

73-08-447 / 26.08.21

## OPINION

on materials submitted for participation in a competition for the academic position of "Associate Professor" in a professional field 6.1. Plant growing, scientific specialty "Soil Science", announced by the Forest Research Institute - BAS in SG no. 35/27.04.2021

Candidate for participation in the competition: Chief Assistant Dr. Vanya Georgieva Kachova from the Forest Research Institute at the Bulgarian Academy of Sciences

Prepared the opinion: Assoc. Prof. Dr. Georgi Hinkov Ivanov from the Forest Research Institute at the Bulgarian Academy of Sciences

### 1. Brief biographical data

Vanya Georgieva Kachova was born in the town of Dospat, Smolyan region. She graduated from the Polytechnic High School in Vidin. Studied at Sofia University, majoring in Analytical and Organic Chemistry, and graduated with a master's degree. For about 3 years she worked at the Institute of Plant Physiology at the Bulgarian Academy of Sciences as a specialist biologist. For several months she was a teacher and technical manager of a training workshop at the "Assen Zlatarov" Chemical Technical School in Vidin. Since 1996 she has been working at the Forest Research Institute at the Bulgarian Academy of Sciences as a chemist in the Forest Soil Science Laboratory. From the beginning of 1999 she started working as a research associate at the same institute and was enrolled as a PhD student. She defended her PhD Thesis in 2006 on "Heavy metals in soils from urbanized oak ecosystems in the Sofia region". Since 2007 she has been Chief Ass. at the "Forest Soil Science Laboratory", "Forest Ecology Department" at the Forest Research Institute. In 2013 she moved to the Department "Forest Genetics, Physiology and Cultures".

### 2. Compliance of the submitted documents and materials of the applicant with the minimum requirements, according to the Regulations for acquiring scientific degrees and holding academic positions at the Forest Research Institute - BAS

The submitted documents and materials of Chief Ass. Dr. Vanya Kachova meet the minimum requirements according to the Regulations for acquiring scientific degrees and holding academic positions at the Forest Research Institute at the Bulgarian Academy of Sciences. The total number of points achieved by the candidate is 1063.5 with a minimum number of 500 points.

### 3. General description of the submitted materials

A total of 27 articles were presented, of which 1 in press ( $\Gamma 7.9$ ), according to the following groups of indicators:

Category A - 50 points;

Category Б - none (without monograph);

Category B4 - 10 publications, 240 points (50 points minimum), which are in referenced and indexed editions, selected by Ch. Ass. Vanya Kachova as the equivalent of a monograph;

Category  $\Gamma 7$  - 9 publications in refereed and indexed editions (207.5 points);

Category  $\Gamma 8$  - 8 publications in non-referenced editions (32 points);

Total  $\Gamma 7 + \Gamma 8 = 239.5$  points (200 points minimum).

The articles have been published in refereed (Scopus and Web Science - 13 issues) and indexed publications (10 issues) in the following scientific journals:

- 3 each in Ecologia Balcanica and BJSS;

- 2 each in Forest Science, Silva Balcanica, Balkan Ecology;

- one publication in the Journal of Geochemical Exploration, Agricultural Science and Technology, BJAS, Procedia Environmental Sciences, Šumarski list.

The articles in non-refereed editions (in conference proceedings and non-refereed journals) are 8 in number.

#### **4. Main directions in the research work of the candidate and the most important scientific and scientific-applied contributions**

In the current competition for "Associate Professor" are presented 27 scientific publications that address issues related to the study of some basic characteristics of forest soils - mechanical, chemical and biological characteristics. Studies of soils affected by anthropogenic activity (urbanized and man-made from industrial and mining areas, mainly heavy metal pollution) have been carried out. Fertilizers and improvers to improve soil quality have been studied. Studies of woody vegetation as an opportunity to reduce soil contamination with heavy metals have been carried out. Some problems have been addressed of the Agroforestry as a method for improving soil condition.

##### ***More important scientific and scientific-applied contributions:***

A general physical and chemical characteristic of anthropogenic and natural soils from the region of Sandanski has been made. The soils of the city park show the characteristic features of the urbanized soils. They have a higher pH and high spatial variability in the accumulation of organic carbon in the surface layer of the soil compared to the lower layer. The organic matter is humified to a lower degree than the controls (Γ 8.2).

A general characteristic of cinnamon forest soils from Lozen Mountain formed under Turkey oak (*Quercus cerris*) and under meadow vegetation was studied. The type of land use affects the accumulation and transformation of organic matter. A higher content of organic C was found in the soils under meadow vegetation, compared to those under Turkey oak (Γ 8.4).

Studies have been made on the sorption properties of forest soils under beech plantations from the Central Balkan and Osogovo (Γ 7.4) and soils in the Sofia region - urbanized, natural and man-made (D 8.3). In urban soils, alkalization of the surface horizons is observed, while in mountain soils acidification in the surface part of the profile is reported. It is assumed that this is a diagnostic feature of soils from urban and forest areas.

An assessment of the condition of soils under black pine (*Pinus nigra*) was performed after the biological reclamation of soles by MK "Kremikovtsi" near the village of Lokorsko. As a result of afforestation, a soil formation process has begun. The formed soil has a slightly acidic reaction on the surface. It is saturated and relatively well stocked with organic matter (Γ 7.1).

In the study of soles in Pernik under afforestation of three different tree species: black pine (*Pinus nigra*), white birch (*Betula alba*) and Pennsylvania ash (*Fraxinus pennsylvanica*) it was found that the processes of humus formation and humus accumulation are differentiated under different tree species. The largest amount of organic C accumulates under *Fr. pennsylvanica* (Γ 7.9).

Physical and chemical properties of soils and substrates, natural and recultivated from the Pernik coal mining region, have been studied. The appearance of elementary processes of soil formation related to the formation and accumulation of humus mainly in the surface layers has been established. The high degree of saturation with bases and the predominance of exchanged calcium determine the favorable physico-chemical status of the reclaimed soles (Γ 8.8).

Two soil groups have been identified in the Alluvial Fluvisols from the islands of Aydemir and Vetren on the Danube river. The first are newly formed soils from the periphery of the islands, which are closest to the river waters. They are characterized by a lighter mechanical composition, lower participation of the clay fraction in the soil texture, lower content of organic carbon, with fulvate type of humus. The second type are the soils from the interior of the islands, in which the soil

formation process is more advanced, has a heavier mechanical composition, is characterized by a greater amount of humus. The common thing about the soils on the islands is that in the composition of the humus the fulvic acids prevail over the humic acids. The soils there are characterized by instability and greater lability of organic matter (Γ 7.8).

A container experiment was carried out with sowing of red oak (*Quercus rubra*) acorns in two variants: control - sole soil from MK "Kremikovtzi" and second variant - mixture of soil and sediment (1:6) from the vacuum filter of the treatment plant, wastewater station of the pulp and processing enterprise "Kostenets". In the second variant, red oak seedlings increase by more than 30% in height and 17% in thickness compared to the control, with the total biomass increasing by more than 50%. This is due to the improved characteristics of the environment - the improved water regime, the microbiological activity, the higher amount of C and N and the better water retention capacity of the sludge. (Γ 8.1).

The use of organic fertilizers "Siapton" and "Biohumus" is favorable for the growth of seedlings of Norway maple (*Acer platanoides*). Seedlings grow significantly better than the control (unfertilized seedlings). The composition of humus also improves with the use of organic fertilizers. It was recommended to use these fertilizers in the cultivation of Norway maple seedlings for the needs of forestry and urban landscaping (Γ 7.6).

An assessment of the condition of 30-year-old black pine forest plantation (*Pinus nigra*) was made after conducting biological reclamation of soles by Kremikovtzi. It has been established that the black pine grows well and sustainably, and it is recommended to create forest crops of this tree species during the afforestation of this type of technogenic polluted terrains (Γ 7.1).

## **5. Reflection of the candidate's scientific publications in the literature**

Chief As. Vanya Kachova pointed out a total of 21 citations, of which 14 are in scientific journals, referenced and indexed in world-famous databases. Six issues are in monographs and collective volumes with scientific review and in non-peer-reviewed journals with scientific review. One citation was found in a dissertation.

The 14 citations in referenced and indexed in world-famous databases (WoS and SCOPUS) are from six publications with leading author Vanya Kachova (Doichinova). They are cited in the following scientific journals in the relevant quarters of the SJR (Scimago Journal Rank):

Q1 - Pedosphere, Geoderma, Chemosphere, Environmental Science and Pollution Research, Ecotoxicology and Environmental Safety, Science of the Total Environment;

Q2 - Pedosphere, Environmental Science and Pollution Research, Plant, Soil and Environment;

Q4 - Ecologia Balkanica (3 citations).

Two citations were found in the journals Acta Biologica Marisiensis, Bulgarian Journal of Soil science.

The analysis of these 14 citations shows that they are completely sufficient to meet the requirements for "associate professor". Moreover, the citations presented are in 6 leading scientific journals in the field of Soil Science, Environment and Pollution.

## **6. Participation in research projects**

Chief Ass. Vanya Kachova has identified a total of 8 projects with her participation. He is the manager of 4 projects, three of which are from the internal subsidy to the Forest Research Institute at BAS. One of them is the bilateral cooperation of BAS with the Romanian Academy of Sciences (RAS). Vanya Kachova is a participant in a project funded by the National Research Fund at the

Ministry of Education and Science. He is a participant in 3 international projects, 2 of which are under COST programs and one bilateral of BAS with RAS.

#### **7. Teaching and learning activities (supervisor / advisor of PhD students, training of students, etc.)**

Chief Ass. Vanya Kachova gave lectures on the Erasmus program in Spain (2015):

- a) Agroforestry in Bulgaria, past and perspectives;
- b) Soil resources in Bulgaria and Sustainable management.

#### **8. Assessment of the personal contribution of the candidate**

In the specified list of 27 publications for the competition, the personal contribution of Chief Ass. Vanya Kachova is very high. In 22 articles she is a leading or first author, in two she is a second author and in three publications she is a third or next author. The assessment is similar in the previous articles before the competition for "associate professor", as well as in the other unrepresented articles in the current competition. Vanya Kachova is a scientist who is distinguished by individualism, leadership position and opportunities to work both independently and in a research team. The publications where she is the first author have been her main personal contribution and leading role in research.

#### **9. Critical remarks and recommendations**

My main critical remarks are on the "Habilitation Extended Reference of Scientific Contributions". The reference contains a number of spelling errors and technical inaccuracies. I would venture to recommend that such important documents be carefully designed, with contributions that are shorter and more accurate.

Along with the other minor technical omissions found, I would not like to belittle in the least the huge work that is reflected in the publications and citations of Chief Ass. Vanya Kachova.

#### **10. Personal impressions**

I know Vanya Kachova since 1996, when she started working as a "chemist" in the laboratory "Forest Soil Science" at the Forest Research Institute. Later she went to work in the section "Forest Ecology" as a research assistant and started her PhD Thesis, which she successfully defended in 2006. Joint assignments with Chief Ass. Vanya Kachova we have after her transfer to the Department "Forest Genetics, Physiology and Cultures" in the period 2014 to 2021. In 2015 she won a project on international bilateral cooperation of BAS and the Romanian Academy of Sciences on agroforestry. At the same time, we participated together in the application of several major research projects on "INTEREG" with the Romanian Forestry Institute ICAS, which were not approved in the last stage of ranking. In 2019, Chief Ass. Vanya Kachova was included in the team of a new international project between BAS and RAS with supervisor Assoc. Prof. Georgi Hinkov. Together we have several joint scientific publications, one of which is with Impact Factor in the scientific journal "Agroforestry Systems", where she the lead author.

I know Chief Ass. Vanya Kachova as an extremely hardworking and dedicated researcher, ambitious and looking for new solutions, with consistent ideas for the beginning and the end of the specific scientific task. She is a proven scientist with numerous publications in international and national journals. She is not afraid to change her professional interests and look for innovations in the field of scientific knowledge. Fighting and ready to tackle various scientific topics, starting from chemistry, going through forest soil science and reaching agroforestry and forest ecology. Participation in the Soil Science competition is a real recognition of her abilities in the field of Science.

## **11. Conclusion**

On the basis of the analysis of the scientific and scientific and applied activity of Chief Assistant Dr. Vanya Georgieva Kachova, I am on the opinion that she meets the requirements of the Law on Academic Growth, the Regulations of the Bulgarian Academy of Sciences and the Regulations of the Forest Research Institute.

The presented works are up-to-date, with scientific contributions cited in scientific publications. I suggest Chief Assistant Dr. Vanya Georgieva Kachova, to be elected as "Associate Professor" in the professional field 6.1. "Plant growing", scientific specialty "Soil Science".

I will vote YES for her selection in the competition for "Associate Professor" at the Forest Research Institute at BAS.

Date 14.08.2021.

Prepared the opinion:

(Assoc. Prof. Georgi Hinkov Ivanov)