биомелиорантов Green-эко и совместное внедрение навоза и минеральных удобрении, показывает оптимальный результат содержание гумуса в составе почвы.

Ключевые слова: Биологический активность почвы, удобрение, органоминералы, засоленные почвы, гумус, биомелиорант.

Beisenova G., Ibraeva M., Suleymenova A., Poshanov M., Moldabek G.

INFLUENCE OF BIOORGANIC MELIORANT AND FERTILIZERS ON THE BIOLOGICAL ACTIVITY OF RICE-MARSH SOILS OF ALMATY REGION BALKHASH DISTRICT AKDALA RICE IRRIGATION ARRAY

Annotation

The article shows a positive impact on various biomeliorant biological activity and humus status of rice-marsh soils of Almaty region Balkhash district Akdala rice irrigation array.From these biomeliorant Green-Eco and joint implementation manure and mineral fertilizers shows optimum results the humus content in the soil composition.

Keywords: The biological activity of the soil, fertilizer, organominerals, saline soils, humus, biomeliorant.

UDC631.445.5: 631.445.9 (574)

Beketova A., Kaldybayev S., Jay Sagin, Ertayeva Zh.

Kazakh national agrarian university

DYNAMICS OF GROUNDWATER LEVEL AND SALINITY OF MEADOW SOLONCHAKSOF ILI ALATAU PIEDMONT PLAINS SASA STRIPS

Abstract

As a result of studies data was taken which allow to assess the dynamics of groundwater level and salinity of previously reclaimed meadow solonchak soils under alfalfa

Key words: dynamics of groundwater level, salinization, resalinization, collector-drainage network, reclamation.

Introduction

N.A.Nazarbayev, President of the Republic on the socio-economic development of Kazakhstan paid special attention to the development of agro-industrial complex in his speech at the enlarged session of the Government on September 9, 2016. At the same time, he noted that primary focus is the introduction into circulation of irrigated lands. In five years he assigned to put into circulation at least 600 thousand hectares of irrigated lands, to provide the necessary volume of water, to use these irrigated lands efficiently and effectively.

Throughout the history of soil science saline soils are one of the main objects of study in many countries. This is because, firstly, the prevalence of saline soils in different regions of the Earth; secondly, the fact that salinity is one of the principal genetic properties and reclamative peculiarities of arid and semi-arid area soils, as well as property, limiting their fertility. And finally, thirdly, salinity is one of the main signs of unfavorable ecological state of lands.

Saline soils are spread across all continents, they are found in 100 countries around the world and practically in all natural zones, but dominate in the areas of steppes, semi-deserts and deserts. At the same time saline soils in different regions differ significantly in properties,

genesis, and hence the reclamation methods, which causes the differences in their development, management and salinity control [1].

Resalinization of irrigated lands causes great damage to agriculture. The main reason of this harmful phenomenon is the absence of an engineering collector-drainage networks in low natural drainage of groundwater. Deterioration of water-salt relations leads to a decrease in the productivity of irrigated lands and the loss of the irrigated lands from agricultural use [2].

Irrigated lands are a vulnerable component of the environment and any disturbance of the natural and reclamation systems balance can lead to irreversible environmental consequences. As a result of economic reforms in agriculture a violation of the structure of crops takes place on irrigated lands, agricultural machinery cultivation and irrigation technology are not maintained, about 50% of these lands are not used in the last years, which is likely to disrupt established ecosystems balance.

According to long-term observations of the ameliorative condition of soil in Almaty Oblast it is found that in the irrigated lands exploitation process there is a decrease in soil fertility, which is manifested in a decrease in reserves of humus and nutrients, deterioration of water-physical properties of soils, development of salinity, alkalinity and soil erosion processes [3-5]. The most intensive development of salinization processes are observed in the last 6-8 years. This is a consequence of the crisis which has affected agricultural production these years. Due to lack of financial and material resources, repair works of irrigation and collector-drainage systems are not performed in a timely manner, which is why irrigation regimes are broken, agricultural machinery is not maintained and there is no crop rotation.

Processes of soil salinity occur almost throughout the region, depending on the system of irrigated agriculture, climatic-natural and hydrogeological conditions

Object and methods of research

The object of research were previously reclaimed salt marshes meadow solonchak of Ili Alatau piedmont plain in the Teskensu farm (Almaty region), where alfalfa (Zhetysu variety)was planted (in 2015) in the area of 2.0 hectares. Watering was carried out by flooding with irrigation norm (for moisturizing 0-50 cm of soil layer) 350 m^3/ha. Total irrigation rate for the year was 1 050 m^3/ha.

In key areas (alfalfa of second year of life) and in the control area groundwater was selected and its salinity was identified. Field, stationary, laboratory and analytical methods were applied for the research.

Results

Ili Alatau piedmont plains are the most water-rich region of the Republic of Kazakhstan. Hydrological conditions of piedmont plains are determined by the peculiarities of the geological structure, intensity and dissection depth of the relief, the ratio of components of the heat and water balance, relationship of surface and groundwater.

The groundwater distribution of mountain and piedmont areas, as noted by V. Kovda, U. Ahmedsafin and other researchers, is subject to zoning, directly related to the common vertical bioclimatic zones. It manifests itself both in depth and power of ground flow, and in the succession of water types under the terms of the power and chemistry features. There 4 hydrogeological zones are marked ranging from the mountains to the river Ili: 1) filtration of surface water and groundwater flow formation conditions; 2) The approach of groundwater to the surface; 3) seepage of groundwater to the surface; 4) secondary immersion of groundwater. Each zone is characterized by groundwater salinity inherent only to it.

Filtration area and the formation of ground flow start from the top of the mountains, including the mountain belt, and upper piedmont plains. This part of the territory is composed of large proluvial rocks of significant permeability. Atmospheric precipitation falling here, river water and melt water of glaciers and snow soaking into the soil and penetrating into the cracks of loose rocks, create subterranean flow of water along the gradient of the slope in the direction of

the piedmont plains. Thus, it is the area of groundwater recharge and movement towards piedmont plain.

In the middle of the piedmont plain there is an approach area of groundwater to the surface. In the central part of the piedmont plains at the periphery of the alluvial fans groundwater approaches to the surface, and there seepage takes place, forming a so-called sasa strip. Here, the depth of groundwater is 0.5-5 m, they are poorly mineralized. The total outflow on area slope excludes the possibility of a significant increase in groundwater salinity and it is usually more than 1-3 g/l, the type of chemistry is hydrocarbonate-calcium. Further, on the piedmont plain, the immersion level of groundwater is up to 5-8 meters and deeper. Closer to the river floodplain of Ili, water lays at a depth of 0.5 to 2 (5 m). For groundwater of piedmont plain zoning by the chemistry type is marked, namely, the hydrocarbonate-calcium and poorly mineralized groundwater of foothill loops is replaced by hydro-sulfate (calcium and magnesium) of sasa strip, gradually passing into the poorly (3-5 g/l)and medium mineralized (8-11 g/l) sulphate-magnesium and sodium waters in lower parts of the piedmont plains.

When approaching a floodplain of Ili groundwater salinity increases up to 15-21 g/l or more, and the chemistry type becomes sulphate-chloride-sodium. As groundwater moves to the periphery of the piedmont plains accumulation of salts in soils occurs, based on an exchange reaction between the groundwater and soil-forming rocks[4, 6].

As known, groundwater has a significant influence on the formation of saline soils. Therefore, the depth of the groundwater level and its salinity are one of the main factors determining the reclamation condition of lands and the whole complex of agro-reclamation measures.

In 1928 it was already discovered by Tyuremnov that for different soil should be established its own acceptable groundwater level, in which capillary salinization must be excluded.

B.Polynov introduced the concept of the critical depth of the groundwater level salinizing the soil and the soil surface, decrease of which causes the surface salinization of soils.

The groundwater level is not constant, but varies according to the seasons, while leaching and irrigation, wherein not only level changes but also salinity.

O.Grabovskaya introduced the term of critical regime of soil salinizing groundwater. Under the critical regime of groundwater salinity refers to the depth above which there is an initial stage of soil salinity by the end of the growing season.

V.Kovda established relation of the critical depth of groundwater level with climatic factors by means of the equation:

$$I = 170 + 8t \pm 15$$

where: I –critical depth (cm);
t - average yearly air temperature (^{0}C).

It should be noted that the formula of V. Kovda reflects the natural zoning, but does not consider the physical properties of soils. Therefore, the value of the critical depth, calculated by this formula may not match with the experimental values for certain irrigation regions.

For the irrigated lands of Uzbekistan critical levels of groundwater (in summer) are differentiated depending on soil type and chemical composition of groundwater as follows:

– sasa areas with bicarbonate fresh groundwater and swampy meadow and swampy type soils- 1,2 - 1,5 m;

– sasa solonchak areas with sulphate fresh groundwater and swampy meadow type soils of sulphate salinity - 1,8 - 2,2 m;

– solonchak areas with chloride-sulphate groundwater and serozem and meadow type soils, subject to salinization of the same type - 2,0 - 2,7 m.

[4] considers that for most areas prone to salinity, the average depth of groundwater should be taken equal to 0,9 - 1,0 h_k, where $h_k$is the height of capillary rise.

[4-6] recommend the depth of groundwater within 0,8 - 1,5 h_k, where, in their opinion, reclamation regime ensures minimum moisture exchange with groundwater.

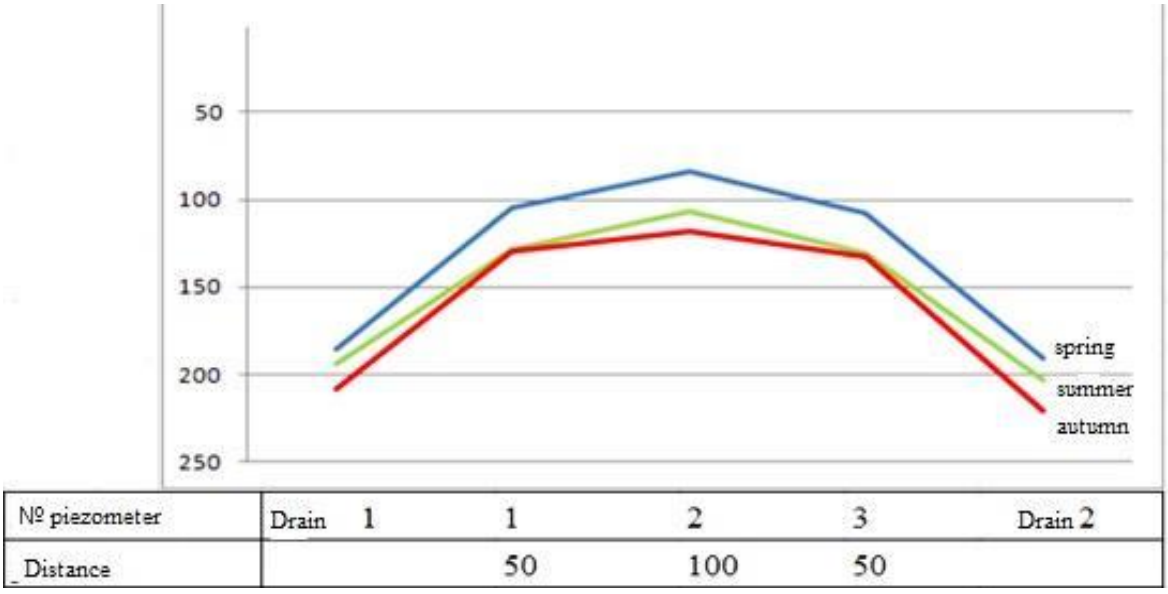
Proceeding from the all abovementioned it is important to maintain the level of the groundwater below the critical level and reduce water salinity in the same extent as the soil.

Chart 1 – Dynamics of groundwater level and salinity on the experimental site (second year alfalfa) drain spacing 200 m., (^{cm}/g/l).

Years	Variant	Period	Piezometer					Mean value
			Drain -1	1	2	3	Drain - 2	
2016	Key site (alfalfa)	spring	186 8,684	105 5,120	84 4,035	108 4,850	191 5,195	135 5,58
		summer	194 6,855	128 5,110	107 3,870	131 4,010	203 4,240	153 4,81
		autumn	208 7,790	129 5,850	118 3,980	133 4,750	221 5,040	162 5,48

Territory of Teskensu experimental site, as mentioned earlier, is typical for Ili Alatau piedmont plain. It can clearly be seen the slope surface from south to north, so that the inflow of groundwater emerged from the mountains in the direction of the Ili River.

The average level of groundwater in the spring under alfalfa was 135 cm and the salinity was 5.58 g/l, that is, by the classification relates to medium salinized. In the summer and autumn some decline in the level of groundwater is observed - up to 153-162 cm and decrease of salinity up to 4,81-5,48 g/l (chart 1, picture 1).



Picture1 – Dynamics of groundwater level and salinity on the experimental site

Conclusion

Apparently, pressure groundwater recharge played an active role in the after reclamation period, since the upward pressure flow often tapers out in the research area and has a salinity of about 1-2 g/l. which increases the groundwater level, as well as reduces its salinity.

References

1. *Ковда В.А.* Проблемы опустынивания и засоления почв аридных регионов мира (отв.редакторы Е.И Панкова, И.П.Айдаров) Ин-т физ.-хим. ибиол.проблем почвоведения РАН. – М.: Наука. - 2008. – 415с.

2. Засоленные почвы России. Отв.редакторы Шишов Л.Л., Е.И.Панкова.- М.: ИКЦ «Академкнига». - 2006. – 854с.

3. *Сапаров А, Чен Ши, Цзили Абдувайли.* Почвы аридной зоны Казахстана: современное состояние и их использование. – Алматы.: Изд-во ТОО «Полиграфия и сервис К^0». - 2014. -440с.

4. *Қалдыбаев С.* Қазақстанның тұзды топырақтары және оларды мелиорациялау. – Алматы.: ЖК «Центр Оперативной полиграфии». – 2016. -502с

5. *Калдыбаев С.* Регулирование водно-солевого режима луговых солончаков сазовой полосы предгорной равнины Илийского Алатау и разработка научно-обоснованных прогнозов параметров их изменения. //Материалы международной научной конференции «Современное состояние почвоведения и агрохимии, проблемы и пути их решения», ТОО КазНИИ Почвоведения и агрохимии им.У.У.Успанова, Алматы. - 2015. – С.9.

6. Отчет о научно-исследовательской работе МОН РК за 2016 год.-Алматы.-С.48-56.

Бекетова А., Калдыбаев С., Джей Сагин, Ертаева Ж.

ДИНАМИКА УРОВНЯ И МИНЕРАЛИЗАЦИИ ГРУНТОВЫХ ВОД ЛУГОВЫХ СОЛОНЧАКОВ САЗОВОЙ ПОЛОСЫ ПРЕДГОРНОЙ РАВНИНЫ ИЛИЙСКОГО АЛАТАУ

Аннотация

В результате исследований получены данные, позволяющие оценить динамику уровня и минерализации грунтовых вод ранее мелиорированных луговых солончаков под люцерной.

Ключевые слова: динамика уровня грунтовых вод, минерализация, вторичное засоление, коллекторно-дренажная сеть, мелиорация.

Бекетова А., Қалдыбаев С., Джей Сагин, Ертаева Ж.

ІЛЕ АЛАТАУЫ ТАУ АЛДЫ ЖАЗЫҚТЫҒЫ САЗДЫ БЕЛДЕУІНІҢ ШАЛҒЫНДЫ ТОПЫРАҒЫНДАҒЫ ЖЕР АСТЫ СУЛАРЫНЫҢ ДЕҢГЕЙІ МЕН МИНЕРАЛДАНУЫ

Аңдатпа

Зерттеу нәтижесінде ертеде мелиорацияланған шалғынды сортаң топырақтардың жер асты суларының деңгейі мен минералдануын бағалайтын көрсеткіштер алынған.

Кілт сөздер: жер асты сулары деңгейінің динамикасы, минералдану, екіншілік тұздану, коллекторлы-дренажды жүйе, мелиорация.