ANNOTATION

dissertation work of Baigazakova Zhadyra on the topic: «Monitoring of the silvicultural and ecological state and development of practical measures for the use of hawthorn (*Crataegus* L.) in Semei city»submitted for the degree of Doctor of Philosophy (PhD) in the speciality 6D080700 – «Forest resources and forestry»

Relevance of the topic. The genus Hawthorn (*Crataegus* L.) has about 1250 species, of which only 7 naturally grow in Kazakhstan. A large number of introduced species of hawthorn grow in many botanical gardens, arboretums and in the landscaping system of populated areas of the republic. The use of hawthorns in landscaping cities and towns is spontaneous, which is confirmed by the absence of any system when planting them, i.e. the species origin, taxation and morphological parameters of plants, etc. are not taken into account.

A large number of species of the genus *Crataegus* L. can serve as a valuable source of raw materials for many industries: food, pharmaceutical, cosmetic, technical, etc. Hawthorn fruits contain many vitamins, sugars, carotene, various organic acids, pectin and tannins. Hawthorn fruits are contained in many medications used to treat the cardiovascular system. The taste qualities of hawthorn fruits are widely used in the manufacture of various food products. The high decorative value of hawthorns is widely used in landscaping work. The phytoncidal properties of this plant improve the environmental situation by destroying pathogenic bacteria.

In our republic, little attention has been paid to the study of hawthorns. Information about Kazakhstani hawthorns found in the literature is most often of a local nature, tied to one specific area. There are practically no publications about hawthorns in the eastern region of the country. Hawthorn, having a number of positive qualities, has not been studied sufficiently, which creates the preconditions for activating research activities in relation to this plant. Almost any information about the hawthorns of Semey will be relevant and will arouse interest on the part of business entities interested in this object.

In connection with the above, the relevance of the topic is determined by the need to study the quantitative and qualitative variability of morphological parts, regenerative ability, environmental sustainability, and the development of scientific and practical proposals for growing hawthorn. In addition, the widespread cultivation of hawthorns will be fully consistent with the state program for planting 2 billion trees in the forest fund and 15 million in populated areas, initiated by the President of the Republic of Kazakhstan.

In the implementation of comprehensive measures to reduce the adverse effects of negative environmental factors on the urban environment, the leading role is given to woody plants. Tree plantations in cities, including representatives of the genus *Crataegus* L., in addition to the decorative function, also perform a sanitary and hygienic function, which is expressed in the enrichment of atmospheric air with

oxygen, absorption of carbon dioxide, dust accumulation capacity, reduction of wind conditions, etc. .

Objects of research: Urban plantings of hawthorns in Semey: Altai hawthorn (*C. altaica* Lge.), blood-red hawthorn (*C. sanguinea* Pall.), dahurica hawthorn (*C. dahurica* Koehne), Douglas hawthorn (*C. Douglasii* Lindl.).

Purpose of the study: To study the growth and development of hawthorns in the city of Semey. Development of practical recommendations for growing hawthorns.

Research objectives:

1. Establishment of forest taxation and bio-morphological indicators of hawthorns based on the parameters of fruits, seeds and leaf blades.
2. Study of the characteristics of seed propagation of hawthorn.
3. Determination of the equivalent dose rate of hawthorn leaves and fruits.
4. Determination of oxygen productivity and gas absorption capacity of hawthorns.
5. Determination of the dust-accumulating ability of hawthorn leaves.
6. Development of practical proposals for the use of hawthorns.

Research methods. The methodological basis for carrying out the work is the general and general scientific methods of scientific research in the field of forest sciences. When carrying out the work, modern guidelines for field experiments in forestry were used.

When conducting research, the principle of unique differences was fully observed; the differences lie only in the species of hawthorns.

According to the methodological instructions of E. Romeder and G. Schönbach, in experiments with tree and shrub species, 10-40 individuals are sufficient to obtain an accurate average value.To determine the growth and development indicators of hawthorns, 10-20 plants of each species were measured, selected randomly. We studied the following characteristics: plant height; trunk diameter; length of annual shoots; the number of spines on the shoot; length, width, weight of the leaf blade; length, diameter, weight of fruits, number of seeds in fruits; length, width, thickness and weight of seeds.

All measurements were carried out taking into account the methodological instructions of A.A. Molchanov and V.V. Smirnov. The selection of typical shoots was carried out according to the method of V.P. Semakin.

Clean and dry seeds from each species were taken in quantities of 20, and the length, width and thickness were measured with an accuracy of 0.1 mm. The weight of one seed was determined on an MW-T type scale with an accuracy of 0.001 g.

When determining the equivalent dose rate of hawthorn leaves and fruits, the sampling site was determined to be two sites in the city of Semey and the village of Abay. To measure radioactive contamination and determine the equivalent dose rate of the vegetative parts of hawthorn, the MKS-AT6130 Dosimeter-Radiometer was used, designed to measure the equivalent dose rate of gamma radiation, allowing one

to quickly detect contamination with radionuclides or find a source of ionizing radiation. Venue: regional engineering testing laboratory «Scientific Center for Radioecological Research»Shakarim State University, Semey.

Oxygen productivity and absorption of carbon dioxide by hawthorns was studied using the method of S.V. Belov.

When determining the dust deposition ability, hawthorns located in various categories of plantings were studied, which was studied depending on the height above ground level (1.5 and 3 m).

To ensure the reliability of the experimental data obtained, analytical determinations were carried out with subsequent processing of the results obtained using modern methods of analysis, statistical, mathematical and graphical processing of data from the experimental results using the computer program package Excel MS Office and Statistica 6.0.

The reliability of the research results is due to an integrated methodological approach; long period of observation; multiple repetition of counts; using both generally accepted methods and modern effective methodological tools; reproducibility of results in territorial and temporal aspects.

Scientific provisions submitted for defense:

- forest taxation parameters of the studied hawthorn species are not identical, there are significant differences between them;
- significant differences in the parameters of fruits, seeds and leaf blades were established between the studied hawthorn species;
- in the fruits of hawthorn growing in the city of Semey and the village of Abay, the content of radioactive elements does not exceed the maximum permissible concentrations, and therefore do not pose a danger to the body;
- hawthorns play a major ecological role in landscaping: they accumulate dust, absorb carbon dioxide, release oxygen, etc.

Scientific novelty of the research:

- for the first time in the conditions of Semey, a comprehensive ecological and forestry assessment of hawthorns was carried out.
- for the first time, a comparative multiple assessment of hawthorns growing in the cities of Semey, Almaty and the Issyk State Dendrological Park was carried out. Laboratory studies have determined the biochemical composition of the morphological parts of hawthorn.
- for the first time, studies have been conducted on the resistance of hawthorns to ionizing radiation.
- for the first time, studies have been conducted on the content of radioactive substances in hawthorn leaves.
- new information is data on the oxygen productivity and gas absorption capacity of hawthorns in Semey.
- new data were obtained on the dust-accumulating properties of leaves of the studied hawthorn species.

Practical significance of the research. The research results will adequately enrich the forest science of the republic in the field of growing hawthorns and can

be taken as the basis for scientific justification for growing hawthorns in populated centers of Kazakhstan.

The theoretical and practical significance of the work is related to the development of recommendations for production on seed propagation and cultivation of hawthorn seedlings in the southeast of Kazakhstan.

The research results can be used by design and survey institutes, landscaping and other organizations in the design, selection of assortment and creation of sustainable plantings and serve as the basis for the development of environmental principles and recommendations. Also, the research results can be used by the design and survey institute «Kazgiproleskhoz» in the design and creation of artificial plantings, plantations for special purposes and in forest nursery farms of the republic.

Compliance with the directions of scientific development and government programs.

The dissertation was carried out within the framework of the research work: 0115PK00142 - Assessment of the ecological and biological sustainability of woody plants in the technogenic conditions of Kazakhstan. The research topic is consistent with state programs for the conservation and sustainable use of biological diversity of the Republic of Kazakhstan until 2030 and for planting 2 billion trees in the forest fund and 15 million trees and shrubs in populated areas until 2025, voiced in the Presidential Address RK in 2020.

Implementationofresearchresults. The developed measures and proposals were implemented in the Republican Forest Selection and Seed Center of the Almaty region. The research results are used when giving lectures and conducting practical and laboratory classes in basic and specialized forestry disciplines at the Department of «Forest resources, Hunting and Fisheries» of the Faculty of«Water, Land and Forest Resources» of KazNARU and at the Department of «Forest Crops» of the Nizhny Novgorod State Agrotechnological University.The introduction of research results into the educational process and practical production is confirmed by relevant acts.

The practical recommendations compiled for the production of seed propagation and cultivation of hawthorn seedlings in the southeast of Kazakhstan were approved by the scientific and technical council of the Forestry and Animal Resources Committee of the Ministry of Ecology and Natural Resources of the Republic of Kazakhstan(protocol No. 1 of January 16, 2024). For these recommendations, protection document No. 41292 dated December 15, 2023 was received.

Dissertation materials can be used in forestry state institutions for the protection of forests and wildlife in Kazakhstan.

Approbation of work. The materials of the dissertation work have been tested at various international scientific and practical conferences: «Current problems of sustainable development of the forestry complex» in Almaty (2018), «Fruit growing, seed production, introduction of woody plants» in Krasnoyarsk (2019); «Scientific youth in agricultural science: achievements and prospects» Almaty (2019); «Nazarbayev's model - a strategic response to the challenges of the 21st century», Almaty (2021); «Socio-economic problems of the region in the conditions of innovative development of territories and ways to solve them», Semey (2021); «State

and prospects for industrial and innovative development of the agro-industrial complex of the Republic of Kazakhstan», Semey (2022).

Description of the doctoral student's contribution to the preparation of each publication. The applicant's personal contribution consists of collecting and analyzing initial information and summarizing materials. 14 scientific papers have been published on the topic of the dissertation. Of these, 1 is in a journal included in the Scopus database (Q2, percentile 55), 3 are in scientific publications recommended by the Committee for Quality Assurance in Science and Higher Education of the Ministry of Education and Science of the Republic of Kazakhstan, 8 are in materials of international scientific- practical conferences, 1 – author's certificate, 1 – recommendations for production.

Structure and scope of the dissertation.The dissertation is presented on 116 pages, consists of an introduction, 7 sections, conclusion and 5 appendices. Contains 32 tables and 15 figures. The list of used literary sources includes 227 scientific works, including 25 foreign authors.