

PREVENTION AND THE CORRECTION OF MICRONUTRIENTS DISORDERS IN MAIZE AND SUNFLOWER PLANTS

**ADRIANA GRIGORE, IOANA OPRICA, DANIELA MIHALACHE, DANIELA
DANA, MARIA SOARE, IULIA ANTON, DANIELA ȘTEFANESCU**

National Research and Development Institute for Soil Science, Agrochemistry and
Environmental Protection of Bucharest

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Abstract

The paper presents the research concerning the elaboration and testing of an unconventional fertilization technology for maize and sunflower crops, which will prevent and correct the nutrition disorders in plant, especially in Zn. The two new foliar fertilizers have a complex composition: mineral macronutrients (N, P, K), micronutrients (Cu, Fe, Mn, Mo, Zn) and physiologically active substances (aminoacids, peptides).

The agrochemical testing of the two foliar fertilizers was carried out in the greenhouse of ICPA Bucharest, with maize and sunflower crops. The soil was Vermic Chernozems from Fetesti, with the following properties: weak alkaline reaction and excessive phosphorous status, these being the potential conditions for zinc deficiency in soils.

The applications of these foliar fertilizers ensured important yield increases of dry matter, on both crops. Also, the foliar fertilizers assured the increases of the micronutrients (Mn, Zn) content in the dry matter of plants.

INTRODUCTION

The foliar fertilizers with mineral nutrients and organic physiologically active substances belong to the unconventional means of fertilization. These fertilizers are applied to plants in order to stimulate and correct nutrition deficiencies or optimize the nutrient contents in the seeds.

According to the durable agriculture concept, these unconventional means of fertilization must be applied together with the classical (conventional) ones; the first insure the environment protection against the chemical pollution, due to increasing the degrees of productive nutrient use from soil and the others insure the agrochemical stabilization of the soil by compensating the nutrient losses from crop exports.

MATERIAL AND METHODS

The agrochemical testing of the two foliar fertilizers was carried out in the greenhouse of ICPA Bucharest in 2008. The tested plants were maize (Talman hybrid) and sunflower (Justin hybrid).

The soil was Vermic Chernozems from Fetesti with the following properties: humus: 3.44%; pH (H₂O):7.67; total N: 0.13%; mobile P: 113.53 ppm; mobile K: 106.66 ppm. The contents of mobile micronutrients (Cu, Zn, Fe, Mn) were over the susceptibility limit.

The experiment was organized in Mitscherlich pots with 20 kg of soil per pot and was treated as a monofactorial experiment with 3 replications. All the variants, excepting control - unfertilized in soil, received 100 mg N/kg soil, 100 mg P₂O₅/kg soil, 100 mg K₂O/kg soil – for the maize crop and 50 mg N/kg soil, 50 mg P₂O₅/kg soil, 50 mg K₂O/kg soil – for the sunflower crop, as a 15-15-15 complex fertilizer.

The foliar fertilizers have been applied three times as diluted solutions with 1% and 1.5% concentrations (30 ml/pot for each treatment). The plants have been harvested after seven days from the last application of the foliar fertilizers.

The new foliar fertilizers have a complex composition: mineral macronutrients (N, P, K), micronutrients (Cu, Fe, Mn, Mo, Zn) and physiologically active substances (aminoacids, peptides). Each foliar fertilizer has two compositions variants: V1, V2 for the maize crops and V3, V4 for the sunflower crops.

The experimental data have been processed by the variance analysis method (Student-Newman-Keuls test) and have been compared with the two controls: unfertilized in soil and fertilized in soil.

RESULTS AND DISCUSSION

The results obtained on the maize crop (Talman hybrid) are presented in table 1.

Table 1

**Data regarding the effect of the foliar fertilizers on maize plant
(Talman hybrid, 2008)**

Variants	Dry matter yields, g/plant	Cu	Zn	Fe	Mn
		ppm			
Control 1	18.27 b	6 c	10 d	92 c	29 c
Control 2	23.17 b	12 a	18 c	199 a	42 b
V1 (1%)	43.61 a	11 ab	21 b	93 c	55 a
V2 (1.5%)	46.00 a	9 b	32 a	113 b	53 a

Both compositions of the foliar fertilizers, V1 and V2, assured yield increases of the dry matter between 25.34 g/plant and 27.73 g/plant as compared with the control unfertilized in soil and between 20.44 g/plant and 22.83 g/plant as compared with the control fertilized in soil. Regarding the effect of the tested foliar

fertilizers on the micronutrient content it can be observed an increase of the Zn and Mn content as compared with the controls.

With sunflower crop (Justin hybrid), the tested fertilizer (V3 and V4) assured yield increases of the dry matter as compared with the controls (table 2).

Similar to the maize crop, the content of Cu and Fe in the sunflower dry matter decreased, but the content of these elements was at the higher limit of the optimum range. The Mn and Zn contents (which were under the limit of the optimum range) increased after the application of the foliar fertilizers.

Table 2

**Data regarding the effect of foliar fertilizers on sunflower plants
(Justin hybrid, 2008)**

Variants	Dry matter yields, g/plant	Cu	Zn	Fe	Mn
		ppm			
Control 1	16.64 b	16 a	14 b	98 a	26 b
Control 2	21.61 ab	17 a	18 ab	61 c	30 ab
V3 (1%)	23.50 ab	8 b	19 ab	88 a	31 ab
V4 (1.5%)	28.77 a	9 b	22 a	73 b	33 a

CONCLUSIONS

1. The application of the tested foliar fertilizers had determined an increase of the maize and sunflower dry matter as compared with the controls.
2. The content of Zn and Mn in the plants dry matter increased, thus the tested fertilizers can be used to prevent and to correct the micronutrient deficiencies often met on the soils with alkaline reaction.

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