



## OPINION

on the materials submitted for participation in a competition for „Associate Professor“ in the field 6. Agricultural sciences and veterinary medicine, in professional direction 6.5. Forestry, scientific specialty „Forest Melioration, Forest Protection and Special Forest Uses“ in the discipline „Soil science with bases fertilization“

In the competition for Associate Professor, published in the Darzhaven vestnik № 28/01.04.2025 and on the site of the University of Forestry with the code FOR-AsP-0325-162 for the needs of the Department of Forestry at the Faculty of Forestry, as a candidate participate D-r Kamelia Georgieva Petrova, Senior Assistant Professor, Faculty of Forestry, Department of Forestry, University of Forestry.

**Prepared the opinion:** Danail Dimitrov Doychev, Ph.D., Professor in a professional direction 6.5. Forestry, University of Forestry, Sofia

### 1. Brief biographical data for the candidate

Kamelia Georgieva Petrova was born in 1987. She received her higher education at the University of Forestry, Sofia – as a bachelor (in 2011) and master (2013) in "Forestry". In 2020, she received the educational and qualification degree "doctor" at the same university in the scientific specialty of the current competition with PhD thesis „Updating the classification of soils from the territory of the Petrohan Training and Experimental Forest Range“.

Her career as a lecturer in higher education began in 2016 in the Department of Soil Science of the University of Forestry as an assistant professor in the discipline of Forest Soil Science. Since 2020, she has been a chief assistant professor in the same department, which since 2023 has become part of the Department of Forestry at the Faculty of Forestry.

### 2. Compliance of the submitted documents and materials of the applicant with those required under the Regulations for Development of Academic Staff at the University of Forestry (RDASUF)

The materials presented by the candidate reflect the fulfillment of the minimum national requirements for the occupation of academic position “Associate Professor” according to the following groups of indicators:

- Group of indicators **A**: According to this indicator, the minimum national requirements include only the presence of a successfully defended PhD thesis. The candidate fulfills this requirement in 2020.
- Group of indicators **B**: The requirement is for 100 points, with K. Petrova presenting 10 publications from bulgarian scientific journals that are referenced and indexed in world-renowned databases with scientific information. These publications replace a habilitation work and for them the candidate receives a total of 202 points.
- Group of indicators **C**: 200 points are required, and K. Petrova reports 212 points obtained from articles and reports in scientific forum proceedings, refereed and indexed in world-renowned scientific information databases.
- Group of indicators **D**: Only 50 points are required for this indicator, and 6 citations submitted by the candidate to three of his publications carry a total of 90 points.

### **3. Assessment of the applicant's educational activities**

Chief Assist. Prof. K. Petrova has been teaching at University of Forestry for 9 years, with full implementation of her annual academic employment during the last five years. She conducted lectures on the discipline „Soil science with bases fertilization“ with students majoring in Landscape Architecture, 1st year, full-time study, Master's degree in the last three academic years. Kamelia Petrova has also been the head of teaching practices in the same discipline from 2021 to the present.

The candidate's educational and teaching activities also include his work with graduates. She was the graduate supervisor of one successfully defended student and also reviewed a total of two diploma theses of Bachelors students in Forestry.

### **4. Assessment of the applicant's scientific, applied and publication activities**

#### **4.1. Participation in scientific, applied science, infrastructure and educational projects**

According to the Regulations for the Development of the Academic Staff of University of Forestry, in which the minimum national requirements from the Regulations for the Implementation of the Law on the Development of the Academic Staff in the Republic of Bulgaria are applied without further amendments, for the occupation of the academic position "Associate Professor" in area 6. Agricultural Sciences and veterinary medicine does not require explicit participation in scientific, scientific-applied or educational projects. Probably, because of this, the applicant did not include data on such in table 2. (Correspondence of the applicant's points with the minimum national requirements). However, additionally, information is presented about the participation of D-r K. Petrova in 12 scientific projects and also an educational project since 2018.

#### **4.2. Characteristics of published scientific results**

The scientific works of chief assistant professor Petrova are classified as follows:

Instead of a thesis, 10 journal publications are presented that are referenced in Web of Science or Scopus and six of these publications have an impact rank (SJR).

Of the remaining 17 publications, also referenced in the above-mentioned world-renowned databases of scientific information, 14 are in scientific journals, which, with the exception of one (Edelweiss Applied Science and Technology), are published in Bulgaria.

Other three papers are from international scientific forums, published in their proceedings, also referenced in Scopus or CABI.

Among the Kamelia Petrova's twenty-seven scientific papers, two are independent, in six she has one co-author, and in the remaining 19 her co-authors are two or more. Two of the publications are in Bulgarian, and the rest are in English.

One of the presented publications is still in print.

#### **4.3. Reflection of the applicant's scientific activity in the literature (citations)**

Chief Assist. Prof. K. Petrova participated in the competition with a total of 6 citations of 3 scientific publications.

These citations were reported in scientific publications referenced in world-renowned databases of scientific information and four of them are also in journals with an impact factor, although this is not explicitly noted by the candidate.



Full-text copies of the relevant publications have not been submitted as evidence for the citations (in the electronic media of the competition materials), but they can still be found online.

#### **4.4. Contributions in the applicant's work (scientific, applied)**

The **scientific and applied contributions** from the publications of Dr. Petrova are formulated according to the following main directions, topics and results:

### **I. Scientific contributions**

#### **I. 1. Classification of forest soils in Bulgaria**

- Soils on the territory of Strandzha Mt. were studied and classified by applying the diagnostic criteria of WRB (2006, 2007). At the first taxonomic level, these soils were classified as Lixisols and Acrisols in areas that, according to the national classification of soils in Bulgaria, are occupied by Yellow Earth-Podzolic soils and Cinnamon Forest soils. At the second taxonomic level, a prefix qualifier haplic and a suffix qualifier – hypereutric were applied to Lixisols. A prefix qualifier haplic was applied to Acrisols. A faster transformation of organic matter was established in soils formed under the influence of eastern beech stands compared to *Quercus frannetto* and *Q. petraea* forests.
- Brown forest soils from the territory of Western Stara Planina Mts. were studied, with the aim of studying basic soil parameters and classification. These soils are characterized by a shallow surface A horizon and a deeper Bw horizon. Low pH values were found, which are the result of the leaching of basic cations in the profile, organic acids washed from the soil surface, and acidic basic rocks. The results of the study show that the majority of the soil profiles are classified as unsaturated with bases (Dystric Cambisols). They are developed on more acidic silicate rocks, higher altitudes and are accordingly formed in the conditions of a colder and wetter climate on the territory of Western Stara Planina Mts.

#### **I. 2. The relationships between forest soils, forest stands and forest landscapes**

- For the first time in Bulgaria, the initial stage of the podzolization process, occurring in brown forest soils in a common beech plantation on the territory of the Petrohan Training and Experimental Forest Range, has been studied and proven.
- Basic soil parameters of Cambisols class soils on the territory of Pirin, Vitosha and Stara Planina Mts. were studied in order to establish correlations with the proven growth depression of spruce stands. It was found that in soils with a very strong acidic reaction, the trees have a more pronounced growth depression, expressed in reduced radial growth and formation of narrow annual rings. No correlations were established with the amount of humus or the nitrogen content in the soil. All studied soils are unsaturated with bases, which can also be considered as a prerequisite for unbalanced nutrition of woody vegetation, which can lead to growth depression in combination with other environmental factors. In some of the sample areas, the surface horizons are overmoistened. Based on this, it can be assumed that in these cases of the studied spruce stands, one of the main reasons leading to permanent growth depression may also be the overmoistening of the soil, which leads to reduction processes and the death of the fine roots located in the 30 cm soil layer.
- The main components of the forest landscape, such as the diversity of soil-forming rocks and the morphometric characteristics of the relief on the territory of the Pirin National Park, have

been studied in relation to the soil health of the Cambisols class. It has been established that the resulting homogeneous territorial units have a fragmented horizontal structure.

## **II. Scientific and applied contributions**

### **II. 1. Microbiological studies of forest soils**

- An approach is proposed for studying data obtained in relation to the study of interrelationships in the system "soil - soil microorganisms - tree composition", using GIS. Territorial units on the territory of the Vitosha Nature Park have been distinguished, in which soils, microorganisms and basic taxonomic parameters of forest stands have been studied. Conclusions have been drawn regarding the peculiarities of the methodology used in the GIS environment for selecting suitable sites for conducting field studies.
- For the first time, detailed microbiological studies of Cambisols soils on the territory of Vitosha Natural Park have been conducted. For the purpose of the analyses, a correlation between environmental factors on soil biogenicity was calculated. A strong correlation was established between changes in altitude and the microbial abundance of the studied soils.
- An innovative study was conducted on the catalase activity of microorganisms that develop in MGP and soils on the territory of Vitosha Natural Park. New and original data were obtained on a strong positive correlation between catalase activity and microbial biomass carbon. It was found that this relationship is more pronounced in deciduous forests compared to coniferous ones.
- Basic microbiological indicators of soils in Norway spruce stands, in which a permanent growth depression was established by dendrochronological analysis, were studied. Based on the results obtained, it can be said that the growth depression of these forests directly affects the normal (standard) distribution of a large part of the soil microbial groups. An atypical distribution of actinomycetes was established in some of the studied soil profiles.

### **II. 2. Erosion processes in different forest soils**

- For the first time, an assessment of the C-factor values for the potential risk of erosion processes on the territory of the Petrohan Training and Experimental Forest Range serve has been prepared. The results obtained on the protective role of the vegetation cover in relation to the soil allow the amount of eroded soil and the real risk of planar erosion in the studied territory to be established.
- For the first time, an IntEro model has been applied to the territory of the Vitosha Natural Park to study the risk of erosion processes for the Vladayska River watershed. It has been established that the studied territory belongs to category IV – a zone with weak erosion. As a result of applying the model, despite the fact that the area has weak erosion, the presence of surface (area) erosion has been established. The amount of eroded soil in the studied part of the watershed is  $W_{god} = 7539.89 \text{ m}^3 \text{ y}^{-1}$ , but the actual soil losses are  $G_{god} = 2761.75 \text{ m}^3 \text{ y}^{-1}$ . When studying some characteristics of the watershed, it was established that during intense rainfall, the shape of the watershed allows the formation of a high wave, which can lead to significant damage.

### **II. 3. Wood litter research**



- An assessment of the chemical composition of the different fractions (leaf mass, wood and reproductive organs and seeds) of the wood litter was prepared. The chemical composition of the soil solution for the permanent sample area in Vitinya was also studied and assessed, within the framework of the Intensive Ecological Monitoring of Forest Ecosystems in Bulgaria. It was found that the amounts of manganese in the leaf mass and that of cadmium in the reproductive organs and seeds exceeded the maximum values specified in the ICP Forests manual, 2020.
- The main parameters of the aboveground mass of wood litter by fractions were studied for the period from 2010 to 2019. The content of essential nutrients in the individual fractions for 2019 was also determined and assessed. The results obtained show high concentrations of Ca, Mg and P in the leaf mass fraction. The chemical composition of the lysimeter waters from the Yundola station was assessed, and a weak removal of basic cations into the soil depth was established. In addition, the main groups of microorganisms in the MGP and soil horizons were studied, with non-spore-forming bacteria dominating in the MGP and A horizon. For actinomycetes, it was established that their quantity increases significantly with increasing soil depth.

#### **II. 4. Content of chemical elements in different forest soils**

- A study of the main parameters of peat soils was conducted for the territory of the "Torfeno Branishte" reserve. The stock of organic carbon was calculated and assessed. The results show that its values depend directly on the bulk density of the samples taken for analysis.
- The concentrations of Fe, Mn, Zn, Pb, Cu and Cd in forest soils from the Western Stara Planina Mountains have been studied and evaluated. A direct correlation of pH<sub>H2O</sub> values with the ongoing processes of accumulation or migration of heavy metals in soil profiles in the A horizon has been established. Clear correlations have been proven between the content of copper, pH<sub>H2O</sub> and the amount of humus in the surface horizon. The concentration of cadmium in the studied soils has been found to exceed the background and safety concentrations for cadmium in Bulgarian soils.
- The content of heavy metals on the territory of the Petrohan Training and Experimental Forest Range was studied and assessed. It was found that in the studied Cambisols, intensive migration processes occur with respect to the content of manganese in the soil, as a result of the strongly acidic reaction of the soil solution.
- The concentrations of Pb, Cu, Zn, Mn, Cd were determined in forest soils with different land uses, which were used in the past for gold mining. It was found that as a result of mining, the concentrations of lead, zinc and cadmium exceed the MAC in individual sites.

#### **5. Forest soils as a medium for the development of economically important underground fungi**

- For the first time, basic soil parameters that have a direct relationship with the growth and development of the fruiting bodies of the common black summer truffle (*Tuber aestivum* Vittad.) have been studied on the territory of Western Bulgaria. An assessment of soil parameters in localities with different stocks of the fungus has been carried out.

#### **II. 6. Soil fertility assessment**

- Basic soil parameters directly related to soil fertility in the Botevgrad Basin were determined. Geostatistical interpolation between basic nutrients in the soil solution was

performed using inverse distance weighting (IDW maps). The results show relatively low values for the studied macronutrients.

- For the first time, the soil fertility of Acrisols on the territory of the Petrohan Training and Experimental Forest Range has been assessed by applying a classification system developed for soils in forest areas, according to which the following 4 indicators were used - soil depth, organic carbon stock, total nitrogen stock and active moisture capacity. Based on the results obtained, it was established that Acrisols are characterized as low to medium fertile. It was established that the good growth of tree species that develop on these soils does not correspond to the estimates of their soil fertility.

## **5. Assessment of the applicant's personal contribution**

I can have no doubts about the participation and personal contribution of Chief Assist. Prof. K. Petrova in the development of the presented scientific production, which is the result of many years of targeted research in the field of forest soil science.

## **6. Critical notes and recommendations**

- I have no comments, except for the recommendation that the candidate publish his results in more foreign scientific journals, including those with an impact factor.

## **7. Personal impressions**

I have known Senior Assistant Professor K. Petrova since she was a student (2008), and later as a graduate student in our department. From the scientific output presented, as well as from our joint work in scientific projects, I have the impression of an ambitious and diligent researcher with teamwork skills.

## **8. Conclusion**

Based on a comprehensive assessment of the qualities and the results presented by the applicant I PROPOSE the applicant D-r Kamelia Petrova to take the academic position of "Associate Professor" in the discipline "**Soil science with bases fertilization**" in the professional direction 6.5. "Forestry" and scientific specialty "Forest Melioration, Forest Protection and Special Forest Uses".

August 11, 2025

Author of the statement:

/Prof. D. Doychev/