

При выращивании озимой пшеницы при капельном орошении наибольшую урожайность обеспечили районированные отечественные сорта Алмалы и Ажарлы. При норме высева семян 6 млн./га и оптимальных условиях минерального питания с внесением $N_{120}P_{60}$ они формировали по 120,0 ц/га. В 2019 году наибольшую урожайность обеспечили линии Купава би Купава 8 - 86,0 и 78,6 ц/га.

Наибольшая урожайность получена при выращивании культуры риса на капельном орошении при рядовом способе посева. При оптимальном количестве минеральных удобрений урожайность риса увеличилась с 5,9 до 21,5 т/га. На формирование урожая сои существенное влияние оказывают как условия возделывания, так и способы орошения и посева. В условиях предгорной зоны Илийского Алатау урожайность сои при ленточном и рядовым способами посева составили 51,8 и 61,0 т/га. На засоленной почве Акдалинского орошаемого массива урожайность сои при посеве ленточным способом получено 57,6 т/га, а при рядовом способе посева - 33,6 т/га.

UDC 631.8.022.3

DOI 10.52578/2305-9397-2023-3-2-160-171

IRSTI 68.35.39; 68.37.33

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CRITERIA FOR ASSESSING THE ECONOMIC EFFICIENCY OF THE APPLICATION OF GROWTH STIMULANTS, MICRO FERTILIZERS AND MINERAL FERTILIZERS ON SOYBEAN CROPS IN THE CONDITIONS OF THE SOUTH OF KAZAKHSTAN

ANNOTATION

The article presents the results of using the effectiveness of growth stimulants, micro-fertilizers and herbicides on soybean crops. We have calculated all types of costs associated with the purchase and delivery of fertilizers, herbicides and their applications during the growing season of plants.

Economic calculations were carried out according to the prevailing market norms and rates in the wage system for 2021 in the LLP «South-Western Research Institute of Animal Husbandry and Plant Growing» and in the southern region of Kazakhstan as a whole.

Over the years of the experiments, the highest indicators of conditional net income of the «Swallow» variety have reached - 503.0 thousand tenge/ha with a reduction in the cost of seeds to 11.6 thousand. tenge/ts were provided on the 5th variant of the experiment, where, against the background of seed treatment with the growth stimulator «vimpel» - 0.5 l/t + micronutrient «Oracle» - 1.5 l/t during the growing season of soybean plants in the phase of 3-5 leaves and during budding, the crops were twice treated with the above-mentioned growth stimulator «vimpel» - 0.5 l/ha, micronutrient «Oracle»multicomplex - 2.0 l/ha + micronutrient «Oracle»molybdenumcolofermin – 0.5 l/ha using herbicides according to the scheme of experiments.

The best indicators of the efficiency of soybean cultivation were revealed with the treatment of seeds of the Zhansaya variety with nitragine and the introduction of phosphorus fertilizers P60 kg/ha

and the treatment of crops with the growth stimulant «Vimpel»-0.5 l/ha, micro-fertilization «oracle»multicomplex at 2.0 l/ha and micro-fertilization «oracle» molybdenum colofermin – 0.5 l/ha. conditional net income amounted to 533.1 thousand tenge/ha with a reduction in the cost of seeds – 12.1 thousand tenge/ts against the background of herbicidal treatment.

Key words: soybean, growth stimulant, micronutrients, mineral fertilizers, nitrogine, herbicide, economic efficiency

Introduction. One of the most important factors in obtaining high and sustainable soybean grain yields in the conditions of the south of Kazakhstan, characterized by hot and dry summers, is the optimization of the water and nutritional regime of the soil with the use of growth stimulants and micro-fertilizers during the growing season. The shortage of irrigation water during the most critical periods of plant life is in most cases insufficient, which leads to a shortage of soybean grain yield. In this regard, the rational use of water resources using growth stimulants, micro-fertilizers and biological fertilizers during the growing season, taking into account the biological characteristics of the cultivated varieties and the development of resource-saving agricultural technologies for their cultivation is an urgent problem of agricultural science and a production necessity in the current market conditions.

Soybean is one of the main protein-oil crops with a wide range of applications: food, feed, technical and medical. Taking into account the high nutritional value and protein content, soybean is defined by the UNESCO organization as a strategic crop [1].

Over the past 20 years, the area under cultivation in the world has increased by 1.6 times and the yield by 1.35 times. Much attention is paid to this crop in the USA, Brazil, Argentina, China, and India, where about 90% of all crops planted in the world are concentrated [2]. In Kazakhstan, taking into account the growing market demand, their sowing areas expanded to 105-110 thousand hectares [3].

From the above it follows that soybeans were mainly grown in Almaty, Zhetysu and Zhambyl regions.

In the regions of Southern Kazakhstan (now the Turkestan region), soybeans began to be cultivated in 1984, and their sown areas in 1987 expanded to 7000.0 thousand hectares. Unfortunately, the cultivated soybean varieties were not adapted to the local weather and climatic conditions of the south of Kazakhstan. The main reason is the high thermal regime during the soybean ripening period at the end of August (26.4°C) and early September (27.2°C) and low relative soil humidity during these periods amounted to 28 and 22%, respectively, which contributes to high cracking soybeans and shedding more than half of the crop onto the ground [4]. For this reason, the expansion of soybean planting area in the south of Kazakhstan was limited.

In recent years, scientists at the Kazakh Research Institute of Agriculture and Plant Growing have created a number of soybean varieties adapted to the hot and dry climatic conditions of southern Kazakhstan. Over the past 2015-2017, we have carried out ecological variety tests of 32 varieties of soybean samples of domestic and foreign selection at the experimental sites of the South-Western Research Institute of Animal Husbandry and Plant Growing. According to the research results, it was revealed that the following soybean varieties were less shed: “Kazakhstanskaya 2309”, “Zhalspaksai”, “Zhansaya” and “Lastochka”. The remaining soybean varieties were inferior to the above-mentioned varieties of domestic selection in terms of yield, susceptibility to diseases and pests, as well as in terms of bean cracking during the ripening period.

Taking into account the above-mentioned economically valuable traits, the late-ripening variety “Swallow” and the mid-late-ripening variety “Zhansaya” were taken for study, since in the conditions of the Turkestan region there are still problems with varietal agro-technologies for soybean cultivation. In order to study the use of growth stimulants and microfertilizers, taking into account the biological characteristics of cultivated varieties, this is an urgent problem in agricultural science and has great practical significance in production conditions [5,6,7].

Results of economic efficiency according to calculations by S.V. Zharkova, O.V. Manylov showed that growing soybean varieties in the forest-steppe conditions of the Ob region of the Altai Territory is equally profitable. The use of a growth regulator and peat-humic fertilizer made it possible to increase the level of profitability of the Altom and Pripyat varieties studied in the experiment [8].

According to V.I. Zaostrovnykh and D.V. Starikova inoculation of bean and soybean seeds with rhizotorphin based on selection strains of nodule bacteria can significantly increase symbiotic nitrogen fixation and reduce the dose of mineral fertilizers, thereby reducing the cost of seed production [9,10].

An analysis of the economic efficiency of the use of microbiological preparations and growth stimulants when growing soybeans under irrigated conditions showed that they contributed to an increase in costs and product prices while simultaneously increasing profitability and economic efficiency rub./rub. invested costs [11].

When using a wide-grab seeder in a demonstration experiment, traditional soybean cultivation, including tillage and moldboard plowing, contributed to a decrease in conditional net income compared to the No-till technology by 21.5 and 7.3%, respectively, and economic efficiency - 17.2 and 8.4%, profitability - 84.0 and 50.0%, the cost of production in these options increased by 25.3 and 15.2%, respectively [12].

The results of the economic efficiency of soybean cultivation under various treatment options over two years of study showed the advantage of option B6, the combined use of a Megafol planatafol tank mixture. The profit for this option was 29,656.6 rubles/ha, economic efficiency was 2.0 rubles/per ruble. invested costs. The increase to the control averaged 0.90 t/ha [13].

At the present stage of development of the agro-industrial complex, the primary task of obtaining high and sustainable yields of crop products, along with effective agro-technological cultivation methods, is the widespread use of biological preparations - bacterial fertilizers based on beneficial groups of microorganisms and various types of microfertilizers and growth stimulants [14,15,16].

According to the results of experiments N.P. Saprykina, I.V. Vasileva, Yu.N. Bakaeva found that the most promising method of basic tillage for soybeans is flat-cut loosening, which promotes better accumulation of moisture in the soil and increases crop yield. It is more expedient to sow crops in an ordinary way using a Primera DMC seeder; this leads to increased productivity and energy efficiency of production. When flat-cut loosening and sowing with a Primera DMC seeder, the energy efficiency coefficient was 1.16 units, the lowest energy cost of 1 quintal of grain was obtained - 1430 MJ and the maximum energy income in the experiment - 1782 MJ/ha. Flat-cut loosening allows you to reduce production costs by 1.4-8.9%, the cost of 1 centner of grain by 121-122 rubles. and increase profitability by 65% [17].

A decrease in the amount of precipitation, accompanied by an increase in air temperature, contributed to a reduction in the duration of periods of flowering and fruit formation and, as a consequence, a decrease in grain yield. The duration of the growing season, depending on agrometeorological conditions when growing the Zara variety, ranged from 114 to 125 days. In this version, on average for 2012–2014. the highest yield was obtained - 1.73 t/ha of grain. In terms of this indicator, it exceeded the standard variety “Duar” by 0.41 t/ha. In 2012 and 2013, the highest economic indicators were obtained; profitability was 70.2 and 67.0%, respectively, against 17.1 and 16.0% in the standard [18].

Currently, the method of tillage, which is commonly called “Strip-Till” technology in the world, is becoming increasingly popular. The main feature of this method is that, simultaneously with loosening the upper fertile layer to the depth of cultivation, mineral or organic fertilizers are introduced into the ground, while not the entire area is cultivated, but part of it. The Strip-Till technology contains the best properties of traditional and no-moldboard tillage, in which only a narrow crop strip (15-25 cm) is cultivated to form a small ridge, and about 2/3 of the field remains uncultivated. The use of such processing technology, especially in the first years, makes it possible to reduce cultivation costs by 2-3 times compared to traditional technology using plowing [19].

Calculation data by E.Yu. Roshchina indicate a direct relationship between the profitability of production and yield, since the highest profitability of soybean production was achieved on farms with a yield of more than 2.0 t/ha. The highest net income was received by enterprises whose production costs amounted to up to 24.0 thousand rubles/ha, and the cost of fertilizers - from 3.1 to 4.0 thousand rubles/ha [20].

In the conditions of a zone of unstable moisture on ordinary chernozem, a positive effect was obtained from the combination of applying ammophos under the main treatment in doses of N12P52

and N24P104 and inoculating seeds with Rizotorfin when growing early-ripening, early-ripening and mid-ripening soybean varieties under irrigation. The highest yield of 2.74 t/ha was obtained when ammophos was applied at a dose of N24P104 and seeds were treated with Rizotorfin, when growing the mid-season variety "Selecta 302". The best economic effect - 68.8% - was obtained when cultivating the Selecta 302 variety with the addition of ammophos at a dose of N12P52 and inoculation of seeds with Rizotorfin [21].

Material and research methods. Field experiments were carried out on the basis of the South-Western Research Institute of Animal Husbandry and Plant Growing LLP at a stationary site of the Department of Agriculture and Plant Growing in 2021-2022. The soil cover of the study area is represented by ordinary gray soils developed on a thick thickness of loess-like loams and sandy loams. The mechanical composition of the upper horizon refers to medium loam.

The objects of research were the released late-ripening soybean variety "Lastochka" and the promising mid-late variety "Zhansaya".

Plant growth stimulator "Vimpel" is a complex natural-synthetic preparation of contact-systemic action for treating seeds and vegetative plants.

"Oracle" seeds are a unique complex liquid microfertilizer for treating seeds of field, vegetable, ornamental crops, potato tubers, soaking cuttings, chubuks, grape seedlings and fruit and berry crops for the purpose of their rooting.

"Oracle" multi-complex - used together with pesticides, growth stimulants, solutions of mineral fertilizers with a wide pH range.

"Oracle" colofermin molybdenum is a concentrated microfertilizer for treating seeds of leguminous crops and foliar feeding of field, vegetable and perennial crops.

Research into plant phenology, biometric analyses, and determination of crop yields were carried out according to the methods of state agricultural variety testing. crops[22].

Biological and structural analysis of soybean yield, depending on the factors studied, was carried out in each experimental plot in 4-fold repetition.

Mathematical processing and analysis of variance of the obtained research results using the method of B.A. Dospehova[23].

The economic efficiency of the experimental options being studied is determined by calculating the actual costs of labor and funds for all types of work according to established standards and market prices of the region of the Turkestan region.

Research results. The criterion for the effectiveness of a particular agricultural technology for cultivating crops is their economic assessment. For this purpose, we determined the cost of money per hectare of soybean cultivation and the production of one hundredweight of grain, depending on the cost of growth stimulants, microfertilizers, as well as direct costs per hectare of sowing for certain types of work associated with their use, insecticide treatment against pests, herbicide against weeds and conditional net income.

Economic calculations were carried out according to established market norms and prices in the wage system for 2021 at the South-Western Research Institute of Livestock and Plant Production LLP and in the southern region of Kazakhstan in general.

To identify the effectiveness of growth stimulants, microfertilizers and herbicides on soybean crops, we calculated all types of costs associated with the purchase and delivery of fertilizers, herbicides and their applications during the growing season of plants.

The most important indicators for identifying economic assessments of the studied agricultural practices are the costs of labor and funds, the level of which in resource-saving technology was determined mainly with the use of growth stimulants, microfertilizers, pesticides, as well as technological operations during the growing season.

The direct costs of the control option for soybean crops of the "Lastochka" variety in the current market conditions amounted to 271.7 thousand tenge/ha, which is associated with the cost of seeds, a disinfectant, soybean sowing, the use of herbicides, grain harvesting and their transportation. In subsequent options using Vimpel growth stimulants and Oracle microfertilizers, depending on the norms and frequency of processing of soybean crops during the growing season, the direct cost

indicator increased from 280.5 to 300.9 thousand tenge/ha, depending on the norms and frequency of treatment of soybean crops in the main phases of growth and higher development with the indicated preparations. The amount of direct costs per hectare of soybean planting when using phosphorus fertilizers P60 kg/ha and treating crops in the phase of 3 - 5 soybean leaves with growth stimulator "Vimpel" - 0.5 l/ha and microfertilizer "Oracle" multi-complex - 2.0 l/ha + microfertilizer "Oracle" colofermin molybdenum - 0.5 l/ha amounted to 307.7 thousand tenge, that is, slightly higher compared to treating crops with growth stimulants and microfertilizers.

The criterion for the effectiveness of a particular agricultural technology for cultivating crops is their economic assessment. For this purpose, we determined the cost of money per hectare of soybean planting of the "Lastochka" variety, depending on the use of growth stimulants, microfertilizers and herbicides. Thus, for both varieties, the direct costs of the control option without the use of herbicides when manually weeding weeds amounted to 271.7 thousand tenge/ha, and against the background of treating crops with herbicide, direct costs per hectare of soybeans decreased to 226.7 thousand tenge, which is due to the exclusion of manual weeding of crops in the fight against weeds. In subsequent versions of the experiment with the treatment of soybean seeds and the treatment of crops with a growth stimulant and microfertilizers in the phase of 3-5 soybean leaves according to the experimental design, direct cost indicators increased to 280.5 thousand tenge per 1 hectare without a herbicide background, and with the use of herbicides this indicator decreased to 235.5 thousand tenge/ha. This is due to the reduction in direct costs when using herbicides.

According to the results of studies of the reporting year using growth stimulants "Vimpel" and microfertilizers "Oracle" multi-complex, the indicators of conditional net income naturally increased per hectare of soybean crops and ranged from 167.1 to 314.1 thousand tenge, that is, with an increase the number of treatments during the growing season in the main phases of growth and development of soybean plants contributed to an increase in grain yield and the level of conditional net income with a reduction in the cost of seed oil against a herbicidal background and fluctuated between 12.4-9.2 tenge/c, and against a background without application of herbicides, these indicators slightly increased 15.6-12.2 tenge/c, compared with the control version of the experiment, these values were significantly lower (16.2-12.6 tenge/c).

The largest amount of conditional net income per hectare when cultivating the "Lastochka" variety was obtained by applying the recommended rates of mineral fertilizers P60 kg/ha, and treating soybean crops during the formation of 3-5 leaves with growth stimulants "Vimpel" - 0.5 l/ha, microfertilizer "Oracle" multi-complex - 2.0 l/ha + microfertilizer "Oracle" colofermin molybdenum - 0.5 l/ha depending on the use of herbicides amounted to 377.3-477.3 thousand tenge/ha, with a reduction in cost of seed oil soybeans by 11.2-8.9 thousand tenge/c (Table 1).

The highest direct costs for growing soybeans for both varieties were noted at the level of 307.7 thousand tenge when treating seeds with nitragine, with the main application of phosphorus fertilizers at a rate of P60 kg/ha, with the treatment of crops with the growth stimulant "Vimpel" - 0.5 l/ha, microfertilizer "Oracle" multi-complex at a rate of 2.0 l/ha, microfertilizer "Oracle" colofermin molybdenum - 0.5 l/ha.

Quite high indicators of conditional net income for the "Lastochka" variety - 441.6 thousand tenge/ha with a reduction in seed cost to 9.2 thousand tenge/c were provided in the 5th variant of the experiment, where, against the background of seed treatment with the growth stimulant "Vimpel" - 0.5 l/t + microfertilizer "Oracle" seeds - 1.5 l/t during the growing season of soybean plants in the phase of 3-5 leaves and during the budding period, the crops were treated twice with the above-mentioned growth stimulator "Vimpel" - 0.5 l/ha, microfertilizer "Oracle" multi-complex - 2.0 l/ha + microfertilizer "Oracle" colofermin molybdenum - 0.5 l/ha according to the experimental scheme.

Similar results of economic efficiency for the Zhansaya variety were calculated according to the factors studied. It should be noted that the indicators of conditional net income for the "Zhansaya" variety were slightly lower, and the cost of grain, on the contrary, was higher compared to the "Lastochka" variety, which is associated with a lower seed oil yield, since the "Zhansaya" variety completes the growing season at 11-12 days earlier compared to the "Lastochka" variety.

Quite high figures of conditional net income for the Zhansaya variety were obtained against the background of seed treatment with the growth stimulant "Vimpel" - 0.5 l/t and microfertilizer "Oracle" seeds - 1.5 l/t, as well as by treating soybean crops twice a day phase of 3-5 leaves and during the budding period with growth stimulator "Vimpel" - 0.5 l/ha, microfertilizer "Oracle" multi-complex 2.0 l/ha + microfertilizer "Oracle" colofermin molybdenum - 0.5 l/ha against the background of herbicide treatment received - 414.1 thousand tenge/ha with a reduction in the cost of seeds - 9.5 thousand tenge/c (Table 2).

It should be noted that with the treatment of soybean seeds of the "Zhansaya" variety with nitragine and the application of phosphorus fertilizers P60 kg/ha and the treatment of crops with the growth stimulant "Vimpel" - 0.5 l/ha, microfertilizer "Oracle" multi-complex at a rate of 2.0 l/ha, microfertilizer "Oracle" colofermin molybdenum - 0.5 l/ha, the largest amount of conditionally net income was obtained - 459.8 thousand tenge/ha with a reduction in the cost of seeds - 9.0 thousand tenge/c against the background of herbicide treatment.

The results of the study revealed that in 2022, in order to determine the direct costs of money per hectare of soybean planting of the "Lastochka" variety, depending on the use of growth stimulants, microfertilizers and herbicides. Thus, for both varieties, the direct costs of the control option without the use of herbicides amounted to 366.6 thousand tenge/ha, and against the background of treating crops with herbicide, direct costs per hectare of soybeans decreased to 290.2 thousand tenge, which is due to the exclusion of manual weeding crops in the fight against weeds. In subsequent versions of the experiment with the treatment of soybean seeds and the treatment of crops with a growth stimulant and microfertilizers in the phase of 3-5 soybean leaves according to the experimental design, direct cost indicators increased to 370.4 thousand tenge per 1 hectare without herbicide background, and with the use of herbicides this indicator decreased to 293.8 thousand tenge/ha. This is due to the reduction in direct costs when using herbicides. It was revealed that in 2022, the direct costs of soybean cultivation increased significantly compared to 2021, this is due to an increase in the cost of certain agrotechnical treatments and fertilizers.

Based on the results of economic calculations, it was revealed that with the use of growth stimulants "Vimpel" and microfertilizers "Oracle" multi-complex, the indicators of conditional net income naturally increased from one hectare of soybean crops and ranged from 172.6 to 329.4 thousand tenge, that is with an increase in the number of treatments during the growing season in the main phases of growth and development of soybean plants.

They contributed to an increase in grain yield and the level of conditional net income with a decrease in the cost of seed oil on a herbicidal background and fluctuated between 14.8-11.6 tenge/c, and on Against the background without the application of herbicides, these indicators increased slightly, 20.5-16.3 tenge/c, compared with the control version of the experiment, these values were significantly lower (23.0-16.1 tenge/c).

According to our calculations for 2022, the largest amount of conditional net income per hectare when cultivating the "Lastochka" variety was obtained by applying the recommended rates of mineral fertilizers P60 kg/ha, and treating soybean crops during the formation of 3-5 leaves with growth stimulants "Vimpel" - 0.5 l/ha, microfertilizer "Oracle" multi-complex - 2.0 l/ha + microfertilizer "Oracle" colofermin molybdenum - 0.5 l/ha, depending on the use of herbicides amounted to 366.5-500.1 thousand tenge/ha, with a reduction in the cost of soybean seed oil by 15.8-12.0 thousand tenge/c (Table 1).

The highest values of direct costs for growing soybeans for both varieties were noted at the level of 410.5 thousand tenge when treating seeds with nitragine, with the main application of phosphorus fertilizers at a rate of P60 kg/ha, with the treatment of crops with the growth stimulant "Vimpel" - 0.5 l/ha, microfertilizer "Oracle" multi-complex at a rate of 2.0 l/ha, microfertilizer "Oracle" colofermin molybdenum - 0.5 l/ha.

Over the years of experimentation, the highest indicators of conditional net income for the "Lastochka" variety reached 503.0 thousand tenge/ha with a reduction in the cost of seeds to 11.6 thousand tenge/c were provided in the 5th variant of the experiment, where, against the background of seed treatment with a stimulant growth "Vimpel" - 0.5 l/t + microfertilizer "Oracle" -

1.5 l/t during the growing season of soybean plants in the phase of 3-5 leaves and during the budding period, the crops were treated twice with the above-mentioned growth stimulator "Vimpel" - 0.5 l/ha, microfertilizer "Oracle" multi-complex - 2.0 l/ha + microfertilizer "Oracle" colofermin molybdenum - 0.5 l/ha with the use of herbicides according to the experimental scheme.

High indicators of conditional net income for the Zhansaya variety were obtained against the background of seed treatment with the growth stimulant "Vimpel" - 0.5 l/t and microfertilizer "Oracle" seeds - 1.5 l/t, as well as by treating soybean crops twice in phase 3 – 5 leaves and during budding with growth stimulator "Vimpel" - 0.5 l/ha, microfertilizer "Oracle" multi-complex 2.0 l/ha + microfertilizer "Oracle" colofermin molybdenum – 0.5 l/ha against the background of herbicide treatment were obtained – 464.0 thousand tenge/ha with a reduction in the cost of seeds – 12.1 thousand tenge/c (Table 2).

It should be noted that in 2022, with the treatment of soybean seeds of the "Zhansaya" variety with nitragine and the application of phosphorus fertilizers P60 kg/ha and the treatment of crops with the growth stimulator "Vimpel" - 0.5 l/ha, microfertilizer "Oracle" multi-complex at a rate of 2.0 l/ha, microfertilizer "Oracle" colofermin molybdenum - 0.5 l/ha, the largest amount of conditional net income was obtained - 533.1 thousand tenge / ha with a reduction in the cost of seeds - 12.1 thousand tenge / c against the background of herbicide treatment.

Conclusions: Consequently, in the conditions of irrigated agriculture in the south of Kazakhstan, the use of growth stimulants, microfertilizers, taking into account the biological need of soybeans for food elements, their use within the recommended periods and norms can significantly increase the amount of conditionally net income with a reduction in the cost of seeds and with a significant reduction in direct costs for their cultivation.

Table 1 – Economic efficiency of cultivating soybean variety “Lastochka” depending on the use of growth stimulants, microfertilizers and herbicides for 2021-2022

Experimentoptions	Background	Soybean yield, centner/ha		Costs per 1 hectare, thousand tenge		Soybean sales, c/ha		Cost of products received, thousand tenge		Conditionally net income from 1 hectare, thousand tenge		Cost of 1 centner of soybean, thousand tenge	
	years	2021	2022	2021	2022	2021	2022	2021	2022	2021	2022	2021	2022
1. Control - nofertilizers	no herbicide	16,7	15,9	271,7	366,6	25000	30000	417,5	447,0	190,8	80,4	16,2	23,0
	with herbicide	17,9	18,0	226,7	290,2	25000	30000	447,5	540,0	220,8	249,8	12,6	16,1
2. Seed treatment incentive. Growth "Vimpel" - 0.5 l/t + micro-convenience. "Oracle" multi-complex - 1.5 l/t	no herbicide	17,9	18,1	280,5	370,4	25000	30000	447,5	543,0	167,1	172,6	15,6	20,5
	with herbicide	19,0	19,9	235,5	293,8	25000	30000	475,0	597,0	239,5	303,2	12,4	14,8
3. Against the background of seed treatment, treatment of crops in the phase of 3-5 soybean leaves is an incentive. growth "Vimpel" - 0.5 l/ha + micro-convenience. "Oracle" multi-complex - 2.0 l/ha	no herbicide	20,9	21,1	289,3	375,9	25000	30000	522,5	633,0	233,2	257,1	13,8	17,8
	with herbicide	23,1	24,0	244,3	300,3	25000	30000	577,5	720,0	333,2	419,7	10,5	12,5
4. Against the background of seed treatment, treatment of crops in the phase of 3-5 soybean leaves is an incentive. growth "Vimpel" - 0.5 l/ha + micro-convenience. "Oracle" multi-complex - 2.0 l/ha and treatment of crops in the budding phase incentive. growth "Vimpel" - 0.5 l/ha + micro-convenience. "Oracle" multi-complex - 2.0 l/ha	no herbicide	21,3	22,0	298,1	386,4	25000	30000	532,5	660,0	234,4	273,6	14,0	17,6
	with herbicide	25,8	26,2	253,1	309,8	25000	30000	645,0	786,0	391,9	476,2	9,8	11,8
5. Against the background of seed treatment, treatment of crops in the phase of 3-5 soybean leaves is an incentive. growth "Vimpel" - 0.5 l/ha + Vimpel. "Oracle" multi-complex - 2.0 l/ha + "Oracle" colofermin molybdenum - 0.5 l/ha, treatment of crops in the budding phase. growth "Vimpel" - 0.5 l/ha + micro-convenience. "Oracle" multi-complex - 2.0 l/ha + micro-convenience. "Oracle" colofermin molybdenum - 0.5 l/ha	no herbicide	24,6	24,0	300,9	390,6	25000	30000	615,0	720,0	314,1	329,4	12,2	16,3
	with herbicide	27,9	27,3	255,9	316,0	25000	30000	697,5	819,0	441,6	503,0	9,2	11,6
6. Seed treatment with nitragin + P60 before. basics field treatment + crop treatment in the phase of 3 – 5 soybean leaves incentive. growth "Vimpel" - 0.5 l/ha, micro-convenience. "Oracle" multi-complex - 2.0 l/ha + micro-convenience. "Oracle" colofermin molybdenum - 0.5 l/ha	no herbicide	27,4	25,9	307,7	410,5	25000	30000	685,0	777,0	377,3	366,5	11,2	15,8
	with herbicide	29,6	27,8	262,7	333,9	25000	30000	740,0	834,0	477,3	500,1	8,9	12,0

Table 2 - Economic efficiency of cultivating soybean variety "Zhansaya" depending on the use of growth stimulants, microfertilizers and herbicides for 2021-2022

Experimentoptions	Background	Soybean yield, centner/ha		Costs per 1 hectare, thousand tenge		Soybean sales, c/ha		Cost of products received, thousand tenge		Conditionally net income from 1 hectare, thousand tenge		Cost of 1 centner of soybean, thousand tenge	
	Years	2021	2022	2021	2022	2021	2022	2021	2022	2021	2022	2021	2022
1. Control - nofertilizers	no herbicide	15,9	14,8	271,7	366,6	25000	30000	397,5	444,0	125,8	77,4	17,0	24,8
	with herbicide	17,5	16,9	226,7	290,2	25000	30000	437,5	507,0	210,8	216,8	12,9	17,2
2. Seed treatment incentive. Growth "Vimpel" - 0.5 l/t + micro-convenience. "Oracle" multi-complex - 1.5 l/t	no herbicide	17,3	17,2	280,5	370,4	25000	30000	432,5	516,0	152,0	135,6	16,2	21,5
	with herbicide	18,9	18,4	235,5	293,8	25000	30000	472,5	552,0	237,0	258,2	12,5	16,0
3. Against the background of seed treatment, treatment of crops in the phase of 3-5 soybean leaves is an incentive. growth "Vimpel" - 0.5 l/ha + micro-convenience. "Oracle" multi-complex - 2.0 l/ha	no herbicide	20,4	19,8	289,3	375,9	25000	30000	510,0	594,0	220,7	218,1	14,2	19,0
	with herbicide	22,4	21,9	244,3	300,3	25000	30000	560,0	657,0	315,7	356,7	11,0	13,7
4. Against the background of seed treatment, treatment of crops in the phase of 3-5 soybean leaves is an incentive. growth "Vimpel" - 0.5 l/ha + micro-convenience. "Oracle" multi-complex - 2.0 l/ha and treatment of crops in the budding phase incentive. growth "Vimpel" - 0.5 l/ha + micro-convenience. "Oracle" multi-complex - 2.0 l/ha	no herbicide	20,9	21,0	298,1	386,4	25000	30000	522,5	630,0	224,4	243,6	14,2	18,4
	with herbicide	25,2	24,1	253,1	309,8	25000	30000	630,0	723,0	376,9	413,2	10,0	12,8
5. Against the background of seed treatment, treatment of crops in the phase of 3-5 soybean leaves is an incentive. growth "Vimpel" - 0.5 l/ha + micro-convenience. "Oracle" multi-complex - 2.0 l/ha + "Oracle" colofermin molybdenum - 0.5 l/ha, treatment of crops in the budding phase. growth "Vimpel" - 0.5 l/ha + micro-convenience. "Oracle" multi-complex - 2.0 l/ha + micro-convenience. "Oracle" colofermin molybdenum - 0.5 l/ha	no herbicide	23,9	24,0	300,9	390,6	25000	30000	597,5	720,0	296,6	329,4	12,6	16,3
	with herbicide	26,8	26,0	255,9	316,0	25000	30000	670,0	780,0	414,1	464,0	9,5	12,1
6. Seed treatment with nitragin + P60 before. basics field treatment + crop treatment in the phase of 3 – 5 soybean leaves incentive. growth "Vimpel" - 0.5 l/ha, micro-convenience. "Oracle" multi-complex - 2.0 l/ha + micro-convenience. "Oracle" colofermin molybdenum - 0.5 l/ha	no herbicide	27,0	25,4	307,7	410,5	25000	30000	675,0	816,0	367,3	405,5	11,4	16,1
	with herbicide	28,9	27,5	262,7	333,9	25000	30000	722,5	867,0	459,8	533,1	9,0	12,1

This work was carried out within the framework of the Program-targeted financing of the Ministry of Agriculture of the Republic of Kazakhstan under the scientific and technical program “Creation of highly productive varieties and hybrids of oilseeds and cereal crops based on modern scientific achievements for sustainable production in various zones of Kazakhstan” (program code BR10764991) for 2021- 2023.

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ТҮЙІН

Мақалада майбұршақ дақылы өгісінде қолданылған өскін үдеткіштің микротаңайтқыштардың және гербицидтердің экономикалық тиімділік көрсеткіштерінің нәтижесі баяндалған, ол пайдаланған өскін үдеткіштің, микротаңайтқыштың, гербицидтердің сатып алу құны, тасымалдауға жұмсалған шығыны және қолдануға кеткен қаражат жиынтығы есептелінген.

Экономикалық тиімділік есеп көрсеткіш нарықтық қатынаста 2021-2022 жылдары «Оңтүстік-Батыс мал және өсімдік шаруашылығы ғылыми-зерттеу институты» ЖШС қалыптасқан жүйеленген еңбек ақы бағасына сәйкес және Қазақстанның оңтүстік өңіріндегі жалпы нарыққа үйлестіріліп анықталды.

Зерттеулер жүргізілген жылдары алынған ең жоғары шартты таза пайда «Ласточка» сорты өсірілген 5-нұсқадан алынды 503,0 мың теңге/ц, осы нұсқадағы өзіндік құн көрсеткіші 11,6 мың теңге/ц құрады. Бұл нәтиже майбұршақ тұқымын «Вымпел» өскін үдеткішімен 0,5 л/т + «Оракул» микротаңайтқышымен 1,5 л/т мөлшерінде өңдеп, ал майбұршақ дақылының өсіп өну дәуірінің 3-5 жалпы шығарған кезінде және шанақтау дәуірінде екі қабат жоғарыда айтылған «Вымпел» өскін үдеткішімен 0,5 л/га, «Оракул» мультикомплекс микротаңайтқышымен 2,0 л/га + «Оракул» колофермин молибден микротаңайтқышымен – 0,5 л/га қолданылған кезінде тәжірибе нұсқасына сәйкес алынды.

Орташа кеш пісегін «Жансая» сортының тұқымын нитрогинмен өңдеп және P_{60} кг/га фосфор тыңайтқышын ендіріп, өсіп даму кезеңінде «Вымпел» 0,5 л/га өскін үдеткішін «Оракул» мультикомплекс – 2,0 л/га және «Оракул» колофермин молибден – 0,5 л/га микротаңайтқыштарын қолданған кезде ең жақсы экономикалық тиімділік көрсеткіш алынды, осы нұсқадағы шартты таза пайда 533,1 мың. теңге/га құрап, майбұршақ тұқымының өзіндік құны 12,1 мың. теңге/ц гербицидпен өңделген нұсқада қалыптасты.

РЕЗЮМЕ

В статье излагаются результаты показателей экономической эффективности стимуляторов роста и микроудобрений, гербицидов использованных в посеве бобовых культур, рассчитана закупочная стоимость использованного ускорителя проростков, микроудобрителя, гербицидов, затраты на транспортировку и сумма средств, затраченных на применение.

Экономическая эффективность расчетный показатель определен в рыночных отношениях в соответствии со сложившейся систематизированной ценой оплаты труда ТОО «Юго-Западный научно-исследовательский институт животноводства и растениеводства» в 2021-2022 годах и согласованно с общим рынком в южном регионе Казахстана.

За годы проведения экспериментов наивысшие показатели условно-чистого дохода у сорта «Ласточка» достигла – 503,0 тыс. тенге/га со снижением себестоимости семян до 11,6 тыс. тенге/ц обеспечивались на 5 варианте опыта, где на фоне обработки семян стимулятором роста «Вымпел» - 0,5 л/т + микроудобрением «Оракул» - 1,5 л/т за период вегетации растений сои в фазе 3-5 листьев и в период бутонизации посева дважды обрабатывались выше названным стимулятором роста «Вымпел» - 0,5 л/га, микроудобрением «Оракул» мультикомплекс - 2,0 л/га + микроудобрением «Оракул» колофермин молибдена – 0,5 л/га с применением гербицидов согласно схеме опытов.

Следует отметить, что в 2022 году с обработкой семян сои сорта «Жансая» нитрагином и внесением фосфорных удобрений P_{60} кг/га и обработкой посевов стимулятором роста «Вымпел» - 0,5 л/га, микроудобрением «Оракул» мультикомплекс в норме 2,0 л/га, микроудобрением «Оракул» колофермин молибдена – 0,5 л/га получена наибольшая величина условно-чистого дохода 533,1 тыс. тенге/га со снижением себестоимости семян – 12,1 тыс. тенге/ц на фоне гербицидной обработке.