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# Factors Producing Natural Moisture in the Soil and their Influence on Plant Vegetation

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**Abstract**

*In this article, the formation of natural moisture in the soil and the factors affecting it are studied in the conditions of climate change. In particular, the results of the research conducted on the amount of annual rainfall in the hilly regions of Northern Fergana and its influence on the vegetation period are described.*

**Key words:** *climate change, world ecosystem, bio-diversity, soil moisture, growing season.*

## Introduction

Now people live in a world where global environmental threats are increasing in size, scope, and impact. In particular, climate change on a global scale is causing a change in the entire world ecosystem, a literal violation of the laws between nature and society. The scale of the impact on biodiversity is particularly alarming. These changes are caused by an increase in the average temperature in the atmosphere, irregular rainfall, and subsequent disruption of the moisture cycle necessary for living organisms.

It is known that in the life of any living organism, various properties of water can be found. In the soil, this process is represented by moisture. However, in the conditions of climate change, it is

important to research the formation of natural moisture in the soil and the factors affecting it from a scientific and practical point of view.

In recent years, scientific researches have been analyzed on the rise of the average temperature in the atmosphere, resulting in an increase in evapotranspiration. It is manifested in the increase of the evopotranspiration process and the somewhat negative effect on the ability to retain moisture in the soil and in the plant. Year-round temperature exceeding the average amount, evaporation, and low precipitation lead to an increase in arid areas (1).

We know that each plant cannot use all the moisture in the soil, it can use only 35-40% of the moisture volume. After the rain, a certain water reserve is formed in the soil, which can be absorbed or not absorbed by the plant.

At this point, it is possible to analyze the factors affecting the plant's ability to absorb (or not absorb) the moisture it needs in the soil:

***1. The factor of the geographical location of the place.*** The geomorphological conditions of the place are important for the plant to get the moisture it needs (hollow, flat, hilly, foothills, mountains, etc.). Precipitation in the foothills and mountainous regions is somewhat stable compared to the plains and hills, and humidity is high. However, it does not look stable on a hill with a slope. Evaporation increases due to high temperature in the plain. Therefore, the formation of moisture at different heights will have a different appearance. The main factor in soil moisture is the amount of precipitation in the area (4).

***2. Climate factor.*** Northern Fergana region differs from all regions of our republic by its soil and climate conditions. In particular, the climatic characteristics of this region are clearly different from west to east and from north to south. These differences affect the distribution and formation of plants. For example, it is manifested in plant growth through temperature, wind speed, solar radiation and relative humidity. The climatic factors of the region have their influence on the formation of natural moisture of the soil, firstly, this region is located in the northern part of the valley, and the solar energy in this region is higher compared to other southern, western and eastern sides of the valley; secondly, possession of 3 altitude regions (plains, hills and foothills); thirdly, the soil cover of the oasis is experiencing a strong anthropogenic influence in the current conditions; fourthly, re-salination of soils is strongly manifested. From the fifth; evapotranspiration is high compared to other regions of the valley. From the sixth; such as the fact that rainfall is not the same in seasons and regions (5).

***3. Soil factor***. In different soils (light, medium, heavy) this process takes place differently. Moisture accumulation and drying is fast in light soils and slow in heavy soils. It is related to the soil's ability to hold water or moisture capacity. Moisture capacity is high in heavy soils and low in light soils. The ability of plants to live in a certain area, to increase or decrease, directly depends on the heavy or light type of soil. In particular, large areas of the Northern Fergana region consist of hills and mainly light loess soils. This has a negative effect on the dense spread of plants (7).

***4. Plant factor.*** Usually, the nutrient and salt regime necessary for the plant in the soil is controlled by moisture. The water requirement of plants depends on its type, root development level, growth period, etc. Therefore, the plant's need for water during its growth varies according to the amount of water in the soil. The water consumption of plants consists mainly of moisture taken from the soil by the roots and water evaporated through the leaves. In addition to them, the water that evaporates from the soil, is spent in sewage, and is sucked down from the layer where the roots are spread are the components of the total water consumption for the plant (7).

***5. Anthropogenic factor.*** The human factor is considered to be the main factor in the long-term dominance, disappearance, and death of plants growing in nature. Today, the landscapes of hills and plains behind the hills have fallen into the sphere of anthropogenic influence. As a result of the full development of these areas, wild grasses have been replaced by cultivated plants. Today, the demand for moisture of all types of plants is increasing compared to previous years under the influence of temperature. From the beginning of the vegetation period, the plant's demand for moisture remains until the end of the vegetation period. However, the moisture retention phase, vegetative parameters, height, leaves, fruits and other physiological characteristics of any plant species differ from each other. The mid-vegetation period is the summer season for many plants. In this case, the plant's demand for moisture increases sharply (2).

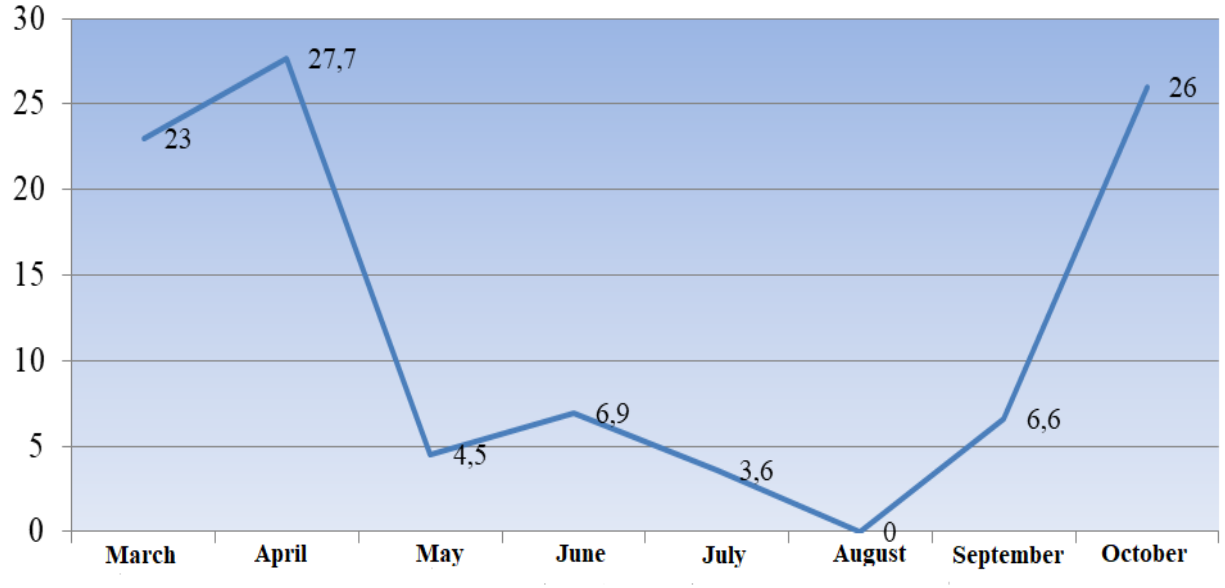


**Figure 1. Precipitation indicators during the growing season in Namangan region, mm.**

Seasonal variability of soil moisture depends on precipitation, temperature, and direct groundwater capillary rise. In Namangan region, the amount of rain during the growing season is 98.3 mm. This condition is less than expected for the formation of plants typical for a short vegetation period. When estimating soil moisture, the amount of precipitation gradually decreases during periods typical for the growing season (Fig. 1). It certainly depends on the regularity of rhythmicity and climatic factors of the region. However, the amount of precipitation that occurs today is related to changes in the climate in the next 15 years.

It is worth noting that in the hilly regions of Northern Fergana, annual precipitation is 180-200 mm, and annual evaporation is around 900-1000 mm (3).

The water demand of each type of plant that has entered the vegetation period depends on its type, the level of root development, the growth period, etc. It is manifested in the reduction of plants that do not meet the indicators. This situation is observed in some ephemeral and ephemeroid plants, especially in the hilly regions of the region. Another reason for the occurrence of such a situation is the large transpiration process, which leaves the leaves through the temperature under the influence of the amount of moisture received through the roots of the plant (6). This process is unique to each

plant. Of course, the physiological system and biological frequency of the plant's water retention play a key role in this. Along with this, geobotanical features are also involved.

In the Namangan region, the stability of soil moisture during the growing season of plants depends on the seasonal rhythm of precipitation, as mentioned above. In many researches conducted in the region, the formation of moisture in the soil due to rain and its beneficial aspects for plants have been analyzed in practice (5). Of course, taking into account the agrometeorological and morphological characteristics of the region. As mentioned above, the ability of the plant to withstand its full moisture capacity for a long time during the growing season is assessed by the active influence of the temperature in the atmosphere. The moisture indicator suitable for the growing season is the opposite of the temperature indicator.

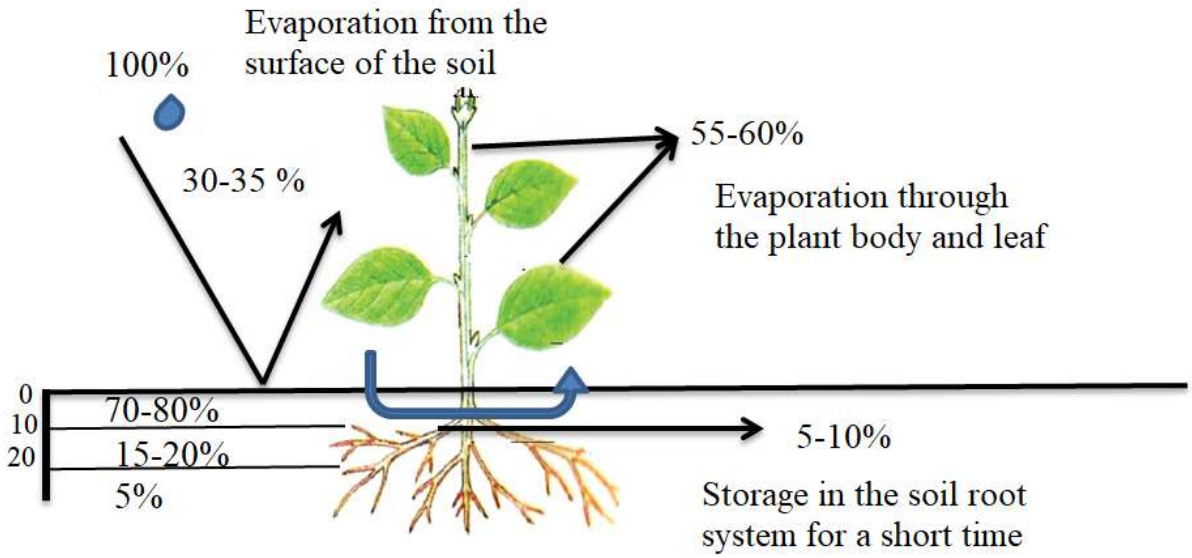


**Figure 2. Quantitative value of soil moisture under the influence of precipitation**

In the indicator of moisture supply to the soil and plants based on the rainfall given in this picture, 55-60% of the moisture is supplied through the plant body and leaves, but this is considered a low positive feature. That is, it happens in a daily rhythm. During the precipitation period, the loss of moisture that the soil can take due to temperature is 30-35%. The most useful moisture for the plant is only 5-10 percent. It is impossible to keep useful moisture in the soil for a long time. The plant's demand for water is constantly fulfilled. Importantly, climatic resources are variable. During the growing season of plants, the moisture generated in the soil is more dependent on the ratio of rainfall. Evaporation and changes in evapotranspiration, in turn, can be considered as one of the biggest influences on long-term vegetation conditions. So today, in most parts of the Namangan region, more precisely, the biotic processes in the hills and hilly regions can be attributed to the high abiotic pressure (4) .

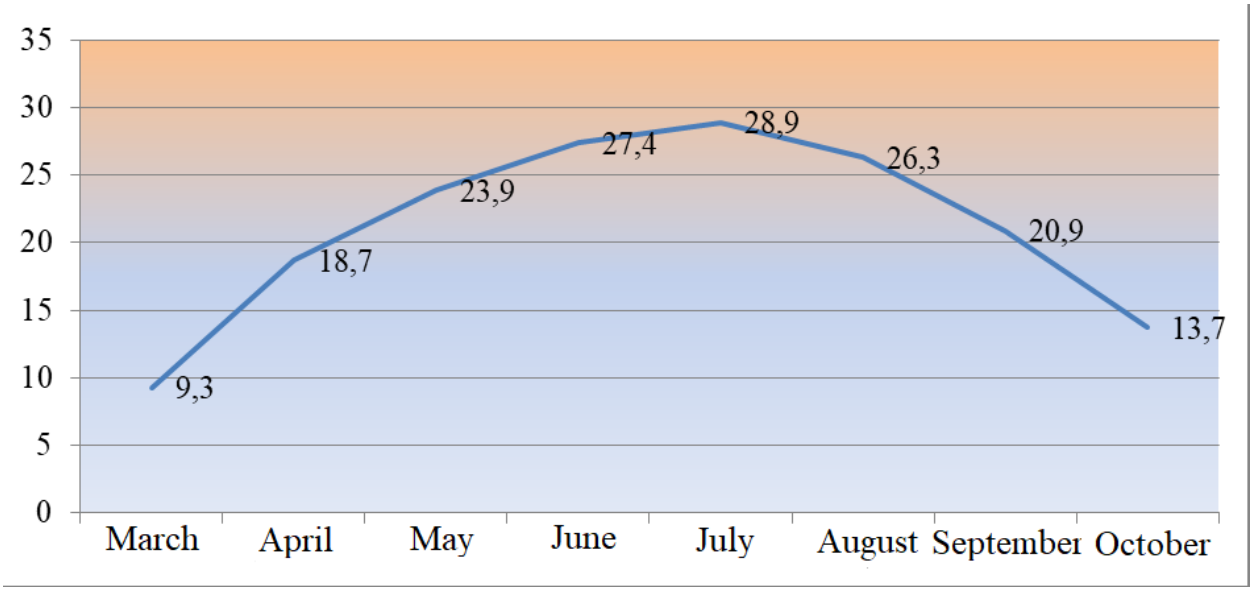


**Figure 3. Average temperature indicators in Namangan region for the period 2000-2022**

The spread, survival and adaptation of all types of plants in the Namangan region are affected by the positive indicator of temperatures during the vegetation period. The sum of positive temperatures during the vetation period, which lasts from March to October in the region, will increase in the next two decades. This indicator changed to +3 +5 $^0$C in summer months and -2-4$^0$C in winter months. Rapid observation of the transformation of soil moisture under the influence of temperature, the presence or distribution of plants in a certain area will not fail to show its effect

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