



## REVIEW

on the materials presented for the entering a competition for an occupation of an academic position "Professor", field of higher education 6. Agricultural sciences and Veterinary medicine, 6.5 Forestry, "Forest plantations, breeding and seed production", subject "Forest genetics and breeding", announced by the University of Forestry, State Gazette No 37/7.5.2019, code of the procedure FOR-P-0419-07.

Candidate:

1. Assoc. Prof. Peter Zhelev Stoyanov, PhD

**Reviewer:** Assoc. Prof. Veselka Gyuleva - Pantova, PhD, 6.5. PhD Forestry, Sc. Sp. "Sylviculture, improvement and seed production", Forest Research Institute - Bulgarian Academy of Sciences, Sofia, Bulgaria

### 1. Short biography of the applicant

After completing the full educational course from 1980 to 1985, Assoc. Prof. Peter Zhelev Stoyanov graduated with a master degree in specialty "Forestry" of the University of Forestry, Sofia. In the beginning of 1993 he defended his PhD thesis. In the period from 1992 to 1999 the candidate held consecutively the academic position "Assistant", "Senior Assistant" and "Chief Assistant". Since 1999 he has been a lecturer at the University of Forestry on the academic position "Assoc. Professor". Apart from teaching and different scientific activities, from 2003 until 2007 Assoc. Prof. Peter Zhelev Stoyanov has been engaged with the administrative management of the Department of Dendrology at the University of Forestry, Sofia. For two mandates the candidate was Deputy Rector of the University of Forestry (2007-2016) responsible in different periods for academic activities, accreditation, international cooperation, public relations, publishing and information services. He speaks fluently English, Russian and French.

### 2. Conformity of the candidate's submitted documents and materials with the Requirements of the Regulations for the Growth of the Academic Staff of the University of Forestry, Sofia

The documents attached and the accompanying materials (CV, notarized copies of diplomas and different inquiries, copies of all published papers, copies of published books, chapters and monographs) are without missing documents and are precisely organized. The candidate has also provided an extensive habilitation reference about the scientific contributions, based on the ten publications (total IF=10.211), which have been referenced and indexed in the world databases from 2002 to 2016 on the topic "*Population genetic diversity of conifers in Bulgaria*". Thus, of the required 100 points of this indicator, Assoc. Prof. Peter Zhelev presents 146.25 points. The total points of articles and reports published in scientific journals, referenced and indexed in world databases, and those published in non-refereed journals with peer review exceeds nearly twice the required minimum of 200 points.

According to the citation indicator, the total number of points, accumulated by the applicant, exceeds many times the required 100 points. Therefore, the accumulated number of points by the indicators' groups exceeds on average five times the minimum national number of points for occupying the academic position of professor, as well as the minimum specified in the Rules of Operation of Law for Development of the Academic Staff in Bulgaria at the University of Forestry.

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

According to the documents presented Assoc. Prof. Peter Stoyanov holds academic position since 1992, or more than 27 years. The candidate conducts different bachelor and master programs in a number of subjects at the Department of Dendrology, University of Forestry, which is a reliable indicator for the fulfilment of his individual teacher's plan. As a very communicative person, Assoc. Prof. Peter Stoyanov has the ability to encourage and to gain support from his students for his creative ideas and suggestions. The evidence for this is the obvious number of the trained and PhD students. Thus, out of a total 6 PhD students, three successfully defended in 2015 and 2017, respectively. One of them is credited with the right of defence and two are at the beginning of their doctoral studies. Under his teaching and training, 114 students successfully defended their bachelor's and master's theses. The developed topics focus on the study of genetic diversity, seed production, breeding and genetic studies, studies on phenotypic variability, species diversity, assessment and conservation of forest genetic resources, and genetic structure of populations of cultivated and native species. All topics are directly related to different areas of forest genetics, improvement and seed production, which is in line (in conformity???) with the scope of this competition.

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

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

During the reviewed period, Assoc. Prof. Dr. Peter Zhelev Stoyanov has worked actively as a manager of 4 and as a team member in 3 international projects. He has been the leader of three and a team member in three national scientific projects funded by the National Scientific Fund. He has also directed one and participated in another national institutional infrastructure project. He has managed three and participated in 5 scientific and applied research projects, funded by other institutions, as well as was involved in three and a participant in 2 scientific projects funded by the University of Forestry in accordance with Ordinance No. 9 / 08.08.2003. As a key expert, he has also directed 2 and participated in 9 other scientific and applied projects apart from the University of Forestry. Consequently, Assoc. Prof. Dr. Peter Zhelev has managed and implemented a total of 39 projects, in 16 being the first manager. The diversity of the projects in which the applicant has participated and / or managed clearly shows both his knowledge and skills in forest genetics, breeding and seed production and his ability to effectively apply this knowledge in compliance with current research standards in his research activities. The subject of this review is the scientific, publishing and teaching activity of Assoc. Prof. Dr. Peter Stoyanov after his habilitation in June 1999.

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

The list and classification of the publications presented by Assoc. Prof. Petar Zhelev Stoyanov for this competition are as follows:

*-scientific publications in journals with Impact Factor (IF)*

This group of scientific journals is represented by 23 publications. Of these, in two publications, Assoc. Prof. Peter Stoyanov is in the first position (Publ. No. 2 and 18, with a total **IF=1.828**). The first publication investigates the isozyme variation of the endemic *Pinus peuce* Griseb. Two significant related groups were identified (Fest-2: LAP-2 and 6-PG1: 6PG-2). The second publication presents results from the growth in diameter and survival rate of Scots pine from a half-sib *Pinus sylvestris* L. offspring in Yundola, Bulgaria.

In eight publications the candidate is in second position (Publ. No. 3, 7, 9, 14, 19, 20, 22 and 23 with total **IF= 7,678**). Articles 3 and 7, jointly developed with his graduate and PhD students, are again related to the isoenzyme variation, differentiation and inbreeding, as well as to the genetic structure of populations of *Pinus mugo* and *Platanus orientalis* in Bulgaria. This is also the direction of paper 14. Publications 9 and 20 discuss the invasiveness of alien species in riparian forests and in the periphery of agricultural fields. I consider these two publications to be relevant to the scope of this competition because of the fact that statistical ranking and classification techniques used for the purposes of the study are also used in quantitative genetics. With the same argument, I accept the next three publications (Publ. No. 19, 22 and 23).

In thirteen publications, Assoc. Prof. Peter Stoyanov is in the third or next position in the authors team. This considerable number of joint publications by an international team of authors proves that he has the skills to work in a team and to take responsibility for the work load on individual tasks. His participation is clearly recognizable. Publications 1 and 4 relate again to the study of the allozyme variation of *Pinus nigra* Arn. and *Pinus sylvestris* L., as well as to the genetic differentiation of oak populations in Central and Eastern Europe.

Genetic differentiation in *Sorbus torminalis* in Eastern Europe, examined by microsatellite markers, and that of the capercaillie and wild goat in Southeastern Europe to elucidate species phylogeography and its expansion in the Carpathian Mountains, are presented in three articles (Publ. No. 5, 8 and 11). The results of the study on the genetic diversity of *Sorbus domestica* from 17 populations covering the European range, including populations from Bulgaria, are presented in publication 10. The natural hybridization of *Abies borisii-regis* was also investigated (publ. No.12). Chloroplast DNA analysis has demonstrated the unique trace evolution of *Carpinus betulus* L. in the Carpathians and the Balkan Peninsula (Publ. No. 17). Original studies were conducted using a combination of molecular and fossil data to elucidate the demographic history of *Quercus cerris* (Publ. No. 15) and to evaluate the local adaptation of *Abies alba* (Publ. No 16). Results on the population genetic data pertinent to the conservation of chamois in Bulgaria are presented (Publ. No. 14). Assoc. Prof. Petar Zhelev's ability to work with large databases and to apply different statistical approaches and techniques for their analysis and synthesis is clearly evident in publications No. 6, 13 and 21.

All publications are written in English. They are recognizable in the international scientific space (field???) . Their total impact factor is very high (**IF =41.165**).

*-scientific publications with impact rank (SJR):* This group of scientific journals is represented by 10 publications.

Of these, in two publications, Assoc. Prof. Dr. Peter Stoyanov is the first author (Publ. No. 24 and 27 with total SJR = 0.622). The results of the study are presented on the interaction between the genotype and the environment in four full-sib experiments with *Pinus sylvestris* at varying environmental parameters, as well as the results on the reproductive process in natural plantations and seed-production gardens of *Pinus nigra* Arn.

In three publications with a total SJR = 0.368, the applicant is in second position (Publ. No. 29, 31 and 32). The first two papers are related to the study of biological diversity in the Slavyanka and Olympus Mountains, and the third one to the distribution, diversity and phytochemistry of the genus *Thymus*. All three publications are indirectly related to the current competition, but are valuable from an (improvement???) point of view.

In five publications, the candidate is ranked third or next in the author team. The main results of a study of the distribution of the individual heterozygosity in natural populations of *Pinus sylvestris* are presented (Publ. No. 25). Studies on natural hybridization in the genus *Abies* - gene exchange and mitochondrial variation are presented in both publications (Publ. No. 28 and 30). The studies conducted in publications 26 and 33 refer to the study of biodiversity, which is a good basis for future selection of forest tree species.

*-publications in scientific journals not referenced in world-renowned scientific information databases*

Out of the total of 21 publications, one is independent and in 2 publications the candidate is in first position. In nine issues the applicant is in second position, and in nine other publications he is in third or next position in the authors team.

There are 7 articles directly related to this competition (Publ. No. 34, 40, 41, 43, 48, 49 and 52). The provenance trials are a classic approach for investigating the response of different origins of a species in a new environment or in nursery areas in combination. The study on *Pinus sylvestris* was conducted in Belgium and on *Platanus orientalis* – in Bulgaria (Publ. No. 34 and 40). The phenotypic and allozyme variation of nine enzyme complexes at (on???) population level of *Betula pendula* are presented in Publ. No. 43, and of *Quercus robur* - in Publ. No. 41. The genetic structure of silver fir in 14 populations from Romania and one population from Bulgaria was studied using 14 microsatellite DNA markers. The clear distinction of the Bulgarian population from Pirin Mountain has been proved (Publ. No. 49). A study on natural regeneration and artificial regeneration of *Picea abies* forests in a cleared windthrow area in Vitosha Nature Park has been reported in Publ. No. 48. Results from the study of the glacial refugia of forest trees on Balkan Peninsula and the application of genetic markers are presented in Publ. No. 52. Other publications, not mentioned here, address different aspects of dendrology and biodiversity and may be indirectly linked to future breeding of forest tree species, which is within the scope of this competition.

*-publications in Proceedings of International Symposiums and Conferences*

Out of the eighteen publications submitted, nine are directly related to the current competition and the subject "Genetics and improvement of forest tree species". In three of them, Assoc. Prof. Dr. Peter Stoyanov holds the first position, in the other three he is in the

second position and in five - in the third and next position by the author team. Nine publications have a direct relation to this competition (publ. No. 56, 57, 58, 60, 63, 64, 65, 66 and 67). A brief comment on a simple-leaf form of *Fraxinus angustifolia* is presented in publ. 56, and biometric characteristics of *Pinus mugo* and its hybrids with *Pinus sylvestris* is presented in publ. 64. Genetic differentiation of *Pinus mugo* and its importance for the conservation of forest genetic resources, as well as the development of a strategy for the conservation of the genetic resources of *Platanus orientalis* and forest habitats of high conservation value, are presented in three publications (Publ. No. 57, 60 and 63). The results of the introduction of some coniferous species in Bulgaria are also presented (Publ. No. 65). Data from the study of the genetic diversity of populations of *Pinus peuce* in Bulgaria are contained in publication No. 66. The genetic identity of the donor and regenerated in vitro plant material of *Betula pendula* has been verified (Publ. No. 58). I accept the candidate's contribution to the used methods and research on the genetic diversity of the capercaillie (Publ. No. 67). The other nine articles, not mentioned here, demonstrate his in-depth knowledge in other professional fields, but are also a very good basis for future research in the field of breeding and conservation genetics of forest species, which is also related to the current competition.

#### ***-books and chapters from books and monographs***

Fourteen books, book chapters and monographs were presented. In one of them, the candidate is in the first position, focusing on climate change, biodiversity and forest genetic resources (Publ. No. 85). In five of the published materials, Assoc. Prof. Peter Stoyanov is in second position (Publ. No. 73, 75, 77, 78 and 84). Again the starting points are biological features, systematic and genetic variation in *Populus*, climate change, forest adaptation measures and others. In the other eight published materials, the applicant is in third or next position, but his participation is very noticeable (Publ. No. 74, 78, 80, 81, 82, 83 and 86). Again, important issues such as: conservation of forest genetic resources, development of methods for genetic monitoring of the genetic conservation units of forest tree species in Europe are analyzed and discussed; approaches to conserve forest genetic resources in Europe in the context of climate change; the legal and institutional framework in Bulgaria for the conservation of forest genetic resources; the *ex situ* conservation of *Abies alba* in Bulgaria and the status of high mountain tree species and their genetic resources in a view of climate change.

#### ***-popular scientific and applied articles and developments***

This section is presented by a total of 17 issues, four of which are popular science books. The candidate is the leading author of one of them and of the others is in the second or next position. In popular scientific and applied published materials and developments, the applicant is the leading author of 8 publications, while in the rest he is the second or next author.

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

A total of 60 citations were noted. Two hundred and seventy citations were in scientific journals with impact factor, one hundred and fifty citations were in non-impact

factor scientific journals and one hundred and eighty-one were citations in monographs, books, dissertations, conference proceedings and others.

#### **4.4. Contributions of the applicants' work (scientific, scientific-applied, applied)**

By accepting completely the contributions thus presented by Assoc. Prof. Peter Stoyanov, I allow myself to point out some of them, as follows:

- *Characterization of the level and distribution of genetic diversity within and between populations of different forest tree species, as well as of some genetic processes occurring in populations.*

##### **1.1. Allozyme genetic markers**

Genetic diversity within species has been documented in *Pinus sylvestris*, *P. nigra*, *P. mugo* and *P. peuce*. In the last species, such markers are applied for the first time. The inheritance of isoenzyme variants has been demonstrated. The differentiation between populations on a European scale has been found to be higher in *P. nigra* compared to *P. sylvestris*. In *P. sylvestris* populations, the distribution of individual heterozygosity corresponds to the theoretically expected. Inheritance of isoenzyme variants has been demonstrated for *P. nigra* and it has been demonstrated that in the natural population and in the seed production garden, the degree of unrelated crossover is high - over 90%. In the *P. peuce* populations a degree of diversity consistent with published values for species with similar biological characteristics was found. *Pinus mugo* has been found to have a relatively high level of inbreeding, possibly due to near-crossover.

Genetic diversity in populations of two deciduous species has been found to confirm trends in species with similar biological characteristics. The study of *Platanus orientalis* shows that the most remote population is the most genetically diverse. The population variability values for common birch are in line with those obtained from other species studies.

##### **1.2. DNA-markers**

For species from the group of silver fir (*Abies alba*, *A. cephalonica*, *A. borisii-regis*), the distribution of genetic diversity within and between populations has been demonstrated, and some other specific issues have been addressed. *A. borisii-regis* has shown not to be a monophyletic taxon and not a result of ancient hybridization, but rather of relatively recent introgressive hybridization. Specific adaptation to the different environmental conditions determined by the altitude was found for *Abies alba* by comparing pairs of populations at different altitudes from the southern part of the range.

Two species of the genus *Sorbus* - *S. torminalis* and *S. domestica* based on their large-scale geographic distribution in different regions of Europe and population diversity have been investigated. In Eastern Europe, *S. torminalis* has a relatively high degree of differentiation and significant geographical isolation, reflecting possibly post-glacial migration processes. For *S. domestica* average general population differentiation was found out and the three groups were identified in Europe: France, the Mediterranean-Balkans and Austria. For the common hornbeam (*Carpinus betulus*) in the Balkans it has found out significantly higher genetic diversity than other parts of Europe, and it has also been shown

that modern populations originate from different microrefugia on the peninsula rather than from a common refugium.

For *Q. cerris* three geographically distinct groups were found out: Western, Central and Eastern. The division into two groups of populations from Italy and the Balkan Peninsula was probably caused by population contraction during the Middle Pleistocene Ice Age.

- *Studies on the variability of different plant species based on morphological and morphometric features*

No geographical differentiation between populations of *Juniperus oxycedrus* on the Balkan Peninsula has been found out based on a study of leaf and conifer features.

A number of regularities have been identified, related to the influence of environmental conditions on *Pinus heldreichii*, investigating the morphometric and anatomical features of the leaves and the width of annual rings of the stem.

Intermediate inheritance of a number of morphometric features in hybrids between *Pinus mugo* and *Pinus sylvestris* has been identified.

The morphometric variability was observed in the common birch from a natural habitat in the Rhodopes. Using morphometric features, the differentiation between two species of the genus *Sideritis* - *S. scardica* and *S. syriaca* – was proved, with one population of the first species being presumed to probably represent a separate taxon.

- *Studies on the selection of forest tree species*

A number of regularities have been identified, related to the selection of *Pinus sylvestris*. High results have been obtained for the survival and heritability of growth based on diameter of half-sib progeny of *Pinus sylvestris* from Yundola. It was shown that coefficient of heritability is able to grow with age. For 144 full-sib progeny from Southern Sweden, relatively lower values of the heritability of growth by diameter, height and volume have been found out, independent of the fact that the basic genetic effects are additive and interaction between genotype and environment are significant but it is with lower importance.

Average coefficients of height growth heritability of *Abies alba* and *Platanus orientalis* were found out based on the combined provenance/progeny tests. In provenance study of *Pinus sylvestris* in Belgium has been proved that the only statistically significant relation is between diameter of tree and longitude. The average diameter decrease significantly from South to the East.

The method for propagation *in vitro* of ornamental form of *Betula pendula* was developed.

- *Conservation of forest genetic resources*

The possibilities for conservation of genetic resources of *Platanus orientalis* have been investigated. The methods have been developed to monitor the status of forest genetic resources and their conservation in the context of climate change. An overview of the conservation of the genetic resources of *Populus nigra* in Bulgaria has been accomplished. The legislative documents related to the conservation of forest genetic resources in Bulgaria were reviewed and the Bulgarian experience in the *ex situ* conservation of the genetic

resources of *Abies alba* was summarized. Technical guidelines for the conservation of the genetic resources of *Quercus frainetto* and *Q. cerris* have been developed.

#### **5. Evaluation of the personal contribution of the applicant**

All above mentioned publications are a clear proof that Assoc. Prof. Petar Stoyanov works with modern methods of biochemical and molecular genetics, statistical techniques and methods of quantitative genetics and breeding at individual and population level. He has a clear ability to interpret the results obtained in an accurate and comprehensible language and to analyze them in depth, which allows him to formulate original research findings. His participations in published materials, regardless of the position he holds in the team of authors, stands out very clearly. He is the author of numerous reviews of articles, books and more. The candidate has also gained remarkable teaching experience. He is a member of numerous national and international committees and councils as a key expert, as well as a number of editorial boards.

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

I have no critical comments on the scientific papers submitted by the applicant.

#### **7. Personal impressions**

I know Assoc. Peter Zhelev Stoyanov since 1990. I have no common publications with him, but I keep close professional contacts after our consecutive specializations in 1996 in the Department of Forest Genetics at the Agricultural University of Uppsala, Sweden. He is a respectable colleague and person.

#### **8. Conclusion**

The above written gives me a reason to summarize that the obtained results and significant contributions from the research, teaching and expert activity of Assoc. Prof. Dr. Peter Zhelev Stoyanov meet the requirements of the Development of the Academic staff Act in the Republic of Bulgaria and the Regulations for its implementation at the University of Forestry.

**I PROPOSE ASSOC. PROF. Dr. PETER ZHELEV STOYANOV** to obtain the academic position "**Professor**" in the subject "Forest Genetics and Breeding". Professional Field 6.5. Forestry

Date: 09 Sept 2019

Reviewer's signature: