ANNOTATION

dissertation work of Tokusheva Assel Salimzhanovna on the topic: «Ways of restoration the degraded pastures with application of no-till technology in the conditions of Northern Kazakhstan» submitted for the degree of Doctor of Philosophy (PhD) in the specialty 6D080100 – «Agronomy»

Relevance of research topics.

One of the priority branches of the rural economy is animal husbandry, it is in this branch, given its potential, that there are opportunities for the introduction of new technologies and the creation of modern animal breeding complexes. Taking into account that the main source of replenishment of fodder resources is field fodder production, which allows to satisfy the need of animal husbandry in quality fodder, balanced in all nutrients.

The global demand for food from livestock production will increase, therefore Kazakhstan should become one of the major regional exporters of meat and dairy products. In plant breeding, it is necessary to find a way to reduce the volume of cultivation of unprofitable crops and replace them with olive, vegetable and fodder crops. As a result, their consumption increases to 30-50%, and the share of concentrates and fodder grain in rations increases, which leads to a sharp increase in the cost of livestock production, as the cost of feed reaches 50-60%. To get out of the situation, it is necessary to create a stable and high-quality fodder base that meets the needs of farm animals. The second most important condition is a set of fodder cultures that ensure the production of fodder planned for animal feeding.

The purpose of the dissertation research: to give a scientific basis to methods of restoration and improvement of degraded pastures when using cereal-legume grass mixtures in the conditions of the arid steppe of Northern Kazakhstan.

Research objectives:

– to select long-term cereal and legume herb mixtures capable of forming highly productive long-term herb stands;

– to study the impact of methods of restoring degraded pastures on the growth and development of cereal and legume grass mixtures;

– to study grain-legume grass mixtures for winter hardiness and preservation of newly created pasture stands with various methods of sowing;

– to give a comparative assessment of the productivity of grain-legume grass mixtures;

– give an economic evaluation of the restoration of degraded pastures.

Research methods.

According to the tasks of the study, the methods used for their solution are used. Since the object of research is degraded pastures, the most rational methods are chosen for the object of research.

Investigations and observations were carried out in accordance with generally accepted methods and GOST standards. «Methodology of field experience» Dospekhov B.A. (1985).

Agrochemical assessment of soil: The determination of the content of organic matter was carried out according to the Tyurin method in the modification of TsINAO. Determination of mobile compounds of phosphorus and potassium by the method of Chirikov in the modification of TsINAO.

Phenological observations of perennial grasses determined by the method of VNII Kormov. The density of parking is counted twice: after planting, before cleaning on specially designated sites in the 1st and 3rd repetitions. The density of plant stands and their safety was determined on test plots from adjacent rows of 0.5 m with subsequent counting.

The height of plants was determined before taking into account the yield of green mass by measuring 25 plants of each species.

The harvest of green mass in the phase of pasture maturity was determined by mowing and weighing the green mass on the registered plots with analysis of the composition of the grass mixture by species and drying the sheaves to an air-dry state. Drying of mowed grass directly on plots to count the number of grass stalks, fixed plots of 1 m2 in three places diagonally on each experimental plot. Mowing grass is used as an imitation of pasture use, that is, at the height of its mowing with a scotoma - 4-5 cm. Immediately after mowing, an average sample weighing 1 kg is taken from each plot, which is placed in a gauze bag and dried. After that, the output of dry matter from 1 m2 is established.

Output air-dry weight - test bundles weighing 1 kg. The determination of the content of dry matter is connected with the establishment of its humidity. The samples were dried to a constant mass and calculated according to the formula.

Data processing method: static data processing - dispersion analysis method (Dospekhov B.A., 1985) using Microsoft Excel 2003 and AGROS 2.11.

The main points that can be made in defense (proven scientific hypotheses and other conclusions that are new knowledge):

– study of methods of restoration of degraded pastures on the basis of 3-component grass mixtures, sown by zero-technology soil treatment;

– comparative study of the growth and development of perennial grasses, their winter resistance and productivity;

– economic efficiency of various methods of restoration of degraded pastures.

Description of the main research results of the study.

Highly productive cereal and legume grass mixtures have been selected for various climatic conditions of Northern Kazakhstan: moderate-hardy – wheatgrass-alfalfa-brome; medium-hardy – wheatgrass-sainfoin-brome; high-hardy – wheatgrass-goatgrass-brome.

In the course of research, it was established that in experiment according to the study of moderately winter-hardy cereal-legume grasslands, the highest density of standing plants was noted in the variant: wheatgrass-alfalfa-brome; in experiment for the study of medium-winter-hardy cereal-legume grass mixtures,

there was a variant: in the wide-row method of sowing wheatgrass-sainfoin-brome, in the row method of sowing it was bluegrass-sainfoin-wheatgrass; in experiment for the study of highly winter-hardy cereal-legume grass mixtures, there was a variant: in the wide-row method of sowing wheatgrass-goatgrass-brome, and in the row method of bluegrass-goatgrass-wheatgrass.

The safety of plants of perennial grasses after the winter period in cereal-legume grass mixtures varied in different ways. The highest indicator of safety in experiment No. 1 with the wide-row and row method of sowing wheatgrass-alfalfa-brome; in experiment No. 2, the following options were noted: in the wide-row method of wheatgrass-sainfoin-brome and in the row-row method of sowing bluegrass-sainfoin-brome; in experiment No. 3 with the wide-row method of sowing wheatgrass-goatgrass-brome, and with the row method of sowing bluegrass-goatgrass-wheatgrass.

The height of the plants of perennial grasses varied according to the experiments and had good growth and development of perennial grasses in all variants.

The highest yield according to the study of moderately winter-hardy cereal-legume grass mixtures with the wide-row and row sowing method was the option: wheatgrass-alfalfa-brome. According to the study of medium-winter-hardy cereal and leguminous grass mixtures, there was a variant: in the wide-row and in the row method of sowing, there was a variant of wheatgrass-sainfoin-brome. According to the study of highly winter-hardy cereal-legume grass mixtures, there was a variant: in wide-row and in-row wheatgrass-goatgrass-brome. Based on the results, it was established that the use of highly winter-resistant fodder cultures provides animals with cheap feed for a long period in harsh climatic conditions.

Economic efficiency in the study of moderate winter-hardy cereal and legume grass mixtures for 2016-2018 with the wide-row sowing method, the largest profit was obtained on the option: wheatgrass-alfalfa-brome – 61,000 tg/ha, with the ordinary sowing method: wheatgrass-alfalfa-brome – 55280 tg/ha.

Economic efficiency in the study of medium-hardy cereal and legume grass mixtures for 2016-2018 with a wide-row and ordinary method of sowing, the greatest profit was obtained on the option: wheatgrass-sainfoin-brome – 60900 tg/ha, 55180 tg/ha.

Economic efficiency in the study of high-winter-hardy cereal and legume grass mixtures for 2016-2018 with the broad-row and ordinary method of sowing, the greatest profit was obtained on the option: wheatgrass-goatgrass-brome – 66800 tg/ha, 59380 tg/ha.

Justification of the novelty and importance of the obtained results.

For the first time, in the conditions of Northern Kazakhstan, resource-saving technologies were developed for the restoration of degraded pastures. The realization of the results of the thesis work will create conditions for the restoration of degraded pastures with an increase in growth and development of vegetation up to 15-20%.

Agrochemical evaluations were carried out based on: the content of organic matter (humus); nitrate nitrogen content; content of mobile phosphorus and

potassium (according to Chirikov, according to Machiginu). Also, a study was conducted where the density of perennial grasses was determined; raising plants; botanical composition of the herbage by analyzing plant samples weighing 1 kg with separation of legumes, cereals and various herbs with subsequent weighing of each component. Determined the productivity of cereal-legume grass mixture by mowing and weighing on the accounting plots with analysis by species composition of grass mixture and drying of sheaves to air-dry condition; a comparative assessment of the development of cereal and leguminous grasslands and their productivity was carried out; Determined economic efficiency of restoration of degraded pastures. The reliability of the obtained scientific data is confirmed by methods of statistical processing and practical use of the obtained results.

With the use of zero technology for the restoration of degraded pastures, the cost of energy and protein of pasture fodder will be reduced by 30-40%. The results of the research are used by economic subjects who own pasture lands and livestock. Potential users: subjects of APC of Kostanay region and Northern Kazakhstan - peasant (farmer) households, agricultural enterprises, personal subsobnye households.

Compliance with development directions for the development of science or state programs.

The work was carried out within the framework of the budget project (O.0749 «Development of technologies for the improvement and rational use of pastures for the development of livestock breeding», under the measure: «Restoration of degraded grass stands of pastures of the arid steppe of Northern Kazakhstan using zero technology» state registration number 0115PK02919. Implementation period 2015 -2017).

Scientific research was carried out under the grant project IRN AR09562508 «System of multispecies agrophytocenoses for the restoration of degraded pastures in the northern regions of Kazakhstan», the source of funding is the Committee of Science of the Ministry of Education and Science of the Republic of Kazakhstan (Contract No. 253/12-2 «15» June 2021).

In the direction of the thesis, the continuation of the research is carried out under the grant project of the IRN «AP19177533» «Adaptation of multispecies agrophytocenoses for long-term use of degraded pastures in the northern region of Kazakhstan», as part of the implementation of grant funding of research of young scientists under the project «Young Scientist» for 2023-2025 years (Contract No. 143 ЖГ-4 «May 17», 2023. The description of the doctoral student's contribution to the preparation of each publication.

The doctoral student directly participated in the preparation of scientific publications, their design and presentation for publication in domestic and foreign publications.

The results of the dissertation studies and the main provisions are reflected in 20 publications, including:

– 3 articles in journals included in the Scopus international database – «Ecology, Environment and Conservation», 2017; «Revista Facultad Nacional de Agronomia Medellin», 2022; «Online Journal of Biological Sciences», 2022.

– 7 articles - in domestic scientific publications recommended by the Committee for quality assurance in the sphere of education and science of the Ministry of Science and Higher Education of the Republic of Kazakhstan: «Izvestia NAS RK series of agricultural sciences» (Almaty, 2017-2018 - 3 articles); «3i:intellect, idea, innovation - intellect, idea, innovation» (Kostanay, 2018, 2019 - 2 articles); Journal of Science of the Kazakh Agrotechnical University named after S. Seifullina (2022) - 1 article; «3i:intellect, idea, innovation» (2023) - 1 article.

– 10 articles - in international scientific and practical conferences of neighboring countries (Russia); in the international scientific and practical conference of Latvia; 12th International Scientific Conference «Students of science», Latvia (Yelgava, 2017); in the material of the international scientific and practical conference of the Kazakh National Agrarian University (Almaty, 2017); «Baytursynovsky reading» KSU named after A. Baitursynova (Kostana, 2018).

Volume and structure of the dissertation.

The dissertation is presented on 120 sheets of typewritten text and includes the following sections: introduction, literature review, research methods, research results, conclusion, list of used sources and appendices. The work contains 19 figures, 53 tables, 226 sources of literature.