



## STATEMENT

About dissertation for the award of educational and scientific degree of "Philosophy Doctor" in higher education area 6. „Agrarian Sciences”, professional field 6.1 "Crop Production", scientific specialty 04.01.14 "Crop Production "

Author of the dissertation: Romyana Georgieva Georgieva - full-time doctoral student at the Department of Crop Production at the Agricultural University, Plovdiv

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

Reviewer: Assoc. Prof. Georgi Yordanov Georgiev, PhD, Soybean and Cereal Crops Station - Pavlikeni, higher education area 6. "Agrarian Sciences" professional field 6.1 "Crop Production", scientific specialty 04.01.14 "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, Plovdiv

### 1. Actuality of the problem.

The world is currently experiencing increasing crop production requirements for three main reasons: population increase, higher consumption of meat and dairy products by the richer population, and increased consumption of biofuels. Increasing yields rather than using more arable land is considered as the most sustainable way for food security. There are two ways to achieve higher yields - breeding improvements and applied production technology that complement each other. Therefore, any agrotechnical practice leading to significant increase in yield becomes an element of crop agro-technology, in particular of specific varietal agro-technology.

The triticale is neglected in our country. The harvested area for 2019 is 15171 ha and the average yield is 2650 kg/ha. But It is an alternative to other cereals, especially for poorly cultivated areas, with less pesticide treatments and lower production costs. Therefore, the studies related to this crop have an actual agronomic, environmental and economic impact.

As a result of the detailed review of the literature on the theme, the author very well argues the need of the research work done. It is logical to conclude that research on triticale is mainly focused on breeding and improvement work, while studies on the effect of plant stimulants on growth and development, productivity, chemical composition and nutritional value of triticale are scarce.

### 2. Purpose, tasks, hypotheses and methods of the study.

The purpose of this dissertation is to determine the influence of plant stimulants VitaferAlgi (VA) and VitaferGreen (VG) on some quantitative and qualitative indicators of three triticale varieties (Colorit, Musala and Trismart), under two soil nutrition regimes (N6P5K2 and N12P10K4). Four tasks related to the main purpose are logically formulated.

The research methods are suitable for achieving the main goal and solving the problems. To realize the aim and tasks of the investigation, a field experiment (2016-2019) was carried out on the experimental field of the Crop Science Department at the Agricultural University of Plovdiv. The biological, biometric, productive and physical characteristics of the grain were investigated. Soil agrochemical analyzes were carried out, plant analyzes, energy nutrition of the grain from the tested variants was established. For the mathematical processing of the data, one-factor and three-factor analysis of variance, correlation analysis were used, using the software products SPSS and "BIOSTAT ©".

Detailed soil and climatic characteristics of the area and agrometeorological conditions during the vegetation of the crop were done during the survey years.

### **3. Visualization and presentation of results.**

The author presents completed work, very well structured into sections and subsections and written in a clear and accessible scientific style. The results are correctly analyzed, interpreted and illustrated in 53 tables, 9 figures and 4 color photographs.

### **4. Discussion of the results and the literature used.**

The Results and Discussion section covers 94 pages out of 175, which is 54% of the total volume of the dissertation. It is structured in 5 sections. The phenological development, such as the dates of occurrence of the individual phenophases and the duration of the interphase periods by varieties and years, as well as the response of the crop to abiotic stress are described in detail. The effect of plant stimulant treatment on biological yield formation with lower and higher soil fertilization rate and on the growth parameters of the triticale varieties (growth rate and specific growth force) was evaluated. The influence of the factors and variants tested is most pronounced on the productivity (grain yield, parameters of productivity, structural elements of the class, harvest index). Changes in grain quality (chemical composition and physical characteristics) of the test factors and years were studied in detail, as well as the energy nutrition of the triticale grain. Correlation dependences between yield, its structural elements and physical characteristics of grain have been established. On the basis of the experimental work carried out, in-depth and precise discussion and analysis of the results, 12 conclusions were drawn that reflect the results obtained reliably.

The cited literature includes 248 sources, 26 of which are in Cyrillic and 222 in Latin. The extensive literature review performed is well systematized and interpreted, beginning with the history of the beginning of culture and ending with unresolved issues.

### **5. Contributions to the dissertation.**

The contributions done by the doctoral student reflect the results obtained correctly and the conclusions drawn. I accept the contributions presented in two groups:

#### **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 experience for the conditions of the Plovdiv region.
2. There are differences in the accumulation of absolutely dry mass in the three varieties of triticale, depending on the levels of fertilizer factor, the treatment with plant stimulants under different meteorological conditions.
3. Maximum pre-twist and post-twist peaks have been established at specific growth rates. The higher fertilization rate leads to a decrease in the specific growth force by 13-15% compared to the low fertilizer level.
4. It has been found that the growth rate is influenced by the conditions of the year, the soil nutrition applied and the treatment with plant stimulants. In conditions of higher soil fertilization rate, VG treatment in Musala and Trismart varieties contributes to the most intense growth, while in Colorit cultivar VA treatments showed the highest yields.
5. There is a strong correlation between yield with number of grains in class ( $r = 0.999$ ), mass of grains in class ( $r = 0.992$ ) and hectolitre mass ( $r = 0.998$ ). There is also a well-correlated relationship between plant height and yield ( $r = 0.890$ ). A weaker relationship was found between the yield and the length of the class ( $r = 0.462$ ), as well as between the yield and the mass of 1000 grains ( $r = 0.474$ ).



### **Scientific applied contributions:**

1. Differences in the average grain yields of the varieties tested were found, depending on the levels of the factors tested, with the Musala variety being the highest yielding for the conditions of the Plovdiv region and exceeding the standard by 58.89 kg/da.

2. Fertilization has been found to be the factor that has the greatest impact on yield, with the indicator increasing as a result of higher fertilization rate. Second is the variety factor, and the treatment with plant stimulants has the least impact on yield.

3. Higher fertilization rate and treatment with plant stimulants have been found to have a positive effect on the structural elements of production but do not affect the physical performance of the grain.

4. It has been found that the amount of protein is most influenced by the fertilizing factor, with higher fertilization rate proven to increase the amount of protein. The administration of VA increased the amount of protein by 0.69% and the treatment with VG by 1.07%. Trismart variety has the lowest percentage of protein in the grain. There is an inversely proportional relationship between the amount of protein and BEV.

### **6. Critical notes and questions.**

I have not critical comments on the author of the disertation.

Question: The plot size of 15 m<sup>2</sup> is indicated, and how large is the harvest area?

### **7. Published articles.**

In connection with the dissertation, the doctoral student Romyana Georgieva has published 4 articles, in 2 of which she is only author and in the others the first and second author, respectively. It collects a total of 30 points, which covers the minimum requirements for the educational and scientific degree of "Philosophy Doctor" according to the Law on the Development of the Academic Staff in the Republic of Bulgaria

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

## **CONCLUSION**

On the basis of the various methods of research, the correctly performed experiments, the summaries done and the conclusions drawn, 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, which gives me a reason to rate it POSITIVE .

I allow myself to offer the respected Scientific Jury also to vote positively and to award Romyana Georgieva Georgieva a full-time PhD student at the Department of Plant Production at the Agricultural University, Plovdiv with a educational and scientific degree of "Philosophy Doctor" in the scientific specialty 6.1.Crop Production.

Date: November 12, 2019  
Plovdiv

Statement prepared by .....  
(Assoc. Prof. G. Georgiev, PhD)