



Influence of foliar fertilization with boron and zinc for maize grain crop in the hilly area of south-western Romania

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For 2 years (2020 and 2021) in the hilly area of south-western Romania a single-factor maize experiment (hybrid Kapitolis FAO 410 from KWS) was established with 4 foliar fertilization variants: V1 = untreated control ; V2 = Treatment 1 at BBCH 14-18 (maize with 4-6 leaves) using Lebosol products 1l/ha Zinc700 + 1,5l/ha Bor ; V3 = Treatment 2 BBCH 24-28 (maize with 8-10 leaves) using the same products ; V4 = Treatment 1 + Treatment 2.

Before the first treatment (T1) leaf and soil samples were collected and after the second treatment (T2) leaf samples from all 4 variants were collected for analysis. The foliar analysis before the first application showed normal values for nitrogen, phosphorus, calcium, magnesium, sulfur, iron, manganese, boron, iron, and molybdenum; low value for potassium; slightly low value for zinc and high value for calcium. After the application of the second treatment, zinc content values were much more improved within the leaves, boron remained constant but molybdenum content decreased a lot. Although at the borderline, the nitrogen content of leaf at T1 and T2 remained at normal value, after application of T1 + T2 it decreased from 4.6% (before application) to 2.96%.

The lowest crop yield was obtained with the untreated control - 5210 kg/ha and the highest yield with the T2 variant - 6050 kg/ha. ANOVA yield analysis showed that the yield increase of 840 kg/ha at T2 is very significant compared to the untreated control and the one at T1 + T2 of 370 kg/ha is distinctly significant compared to the same control.

Although the maize yield was high compared to the control after application of T1, it was not statistically assured. Of the yield and quality elements studied, the most stable were: test weight (values ranging from 69.9-71.8 kg/hl), protein content (values ranging from 5.79-6.55%) and fat content (values ranging from 3.13-3.26%). Large ranges of values were observed for the thousand kernels weight (values ranging from 300.3-352.4 g) and starch content (values ranging from 67.76-69.54%).

Soil analysis

Analiza SOL	Rezultat	Limita	Interpretare
pH	6.1	6.5	Ușor scăzut
Fosfor (ppm)	23	16	Normal
Potasiu (ppm)	269	121	Normal
Magneziu (ppm)	595	50	Mare
Calciu (ppm)	4361	1600	Normal
Sulf (ppm)	5	10	Scăzut
Mangan (ppm)	51	25	Normal
Cupru (ppm)	6.3	4.1	Normal
Bor (ppm)	0.87	1.6	Scăzut
Zinc (ppm)	2.2	4.1	Scăzut
Molibden (ppm)	0.03	0.6	Foarte scăzut
Fier (ppm)	621	50	Normal
Sodiu (ppm)	32	90	Foarte scăzut
C.E.C. (meq/100g)	32.3	15	Normal



Variant	Yield (kg/ha)	Difference (%)	MMB (g/1000 boabe)	MH (kg/hl)
Control	5210	100	300.3	69.9
T1 - BBCH 14-18	5430	104	317.8	70.07
T2 - BBCH 24-28	6050***	116	352.4	70.05
T1 + T2	5580**	107	337.6	71.8

DL 5% = 145 kg/ha
DL 1% = 368 kg/ha
DL 0,1% = 671 kg/ha

Varianta	Productie (kg/ha)	Amidon (%)	Proteina (%)	Grăsimi/Ulei (%)
Martor	5210	69.39	5.79	3.13
T1 - BBCH 14-18	5430	68.58	6.28	3.15
T2 - BBCH 24-28	6050	69.54	5.94	3.24
T1 + T2	5580	67.76	6.55	3.26

T = 1.5 l/ha Bor + 1 l/ha Zinc700

Results of foliar analysis

Pre-application foliar analysis				Foliar analysis after application							
Analysis	Result	Limit	Interpretation	Control		T1		T2		T1 + T2	
				Result	Interpretation	Result	Interpretation	Result	Interpretation	Result	Interpretation
Nitrogen (%)	4.6	3.5	Normal	3.07	Slightly low	3.55	Normal	3.62	Normal	2.96	Slightly low
Phosphorus (%)	0.39	0.35	Normal	0.28	Slightly low	0.31	Slightly low	0.33	Slightly low	0.32	Slightly low
Potassium (%)	2.13	3	Low	2.02	Low	2.76	Slightly low	2.16	Low	2.37	Slightly low
Calcium (%)	0.82	0.3	Normal	0.37	Normal	0.49	Normal	0.52	Normal	0.4	Normal
Magnesium (%)	0.29	0.25	Normal	0.17	Low	0.13	Low	0.23	Slightly low	0.17	Low
Sulphur (%)	0.45	0.1	Normal	0.27	Normal	0.28	Normal	0.28	Normal	0.23	Normal
Iron (ppm)	347	75	Normal	196	Normal	158	Normal	167	Normal	147	Normal
Zinc (ppm)	29	30	Slightly low	24.1	Slightly low	32.2	Normal	284.9	High	178.3	High
Manganese (ppm)	59.4	40	Normal	53.8	Normal	62.4	Normal	57.5	Normal	40.1	Normal
Boron (ppm)	8.7	7	Normal	10.2	Normal	9.9	Normal	9.1	Normal	12.5	Normal
Copper (ppm)	17.8	7	High	9.5	Normal	11.7	Normal	11.9	Normal	10.1	Normal
Molybdenum (ppm)	0.31	0.2	Normal	< 0.05	Very low	0.09	Very low	< 0.05	Very low	0.11	Low

Cob aspects depending on treatment



Conclusions

While boron is essential for pollination and thus for yield development, zinc plays an important role in optimal plant development.

Where the farmer applied 1l/ha of zinc to maize areas for the first time, the average per farm was around 6000kg/ha, which is above the average yield in previous years..

Bibliography

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