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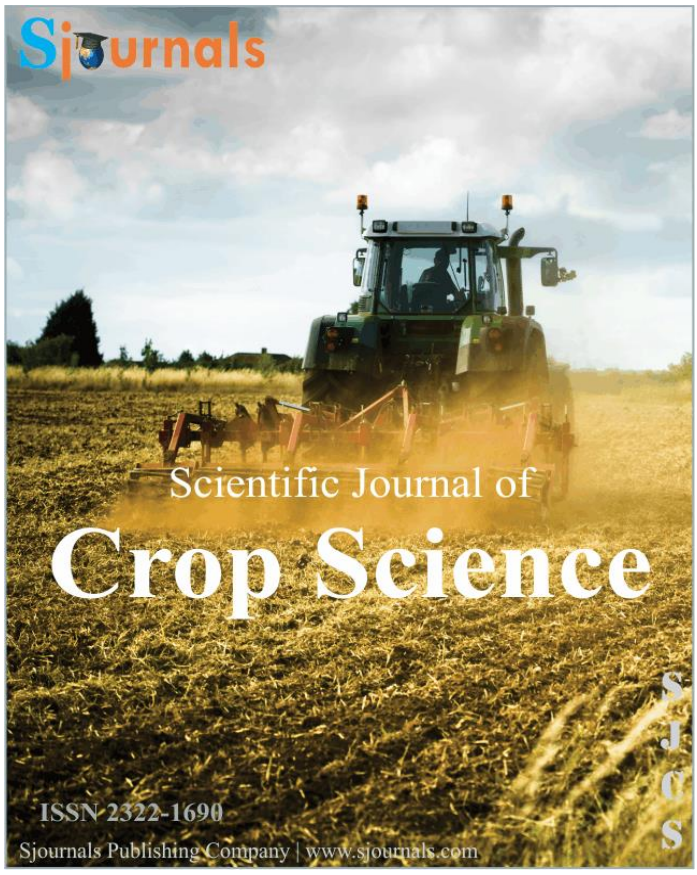

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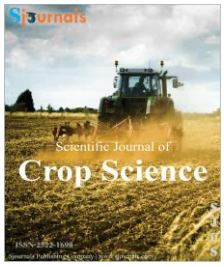

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Review article

Increasing the yield of rice cultivation by traditional methods in the conditions of Kyzylorda region

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ABSTRACT

One of the most widespread crops in the world is rice culture. Rice is a very valuable crop in almost 110 countries of the world, reaching $ 150 million. ha sown, of which 90% is grown in Asia, 4% - in America, 2% - in Africa, 4% - in other countries. Rice occupies the second place after wheat in terms of sown volumes, and the first in terms of yield. If bran is used for livestock feed, then alcohol, starch are obtained from it and used in perfumery. Straw is used to make high-grade paper, cardboard, thread, bags, caps, mattresses and other household items. In addition, agromelioratype rice is of great importance for improving saline and wetlands and introducing them to agricultural use.

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1. Introduction

Large-scale desertification processes occurring in the Aral Sea region, along with global climate changes, have led to natural and climatic, ecological changes both in pastures and on irrigated lands. Thus, the amount of low water increased, which negatively affected the sustainable development of agriculture in the lower reaches of the rivers. Please note the low water content in 2000-2001. The territory-600 thousand hectares of irrigated land, mainly rice irrigation systems, led to the withdrawal from agricultural turnover.

161367 hectares were sown in Kyzylorda region. The production of gross agricultural output amounted to 35.9 billion tenge. Kyzylorda region of the Republic of Kazakhstan is one of the most promising regions where rice is grown. In 2016, the acreage increased from 70 thousand hectares due to sufficient land resources, favorable climatic conditions, necessary water resources suitable for rice cultivation. However, the yield of rice, wheat, alfalfa, etc. on the rice crop rotation is declining due to pests and diseases and weeds.

These processes have led to an increase in ground water levels, an increase in soil salinity, and a decrease in crop yields due to the lack of modern irrigation methods and a lack of dewatering systems. Since 1980, the total yield of cotton has decreased from 396 thousand tons, and rice-from 327 thousand tons by 2-3 times, and the yield of these main crops has decreased. In this regard, market prices for rice, the main food products consumed by local residents, have increased.

2. Materials and methods

During the dry years, rice crops were stopped in the region. In addition, it was necessary to improve the existing agricultural technology of rice cultivation in the ecological conditions of Karakalpakstan and introduce new agricultural technology of rice varieties in order to obtain environmentally friendly products in the conditions of natural and climatic conditions, deterioration of the reclamation state of irrigated lands and climate aridization. Rice is considered a staple food of Central Asia. Rice is of great economic importance, primarily as a food additive. However, the production of this intensive water culture creates serious difficulties in providing water at a lower water level. In the future, the processes are intensified as a result of climate warming, reduction of water resources and deterioration of its quality.

Another problem is an increase in the level of salinity of the surface and groundwater, an increase in the accumulation of toxic substances on the soil surface and in groundwater over large areas, in particular, in the lower part of the Amu Darya. This is due to the lack of ideal forms of drainage in the field, modern technology and irrigation of agricultural crops. Environmentally friendly rice varieties and advanced, modern agricultural technologies that increase the yield of rice are still not enough. For example, in China, the yield of rice is stable at 110 centners per hectare, in Spain, rice is grown with a yield of more than 220 centners per hectare. In recent years, the lower part of the Amu Darya has seen a significant decrease in the gross rice harvest, as well as a 2-2. 5-fold increase in the rice yield. This affects the socio-economic and environmentally sustainable development of the region, the level of income of agricultural workers and farmers. Consequently, the most urgent problem of the Aral Sea is to increase the yield of traditional rice plants grown in the lower reaches of the Amu Darya, introduce modern agricultural technologies, and reduce the use of mineral fertilizers and pesticides. On the other hand, it is necessary to use the introduction of World Rice Institute varieties, as well as water-saving rice varieties, local varieties and new varieties grown in other countries of the world. Rice farms in the country have adopted a method of growing rice based on continuous flooding of the field surface with a layer of water. At the technical level of modern rice irrigation systems, water consumption for rice cultivation exceeds the biological needs of plants using irrigation technology and amounts to 20-25 thousand m3 per 1 hectare enough. In addition, depending on the soil and climatic conditions and the yield per 1 hectare of rice area, the total water consumption is 6-8 thousand meters of water. The remaining part (13-16 thousand m3 and more) is spent on water, filtration, runoff and discharge, on the creation and storage of a water layer. In this regard, large volumes of collector and wastewater polluting sabotage of water intakes create an emergency ecological situation in traditional rice-growing areas. However, a fundamentally different technology for growing rice, if it works in the field, is not flooded with a layer of water.

3. Results and discussion

The lack of rice in water with irrigation technology is compensated by periodic watering. As a result, the cost of irrigation of rice fields was reduced by 3-5 times compared to traditional technology, and the total water output approached the biological water consumption of plants. This has determined the research direction we have chosen in relation to the development of fundamentally new water-saving, highly efficient and environmentally friendly technologies for irrigation of rice through periodic irrigation. The increase in rice yield was determined by improving the reclamation state of soils in the rice field. When using periodic irrigation of rice for an earlier period, the volume of water per 1 ton of production is reduced by an average of 27%, and with mixed irrigation-by 16%.

Nitrogen fertilizers are used in the same technologies as when using rice fertilizers applied to deposits using agricultural aviation. In addition, the cost of rice grain increases. Maintaining soil moisture in a layer of 0.4 m from sowing to drinking during the initial growing season improves the water maturation of plants and, accordingly, stimulates the accumulation of plant mass. The increase in rice yield is stable with an average daily water consumption. So, for example, a 4-ton yield of one hectare 3 is provided with the consumption of 54.8 m3 / ha of water per day on average during the growing season. An increase in the average daily water runoff during the growing season to 56.3-56.6 m/ha provides rice output of 5 tons of grain per hectare. Knowledge of the regularities of changes in the daily water consumption of rice with excessive irrigation makes it possible to predict in advance the time of irrigation at the stages of its cultivation and development and distribute them in a timely manner.

Coefficients of water consumption and specific costs of irrigation water for the formation of rice collection. When determining the effectiveness of plant water use, one of the main indicators is the cost of forming a unit of marketable products. water consumption coefficient. The quantitative values of the indices vary and depend on many factors, such as the weather conditions of the growing season, the availability of moisture, soil fertility, agricultural technology, and the method and methods of irrigation. The determining effect on the value of the water consumption coefficient is the level of profitability obtained.

The plant absorbs all elements found in nature, in smaller or larger quantities, but only 20-25 of them are considered biological. For rice, these are: oxygen, hydrogen, carbon, nitrogen, phosphorous, potassium, silicon, sulfur, sodium, magnesium, calcium, chlorine, vanadium, chromium, molybdenum, manganese, iron, cobalt, zinc, tin, fluorine, iodine and boron. The main composition of dry rice mass consists of carbon, oxygen, hydrogen and nitrogen. These elements are called organogenic. Their absorption or reproduction is mainly accompanied by photosynthesis, respiration, and water regime. The content of nitrogen, phosphorus, potassium and silicon in the surface layer of rice is about 0.1-10%. They are considered trace elements in rice. In terms of the content of dry matter, sulfur, magnesium and calcium are close to macronutrients. And the remaining elements are considered micro (below 0.15-0.01%) and ultra microelements (below 0.01%) for rice. The mineral nutrition of rice is closely related to the specifics of its root structure.

When woody leaves begin to appear on the plant, the roots of the rice crop begin to come out and wash away. And the number of roots will closely depend on the soil and water regime. During the flood period, it is 2 times more than during normal moisture. At the same time, the soil-water regime determines not only the number of plant roots. It indicates the nature of their location. At the moment when the soil is wet, many roots stand down, and only in the corners you can see small rhizomes located horizontally. And at the moment when the water is filled in the furrows, most of the roots begin to come out from under the angles (46%), and a third is located vertically and about 20% horizontally. This means that the root system of rice is located in the upper layer of the soil layer (0-10cm). It plays an active role in the mineral nutrition of rice.

The second feature of the root system is the presence of a very small number of bottoms nearby and the complete absence of root crops. These assimilating substances are used to form a strong shoot and are stored in the endosperm as an additional reserve at the end of the growing season.

Because the root system of rice in the flooded valley is weak, respiration becomes weak. At the same time, roots in furrows filled with water are separated from 1 g of dry matter by 1.8 mg of CO_2 per hour, and in wet soils this figure is about 4 mg. The weak intensity of respiration at the roots of rice indicates that the vessels are poorly supplied with oxygen. It reflects only a small expenditure of energy materials for their creation. The accumulation of oxygen in the root system is carried out by aerenchemy-vegetative membranes that are well developed on both the main and additional roots. Oxygen produced as a result of photosynthesis is continuously supplied to the roots through the aboveground organs of the plant.

4. Conclusion

Since photosynthesis takes place in the light, the amount of oxygen in the air cavities of the plant during the day is greater than in the atmosphere. Oxygen, which moves to the root, keeps a high concentration in the air cavities. Anatomical and physiological features of rice root should be strictly taken into account when using mineral nutrition.

Rice during its growing season uses a large amount of nutrients, primarily nitrogen, phosphorus and potassium. The low content of these elements in the soil leads to low crop yields. The lack of nitrogen has a

particularly negative impact on rice. Rice is well fed with nitrogen fertilizers, which play an important (crucial) role in the rice fertilizer system. At this time, it is necessary to pay attention to the state (form) of nitrogen in the fertilizer. In rice fields, only nitrogen-containing fertilizers are used in the ammonia state (ammonium sulfate, ammonium chloride, anhydrous ammonia, complex fertilizers with ammonium) or in the amide state (urea or urea, calcium cyanamide). Because in the process of their circulation, ammonium nitrogen is formed in the soil. One of the main reasons for nitrogen entering rice in different states (ammonia and nitrate) is the different degree of their deposition on the water intake soils of rice zones. An important element of rice nutrition is phosphorus. When phosphorus fertilizers are sown in rice, the grain yield increases. Phosphorus is a part of important organic compounds and participates in metabolism. Therefore, its lack negatively affects the growth and development of the plant, especially during the initial growing season. Without the combined use of nitrogen, phosphorus, and potash fertilizers, it is impossible to obtain a high yield of rice. Due to the lack of nitrogen, the growth process is disrupted, the leaves turn yellow, the granularity of cycads decreases, and the yield of the plant decreases.

Thus, the assessment of the traditional technology of cultivating varietal rice used in the conditions of the Kyzylorda region is one of the important points of increasing the yield of rice in the Aral Sea region. In particular, in the mode of tillage (plowing, harvesting, harvesting from the garden, planning, etc.), the conditions for receiving and seeding rates depending on the choice and treatment of seeds, the mode and irrigation equipment, the type and structure of the soil, the diet, the norms and terms of applying mineral fertilizers, microelements, pests and diseases of rice, agronomic requirements, terms of harvesting and processing of rice are priority areas, using domestic and foreign varieties of rice (plateau) to adapt the soil and climate.

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