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THE REGULATION OF WATER REGIME OF FIELD CROPS AND DECORATIVE WOODY PLANTS IN NATURAL CONDITIONS BY APPLYING POLYMER-MINERAL RAW MATERIAL

S.B. Galstyan[1], A.H. Vardanyan[2], V.H. Tokmajyan[1], N.E. Gorshkova[2], H.V. Tokmajyan[1]
[1]*Shushi University of Technology*
[2]*Moscow State University after Lomonosov*

The efficient use of solar energy to synthesize organic matter has ever been and still remains the main task of agriculture. In addition to the light and heat from the sun which are the main and only way for the plants to function normally, water, nutrients and air (CO_2 և O_2) which the plants get from soil and surrounding atmosphere are needed for the continuation of this process along with the natural activity of plants. Among the mentioned factors, water is the criterion of crop yield in those regions of Armenia having insufficient and unstable humidity. This article offers solutions for providing water regime in the soil.

Key words: agriculture, harvest, raw material, organic substance, ameliorant, rain-fed soils.

Introduction

The vital processes of plants, the activity of microorganisms as well as the technological properties of the soil, specific resistance, processing time and other issues are due to water content in the soil. In any case, crops grow and develop normally in cultivated agricultural lands which contain water and air simultaneously.

Attempts have been made in various periods to rapidly improve the physical properties of the soil in addition to the existing traditional means of using various ameliorants [1-3].

Conflict settings

The aim of the work is to apply the polymer mining raw materials created by the Institute of Mechanics of the Moscow State University after M.V. Lomonosov as ameliorants to reduce the costs on unit product, to increase the yield, to regulate water regime in soybean nurseries of decorative use and other corns among them winter wheat and sainfoin which is used as animal feed rich in proteins and carotene gaining new circulation in the republic in rain-fed agricultural conditions of Artsakh and Armenia.

Research results

Autumn wheat which is considered to be the main food crop, is one of the most valuable and high-yield plants. In all cultivation areas the average yield is significantly higher than the spring wheat crop as it has good use of autumn and spring moisture. Autumn wheat has a well-developed root system that penetrates deep into the soil due to which it absorbs nutrients well and suffers little from drought. It protects itself from drought and sandstorm due to its early maturation. The high value of autumn wheat lies in the fact that having the same nutritional value as spring wheat it is more valuable from management and economic point of view. Winter crop and relatively early harvesting, compared to spring wheat, allows the full and balanced use of labor and production facilities.

The second crop that is another topic for research is sainfoin which as papilionaceous feed plant is the first in its distribution and meaning prevailing in our country (the second is alfalfa which is cultivated in irrigated lands).

The sainfoin exceeds clover and alfalfa by its total caloric value of corn (1 kg of grass contains 0,54 feed units) and the amount of digestible protein is close to alfalfa (10,6% in grass). It is cultivated for getting grass, grass flour and green mass which all kinds of animals eat with pleasure. Unlike other

papilionaceous flowers, tympanic disease does not occur when feeding animals with green sainfoin. Sainfoin has a relatively high yield and often exceeds alfalfa and clover in its main cultivation areas. Sainfoin is an excellent honey plant. It provides 80-100 kg or more of honey per 1 hectare. The agro-technical significance of sainfoin is also great. It enriches the soil with organic matter and nitrogen. In the case of 50-60 c/ha of harvest for two years sainfoin leaves 100-120 kg of nitrogen in the root and stubble remnants in plowland.

The southern species of the tree of life belonging to the family of cypress are the third object of the study, they are trees and shrubs of xerofite properties and are widely used in greening the environment, gardening and forestry.

The first two objects which are distinguished by the plasticity of adaptation to different soil and climatic conditions and the best nutritional and food features, are considered to be strategically important crops in the agricultural economy of the republic. Therefore, in the current conditions of increasing environmental stress it is necessary to ensure high yields at the lowest possible cost by developing various agro-technical measures and investing in production.

The factor of minimized yield is water in Armenia and Artsakh in conditions of insufficient and unstable humidity. Therefore, in the lowland zone where the annual precipitation is 250-450 mm, the cultivation is carried out mostly in irrigated conditions and in the foothills and middle mountain zones where the average annual precipitation varies between 450-650 mm and it is carried out mainly by rain-fed conditions. However, frequent droughts and hailstorms in recent years have caused great damage to agriculture threatening desertification.

In natural conditions (without irrigation), as the results of many studies show, the reason for moisture deficit does not depend only on the increase in temperature and the decrease in precipitation. One of the reasons for the decrease in soil moisture is the anthropogenic factor. With the increase in the power of machinery and tools, the increase in cultivation depth, the intensive mellowing of arable land with traditional furrow turn accompanied by an increase in the number of operations and the intensification of agriculture create favorable conditions for such negative phenomena as degradation of soil aggregates, acceleration of dissolving rates of organic substances, pulverization of plowland, loss of moisture, acceleration of erosion and increase in labor and material costs etc.

In order to prevent soil degradation, it is important to have minimal and zero tillage, to use such agronomic measures as the use of scientifically justified crop rotations, fertilization with organic fertilizers as well as rapid improvement of agro physical properties of soil with various ameliorants.

Fertility is the main and important feature of the soil which in its turn depends on a number of other properties. One of the most important of these features is its absorbency. It is highly dependent on colloidal (less than 0,0001 mm) particles of mineral, organic and organic –mineral origin. The more these particles are, the better the soil absorption is and therefore the greater the amount of water and soluble salts and gases is absorbed by it and retained by certain forces. Absorbed substances are not absorbed by the soil forever. They are only stored until the amount of water increases and the plants require them through their root system. If soil moisture increases, some of the substances will undoubtedly return to the soil solution.

If there are enough nutrients in the soil but there is lack of water and air, the plants die. Therefore, care must be taken to ensure that there is always water and air in the soil along with nutrients. They are located in soil pores and cracks which occupy in average 50% of the total land area.

It is preferable to make pores for crops in the soil (from several mm to tens and hundreds of mm). In this case even big pores of the soil will contain air which is necessary for respiration of soil inhabitants and plant root system and even the smallest pores contain water.

One of the main elements of soil fertility is its water permeability index. The water falling in the form of precipitation on the surface of the soil under the influence of gravity, is absorbed by large pores in it and is absorbed by thin pores or capillaries surrounding the soil particles with a wide layer. The larger the soil particles (for example, in sand) are, the larger the holes between them are and the

easier is water penetration in such soil. In contrast to clay soils which are rich in smallest particles, the holes between them are very small and the water penetrates relatively slowly.

However, this applies not only to non-structural clay soils. If such soil is rich in humus and lime compounds, the individual smallest particles, especially the colloidal particle coagulate, soften and are stuck to each other in it forming porous grains and particles which are quite strong in the presence of humus and lime and withstand prolonged water washing. In natural conditions middle-sized holes appear between the grains and particles as in sand and such structural clay obtains good water permeability. The more porous the soil is, the more water there is in it. This amount of water corresponds to the soil water permeability index. It is clear that the water permeability of the soil is equal in volume to its porosity. However, water permeability must be distinguished from soil moisture. Soil moisture is the moisture retained by it that remains in it after complete wetting and free squeezing with the pores directed downwards or sideways according to the slope.

The properties of the soil include the evaporating properties of the soil, the water-raising force and so on.

All the properties of the soil are important for the growth and development of crops and find their best expression in the agricultural lands which contain water and air at the same time.

According to the principles of the traditional soil cultivation system, the methods of maintaining soil structure are: deep tillage by traditional furrow turn, introduction of meadow crops, application of organic and mineral fertilizers, fertilization of acid soils, gypsum of saline soils etc. However, centuries of experience in agriculture have shown that this is not so. As t is mentioned above, the deep loosening of the soil by furrow turn and the increase in the number of cultivations are the cause of all the negative effects that lead to accelerated soil degradation. According to current ideas, both the best conditions for maintaining and improving the structure and the other properties of the soil that create the total fertility are created by the minimum and zero continuous cultivation of the soil scientifically based on the use of crop rotations, fertilizers and ameliorants to improve the plowland of the soil quickly.

Based on the above mentioned and guided by the requirements of basic and applied sciences, we set ourselves the task to determine the impact of the application of polymer mineral raw materials created by Moscow State University after M.V. Lomonosov on the regulation of water regimes of field crops and woody plants through vegetation and field experiments in rain-fed conditions.

We call water regime all the processes that take place in the soil related to water penetration, movement and distribution through certain horizons and its storage and waste as well.

Field experiments should be carried out in dark chestnut gravel weak carbonated soils in the foothills of the republic at an altitude of 600 m above sea level. In the natural conditions of this zone the main source of moisture in the soil is atmospheric precipitation and deep water. In addition to precipitation and deep water, the soil moisture is affected by the nature of the vegetation, the relief, the cultivation system, the presence of winds etc. The average annual precipitation in the zone is 524 mm and the average annual air temperature is 11,8^{o}.

For field crops such as wheat and sainfain the ameliorant will be put into the soil and mixed with the 7-8 cm layer of cultivated soil taking into account the production capacity. It is also worth noting that the plot of land intended for the experiment which has a weak slope to its eastern parts, is cultivated continuously in a minimal method for 12 years.

Conclusion

In order to improve the properties of degraded lands, to regulate water and food regimes of crops, to reduce the cost price of production it is necessary to carry out laboratory, field and vegetation experiments by means of studies to reveal the impact of different amounts of polymer-mineral raw materials invented by Research Institute of Mechanics of Moscow State University after M.V.Lomonosov and their application methods on soil improvement, regulation of water and food regimes and as a result on economic efficiency of crops and decorative trees.

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ԲՆԱԿԱՆ ՊԱՅՄԱՆՆԵՐՈՒՄ ԴԱՇՏԱՅԻՆ ՄՇԱԿԱԲՈՒՅՍԵՐԻ ԵՎ ԴԵԿՈՐԱՏԻՎ ԾԱՌԱԲՈՒՅՍԵՐԻ ՋՐԱՅԻՆ ՌԵԺԻՄԻ ԿԱՐԳԱՎՈՐՈՒՄԸ ՊՈԼԻՄԵՐԱՀԱՆՔԱՅԻՆ ՀՈՒՄՔԻ ԿԻՐԱՌՄԱՄԲ

Ս.Բ. Գալստյան[1], Ա.Հ. Վարդանյան[2], Վ.Հ. Թոքմաջյան[1], Ն.Ե. Գորշկովա[2], Հ.Վ. Թոքմաջյան[1]
[1]Շուշիի տեխնոլոգիական համալսարան
[2]Լոմոնոսովի անվան Մոսկվայի պետական համալսարան

Երկրագործության հիմնական խնդիրն եղել և մնում է օրգանական նյութ սինթեզելու համար արեգակնային էներգիայի արդյունավետ օգտագործումը: Այդ գործընթացը ապահովող գլխավոր և միակ միջոցի՝ բույսերի բնականոն գործունեության համար բացի արեգակից ստացվող լույսից ու ջերմությունից անհրաժեշտ է նաև ջուր, սննդանյութեր, օդ (CO_2 և O_2), որոնք բույսերն ստանում են հողից և հողամերձ մթնոլորտից: Նշված գործոններից՝ ջուրը Հայաստանի անբավարար ու անկայուն խոնավություն ունեցող շրջաններում մշակաբույսերի բերքատվության չափորոշիչն է: Սույն հոդվածում առաջարկվում են լուծումներ՝ հողում ջրային ռեժիմի ապահովման համար:

Բանալի բառեր. երկրագործություն, բերք, հումք, օրգանական նյութ, մելիորանտ, անջրդի հողեր:

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ПРИМЕНЕНИЕ ПОЛИМЕРНО-МИНЕРАЛЬНОГО МАТЕРИАЛА ДЛЯ РЕГУЛИРОВАНИЯ ВОДНОГО РЕЖИМА ПОЛЕВЫХ РАСТЕНИЙ И ДЕКОРАТИВНЫХ ДЕРЕВЬЕВ В ЕСТЕСТВЕННЫХ УСЛОВИЯХ

С.Б. Галстян[1], А.А. Вартанян[2], В.О. Токмаджян[1], Н.Е. Горшкова[2], О.В. Токмаджян[1]
[1]Шушинский технологический университет
[2]Московский государственный университет им. Ломоносова

Основной задачей земледелия в естественных условиях является эффективное использование солнечной энергии для синтеза органического вещества. Для обеспечения нормальной деятельности растений, кроме света и тепла, также необходимы вода, питательные вещества, воздух (CO_2 и O_2), которые растения получают из почвы и окружающей среды. Из отмеченных составляющих, для регионов Армении с недостаточной и неустойчивой

влажностью, вода является важным фактором урожайности возделываемых культур. В статье предлагаются решения для обеспечения водного режима в почве.

Ключевые слова: земледелье, урожай, сырье, органическое вещество, мелиорант, неорошаемые земли.

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