

## REVIEW

regarding a competition for Full Professor in the field of higher education 6. Agricultural Sciences and Veterinary Medicine, professional field 6.1. Plant Growing, scientific specialty Ornamental plants, announced in State Gazette No. 62. from 21.07.2023, with candidate Assoc. Prof. Valeria Stefanova Ivanova, Ph.D. from Agricultural University - Plovdiv, Faculty of Viticulture-Horticulture, Department of Horticulture

by Prof. Dr. Elena Tomova Iakimova appointed as a member of the scientific jury with Order No. RD-16-901 /25.09.2023 of the Rector of the Agricultural University - Plovdiv.

**Reviewer:** Prof. Dr. Elena Tomova Iakimova, Institute of Ornamental and Medicinal Plants, Negovan, Sofia, Agricultural Academy, field of higher education 6. Agricultural Sciences and Veterinary Medicine, professional field 6.1. Plant Growing, scientific specialty Ornamental plants.

In the competition for the academic position Professor in the Department of Horticulture at Agricultural University – Plovdiv participates only one candidate.

### 1. General information on the candidate's career and thematic development

**Educational record and qualifications:** Associate Professor Dr. Valeria Ivanova, PhD, was born in February 1963 in the village of Alekovo, Loveshka region, Bulgaria. Secondary education was completed at "Aleko Konstantinov" Secondary School, Svishtov /1970-1981/ with study on general education subjects, natural-mathematical, humanitarian disciplines and practical training. Higher education in agronomy /1981–1986/ - Agricultural University /AU/, Plovdiv with qualification of Engineer-agronomist in Horticulture, specialization in Floriculture and Master degree in Horticulture. She obtained the educational and scientific degree "doctor" in AU, Plovdiv (2003) as a doctoral student in a free form of study. Topic of the dissertation "Optimization of plant load and nitrogen fertilization of chrysanthemum /*Chrysanthemum indicum* L./ grown for cut flowers in polyethylene greenhouses".

**Employment and thematic focus:** 1986 - 1989. **Agronomist**, programmer in the Scientific and Production Laboratory for Tissue Cultures /NPLTK/, Institute of Floriculture /now Institute of Ornamental and Medicinal Plants /IDLR/, Agricultural Academy, Negovan, Sofia. Main duties: research, applied and administrative activities: organization of the production process; propagation of ornamental plants by tissue culture methods; sterilization of plant material and preparation of nutrient media; initiation of *in vitro* culture, micropropagation and rooting *in vitro*; adaptation from *in vitro* to *ex vitro* and *in vivo* conditions; production of virus-free planting material from *Dianthus caryophyllus* and establishment of a collection of mother plants; production of planting material from *Dianthus caryophyllus*, *Chrysanthemum*, *Gerbera*, *Dracaena*, *Dieffenbachia*, *Anthurium*, *Gypsophilla*, etc.; 1989 – 1991.

**Research Associate**, Institute of Floriculture /IDLR/, Sofia, Negovan. Research, including improvement of methods for decontamination of bulbs of the ornamental plants *Tulipa*, *Lilium*, *Hyacinthus*, *Narcissus*, *Hippeastrum* etc.; development of protocols for micropropagation of bulbous flowers; 1991 – 1993. **Research Associate**, Agricultural University (AU), Plovdiv. Teaching and research activities: practicals and seminars with undergraduate students; co-supervision of doctoral students; leadership and participation in scientific projects; 1993 – 1996. **Senior Research Associate**, AU, Plovdiv. Teaching and research activities: practicals and seminars with undergraduate students; supervision of doctoral students; leadership and participation in scientific projects; 1996 - 2007. **Assistant Professor**, AU, Plovdiv. Teaching and research activities: lectures, practicals and seminars with students from bachelor, master, TEMPUS and ERASUM courses in AU; supervision of doctoral students; leadership and participation in scientific projects; from 2007 until currently – **Associate Professor**, AU, Plovdiv. Dr. Ivanova received the title "docent" in the scientific discipline Ornamental Plants with a diploma issued by the Higher Attestation Commission. As Assoc. Prof. the activity includes teaching and research: lectures, practicals and seminars with students from bachelor, master and ERASUM courses in various departments of AU; lecturing abroad; supervision of graduate and doctoral students; leadership and participation in national and international scientific projects.

**From the educational and employment record, it is evident that the candidate's career development is characterized by purposefulness, consistency, systemic increase and expansion of qualifications, and growth in academic ranks with a clear focus on topics in the field of ornamental plant species.**

### 2. General description of the presented materials

The documents of Assoc. Prof. Dr. Valeria Ivanova for participation in the competition for professor are well prepared and presented according to the Law for development of the academic staff and the requirements of the Agricultural University, Plovdiv.

#### Publishing activity

Scientific publications in the nomenclature specialty - a total of **119** issues, of which:

- Publications related to the doctoral dissertation - **3**, which are not a subject to consideration;
- Publications related to the obtaining of the title Associate Professor - **39**, which are not a subject to consideration;

In the competition for Professor, Assoc. Prof. Dr. Valeria Stefanova Ivanova participates with a total production of **35** scientific works.

• Publications after Associate Professor - a total of **78**, of which **35** works are used in the competition for professor and are a subject to consideration, including **33** publications, **1** monograph and **1** chapter of a book based on a dissertation for the acquisition of the scientific degree doctor.

Note: In reference to publications I define the chapter of a collective monograph as a published book based on a dissertation for the acquisition of the scientific degree of doctor.

The scientific papers subject to analysis for the preparation of the current review in the competition can be grouped as follows:

✓ Publications in databases Web of Science and Scopus /total **15**/

- Publications in Web of Science: with impact factor – **6** in Web of Science Core collection quartile Q4 (in *Scientific Papers Series B – Horticulture*); without IF in Web of Science CABI - **4** (in *Agricultural Science and Bulgarian Journal of Crop Science*) and **1** without IF in Web of Science, Zoological record (*Journal of BioScience and Biotechnology*);

The articles with IF in Web of Science fall also into the category of journals with the Journal Citation Indicator (JCI), based on indexing for the last three years preceding the year of publication.

- Publications in Scopus, SJR - **4** papers in quartiles Q3 and Q4 (*Acta Horticulturae* and *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*);

• Publications in peer-reviewed and not indexed scientific journals or in edited collective volumes - **18**; of them, **4** publications in proceedings of scientific conferences /*Proceedings of the 4th international symposium "Ecological Approaches towards the production of the safety food"*, Bulgaria, 2011 and *International Ornamental Plant Congress*, Turkey, 2019/; **5** articles in journals /*Rastenievudni nauki* and *Journal of International Scientific Publication: Agriculture&Food*/; **9** papers published in edited collective volumes /*Scientific Works of the Union of Scientists - Plovdiv*/.

The personal contribution of Assoc. Prof. Dr. Valeria Stefanova Ivanova in the mentioned 35 papers is illustrated by the fact that **4** of them are independent, incl. the monograph, in **15** she is the **first /leading author/**, in **9** is the second, and in the remaining **7**, incl. book is the third and subsequent author. **Leading author /corresponding/**, in a position different from the first, is also in **2** more articles.

### **3. Main area in the candidate's research. Demonstrated skills or aptitude for leading the research (project management, attracted external funding, etc.).**

#### **• Main area in the candidate's research**

Assoc. Prof. Ivanova's research work is distinguished by a wide range of competencies and skills in various areas of research in ornamental crops, demonstrating in-depth knowledge in the specific and accompanying scientific areas and sub-areas in general plant agrarian sciences and fields of plant agrobiology.

The main areas of research include studies on ornamental plants, including growing, regulation of growth and development, species and variety specificity of behavior, growth regulators and other biologically active substances, phytohormonal control, optimization and development of protocols for micropropagation, stress physiology, nutrition /fertilization/, metabolism.

Objects of the research are numerous species and varieties of different genera and families of annual and perennial, flowering and leafy, bulbous and tuberous, pot plants, herbaceous, shrubby and woody deciduous and coniferous species, among which:

**Herbaceous flowering ornamentals:** *Chrysanthemum morifolium*, *Lupinus polyphyllus* Lindl., *L. mutabilis* Sweet, *Dianthus caryophyllus* f. *spray*, Hort.), *Tagetes erecta*, *T. patula*, *T. signata* Bartl., *Antirrhinum*, *Zinnia*, *Verbena*, *Callistephus chinensis*, *Helichrysum bracteatum*, *Echinaceae purpurea*, *Verbascum thapsus*, *Gypsophilla*, *Gerbera jamesonii*; **Bulbous and tuberous flowers:** *Gladiolus* sp., *Dahlia variabilis*, *Tulipa gesneriana*; **Pot plants:** *Dracaena*, *Dieffenbachia*, *Anthurium*; **Ornamental trees and shrubs:** *Ginkgo biloba*, *Taxus baccata*, *Magnolia x soulangeana* Soul.-Bod., *M. grandiflora*, *Abies alba*, *A. concolor*, *Pinus nigra*, *Metasequoia glyptostroboides*, *Cedrus*, *Chamaecyparis*, *Picea*, *Pinus*, *Cupressus*, *Juniperus*, *Tilia argentea*, *T. platyphyllos* Scop., *T. cordata* Mill., *T. tomentosa* Moench., *Camptotheca acuminata* Decne., *Aucuba japonica* Thub., *Lonicera nitida* Wils.

#### **• Demonstrated skills or aptitude for leading scientific research (project management, attracted external funding, etc.).**

Earlier and in the period after acquiring the title of Associate Professor, Dr. Ivanova has proven herself as a successful leader and active participant in national and international scientific and educational projects financed by the Scientific Research Fund of Bulgaria, the European Commission and other sources such as internal funding from AU.

Projects in the field of higher education: 1 project /2013-2017/ in the Operational Program of the EC "Development of Human Resources", where Dr. Ivanova participated in the development of teaching materials; 2 projects "Student internships", in the Operational Program "Science and Education for Intelligent Growth" /2013-2017 and 2014-2020/; Participation in EC-funded Tempus Project S\_JEP 11476-96 and, Development of independent Tempus Project, 1994.

Research projects: team member in 2 international projects with China, funded by the Scientific Research Fund of Bulgaria /2011-2014 and 2016-2019/, team member in 3 and Head of 13 projects with internal funding from the Agricultural University.

**The mentioned activities unequivocally emphasize the abilities of Assoc. Prof. Ivanova to work in a team, to lead educational and research projects and contribute to attracting external funding.**

#### **4. Evaluation of the pedagogical ability and activity of the candidate. Its role in the training of young scientists.**

Assoc. Prof. Ivanova is an established, effective and successful teacher with more than 32 years of experience at the Agricultural University, Plovdiv. For the period 2019-2023, her teaching duties are 3832 hours incl. lectures, exercises and extracurricular activities; average workload per year in the last five years is approximately 766 hours, of which an average of 520 hours lectures, 37 hours practicals and 235 hours of extracurricular work.

The pedagogical activities of the candidate and her active role in the training of students and young scientific personnel make a very good impression. In support of this are the following activities: Development and management of the Master's course "Ornamental Plants and Landscape Design", Authorship of three Manuals for exercises on floriculture in AU, Plovdiv - 1995, 2001 and 2022; Author of an independent monograph on chrysanthemum growing issues, which can serve as a valuable teaching aid; Co-authorship in a book published on the basis of a dissertation work for obtaining the scientific educational degree doctor; Head of the discipline Ornamental Gardening and Landscape; Head of Doctoral Program in Ornamental Horticulture; Supervisor of two successfully completed doctoral dissertations and one in current course. A member of scientific juries for defense of doctoral theses and in competitions for assistant and associate professor. Participation in examination committees for admission and candidate minimum of doctoral students in various forms of study; Guidance and assistance in the development of diploma theses and participation in committees for their defense, as well as in committees for state exams.

Dr. Ivanova has completed a Course for student mentors. Already during his higher education at the Agricultural University, through a second specialization "Associate to mass media" (Journalism), she acquired skills for public conversation with discussion and written coverage of events.

#### **5. Significance of the obtained results, proven by citations, publications in prestigious journals, awards, membership in international and national scientific bodies, etc.**

**Citations:** The results reported in the scientific works of Assoc. Prof. Valeria Ivanova have found a good response in the international scientific community. In connection with the competition, 10 citations (without self-citations) of 4 scientific articles are indicated, and the citations are in prestigious journals with an impact factor or impact rank referenced and indexed in the databases Web of Science and Scopus. According to my reference, in these databases more citations are found, but the ones selected by the candidate are quite sufficient and even exceed the total number of points as required by this criterion. The citations are in works published in the period after the acquisition of the scientific title docent and are in journals of high rank: *Scientia Horticulturae*, *Cytology and Genetics*, *Ecological Engineering*, *Toxicological & Environmental Chemistry*, *Journal of Biotechnology*, *BioMed Research International*, *Journal of Plant Interactions*, *Molecules*, *Industrial Crops and Products*, *Bulgarian Journal of Agricultural Science*.

The quality of the scientific publications and the results reported in them show a very good theoretical background in the specific problems, detailed familiarization with the available information in the literature sources from previous and recent years, precise methodical approach and accuracy in the application of various experimental techniques, proper structuring of the articles, sophisticated scientific style in describing results and criticism in the discussions.

The demonstrated interest in the obtained results, the recognition of Dr. Ivanova through international citations and publications in renowned journals with high criteria and peer review are a proof of the significant scientific value of the conducted studies and the international recognition of the candidate for professorship.

Evidence of the high quality of the research and teaching performance, of the organizational and management skills in the scientific and teaching activities is Assoc. Prof. Ivanova's membership in governing bodies, among which Member of the Faculty Council of the Faculty of Viticulture - Horticulture at AU - Plovdiv, Chairman of The General Assembly of the Faculty Council of the Faculty of Viticulture - Horticulture, Member of the ERASUM Program Commission at the Faculty of Viticulture - Horticulture. Dr. Ivanova has been a member of the Scientific Committee of the 1st International Conference "Innovative (Eco) Technology, Entrepreneurship and Regional Development", 2015, University of Applied Sciences, Kaunas, Lithuania. The candidate is a member of the Union of Scientists in Bulgaria, Deputy Editor-in-chief of *Scientific Works of the Agricultural University* and of the journal *Agricultural Sciences*.

**Other achievements:** Valeria Ivanova's professional skills have been extended and her knowledge enriched through courses and specializations in several foreign scientific centers and educational institutions, including the Botanical Garden - Sochi, Russia, Tissue Culture Laboratory - Budapest, Hungary, Training in techniques in Molecular Biology - Czech Republic, Course in Modern Horticulture - Belgium, International Course in Intensive Vegetable Production under Different Conditions - Israel. Dr. Ivanova's international activity is complemented by giving lectures on Ornamental Gardening at scientific forums abroad /Germany, Greece, Lithuania/.

The good knowledge of the scientific terminology and the high level of spoken English and Russian are an advantage to Assoc. Prof. Ivanova's communicative abilities in a foreign environment and for the use of foreign scientific literature.

**Summary on the fulfillment by Assoc. Prof. Valeria Stefanova Ivanova, Ph.D., of the minimum national requirements /points by groups of indicators/ according to the criteria for a professor in Law on the Development of the Academic Staff in the Republic of Bulgaria, the article 1a, paragraph 1 of the Regulation of its application and the Regulations in Agricultural University – Plovdiv for field of higher education 6. Agricultural Sciences and Veterinary Medicine, professional field 6.1. Plant Growing**

Group of indicators	Criterion	Minimum requirements for the academic position professor	Results of Assoc.Prof. Dr. Valeria Ivanova
A	1. Dissertation for obtaining the educational and scientific degree "doctor"	50 points	50
B /3 or 4/	3. Monography	100 p.	100
C /5 till 12/	6. Published book based on a dissertation for obtaining the educational and scientific degree "doctor"; 7. Scientific publications in journals referenced and indexed in world-renowned databases with scientific information; 8. Scientific publications in non-refereed peer-reviewed journals or in edited collective volumes	200 p.	272.67
D /13 and 15/	13. Citations in scientific journals, referenced and indexed in world-renowned databases with scientific information	100 p.	150
E /from 16 to the end/	17. Supervision of a successfully defended doctoral thesis; 18. Participation in national research or educational project; 19. Participation in an international research or educational project; 23. Published university manual	100 p.	145
	<b>Sum</b>	550 p.	<b>717.67</b>

Note: In the table only the criteria according to which materials are presented.

**6. Significance of the contributions for science and practice. A motivated answer to the question to what extent the candidate has clearly defined profile of research work**

I accept all scientific-theoretical, scientific-applied and methodologically oriented contributions as outlined in details by the candidate and systemize them according to their significance.

**I. ORIGINAL SCIENTIFIC CONTRIBUTIONS**

Theoretical contributions: 1. For the first time, the possibility of intensive cultivation of chrysanthemum and increasing the yield from cut flowers, by increasing the number of shoots per unit area and optimizing the nutritional regime is studied. The influence of nitrogen fertilization on the mineral composition of plants has been proven. The most suitable nitrogen doses for obtaining high and quality yields have been established. A detailed original analysis of the quality and postharvest performance of cut chrysanthemum flowers obtained from the branches of differently formed plants is carried out (monograph, B.1.). 2. A comparative economic evaluation of the production of cut flowers from chrysanthemum under conditions of increasing nitrogen doses and different number of shoots per unit area is done. It has been proven that with highest values of the economic indicators in both varieties object of the study, are the plants formed with three stems and supplemented with the highest doses of nitrogen (monograph, B.1.). 3. In physiological aspect, it is found that the fertilization with the highest nitrogen dose has exerted a positive effect on the synthesis of leaf pigments, intensity of photosynthesis and activity of peroxidase and nitrate reductase. The obtained results are important in determining the optimal regime of fertilization and can be used as a theoretical basis for finding solutions of chrysanthemum nutrition (monograph, B.1.). 4. In a model system under conditions *in vitro*, the effect of osmotic stress caused by water deficiency in mini carnation (*Dianthus caryophyllus f. spray*, Hort.), Bulgarian variety "Mermaid" is studied for the first time. For simulating the stress a range of concentrations of polyethylene glycol (PEG-6000) and different duration of exposition have been tested. Explants growth has been established to decrease proportionally with the increase of PEG concentration. The greatest water deficit was found at the highest concentration of PEG and the longest duration of exposition (publication 7.14 of those presented in full text). 5. In relation to the effects of water stress, it has been shown that at twice or once watering per week, the growing of asters (*Callistephus chinensis*), *Helichrysum bracteatum* and echinacea (*Echinaceae purpurea*) (publication 7.10), in containers for a period of 3 months leads to significant suppression of growth and even death of the plants. Relative water content /RWC %/ and electrolyte leakage have been used as markers to detect the effect of water stress. In accordance with the increase in the strength of the water stress (one watering per week) the leakage of electrolytes increases, which reaches high values especially in helichrysum, followed by asters and echinacea. This correlates with the low RWC% and reduced plant sizes (height and diameter). The lowest values of RWC for aster, helichrysum and echinacea are observed in the variant with one-time weekly watering, 15%, 11.5% and 15.8%, respectively. 6. A pioneering study is carried out to identify overwintering damage of *Dahlia variabilis* tubers in the soil. It is found that after wintering, the

number of tubers increases significantly in all three investigated varieties Vitus, White Ball, Dark Red. An increase in plant height has been recorded. In all three cultivars a significant increase in stem and inflorescence biometric characteristics has been established. (publication 8.6). Overwintering plants are found to enter the initiation and mass flowering phenophases earlier. Longer flowering of individual flowers and the whole plant are recorded in overwintered plants (publication 7.6). 7. Five new for our country gladiolus varieties Purple flora, Priscilla, Plum tart, Oscar and Green star are tested in order to determine their suitability for cultivation under the conditions of Bulgaria. Green star and Purple flora cultivars are found to show the best vegetative development, resulting in the formation of the tallest plants with the largest stem diameter and highest number of leaves. With proven highest ornamental value of all studied genotypes, in the conditions of Bulgaria, is the variety Purple flora. Positive correlations between plant height and number of leaves, and also between the length of flower stem and number of developed flowers is found (publication 7.7). 8. Original is the research on the performance of seeds of three types of linden in five periods of seed harvesting. It is found that the fastest growing are the seedlings of *Tilia cordata*, *T. platyphyllos* and *T. tomentosa*. The plants of the species *T. cordata* have the highest stem height, and those of *T. tomentosa* are with the largest stem diameter (publication 8.2). 9. The phenological development of seeds obtained from seeds collected 75 and 90 days after flowering of the widespread linden species in Bulgaria - *T. platyphyllos* - is monitored. The phenological and growth indicators, beginning of and mass emergence, emergence of cotyledons, emergence of first and third true leaf are followed. Recorded are the average daily temperature and the amount of precipitation during the growing season. The correlation between the phenological manifestations and the studied elements of the climatic conditions are determined. In addition, the correlations between the average daily temperature and the periods between the different stages of seed development is estimated. A regression analysis is also performed between the duration of the different phenophases and the average daily temperature. The influence of environmental conditions on phenological development has been established, particularly for germination and the appearance of the first cotyledon leaf (publication 7.11). 10. Tracking the changes in gas exchange and total chlorophyll content in the leaves of *T. grandifolia*, *T. argentea* and *T. parvifolia* linden seeds establishes germination and survival in comparison to the total number of seeds sown, as well as to the number of germinated seeds, the intensity of photosynthesis, transpiration, stomatal conductance and total chlorophyll. The germination rate has been low, but the percentage of surviving plants to germinated seeds is higher - 84% to 99.6%. Photosynthetic and transpiration rates are highest in *T. parvifolia* leaves, while total chlorophyll is highest in *T. argentea* (publication 8.15).

Theoretical contributions that are original additions to previous information: 1. In the duration of several phenological seedling phases, differences between the linden species *Tilia platyphyllos*, *T. cordata* and *T. tomentosa* were found, depending on the time of seed harvesting. The earliest flowering and seed maturity are observed in the large-leaved linden (*T. platyphyllos*). In the tiny-leaved linden (*T. cordata*), the seeds germinate the earliest, while in the seedlings of the silver-leaved linden (*T. tomentosa*) the formation of the cotyledons, first and third true leaves is the earliest (publication 8.10). 2. Biotechnological and conventional propagation methods of *Ginkgo biloba*, *Taxus baccata*, *Magnolia x soulangeana* Soul.-Bod and *Magnolia grandiflora* L. are reviewed (book C.6.). 3. The growth characteristics of *G. biloba* seeds grown in conventional above-ground containers and in pot-in-pot containers are studied. Although in comparison to the control both cultivation systems show proven higher values of the growth characteristics of *G. biloba* seeds, the use of conventional above-ground containers is preferable (publication 8.14). 4. Studies on the content of secondary metabolites in *G. biloba* show the highest concentration of ginkgolides A, B, C and bilobalide in the leaves of trees from Plovdiv and Hisar. Of the three types of ginkgolides - A, B and C, the highest content is of ginkgolide A, followed by ginkgolide B and the lowest content of ginkgolide C. It is found that the concentration of the studied substances is the lowest in spring and autumn, and highest at the beginning of summer. (publication 8.13). 5. Developed is a protocol for *in vitro* propagation of *G. biloba*. The cytokinin meta-topolin is found to significantly enhance lateral bud proliferation (Publication 7.8). *In vitro* propagation of *G. biloba* on MS or WPM media has been achieved for the first time, when the culture is initiated from shoot tips with 2 buds (publication 8.18). 6. The possibilities for improving the *in vitro* propagation of *Magnolia grandiflora* and *Magnolia x soulangeana* is studied. By using two media based on MS (Murashige and Skoog) or DKW (Driver and Kuniyuki) supplemented with the cytokinin meta-topolin (mT 0-8.5  $\mu$ M) the influence of media components on micropropagation is investigated for both magnolia species. The influence of the auxin indolyl-3-butyric acid (IBA) and the biostimulator Charcor on the rooting of microplants is also determined. The best rate of propagation for both magnolia species is found to be at the enriching the culture medium with 7  $\mu$ M mT. For *M. grandiflora*, basal DKW medium appears more effective, while for *M. x soulangeana* MS proved to be more suitable. The biostimulant Charcor added to liquid MS medium is highly effective for the rooting of *M. grandiflora* L. and *M. x soulangeana* (publication 7.2). 7. Two methods of disinfection /with a 5% solution of calcium hypochlorite ( $\text{Ca}(\text{OCl})_2$ ) and 2% silver nitrate ( $\text{AgNO}_3$ ) are applied for sterilization of apical buds, stem cuttings from the top of mature cuttings, actively growing one-year shoots of adult trees and apical and nodal segments of actively growing seedlings of the three main linden species *T. cordata*, *T. platyphyllos* and *T. tomentosa*). Propagation media based on MS, DKW and WPM (McCown woody plant medium) basic media are used. The effect of the cytokinins 6-benzylaminopurine (BAP), kinetin (6-furfurylamino-purine), meta-topolin (mT, [6-(3-hydroxybenzylamino)purine]) and 2-iP (6- $\gamma$ - $\gamma$ -(dimethylallylamino)-purine) applied at equimolar concentrations of 5  $\mu$ M, on the propagation of large-leaved linden (*T. platyphyllos*) has been evaluated. The best disinfection procedure is found to be the sequential application of  $\text{Ca}(\text{OCl})_2$  and  $\text{AgNO}_3$  to explants of actively growing shoots, with the best results obtained for *T. cordata*. For *T. platyphyllos*, the maximum number of lateral shoots is reported in the medium with meta-topolin. The highest rooting rate of large-leaved linden (*T. platyphyllos*) has been achieved on half strength macronutrient MS medium supplemented with 0.3 mg l<sup>-1</sup> IBA (publication 7.3.). 8. An efficient protocol for micropropagation of *Camptotheca acuminata* Decne is elaborated. By supplementing MS-based or DKW-based culture

media with purine- and non-purine-type cytokinins (BAP, 2iP or mT), the aromatic cytokinin metatopolin is found to stimulate plant growth. The optimal shoot proliferation rate of *C. acuminata* is observed in DKW basal medium supplemented with 2.5 µM metatopolin grown under mixed LED light. A positive effect of 0.3 mg l<sup>-1</sup> NAA on root number is shown (publication 7.4). 9. Sonication for 6 minutes is found to cause the greatest increase in germination in *Lupinus polyphyllus* Lindl. and *L. mutabilis* Sweet. Higher values of germinating energy, average germination duration and germination uniformity, hypocotyl and embryonic root length, seed fresh and dry matter are observed in *L. polyphyllus* species (publication 7.1.). 10. Among the combinations of IBA and gibberellin (GA<sub>3</sub>) studied in *Lonicera nitida* propagating through mature cuttings, 1000 ppm IBA is found to be the most effective treatment resulting in the highest rooting percentage and best characteristics of the root system (publication 8.8).

**II. CONFIRMATIVE SCIENTIFIC CONTRIBUTIONS:** 1. The pre-sowing treatment of *G. biloba* seeds with different concentrations of GA<sub>3</sub> increases the germination rate of the treated seeds up to 83.6%. A positive correlation between GA<sub>3</sub> concentration and vegetative plant growth is found. Plants treated with 2500 ppm GA<sub>3</sub> have the tallest stem, the largest number of leaves, and the biggest leaf area (publication 8.1). 2. It is established that when treated with Panamin Agro, the growth characteristics of three species of tagetes: *Tagetes erecta*, *T. patula* and *T. signata* significantly exceed those of untreated control plants. With the tallest and thickest stems, the largest number and size of leaves and flowers, and a long vegetation period are the three tagetes species treated with 1.0% Panamin Agro. The effect of foliar treatment with Panamin Agro on biometric characteristics of the root system is insignificant. We suggest the use of 1.0% Panamin Agro in the nursery practice for the production of tagetes (publication 7.9). 3. The application of *Azospirillum sp.* in combination with *Bacillus sp.* and full mineral fertilization results in the highest values of growth parameters in one-year old *Gingko biloba* seedlings. It has been proven that the biofertilizers used have the capacity alone and in combination to increase the nutritional value of the soil mixture. In addition, they increase the efficiency of the added chemical fertilizers and make it possible to use a quarter or half of the recommended dose of chemical fertilizers along with each of the bacteria used to grow *G. biloba* seeds with high quality and with minimal environmental pollution (publication 8.12.). 4. The study on the effect of the biomineral fertilizer Lumbricol on annual flowers *Antirrhinum*, *Tagetes*, *Zinnia* and *Verbena* proves that treatment with Lumbricol has a positive effect on seed germination, root system volume, number of leaves and leaf area, and phenophases of plants at the optimal concentration of the biomineral preparation of 20%. The effect of Lumbricol is species specific and the treatment has a better effect on *Antirrhinum*. The 20% concentration of Lumbricol can also be recommended for the treatment of annual plants for the production of planting stock (publication 8.16). 5. The study on the possibility of using *Verbascum thapsus* as an ornamental plant (publication 7.5) shows that plants with seeds sown in early July have the best ornamental behavior - the largest flowers, the highest number of flowers and the longest flowering period. 6. Based on the ornamental characteristics, the possibility for using species of the genus *Capsicum* - *C. annum*, *C. frutescens* and *C. baccatum* as ornamental plants has been confirmed. *C. baccatum* plants had the tallest stem, the highest number of branches and the most fruits. However, these plants are not suitable for group planting, but are very appropriate for solitary cultivation or growing in pots (publication 8.3). 7. The highest percentage of rooting of aucuba (*Aucuba japonica* Thub.) propagated through mature cuttings is reported when a peat-perlite substrate is used. Good root development is noted also in the sand-containing combination (publication 8.9). 8. A survey of methods for identifying noise pollution in urban areas was carried out and a trend towards the introduction of ornamental trees and shrubs as green sound barriers was noted (publication 7.13). 9. It has been reported that the Dendrological Park at the Agricultural University, Plovdiv has fulfilled its original purpose as a place for students from various faculties studying disciplines related to ornamental horticulture to gain new knowledge. Over the years, many nurseries in southern Bulgaria have received starting materials - seeds and cuttings - from the Dendrological Park of the Agricultural University. Disadvantages include the lack of flowering shrub species and the low percentage of coniferous species (publication 8.5). 10. The results of a study on the use of coniferous species in the parks and gardens of the Plovdiv region were obtained (publication 8.11). Eight of the largest settlements in the region are included - Plovdiv, Pazardjik, Stamboliyski, Asenovgrad, Popovitsa, Hisar, Banya and Karlovo. In Bulgaria there are 27 species of the most common coniferous trees and shrubs. The vital and decorative condition of these species is defined by a special methodology. Coniferous species were found to be a smaller part of the total number of plants planted in parks and gardens in this part of the Thracian Lowland. The vitality and ornamentality of most individuals are considered unsatisfactory. It is recommended to increase the percentage of conifers and shrubs used by using planting material produced in nurseries from the same region. It is also recommended to limit the use of the species *Abies alba*, *Abies concolor*, *Pinus nigra* and *Metasequoia gliptostroboides*, and to expand the use of *Cedrus*, *Chamaecyparis*, *Picea*, *Pinus*, *Cupressus* and *Juniperus*.

**III. METODOLOGICAL CONTRIBUTIONS:** Original: 1. A manual for practicals in floriculture /E23/ has been developed. 2. New procedures for surface sterilization of ginkgo and plum shoot apical explants as well as cherry embryos were studied for the first time. Silver nitrate or chlorhexidine gluconate was used in different concentrations and exposure times. Silver nitrate and chlorhexidine gluconate have been recommended as effective surface sterilizing agents in disinfection procedures when introducing lignified tissues and embryos into culture (Publication 7.15). 3. A procedure for *in vitro* culture of *T. baccata* shoots was improved. The best survival of shoot tips with a high frequency of axillary bud induction was shown by the WPM medium supplemented with zeatin. WPM without growth regulators induces shoot elongation (Publication 8.17).

#### IV. APPLIED CONTRIBUTIONS

Original: 1. It was established that the treatment with 0.01% Biolan for 12 hours significantly stimulated the germination of the seeds of the Balkan endemic species with valuable ornamental qualities included in the Red Book of Bulgaria - *Limonium bulgaricum* Anchev and *Goniolimon dalmaticum* (C. PRESL) RCHB . F., the effect being genotype specific. Furthermore, a positive effect on seedlings length and number of leaves formed was observed in both species, especially in some of the *Goniolimon* genotypes (publication 8.7). 2. The influence of the growth regulators auxin (IAA) and gibberellin (GA<sub>3</sub>), as well as the biostimulators Biolan and Agrostimulin, on the germination of *Magnolia grandiflora* seeds was tested. Pre-sowing treatment of *M. grandiflora* seeds with GA<sub>3</sub> alone or in combination with 2500 ppm IAA increased their germination rate by two-fold compared to the control. However whereas the treatment of *M. grandiflora* seeds with Biolan and Agrostimulin did not improve seed germination, it had a favorable effect on the further development of the seeds. Plants obtained from seeds treated with 0.02% Biolan have a larger leaf area and fresh leaf mass compared to the other variants. Treatment of the seeds after their stratification with 0.005% Agrostimulin has a positive effect on the development of their root system (publication 7.12.).

Confirmative: The application of Osmocote, a granular fertilizer with controlled release to the substrate for *ex vitro* growing *in vitro* propagated plants of *M. grandiflora* and *M. x soulangiana* has been proven to have a positive effect on plant growth and development. For *M. grandiflora*, the application of the 4th generation Osmocote (Exact Hi End) is most suitable, while for *M. x soulangiana* a better effect shows the inclusion of Osmocote Pro 3-4 M (2nd generation) and Osmocote in the substrate Exact Standart (3rd Generation) (publication 8.4.).

The outlined contributions to the scientific and scientific-applied research and methodological achievements unequivocally illustrate that the candidate has a clearly defined profile of scientific research and educational work in the field of Floriculture.

#### 7. Critical notes and recommendations

I recommend, in her future work, the candidate to expand her publication activity toward publishing scientific articles primarily in journals with an impact factor or impact rank.

#### 8. Personal impressions and opinion of the reviewer

I have known Valeria Ivanova since the first years of her activity in the field of ornamental plants, when she performed experimental and organizational tasks in the Tissue Culture Laboratory at the Institute of Floriculture, Sofia, and subsequently I followed her professional development with interest. My impressions are that she is an ambitious, enthusiastic, tireless and capable specialist, with a high potential for scientific activity and a distinctive ability to work both independently and in a team with respect for the opinion of her colleagues. Valeria has demonstrated a constant interest in developing new and improving existing experimental methods and approaches, simultaneously expanding and upgrading her competencies, which has clearly led to her establishment as a very good researcher. I note with satisfaction that at the Agricultural University, Plovdiv, Dr. Ivanova has developed and realized herself as a highly erudite teacher, administrator, manager, organizer and scientific staff in the field of ornamental horticulture.

### CONCLUSION

Based on the analysis of the pedagogical, scientific-theoretical and scientific-applied activity of the candidate, I am convinced that Assoc. Prof. Dr. Valeria Stefanova Ivanova fully complies with and significantly exceeds the minimum requirements of the criteria for a professor in Law on the Development of the Academic Staff in the Republic of Bulgaria, the article 1a, paragraph 1 of the Regulation of its application and the Regulations in Agricultural University – Plovdiv for field of higher education 6. Agricultural Sciences and Veterinary Medicine, professional field 6.1. Plant Growing

All this gives me a reason to POSITIVELY evaluate the overall activity of Assoc. Dr. Valeria Stefanova Ivanova.

I am proposing to the honorable Scientific Jury to also vote positively, and the Faculty Council of the Agricultural University - Plovdiv to elect Assoc. Dr. Valeria Stefanova Ivanova as PROFESSOR in professional field 6.1. Plant Growing, scientific specialty Ornamental plants.

Date: 16.11.2023

Sofia, Bulgaria

REVIEWER: Prof. Dr. Elena Tomova Iakimova)

