ABSTRACT

of the dissertation work by Abdrazakov Yerlan on the topic:

"Features of oilseed flax cultivation as a stubble under irrigation conditions" submitted for the degree of Doctor of Philosophy PhD in the educational program 8D08101 –"Agronomy"

Relevance of the research topic. The hydrothermal conditions in the southeastern regions of Kazakhstan are quite suitable for growing two crops per year. With the right choice of cover crop, growing two crops per year on the same plot will not lead to a decrease in soil fertility, and will allow intensive use of irrigated fields to maximize yields per unit area. However, in practice, the cultivation of the second crop is incorrectly used by farmers, although after harvesting winter crops there is a lot of time (90-120 days) for growing crops. Direct sowing eliminates the main and pre-sowing tillage for crops, and drip irrigation allows for a timely additional harvest, the period of "harvesting cash crops-sowing crops" is reduced by at least 20-30 days, which allows for a guaranteed second crop harvest. However, to date, no targeted research has been conducted on the use of oilseed flax as a legendary crop in Kazakhstan. Such studies are especially relevant for increasing yields, preserving the fertility of irrigated lands and soils and reducing greenhouse gas emissions, managing the phytosanitary status of crops, and rational use of irrigation water. The thesis provides for the development of technologies for growing cover crops by drip irrigation using direct seeding of the main irrigated crops in the south and southeast of Kazakhstan. The technology being developed ensures guaranteed cultivation of two crops per year, reduction of irrigation water consumption and pesticide load per unit area, preservation of soil fertility and environmental protection, and ultimately a multiple increase in yields per unit of irrigated arable land. The results obtained may underlie the development of a completely new system of irrigated agriculture that ensures the preservation and reproduction of soil fertility for the south and southeast of Kazakhstan, sequestration of greenhouse gases, irrigation water consumption, and the achievement of potential productivity of irrigated arable land.

The purpose of the dissertation work. Development of technologies for growing on irrigated lands of Southeastern Kazakhstan after the main crop, winter wheat, based on drip irrigation and traditional, minimal and direct sowing of cover crops, ensuring two harvests per year, saving irrigation water, preserving soil fertility and protecting the environment.

The tasks of the dissertation work:

- determination of the characteristics of growth and development, formation of winter wheat of the main crop;
- study of the features of the development and growth of oilseed flax in the legendary cultivation;
- study of the formation of seed quality and yield of oilseed flax in the cultivation of legends;
- determination of greenhouse gas emissions and soil fertility into the atmosphere

in the fields of major and legendary crops;
- economic efficiency of oilseed flax cultivation.

Forms and methods of research

Characteristics of the main scientific problems and hypotheses of the thesis, substantiation of research strategies and approaches, types of research used in scientific work (descriptive, correlational and experimental), the sequence of research;

The experiment was built on an area of 4.8 hectares (length 300 m, width 158 m). The area of each tillage option is 1.4 hectares, within which, after harvesting winter wheat, oilseed flax (a legendary plant) was placed.

It was tested in production when growing oilseed flax using three different methods of tillage (traditional, minimal and zero), two different irrigation methods (micro-sprayable sprinkler belts and drip irrigation) and seeding methods (15 cm simple stacking and 30 cm wide stacking) (Table 5).

Solving the tasks set It was carried out by collecting and conducting production experience at the demonstration site of the Kazakh Research Institute of Agriculture and Crop Production in the Almaty region.

The total area of the experiment is 4,800 m^2, the neighborhood is 630 m^2 (width 6.3 m x 100 m)

Field studies were conducted in the irrigated farming area in southeastern Kazakhstan by cultivating the soil in three different ways (traditional, minimal and direct seeding), in the irrigated farming area on light brown soils of the Almaty region (at the demonstration site of the Kazakh Research Institute of Agriculture and Crop Production).

To select the main crop as a cover crop, 11 varieties of winter wheat of domestic and foreign varieties, as well as zoned varieties of Aydin winter barley and winter rapeseed, were studied. Sowing was carried out on October 21-22, 2020 with a direct-seeding drill vence-Tudo (Brazil) with a sowing rate of 200 kg/ha with simultaneous application of 100 kg/ha of ammophos. The largest dry biomass of winter wheat and winter barley and winter rapeseed during the period of full grain maturation was 453.7-1525.2 g/m2, winter barley – 329.5 g/m2 and winter rapeseed – 287.3 g/m2.

The results of studies on the effectiveness of winter wheat and winter barley and winter rapeseed varieties as the main crop have shown that winter wheat is the most favorable, which showed better wintering, growth and development, and high yields compared to winter barley. The zoned variety of winter barley did not winter well, as a result of which it lagged behind in growth and development, eventually forming a low yield. The highest yield with good ripeness was provided by the zoned variety of winter wheat Vitreous - 24, which we used as the main cover crop, after harvesting which we sowed the studied mobile oilseed flax.

Irrigation system

The drip irrigation system includes:

- 36m^3 irrigation catchments near the Kaskelen River;
- Pedrollo F 32/200B water pump, capacity 50 m^3/h;
-a settling tank with a height of the lower tier of 5m-25m^3;

- sand filter;
- strainer;
- injector for delivery;
- main pipelines;
- distribution pipes;
- the irrigation system is carried out by connecting to irrigation hydrants;
- pressure purification and distillation system;
- main pipelines;
- distribution pipes;
- drip irrigation tapes for surface drip irrigation;
- spray for micro-spraying tape.

The main provisions submitted for defense

The scientifically researched technology ensures guaranteed cultivation of two crops per year, reduction of irrigation water consumption and pesticide load per unit area, preservation of soil fertility and environmental protection, and ultimately a multiple increase in yield per unit of irrigated arable land. The results obtained may underlie the development of a fundamentally new system of irrigated agriculture for the south-east of Kazakhstan, ensuring the preservation and improvement of soil fertility, reducing greenhouse gases, consumption of irrigation water, and achieving potential productivity of irrigated arable land.

Successful implementation of research projects ensures:

- obtaining a by-crop of oilseed flax 1.5-2 times higher than c/ha;
- increased the yield of feed units by 1.5-2 times from 1 hectare of arable land;
- reduced crop pollution by 40-50%;
- reduction of irrigation water consumption by 30-40%;
- reduced irrigation erosion of the soil;
- reduction of water consumption coefficient by 1.5-2 times per unit area;
- preserves the agrophysical properties of the soil;
- emissions from arable land have decreased by 30-40%.

Description of the main research results

Winter wheat was sown as the main crop of oilseed flax, after harvesting winter wheat, oilseed flax was sown, consisting of three repetitions, using three different tillages (traditional, minimal and zero) and two different crops (15cm in a row and 30cm in a wide row). Simultaneously with the sowing work, ammophos fertilizer was applied in the amount of 100 kg/ha. Oilseed flax was watered in two different ways (drip irrigation and micro spray belts).

In the conditions of the foothill zone of the south-east of Kazakhstan, after harvesting the pre-crops, the legendary crop (oilseed flax) was sown on the same day with the recommended amount of sowing. Direct seeding was carried out with a Vence Tudo mixed seeder (Brazil) untreated with an interval of 15-30 cm, in fields that have been treated with a disk and plowed.

Substantiation of the novelty and significance of the results obtained

The peculiarities of growing oilseed flax as a crop cover crop in conditions of irrigated agriculture were first carried out in the foothills of southeastern Kazakhstan, the improvement of agrophysical and agrochemical properties of soils

when grown as a crop crop was proved, and it was found that greenhouse gas as a cover crop reduces carbon pollution of the atomosphere.

To preserve soil fertility and reduce greenhouse gas emissions, the Food and Agriculture Organization of the United Nations (FAO) is calling on farmers to reduce tillage, improve soil cover and diversify crop rotation. Of all the methods designed to reduce tillage, organic rotary tillage systems based on crop (cover) crops are of the greatest interest. These systems reduce tillage by adding humus to high-yielding cover crops, which end in a short rotation.

Based on the conducted research on the study of crop cultivation of oilseed flax in the irrigated conditions of the south-east of Kazakhstan, the following results were obtained:

Tillage methods had the greatest impact on yields. There were mutual differences between them. According to the results of 2020, high yields with the method of ordinary sowing of minimal treatment amounted to 14.5 c/ha, wide-row crops with zero-12.6 c/ha, with ordinary sowing with traditional treatment -11.7 c/ha. These high indicators were manifested only with the method of sowing in a row from all types of tillage, and the yield with the method of sowing in a wide row was lower than with sowing in a row in all methods of tillage. In our study, we found that a high yield result is repeated only with the sequential sowing method (cm), that oilseed flax does not challenge the mutual nutrient medium, and a large number of crops affects yield.

2020-2022 using two different irrigation methods. in 2020, with drip irrigation of 15.3 c/ha, with irrigation with micro-spray sprinkler belts of 14.5 c / ha, and in 2022 with the minimum method of tillage, with drip irrigation of 13.3 c/ha in the variant with simple sowing in rows, with irrigation with micro-spray sprinkler belts in the traditional treatment method, 10.1 c/ha of products.

The results of the analysis of variance were the absolute value of HCR05 (minimum deviation) – 4.03 and the relative value – 1.26.

Compliance with scientific development directions or government programs

The dissertation work was carried out within the framework of the grant project 2020-2022 "increasing the productivity of irrigated agriculture based on cover crops and drip irrigation", state registration number 0120RK00358, OGRN AP08855366.

Description of the doctoral student's contribution to the preparation of each publication

During his dissertation, doctoral student Yerlan Bekaripovich Abdrazakov took responsibility for his scientific work, prepared a research program and methodology, and made a personal contribution to the planning and conduct of experiments. He carried out the tasks of scientific research with great interest. According to the results of the dissertation research, a total of 5 scientific articles have been published, including: 1 – in the popular scientific journal of the Scopus Information and abstract Foundation; 3 - in domestic publications submitted by the Committee for Control in the field of Education and Science of the Ministry of Education and Science of the Republic of Kazakhstan; 1-at international scientific and practical conferences; 2 - is the author of the appendix to the patent for a utility

model of the Republic of Kazakhstan.

The volume and structure of the dissertation.

The total volume of the dissertation is 123 pages. It consists of an introduction, 6 parts, a conclusion and a proposal for production. The dissertation contains 21 figures, 33 tables and 3 appendices. There are 120 references in the list of references.