

**OPINION**

from Prof. Marina Ivanova Stanilova, PhD

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Regarding the awarding of the educational and scientific degree "Doctor", in the field of higher education: 4. Natural sciences, mathematics and informatics, Professional direction 4.3. Biological Sciences, Scientific specialty Botany (01.06.03), to Asya Pavlova Kozhuharova, based on her dissertation work on the topic: "Biotechnological approach to the protection and cultivation of licorice (*Glycyrrhiza glabra* L.), Fabaceae", with scientific supervisor prof. Dr. Marina Stanilova and scientific consultant Prof. Dr. Strahil Berkov.

This opinion was prepared on the basis of Order No. 75/06.10.2023 of the Director of IBER - BAS and according to the rules for scientific juries of doctoral students enrolled before 05.05.2018, according to which the scientific supervisor or scientific consultant is legally included in the scientific jury, if they are habilitated persons, and their opinion has the character of the opinion of the scientific supervisor and is mainly aimed at the qualities demonstrated by the doctoral student in the course of the doctoral studies, without evaluating the nature of the scientific contributions (Art. 9, Item 16 from the Regulations on the terms and conditions for acquiring scientific degrees and for occupying academic positions at IBER - BAS).

This opinion is focused on the qualities demonstrated by the doctoral student, according to the above requirements in cases where the scientific supervisor is a member of the scientific jury. My first impressions of Asya Kozhuharova are from the period March-June 2014, when she came to the Biotechnological Laboratory for Medicinal Plants (BLMP) led by me, as one of six interns, in connection with the first stage of the project "Student Practices" launched by the Ministry of Education and Sciences. Asya very quickly got into the nature of the work in the laboratory and was equally interested in the practical activities, which she diligently performed, as well as in the theoretical statements and the interpretation of the obtained results. I gladly agreed to be the co-supervisor of her master's thesis in the specialty "Medicinal and Aromatic Plants" at the Plovdiv University “Paisii Hilendarski”. All the experimental work related to *in vitro* propagation of valerian was carried out at BLMP, during which time I solidified my impressions concerning her. In 2015, Asya Kozhuharova started working as a biologist in the Applied Botany division and willingly got involved in our

ongoing projects. During her first participation in scientific forums (Seminar of Ecology, 2015 and 2016) she showed imagination and aesthetic sense when creating the posters.

Asya Kojuharova was enrolled in full-time doctoral studies in January 2015, and after the expiration of the three years she was dismissed with the right of defense. In October 2019, she went on maternity leave, which also explains the longer period she needed to write her dissertation. Her scientific interests fully fit into the subject of the RG "Plant biotechnology and *ex situ* conservation of rare, medicinal and aromatic plants", in which she has been working for 9 years: medicinal and aromatic plants, *in vitro* micropropagation, biosynthesis of secondary metabolites, biodiversity, *ex situ* and *in situ* conservation of rare and protected plants. In her work, she is distinguished by precision in the implementation of laboratory activities, responsible attitude to details and motivation to bring the research to the end, looking for an opportunity to apply the obtained results in practice. In recent years, she also gained some experience as a project manager, involving herself enthusiastically in all the opportunities provided by the Young Scientists and Postdoctoral Support Program: the first time she extended her research on the subject of her thesis by an additional cultivation method to obtain *hairy root* culture (2017-2019); the second time, she successfully propagated selected individuals of *Helichrysum italicum* by clonal propagation and created an *ex situ* collection suitable for source material in the eventual introduction of the species into agriculture (2019-2021); and in a current project her experiments are aimed at breeding endangered species of the genus *Swertia* (2022-2024). She enthusiastically learns new methods and establishes contact with scientists in the field of plant biotechnology in Bulgaria and abroad in order to gain from their experience and enrich her knowledge and practical skills. During her short mobility (September 2018) at the Institute of Biology of the Romanian Academy, Bucharest, at the invitation of Dr. Irina Holobiuc, she mastered the method of somatic embryogenesis and the creation of artificial seeds from different plant species. In May 2023, she joined a COST-action under an international project, giving her the opportunity to learn about the cryopreservation method, suitable for long-term storage of valuable plant material, within a week in Spain. The PhD student has published the results of her research on *Glycyrrhiza glabra* in 3 publications, one of them in a journal with an impact factor. She has experience in *in vitro* propagation of other species belonging to different genera and families: *Dianthus* sp. (Caryophyllaceae), *Valeriana officinalis* L. (Valerianaceae), genus *Verbascum* (Scrophulariaceae), *Astragalus physocalyx* (Fabaceae), genus *Narcissus*, *Leucojum aestivum* L. (Amaryllidaceae), *Helichrysum italicum* (Asteraceae), genus *Swertia*

(Gentianaceae). Some of the results obtained with these species have already been published, bringing the total number of her publications to 6, of which 2 in C.R. Acad. Bulgaria Sci. with IF and SJR. She is the first author of all publications and a correspondent of some. To date, she has participated in 10 scientific forums, of which 6 are international, 3 of them abroad, and her participation in 6 of the forums is related to the subject of the dissertation. Also noted were 4 citations to one of the publications, 2 of which were in journals with SJR (Q3). The number of projects in which she has participated so far is 10, of which 8 are externally funded, 3 of which she is the head of, within the framework of the Program for supporting young scientists and postdoctoral fellows: 2 successfully completed and 1 ongoing. Asya Kozhuharova knows how to work in a team and performs the assigned tasks qualitatively and on time.

In addition to the direct research work, A. Kozhuharova also willingly participated in the presentation of scientific activity at IBER to the public: first with an interview on the national radio as an intern in "Student practices" project, then in a broadcast on Bulgarian television ON AIR (03.08.2017) under the title "*In vitro* medicinal plants are propagated at the BAS", with an interview and a demonstration of the propagation of licorice under sterile conditions in the Biotech Lab.

In conclusion, the doctoral student has collected 462 credits under the BAS credit system, which is much more than the required minimum of 250, she works actively on many projects, successfully fitting into the scientific teams during their development, and shows a lasting interest in acquiring new knowledge and skills. Working in the field of plant biotechnology brings her joy and satisfaction, especially with the prospect of applying the obtained results in practice. All this gives me reason to confidently recommend to the respected members of the Scientific Jury to vote positively and to award Asya Pavlova Kozhuharova the Educational and Scientific Degree "Doctor" in the scientific specialty 01.06.03 "Botany" of the professional direction 4.3. Biological Sciences.

Sofia, 20.11.2023

Signature: .....  
(Prof. M. Stanilova)