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Role of the climate change in soils salinization

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doi: 10.18411/lj-04-2021-76

Аннотация

В статье представлена информация о последних изменениях климата в Азербайджане. Исследования показали, что изменения климата орошаемые земли на Муганской равнине в Кура-Аразской низменности также подверглись засолению и засоленность в результате наводнений, снизилось плодородие почвы и урожай сельскохозяйственных культур. Эти наводнения серьезно повредили площадь 70012 га, и считается целесообразным проводить мелиоративные мероприятия без учета природных условий.

Ключевые слова: климат, орошение, наводнение, плодородие, урожайность.

Abstract

The information about the changes occurring in the Kur-Araz valley soils has been given in the article. The investigations showed that the irrigated. Soils of the Mughan plain in the Kur-Araz valley exposed to salinization and solonetrification, the soils fertility decreased, the productivity obtaining from agricultural plants reduced as a result of the floods and mudslides. The same floods seriously damaged 70012 h of the zone and the meliorative measures were realized for their prevention.

Key words: climate, irrigation, flood, fertility, productivity.

At present correctly using of the soils, obtaining of higher product from agricultural plants is one of the most important problems. Now some of the plots good for agriculture aren't used or are used in a planned way in the republic. That's why the GIS technologies are used in performance of the exact soil work at present. Here the soil work makes a chance to optimize cultivation and develop agricultural crops by considering the natural, economical, technological and social factors[4].

It is known that performance of the melioration work depends on directly concrete natural conditions to develop agriculture. Realization of the meliorative measures must be fulfilled after soil study, definition of the hydrological climate and other factors change and a need of the agricultural crops according to the same factors. In fulfilment of these measures considering of the water-air regimes assumes a great importance. Though a natural-climate condition of our country gives a change for growing of the agricultural crops all year round, 55,2% of the soil fund is good for agriculture and most of them are due to the arid zone where moisture is not enough and that's why it is impossible to produce the agricultural crops without an application of irrigation. So, unsatisfactory reclamation state of lands, the obsolete and non-modern land reclamation and economic systems, water deficiency, use of arable lands as pastures and hayfields, the circumstances of illegal use of arable lands, salinization and solonchization and erosion happen. The degradation processes strongly increased as a result of the anthropogenic impact on soil, i.e. the human's incorrect farm activity, some shortages in soil stocks management and an influence of the climate changes.

At present there are some ecological problems on the earth, the climate changes are considered important. The climate changes are creating basic problems on the earth, including in our country. So, increase of the temperature year after year raised evaporation and this caused humidity shortage during the vegetation. These changes accelerate enlargement of the irrigation, mineralization of organic substances as a result of the temperature increase strong decrease of humus in soil is observed, and as a result the productivity of the growing plants decreases. This process occurs intensively in the soils without collector-drainage net. If we consider that the climate changes influence not only on agriculture but also on biodiversity and the men's health [9]. Improvement of the ecological environment of the soils good for sowing, different agrotechnical, meliorative and recultivation measures are performed to get an abundant harvest from plants. Presently, improvement of the saline and solonchak soils for agricultural plants is an important problem.

Research object and method

The research object was soil in the Mughan plain of the Kur-Araz valley. The changes occurring in the soils remained under the flood waters in 2010 where investigated the necessary chemical analyses according to the method of the soil samples which were taken to define a change in the same zones were performed [1].

Analysis and discussion

The climate changes of the world is observed in Azerbaijan. Strong shortage of the water stocks under the global climate changes during the vegetation, the unequal distribution of these stocks on regions, water-wind erosions of soils in the main agricultural region, inclination to solonchization, performance of the work for melioration and irrigation area in two directions are important purpose. It is important to plant drought tolerant crops in the dry-farming zones under an influence of the climate changes in Azerbaijan. This process negatively affects the soil, plant and water stocks, the landslide, the river overflow, the soils used under the agricultural plants. The researches indicate that the water shortage was created in connection with the climate changes in some regions of the republic.

At present the natural climate change is being observed in connection with the increase of the sun system action on the earth, and this directly influences the living world, as well as the soil cover. The powerfulness of evaporation under the hot-dry climate condition causes mineralization of subsoil water and soil salinization. This process intensively occurs in the soils without collector-drainage net. Generally, salinization, solonchization, bogging occurring in the soil mostly decrease the soil fund and the sown areas are out of circulation. More than 90% of the salinized soils widen in the Kur-Araz valley of Azerbaijan. Approximately, 60% of the valley soils are averagely and strongly salinized. Salinization of soils is caused by the evaporation of water from the Caspian Sea as a result of repeated ups and downs [2].

The researches indicate that compared to the 80s, the temperature in the Kur-Araz lowland increased by an average of $0,5-0,6^{\circ}\text{C}$, as well as more in the last 10 years. The changes happened in decrease of the river flows and distribution of the water. A volume of the river flows increased 10-11% in 1978-1995. Increase of the rainfall intensity negatively affected strengthening of soils erosion and agricultural plants. Generally, the climate change negatively influences the formation of both surface and groundwater resources. The water pressure and floods caused intensification of salinization in soils. The same water floods had a destructive effect on 70012 hectares of the zone[8]. It is necessary to indicate that the most part of the soils used under planting spread in the zones which have dry-climate condition. Under such condition the agriculture is only possible with artificial irrigations. A total soil plot of the Kur-Araz valley is 2242 000 hectares and its 1438,8000 hectares consist of irrigated soils, 664,6000 hectares (46,6%) of irrigated soils exposed to salinization to a different degree, but 497,6000 hectares (33%) exposed to solonetzification to some or other degree[5]. The calculations show that productivity of the agricultural plants in the soils exposed to salinization decreased 14% on Republic. The salinization rises as the depth grows, on profile in the main irrigation zones of the Kur-Araz valley[7]. Some researchers—V.R.Volobuyev., M.E.Salayev., G.Sh. Mammadov., M.P.Babayev., M.G. Mustafayev and others investigated main reasons of the soil salinization in the Kur-Araz valley in the different years.

The Mughan plain soils in the Kur-Araz valley are among the regions engaged in irrigated agriculture and a certain part of soils exposed to salinization to a different degree because the agrotechnical measures weren't followed properly. The first soil researches in the Mughan plain were performed by M.F.Kalinin, Y.A.Kamenicki, and S.A. Zakharov, but the large-scale soil researches were performed by S.A.Zakharov, and S.I.Turemnov. The authors indicated that the main reason of the soil salinization was related to irrigation. Later V.R.Volobuyev., M.R.Abduev, I.K.Iskandarov, G.Z.Azizov., M.G.Mustafayev and others performed researches in a direction of melioration, and studied the changes occurring in the soil: salinization and solonetzification. The climate changes occurring in last years negatively affected on soils of the plain. The salinization process strengthened in the plain soils as a result of the water pressure and floods happened in the republic in 2010 and the productivity obtained from the agricultural crops was low. It was defined that the salt amount (for dry residue) was 0,25-0,65% in 2014, it was 0,23-0,65% in 2015, but it was 0,073-0,478% as a result of the agromeliorative measures in 2016. The experiments indicated that mineralization of subsoil waters is different, changes 2,025-2,295 g/l. The irrigation erosion happened in the soils remained under the stream water in Sabirabad. It must be noted that overflowing of the stream water and water pressure in some villages of the Sabirabad region caused collection of the silt particles, soil erosion and salinization.

The researches indicate that due to the little amount of humus in these soils, there are differences in the sown and subsoil layers. As the amount of easily soluble salts increases, so the productivity of plants decreases. So, the product loss was 1,95 s/h or 7,5%, in cotton and grain while the salt amount was, 0,25-0,50%, but it was 15,10s/h or 58,48% while the salt amount was 1,0-2,0%; the loss was 15,10s/h while the salt quantity was 1,0-2,0 %. As a result of complex measures taken in recent years, the reclamation condition of lands in the area has improved and the productivity of agricultural crops grown there has been satisfactory. In order to maintain the fertility of these areas and to obtain high and quality products from agricultural crops, it is considered important to apply 40t/h of organic fertilizers or N90P90K75+20t/h of manure per hectare to the flood-free arable lands[3,6].

Conclusion

1. The investigations showed that the melioration work performance depends on concrete natural condition to develop agriculture and that's why comprehensive study, an influence of the climate and other factors must be defined.

2. While realizing the meliorative measures, the water-air regime of soil and a need of plants for water and temperature must be taken into account. Generally, proper

observance of agro-technical rules (softening and deepening of plowing layer) in the soil, planting of salt –tolerant plants in salted and solonetzified soil create conditions for increasing both soil fertility and productivity.

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