



OPINION

on a dissertation for obtaining the educational and scientific degree "Doctor" in field of higher education 6 "Agrarian sciences and veterinary medicine", professional field 6.1 "Crop production", scientific specialty "Agrochemistry"

Author of the dissertation: Ivan Dimitrov Velinov, regular Ph.D. student at the Department of „ Agrochemistry and soil science” at the Agricultural University, Plovdiv.

Topic of the dissertation: "Effect of nitrogen fertilization on yields and quality of grain sorghum”

Member of the scientific jury: Prof. Dr. Radka Veleva Ivanova, field of higher education 6. "Agrarian sciences and veterinary medicine", professional field 6.1 "Crop production", scientific specialty "Crop production", appointed as a member of the scientific jury by order № RD-16-145/ 26.02.2021

1. The relevance of the problem.

The sorghum is a drought-resistant crop, with a short growing season and relatively low production costs. It is suitable for arid areas where it is grown without irrigation and is superior in yield to corn for grain. Its grain can be used for human food, for grain and green animal feed, brooms and bioethanol. It is an alternative crop known for its natural adaptability to extreme conditions, suitable for overcoming increasing global warming and water scarcity in recent years. The potential of this culture in our country is not well studied.

That is why the doctoral student realizes its future importance and decides to test new varieties and their reaction to nitrogen fertilization, offering the most suitable varieties for the region and the optimal fertilizer rates for them. The lack of developments in this direction in our country make the topic dissertable and relevant.

2. Purpose, tasks, hypotheses and research methods

The aim of the study was to investigate the effect of nitrogen fertilization on the productivity, quality and efficiency of nitrogen use in grain sorghum. The tasks that are set are in accordance with the set goal.

To achieve this goal, two vascular experiments were set in advance, one to study the influence of nitrogen nutrition at levels 0 - 800 mg N / kg on the formation and distribution of dry biomass, nitrogen, phosphorus and potassium in the organs of sorghum hybrid EU Alize, and a second to study the impact of eight levels of mineral nutrition.

The field study was conducted in the period 2017-2019 in the educational and implementation base of the Crop Science Department at the Agricultural University – Plovdiv, under non-irrigated conditions, by block method in 4 replicates with the French hybrid EU Alize. The influence of different rates of nitrogen fertilization from 0 to 30 kg N / da and their influence on the productivity and quality of sorghum grain was studied.

3. Visualization and presentation of the obtained results.

The dissertation is developed on 208 pages. The dissertation is well- structured and balanced and contains all the necessary sections. The results of the research are very well illustrated and presented in 108 tables and 10 figures. The dissertation is written in a high scientific style and reflects the author's ability to analyze and summarize results independently.

4. Discussion of the results and used literature.

The results of the research, their analysis and discussion occupy an essential part of the dissertation. They are presented in a well-structured logical sequence. The results analysis is performed in- depth, in a logical sequence and in a high scientific style. The doctoral student shows good theoretical training and mastery of modern methods of analysis. The doctoral student also shows good theoretical training by using modern methods of analysis.

To establish the productivity and quality of sorghum, the author analyzes a large number of indicators. Based on them, new information is obtained on the concentration, content, distribution, recycling and export of nitrogen, phosphorus, potassium and their cost for the formation of 100 kg of grain with a corresponding accumulation of biomass, the results of which can be used in modeling for fertilization and process control in the cultivation of sorghum for grain. Effective fertilization rates for increasing the profitability of production are substantiated through economic analysis.

A purposeful and in-depth literature review on the topic was made, highlighting the views of a number of Bulgarian and foreign researchers on the issue. 278 literary sources were cited, 31 in Cyrillic and 247 in Latin.

5. Contributions to the dissertation.

Based on the experimental work done and the results obtained, the Ph.D. student Ivan Velinov formulates the following contributions:

1. Scientific - theoretical contributions:

1. The complex influence of meteorological factors on the formation of biomass, yield and quality of sorghum grain has been established.

2. The consumption of nutrients for the formation of 100 kg of grain with a corresponding accumulation of biomass has been established.

3. Sorghum has been found to efficiently convert fertilizer nitrogen into grain and grain protein yields, including at low levels of nitrogen nutrition.

4. Effective fertilization rates for sorghum for grain to increase the profitability of production are substantiated by economic analysis.

II. Scientific and applied contributions:

1. It was found that the optimal level of fertilization in the hybrid EU Alize is 18 kg N / da in dry years, and in wetter is 24 kg N / da.

2. Under vascular experience, nitrogen fertilization alone does not significantly affect the productivity and quality of sorghum grain.

To achieve maximum results in productivity and quality, it is mandatory to combine nitrogen fertilization with phosphorus-potassium.

3. Soil fertility would remain relatively stable in the long run when fertilizing sorghum with 12 kg N / da, with a partial nitrogen productivity averaging 1.06. The balance of phosphorus is negative except in the control, which indicates that it is necessary to apply larger amounts of phosphorus fertilizers to maintain the total phosphorus content in the soil.

6. Critical remarks and questions.

I have no significant critical remarks on the presented dissertation.

7. Published articles and citations

The doctoral student has presented 3 scientific publications, 1 of which the doctoral student is the single author, the others are co-authored in indexed journals, which cover the required 30 points for the acquisition of ONS "Doctor" according to the new Law of development of academic staff in Bulgaria. There is no reference to the cited documents in the submitted papers.

The presented abstract objectively reflects the structure and content of the dissertation.

CONCLUSION:

Based on the learned and applied doctoral student, different research methods, correctly performed experiments, summaries, and conclusions. I believe that the presented dissertation meet the requirements of the Law for the development of the academic staff in Bulgaria and the Agricultural University Regulations. It gives me a reason to rate in POSITIVE.

I allow myself to suggest to the esteemed Scientific Jury also to vote positively and to award **Ivan Dimitrov Velinov** the educational and scientific degree "**Doctor**" in scientific specialty "Agrochemistry".

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Plovdiv

Prof. R. Ivanova, PhD

