European Journal of Business & Social Sciences
Available at https://ejbss.org/
ISSN: 2235-767X
Volume 07 Issue 14
November 2019

Water-saving technologies of cultivating grains on slightly salinized lands of Karakalpakstan.

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Annotation.

Agrotechnological methods of increasing water productivity in water consumption planning analyzes the results of a study of agrotechnological methods of in creasing water productivity and planning water consumption, taking into account the water availability of the territories.

Keywords: irrigation method, drip irrigation, water resources, water consumption, productivity, irrigated land, recycled water supply.

Carried out in the Republic of Karakalpakstan organizational and structural measures for consistent transition to market relations in the agricultural sector involve need to improve the use of available water and land resources, to widespread adaption of science-based agro-technology methods, to improve the productivity of irrigation areas and water resources which is spent to increase yield from growing cultivated crops. Considering this and the need to develop science-based water saving and sustainable system of crop rotation of grain crops, during 2005-2007 field experiments were carried out on the territory of the farm "Sary-Altyn" of Chimbay region.

The area of the experimental plot is 3.3 ha. The territory of the farm is consist of meadow-alluvial, slightly saline soil. In the upper 0-100 cm layer of soil salt content before starting experiment (September 2005) was 0,46-0,58% on solid residue with chloride-sulphat type of salinity. Groundwater with mineralization of 4,0-5,7 g./l. on solid residue in autumn 2005 lied at a depth of 0.9-1.2 m. from the soil surface. The mechanical composition of 0-120 cm of soil layer is presented in the profile of iridescent loamy clay differences. Huge mass of arable soil in its initial state was 1.29 g./cm^3., and the subarable soil was -1.49g./cm^3, which is caused by the presence of compacted layer, so-called "Plough pan".

Nutritious elements content of soil is generally not high. In the arable layer humus content does not exceed 0,8-0,9% of the weight of soil and they are classified as medium provision, and lower horizons are poor provision – 0,40-

ISSN: 2235-767X
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0,73%. According to the content of mobile forms of Nutritious elements of the soil of experimental plot is classified as poor provision.

Field experience is lain on the following scheme (Table 1)

In the first year of experiment winter wheat yield at all variants of the experiment was rather low (7.8-10 centner / ha) which to some extent was explained by the unsatisfactory technical condition of existing drainage network. After cleaning, its water-salt regime in rooting layer of soil greatly improved, because of this winter wheat productivity after rice seedlings (2006) was 2 times higher (20,3-21,5 centner / ha.) compared to the previous year.

In 2006 and 2007, after the harvest of winter wheat in all variants of the experiment, was cultivated in regionalized medium ripening varieties of rice "Nukus-2" which is created by the breeders of Karakalpak branch of UzSRI of rice in 1986.

At I-VI variants of the experiment sowing of rice was done by seedling, and at controlled variants sowing was done by usual (seeds) method. Rice seedlings were grown in a seed plot of size 20x30 m., where after seeding at the rate of 80 kg./ha., it was supported by a layer of 10-13 cm of water.

Irrigation of rice in the seed plot and in controlled variant (both variants) were carried with shortened flooding.

Comparison and analysis of the results of the systematic recordings of the supplied water for irrigation of rice indicates a significant difference in the rate of irrigation, depending on the degree of premeditated field and methods of cultivation (seeding) rice. Thus, in 2006, irrigation norm of rice in 1 variant, where planning was carried out using a laser system, was 14679 m^3/ha., and in 2007, 14506 m^3/ha. or 36% and 28% less compared to the control variant, respectively. In II variant, where rice was cultivated also in well-planned field, irrigation norm was 26% less compared to the controlled variant.

Noted decrease of rice irrigation norm is also due to the adapted in experiment, seedlings method of growing plants is widely used in the word practice of rice cultivation.

It was noted above that the content of water-soluble salts in the rooting layer of soil of experimental plot belong to the low and medium saline category. According to the date of systematic observation, during the period of the experiment, as a whole significant changes in soils salt regime did not happen.

During the period of the experiment there was a decrease in mineralization of ground water compared to its initial state. Thus, prior to the experiment mineralization of groundwater varied between 3,9-5,8 g./l. when its average value through the pond was 5.0 g./l. through solid residue (01.III.2005). By the fall of 2007 (29.IX) average groundwater mineralization was 2.75 g./l. in the range of its change within the experimental field from 1.80 g./l. to 3.84 g./l. through solid

ISSN: 2235-767X
Volume 07 Issue 14
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residue. Reduction in ground water mineralization is due outgoing filtering of the irrigation water which constantly takes place on a flooded rice field.

Separate calculation of rice yield according to the method, which is used in similar researches, allowed to establish the presence of significant differences between the variants of experience. The highest yield of rice was received in the I and II variants of the experiment, where rice is grown on carefully planned field by seedling method of seedling – 56,1-60,1 centner / ha. In the III and IV variants, where the planning of the field was not carried out, but was also used seedling method of rice cultivation, amount of yield was significantly lower and amounted to 46,3-55,8 centner / ha. In the control variant, where rice was cultivated by traditional technology, productivity did not exceed 42,3-45,1 centner / ha. (Table 2).

Variants	Background	The first year of experience			The second year of experience		
		The technology of soil preparation for sowing	Variety and productivity of wheat center/ ha.	Seeding time	The technology of soil preparation for sowing	Variety and productivity of wheat center/ha.	Seeding time
1	Zero tillage+ planning	Planning, sowing with Brazilian seeding machine	Chillaki-10,0	15.IX	Sowing with Brazilian seeding machine	Polovchanka 21,5	27.X
2	Normal plowing+ planning	Planning, plowing, grading, cultivating	Chillaki-10,0	15.IX	Plowing, grading, sowing, grading	Polovchanka 20,3	27.X
3	Zero tillage without planning	Sowing with Brazilian seeding machine	Chillaki-9,0	15.IX	Sowing with Brazilian seeding machine	Polovchanka 15,4	27.X

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4	Normal plowing without planning	Plowing, grading, sowing, grading	Chillaki-8,0	15.IX	Plowing, grading, sowing, grading	Polovchanka 16,5	23.XI
5	Traditional technology	Plowing, grading, sowing, grading	Polovchanka-7,8	23.IX	Plowing, grading, sowing, grading	Polovchanka 16,1	23.XI
6	Steam				Plowing, grading, sowing, grading	Polovchanka	2.XI

Irrigation water consumption to create one center of grain yield at various technologies of soil preparation and sowing seeds

Variants of experiment	The first year of experience					The second year of experience				
	Irrigation norm of wheat, m^3/ha.	Irrigation norm of rice, m^3/ha.	Total volume of water provided for 1ha, m^3	Total harvest of grains centner/ha	Water consumptions for production of 1 centner of grain, m^3	Irrigation norm of wheat, m^3/ha	Irrigation norm of rice, m^3/ha.	Total volume of water provided for 1ha, m^3	Total harvest of grains centner/ha	Water consumptions for production of 1 centner of grain, m^3
I	1150	14679	15829	67,2	235,5	-	14506	14506	81,6	177,8
II	1850	17002	18852	66,1	285,2	-	14871	14871	77,8	191,1
III	1850	21251	23101	64,7	357,0	-	20104	20104	71,2	282,3
IV	1850	21251	23101	54,3	425,4	-	17152	17152	64,3	266,7
Control	1850	22900	24750	52,9	467,8	-	20120	20120	58,4	344,5

ISSN: 2235-767X
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It was noted above that the main purpose of the organizing the experiment was to study experimentally the possibility of increasing the productivity of irrigated fields and irrigation water during the cultivation of increasing the productivity of irrigated fields and irrigation water during the cultivation of grains on salt affected lands, by using advanced technology of soil preparation and seeding. Comparison and analysis of results of the experiment shows that the total harvest in the context of variants in 2006 varied in the range of 52,9 centner/ha. (in control method) – 67.2 centner/ha. (in I variant), and in 2007 from 58.4 centner/ha. to 81.6 centner/ha., respectively. The highest total harvest of grains is obtained: at zero tillage and carefully planning of the field, by planting winter wheat in given norms, and rice by planting in seedlings method.

In the experiment, the lowest consumption of water to create a center of crop (grain) was achieved in I variant at zero tillage, by planning the field with laser equipment, by sowing the seeds of wheat in given norms, and planting the rice by seedlings. In the control variant, water consumption per unit of harvest is almost 2 times higher (Table 2).

Outlined above suggests the possibility of a significant increase in the productivity of water and irrigated hectare by applying modern technology during the preparation of field (zero tillage, laser leveling of fields), by the method of sowing given norm (exact seeding) for seeds of wheat, by planting rice by seedlings, by cultivating grains according to intensive schedule of alternating grains cultures, and by creating favorable conditions for the main crop rotation.

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