

STANDPOINT

on a dissertation work for obtaining the educational and scientific degree "PhD" by: field of higher education 6. Agricultural sciences and veterinary medicine, professional direction 6.1. Plant-growing, the scientific specialty "Agrochemistry"

Author of the dissertation: Wissam Hassan Hourani, part-time doctoral student at the Department of Agronomy at University of Forestry, Sofia.

Dissertation topic: "New approaches for fertilizing of saffron (*Crocus sativus* L.) in Lebanon"

Member of the scientific jury: Assoc. Prof. PhD Nikolay Minev, Agricultural University - Plovdiv, field of higher education 6. Agricultural sciences and veterinary medicine, professional direction 6.1. Plant-growing, the scientific specialty "Agrochemistry, appointed as a member of the scientific jury by order № № ZPS - 641/5.12.2022 of the Rector of University of Forestry, Sofia.

1. Topicality of the problem.

Saffron is one of the most valuable agricultural and medicinal plants, which for centuries has been cultivated in Iran, India and southern Europe, as the dried red flower lillies of *Crocussativus* L. and used in the pharmaceutical, cosmetic, perfumery and textile industries for dyeing. The issue of replacing illegal crops such as cannabis and poppy in the underdeveloped areas of Lebanon with saffron and thus promoting the socio-economic development of these regions is also topical. With modern technologies for growing crops, including saffron, products stimulating the growth, development, productivity and quality of plants become more and more important. Optimizing saffron nutrition by using new generation fertilizers for the specific soil and climate conditions is a current and poorly researched scientific problem.

The topic and tasks of the dissertation work are current both in scientific and scientific-applied aspects, and the obtained results would significantly support the improvement of the cultivation technology of this important crop for the region.

2. Degree of knowledge of the state of the problem and creative interpretation of the references.

The literature review is detailed and reflects the doctoral student's knowledge of the topic of the dissertation. It is structured in 26 pages, citing 226 literary sources, most of which are after 2010.

3. Aim, tasks, hypotheses and research methods. Correspondence of the chosen research methodology with the set goal and tasks of the dissertation work.

The aim of the dissertation work is to evaluate and optimize the cultivation of saffron under the climatic conditions of Lebanon using SAP (super absorbent polymer) and the nano-fertilizers Seaumic, LITHOvit FORTE, Super plus ZFM++. In order to achieve the set goal, 3 main tasks have been completed - comparing the phenological dates, quantitative and qualitative indicators of saffron between Duma and Mahalat, DNA sequencing on bulb samples to identify the species cultivated in Duma and comparing the phenological dates, quantitative and qualitative indicators of saffron with different tuber weights as affected by the application of nano-fertilizers and SAP alone or in combination. To achieve the set goal, *Crocussativus* saffron bulbs were grown in two locations characterized by different geographical and meteorological conditions: Douma, located in Northern Lebanon, and Mahalat, located in Iran, as the experiments in Douma and Mahalatsa conducted simultaneously. The study was conducted in three phases: the first phase (2019) was to investigate the effect of the climatic conditions of Northern Lebanon (Douma) on the yield and quality of saffron compared to those obtained in Iran (Malahat). The second phase of the experiment was conducted in 2020 to identify the saffron species that are grown in Douma (Northern Lebanon). The third phase (2021) of research is to investigate the effects of different tuber weights, nano and organic fertilizers and the application of SAP on the performance of saffron cultivated in Lebanon. A competent soil and meteorological characterization was made. The main quantitative and qualitative parameters of saffron production have been determined, as well as the foreseen phenological and morphological observations. The doctoral student has successfully mastered and applied modern methods of analysis and appropriate programs for mathematical and statistical processing of the results. The data were processed using the ANOVA method, and the mathematical processing was performed with the SPSS® program.

4. Transparency and presentation of the obtained results.

The dissertation is presented on 127 pages, and the obtained results are presented in excellently illustrated 14 tables and 28 figures. The dissertation is well structured and meets the requirements for a dissertation for the award of the "PhD" and is in accordance with the law and the rules for its application in University of Forestry, Sofia.

5. Discussion of results and used references.

The discussion of the results is done consistently, competently and thoroughly, by interpreting the results in accordance with the modern scientific achievements in this field. In the discussion, the doctoral student skilfully compares, compares and comments on the obtained results. The dissertation shows that the doctoral student can conduct independent experimental work and correctly interpret the obtained data, and the statistical methods used increase the precision when evaluating the results. The attached list of references (226 literature sources) shows that the doctoral student can correctly interpret and use the available information.

6. Contributions of the dissertation work.

Scientific contributions

It was found that the Spanish crocus cultivated in Douma (North Lebanon) was *Crocus oreocreticus* according to DNA research.

Scientific and applied contributions

The climatic and soil conditions in Douma (Northern Lebanon) have been proven to be suitable for saffron cultivation, allowing the production of a sufficient yield of stigma per flower. It was found that nano-fertilizers and Seaumic, applied alone, could improve all quantitative and qualitative characteristics of saffron compared to untreated plants. It was clearly demonstrated that the use of SAP could complement the effect of the tested fertilizers, improving the overall performance of the plant, resulting in higher yield and better quality. The use of the tested fertilizers and SAP in combination can compensate for the smaller size of saffron bulbs, allowing high yield with good quality to be achieved in bulbs of 4-6 g.

7. Critical notes and questions.

The dissertation work is very well developed in terms of structure and scientific value, and I have no significant critical remarks and questions. I believe that in his future developments it would be good to make an economic evaluation regarding the use and effect of nano-fertilizers and SAP applied to saffron.

8. Published articles and citations.

Attached are three scientific publications related to the dissertation work, all of which are in scientific journals with an impact factor. Two of the publications are in print. The doctoral student is the independent author of one of the articles and co-authored one with his tutor. Scientific interest in the subject of the dissertation is reflected in three citations of one of the publications.

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

CONCLUSION:

Based on the various research methods learned and applied by the doctoral student, the correctly performed experiments, the generalizations and conclusions made, I believe that the presented dissertation meets the requirements in accordance with the law and the rules for its application in University of Forestry, Sofia, which gives me reason to evaluate it **POSITIVE.**

Taking into account the extensive experimental material, the originality of the achieved results and the significance of the contributions in the dissertation, I allow myself to propose to the honorable Scientific Jury to also vote positively and award **Wissam Hassan Hourani** the educational and scientific degree "PhD" in the scientific specialty "Agrochemistry".

Date: 08.12.2022

PREPARED THE STANDPOINT

Plovdiv

(Assoc. Prof. PhD Nikolay Minev)

