REVIEW

on the materials for participation in a competition for the academic position "Associate Professor", field of higher education 4. "Natural Sciences, Mathematics and Informatics", professional field 4.4. "Earth Sciences", scientific specialty "Ecology and Ecosystem Protection", in the discipline "Ecology", announced by the University of Forestry in SG no. 4/15.01.2021/15.1.2021, procedure code ELA-AsP-0121-52.

Candidates for participation in the competition are:

1. **Chief Assistant Dr. Ralitsa Todorova Kuzmanova**

Reviewer: Assoc. Prof. Dr. Petar Gospodinov Petrov on NS 4.4 "Earth Sciences", from the University of Forestry, Sofia

1. **Brief biographical data about the candidate**

Ch. Assistant Professor Dr. Ralitsa Todorova Kuzmanova was born on June 4, 1974. She graduated from the Sofia Mathematical High School with advanced study of English, biology and chemistry. In 1992-1997 she was a student at the University of Forestry (UF), majoring in "Ecology and Environmental Protection". In 1997 she graduated with a Master's degree, with the classification "Engineer of Ecology, Protection and Restoration of the Environment." During her studies at the Master's degree, she acquired the professional qualification of "Teacher" in Engineering Pedagogy. In 2015 she defended her doctoral dissertation on "Phenological studies on common beech (*Fagus sylvatica L.*) in the area of SHF "Vitinya" and TEF "Petrohan". From 1999 until now he has been successively assistant, senior assistant and chief assistant.

From the presented CV it can be seen that the candidate has good computer literacy, including good knowledge of statistical software SPSS, basic skills in AutoCAD and GRASS GIS. Fluent in English and Russian.

She was responsible for the educational mobility activities "Erasmus +" related to the specialty "Ecology and Environmental Protection" of the Faculty of "Ecology and Landscape Architecture" at the University of Forestry, mentor of the first year specialty "Ecology and Environmental Protection" of Faculty of "Ecology and Landscape Architecture" at the University of Forestry, reviewer of an article in the journal Forestry Ideas by foreign authors. She is a member of the expert group on Meteorology, Phenology and Leaf Surface Index

(Meteorology, Phenology & LAI) at the ICP Forests (International Cooperative Forest Program).

She is a member of the Management Board of the Association "Ecological Monitoring of Forests" – EcoMonFor.

2. Conformity of the submitted documents and materials of the candidate with the required ones according to the Regulations for DAS in UF

The documents submitted by Ch. Assistant Professor Dr. Ralitsa Kuzmanova, the only candidate, meet the requirements of the Rules of DAS in UF. The materials are in accordance with the requirements of Art. 60 of the ASDA (Academic Staff Development Act) in the Republic of Bulgaria and the Regulations for its application. The documents are in accordance with the Regulations for the conditions and the order for acquiring scientific degrees and for holding academic positions at the University of Forestry in Natural Sciences. "4. Earth Sciences". According to the minimum required points for Natural Sciences 4.4 "Earth Sciences", the reference and assessment of conformity by indicators is as follows:

1. Indicator A - Dissertation for the award of educational and scientific degree "Doctor". A copy of the diploma for Educational and Scientific Degree "Doctor" is presented. The required 50 points have been met.
2. Indicator B.3 – A monograph with a volume of 156 pages is presented. The required 100 points have been met.
3. Indicator Г.7. - Articles and reports published in scientific editions, referenced and indexed in world-famous databases with scientific information - 8 issues.
4. Indicator Г.8. - Scientific publication in unreferred journals with scientific review or in edited collective volumes - 10 issues.

   Total Г7 + Г8 required 200 points, met are 357.2 points.

   Copies of publications and abstracts are presented.
5. Indicator Д.10 - Citations or reviews in scientific journals, referenced and indexed in world-famous databases with scientific information or in monographs and collective volumes - 11 issues.
6. Indicator Д.11 - Citations in the monographs and collective volumes with scientific review - 6 issues.

7. Indicator Д.12 - Citations or reviews in non-peer-reviewed journals with scientific review - 1 issue.

From the use of 50 points, 80 points are fulfilled.

A list of citations by individual indicators is presented.

Outside the reference to the minimum required points in Group indicators of academic positions "associate professor", are presented and: Three separate research papers in relation to developing a dissertation that are not reviewed, a cry for participation in international conferences with published abstracts in Romania and Turkey and a poster from an international conference in Bulgaria. In the Reference is published in co-authorship university textbook.

Also presented are: List of scientific and scientific-applied projects in the field of the competition, financed by SRS (Scientific research sector) of UF - 8 issues; International scientific-applied project - 1 piece; Graduates for whom she is a reviewer - 3 pieces and 10 documents, for additional qualification (courses and trainings) in the field of the competition.

All submitted additional materials are in the direction in which the applicant works and in which the present procedure is announced.

3. Assessment of the teaching activity of the candidate

Ch. Assistant Professor Dr. Ralitsa Kuzmanova gives lectures and exercises in full-time and part-time form of Bachelor's degree in the discipline "Ecology" of the specialty "Ecology and Environmental Protection" (EEP) (lectures 60 hours, exercises 60 hours and practice 12 hours), on a Bachelor's degree in the discipline "Ecology, Protection and Restoration of the Environment" (EPRE) of the specialty "Forestry" (lectures 14 hours and exercises 30 hours) and in the master's degree in discipline "Biodiversity Conservation and Ecological Network", module "Phytodiversity" of the specialty EEP. She has worked on updating the curricula for students in the discipline "Ecology" for Bachelor's degree, specialty EEP and discipline "Conservation of Biological Diversity and Ecological Network" for Master's Degree, specialty EEP and "Ecology and Environmental Protection" for Bachelor's Degree for specialty "Forestry".

Chief Assistant Dr. R. Kuzmanova is a teacher who organizes and manages the learning process at the required professional level.

4. Evaluation of the scientific, scientific-applied and publishing activity of the candidate

4.1 Participation in scientific, scientific-applied and educational projects

For the period 2008 - 2020, Chief Assistant Professor Dr. Ralitsa Kuzmanova has participated in 12 projects. On 3 of them, related to phenological observations in various objects and monitoring of protected natural areas, is a scientific supervisor. Since 2008 she has been a member of a working team in the International Cooperative Program "Assessment and Monitoring of the Impact of Atmospheric Air on Forest Ecosystems" (Monitoring of the Condition of Forest Ecosystems), in which more than 30 countries participate. She also participates in 5 projects funded by SRS of UF, 1 infrastructural project "Building a research laboratory in Ecology", a project "Student Internships" of the Operational Program "Human Resources Development", co-financed by the European Social Fund as an academic mentor and in the educational project "Update of the curricula for the specialties in the Faculty of "Ecology and Landscape Architecture".

Since 1998 so far she has participated in: Discussion of the project "National Action Plan for Biodiversity Conservation", organized by the Ministry of Environment and Water (MEW); Sixth International Conference "Natural Resources Protection and Environmental Management, Romania; First European Symposium: "Research, Conservation and Management of Biodiversity in European Coastal Zones", Bulgaria; Expert Panels on "Biodiversity and Vegetation, Meteorology, Phenology and Leaf Surface Analysis", Slovakia; Eighth Scientific Conference "Trends and Phenomena - Drying, Extreme Climate and Air Pollution in European Forests", Turkey.

4.2 Characteristics of publishing scientific results

In the presented Reference for the scientific and publishing activity, it can be seen that Ch. Assistant Professor Dr. Ralitsa Kuzmanova is the sole author of the monograph "Phenological studies of common beech (*Fagus sylvatica L.*). The content includes results from phenological observations conducted during the period 2008 - 2019 on common beech (*Fagus sulvatica L.*). Established relationships between phenological phases and some abiotic environmental factors are indicated. It is also indicated the results of the application of phenological models for forecasting the development common beech and the possibilities for using satellite images to

assess the phenological development of beech plantations in the region of Vitina, Petrohan and Vitosha (3.1).

Individual publications are 58% (3.1, Г.7.2, Г.7.4, Г.7.5, Г.7.8, Г.8.1, Г.8.2, Г.8.3, Г.8.4, Г.8.7, Г.8.9). She is in first place in 26% of publications (Г.7.3, Г.7.6, Г.7.7, Г.8.8, Г.8.10), in the remaining - 21% she is in third and subsequent place (Г.7.1, Г.8.5, Г.8.6). In referenced and indexed journals in world-famous databases with scientific information are 44% of the publication (Г.7.1,Г.7.2, Г.7.3,Г.7.4, Г.7.5, Г.7.6, Г.7.7, Г.7.8) and in edited collective volumes are 56% (from Г.8.1 to Г.8.10).

The main directions of the scientific works presented for participation in the competition by Ch. Assistant Doctor Ralitsa Kuzmanova are:

- Observations on the development and duration of the main life processes in the phenological development of common beech; identification of the main factors that are important for the beginning and end of the phenological phases; application of phenological models for predicting the development of common beech. (B3, Г.7.8; Г8.1; Г8.2; Г8.4; Г8.7)
- Research on the content of some more important macro- and microelements in the leaves/conifers of tree species and establishment of regional values (Г7.1, Г7.6, Г8.6).
- Assessment of the representativeness of the landscapes and the types of natural habitats from the ecological network Natura 2000 in the sample areas for large-scale monitoring of the forest ecosystems. (Г8.8; Г8.9; Г8.10).
- Assessment of the current state and of the forecasted anthropogenic impacts on landscapes, ecosystems and protected areas under the Habitats Directive in a certain area. (Г7.3; Г7.4).
- Analysis of results from biological reclamation, assessment of opportunities for restoration of disturbed terrains and for assessment of ecosystem services in reclaimed terrains. (Г7.2; Г7.5; Г7.7).

4.3 Reflection of the candidate's scientific activity in the literature (citation)

There were 12 citations of 7 publications in refereed and indexed journals in world-famous databases of scientific information (Journal of Balkan Ecology, Forestry Ideas, Scientia Horticulturae, Forest Science), 6 citations of 6 publications in collective volumes with scientific review (Forest Condition in Europe) and 1 citation of 1 article in unreferred scientific peer-reviewed journals (Stands in the West Balkan mountain, BALWOIS 2012).

4.4 Contributions in the works of the candidate (scientific, scientific-applied, applied)

In general, I accept the scientific and scientific-applied contributions formulated in the Reference. Here are some of them:

- The periods of manifestation of the phenophases swelling of buds, leafing, flowering, yellowing of leaves, leaf fall and dormancy of populations of common beech located in plant communities at different altitudes in the region of Vitinya (950 m above sea level), Petrohan (1450 m asl) and Hoof (1450 m asl) have been determined. For the period 2008 - 2019, changes have been established in the duration of the individual phases and the continuation of the vegetation period, as there is a cyclical increase every 4 years, which in the individual periods changes in duration. For 2008 it is 194 days, for 2009 -190, for 2011 -189, for 2012 - 193, for 2013 -184, for 2014 - 194, for 2015 - 202, for 2016. -215, for 2017 -207, for 2018 - 188 and for 2019 - 194 days. (B3; Г7.8; Г8.1; Г8.2; Г8.4; Г8.7)
- The obtained high correlation coefficients between the actual phenophases and the predicted with "cooling day model" (*Chill Days Model*) initial phases of the vegetation, make possible to predict the beginning of beech leafing under different habitat conditions. For Vitinya, 124 cooling days have been identified, necessary to meet the cooling requirements of the "beginning of differences" phenophase period. For the normal course of the physiological processes, which are related to the threshold temperature, through the model, a threshold value of 7.3 ° C has been determined for common beech (B3).
- The results of the research confirm the shift of the spring phenophases observed by other authors in the last decades. (B3; Г7.8; Г8.1; Г8.2; Г8.4; Г8.7)
- With data from satellite images, the phenological phases of development of common beech in sample areas from the region of the Western part of Stara Planina (Vitinya), the southern part of Berkovska mountain (Petrohan) and the northern slope of Vitosha (Kopitoto) were traced. For comparison between the results of field observations of the phenological phases and the data from satellite images, two modified indices were applied - vegetation index (NDVI) and water index (NDWI), calculated on the basis of satellite images. (B3).
- Based on the results of long-term research (from 1986 to 2016) on the content of macro- and microelements in the leaves / conifers of different tree species,

monitored in the sample areas of the Monitoring the condition of forest ecosystems – Forests (MCFE) network, the ones adopted in 2002 have been updated minimum and maximum limits for the content of mineral nutrients in the leaves of common beech (*Fagus sylvatika L.*) in the Western Balkan Mountains and in one- and two-year-old conifers of common spruce (*Picea abies (L.) Karst.*) and common fir (*Abies alba Mill.*) from the central and western part of the Rhodopes and the eastern part of Rila. (Г7.1; Г7.6). The established regional boundaries are applied as criteria for assessing the nutritional status and presence of pollutants in the observed habitats. (Г7.1; Г7.6)

- A comparative analysis was made with the limits recommended in the MCFE-Forests for the content of some macro and microelements in the leaves/conifers of tree species from forests in Europe, in which the nutrition of tree species was assessed as normal. The existing differences between the minimum and maximum values of the elements of the mineral nutrition for the predominant part of the tree species in Bulgaria are significant. The analysis shows that for some elements it is necessary to take into account regional environmental characteristics. (Г7.1; Г7.6; Г8.6).
- For Strandzha, Sakar and Eastern Rhodopes are described the landscapes and types of natural forest habitats from the Ecological Network Natura 2000, which include the observed plantations from the network for monitoring of forest ecosystems. (Г8.8; Г8.9; Г8.10) It is recommended, in case of future updating of the network of trial areas for Monitoring of Forest Ecosystems - MFE-Forests, to set trial plots in the following forest habitats: (Г8.8,Г8.9)
    - 91AA* Eastern forests of hairy oak and 91* S0 West Pontic beech forests in 33 BG0000219 Derventa hills 2.
    - 9170 Oak-hornbeam forests of the *Galio-Carpinetum* type, in 33 BG0001032 Rhodopes-Eastern.
    - 9410 Acidophilic forests from Picea in the mountain to the alpine belt (*Vaccinio-Piceetea*), 9170 Oak-hornbeam forests of the *Galio-Carpinetum* type, priority habitat 9530* Sub-Mediterranean pine forests with endemic subspecies of black pine in 33 BG 0001031 "Rhodopes-Medium"
    - 91AA* Eastern forests of hairy oak in 33 BG 0000212 "Sharp stone".

- The possible impact of the projected construction of the international power line "MARITSA EAST" (Republic of Bulgaria) - "NEA SANTA" (Greece) on the landscapes and natural habitats, protected in three protected areas under the Habitats Directive, from the Natura 2000 network - 33 0000578 "Maritsa River", 33 0001034 "Sharp Stone" and 33 0001032 "Rhodopes-East". (Г7.3):
    - The agricultural, grass and shrub-grass ecosystems are assessed with a low degree of impact due to the local nature of the impact and limited disturbance of vegetation cover. Some agro-ecosystems have a high potential for self-recovery and are therefore considered low-sensitivity. (Г7.4)
    - In forest ecosystems, due to the physical presence of the power line, partial fragmentation and disruption of the integrity of the location of the Balkan-Pannonian cervo-upper forests, Moesian beech forests and Oak-hornbeam forests of *Galio-Carpinetum* type is possible. (Г7.3,Г7.4)
- A comparative ecological analysis of the results of long-term complex studies on embankments of the Maritza-Iztok mines has been made; the process of change of plant species in the creation of new communities as a result of ongoing succession processes is characterized. (Г7.5)
- Suitable plant species and compositions have been identified for the purposes of biological reclamation of the disturbed terrains from copper extraction in the Ellatsite mine. (Г7.7)
- An indicative economic assessment of part of the ecosystem services in reclaimed terrains is proposed. It is applied as a National Methodology for assessment and mapping of ecosystems and the ecosystem services provided by them. (Г7.2)

5. Assessment of the candidate's personal contribution

The participation of Ch. As Dr. R. Kuzmanova in the above 19 works is as follows: 11 are independent publications, in 5 she is the author in 1st place and in 3 in second and subsequent place. This shows her significant participation in the presented results of the research work. A larger number of publications are related to results obtained from phenological observations of common beech, and here it is important to note that studies and publications on this issue in Bulgaria are minimal. She presented a protocol for the collective publications, which shows that the authors have equal participation.

6. Critical remarks and recommendations

I don't have any critical remarks, but I allow myself to make a recommendation - in the future, to direct her publishing activity to journals with an impact factor and to start teaching a doctoral student.

7. Personal impressions

I know Ch. Assistant Professor Dr. Ralitsa Kuzmanova as Chief Assistant in the discipline "Ecology", as a colleague in the Department of "Ecology, Environmental Protection and Restoration" and from our joint work on research projects. My impressions are that she is a very good teacher, develops and enriches her teaching style, updates the teaching material with modern information. She is responsible, precise and has a serious attitude to the implementation of the tasks.

Most of the publishing activity is related to field work, to which she refers responsibly. She is creative in summarizing the results and their interpretation.

8. Conclusion

Based on the mentioned research, teaching and applied results, as well as the fact that in terms of volume and content, the scientific production fully covers all the requirements for the academic position "Associate Professor", I confidently suggest that the candidate **Ch. Assistant Professor Dr. Ralitsa Todorova Kuzmanova** to take the academic position **"Associate Professor"**, field of higher education 4. "Natural Sciences, Mathematics and Informatics", professional field 4.4 "Earth Sciences", scientific specialty "Ecology and Ecosystem Protection" , in the discipline "Ecology".

Дата: 17.05.2021 Reviewer: