# REVIEW

**concerning the competition for occupation of the academic position "*Associate Professor*", higher education domain 6. *Agricultural Sciences and Veterinary Medicine*, professional field 6.1. *Crop Production*, scientific speciality "*Land Reclamation*", announced in the State Gazette No. 98 of November 17, 2020 by the Agricultural University – Plovdiv, Bulgaria, with the single candidate *Radost Petrova Petrova***

***Reviewer:*** Professor Kouman Smilkov Koumanov, Fruitgrowing Institute – Plovdiv, higher education domain Agricultural Sciences and Veterinary Medicine, professional field 6.1. Crop Production, scientific specialities "Land Reclamation", and "Fruitgrowing", chair of the scientific jury appointed by the Rector of the Agricultural University – Plovdiv, order No RD 16/10 of January 10, 2021.

## 1. General Information on the candidate's carrier and thematic development:

Radost Petrova was born in 1985. In 2008 she graduated from the Agricultural University – Plovdiv, acquiring a Batchelor degree and professional qualification in Agronomy-Hydromeliorations. In 2009 she acquired a Master's degree in Ornamental Plants and Landscape Design. Also in 2009, she was appointed to Assistant Professor at the Dept. of Land Reclamation and Geodesy, Agricultural University – Plovdiv. In 2004 Petrova acquires a Ph.D. scientific degree in Land Reclamation (incl. soil erosion and its mitigation). In 2015 she is already a Chief Assistant Professor in the Dept. of Land Reclamation and Geodesy, now Land Reclamation, Land Regulation and Agrophysics, where she has been working until now.

## 2. General description of the submitted materials:

In the competition for the Associate Professor academic position Radost Petrova has submitted 67 works total, grouped as follows:

- ***Scientific publications of the nomenclature speciality – 65 pcs., including:***
  - *Publications related to the Ph.D. thesis – 4 pcs., not subject of consideration;*
  - *Publications with impact rang (SJR) – 1 piece;*
  - *Publications in reviewed and referred scientific journals – 16 pcs.;*
  - *Publications in non-referred journals with scientific reviewing – 37 pcs.;*
  - *Publications in proceedings of conferences – 6 pcs.;*
  - *Monography – 1 piece.*
- ***Scientific publications beyond the nomenclature speciality – 2 pcs., including:***
  - *Publications in non-referred journals with scientific reviewing – 1 piece;*
  - *Publications in proceedings of conferences – 1 piece.*

The present review analyses **63 scientific works**. The candidate's participation in these scientific publications is as it follows: first author – in 23, second author – in 24, and in the rest ones – third or subsequent author.

The numerical expression of the publication activity of Radost Petrova considerably surpasses the minimal thresholds, by the groups of indices, necessary for acquiring the

"Associate Professor" academic position in the higher education domain Agricultural Sciences and Veterinary Medicine, professional field 6.1. Crop Production, imposed by the respective legislation and the Regulations for the implementation of this legislation in the Agricultural University – Plovdiv.

A list of 52 candidate's oral and poster participations in scientific forums have been submitted as well, including 3 events abroad and 49 in Bulgaria.

**3. General directions of the candidate's research. Demonstrated skills or talents for research management (project leadership, provision of external funding, etc.):**

The predominant part of Radost Petrova's research is related to the irrigation management of agricultural crops. Her scientific interest has been directed to: green and common bean (21 papers), soybean (14 papers), sunflower (9 papers), maize (8 papers), ryegrass and red fescue (4 papers), pepper (2 papers), greenhouse tomatoes (1 paper), celery (1 paper), silage corn (1 paper), as well as 1 paper on the results of 25 experiments on cereals, forage, industrial, vegetable, and fruit crops. The subjects of the investigation include: the crop water consumption (crop evapotranspiration, ET), the water sources for plants (soil water storage, rainfalls and irrigation) and their contribution to the evapotranspiration under full and partial meeting of the crop water needs, the contribution of the separate soil layers to the water balance and the effective depth of the root zone, the timing of the irrigation applications, the individual and annual application rates, the irrigation techniques, the methods and equipment for irrigation scheduling and management, the effect of the irrigation regimes on the plant physiology and vegetation, and the yield quantity and quality. Generally, the candidate's work has been focused on the effective water use in irrigation as an element of the system for integrated management of the water resources under conditions of increasing water deficit, when a particular management decision depends on an impartial and reliable prognosis for the reaction of a particular crop under varying water availability under specific soil and meteorological conditions. The only solution providing such a prognosis is the use of simulation models allowing to run multitude of scenarios, something that is practically impossible in field conditions. Based on such reasons, Radost Petrova has worked on the calibration of mathematical models describing the effects of both the annual application rate and the seasonal evapotranspiration on the yield – total or additional (due to irrigation) – under different levels of regulated deficit irrigation. Furthermore, Petrova has worked in a team developing the technology for growing chilli pepper.

Radost Petrova was the operative manager of two research projects funded by the Research Center of the Agricultural University – Plovdiv. Also, she participated in a research project of the Forage Crops Institute – Pleven, funded by the Agricultural Academy.

**4. Evaluation of the candidate's pedagogic skills and activities. Her role in the tuition of young researchers.**

Radost Petrova starts her teaching career in 2009 as an Assistant Professor at the Agricultural University – Plovdiv, where she has been working until now. In 2015 she was appointed to Chief Assistant Professor. Her total experience as an university professor is 11 years and 6 months. Petrova has lectured the disciplines of "Irrigation and Drainage" and "Park Irrigation Technologies". Furthermore, she has taught practical lessons on the disciplines of "Irrigation and Drainage", "Irrigation management", and "Park Irrigation Techniques", as well as a Masters course on "Vineyard Irrigation Technologies". She has

led off the summer practical training of fist- and second-year undergraduates in the "Agronomy-Hydromelioration" speciality. The character of the disciplines taught by Radost Petrova attests both to the high level of her pedagogical background and her important role in the education of young specialists.

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

Radost Petrova's Research achievements have been fittingly recognized by the scientific community with a total of 20 citations, including 7 in scientific publications referred to and indexed in world-wide data bases (SCOPUS, Web of Science), 7 in foreign reviewed journals and proceedings of international scientific forums, as well as 6 in Bulgarian reviewed journals and proceedings of national scientific forums.

**6. Importance of the contribution to both science and practice. Motivated answer to the question of how distinguishable is the candidate's research profile:**

Basically, the contribution of Radost Petrova's research is related to improvements in the irrigation scheduling and management of a great diversity of agricultural crops, taking into account the exceptional role of irrigation for providing high and sustainable yields with excellent quality of the crop production in the Bulgarian climatic conditions. The created opportunities for enhancement of the water productivity of the crops, respectively economy of irrigation water in the conditions of increasing water deficit, is an important milestone in the candidate's development. The chilly-pepper research contribution can be considered in the same context.

As a whole, the contribution reference prepared by the candidate is acceptable, but I find it too circumstantial. Probably, such an impression is deepened by the author's decision to present her undoubtedly substantial and numerous results crop by crop. In my opinion, the main scientific and practical contributions could be summarized and systemized as it follows:

I. ORIGINAL CONTRIBUTIONS

1. It has been the first time estimating the water-balance of the minimum allowable soil moisture (triggering an irrigation event) for a depth shallower than the root zone depth. This approach mitigates the adverse drop of the soil moisture near the soil surface i.e., in the zone of the active roots' maximum concentration.

II. METHODOLOGICAL CONTRIBUTIONS

1. The contribution to the evapotranspiration formation of both the entire root-zone depth and the individual soil layers has been justified for soybean and green bean (works 26, 39, and 42)
2. The biologically allowable soil-water depletion has been estimated for soybean, green bean and a grass mixture (works 12, 26 31, and 34).
3. The precision of formulas estimating the crop evapotranspiration from single meteorological characteristics (e.g., sum of the average daily temperatures) has been proven comparable to that of the FAO 56 method.

III. SCIENTIFIC CONTRIBUTIONS

1. The annual evapotranspiration, the course of the ET average daily values, and the share of the contribution factors (water storage in the root zone, rainfalls, and irrigation) have been estimated under both optimal irrigation and regulated deficit irrigation for soybean, maize, sunflower, green bean and common bean, and a grass mixture (works 1, 13, 17, 18, 19, 22, 25, 32, 34, 36, 39, 41, 42, and 59).
2. The crop reaction (yield and growth) has been estimated under both optimal irrigation and regulated deficit irrigation (decreasing or cancellation of the application rates in certain phenological phases) including by regression equations for soybean, maize, sunflower, green bean and common bean, and a grass mixture. Water productivity was evaluated as well (works 2, 12, 14, 16, 17, 18, 20, 23, 24, 26, 28, 29, 30, 31, 33, 35, 37, 40, 41, 46, 48, 51, 52, 60, and 62).
3. With green bean, there has been found a strong correlation between the annual application rate and the leaf area index (LAI). Regression equations have been derived for determining the leaf area, respectively LAI, from both fresh and dry mass of the leaves, as well as for LAE-based yield prognostication (work 7).
4. The infrared thermometer method has been calibrated towards irrigation management with soybean and green bean. Correlation equations have been derived, describing the relationship between the soil moisture and the leaf-air temperature difference (works 21, 49, and 54).
5. Mathematical models describing the "yield – annual application rate" and "yield – evapotranspiration" relationships have been calibrated for soybean, maize, maize for forage, sunflower, green bean, grass mixture, and greenhouse tomatoes (works 4, 5, 8, 9, 15, 16, 27, 37, 38, 43, 44, 45, 47, 48, and 50)
6. The effect of both the allowable soil-water depletion and the regulated deficit irrigation on the photosynthetic potential (FP) have been estimated with green bean. Correlation equations have been derived describing the "ET – FP" and the "annual application rate – FP" relationships. The "FP – yield" regression allowed for early yield forecasting (works 10 and 11).

IV. CONTRIBUTIONS TO THE PRACTICE

1. Values of biophysical coefficients for calculating the evapotranspiration have been estimated for green bean (work 58).
2. The effect of both irrigation and fertilization management on the yields of maize, green bean, and soybean has been established using mathematical-statistical analysis (works 6, 53, 55, 56, and 61).

The review of the research projects, the publications, and the ensuing contribution of Radost Petrova to both science and practice unreservedly positions her research activity in the field of the "Land Reclamation" scientific speciality.

**7. Critical notes and recommendations**

7.1 The commonly used unit for water productivity is kg $m^{-3}$ or its reciprocal $m^3$ $kg^{-1}$ instead of kg $ha^{-1}$ $mm^{-1}$, kg $da^{-1}$ $mm^{-1}$ or the incorrect kg $mm^{-1}$ used by the candidate (works 1, 12, 22, 32, and 33).

7.2 It would be useful, if the results of the numerous and precise evapotranspiration trials have been used for evaluation of some biophysical coefficients for the studied crops (by decades or versus GDD) relating the crop ET to meteorological factors in the specific agroecological conditions, just as it has been done for the green bean in

work 58.

These critical notes do not belittle the candidate's contributions. They are aimed at perfecting her further research.

**8. Personal perception and standpoint of the reviewer**

I have known Radost Petrova since 2007 when I lectured her on "Hydrology" and "Hydraulics". I participated in the examination board, which rated her doctoral schooling on the discipline of Land Reclamation excellent. I chaired the scientific committee which granted the Ph.D. degree to her. I have been in the course of her research. In all undertakings Petrova proved herself as a studious, diligent, purposeful and self-dependent person. I am confident that she has the capacity for being both researcher and teacher.

## CONCLUSION

Based on the analysis of the candidate's pedagogical, research and applied activities I am convinced that Radost Petrova Petrova, Associate Professor, meets the requirements imposed by the Law on the Development of the Academic Staff in the Republic of Bulgaria, its implementing regulations, and its implementing regulations at the Agricultural University – Plovdiv. Her research has yielded significant scientific and applied contributions. As an university teacher, Petrova successfully lectures, teaches exercises, and leads practical training on four subjects. The Radost Petrova's research and teaching profile is clearly defined and it thoroughly corresponds to the "Land Reclamation" scientific speciality.

All this gives me the reason to rate **POSITIVE** her overall activity.

I dare appeal to the honorable scientific committee members to vote positive too, and also to the Faculty Council of the Department of Horticulture with Viticulture at the Agricultural University – Plovdiv to grant Radost Petrova Petrova **Associate Professor** the scientific speciality of **Land Reclamation** of the professional field: 6.1. Crop Production in the higher education domain: 6. Agricultural Sciences and Veterinary Medicine.

13 February, 2021
Plovdiv

**REVIEWER**:
(Kouman Koumanov, Professor)