

REVIEW

on the materials for participation in a competition for the academic position of Professor, field of higher education 6. Agrarian Sciences and Veterinary Medicine, Professional area 6.1. Crop Production, scientific specialty "Agrochemistry", educational subject "Agrochemistry", announced by the University of Forestry in State Gazette No. 59/12.07.2024, procedure code AGR P-0524-132

Candidates for participation in the competition are:

1. Associate Professor, DSc Veselin Iliev Kutev

Reviewer: Assoc. Prof. Dr. Margarita Todorova Nikolova, Retired, Sofia, PN 6.1. Crop Production, scientific specialty "Agrochemistry", appointed as a member of the scientific jury by Order No ZPS-515/18.09.2024 of the Rector of the University of Forestry-Sofia

1. Brief curriculum vitae of the candidate(s)

Assoc. Prof. Dr. Veselin Kutev was born in 1961 and graduated with honors from the State Agrarian University "V.V. Dokuchaev" – Kharkiv, Ukraine with a degree in agronomist, agrochemist, soil science. After graduating from higher education in 1987, he developed his scientific career at the Soil Science Institute "N. Pushkarov", where he defended his doctoral dissertation, was habilitated as an associate professor and in 2013 he acquired the scientific degree of "Doctor of Science". The topic of his major doctorate is: "Geostatistical Approach for Studying the Spatial Variation of Soil Indicators for the Needs of Agrochemical Studies and Agriculture".

In the period 1995 – 1999 he carried out 3 long-term specializations in authoritative scientific centers in Switzerland and France, as well as several short-term specializations and courses in foreign scientific institutions. In the last 10 years he has participated in the development of 19 scientific projects – 10 funded by the Agricultural Academy, 5 funded by other national institutions and 4 funded by international scientific organizations in the field of agrochemistry, soil science and the environment. In the period 2011-2012 he was an associate professor on a second employment contract at the Institute of Mathematics and Informatics at the Bulgarian Academy of Sciences. In the period 2012-2014 he was Head of the Bureau for Transfer of Technological Solutions in Agriculture at the Soil Science Institute "N. Pushkarov". The main activity of the unit is the preparation of fertilizer recommendations for farmers.

Since 2014, after a competition, he has held the academic position of Associate Professor at the Faculty of Agronomy of the University of Forestry. In the period 2016-2019, he headed the Department of Agriculture and Herbology, and since 2024 he has been the head of the Department of Agronomy. His activity at the University of Forestry covers all aspects of teaching - he gives lectures and exercises, teaching practices, works with graduate and doctoral students. He has introduced new disciplines in the master's programs, thus contributing to the training of agronomists with competencies in new, current fields.

Along with teaching, Assoc. Prof. Kutev is also active in scientific activity. His areas of competence are diverse and include: agrochemical research; mineral and organic fertilization and environment, nitrogen nutrition and fertilization of plants, nitrogen transformations in soils, nitrates leaching in groundwater, selection of an appropriate form of fertilizer depending on the crop and specific soil conditions, isotopically exchanged Zn and P in soil (32P and

65Zn); heavy metal contamination of soils; phosphorus pollution of water pools, spatial variation of nutrients and heavy metals; monitoring and new methods for sampling, precision agriculture, organic farming. The complex nature of the research is related to participation in interdisciplinary scientific teams, which increases the importance of the results obtained and the contributions. The modern level of scientific research of Assoc. Kutev is also contributed by his specializations in authoritative European academic institutions.

Ass. Prof. Kutev is a member of the Bulgarian Soil Science Society, the International Society of Humus Substances, the Austrian Lysimetric Group, ISTRO and FAO-RAMIRAN. He speaks Russian, English and French. He has excellent computer skills, along with standard office programs, and uses GIS, drone and other programs.

2. Compliance of the submitted documents and materials of the applicant with those required under the Regulations on the Development of the Academic Staff in the University of Forestry;

In the announced competition, the candidate Assoc. Prof. DSc Veselin Kutev participated with a total of 50 scientific publications with 15 citations. He submitted documentation certifying the leadership of 4 PhD students, participation in international and national projects, authorship of textbooks.

Indicator	Publications/ Quotes	Candidate Points	MNI	For the group of indicators	Under MNI
Q4	11	121,7	60/n	121,7	100
G5	1	16,7	100/n	342.6	200
G6	2	80	40/n		
G7	16	174,8	30/n		
G8	19	51,1	10/n		
G11	1	20	20/n		
D13	15	225	15	225	100
E16	1	40	40	415	100
E17	4	120	40/n		
E18	1	5	15/n		
E19	1	20	20		
E20	2	60	30		
E21	4	160	40		
E23	1	10	20/n		

The analysis of the self-assessment report of Assoc. Kutev with the MNI shows that the requirements for the academic position of "professor" have been exceeded in all indicators.

3. Evaluation of the teaching activity of the candidate

For the 10-years period at the University of Forestry, Assoc. Prof. Kutev has developed an active teaching activity - he conducts lectures and exercises, training practices, works with graduate and doctoral students. He develops programs and leads courses in "Agrochemistry", "Crop Production" for bachelors, as well as for new master's programs (11 in total). He also introduces new, up-to-date disciplines in the master's courses - "Plant Nutrition and Fertilization", "Precision Agriculture", "Organic Residues Management", "Soil Fertility

Management", "Minimum and Zero Soil Tillage", "Good Practices for Manure Management", "Crop Fertilization in Precision Agriculture". He has co-authored a textbook on "Fertigation Technology in Vegetable Cultivation". Along with this, during the period Assoc. Prof. Kutev manages 2 national, 4 international educational projects and participates in 2 more (one national and one international) educational projects. His scientific and educational activities also include the supervision of 4 PhD students who have successfully defended their dissertations on current topics.

The above, as well as the score of 415 points on indicators from group E (with the required 100 points, according to the Law for Development of Academic Staff) gives grounds to give an excellent assessment of the teaching activity of Assoc. Kutev.

4. Assessment of the scientific, applied and publication activities of the applicant

4.1. Participation in scientific, applied and educational projects

In this competition Assoc. Prof. Kutev presented the management and participation in 8 projects after his appointment to the position of Associate Professor at the University of Forestry – management of 4 international, 2 national and participation in another international and one national. He is the coordinator for Bulgaria of a project from the Sixth Framework Programme of the EU (FOOD-CT-2004 003375 "Opening channels in communication between the associated candidate countries and the EU in organic farming"2004-2006); of a project funded by the Ministry of Foreign Affairs of Greece - "Hellenic - Bulgarian cooperation for the protection and management of natural resources - 2004 - 2006"; Head of project BUL/017/06 funded by the Flemish Government for Bulgaria - "Implementation of farm gate nutrient balances in Bulgaria: A management tool towards sustainable agriculture", 2007-2010; He is also the head of a project at the National Science Fund - Contract DNTS/Austria 01/2 of 23.08.2017 - "Nutrient distribution in the soil under intensive vegetables cultivation with fertigation and optimization of the crop nutrition in order to reduce the impact of fertilizers on the environment". Along with these, he manages and participates in more international and national projects covering the main areas of the candidate's research - balanced plant nutrition, soil nutrient balance, precision agriculture, organic production, fertigation, climate change and soil monitoring;

The participation of Assoc. Kutev in large-scale international projects gives him the opportunity for a quick exchange of information and research of many topical problems for Bulgaria.

4.2. Characteristics of the published scientific results

The publication activity of Assoc. Prof. Kutev is diverse and is mainly related to his leadership and participation in international and national projects (B4,4; B4,6; G7,14; G7,15; G8,13; D8,14), as well as to the development of doctoral theses. A significant part of the publications are in prestigious international journals, refereed and indexed in Scopus and/or Web of Science. 14 of the submitted articles or 30.4% have an impact rank (SJR), and 10.9% with an impact factor (IF). In addition, he is author of two books: "Study of nitrogen mineralization in the conditions of laboratory, vascular and microfield experiments (using ^{15}N)" (2023) and "Geostatistical approach to the study of spatial variation of soil indicators for the needs of agrochemical studies and agriculture" (2023), based on his dissertation for the degree of "Doctor of Science" award. He is also a co-author of the book "A study of the balance of nutrients at farm level in Bulgarian agriculture and its use as a mean of sustainable agriculture managing " (2017). In the scientific work "Soil organic matter and soil fertility in Bulgaria", published in 2014 by a large

team of authors, Assoc. Kutev is the author of Chapter 3.6 "The nitrogen mineralization ability of soils and its importance for assessing soil fertility". In 2019, a team of authors from the University of Forestry, Sofia and the VOKU University in Vienna published the book "Technology for Fertigation of Vegetable Crops" within the framework of a bilateral scientific project between Bulgaria and Austria, funded by the National Science Fund. It serves as a teaching tool for students in agricultural technical schools.

Along with the agrochemical publications, Assoc. Kutev has publications related to animal husbandry, magnetosphere, forestry. He also participated in the creation of a science film dedicated to the balance of nutrients at the farm level. For the successful participation of Assoc. Prof. Kutev in multidisciplinary projects, his academic knowledge in different fields, his excellent foreign languages knowing, the application of appropriate, innovative research methods, and knowledge of specialized software products are essential.

The published scientific results of the candidate's research activity can be attributed to the following areas:

- Sustainable Agricultural Production, Crop Nutrition Management, Irrigation, Production Quality and the Environment in the period of Climate Change (Publications B4,9; D6,1; D7,11; G7, 10; G7.12; G8.10; G8.18;)
- Development of fertilization and fertigation systems for field and vegetable crops. Nutrient transformations, especially nitrogen in major soil differences. (publications - B4, 11; G7,3; G7.4; G7.5; G7.13; G8, 8; G8.9; G8.12; G11).
- Characterization of different crops varieties, fertilizer forms testing, depending on the method of application. (G7.9; G7.16; G8.1; G8.2; G8.4; G8.17; G8.19).
- Precision agriculture - creation of monitoring network, based on geostatistical analyses in order to determine the spatial variation of the available forms of nutrients and organic nitrogen under irrigation conditions (B4.5, B4.10, B7.7, G6.2, G7.2, G7.6, G8.3, G8.7, G8.11, G11.1).
- Climate change and the role of the anthropogenic factor in dealing with emerging situations. The influence of hydrological, weather conditions, as well as the role of the ground and space cover and the possibilities for its use in the occurrence of climatic anomalies (B4.1, B4.2, B4.3, B4.7, B4.8, G7.1, D8.15) are assessed.
- Analyses and recommendations at farm level. This includes applied activities under contracts and advisory activities in real farms (G5; G7.8; G8.5; G8.6; E23.1).

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

Assoc. Prof. Kutev has indicated 15 citations of his publications only in journals referenced in Scopus and/or Web of Science, with 46.7% of the citations being in journals with high scientific ratings (Q1 and Q2). Citations in journals with IF are 53.3% of the total number of citations presented with the documents. According to the reference for citations, Assoc. Prof. Kutev has 225 points, which significantly exceeds the required 100 points for indicator D13.

4.4. Contributions to the candidate's works (scientific, scientific-applied, applied)

In the documentation for the competition for the academic position of Professor at the Department of Agronomy, scientific specialty Agrochemistry, Assoc. Prof. Kutev has presented 46 contributions, which I accept in general. As noted, the scientific activity of the candidate is in different fields, in which the desire to study new, current problems and

processes in depth, using modern methods and approaches is evident, computer and statistical programs and the ability to work in a team. In this review, I focus on contributions in the field of crop production.

Scientific contributions

- The spatial variation of agrochemical parameters in smolnitza with grown barley and sunflower has been studied. An opportunity to reduce phosphorus fertilization rates based on taking into account the real variation is shown. The results obtained for the applying variable fertilization rates are particularly important for precision agriculture (G7,10)
- Based on the studied soil and climatic information, a permanent monitoring network of 36 points on smolnitza has been created. The factors having a major influence on the variation of nutrients and organic matter are defined. A high correlation of spatial variability between P and K has been established, which depend on the processes of soil formation and the prevailing parent materials. The differences in nitrogen are explained by the application of nitrogen fertilization, and the variation of organic matter and humus with different hydrological and relief conditions in a flat part and soil erosion processes in a hilly area. (G7.6; G7.7; G11.6; G11.7)
- The straw:grain ratio was determined for 100 old and modern varieties of wheat. A significant difference in this indicator was found between the two main breeding centers in Bulgaria – Sadovo and General Toshevo, as well as between silly and non-silly varieties. The N, P and K fertilization rates also affect this ratio. These characteristics are extremely important for optimizing the data on the nutrients removal per unit area depending on the variety and the method of harvesting. In this direction are the plant height data obtained from a study of 358 European varieties of winter and 14 varieties of spring wheat based on field data in eight countries. (G11:4)
- The change in the NDVI index and the status of wheat and rapeseed crops before wintering were investigated using a drone and a multispectral camera. This is one of the first applications of this methodical approach, which allows diagnosing the need for nitrogen fertilization and more accurately determining the nitrogen doses during the vegetation in different parts of the field. (B4.5; (G7.5)
- The possibility of using the digital vegetation index NDVI has also been investigated to establish a link between surface and groundwater pollution with nitrates. New data on nitrate pollution have been obtained, the main source of which are nitrogen fertilizers used in agriculture (B4,5).
- In long term trial with corn, increased nitrate pollution has been found over a 20-year period. The possibility of controlling the process by using a mathematical model is shown. (B4,9)
- The organic carbon content of the depth of light soil profile after fertilization with manure was studied. Significant movement in depth over a period of two years was found, which indicates the need to revise the perception that there is no strong leaching of organic matter. (G7.2)
- In connection with climate change, trends in changes in the amount of snow fallen, its water equivalent and the development of winter crops are analyzed. Through hydrological modeling, a decrease in the water resource from snow has been established, an indicator of changes in hydroclimatic conditions in winter. Differences in the reaction of the grown winter crops have also been found. While rye yields decreased significantly, triticale yields were more resilient for the period studied. (G11:16)

- The main environmental parameters influencing the replenishment of water resources in our country through snowfalls for the South Central region have been studied. Results have been obtained on the influence of winter precipitation for a period of 22 years on the yields of winter crops. It has been found that this relationship changes depend on the precipitations in the rest of the seasons. (B4.2; B4.3)
- By using a hydrological model of precipitation and runoff, which is a submodel of NASA's climate model, an estimate of the expected changes in an important part of Bulgaria's water resources caused by the shift of the main precipitation to the warm seasons has been made for the Struma and Mesta river basins. (B4.8; D11.15)
- The movement of nutrients in the soil during fertigation has been investigated. By determining the electrical conductivity, vertical and lateral movement of the dissolved salts has been established. The results obtained allow adjustments of the applied irrigation and fertilization rates, as well as the location of the irrigation lines to the grown crop. (G11:10; G11:11; G11:12)
- In fertigation experiments, a comparative study of ortho- and polyphosphate fertilizers and different forms of nitrogen fertilizers was carried out. Original data on their efficiency in vegetable crops (zucchini, onions and lettuces) have been obtained. The NDVI index was measured and a relationship was made with the nitrogen fertilizers used (G7.4; B4.11; G7.11; G7.12; D7.13; D18).

Scientific and applied contributions

- In the main soils of Eastern Bulgaria, the content of mineral nitrogen and available forms of phosphorus and potassium has been investigated. It has been found that under the applied fertilization practices there is a strong decrease in phosphorus and potassium reserves, which indicates a decrease in soil fertility. The threshold content of N, P₂O₅ and K₂O has also been established, at which is possible not to fertilize with the relevant elements.
- The immobilization of ammonium and nitrate ions in joint application by using labeled ions in different soils has been studied. Significantly stronger immobilization of ammonium cations compared to nitrate anions has been established. The results allow optimizing the nitrogen fertilizers forms used depending on the soil type.
- Factors influencing the nitrogen efficiency in 100 varieties of wheat have been studied. Significant differences have been established between old and modern varieties depending on the place of cultivation. This justifies the need to take into account the varietal characteristics when optimizing nitrogen fertilization.
- The influence of fertigation on some soil indicators such as pH and the phosphorus fixation introduced with fertigation has been studied. A slight acidification of the soil during fertigation in the control variant and when using compost has been found, while in the application of manure the acidification is insignificant. (G7:10)
- A large range of different liquid organic fertilizers of plant and animal origin, as well as foliar fertilizers, has been studied. The information obtained is important for the practice in the green economy.
- An assessment of the causes of the devastating destruction from the floods on the Southern Black Sea coast in 2023 has been made through map observations of the terrain from satellite surveys.

In conclusion, I would like to note that some of the scientific contributions of Assoc. Kutev were obtained by introducing new methodological approaches and refer not only to specific research, but also outline a vision for future projects. A large part of his contributions

are also practical, allowing updating the parameters underlying the algorithms for optimizing fertilization rates. Ass. Prof. Kutev is also one of the authors of the Nitrogen Plant Nutrition Management System, developed under the IPNI project for Bulgaria "Good Practices for Sustainable Crop Nutrition Management in Bulgaria".

4. Assessment of the candidate's personal contribution

The personal contribution of the candidate is undeniable, given that for the period he has led 4 international and 2 national projects, introduced new, current disciplines in the training of master's students, developed programs for them, supervised 4 PhD students who successfully defended their dissertations.

5. Critical notes and recommendations

I have no critical remarks on scientific and teaching activities of Assoc. Kutev in general. I would note the rather expanded scientific topic and recommend focusing on agrochemical problems, in particular nitrogen agrochemistry, a field in which he is a leading scientist in the country. In his research, he has accumulated a large database, allowing the development of algorithms for optimizing fertilization rates not only by crops, as it is now, but differentiated by crop varieties and agro-ecological regions.

7. Personal impressions

I have known Veselin Kutev since he started working at the Nikola Pushkarov Institute of Soil Science and Plant Nutrition, i.e. over 20 years and I have witnessed his development as a scientist. We also worked together on the IPNI project "Good Practices for Sustainable Crop Nutrition Management in Bulgaria", within of which Assoc. Prof. Kutev processed the results of a large number of field trials and supported the updating of the parameters, participating in the optimization of nitrogen fertilization rates. Therefore, I can point out a number of qualities that have contributed to his progress in science – innovative thinking, development of current topics, mastering modern methods and techniques, good knowledge of statistical programs, knowledge of foreign languages, international contacts.

8. Conclusion

From the analysis of the scientific production, applied and teaching activities of Assoc. Prof. Veselin Kutev, Ph.D., it can be seen that he has made significant contributions in the field of Crop Production and in particular Agrochemistry. As a scientist he has received international recognition, and is also an authoritative and respected lecturer. According to all criteria, he fully meets the requirements of the Law on the Development of the Academic Staff and the Regulations of the University of Forestry for occupying the academic position "Professor".

In accordance with the above, I propose that the candidate Assoc. Prof. **Veselin Iliev Kutev** take the academic position of "Professor" in the discipline "AGROCHEMISTRY" from PN 6.1. Crop production.

Reviewer's signature:

The review has been submitted to: 28.10.2024