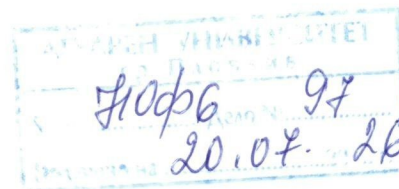


REVIEW



on dissertation for obtaining the educational and scientific degree "Doctor" in: field of higher education 6.0 Agricultural Sciences and Veterinary Medicine, professional field 6.1 Crop science, scientific specialty Viticulture

Author of dissertation:

Hristo Shterev Kozarov, full-time doctoral student at the Department of Viticulture and Fruit Growing at the Agricultural University, Plovdiv.

Dissertation Topic:

Application of organic products and their impact on the growth and reproductive performance of Merlot variety grown under non-irrigated conditions.

Reviewer:

Assoc. Prof. PhD. Lyudmil Todorov Angelov, field of higher education 6.0 Agricultural Sciences and Veterinary Medicine, professional field 6.1 Crop science, scientific specialty Viticulture, appointed as a member of the Scientific Jury by Order RD 16-775/23.06.2026 of the Rector of the Agricultural university – Plovdiv.

1. Brief introduction of the candidate.

Hristo Shterev Kozarov was born on March 29, 1998 in the city of Sliven. He completed his secondary education in the period 2012-2017 at the Specialized - Natural Sciences and Mathematics High School "Dobri Chintulov" in the same city. He obtained a bachelor's degree during his studies at the Agricultural University - Plovdiv from 2017 to 2021 in the specialty Agronomy (Viticulture), completed a master's degree in the master's course in Viticulture with fundamentals of winemaking at the same university. In order to enrich his knowledge in the field of winemaking, he also obtained a master's degree in the master's course in Technology of Wine and High Alcoholic Beverages at the University of Food Technologies - Plovdiv. Hristo Kozarov is distinguished by his active public activity in various spheres of education, for example, during the period 2018-2023 he was the Chairman of the Student Council at the Agricultural University - Plovdiv, Chairman of the General Assembly of the Student Council at the Agricultural University - Plovdiv to the present, from 2019 to 2026 he was the Chairman of the Dormitory Council of the student dormitory "Chaika 3" - Plovdiv, Chief Expert on

Social and Domestic Issues of Students at the Agricultural University - Plovdiv, Member of the Academic Council of the AU-Plovdiv (2018-2023), Member of the General Assembly of the AU-Plovdiv (2018-2026), Member of the Faculty Council of the Faculty of Viticulture (2018-2023), Member of the Central Quality Commission (2018-2023), as well as many others. He is fluent in English and Greek. He was enrolled in full-time doctoral studies with order RD-26.03/09.01.2023 with a term of study until 03.01.2026. He was enrolled with the right to defend his thesis on 29.01.2026 with Protocol No. 2 of the Department of Viticulture and Fruit Growing.

2. Relevance of the problem.

Over last decade, significant changes have occurred in the use of agricultural land. The current period of viticulture development is characterized by a desire to develop modern and competitive production, consistent with new legislation, ownership relations, structures and requirements for the production quality. Since Merlot is one of the most common red wine varieties in typical wine-growing countries around the world, as well as in Bulgaria, it is necessary, due to climate change and the lack of a functioning underground and aboveground irrigation channel network, to conduct research related to water deficit and the stress caused by it. This is accompanied by the testing of new organic products that can play the role of both antitranspirants and prevent water stress in vines, especially under non-irrigated conditions. I believe that the topic is relevant and has been selected correctly and in a timely manner, due to the fact that the problem of producing wine grapes for obtaining high-quality wines is serious in many countries, because over the last decade, seasonal variability has been observed in all wine-growing countries, which makes research related to studying new elements for improving the technology for producing wine grapes and wines extremely important.

3. Aim, objectives and research methods.

The aim of the study is to establish the potential of the organic product "Humat Rost" and its impact on the growth and reproductive manifestations of the Merlot variety, grown under non-irrigated conditions, which is directly related to overcoming stress conditions during the dormant and growing periods. The tasks are clearly formulated and cover several aspects from the reproductive manifestations of the variety to the final product - wine, as follows:

- » Studies on the climatic and soil conditions at the experiment site;
- » Assessment of the metabolic activity of bacterial communities in the soil;
- » Studies in phenology differences;
- » Identification of differences in the indicators characterizing the potential fertility of the vines;
- » Identification of differences in the indicators characterizing the actual fertility of the vines, the intensity of leaf mass photosynthetic activity, the dynamics of grape ripening, changes in the yield and grape quality;
- » Features of grape vinification through physico-chemical analysis;
- » Organoleptic evaluation of experimental wines to identify differences in the organoleptic profile.

The dissertation has the necessary structure, meeting the requirements of the Higher Education Act. The methodological plan is developed in detail, including modern methods of analysis and interpretation of the results obtained. It would serve as a useful reading, both for students and for practice.

4. Visualization and presentation of the results.

The experiment was conducted during the period 2023-2026, in a vineyard located in the land of the town of Kuklen, Kuklen municipality at an altitude of 220 meters. The soils are alluvial-diluvial deposits, and the climate is transitional-continental. Climatic data were taken from the meteorological station located on the territory of the Training and Experimental Field of Viticulture at the Agricultural University - Plovdiv. The vineyard is 15 years old, with an area of 0.2 hectares. The vines were grafted onto Berlandieri x Riparia SO4 rootstock, planted at 3 m inter-row and 1 m intra-row spacing and trained according to the "Double cordon" system, with bud loading being carried out by leaving 6 spurs with 2 buds each or a total of 12 buds per vine.

The experiment was conducted entirely under NON-IRRIGATED conditions.

The product "Humat Rost" was used, which is completely organic, extracted from peat. Its liquid formulation has a rich dark brown color and is a relatively new

development produced in Bulgaria, which refers to the organic substances constituting extracts from peat deposits.

The data statistical processing was performed with Excel program. The SPSS program (IBM, ver. 26) was used to calculate average values, standard deviations and conduct statistical analysis. The homogeneity of the variances was checked using the Levene test. The results are presented as the mean $\pm$ standard deviation, with statistically different groups marked with different letters. The data were collected over three consecutive years, with each year treated as an independent repetition in order to assess annual variability.

To establish statistically significant differences, an analysis of variance (ANOVA) with LSD test for multiple comparisons at a significance level of $p < 0.05$ was applied. To determine statistically significant differences between the variants when applying the "Biologist" method, a one-way analysis of variance (ANOVA) was used with the outcome variable the studied parameter and the factor "variant", and Tukey's test for multiple comparisons was applied at a significance level of $p < 0.05$. For each variant, one biological sample per year was used, with the repetitions being carried out at the Ecoplaque level.

5. Discussion of results and literature used.

Discussion is adequate to the goals and objectives set in the methodology. It was carried out in depth and in a wide scope. The results obtained are presented in 29 tables and 54 figures, well constructed and understandable. All data are processed mathematically, and the chosen approach allows for their good interpretation. The list of literature includes a set of 275 titles, which is evidence of the ability of the doctoral student to become thoroughly familiar with the problem and to process the available scientific information.

6. Contributions of the thesis.

I accept the contributions to the dissertation presented by the doctoral student as follows:

Scientific contributions

A) It was found that the application of a lower dose in the soil treatment of variant V₅ leads to an increase in the functional diversity and metabolic activity of the soil microbial communities, expressed by higher values of the functional indices summarized by statistical analysis (MANOVA).

B) In the treated variants, the absorption of amino acids by the microbial communities was stimulated compared to the control variant V_0 . The higher metabolic activity in V_5 , especially after the 96th hour, indicates a more efficient use of amino acids and suggests an enhanced functional potential of the microbial community.

C) The significant dependencies established between the applied foliar treatments with "Humat Rost", the specificity of the harvest and the organoleptic characteristics of the resulting wines are also original. It has been proven that the tasting assessment varies significantly depending on both - the year of the harvest and the treatment doses used by variants.

Scientific and applied contributions

D) In the root treatment with a dose of 25 kg/da, a higher rate of absorption of "amines" is maintained compared to the other variants, which reveals the specific metabolic reaction of the soil microbiota to the applied treatment.

E) A tendency towards dose dependence in the manifestation of the effect has been proven, as well as the significant influence of climatic conditions on changes in linear growth and maturation of shoots.

F) Practical guidelines have been developed for increasing the buds viability by optimizing the time for sampling and applying organic fertilization, leading to increased resistance to late spring frost and preserving the reproductive potential of the vine.

G) Regression analysis reveals significant dependencies between nutritional regimes, periods of feeding and the formation of reproductive and vegetative organs in the vine.

7. Critical comments and questions.

I have no critical remarks towards the doctoral student, but I would like to ask the following questions:

1) Although the Berlandieri x Riparia SO4 rootstock is the most widely used in viticulture due to its valuable economic qualities, will it be necessary to conduct research with other rootstock combinations in order to confirm the results and the possibilities for wider application?

2) Are there data on the economic efficiency of the product compared to other products based on the same rootstock?

8. Published articles and citations.

In connection with the dissertation work, one scientific article has been published, with the doctoral student as an independent author as follows:

1) Kozarov, H. (2025). Disruptions Caused by Abiotic Factors Affecting Inflorescence Development During the Short Annual Growth Cycle of the Grapevine. Journal of Mountain Agriculture on the Balkans (Vol. 28, Issue 5, pp. 576–601).

No citations were found.

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

CONCLUSION:

On the basis of the different research methods learned and applied by the PhD student, the correctly derived experiments, the made generalizations and conclusions, I consider that the presented dissertation meets the requirements of the FRAADB and the Regulations of the Agricultural university – Plovdiv for its application, which gives me the reason to evaluate it as **POSITIVE**.

I take the liberty of suggesting that the Honourable Scientific Jury also vote **POSITIVE** and award Hristo Shterev Kozarov the educational and scientific degree "Doctor" in the scientific specialty Viticulture.

Date: 19/07/2026
Plovdiv

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