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DIVERSIFICATION OF CROP PRODUCTION - THE MAIN DIRECTION OF INCREASING THE SUSTAINABILITY OF AGRICULTURE IN THE KAZAKHSTAN ARAL SEA REGION

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Annotation: Based on scientific research and generalizations of best practices, the article provides recommendations for the future for the further development of the agro-industrial complex, including agriculture, agricultural production, and the economy. The questions of ecology and environmental protection are considered.

Keywords: grain crops, water resources, ecological situation

In the conditions of the Aral ecological crisis, the problem of diversification of agricultural production, as one of the main directions of increasing the sustainability of agriculture in the Kazakhstan Aral Sea region, should be given priority attention. Diversification weakens the impact of economic and environmental crises, mitigating their effects.

In a market economy, it implies flexibility and multi-variance in determining not only the composition of cultivated crops, but also their areas in individual regions and zones. At the same time, soil fertility, the amount of precipitation, their distribution by season of the year, the amount of irrigation water by season in the

regions of irrigated agriculture, temperature regime, biological characteristics of crops, their adaptation to specific soil and climatic conditions must be taken into account in a mandatory order; since there is a close relationship between these factors and productivity, as well as product quality. It is also necessary to ensure not only the domestic needs of the country, but also the possibility of exporting certain types of high-quality products.

The problem of diversification is particularly acute in the Kyzylorda region as a result of the environmental situation and the low level of employment, especially since agriculture, especially crop production, is one of the foundations of the region's economy.

The Aral ecological crisis has put the region's economy in need of developing a new concept for the development of agriculture.

The agricultural production strategy in the Kazakhstan Aral region includes:

- definition of priority areas for the rational use of available water resources, reduction of water consumption with an increase in the final results of agricultural production;

- implementation of a set of measures to improve the reclamation state of the land, reconstruction of irrigation systems;

- reviewing the structure of cultivated areas, exclusion of unproductive irrigated lands from agricultural circulation and an increase in the share of less moisture-intensive crops (diversification of crop production);

- development of promising options for the specialization of farms for the production of competitive crops for non-traditional for the Kazakhstan Aral region;

- the introduction of a new generation of environmentally balanced, economically sound agricultural production technologies based on the biologization of agriculture and the optimal level of chemicalization;

- creation of new varieties and hybrids of crops and breeds of farm animals that are maximally adapted to the environmental situation in the region;

- the widespread construction of mini-plants for the deep processing of agricultural products.

An analysis of the development trends of agricultural production in the Kazakhstan Aral Sea region shows that in the future it will develop under conditions of even more severe limited water resources due to an increase in the region's population with increasing soil cover degradation, salinization processes, and anthropogenic desertification. For the traditionally agricultural region, the degradation of arable and grazing lands, as one of the most serious consequences of the Aral Sea crisis, means the loss of livelihoods.

Recent years for the Kyzylorda region have become years of chronic low water, when in summer the flow of water along the transboundary Syrdarya River does not fully meet the needs of agriculture in irrigation water. The water production limit for 2018 was reduced from 4,980 million m³ to 4,280 million m³ (700 million m³) compared to a low-water year 2017. As a result, the stability and efficiency of agricultural production decreased due to the reduction of sown areas and the death of crops.

Under these conditions, the development of a program to optimize and stabilize the structure of sown areas, taking into account the need to expand crops of non-traditional crops for the Kyzylorda region: sugar beets, barley, safflower, winter wheat, rye and others, is of paramount importance for increasing the sustainability of agricultural production.

An analysis of the cost of irrigation water per unit of agricultural output produced is given in table.

Table

Calculations of irrigation water costs per unit of output

Culture	Irrigation water costs, thousand m ³ / ha	Average yield, t / ha	The output of commercial products, t / ha	Market value of marketable products, tg / ha	Irrigation water costs, m ³ / tg
Rice	100	3,6	1.8	252 000	1,56
Winter wheat	18	2.0	1.0	160000	0,44
Spring wheat	18	0,8	0.4	64000	1,12
Winter rye	18	2,6	1,3	260000	0,276
Barley	18	1,5	0,75	150000	0,48
Oats	18	1.2	0.60	132000	0,56
Safflower	4	1.2	0,24	96 000	0,164
Sunflower	32	0.8	0.72	167520	2,228
Sorghum	9	3.0	1,5	122000	0,312
Corn	32	4.0	2,0	240000	0,5

Due to the chronic low water of recent years, the problem of using engineering-prepared lands has arisen. In this regard, along with the efficient use of water resources, it is necessary to maximize the use of natural rainfall.

A wide variety of natural conditions makes the question of the optimal structure of sown areas in the region, the ratio of food and feed grain, as well as raw materials for industry (cereals, oilseeds and some other industries) very difficult.

One of the main directions of increasing the sustainability of agriculture in the region is to expand the area under crops of grain crops. As part of the crop production diversification program of the Kyzylorda region, it is advisable to expand the sowing area of spring wheat from 5.0 thousand ha to 10.0-15.0 thousand ha in the southern regions of the region, since the aridity of the climate contributes to the formation of high-quality grain with a content protein in the range of 15-19%, gluten - up to 40% and flour strength - from 400 to 800 units. and higher, which significantly exceeds the wheat indices of other regions not only in Kazakhstan, but also in many neighboring CIS countries.

In addition, it is necessary to increase winter wheat sowing from 5.0 thousand ha to 10.0 -15.0 thousand ha, as the long-term practice of farmers in the region has shown that this crop produces more stable and higher yields with proper agricultural technology compared to spring wheat. This is explained by the biological characteristics of winter wheat - its vegetation period occurs in the most favorable seasons according to meteorological conditions - in autumn, spring and early summer. In the warm autumn period before the onset of winter, winter wheat develops a good root system and grows. Touching into growth in the early spring,

long before the sowing of spring crops, it makes fuller use of the moisture accumulated in the soil during the autumn-winter period. Due to the powerful root system, moisture of deeper soil layers is accessible to it.

The use of winter-hardy and drought-resistant varieties of winter wheat makes it a culture of a guaranteed crop at the present time, when high-yielding varieties of winter wheat have become common in the southern regions of Kazakhstan. Winter wheat fits well in rice rotation as an intermediate culture for obtaining nutritious and high-quality green feeds rich in protein, essential amino acids in the early spring, when the demand for them is highest.

The main factor restraining the growth of sown areas of winter and spring wheat in the Kyzylorda region to the above level is the short sowing campaign due to the rapid drop in moisture content in the arable horizon of the soil (no more than a week), which leads to the need to simultaneously mobilize a large amount technicians.

Due to the more developed root system, winter rye uses autumn - winter rainfall more efficiently than winter wheat, and in many respects it is an intermediate crop (crop weed, number of root and crop residues, and yield) is ahead of winter wheat[1].

In the conditions of the Kyzylorda oblast, in the general case of grain crops in the case of low water and a reduction in the sown area of rice, crops such as millet, oats, barley, corn, sorghum and other crops, which produce relatively high harvests of grain and green mass, gain insurance value.

One of the reasons restraining the growth of sown areas of grain crops (wheat, oats, barley, corn, etc.), along with the above, is the low salt tolerance, which is typical primarily for wheat and, to a lesser extent, for barley and oats. If we take into account that the high salt content in the arable horizon of the soil is one of the main limiting factors for farming in the region, then the introduction of non-traditional, salt tolerant crops is of great importance for the diversification of crop production.

Such a culture, which has proven itself perfectly in the conditions of the Kazakh Aral Sea region, is grain sorghum - one of the main cereal crops cultivated in Africa. Grain sorghum is not only salt tolerant, but also drought tolerant, which allows cultivating it in all areas of the Kyzylorda oblast with minimal irrigation. The main reason restraining the growth of sorghum cultivated areas is the lack of tradition of its use as a cereal crop. Grain sorghum is one of the most promising insurance crops, grain and forage at the same time, with the current tendency to reduce water resources and increase soil salinity.

It was noted above that rice should remain the main sowing crop when introducing less moisture-intensive technologies for its cultivation.

Another direction of further work on diversification of the plant growing industry in the region should be the expansion of the assortment (composition) due to currently scarce, but promising, more productive, adapted to environmental conditions and economically profitable crops, including include oilseeds, sugar beets, etc.

Of course, it is unrealistic to fully supply the region with vegetable oil of our own production in the near future, but it is quite possible to provide 15-20% of the need for it.

The crop production diversification program of the Kyzylorda oblast is not limited to the listed cultures, but this brief review allows us to characterize the main trends in crop production diversification to achieve agricultural sustainability in this region.

The main oilseed crop in Kazakhstan is sunflower, which accounts for 75% of the oil grown in the country. Sunflower oil has high taste and nutritional qualities. When processing its seeds receive up to 35% of the cake, which is a high-quality animal feed. Therefore, expanding the acreage of sunflower is an urgent task for the next 5 years, but this culture has a negative effect on soil fertility, and it is better to use it in the system of nomadic farming and not enter into crop rotation.

Soybean and safflower oil crops are noteworthy. The seeds of these plants contain up to 30% or more high-quality oil.

The diversification program of the Kyzylorda region provides for a significant expansion of the cultivated areas of these crops. Especially promising is the expansion of safflower crops, which is a salt tolerant, drought tolerant crop and is easily introduced into the rice crop rotation as a cover crop to improve the reclamation state of the contaminated and saline rice fields.

The need for potatoes according to scientifically based consumption standards is 97.3 thousand tons for the population of the Kyzylorda region. Currently, the total sown area of potatoes ranges from 3.0-4.0 thousand hectares. However, the average potato yield in the region is low, which does not allow to provide a physiologically necessary rate of consumption. The main limiting factors for the cultivation of potatoes are the lack of specialized seed farms in the region and an established system for seed production of potatoes, as well as the low tolerance of cultivated varieties. Within the framework of the program for diversification of crop production in the region, the introduction of salt tolerant varieties (Aral, Tokhtar, etc.) and the development of a potato seed growing system are envisaged.

Particularly debatable is the question of the need to cultivate cotton in the Kyzylorda region, the crop area of which in 2001 was 397 hectares, of which 350 hectares in the Zhanakorgan region, where 25-30 centners per hectare of cotton was produced, in Shieliysky 137 ha. At a sales price of 27 tg / kg, each ha of cotton yielded products for 67.5-81.0 thousand tenge, which is quite comparable with rice with irrigation water costs 3.5 to 4 times less.

However, with cotton monoculture and even with the introduction of cotton alfalfa crop rotation, as the experience of the South Kazakhstan region shows, where rice checks were converted to cotton production much earlier than the Kyzylorda oblast, the land quickly goes out of agricultural circulation due to progressive secondary salinization[2].

The way out of this situation could be the development and development of a new type of rice-cotton-alfalfa crop rotation with regular soil leaching with rice crops. However, it will be significantly difficult to technologically master such crop rotation, since the cultivation of cotton will require considerable work on the

conversion of checks and the return of rice to these lands is quite problematic. In addition, the growing season of cotton — 120 days — makes it a risky crop, since in some years early spring and late autumn frosts can destroy these crops.

At the same time, the diversification program will be successful only in the construction of its own mini-factories for the processing of agricultural products, which will simultaneously increase the employment level of the population.

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ОРГАНИЗАЦИОННО-ЭКОНОМИЧЕСКИЕ АСПЕКТЫ РАЗВИТИЯ ОПТОВОЙ ТОРГОВЛИ ЗЕРНОМ В РОССИИ

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***Аннотация:** разработаны научно-практические рекомендации развития оптовой торговли зерном с точки зрения организационного подхода путем совершенствования организационной структуры рынка зерна, как системы рынков различных типов, каждый из которых обладает уникальным, присущим только ему функционалом.*

***Ключевые слова:** рынок зерна, организационная структура, рыночный обмен, биржевой и внебиржевой рынки зерна.*

Согласно Д.Норту [1], процесс развития рыночного обмена характеризуется постепенным переходом от персонифицированных рыночных отношений к неперсонифицированным. В свою очередь, данный переход сопровождался усложнением правил обмена, в ходе которого функции гаранта исполнения обязательств перешли к третьей стороне, посредникам в обмене. На протяжении данного перехода формировались различные типы рыночных структур, как реакция на усложнение правил обмена. Согласно классификации А.А.Аузана [2], дополненной и расширенной автором, можно выделить следующие типы оптовых и розничных рынков: розничные (открытый и крытый публичный рынки, ремесленная лавка, универсальный магазин), оптовые (ярмарки, ярмарки-выставки, биржи, оптовые продовольственные рынки). Так как рынок зерна является оптовым по своей сути (конечно же в его