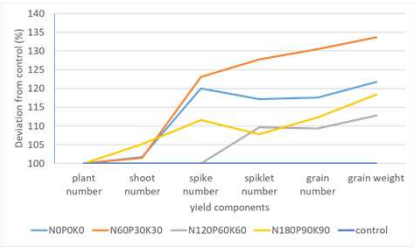

Figure 3. The development stages of treated wheat plants compared to control.

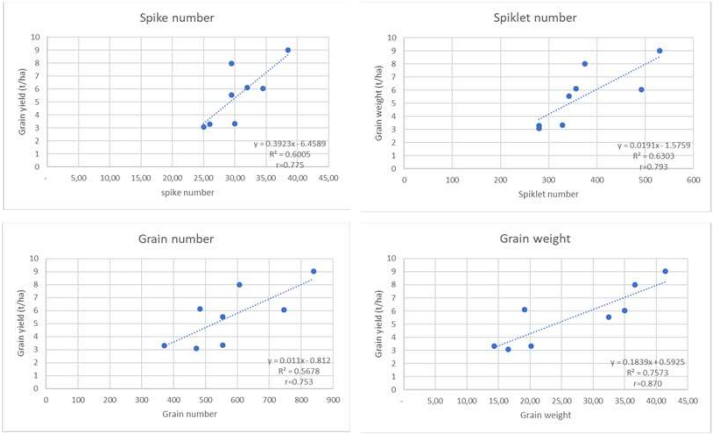

Figure 4. Regression result on the effect of yield components on winter wheat grain yield.