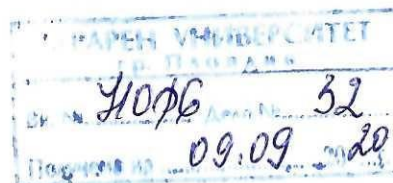


OPINION



on a dissertation for obtaining the educational and scientific degree "Doctor" in: field of higher education **Agricultural Sciences and Veterinary Medicine**, professional field **6.1. Plant Growing**, scientific specialty **Plant Growing**.

Author of the dissertation: Todor Kostadinov Gubatov

PhD student in self-study at the Department of Plant Growing at the Agricultural University, Plovdiv

Dissertation topic: Interaction between environmental conditions and grain yield in varieties of common wheat (*Triticum aestivum* L.)

Reviewer: Assoc. Prof. Ph.D. Albena Marinova Ivanova, College-Dobrich - "Konstantin Preslavsky" University of Shumen, field of higher education Agricultural Sciences and Veterinary Medicine, professional field 6.1. Plant Growing, scientific specialty General Agriculture

appointed as a member of the scientific jury by order № RD-16-650/27.07.2020 by the Rector of Agricultural University.

1. Relevance of the problem.

The creation of genotypes with high and stable yield is a key problem in selection programs aimed at obtaining new varieties with high productivity, suitable for different conditions and areas of cultivation. The interaction of genotype x environment has a strong influence on the manifestations of the traits, which makes the selection of a suitable genotype even more difficult and complex. The study of the influence of environmental conditions on the genotype of different crops is especially relevant against the background of established persistent trends in climate change on the planet and especially wheat, which is the main crop for humanity and the development of human civilization is undoubtedly related. with its cultivation and improvement.

2. Purpose, tasks, hypotheses and research methods.

The aim of the dissertation is a detailed and in-depth study of the regularities related to the influence of environmental conditions on the variation and the level of the grain yield characteristic of common wheat.

The goal is realized through the implementation of three main tasks:

1. Study of the influence of environmental conditions on grain yield.
2. Study of the possibilities of different statistical methods and approaches for extracting correct information about the interaction of genotype x environment in wheat grain yield.
3. Analyzing the suitability of different approaches for objective evaluation of a particular variety in terms of a compromise combination between the manifestation of the grain yield trait and its plasticity and stability.

For the purposes of the development, field experiments were conducted, which cover two periods - four and two years. A large number of statistical packages with general and specific purpose have been used.

3. Visualization and presentation of the obtained results.

The dissertation is very well structured and contains all the necessary sections. It contains 185 typewritten pages of text, 46 tables and 23 figures, which give a very clear idea of the research.

4. Discussion of the results and used literature.

The list of cited literature contains a total of 215 references, of which 25 in Cyrillic and 190 in Latin. The way of presenting the literature review shows the excellent awareness of the doctoral student on the topic of the dissertation. His opinion on the treated issue is clearly stated and the need for conducting the present study is correctly stated. A scientifically sound style is used in the presentation and commentary of the obtained results. The results are interpreted skilfully and thoroughly, and the relationships between the individual traits are indicated and compared with data from other studies. Of exceptional interest for the practice is the established stable manifestation of the yield of the individual genotypes under the changing climatic conditions. This allows for their proper comprehensive assessment and their further use. Naturally, 20 conclusions have been formulated, adequately reflecting the decision of the purpose of the dissertation.

5. Contributions of the dissertation.

As a result of in-depth and correctly performed research activity and on the basis of the obtained results 6 scientific and 4 scientific and applicable contributions are clearly and precisely formulated.

Scientific contributions

1. Grain yield in wheat is a productive trait, largely dependent on the environment, due to the complex change in the traits from which it is formed.
2. The interaction of the grain yield trait with the environmental conditions has a complex and multicomponent character, which is difficult to predict and analyze without experiments against the background of the unpredictable conditions of the seasons.
3. The analysis of the change in grain yield of the variety grown in different conditions is mandatory for its objective assessment among the other varieties in the group.
4. The information on the grain yield behavior of the individual variety is relative to the background of the group in which it is tested and thanks to it it can be characterized in any of the four groups according to the size of the yield and its stability.
5. Each of the analyzed methods for evaluation of the interaction genotype x environment in itself gives part of the information about the behavior of each variety in the conditions of multifactor field experiments, which, however, is not sufficient for its proper comparison with other studied varieties.
6. Ranking approaches for the evaluation of varieties can be successfully used to identify those experimental varieties with high yields and strong adaptability to different environmental conditions.

Scientific and applicable contributions

1. The nonparametric approach of Huhn (1979) and the parametric method of Francis and Kannenberg (1978) are relatively informative for grouping varieties by yield and stability. Here the relationship between grain yield and its stability is most expressed.
2. When applying the indices "ASV" and "GA" it is not possible to obtain correct information about the degree of variation of a particular variety in the group, therefore they should not be used for this purpose.
3. Combining the classical method (averaging the data from the different conditions) with the correction of the stability of the genotype is a correct approach for grouping the varieties in order to zoning them in specific environmental conditions.
4. The new varieties created in the last few years exceed the standards of yield and stability, despite the strong interaction of yield with environmental factors.

6. Critical remarks and questions.

I have no critical remarks or questions to the PhD student.

7. Published articles and citations.

Most of the results and contributions of the dissertation are presented in three scientific publications, in two of which the PhD student is a leading author. A reference to established citations is not provided.

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

CONCLUSION:

On the basis of the different research methods applied by learned and applied by the PhD student, correctly performed experiments, summaries and conclusions, I believe that the presented dissertation meets the requirements of the Law on the Development of the Academic Staff of the Republic of Bulgaria (LDASRB) and the Rules of the Agricultural University for its application, which gives me reason to evaluate it **POSITIVE**.

I allow myself to suggest to the esteemed Scientific Jury also to vote positively and to award **Todor Kostadinov Gubatov** the educational and scientific degree "**Doctor**" in the scientific specialty **Plant Growing**.

Date: 01.09.2020
Plovdiv

**MANUFACTURED
OPINION:**

(Assoc. Prof.  Ph.D. A. Ivanova)