



PEER REVIEW

In a competition to obtain the academic title of “Associate Professor” — field of higher education 6. Agricultural Sciences and Veterinary Medicine, Professional Division 6.1 Plant Production — Scientific Specification “Meliorations (including soil erosion and the fight against it)”, published in State Gazette No 98 of 17 November 2020 for the needs of the Department of Irrigation, Soil Conditioning and Agrophysics, Agrarian University of Plovdiv.

Reviewer: Associate Professor Dr Zhivko Vassilev Zhivkov — Sofia, Zona B-5, Block 2, Entrance A, App. 59.

1. Short presentation of the candidate

The competition is open to Dr Radost Petrova, born in 1985 in Plovdiv. In 2008 she graduated as a full-time student in Plovdiv and graduated with the academic title of Bachelor, specialising in agronomic hydromelioration, and, in 2009, completed her studies at the Faculty of Wine Growing and Horticulture and graduated with the academic title of Master Agronomist, specialising in Ornamental Plants and Landscape Design. Following a successful competition on 7 May 2009, she was assigned the position of assistant in the department of Irrigation, Soil Conditioning and Agrophysics where she is still working today. As she joined the faculty, she started to engage in scientific research and took part in and carried out field experiments. She succeeded in free training in preparing and defending the dissertation in May 2014 on the topic of irrigation of French bean. She was awarded the academic title of ‘Doctor’ in the academic field of ‘meliorations’ and she was appointed as a ‘head assistant’ at the UA since 7 May 2015. After her appointment, she was also entrusted with the lectures of part-time students.

2. General description of the presented work

Dr Radost Petrova was the only candidate in the associate professor competition and participated with a total of 66 works, grouped as follows:

Publications in the field of work according to nomenclature — 66, of which:

Publications related to the doctoral thesis — 4 items, which are not subject to a review;

— Impact factor publications — 1

Articles published in scientific journals referenced and indexed to world-wide scientific and information databases SCOPUS and Web of Science — 17

Articles published in unreferenced journals with scientific review — 27.

These materials were published in the following scientific journals: Emirates Journal of Food

and Agriculture —1 (No 7); *Journal of Mountain Agriculture of the Balkans* —12 (Nos 9, 10, 13, 14, 15, 16, 19, 20, 31, 32, 38 and 39); *Rastenievadni Nauki /PlantScience/* 6 (Nos 35, 36, 51, 52, 53 and 54); *Selskostopanska tehnika* (Agricultural machinery: 3 (Nos 26, 27 and 28). *Agrarni nauki* (Agricultural sciences) — Plovdiv — 2 (Nos 5 and 6); Scientific papers — University of Agronomic Sciences and Veterinary Medicine of Bucharest- 2 (Nos 3 and 17); *Agricultural Science and Technology**— Trakia University, Stara Zagora – 2- (Nos`8and 12 / Science & Technologies — Union of Scientists in Bulgaria - Stara Zagora — 15 articles (Nos 1, 2, 4 , 24, 25, 33, 34, 40, 41, 42, 43, 44, 45, 49 * and 50), *Scientific works of the Union of Scientists in Bulgaria*, Plovdiv — 1 (No 23).

Articles publicised in thematic collections of scientific forums — 16

Conferece — Balvois — Ohrid, Republik of North Makedonia — 1 (No 18); *Compendium of Scientific Reports "100 Years of Soil Science in Bulgaria Part II, 1(No 21)*; *Reports on Environmental Approaches in the Production of Safe Food*, Plovdiv, 1 article (No 22); *Scientific works of the Union of Scientists in Bulgaria*, Plovdiv — 1 (No 23); *Compendium of scientific papers of the Agrarian University of Plovdiv* — 2 (Nos 29 and 30); *Agrarian University of Plovdiv — UNCCD Compendium of scientific reports- 1* (No 11); Research papers of the University of Ruse — 5 (Nos 37, 46, 47, 55 and 56); *Compendium of scientific reports of the University of Forestry of Sofia Management and Sustainable Development Compendium - 3* (Nos 48, 57 and 58); *Compendium 135 Years of Agricultural Science in Sadovo*, 2 (Nos 59 and 60);

The monograph 'Irrigation of French beans' is also presented. There are no textbooks and manuals.

Articles not covered by the nomenclature for the scientific field — 2

A significant proportion of the applicant's publications are presented and reported in scientific forums, mainly with international participation, as reports and posters and thus have become available to the scientific community before being printed.

In the 60 peer-reviewed works in the field according to nomenclature, the personal participation of the applicant consists of the following: in 23 publications she was the first author (38.3 %), in 21 she was the second author (35.0 %), in 9 publications she was the third author (15.0 %) and in the remaining 7 she was fourth or subsequent author (11.7 %).

The composition of the authors of the editorials shows that the applicant worked with scientists from the Department where she works with other departments of the Agrarian

University and other universities — Stara Zagora, the University of Forstry of Sofia and the Agricultural Academy's system, which is evidence of the recognition of the applicant by those working in irrigation. In the published works, regardless of the applicant's position, the applicant is personally involved in the preparation and publication of the material.

3. Main fields of the applicant's research. Demonstrated skills or abilities to lead research (project management, attracting external funding, etc.)

The candidate's scientific work presented for the competition is mainly based on an analysis of the results of field experiments on the problems of irrigating sunflower, maize, soya, beans and vegetables (early and late French bean, tomatoes, celeriac) and grass mixtures.

The 60 publications to be peer-reviewed are broken down by culture as follows: 9 of these were devoted to sunflower (Nos 1, 2, 4, 5, 9, 22, 23, 29 and 30), 9 maize (Nos 18, 19, 20, 24, 25, 28, 37, 50 and 53), 14 soybeans (Nos 6, 21, 26, 27, 35, 36, 39, 40, 44, 45, 46, 48, 51 and 55), beans (field production): 4 publications (Nos 16, 41, 42 and 52), French bean — early and late field production — 18 publications (Nos 7, 8, 10, 11, 12, 13, 14, 16, 17, 33, 34, 49, 54, 56, 57, 58, 59 and 60), grass mixtures - 4 (Nos 31, 32, 38 and 43) and 1 publication for tomatoes (No 15) and celeriac (47), i.e. there are 36 publication on field crops and 18 publications on French bean, which is 90% of the publications subject to the peer review.

The published material provided and analysed information on the implemented irrigation regime for sunflower over a multi-annual period, established ET (No 1 and 22) cumulatively for vegetation, % contribution of the different elements (rainfall, irrigations and soil moisture), values and ten-day rates and rates. The number of irrigations (Nos 2 and 22), the yields generated at optimum and water deficit, the grain losses in the event of a regulated and persistent water deficit/abated and realised single irritation during the various phenphases (No 29) and the impact of the regulated water deficit on the structural elements of the yield (Nos 23 and 30) have been established. This information makes it possible to make informed decisions on the optimal irrigation and irrigation regime for sunflower in case of water deficit and high water costs.

The parameters of the relationship 'yield/irrigation rate' (No 4), 'additional yield — irrigation rate' (No 5) and the relationship 'yield — ET' (No 9) have been established.

The 14 publications on soybean are entirely relevant to the competition. Information has been interpreted on the impact of the implemented irrigated regimes (No 51), changes in yields (Nos 48 and 51), the effect of irrigation, the loss of grain during irrigation in the event of water deficit — in the event of the cancellation and implementation of irrigation (No 35), irrigation with

reduced irrigation rates (regulated water deficit) (Nos 26 and 36). Information has been provided to assess the influence of irrigation modes on the biometric performance of soybeans by Cluster Analysis (Nos 6 and 54), dispersion analysis (No 51) and correlation analysis (No 46). The information gathered on irrigation of soybeans in the area during reduction (No 36) and removal of irrigations (No 35) has been analysed and solutions for applying a scientifically sound irrigation regime are being processed in order to obtain yields similar to those obtained by optimisation of humidity (No 35).

The size of the ET and the involvement of the soil strata in its formation (No 39), its productivity, the relationship yield-ET (Nos 9 and 27), the 'yield-irrigation rate' (No 45) 'additional yield - irrigation rate' (No 26) were established.

In the nine publications on the field experiments with maize, information was presented and analysed on the ET size (Nos 18, 19, 25 and 28), formation and productivity (Nos 20 and 28), irrigation regime (Nos 19 and 37), grain yields and losses during crop cultivation with a relatively constant (No 20) and a intermittent deficit (No 24). Two publications deal with the influence of fertilisation and irrigation regime (No 53). The information updates the one available and allows a irrigation regime to be applied in the event of water shortages in order to obtain economically viable yields.

New information on the individual elements of the polishing regime and its impact on the performance of grass mixtures grown for vegetation (No 31) and possibilities for cultivation in the event of water deficit are provided in the four publication on grass mixtures. The values for ET and its productivity (No 32), the parameters for the 'yield/irrigation rate' (No 38) and the link 'extraction — irrigation rate' of the celeriac (No 47) have been established.

The four publications on field beans production present information on the irrigation regime for optimum irrigation, the total values of ET, its daily average fluctuations, the productivity of ET (No 41) and the contribution of individual soil layers to its formation during irrigation and without irrigation (No 42). The effect of irrigation of Bulgarian beans genotypes has been identified (No 52).

The experiments carried out with the four cereals are one stage of the applicant's entry into the problems and terminology of the specialty. The content of the publications, the problems, which were analysed and an answer was provided, the proper and informed interpretation of the data and the use of modern methods for assessing results indicate that the applicant has completed a difficult but successful period of its education in her field of work.

During this period, she began the parallel conducting of field experiments with **early and late French bean production**. For her participation in the competition, the candidate has submitted 17 publications.

In the conducting of the French beans experiments, she employed a professional methodological approach, giving full clarity to the question of the level of pre-irrigation humidity, which resulted in maximum economic yields (80%) and she clarified the depth of the active soil layer (0-40 cm) and she calculated the magnitude of the irrigated rates for introducing moisture to the layer of 0-60 cm (No 33). The information provided and analysed in the publications for the irrigation of beans at pre-irrigation moisture levels of 60, 70, 80 and 90 % of the field capacity (No 12) is new and gives an accurate assessment of the optimum humidity. The publications reflect the impact of pre-irrigation humidity and the used irrigation treatment on yield rates and produce quality changes (Nos 7, 12 and 60) (average mass of a grain of beans, length and diameter of beans) and on the growth and development of beans (11) — (on plant growth dynamics, foliage, leaf area index (LAI)/No 7), on the photosynthetic potential (PSP) (No 10) and on the net productivity of photosynthesis (NPP, No 11). This information is new, comprehensive and a contribution from the applicant. It comes from experiments set on a methodologically sane basis, which means the results are of high scientific and practical value.

The publications provide and analyses information on the total and daily averages of ET for the crop (for both early (No 13) and late field production) (No 59), (in the case of optimum water availability and water deficit and the type of irrigation), development, layered formation and percentage participation of the elements in various pre-irrigation humidity levels (Nos 13, 18 and 34). The relationship 'production — ET' (No 8) has been established. The values for the biophysical coefficients by ten-day periods and by phases (No 58), which are new for the crop and the region. The information on the number and distribution (No 16) of the irrigation treatments and the water consumption for irrigation in the case of optimum water availability and water deficit in late crop is also new. The analysis of yields and changes in the case of optimum water availability and in the case of irrigation water deficit (Nos 17 and 60) and the established productivity of irrigation water for beans provide the basis for proper decisions on the irrigation treatment (Nos 12, 33 and 60). The publications have interpreted the impact of irrigation in a regulated water deficit on yields (No 33) and periodic water deficit /cancellation of individual irrigation treatments — late crop (No 17) and identified the sensitivity of the phenophases to water deficit, which is a scientific and a practical contribution. The relationship 'yield — ET' (No 8) and

'irrigation rate — yield' (No 16 and 33) has been established. Information has been provided and published for comparative testing of the influence of the different ways of irrigation on crop yields (No 14). An assessment of the economic impact of the irrigation treatment on the productivity of French beans (No 57) was carried out and which gave an accurate answer to the question what the biological and economically viable yield is. A cluster analysis was used to assess the impact of different irrigation treatments based on basic biometric indicators in beans (No 56) and an infrared thermometer to identify water stress in beans (Nos 49 and 54).

In conclusion, it can be said with full conviction that the excerpt made available by the candidate for participation in the competition, in terms of volume and content, is perfectly sufficient and is relevant to the subject matter of the competition. It is up to date, correctly collected and well interpreted, appropriately illustrated in the published material and has a high scientific and practical value.

The doctoral thesis is also in the field of the competition.

Assistant Dr Petrova participates in three projects — two internally funded and one financed by the Agrarian Academy.

The two projects financed internally helped the applicant to carry out the field experiments, collect information and publish the materials.

4. Assessment of the candidate's pedagogical training and activities. Her role in the training of young scientists

I have no personal impression of the candidate's pedagogical work. However, by following her development over the last decade, from an assistant to a chief assistant, her individual work and successful defence of the doctoral thesis, the enormous research work with field and vegetable crops, I am convinced that she has the necessary erudition for an associate professor in melioration.

The applicant conducted practicals with and read lectures to students from various faculties at the Agrarian University: in disciplines concerning crop irrigation and irrigation techniques, which meant the applicant had a full-time workload that was corresponding to her level of academic background and competence.

5. Relevance of the obtained results, as attested by references, publications in prestigious journals, prizes, membership of international and national scientific bodies, etc.

There are no textbooks and training manuals presented.

With regard to the requirements of the Law on the development of academic staff in Bulgaria,

candidates for the title of associate professor must meet certain scientometric requirements, it is apparent from the annexed note that Chief Assistant, Dr Petrova is perfectly compliant with the mandatory minimum knowledge requirements for this position. With regard to the required 100 points for publications referenced in the *SCOUPUS* and *Web of Science* databases, she presents 10 publications, one of which has an impact factor, which results in 185 points. Of the required 200 points from publications referenced in other databases, the applicant generates 305 points in total. As regards references to the applicant's publications by other authors, where the minimum is 50 points, the applicant presents 7 references in the world-renowned *SCOUPUS* and *Web of Science* databases, which bring in 105 points. References by other authors in other secondary sources, 13 in total, bring in 170 points. Thus the total number of points far exceeds the minimum required.

6. Relevance of contributions to science and practice. Reasoned opinion on the question whether the applicant has a clear profile of scientific research work

The research activities and the publications of Chief Assistant, Dr Petrova are focused on studying the irrigation regime of field crops and vegetables. The applicant appears to be a good researcher, who has mastered the technology of field experiments and the methodology for processing the data from these experiments and the extraction of certain conclusions and dependencies relevant to science and practice. Enormous work has been done in carrying out the experiments, collection, processing of data using cluster analysis, dispersion analysis and correlation analysis. The published information is accompanied by competent and precise comments. Information on French beans is predominantly new, complete and comprehensive, especially on the irrigated crop regime with optimum water and water deficit. The information is accompanied by an economic assessment of results and specific recommendations. The comments and analyses demonstrated that the applicant has detailed knowledge of the terminology of the speciality and has earned her own niche in irrigation, work which deserves recognition. On the basis of the published material, the following main contributions can be identified, such as novel, original * and contributions of a scientific and practical nature * *:

- Establishing the level of pre-irrigation humidity allowing for economically viable yields in French beans and above which irrigation is economically unprofitable.

- Establishing the effect of the main elements of the irrigation regime and water consumption for optimum irrigation (Nos 12, 17 and 60) and water deficit for irrigation of French beans late crop *.

- Establishing the effect of pre-irrigation humidity and irrigation regime in case of optimum

water and water deficit on the growth and development of French beans (No 11), on plant growth dynamics, on the foliar area and on the foliar index (No 7), on the photosynthetic potential of the crop and on the development of its formation (No 10 and 11) and on the net productivity of photosynthesis (NPP) (No 11).

-Identifying the influence of the pre-irrigation humidity and irrigation regime in the case of optimum water and water deficiency on the size of the organic and commercial yield of French beans and changes in its quality (No 7, 12 and 60) (average mass of one bean, length and diameter of the beans).

The information gathered enriched existing knowledge and adds new information to improve the cultivation technology for irrigation of strategically important crops for the country — sunflower, maize, soya and beans, with irrigation under optimum conditions and in case of water deficit.

Identifying of the average multiannual evapotranspiration for optimum irrigation — total for the growing season and ten-day periods and phenophases, for sunflower publications (No 1 and 22), maize — (No 18, 19, 25 and 28) for soya beans (No 36), field beans (No 18,34,41 and 42), French beans — early and late crop (Nos 13 and 59), grass mixtures (No 32), for tomatoes (No 15) and celeriac (No 47).

Establishing of biophysical coefficients for the calculation of evapotranspiration for maize, soya, sunflower, beans, French beans, grass mixtures and celeriac.

Establishing the parameters of the relationship — ‘yield — ET’ for sunflower (No 9), beans (No 8), French beans (No 8), soybean (No 27), ‘additional yield — irrigation rate’ for sunflower (No 5), for soybean (No 44), grass mixtures (No 43), celeriac (No 47), and ‘yield — irrigation rate’ for sunflower (N 4), soybeans (No 45), beans (No 16), tomatoes (No 15), grass mixtures (No 38) and celeriac (No 47) (this contribution can be categorized as new facts and dependencies for existing problems).

It was proven that the temperature and temperature difference (leaf surface — environment) measured with an infrared thermometer can be used to assess the water stress of French beans (No 49 and 54) and soybean (No 21) to determine the moment for irrigation. The contribution is of positive nature regarding the reliability of this indirect method.

It has been demonstrated that the ways in which the crop is irrigated (French beans) do not lead to differences in the total value of ET (No 13) and have a slight and non-unidirectional impact on the size of yields (No 14).

7. Critical remarks and recommendations

The comments and recommendations below do not dispute the contributions of the applicant, but are intended to help her work in the near future.

1. The applicant should prepare summaries and seek publication in prestigious international journals, leading to further promotion and steep increase of the rating of the underlying organisation.

2. Explore the possibility of applying the acquired scientific knowledge in practice and for the training of students.

3. Compare, publish and add the information collected on irrigation regimes, yields and established biophysical coefficients to those available in the work of the Collection of the Institute of Hydrotechnics and Rameliorations — “Stratification of the Irrigation Regime” and the Compendium “Yields according to Agr-ecological Areas”.

4. Fine-tune the methodology for growing second crops and clarifying the results of the non-irrigated option and clarifying the role of the initial irrigation treatment.

5. A large amount of literature and information has been used to justify the methodological set-up of the trials, but I recommend prioritising the selection of data options from areas with similar soil and climate indicators to the ones in the region of Plovdiv.

8. Conclusion and opinion of the reviewer

Chief Assistant Dr Petrova graduated from the Agrarian University of Plovdiv as a bachelor and master with honours, which is a testament to the level of her basic training. After winning a competition, she worked as an assistant and chief assistant at the Agrarian University and as soon as she was appointed, she became involved in scientific research participating in and carrying out field experiments. She defended her thesis in 2014 as a PhD student in free form of education and she was awarded a doctoral degree in the academic field of ‘Meliorations’.

The applicant is establishing herself as a good experimentator who mastered the technology of field experiments and the methods of data processing and the extraction of clear conclusions and dependencies relevant to science and practice. She is participating in the competition with a fully sufficient volume and quality of scientific output.

Her teaching activity consists of carrying out practicals with and reading lectures to students from different disciplines at the Agrarian University of Plovdiv in disciplines relevant for the field of the competition.

Based on all this I can vote in favour with full conviction and recommend that the members of the

scientific jury and the faculty council support with a positive vote the candidacy of Chief Assistant Dr Radost Petrova to be awarded the academic title of 'Associate Professor' in the academic field of 'Meliorations (including soil erosion and the fight against it)', which she fully deserves considering her previous scientific and teaching activities.

2021

Plovdiv

Reviewer.....

(Ass. Prof. Dr Zhivko Zhivkov)