



# CORRELATION BETWEEN SOME FOLIAR FERTILIZERS USED IN ORGANIC AGRICULTURE AND NITROGEN UPTAKE IN DIFFERENT CROPS AND GROWTH STAGES

Andrei MOȚ<sup>1</sup>, Violeta Alexandra ION<sup>1</sup>, Roxana Maria MADJAR<sup>1,2</sup>, Liliana BĂDULESCU<sup>1,3</sup>

<sup>1</sup>Research Center for Studies of Food Quality and Agricultural Products, University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Marasti Blvd, District 1, Bucharest, Romania

<sup>2</sup>Faculty of Agriculture, University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Marasti Blvd, District 1, Bucharest, Romania

<sup>3</sup>Faculty of Horticulture, University of Agronomic Sciences and Veterinary Medicine of Bucharest, 59 Marasti Blvd, District 1, Bucharest, Romania

Corresponding author email: violeta.ion@qlab.usamv.com

**Keywords:** crop nitrogen status, foliar fertilization, organic, CHNS elemental analysis.

## INTRODUCTION

Nitrogen, as a vital element for plants, can be delivered through special nitrogen fertilizers, in different forms. In addition, some other nutrients can improve nitrogen use efficiency, so the key of a good fertilization is to find a balance between elements (Rietra et al., 2017). Foliar fertilization has a series of advantages over conventional soil fertilization, especially when it comes to micronutrients (Kurešová et al., 2019). These elements are often inaccessible although their quantity in soil is sufficient. Micronutrients availability from soil to plants is influenced by a lot of factors such as the organic matter, soil minerals, redox potential, pH, soil microorganisms, enzymes and many more. This study aims to determine the influence of a chelated complex fertilizer of micronutrients (Codamix) and an organic fertilizer based on proteins and seaweed (Ecoaminoalga), on the total nitrogen content of four crops: wheat, maize, sunflower, and soybean.

## MATERIALS AND METHODS

### PLANT MATERIAL

- Wheat (Trivale variety)
- Maize (F.376 hybrid)
- Sunflower (Puntasol hybrid)
- Soybean (Florina F variety)

### VARIANTS OF TREATMENTS

- V1 – Control variant (no fertilization)
- V2 – Foliar fertilization (Codamix)
- V3 – Foliar fertilization (Ecoaminoalga)



### The plant samples used for analyzes

Crop	Plant part	Date of reception
Wheat	Leaves	04.06.2020
	Grains	28.07.2020
Maize	Leaves	02.07.2020
	Grains	07.09.2020
Sunflower	Leaves	02.07.2020
	Grains	07.09.2020
Soybean	Leaves	02.07.2020
	Grains	20.10.2020

Dried to  
constant mass

Ground with the  
laboratory grinder  
into fine powder

Total nitrogen  
(CHNS elemental  
analyzer)



All the analyses for this study were made using the infrastructure of Research Center for Studies of Food Quality and Agricultural Products, University of Agronomic Sciences and Veterinary Medicine of Bucharest. The obtained data were processed using IBM SPSS statistical software. Duncan's Multiple Range Test at  $P \leq 0.05$  level was used for significance determination between groups of means. The same letters above each bar means that they are not significantly different.

## RESULTS AND DISCUSSIONS

### The effect on wheat crop

The wheat leaves from both fertilized variants showed a significant higher content of nitrogen compared with the control. The wheat grain also showed a significant difference on nitrogen content between control and fertilized variants.

### The effect on maize crop

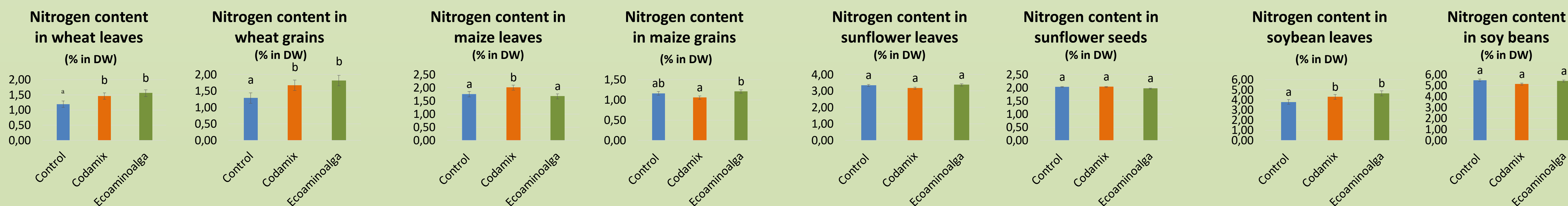
There are no significant difference between the control and Ecoaminoalga fertilization on maize leaves. Regarding the nitrogen content in maize grains, there are no important modification between control and both the fertilized variants (Mueller & Diaz, 2011).

### The effect on sunflower crop

The difference on results on sunflower were almost invisible regarding the nitrogen uptake. No notable difference was observed neither to the leaves nor to the seeds between tested variants.

### The effect on soybean crop

Although the nitrogen uptake of leaves was significantly higher on fertilized crops compared both control crop, the nitrogen content did not differ much in soy beans from all variants (Staton, M. 2019).



## CONCLUSIONS

- The foliar micronutrient fertilization have an unpredictable response to nitrogen uptake on different crop types.
- On wheat, the nitrogen uptake was clearly superior when foliar fertilizers were used, especially when the nitrogen content of fertilizer was higher.
- On maize crops, the foliar fertilization has no noticeable effect on grain nitrogen content, but may increase the yield. This aspect was not followed in this paper.
- Also, the same response was achieved for sunflower crop, with no increase in nitrogen content on fertilized variants.
- On soybean, the nitrogen uptake was well observed on leaves collected in summer, but on the beans harvested in autumn the nitrogen content was not significantly different from the control crop.
- The type of crop has an important influence on fertilizer efficiency. An optimal foliar fertilizer must take into account the needs of the plant but also the water and nutrient uptake capacity of the leaves. These aspects, together with other factors such as soil characteristics, climate are responsible for the efficiency of different fertilizers

## ACKNOWLEDGEMENTS

This paper is financially supported by project ADER 1.4.4. Identification, evaluation, testing, development and validation of analysis methods of nutrients and contaminants from inputs usable in organic agriculture and it is consistent with research directions and guidelines specified by Ministry of Agriculture and Rural Development in aforementioned project.

## REFERENCES

- Kurešová, G., Menšík, L., Haberle, J., Svoboda, P. & Raimanová, I. (2019). Influence of foliar micronutrients fertilization on nutritional status of apple trees. *Plant, Soil and Environment*, 65, (6), 320–327.
- Mueller, N.D. & Diaz, D.A.R. (2011). Micronutrients as starter and foliar application for corn and soybean. *North Central Extension-Industry Soil Fertility Conference* (27), 36–41.
- Rietra, R.P.J.J., Heinen, M., Dimkpa, C.O. & Bindraban, P.S. (2017). Effects of Nutrient Antagonism and Synergism on Yield and Fertilizer Use Efficiency. *Communications in Soil Science and Plant Analysis* 48(16), 1895–1920.
- Staton, M. (2019). Foliar fertilizer applications to soybeans are rarely profitable. Michigan State University Extension. From [https://www.canr.msu.edu/news/foliar\\_fertilizer\\_applications\\_to\\_soybeans\\_are\\_rarely\\_profitable](https://www.canr.msu.edu/news/foliar_fertilizer_applications_to_soybeans_are_rarely_profitable)