



STATEMENT

on the materials for participation in a competition of academic position „Professor”, domain of higher education 6. „Agricultural sciences and veterinary medicine”, professional area 6.5. „Forestry”, scientific specialty „Forest Melioration, Forest Protection and Spatial Forest Utilisation”, educational subject „Forest entomology”, announced by Forestry University in State Gazette N° 102/08.12.2023, code of the procedure: ELA-P-1123-113.

Applicant for the position: Associate Professor Danail Dimitrov Doychev, Ph.D

Author of the statement: Associate Professor **Gergana Ivanova Zaemdzhikova, Ph.D.**, professional area 6.5. „Forestry”, scientific specialty „Forest Melioration, Forest Protection and Spatial Forest Utilisation”, educational subject „Forest entomology”, Forest Research Institute – Bulgarian Academy of Sciences.

1. Short biography of the applicant

Danail Doychev was born on 21 January 1972 in Radomir. He completed his secondary education in 1991 at the Professional high school of electrical engineering and automation – Sofia. He graduated the University of Forestry in 1999, subject forestry with professional qualification forestry engineer (MSc. degree). During the period 2000-2015, he gradually passes through the positions: assistant (2000, department „Plant Protection”), senior assistant (2002, department „Plant Pathology and Chemistry”) and chief assistant (2005) in the University of Forestry, Sofia. In 2015 he defended PhD thesis on “Bark beetles Coleoptera, Curculionidae, Scolytinae) in Scots pine (*Pinus sylvestris* L.) plantation in South-Western Bulgaria – species composition, distribution and damages”. Since 2015, he is associate professor at the Department “Plant Pathology and Chemistry” at the University of Forestry, Sofia. So far, Assoc. Prof. Doychev has 23-year-long experience of teaching career in the University of Forestry and up to now is a titular teacher on the subjects forest entomology, forest protection, introduction of plant protection, ornamental plants protection and integrated methods of plant protection for the specialties in forestry, ecology and environmental protection and landscape architecture. Assoc. Prof. Doychev speaks well English and Russian and possesses very good computer skills. He is a member of the Union of Scientists in Bulgaria.

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

To participate in the competition, Assoc. Prof. Doychev has submitted all necessary documents required by the Act for the Development of the Academic Staff in the Republic of Bulgaria (ADASRB) and the Regulations for the Development of the Academic staff of University of Forestry (RFASUF). All documents are described in details in the submitted application for participation in the competition.

The present report on the minimum scientometric requirements shows that Dr. Doychev covers them and in a number of cases significantly surpasses them. The scores by indicators are as follows: Indicator A - 50 pts. (required 50), Indicator B – 144.57 pts. (required 100), Indicator G – 236.57 pts. (required 200), Indicator D – 300 pts. (required 100) and Indicator E

– 135 pts. (required 100). The total amount of points, according to parameters in the RFASUF applications for the relevant professional field of the competition, is 866.14 at a required minimum 550 points.

3. Characterisation and evaluation of the candidate's activity

3.1. Evaluation of the teaching activity of the applicant

Assoc. Prof. Doychev is an erudite and demanding teacher. During his over 20-year-long teaching career, he gave lectures and conducted laboratory classes and practical training in the subjects of forest entomology, forest protection, introduction of plant protection, ornamental plant protection and integrated methods of plant protection with students from different specialties of the University of Forestry. He is the author of study programmes of the mentioned subjects. He is the supervisor or consultant of two doctoral students, one of whom successfully defended his PhD thesis. Under his supervision, 25 diploma theses were defended – 4 for BSc. and 21 for MSc. Assoc. Prof. Doychev participates in a number of scientific juries and competitions for academic positions. In the period 2015-2023, he was an expert in the National Commission for Forest Protection at the Executive Forest Agency. He is also the author of several applied expertises. Dr. Doychev also participates in several working committees at the University of Forestry.

It can be summarized that for more than two decades Dr. Dochev has been conducting and continues to conduct high-level teaching activities for students from various specialties at the University of Forestry. He is a sought-after specialist and expert on juries and committees among colleagues in academic circles.

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

4.1. Participation in scientific, applied science and education projects

Assoc. Prof. Doychev has submitted certificates of participation in 7 scientific projects, two of which are financed by the Bulgarian National Science Fund. He himself is a head of one project. He is also a participant as an expert in several applied projects for assessing the health status of tree vegetation in the village of Mezek and the National Assembly - Velingrad.

4.2. Characteristics of published scientific results

The candidate Assoc. Prof. Doychev participates with 10 articles (indexed at WoS and Scopus) united by a common topic in habilitation report (Indicator B4), as well as many other scientific and scientific-applied articles, of which 29 have been published in refereed scientific journals (WoS and Scopus) (Indicator G7). Five articles have been published in non-refereed journals, 3 of which have been published in national and international scientific conference proceedings (Indicator G8). The candidate has co-authored 6 chapters of collective monographs (indicator D11). In one of the publications the candidate is the first author, in 5 publications the candidate is the lead author, and in the rest, he is the second and next author. A total of 8 publications are in Bulgarian and 32 in a foreign language (English).

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

The applicant has presented information about 20 citations. All of them are in prestigious and international journals, such as *Insects*, *European Journal of Entomology*, *Biocontrol Science*

and Technology, etc. (Indicator D13). It should be noted that the number of citations is several times more than those applied for the competition.

4.4. Contribution in the scientific production of the applicant (scientific and applied contributions)

The research work of Assoc. Prof. Doychev can be classified in the following general directions:

- Faunistic studies of forest insects
- Forest ecosystem monitoring
- Damages caused by biotic and abiotic factors in forest ecosystem
- Dead wood and saproxylic insect species, associated with it
- Natural regulators of forest insect populations
- Laboratory and field trials for the control of xylophagous insect species

The candidate has presented detailed classification of his contribution, which are objective and accurate. For the purposes of the present statement, a detailed examination of the scientific and applied contributions in its publications is not necessary. Therefore, I highlight only the most important scientific and scientific-applied contribution in the applicant's scientific works.

Faunistic studies of forest insects

- Two species are new for the fauna of the Balkan Peninsula: *Medetera pinicola* Kowarz (Dolichopodidae) and *Lonchaea fugax* Becker (Lonchaeidae) (Diptera).
- Three species are new for the fauna of Bulgaria: *Rhimphoctona xoridiformis* (Holmgren) (Ichneumonidae), *Aproceros leucopoda* Takeuchi (Argidae) (Hymenoptera) and *Pediacus dermestoides* (F.) (Coleoptera: Cucujidae).
- *Sphenoptera cuprina cuprina* Motschulsky, 1860 (Coleoptera: Buprestidae) was established as a new species for the fauna of North Macedonia
- Data about distribution of jewel beetles (Coleoptera: Buprestidae) in Bulgaria are summarized, respectively: Agrilinae (31 taxa), Buprestinae (47), Chrysochroinae (19) and Polycestinae (13).
- The host plants of xylophagous longhorn beetles (Coleoptera: Cerambycidae) were studied using the available literature and original data from Bulgaria. A total of 104 trophic conations between 54 tree and shrub species and 93 cerambycid taxa are reported.
- *Quercus suber* L. was established as a new food plant in Bulgaria for the following insect species: *Acmaeodera crinita* Spinola, *Acmaeodera ottomana* (Frivaldszky), *Chrysobothris leonhardi* Obenberger (Coleoptera, Buprestidae), *Lichenophanes varius* (Illiger) (Coleoptera, Bostrichidae), *Callimus angulatus* (Schrank) (Coleoptera, Cerambycidae), *Xyleborinus saxesenii* (Ratz.) (Coleoptera, Curculionidae, Scolytinae) and *Neurothaumasia ankerella* (Mann) (Lepidoptera, Tineidae).

Forest ecosystem monitoring

- Within the framework of the International Co-operative Programme on Assessment and Monitoring of Air Pollution Effects on Forests (ICP Forests), an assessment of the health status of forests in different mountain regions of the country was made over a 20-year-long period. The abiotic and biotic factors influencing the health status of the forests in the different habitats have been identified.

Damages caused by biotic and abiotic factors in forest ecosystem

- The health status of coniferous plantation in Bulgaria was evaluated on the basis of dendrochronological analysis of *Pinus sylvestrus* and *P. nigra* trees cultivated on different elevation, results obtained by several research surveys and available data at Forest Protection Information system and Executive Forest Agency. The main threats to pine plantations are indicated and the role of the main abiotic and biotic factors in the deterioration and dieback of plantations is highlighted. Among the xylophagous species, the most dangerous pest in pine forests is the bark beetle (*Ips acuminatus*), and of the pathogens - *Heterobasidion annosum*. A system of forestry measures is proposed, aimed at suppressing insect's calamities and improving the health status of forests.
- The first study in Bulgaria was conducted on the distribution of *Biscogniauxia mediterranea* in cork oak plantations. Symptoms of the disease caused by *B. mediterranea* were found on stems and branches of cork oak. Cork extraction was found not to affect the health of the trees. A significantly higher risk of the development of pathogenic fungi occurs in coppice woodland management, where they cause dieback of the young coppice. Associations of cork oak with 10 species of insects are new for Bulgaria. Eight of these are potential insect vectors of *B. mediterranea*.

Deadwood and its saproxylic insect species

- During 2022, the stock, value and structure of the dead beach woods (*Fagus sylvatica*) as well as the diversity of the wood-destroying fungi were investigated in Stara Planina Mt. In addition to fungi and other organisms, 24 insect species from 14 families were found in the dead wood. The species composition of insects depends on the age of the plantations and the presence of large-diameter structures (stems and branches). Conversely, it does not depend on the altitude and the relative density of the plantations. Five of the found insect species are part of the International Union for Conservation of Nature (IUCN) and European Red List of saproxylic beetles - *Cerambyx scopolii* Fuessly (Cerambycidae), *Denticollis rubens* Piller & Mitterpacher (Elateridae), *Isoriphis melasoides* (Laporte de Castelnau), *Isoriphis nigriceps* (Mannerheim) (Eucnemidae) and *Sinodendron cylindricum* (L.) (Lucanidae). For the first time in the country, *F. sylvatica* was established as a food plant for *Agrilus olivicolor* Kiesenwetter (Buprestidae) and *Xylosteus spinolae* Frivaldsky (Cerambycidae).

Natural regulators of forest insect populations

- Five entomophages of *Ips typographus* (Linnaeus) (Coleoptera: Curculionidae, Scolytinae) were recorded between 2008-2014 in spruce forests in three Bulgarian mountains (Vitosha, Lyulin and Western Rhodopes). They belong to two hymenopteran and two dipteran families: *Coeloides bostrichorum* Giraud, *Dendrosoter middendorffii* (Ratzeburg) (Hymenoptera: Braconidae), *Roptrocercus xylophagorum* (Ratzeburg) (Hymenoptera: Pteromalidae), *Medetera pinicola* Kowarz (Diptera: Dolichopodidae) and *Lonchaea fugax* Becker (Diptera: Lonchaeidae). The hymenopteran species – *C. bostrichorum* and *D. middendorffii* are new parasitoids of *I. typographus* for Bulgaria, and *M. pinicola* and *L. fugax* are new predators of the host. The parasitism of *I. typographus* caused by *C. bostrichorum* varied between 12.0 and 55.2% (av. 38.1%).
- *Bothria frontosa* (Meigen) (Diptera: Tachinidae) was established for the first time as a parasitoid of *Thaumetopoea pityocampa* Denis & Schiffermüller (Lepidoptera, Notodontidae). This is the first record of the Notodontidae family as a host of *B. frontosa*.
- *Oecanthus pellucens* (Scopoli, 1763) (Gryllidae) is recorded for the first time as a predator on the larvae of *Thaumetopoea pityocampa* (Denis & Schiffermüller, 1775) in Bulgaria.
- The results for pathogens and parasitoids reared by *Ips typographus* in Bulgaria for the period 2003-2018 are summarized. A total of 2 916 individuals of *I. typographus* were studied. As a result – a protozoan, a microsporidium, a fungus and nematodes were detected. The protozoan *Gregarina typographi* was relatively high in the beetles from all studied sites and was the dominant pathogen species. The percentage of infected beetles varied from 1.4% to 50.4%. The prevalence of the microsporidium *Chytridiopsis typographi* ranged from 0.8% to 8% in the host beetles. Five nematode species (four parasite and one associated with the host beetles) were also found. The infection rates of nematodes ranged from 38.8% to 96.2% for different localities. Important data about pathogen localization, distribution and infection levels were established.

Laboratory and field trials for the control of xylophagous insect species

- It was confirmed that entomopathogenic fungi of the genus *Beauveria* are natural component of insect pathogenic mycoflora in populations of *Ips typographus* in the Vitosha National Park. Two species, *B. bassiana* and *B. caledonica*, were identified from collected cadavers of bark beetles. Pathogenicity of obtained *Beauveria* strains was demonstrated against bark beetle adults in laboratory bioassays. Virulence varied among the strains and the five most virulent strains showed efficacy comparable with the commercial mycoinsecticide Boverol® and the recently selected *B. bassiana* strain patented for use against spruce bark beetle in Slovakia. The results suggest that the Bulgarian strains have a potential for the control of bark beetle adults and deserve further investigation under semi-field and field conditions.

- Efficacy of entomopathogenic fungus *Metarhizium pemphigi* was evaluated against *Ips typographus* adults in a laboratory bioassay for the first time. Series of four conidial concentrations (2×10^4 – 2×10^7 conidia/ml) were used. The cumulative mortality caused by *M. pemphigi* varied between 75% and 100% ten days post-treatment, with LC50 value of 2.9×10^3 conidia/ml and LC90 value of 6.4×10^4 conidia/ml. The median lethal time (LT50) of treated beetles depended on conidial concentrations and ranged from 1.78 to 5.98 days. Pathogenicity of *M. pemphigi* was reported for the first time and the tested strain was found to be promising for further evaluation in terms of management options against the spruce bark beetle.
- Three plant extracts – *Origanum vulgare* subsp. *hirtum* essential oil (EO), *Monarda fistulosa* EO and a hexane fraction of *Tanacetum cinerariifolium* were evaluated and compared regarding their insecticide activity under laboratory conditions against the adults of the European spruce bark beetle, *Ips typographus*. Generally, the mortality of beetles increased with the concentration of extracts and a significant positive correlation between the cumulative mortality and the extract concentration was confirmed by Pearson's correlation analysis. At the highest extract concentration (10%), the total cumulative mortalities reached 98% for *O. vulgare* subsp. *hirtum* and *T. cinerariifolium* extracts at the end of the bioassay (four days after treatment). The exposure of beetles to *M. fistulosa* extract decreased the survivability of *I. typographus* the most (15%) and was followed by *T. cinerariifolium* (38%) and *O. vulgare* subsp. *hirtum* (43%).

5. Evaluation of the personal contribution of the applicant

The applicant's personal contribution to the conducted scientific and scientific-applied studies stands out clearly. He is one of the leading scientists in our country in the field of study of forest entomology and forest protection. Therefore, in most publications, he has a leading role, regardless of whether he being first or subsequent author.

6. Critical remarks and recommendations

I have no critical remarks or recommendations.

7. Personal impressions

I have known the candidate Associate Professor Danail Doychev since 2000, as my teacher at the University of Forestry in the subject ornamental plants protection. Our common interest in the field of forest entomology continues to keep our professional contact to present day. My joint work with Assoc. Prof. Doychev on various projects and scientific publications over the years gives me the reason to highly appreciate his professional skills and competence.

8. Conclusion

Associate Professor Danail Doychev is an established scientist and teacher, who enjoys a high reputation among colleagues and students. He has achieved significant scientific and applied results, which have been highly appreciated by colleagues in Bulgaria and abroad. He meets all scientometric and other requirements provided in the ADASRB and RDASUF. Based on all facts and evaluation presented above, I support the candidature of Assoc. Prof. **Danail**

Dimitrov Doychev for the academic position „**Professor**” of the subject „Forest entomology”, professional area 6.5. Forestry, scientific specialty „Forest Melioration, Forest Protection and Spatial Forest Utilisation”.

Date: 25.03.2024

Author of the statement:

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