

ANNOTATION

of the PhD thesis by Zorzhanov Berik Doktorkhanovich on the topic «Technology of production of environmentally friendly melon crops in the south-east of Kazakhstan», submitted for the degree of Doctor of Philosophy (PhD) in the specialty - 6D080900 – «Fruit and vegetable growing»

Relevance of the research topic

Melon farming is one of the main branches of agriculture in Kazakhstan. The agro-industrial complex of Kazakhstan is one of the main opportunities for improving the economy of our country, which owns millions of hectares of agricultural land, but today its potential in the country is being used to the fullest. Due to the destruction of the agricultural system of the post-Soviet period and the limitation of technical and economic opportunities in subsequent periods, agricultural chemicals (mineral fertilizers, chemically synthesized pesticides – herbicides, fungicides, insecticides, etc.) are used in many places.) is still not widely used, and in some places is not used at all. In this regard, there are great opportunities for the production of organic and environmentally friendly products in demand not only within the country, but also abroad. We must gradually increase the area of irrigated land to 3 million hectares by 2030, and this is one of the tasks that will increase the volume of agricultural products by 4.5 times. The Ministries of Trade and Integration and Agriculture should provide farmers with maximum support for the sale of their products. In this regard, the Government was given a corresponding instruction. This is an important task in the export of agricultural products, it is necessary to abandon the raw material base. Despite the fact that only 40 percent of the potential of enterprises for processing products is used, its volume has reached 70 percent.

For Kazakhstan, the biologization of melon products is of great importance, as it is directly related to the health of the population. Therefore, the value of the environmental friendliness of the melon products produced is high. Of particular relevance is the production of natural, high-quality melon products for full, proper use by the population of Kazakhstan, improving public health.

Environmentally friendly melon products may well become the brand of our independent country. This is becoming more and more important when Kazakhstan is on the list.

In Kazakhstan, organic farming occupies 303.4 thousand hectares, of which 300 thousand tons of organic products were produced. However, there is no garden production on this list at all. In the future, the volume of organic production in melon farming is planned to increase to 2.5%.

For Kazakhstan, the biologization of melon farming is important, since the health of the nation directly depends on it.

Melon crops, due to their agrobiological characteristics, require the use of large amounts of fertilizers and frequent treatment with pesticides.

Melons are mainly (95-97%) eaten fresh among the population. For this reason, it is very important that the garden products produced are environmentally

friendly. For proper care, proper nutrition and improvement of public health, the production of natural, highly productive melon products is becoming especially relevant. It is quite possible that environmentally friendly, natural melon products will become the brand of our independent state.

Organic melon farming is a production system that provides for maintaining ecological balance and minimizing the negative impact of agrochemicals on the environment, which avoids the use or significantly reduces the level of use of chemical (mineral) fertilizers and pesticides.

The most accessible and regulated elements of biological melon cultivation in production conditions are: selection of natural varieties of garden crops tolerant to pests and diseases, biological crop rotations of the garden, biological pest control method, agrotechnical methods of weed control (if necessary, single treatment with environmentally friendly herbicides), toxic fungicides during the growing season against diseases and pests disinfection seeds with complex preparations to minimize and prevent the need for insecticides, the use of modern technologies, such as minimizing technological processes, preventing the flushing of the fertile soil layer (irrigation erosion), improving the phytosanitary condition of garden plantations to minimize the load of mechanical impact on the soil, etc.

All these factors will be studied in a complex for the development of biological melon farming. It should be particularly noted that the project mainly uses Kazakhstani products (varieties, organic and mineral fertilizers, biostimulators of soil and plant vital activity, plant protection biologics and others).

The above indicates the relevance of the proposed study. The implementation of this research will make it possible to transfer chemical melon farming to biological rails.

The relevance of scientific research is determined by the implementation of the grant project AP08052493 "Technology for the production of environmentally friendly melon products (watermelons, melons) in the south-east of Kazakhstan". Kazakh Scientific Research Institute of Horticulture LLP 2020-2022, in which B.D. Zorzhanov was one of the main executors of the project from beginning to end (state registration No.0120RK00175).

The purpose of the dissertation research: The purpose of the research is to ensure the production of environmentally friendly melon products based on the use of new environmentally friendly varieties of domestic breeding, protection of watermelons from harmful organisms and biologization of mineral nutrition systems in the south-east of Kazakhstan.

Research objectives

- identification of the best varieties (hybrids) of watermelon culture that are resistant to adverse environmental conditions and harmful organisms and have high adaptability, allowing to obtain an environmentally friendly harvest;

- development of a scientifically based organo-mineral fertilizer system for watermelon crops through the optimal use of local organic fertilizers (manure, vermicompost, straw, bird droppings), new types of domestic bioorganomineral fertilizers (MERS, Biosok, BioZZ, WORMic, etc.) and biostimulators regulating plant growth;

- development of a biological system for protecting watermelon crops from harmful organisms based on the use of biocultures and the use of environmentally friendly pesticides;
- determination of the impact of biological agrotechnologies on the yield, quality and environmental friendliness of watermelon harvest;
- assessment of the economic and environmental efficiency of the technology for the production of environmentally friendly melon products based on the biologization of watermelon cultivation;
- Development and presentation of technology for the production of environmentally friendly watermelon products for farms growing melons in the south-east of Kazakhstan.

Research methods

Field experiments and laboratory studies were carried out in accordance with generally accepted classical methods, guidelines, recommendations and instructions adopted in crop production (vegetable growing), soil science and agrochemistry:

- Agrochemical methods of soil research (M., 1975); - Yudin F.A. Methods of agrochemical research (M., 1980); - Dospekhov B.I. Methods of field experience (M., 1985); - Methods of experimental business in vegetable growing and melon growing (Edited by V.F.Belik; M., 1992); - Methods of physiological research in vegetable and melon growing (edited by V. F. Belik; M., 1970);- Methodological guidelines for the determination of nitrates in crop production (M., 1986); - Basic methods of phytopathological research (Ed. Chumakovaa.E.; M., 1974); - Methodological guidelines for conducting registration tests of insecticides, acaricides, biopreparations and pheromones in crop production (Almaty-Akmola, 1997); - Methodological guidelines for conducting registration tests of fungicides, seed protectants and biopreparations in crop production (Almaty - Akmola, 1997). -"Methods of mass testing of agricultural crops (potatoes, vegetable and melon crops)" (M., 1975).- The economic efficiency of using various types of organic fertilizers for vegetable crops was determined by N.N. Baranov (M., 1979).- Statistical processing of data on the yield of vegetable crops was carried out by the method of dispersion analysis (B.A.Dospekhov, 1985).

Agricultural technology of vegetable crops in experiments is generally accepted for the foothill zone of south-east Kazakhstan, carried out in accordance with the recommendations of KazNIPO. Varieties of melons approved for use (zoned) in the Almaty region were cultivated on experimental plots: watermelon EXPO.

Phenological and biometric studies have been conducted to study the timing of the onset and passage of the main phases, the intensity of plant growth and development, and the dynamics of biomass accumulation of melons in experimental plots.

Description of the main results of the study

During the mentoring of preliminary tests, 3 samples of early-ripening (67-79 days) watermelon harvest, 3 samples of medium-ripening (80-88 days) maturation and 4 samples of late-ripening (92-102 days) maturation were

identified. In the observation nursery, 2 early-maturing (SP-30, GBP6) and 1 medium-late (Gb PP-2015) specimens were distinguished. These varieties were distinguished by high yields (35.0 t/ha), fruit size (average weight - 9.5 kg) and high tasting prices in terms of taste (5.0 points).

According to the resistance of watermelon culture to fungal diseases (peronosporosis powdery mildew, fusarium), varieties No. 1; 3; 4; 7 and 8 differed.

As a result of the evaluation of varieties, a new variety of watermelon was sorted and transferred to the State Commission for Varietal Testing of Agricultural Crops called "Grant" and the National Institute of Intellectual Law for patentability tests. In 2024, an innovative patent was issued for the Grant variety as a new breeding achievement.

Laboratory examination of agrochemical indicators of soils showed that the maximum level of mobile forms of macronutrients was recorded when bird droppings were introduced into the soil at the rate of 10 t/ha. The maximum content of nitrate nitrogen was accumulated in the soil with a combination of 10 t/ha of bird droppings, granular vermicompost at the rate of 10 t/ha, cattle manure at the rate of 40 t/ha and straw with mineral fertilizers - 50.4-58.8 mg/kg. All variants of experiments with mobile phosphorus were above control. The results of the study of soil parameters showed an increase in total phosphorus (up to 0.212%) and total potassium (up to 2.593%) in the bioorganic fertilizer system. It was found that the application of cattle manure, bird droppings and granular vermicompost from bioorganic fertilizers increases the number of beneficial microorganisms in the soils of experimental crops. In the experimental version, in which cattle manure was applied as an organic fertilizer, the content of nitrogen-fixing microorganisms in the soil was the highest. Based on the results of the research results for 2020-2021, optimal bioorganic fertilizer systems for melons have been developed and recommendations have been given.

Scientific novelty

The results of the study are of great importance on a national scale, as they are aimed at creating a "biological garden" designed to provide the population with environmentally friendly garden products.

The ecological agrotechnics of garden production developed on the basis of our research is of paramount importance for the processing industry, which makes it possible to provide this industry with high-quality, clean garden raw materials.

As a result of research work, a new crop of watermelons was registered at the state variety testing. The name of the ecological variety is "Grant". (Patent of the Republic of Kazakhstan for selection achievement No. 1117 dated 01/19/2024).

The results of the study will positively affect the development of science on ecological gardening in the Republic, will be the beginning of the widespread introduction of "green" (biological) technologies for the production of environmentally friendly products into production.

Environmentally friendly, high-calorie, nitrate-free garden products produced by biological gardening improve the health of the population, which brings producers a lot of income.

This is a new study for the republic, therefore it will be conducted for the first time in horticulture in Kazakhstan.

The main requirements for the defense of a dissertation

1. Biological systems for fertilizing garden crop rotations by using bioorganic fertilizers in combination with mineral fertilizers for the conditions of the south-east of Kazakhstan.

2. Development of environmentally friendly systems for protecting melons (watermelons) from diseases and pests.

3. Agroeconomical and ecological efficiency of the application of biologized technologies in melon cultivation.

The results of the research publications. Based on the materials of the dissertation, 17 scientific articles were published, including 12 articles at international conferences, 3 articles in the SCOPUS database, 2 articles in scientific publications recommended by the Committee for Quality Assurance in Science and Higher Education of the Ministry of Science and Higher Education of the Republic of Kazakhstan. The dissertation work consists of 106 pages. It contains an introduction, a literature review, research materials and methods, the main results and their discussion, conclusion and a list of references. The list of references consists of 204 titles. The text of the dissertation is illustrated with 34 tables and 23 figures.