

70-08-1002/30.08.21

## OPINION

On the dissertation for obtaining the educational and scientific degree "Doctor", field of higher education 6. Agrarian sciences and veterinary medicine, professional field 6.5. Forestry, scientific specialty "Forest plantations, selection and seed production "

**Author of the dissertation:** eng. Nikolay Yanchev Stoyanov, doctoral student of independent training

**Dissertation title (theme):** Distribution, variability and health status of *Ulmus* species in Northern Bulgaria

**Member of the scientific jury:** Prof. Dr. Sonya Hristova Bencheva, University of Forestry; field of higher education 6. Agrarian sciences and veterinary medicine, professional field 6.5. Forestry, scientific specialty "Forest melioration, Forest protection and Special forest uses" (order ПД 15-298/14.07-2021 of the Director of the Forest Research Institute - BAS).

### 1. Relevance of the problem

Knowledge and conservation of the local forest genetic fund is an important requirement for environmental protection. Human activity often leads to habitat disturbance. In Bulgaria, alien species are distributed naturally or by humans and some of them pose a threat to the genetic purity of local populations or damage the qualities of natural habitats. On the other hand, afforestation is mainly carried out with economically viable tree species, and the gradual loss of genetic resources can disrupt adaptive processes in populations in response to climate change. This determines the relevance of the dissertation theme, directly related to the conservation of the elm genetic fund.

### 2. Degree of knowledge of the state of the problem and creative interpretation of the literature review

Eng. Nikolay Stoyanov made a relatively short literature review, prepared on the basis of 153 sources, over 70% of which were published before 2000. It analyzes the taxonomy of the family Ulmaceae and describes the representatives of the genus *Ulmus*, distributed in Bulgaria. Some causes of damages and diseases on elm have been described with the main focus on the tracheomycosis epiphytotics. The results of leading scientific and practical programs related to the conservation of the genetic fund of the genus *Ulmus* by "in situ" (in their natural environment) and "ex situ" (under controlled conditions) are also noted.

### 3. Purpose, tasks and research methods. Correspondence of the chosen research methodology with the set goal and tasks of the dissertation

The aim of the work is to determine the distribution, variability and health status of the elm genetic fund in Northern Bulgaria and to study the possibilities for preservation of this fund by "in situ" and "ex situ" methods. The set tasks include analysis of the condition of the elm genetic fund and mapping of the identified localities; study of the biological diversity in the natural elm habitats and clarification of the existence of ecotypes and forms; selection and differentiation of seed production plantations and plus trees with a proposal for their inclusion in the National Register of Forest Seed Production Base; preservation of the genetic fund of representatives of the genus *Ulmus* by the methods "in situ" and "ex situ". The methods used are suitable for the purpose and tasks of the work.

### 4. Presentation and illustration of the obtained results

The presented dissertation is well structured, as the section with the analysis of his own results has the largest volume (60%). The results are presented in a logical sequence. They are illustrated with 15 tables and 39 figures, including maps, graphs and photographs. Much of the information about the surveyed sites, experimental crops and sample areas, as well as the passports of the selected plus trees are added in 5 appendices to the dissertation.

## 5. Discussion of the results and used literature

The obtained results are mostly correctly analyzed and logically summarized. The literature used is cited appropriately.

## 6. Contributions from the dissertation

The contributions of the dissertation are related to updating the information about the genetic fund of the genus *Ulmus* in Bulgaria.

### Scientific contributions

- The variability of the studied morphological features of the species of the genus *Ulmus* in Northern Bulgaria has been proven and categorized.

### Scientific and applied contributions

- An information database has been created through the developed maps for the location of the representatives of the genus *Ulmus* in Northern Bulgaria.

- A laboratory protocol for in vitro propagation of *Ulmus laevis* Pall has been developed and its introduction in the modern programs for in situ and ex situ propagation has been proposed.

### Applied contributions

- For the territory of Northern Bulgaria, 170 plus trees of the genus *Ulmus* have been selected and permanently marked on the terrain, including 7 from *Ulmus minor* Mill, 51 from *Ulmus glabra* Huds. and 40 of *Ulmus laevis* Pall.

- 12 plantations are proposed for inclusion in the forest seed production base of the Republic of Bulgaria.

- Two experimental crops were created and saplings were produced for the construction of a branch archive of different elm species.

- It is proposed to improve the technologies for the production of seedlings and for the creation of forest crops from different elm species.

## 7. Assessment of the degree of personal participation of the author in the contributions

The results and contributions of the doctoral student are his personal work.

## 8. Critical remarks and questions

A lot of technical mistakes were made in the dissertation; the text is not well formatted in many places. Most of the photos used are of poor quality and do not provide the necessary information; the same applies to all maps in the text and in the appendices, as well as to most graphics that are simply photographed from the text of the respective publication. Many of the pests do not list the authors after the Latin names; some Latin names are wrong (*Phomes*, *Ployporus*, *Inontus hiespidus*); there is duplication of cited publications (Захариева, 2015 = Пенчева, 2015); not all authors are listed in the bibliography (Роснев Б. и др, 2006); use of old and new names of forest administrative units.

The study is largely of an inventory nature, which does not detract from its importance. Despite these shortcomings, the doctoral student has successfully completed all tasks. To the extent that the topic of the work includes determining the health status of the species of the genus *Ulmus*, my remarks are mainly related to this part of the work:

- The list of described elm pests has not been updated. A reference in the EPPO Global Database can even show the announcement in Bulgaria of a new invasive species of elm insect – *Aprocero leucopoda* (Doychev, 2015).

- The description of phytoplasmas made in the literature review is superficial and incomplete. It would be more appropriate to call the disease, called by the doctoral student Elm Yellowing, tracheophytoplasmosis (or in literal translation "phloem necrosis") and to indicate its cause *Candidatus Phytoplasma ulmi*. Mentioned as its vector elm grasshopper *Scaphoideus luteolus* is actually a cicada.

- The possible causes of high forkiness (found in 80% of white and field elm trees) and the

formation of aquatic shoots (in 50%) have not been analyzed; it is not clear which environmental factors could affect the type of bark cracking (mentioned on page 69)). There is no statistical processing of data on seedling growth (Table 6).

- Table 8 shows only 2 stands (on the territory of SF Smyadovo) with respectively average and high complex assessment of the health condition, which is about 7% of the total number of sample areas and much less than the total number of assessed trees. It is not clear why the analysis of these data determined that "medium and severely affected by damage" stands are 14%.

- Nowhere in the text are the symptoms and how the viral origin of the yellowing of the leaves was diagnosed in the SA 15, SF Ribaritsa and in the area of SF Smyadovo, it is not clear what is meant by "leaf sclerotization".

- The pathogen causing tracheomycosis or the so-called Dutch elm disease, reported by the author as the most serious threat to elm, is not sufficiently described (taxonomy, spore formation, ecology), while its bark beetle vectors are presented in great detail. Nowhere in the text is it stated what the symptoms and signs are by which *Ophyostoma ulmi* was diagnosed. What samples were collected for laboratory analysis in the Central Plant Quarantine Laboratory at the BFSA and what methods have been used to distinguish this species from *Ophyostoma novo-ulmi* and *Candidatus Phytoplasma ulmi*, given the similarity in symptoms? Fig. 32 shows not the conidia spore formation described by the author, but rather sexual fruiting bodies (which are typical for most wood-staining fungi of the genera *Ophyostoma* and *Ceratocystis*). In view of the above, I do not accept the conclusion that *Ophyostoma ulmi* is ubiquitous due to insufficient research and the poor justification for the existence of this species.

## 9. Published articles and citations

7 publications related to the topic of the dissertation are presented - 6 articles in journals and 1 - in proceedings of scientific forums. No citations are given.

## 10. Evaluation of publications related to the dissertation

Two of the articles were published in the specialized scientific journal "Forest Science" (included in the CABI database and indexed in the BIOSIS Citation Index of the Web of Science); three - in unreferred journals: "Investigation Agraria, Sistemas y Recursos Forestales", "Analele ICAS", "Forestry Ideas" and "New Knowledge", and one is in a proceedings of scientific congresses in Macedonia.

No information on established citations was attached.

The presented abstract objectively reflects the structure and content of the dissertation.

## CONCLUSION

Based on the various research methods learned and applied by the doctoral student, the correctly performed experiments, the summaries and conclusions made, I believe that the presented dissertation meets the requirements Regulations for acquiring scientific degrees and holding academic positions at the Forest Research Institute - BAS, which gives me reason to rate it **POSITIVE**.

I propose to the esteemed Scientific Jury to vote positively and to award to Eng. Nikolay Yanchev Stoyanov the educational and scientific degree "Doctor", in the field of higher education 6. Agrarian sciences and veterinary medicine, professional field 6.5. Forestry, scientific specialty " Forest plantations, selection and seed production ".

20.08.2021

Member of the scientific jury  
(Prof. S. Bencheva)