STATEMENT

On PhD thesis for the award of educational and scientific degree of "***Philosophy Doctor***" in Field of higher education 6. Agricultural Sciences and Veterinary Medicine, Professional field 6.1 Crop Production, scientific specialty "Crop Production"

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Theme of the PhD thesis: "Variety specific of triticale (x *Triticosecale* Wittmack) by treatment with plant stimulants under different soil nutrition regime"

Reviewer: Prof. Viliana Marinova Vasileva, PhD - Institute of Forage Crops - Pleven, Field of higher education 6. Agricultural Sciences and Veterinary Medicine, Professional field 6.1 Crop Production, scientific specialty "Crop Production", member of the Scientific Jury appointed pursuant to order No. RD-16-1125/24.10.2019 of the Rector of the Agricultural University of Plovdiv

1. Actuality of the problem.

The global challenge of agriculture in the 21st century is to meet the increasing food demand of the growing world population under increasing threats from the climate change and at the same time to protect the environmental quality. Achieving this balance is not an easy task. Contribution to the solution has been used for crops with good adaptive potential. Only a significantly enhanced biological adaptive potential of crops, and consequently improved plasticity of agroecosystems, can help to improve the current agricultural production levels and meet future food demands.

High yields from crops are associated with the use of mineral fertilizers. However, they pollute the environment. Plant stimulants are one of the alternatives for reducing their use and obtaining environmentally friendly production. Recently, they have been used in agricultural practice as effective, economical and environmentally friendly products that increase the efficiency of growing crops. Their application leads to optimization of plant nutrition and reduction of environmental pollution.

Triticale (x *Triticosecale* Wittmack) - the subject of study in the dissertation is a relatively new cereal crop, bearer of valuable qualities, including high adaptive potential. It is characterized by low demand for soil and climatic conditions, cold and dry resistance, high and stable yields, high nutritional value of the grain and the ability to grow in different directions.

The determination of the varietal specificity of triticale when treated with plant stimulants under different soil nutrition regimes is an up-to-date study. So far, research has focused mainly on selection. To the relevance of the problem I would add the fact that having in a mind the agro-meteorological conditions, the crop is very suitable for cultivation in the area where the studies were conducted.

2. Purpose, tasks, hypotheses and methods of research

The main aim of the research in the dissertation is to determine the influence of plant stimulants on some quantitative and qualitative indicators of triticale varieties under different nutrition conditions of the soil. In order to achieve it in the course of the research the following tasks were solved: 1. Study of the growth and phenological development of triticale in order to establish biomass accumulation and the duration of the interphase periods depending on the variety, soil nutrition and treatment with plant stimulants; 2. Investigation of the effect of treatment with plant stimulants on the dynamics of plant growth, grain yield and

its components under different soil nutrition; 3. Determination of the chemical composition and energy productivity of the grain in triticale varieties under different nutrition conditions of the soil, depending on the effect of the treatment with plant stimulants; 4. Investigation of the physical and chemical properties of the grain under different nutrition conditions of the soil in triticale varieties depending on the treatment with plant stimulants.

Fully adequate research has been carried out to fulfill this purpose. Three years field experiment (2016-2019) was carried out on the experimental field of the training and experimental base of the Crop Production Department at the Agricultural University of Plovdiv. Three triticale varieties (Kolorit, Musala and Trismart) and two plant stimulants (VitaferAlgi and VitaferGreen) were studied under the conditions of two regimes of mineral fertilization (N6P5K2 and N12P10K4). The experiment is methodologically correct. An agrochemical analysis of the soil was performed before the experiment was set. A detailed description of the climatic conditions for the area and the agrometeorological conditions during the vegetation of the crop for the study period are presented. Appropriate agro-technology practice was applied and described in details also. The composition of the plant stimulants is indicated. Biological, biometric and productive characteristics were correctly assessed, chemical analyzes were done, and the energy nutrition of the grain was calculated.

The experimental data obtained were processed using modern software products.

3. Visualization and presentation of the results obtained.

All chapters of the dissertation are well structured. The results obtained from the studies are presented in the form of tables (53), colored figures (9) and illustrated in color photographs (4) also.

4. Discussion of the results and the literature cited.

The experimental results are thoroughly discussed. This chapter occupies the largest part of the dissertation (over 50%) and consists of 5 subchapters, i.e. Triticale growth and development, Economic productivity, Grain quality, Correlation dependencies between the yield, structural elements of grain and physical performance of grain, Energy nutrition of the grain. Each subchapter ended with conclusion from the experimental data obtained and showing of the trends outlined.

The results of the studies conducted are analyzed and summarized in 11 conclusions that I accept.

The literature cited includes 248 references (26 in Cyrillic and 222 in Latin) - a serious addition to the profile showing grasp of knowledge on the subject by the candidate.

5. Contributions to the thesis.

Scientific-theoretical (5) and scientific-applied (4) contributions have been formulated.

Scientific contributions

1. Varietal differences in the phenological development of triticale have been established and the duration of the interphase periods for each variety has been determined under the different meteorological conditions of the years of study for the conditions of the Plovdiv region.

2. The differences in the accumulation of absolutely dry mass in the three varieties of triticale depending on the levels of fertilization, the treatment with plant stimulants under different meteorological conditions were found.

3. The higher fertilization rate leads to a decrease in the specific growth force by 13-15% compared to the low fertilizer level.

4. The growth rate is influenced by the year, the soil nutrition applied and the treatment with plant stimulants. In the conditions of better soil nutrition, the treatment with

VitaferGreen in Musala and Trismart varieties contributes to the most intensive growth, while the highest results for Kolorit variety were obtained after the treatment with VitaferAlgi.

5. A strong correlation was found between the yield and number of grains in spike (r = 0.999), between the plant height and yield (r = 0.890) and weaker relationship was found between the yield and length of spike (r = 0.462), as well as between the yield and 1000 grain weight (r = 0.474).

Scientific-applied contributions

1. Differences in the average grain yields of the varieties tested depending on the factors studied were found. Musala was found the highest yielded variety for the Plovdiv region exceeding the standard by 58.89 kg/da, respectively.

2. Fertilization has been found to be the factor that has the greatest impact on yield, with the indicator increasing as a result of better soil nutrition. A second factor is considered the variety factor, followed by the treatment with plant stimulants.

3. Both, better soil nutrition and treatment with plant stimulants were found to have a positive effect on the structural elements of the yield, but do not affect the physical characteristics of the grain.

4. It was found that the crude protein content is most influenced by the fertilizing factor. Applying of VitaferAlgi increased the amount of crude protein by 0.69% and VitaferGreen by 1.07%, respectively.

6. Critical notes and questions.

I have any critical notes and questions. The dissertation exceeded the requirements for the award of educational and scientific degree of "Philosophy Doctor". I am impressed by the logical thought and scientific statement of the author. The work is written in a high scientific, and in the same time understandable style. It contains scientific and scientific-applied results, which are original contributions to science and have important both, theoretical and practical implications. This clearly shows that the candidate has a thorough theoretical knowledge of the scientific specialty "Crop production" and the ability to perform independent scientific research. The study conducted is in line with the challenges of the present time and the results obtained are fully applicable in the concept of sustainable agriculture.

7. Published articles and citations.

Four scientific publications related to the dissertation were published, two of which the PhD student is an independent author and the other - the first and second author, respectively.

The abstract presented objectively reflects the structure and content of the dissertation. It is written on 41 pages with 32 tables and 9 colored figures included.

CONCLUSION

Based on the learned and applied by the PhD student the various methods of research, the correctly performed experiments, the summaries and the conclusions done, the dissertation submitted meets the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria and the Rules of the Agricultural University for its application, and this gives me a reason to assess it **POSITIVE**.

I allow myself to offer the respected Scientific Jury also to vote positively and to award Rumyana Georgieva Georgieva a full-time PhD student at the Department of Crop Production at the Agricultural University of Plovdiv with a educational and scientific degree of "***Philosophy Doctor***" in the scientific specialty "Crop Production".

Date: November, 22, 2019
Pleven Town

Statement prepared by .....
(Prof. Viliana Vasileva, PhD)