

## ВЛИЯНИЕ ОРОШЕНИЯ НА ЭКОЛОГИЧЕСКОЕ ЗАСОЛЕНИЕ ПОЧВ В ДЕЛЬТЕ РЕК ЗЕРАВШАН И КАШКА-ДАРЬИ В УЗБЕКИСТАНЕ

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Масштабы и темпы развития орошаемого земледелия в Узбекистане требуют поиска наиболее целесообразных агротехнологий возделывания хлопка, чтобы избежать вторичного засоления песчаных, серокоричневых и аллювиальных луговых почв на территории дельты рек Зеравшана и Кашка-Дарья. Засолению способствуют как особенности засушливого климата, так и минерализованные грунтовые воды (5-10 г/л). Проведение междурядного рыхления хлопчатника культиватором, бороздование на различную глубину в зависимости от стадии развития хлопчатника (от 10 до 18 см); внесение в 4 срока развития растений удобрений, различных по количеству и качеству (после промывки почвы  $N_{250}P_{175}K_{125} + 30$  т навоза/га); промывка почвы (6500-8000 м<sup>3</sup>/га) и вегетационные поливы (5600-600 м<sup>3</sup>/га) позволяют получить хлопка до 23 ц/га, что на 20-25 % больше по сравнению с неорошаемыми почвами.

**Ключевые слова:** хлопководство, агротехника, орошение, засоление дельты рек Зеравшан и Кашка-Дарья, Бухарский оазис.

## INFLUENCE ON ECOLOGICAL SALINIZATION OF IRRIGATED SOILS AT THE DELTA RIVERS ZERAVSHAN AND KASHKADARYA IN UZBEKISTAN

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In article researches directed on improvement of an ecological state the highly saltiness of soils in arid zones are considered. Researches show that the carried-out washings, plannings and introduction the organical fertilizers, also observance of agrotechnical rules of irrigation, promote transformation motley on structure of salted ESA and SSC in the uniform well expressed fertile fields of 20-50 hectares and more. It allows to create models of a sustainable development of agriculture in the territory of farms by melioration and integration of small ESA(3-5 hectares) to large uniform and fertile squares of soils.

**Keywords:** Elementary soil areas, structure of a soil cover, desert sandy soils, gray-brown soils, meadow alluvial soils, spotty salinization, irrigative condition of lands, ecological condition of lands, agrotechnical and agromeliorative actions, water-salt mode, agromeliorative processing of the soil, technology of furrowing, extent of salinization.

**Introduction.** In Uzbekistan, in particular and on deltas Zeraвшan and Kashkadarya relating to Bukhara and Kashkadarinskii areas, land users become the farms, testifying that regions of our country really pass to the market derivative relations. Such social and economic transformations and development of productive forces is objective regularity. Nevertheless, scales and rates of development of irrigated agriculture here demand search of the most expedient forms of interaction of farmers in various elementary soil areas (ESA) and the structure of a soil cover (SSC). Because, development and distribution of secondary salinization in the form of ESA and SSC on irrigated fields characterizes various degrees and characters of a salinization. Desert sandy, gray-brown and alluvial meadow soils are widespread on irrigated lands of characterized territories. Ground waters in the territory of these soils lie at a depth of 1-3 m, the mineralization of ground waters fluctuates within 3-10 g/l and more, and on a chemical composition they treat chloride-sulfate and sulfate-chloride types of salinization. Evaporation of these mineralized ground waters in summer hot days promotes accumulation on a surface and in a root layer of irrigated soils of toxic salts NaCl, Na<sub>2</sub>SO<sub>4</sub>, MgCl<sub>2</sub>, Na<sub>2</sub>SO<sub>4</sub> and partly NaHCO<sub>3</sub>. The increase in these processes of accumulation of salts in the top horizons of soils, gradually leads to expansion of their areas in space. This process causes to emergence on the district of various ESA salted seasonal, seasonal and spotty, constant and spotty, etc. soils among cultivated fields [1,2,3].

The researches executed by us directed on improvement of an ecological state the highly saltiness of soils of the above oases show that the carried-out washings, plans and introduction the organic minerals of fertilizers, also observance of agrotechnical rules of an irrigation, promote transformation motley on structure of salted ESA and SSC in the uniform well expressed fertile fields of 20-50 hectares and more. It allows to create models of a sustainable development of agriculture in the territory of farms by melioration and integration of small ESA (3-5 hectares) to large uniform and fertile squares of soils. For example, in the territory of desert sandy soils new irrigated the saltiness with characteristic for them motley spotty (3-5 hectares) saltiness, after planning and their washing, organized cotton crops on the area of 48 hectares.

Watering of a cotton was made according to the scheme of 70-70-65 % of limit and field humidity, and was brought nitrogen of 250 kg/hectare, phosphorus and potassium respectively on 200 and 100 kg/hectare and manure of 25 t/hectare. Thus productivity of a cotton I raised from 5-11 to 28,4 c/hectare[4,5,].

Now defining major factors of irrigated soils of the Bukhara oasis are depth soil waters, degree of their mineralization, outflow of waters of drainages and collectors. If at ground waters a superficial bedding (1-2 m) and their degree of a mineralization high (5-10 g/l), besides their outflow needy, processes of salinization develop strongly. Besides, existence of an arid climate and evaporation through capillaries of soils of the mineralized ground waters, causes to accumulation of harmful salts from 1-3 % to 3-5 %. As a result, on irrigated fields spotty forms of salinization of different size are formed. Now, in farms with a problem of salinization the card on the scale of 1:10 000 where recommend a number of agromeliorative and agrotechnical actions is made[6,7].

According to existing cards in farms these recommendations effectively aren't used since increase of fertility of soils, cultivation of plants, productivity doesn't conform to requirements, also in farms of our country improvement of a meliorative and ecological condition of irrigated lands is directly connected with crop rotation introduction. This question is especially important for Bukhara area where 65 % of lands are occupied with cotton, 31 % of the territory occupy cereals, and other 4,2 % are grown up other cultures.

**Materials and methods.** Studied lands are located on the average a current of the delta of the river Zarafshan which on administrative division belongs to the farm "Pakhtakor", Vabkent area.

According to Bukhara branch of Uzgiprozem institute, in the territory of economy old irrigated meadow and alluvial soils which their total area makes 2104 hectares are located. From them 120 hectares not salted, 712 hectares the low-salted, 495 hectares middle salted, and 106,1 hectares highly salted soils. Despite outstanding in recent years works on improvement of a meliorative condition of soils of the Vabkent area, including a farm "Pakhtakor", the salted areas weren't washed out. Besides repair work on collectors didn't conform to requirements, as a result on the above lands development of processes of salinization is expected, and this process, in turn, negatively influences fertility of the soil or site class. To increase productivity of cotton, cereals and other agricultural plants in economy, it is necessary to increase estimation point.

Therefore, main objective of this work development number of agrotechnical and agromeliorative actions for improvement water-salt and nutritious modes of the soil. That will carry out a certain task, in sites Sorin and Huzhaporso, Kuchka Osiyo of the farm "Pakhtakor" it is necessary to improve a meliorative condition of 274,0 hectares the highly salted lands. Also, we studied handy methods of cultivation of cotton, cereals and corn.

In the high salted meadow and alluvial old irrigated soils in a layer of 0-100 cm, the quantity of the dense rest makes 0,302-0,98 %, a chlorine ion – 0,018-0,035 % and a sulfur ion – 0,120-0,182 %, in the high salted soils washing works were carried out in months – December and January. (2012-2013). Before washing of the earth were processed. After were leveled by means of a harrow and ridges 50-60 cm high were formed, the top part the 20-30 cm wide was leveled. During a season were twice washed out in norm of 6500 - 8000 m<sup>3</sup> on hectare, it is carried also out plowing and soil loosening. After furrowing by means of a cultivator 60 cm wide crops of seeds of a cotton are carried out.

The norm of an irrigation made 1500-2000 m on hectare. I made time of an irrigation 40-50 hours. For improvement of nutritious modes of grades of a cotton of Bukhoro-6, Omad, S-4727 was taken in attention of feature of the soil and the terms accepted in production of introduction of fertilizer. Fertilizers were introduced in the following order: N-300 of kg/hectare, P<sub>2</sub>O<sub>5</sub>-175 of kg/hectare, K<sub>2</sub>O-125 of kg/hectare and 30 tons of manure on hectare. During vegetation observation works of phenology of plants, irrigation terms, time of processing of a cotton and other agrotechnical events were held by means of the standard methods (the NIHI union, 1977).

For washing of the salted lands of a field were plowed under a plough land and were leveled. In experiences sowing works were carried out 15.04.2012.

**Results and their processing.** In the made experiments the following research works were analyzed. Therefore, in a farm studied by us, the point of site class of the soil makes 55 points.

- > processing of a cotton between the rows
- > Technology of furrowing and fertilizer's introduction.
- > To define extent of salinization of soils.
- > To study growth and cotton development in the conditions of do not salted soils.

We will pass to the analysis of results of the researches repeated and directly connected among

themselves.

Processing of a cotton between the rows . After crops of seeds of a cotton the soil is almost condensed, especially at an irrigation after crops. Therefore, very important, processing of a cotton among the rows , fight against weeds and to keep friability in the top layers of earth. Besides, in our field after cultivation reduction of evaporation of moisture, a field three times was observed were cultivated, in a grasp zone weeds were completely destroyed by working bodies of a cultivator. Grasp of working bodies of a cultivator wide and between beds it was provided the necessary depth of cultivation. At cultivation tried not to do harm to cotton roots, besides, loosening of the soil ended well. Soil particles with a size of 0,10-10 mm there were not less than 40 %, and a particle wasn't larger than 50 mm. Cultivation was carried out effectively.

Essence of rows processing in that , it prevents from making broken soil layers . As a result of late preprocessing food of plants therefore development decreased by 5-10 % (4-8 days) was broken. Because, at this time weeds managed to grow and well to develop in relation to a cotton. To resist to evaporation of excess moisture from the examinee of a field were carried out, not only cultivation, but

Loosening the rows of the soil is carried out on depth of 10-12 and 15-18 cm, during a season three times was processed. In places where weeds are strongly developed, deep processings between beds were carried out. Some weeds with pedicellate roots (гумай, ажрик) deeply cleared away without leaving in the field. In experience, working bodies of the first cultivation established on depth of 6-8 cm (knives). And arrow fingers established on the center of 10-12 cm in depth. On this zone of protection width of a grasp didn't exceed 10-12 centimeters.

At cultivation in the second and for the third time to a zone of protection added width on 15-16 cm. When loosening soil from six workers of bodies of a cultivator to steam of bodies established on two extreme rows of plants in an interval 10-12 cm. And other 2 couples on depth of 6-7 cm. If on a cultivator two workers of body, one of them are established on depth of 8-10 cm, and the second on 14-16 cm, in the presence of one worker of body depth establish on the 14-16th.

***Furrowing and fertilizer introduction*** during a season is closely connected with soil loosening between beds. Therefore when furrowing, it is necessary to consider that the raw passed, in the middle of a furrow and I reached the necessary depth, it is one of major factors in the examinee a field. When furrowing between beds tried not to dig in cotton sprouts the soil because, the cotton was, it is still poorly developed and the first furrowing was carried out superficially, at a depth of 10-12 cm.

At a blossoming that is when the seedling grew by 30-40 cm, depth of a furrow has to reach 14-15 cm and during blossoming of 16-18 cm. During growth of a cotton of food were carried out by a fertilizer instillation on 2-4 cm. For the first two single power supply depth introduction of fertilizer made 15-16 cm. The distance between beds made 15-18 cm. And for the second time fertilizers were introduced at the edges of a furrow in distance of 20-22 cm, other fertilizers on the furrow middle.

During vegetation at first furrowing was carried out through ridges (in certain cases together with food). We were convinced of that that, furrowing on a trace of wheels of a tractor has positive influence on the soil. As a result of cultivation were carried out qualitatively, the soil after washing of salt found agronomical structure. It is known that after washing the cotton is even more exacting to nutrients and during growth at different times demands in different amounts of nutrients.

On it, in the washed-out soils, respectively, to apply the following norms of application of fertilizers: 250 kg of nitrogen, 175th phosphorus, 125 kg of potassium and 30 tons of organic fertilizer. In the made experiments appointed the following terms of use of fertilizers

**The first period** - from shoots of seeds before emergence of the first real leaves requirement of a cotton to organic substances and to phosphorus were satisfied.

**The second period** – in an interval of emergence of the first real leaves and the first buds, a cotton was provided with nitrogen, phosphorus and manure.

**The third period** – increases in this period requirement of a cotton to nitrogen and to potassium. Therefore, plants were provided with nitrogen, potassium and manure.

**The fourth period** – time of blossoming and emergence of boxes of a cotton, at this time plants quickly develop their requirement to nitrogen and to phosphorus strongly increase. In the made experiment part of fertilizers, that is, their 55-65 % it is applied no later than emergence of 10-12 flowers. Respectively, for good development of a cotton, for early disclosure of boxes, also for a good harvest need of a cotton for nutrients it is provided in time.

Definition of extent of salinization of soils.

It is known that in arid zones, including in soil climatic conditions of the Bukhara oasis during

vegetation of plants in a soil profile are observed evaporation of ground waters, salinization processes as a result develop. To prevent these processes on washing fields established norm of an irrigation 500-600M3 on hectare. Owing to what, in the soil salinization processes weren't observed. Because well soluble salts of chlorides from the top and average horizons are washed out in deeper layers of earth and create optimum conditions for cotton development. In the made experiments, on the washed-out old irrigated meadow and alluvial soils, in the horizons of 0-10, 10-20, 30-50 and 50-100 cm the quantity chlorine of an ion made 0,0091-0,0140 %, during vegetation in tests the amount of soluble salts didn't exceed 0,005-0,0071 %. Means it is possible to come to a conclusion that during growth and cotton development we managed to create optimum conditions.

**Results.** And so, as a result of works in conditions the high salted old irrigated meadow and alluvial soils of the Bukhara oasis it is possible to draw some conclusions.

In the high salted meadow and alluvial soils of the Bukhara oasis old irrigated if the norm washing will make 6500-8000 m3/hectare, and vegetative irrigation norms of 500-600 m3/hectare, for cultivation of a cotton the optimum water mode is created.

At such norm of washing and a water mode in soils decreases, processes of accumulation of salt. According to the taken data, in studied soils the quantity of the dense rest decreases in the following order: The dense rest – 0,0062 %, Chloride ion – 0,017 % and SO<sub>4</sub>-2 ion – 0,092 %. That will grow up a cotton according to all requirements, in an interval of crops of seeds and before cleaning (a butonization, blossoming, disclosure of boxes and B'day) application, modern agricultural technologies (an irrigation, processing and application of fertilizers) increases productivity.

Processing of a cotton between the rows , furrowing, timely introduction of mineral and organic fertilizers belong to this agricultural technology. To prevent from salinization processes between the rows loosening of the soil are carried out at a depth of 10-12 and 15-18 cm. Also depending on growth of plants cultivate at distance of 4-5, 6-7, 10-12 and 15-16 cm.

When furrowing that not to dig in a cotton at a depth of 10-12 cm. During a butonization of 15-17 cm and during blossoming of 20-22 cm.

For top dressing salted meadow and alluvial the highly saltedness of soils expediently introduction of 250 kg of nitrogen, the 175th phosphorus, 125 kg of potassium and 30 tons of manure on hectare. This very significant practical action that generations of a cotton would correspond according to all requirements.

As a result of improvement of a meliorative and ecological condition of strongly salted soils from each hectare received 22-23 c of a crop of a cotton. It is 20-25 % more than in not washed out soils. Above the provided data belong to too salted meadow and alluvial soils of the Bukhara oasis for which application of scientifically reasonable agricultural technologies, give the chance of them to development. Besides it is required to accelerate and deepen scientifically – experimental works on this occasion.

**Conclusion.** Thus, the above-stated data relating to influence of processes of salinization on an ecological condition of irrigated soils of the delta of the rivers Zeravshan and Kashkadarya show that development and distribution not ESA and SSC uniform in form and content is caused by distribution of processes of secondary salinization which worsen water and physical and chemical properties of the cultivated lands that influences cotton development, etc. crops.

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