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INS w Puławach

## **Review of doctoral dissertation**

### **The Effectiveness of Foliar Fertilization of Several Cultivars of Potato (*Solanum tuberosum* L.) under Conditions of the South-Eastern Poland**

**presented by Ali Hulail Noaema**

#### **1. Introduction**

Agriculture is currently the fourth largest sector of economy in Poland and its contribution to the country's GDP (Gross Domestic Product) is much higher than the European average. Rural areas constitute 93% of Polish territory and are inhabited by nearly 40% of the population. The agrifood sector is an important component of the country's economic potential as it accounts for almost 8% of the total Gross Value Added. It also provides employment for nearly 20% of economically active population. The export of agrifood products represent almost 12% of total Polish export. After Poland's accession to the EU, the intensity of plant production has increased significantly. This is a result of administration of nutrients, fertilizers use and improving the properties of soil and development of soil susceptibility to agricultural production, as well as the re-evaluation of the farmers. The farmers are not only involved in agricultural production, but they also participate in the economic and social fields and other fields of rural development.

The agriculture in Poland is characterized by a great diversity of natural and socio-economic conditions. The agricultural productivity largely determines to the intensity of plant production technology. The fertilizer dosage is one from more important factor in the cultivation technology in plant production system. This factor determine approx. 40-60% of total cost production depending on the intensity of production. The nutrient utilization by crops is also diversified depending on level of fertilizers and the weather conditions during the growing season. For example, the utilization of nitrogen may be in the range from 20% to 60%, the utilization of phosphorus does not exceed 25%, and potassium approx. 60%. The rest unutilized nutrients from fertilizers can be dispersed to the air or water.

From this reason the sustainable fertilizer application is very important factor in crop production especially in potato production. Poland is the second largest potato producers in



Europe, and six in the world. Especially in Poland, the potato yield are subject to large fluctuations, which are influenced by unfavorable climatic and soil conditions. Yields of potato tubers are variable, depending on a variety (genotype) and production factors such as climate, soil, water availability and agronomic practices. One from the most important factors in plant growth and yield of potato tubers is nutrient management.

The reviewed study aimed to determine the effect of macro- and microelements contained in foliar fertilizers on potato productivity and selected qualities of tubers. In addition, the research aimed at evaluating the effectiveness of foliar fertilization of selected potato cultivars and to determine their suitability for direct consumption and food processing in soil and climatic conditions of South-Eastern Poland.

## **2. Formal review**

The reviewed dissertation includes of 200 pages, consists of 8 main chapters – including Introduction, Literature Review, Materials and Methods, Conditions of Research, Results, Discussion, Conclusions and References includes 468 items. The List of Tables, List of Figures and List of Photos are also included. At the end of the study are provide Appendix a bibliography includes 334 items. The proportions of each chapters of the dissertation are correct and already apparent from the substantive content. The statistical analyzes used in dissertation were based on three-factor analysis of variance (ANOVA – Analysis of variance) and is correct. The reviewed dissertation is written in very good scientific language. Dissertation is prepared very carefully in terms of form.

## **3. Essential review**

The doctoral dissertation is very interested from practical point of view. The study aimed to determine the effect of macro- and microelements contained in foliar fertilizers on potato productivity and selected qualities of tubers. In addition, the research aimed at evaluating the effectiveness of foliar fertilization of selected potato cultivars and to determine their suitability for direct consumption and food processing in soil and climatic conditions. The field experiment was conducted in 2015-2017 years in Experimental Station for Cultivars Evaluation in Uhnin, located in Lublin Province. The experiment was carried out on sandy loam soil type, these soils belong to slightly acidic good rye complex. It is typical soil to potato cultivation. The climate of the Lubelskie region is characterized by mild continental climate.



The experiment was set up following the randomized blocks method in a subsidiary system (split-split-plot) in three replications. The first order factor were 4 cultivars of potatoes belonging to different classes of earliness: Lord - very early, Vineta - early, Satina - medium early and Jelly - medium late. The second order factor were 4 foliar fertilization technologies provided by Suplo fertilizers: A) Suplofol mikro ZM + Suplofol mono Mn + Suplofol mono B + Magnesium sulphate; B) Suplofol mikro ZM + Suplofol mono Mn + magnesium sulphate; C) and one from the factors was Basfoliar Extra 36. The control object was provided without foliar spraying, treated with clean water.

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The scope of the study included determination of:

- the total and commercial yield of tubers;
- structure yield of tubers;
- chemical composition of tubers;
- nutrient yield;
- potato culinary characteristics,

and comparison between 4 selected cultivars of potato belonging to different classes of earliness.

The work has verified the alternative hypothesis, which assumes that foliar fertilization has a positive effect on the total and commercial yield of tubers, its structure, chemical composition and tuber quality, in relation to the null hypothesis, that is no difference between foliar application and standard combination without foliar fertilization. There are 8 conclusions are presented also, but in my opinion it is rather a summary, not conclusions.

#### **4. Comments and remarks**

In my opinion, it is impossible to generalize results on the basis of conditions existing in the South –Eastern Poland as potatoes were grown only in one place – Uhnin and in one type of soil which rather makes it impossible to draw such broad conclusions. The agricultural production environment of South-Eastern Poland is widely known to be diversified in terms of both soil and climate. Therefore, it would be more advisable to use the term: the East Lublin region.



Results of doctoral dissertation presented in the form of summary not as conclusions are interesting but they are too specific and it is very difficult to conclude what practical recommendations for potatoes producers could be given based on this dissertation.

I kindly ask for explanation what the novelty of dissertation is and how the doctoral student intends to use this novelty in his native country Iraq.

The comparison of the studied technologies in relation to economic profitability that is whether it is beneficial to apply foliar fertilization in broadly understood agricultural practice would be very interesting as this is the most important issue for farmers growing potatoes.

## 5. General conclusion

**The doctoral dissertation is very interested from practical point of view. The work provided in experiment was carried out very well and dissertation is very carefully prepared.**

The concept of dissertation and basic methodological assumptions can be evaluate positively, recognizing to determine the effect of macro- and microelements contained in foliar fertilizers on potato productivity and selected qualities of tubers. In addition, the research aimed at evaluating the effectiveness of foliar fertilization of selected potato cultivars. I believe the author has a very good understanding the problem of the sustainable fertilizer application in potato production.

Considering the methods and research methodology and the manner of preparing doctoral thesis, the dissertation of Ali Hulail Noaema deserves the honorable mention in accordance with the principles of rewarding and highlighting this type of studies.

After a thorough and detailed review of Doctoral Dissertation I hereby conclude in an unambiguous manner that it meets the requirements pertaining to doctoral dissertations pursuant to the Polish Act of 14 March 2003 on Academic Degrees and Academic Title and Degrees and Titles in Art (Journal of Laws of the Republic of Poland of 2003 No. 65 item 595) and thus, I make an application to accept the submitted Doctoral Dissertation and allow Mr. Ali Hulail Noaema to undertake a public defense.

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