

## Environmental Problems And Ways Of Increase Of Rice Productivity On The Meliorated Saline Soils Of Kazakhstan.

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**Abstract:** Kazakhstan is one of leading producers of rice in the CIS where holds a peculiar place Kyzylorda province, in particular the lower reaches of the Syr-Darya River with favorable natural conditions and the specialized engineering prepared lands. Increase of efficiency of agrarian industry and domestic markets is the major problem. In the paper there are the results of long-term researches on increase of rice production on the meliorated saline soils in Kazakhstan. It is established during the research, that the farther rice is located from a bed of long-term grasses in a crop rotation, the more there is a difference in productivity under the influence of salts in soil. With increase of level of soil salinity on rice crops the efficiency of mineral fertilizers fell by 20 %. It considerably occurs when proportionally increased in doses of mineral fertilizers (N60-150, P90-120, K45-90) depending on level growth of soil salinity on rice crops.

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### 1. Introduction.

Kazakhstan is one of the largest rice producers in an irrigated zone of the republic where Kyzylorda province holds a peculiar place, in particular the lower reaches of the Syr-Darya River with favorable natural conditions and the specialized engineering prepared lands. Thereupon it is planned to upgrade rice production up to 300 thousand tons that is necessity of grain productivity increase on the basis of the further crop raising. Except rice cultivation in the province where irrigated agriculture is developed, the increase in forage production for cattle is actual. For this purpose it is recommended to cultivate melilot which is one of the basic soil-improving cultures of rice crop rotations.

Basis of productivity increase when irrigated is observance of the scientifically-proved measures on mobilization of resources of natural fertility of the saline soils, application of optimum doses of organomineral fertilizers with ameliorators, also the stimulators, raising bioenergy of seeds potentials of rice and other cultures of a crop rotation.

Irrigation and chemicalization are two inseparable conditions of the productivity growth, mutually raising efficiency of each other.

It is necessary to notice, that as a result of irrational and inefficient use of the irrigated lands there is a growth of water mineralization of the Syr-Darya River and when used so it amplifies secondary

salinization. So, according to Statistics Agency of the Republic of Kazakhstan from 277,7 thousand hectares of the engineering-prepared irrigated lands in Kyzylorda province now crops with the area according to them of 58,5 thousand hectares, 17,2 thousand hectares and 28,3 thousand hectares are not used because of malfunction of irrigating networks, water scarcity and degradation of soil - reclamation conditions, i.e. due to increase salinization and waterlogging. All this testifies to degradation of agroreclamation condition of lands and decrease of soil fertility. From the explored 227,7 thousand hectares of arable soils the majority is characterized by low (0,8-1,1 %) content of humus. The content of mobile forms of nutrients also decreases: 67,8 % of the ground area has the low content of mobile phosphorus, 72,9 %-easy hydrolysable nitrogen and 29,1 %-exchange potassium. In this connection the area of rice crops is sharply decreased from 93000 to 50957 hectares in 2002 in comparison with period 1981-1985, and application of fertilizers per 1 hectare is decreased from 228,1 kg to 98 kg in NPK, respectively.

In comparison with 1991 in 2003 the area under long-term grass crops was reduced to 20 thousand in hectares (per 55 %) and as a result productivity of rice was decreased per 17 %, and long-term grasses - per 20 %.

Thereupon increase of efficiency of agroindustrial

industry, competitiveness of production in the world and domestic markets is the major problem. In recent years, as a result of the effectual measures undertaken by the government of the Republic of Kazakhstan, the tendency of steady economic stabilization of agrarian sector was outlined. The concept of agriculture development in Kazakhstan for 2006-2010 is agricultural production transition to steady economic development in the conditions of market economy. This process is connected with formation and introduction of the new agrarian policy providing working out of highly effective innovative agroeclimation ways of increase of soil fertility and productivity of agricultural crops. In our opinion, this concept will give the possibility of breakout in integrated system of agricultural crops cultivation and can be the base of modern agriculture systems in a combination to traditional recommended optimum sets of agro ways and organizational actions.

## 2. Materials and methods

Decrease in application efficiency of mineral fertilizers considerably began in the end of the 20th century and it is connected with shortage of water of the Syr-Darya River, loss as geographical object of Aral Sea. These global factors objectively existing in environment promoted increase of the tendency of secondary salinization on soils of rice crop rotations. In the meantime secondary salts perniciously corrode fertility of the land and as a result productivity of rice and companion crops is tendentiously decreased under the influence of toxic salts and compounds in soil, despite increase by commodity producers of doses of mineral pomaces in system of fertilizers under rice and other cultures (tables 1 and 2).

Interpretation of long-term (1991-2001) crop data and the doses of mineral fertilizers brought in soil in scientific experiences and on production crops shows, that the farther rice is located from a bed of long-term grasses in a crop rotation, the more there is a difference in productivity under the influence of salts in soil. With increase of level of soil salinity on rice crops the efficiency of mineral fertilizers fell by 20 % (table 1). It considerably occurs when proportionally increased in doses of mineral fertilizers (N60-150, P90-120, K45-90) depending on level growth of soil salinity on rice crops in Kyzylorda province (table 2).

However the existing material base of rice-growing in Kazakhstan does not give the possibility of measures application in agriculture according to radical improvement of a reclamation condition of the saline soils on rice crops. For restoration of a reclamation condition of rice soils it is necessary to spend millionth financial assets which the World Bank of Development on the basis of the credit can only maintain. Thereupon commodity producers need to be engaged in search of

local reserves as innovative ways of application of new cheaper resource saving means for melioration of the saline soils and water, to receive production with lower cost price and this most to promote improvement of environment ecology.

## 3. Results

For the problem solving of competitiveness back development of rice-growing production in the world and domestic markets it is necessary to create new theoretical bases of fertility increase of the rice saline soils in Kazakhstan. Thereupon we were carried out workings out of some highly effective agrochemical and reclamation ways during the conducted study for 2001-2011. In researches for 2001-2008 for the first time the theory of waste organic materials composting of rice production as straw and husk of rice with application of complex domestic preparations in which compound the microorganisms, bioenergy products, strengthening processes of decomposition of straw and husk of rice, are introduced in compost components. Thus industrial consumption is decreased when composting expensive organic ferment. These innovative offers appeared patentable (Patent №61529; 04.09.2008). Soil fertility of crops in an economy for 4-5 years can be increased when used own composts in production. It is favorable to apply composts in seed-growing crops.

During the research for 2006-2011 the theory of melioration of the saline farmlands in Kazakhstan rice-growing was improved. Dolomite application on average- and strongly-saline soils and its combination to seeds processing by stimulators of domestic and foreign productions, technology of cultivation of rice and long-term grasses was improved, in our example - melilot. These offers also appeared patentable (Patent №66328; 16.07.2009). It will be possible to develop strongly-saline soils which have left a turn of use with application of this working out in production and it is also possible to improve fertility of those soils by means of this way. So, application (2001-2005) of humate of sodium on weakly- and average-saline soils in a combination with the stimulators, used in processing of rice seeds, also on dolomite of those on stronglysaline soils (2006-2011) it is developed improved systems of fertilizers on increase of rice productivity on the meliorated saline soils of Kazakhstan.

In this connection the special actuality is got by optimization of conditions of a mineral nutrition of rice by innovative workings out in the conditions of coming secondary salinization. New working out provides the best realization of genetic potential of the cultivated cultures connected with introduction of active organic compounds in plants with growth factors which regulate a life of plants in the stressful and usual

conditions caused by an environment.

As a result these complex measures promote way

of stably high competitive crops on quality of production.

Table 1. Influence of salinization soils on rice crops fields on rice productivity

Weakly saline soil with solid residue 0,3-0,5%			Average saline soil with solid residue 0,7-0,9%			Strongly saline soil with solid residue 1,0-2,0%			Difference in Разница в crop capacity depending on level of crop salinity soil					
Crop capacity of grains, centner/hectar	Difference according to previous crops		Crop capacity of grains, centner/hectar	Difference according to previous crops		Crop capacity of grains, centner/hectar	Difference according to previous crops		1 column - 4 column		4 column - 7 column		1 column - 7 column	
	ц	%		centner/hectar	%		centner	%	centner	%	centner	%	centner	%
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
According to bed of long-term grasses						According to deposit of rice the 1st year of use			According to bed of grass		According to bed of grass and deposits			
57,8	-		53,1		-	48,0		-	4,7	8,1	5,1	9,6	9,8	16,9
According to bed turn of long-term grasses						According to deposit of rice the 2nd year of use			According to bed turn of grass		According to bed turn of grass and deposits of the 2nd year of use			
53,1	4,7		47,8	5,3	10,0	41,8	6,2	13,0	5,3	10,0	6,0	12,5	11,3	21,3
According to rice the 3d year						According to deposit of rice the 3d year of use			According to rice-growing		According to rice-growing after grasses and deposits of 3d year of use			
48,3	9,5	16,4	42,3	0,8	20,3	35,3	12,7	26,5	6,0	12,4	7,0	14,5	13,0	26,9

Table 2. Approximate optimum system of fertilizers under the rice crops cultivated in a rice crop rotation at different degree of soil salinization

Weakly saline soil with solid residue 0,3-0,6%			Average saline soil with solid residue 0,7-0,9%			Strongly saline soil (solid residue 1,0-2,0%)
Bed of long-term grasses	Bed turn of long-term grasses	Rice, 3d year	Bed of long-term grasses	Bed turn of long-term grasses	Rice, 3d year	Deposit, previous rice-growing
N 60-90	N90-120	N 120	N 90	N 120	N 120-150	N 150
P <sub>2</sub> O <sub>5</sub> 90-110	P <sub>2</sub> O <sub>5</sub> 110	P <sub>2</sub> O <sub>5</sub> 120	P <sub>2</sub> O <sub>5</sub> 90-110	P <sub>2</sub> O <sub>5</sub> 110	P <sub>2</sub> O <sub>5</sub> 120	P <sub>2</sub> O <sub>5</sub> 140
K <sub>2</sub> O 45-60	K <sub>2</sub> O 60	K <sub>2</sub> O 60-80	K <sub>2</sub> O 60	K <sub>2</sub> O 80	K <sub>2</sub> O 90	K <sub>2</sub> O 100

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### References

1. Yezhov Ju.M. Perfection of processing and improvement of soil fertility in an agroeclimation field of rice crop rotation.//Thesis abstract for candidate degree, Krasnodar. - 18.
2. Aleshin E.P., Smetanin A.P. Mineral nutrition of rice. Krasnodar. Publishing house, 1965.-215p.

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