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SOILS

Заволока К.С. *– здобувач вищої освіти АМН 1/1*

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У статті розглянуто як впливають рослини на грунт. Рослини відіграють важливу роль у розвитку та підтримці родючих ґрунтів. Вони затримують вітрову та водну ерозію. Мінерали виймаються з глибших шарів ґрунту корінням і переміщуються в пагони. Коли коріння та пагони загнивають, мінерали залишаються у верхньому шарі ґрунту. У висновку йдеться мова, що територія може давати урожай протягом одного або декількох років, але потім настільки виснажена корисними копалинами, що не може отримати прибутку, щоб використовувати його для ведення сільського господарства. Якщо такі ґрунти потрібно використовувати, необхідно постійно мати щільний ріст рослин.

The article deals with the essence of how plants affect the soil. Plants play an important role in the development and maintenance of fertile soils. They delay wind and water erosion. Minerals are extracted from the deeper layers of soil by the roots and moved into shoots. When the roots and shoots rot, the minerals remain in the topsoil. The conclusion is that the area can produce for one or more

years, but then is so depleted of minerals that it cannot profit to use it for farming. If such soils are to be used, dense plant growth must be maintained.

Key words: *soil, plants, minerals, land, farming.*

Soils is more than just dirt. Soil is highly complex, constantly changing, affecting the growth and development of plants and in turn affected by plants, both large and microscopic. It has a structure much like that of a cake, in that particles are held together in crumbs, connected by films of moisture, with air spaces in between. In each crumb of soil that you can see with your unaided eye there are rock particles of various sizes, mineral salts dissolved in water held on the surface of the particles, bits of decaying plant and animal material, and thousands of microscopic plants and animals. Many of the rock particles in this crumb are the size of sand, many are smaller than sand and are called silt, and still smaller particles are called clay. All of the factors that have fashioned the face of the earth have contributed to the making of soils.

The uplift of the earths crust formed mountains and offered the exposed rocks to the weathering effects of wind and rain, heat and cold. As the mountains have been leveled by these forces, the rocks have been broken up and washed into the valleys. Glaciers added their grinding force, to shear rocks from the parent stratum, to pulverize them as they carried them along in their frozen undersurface, and finally to deposit the resulting gravel when the ice melted. Ancient lakes and rivers and inland seas, few of which were seen by man, have left the pattern of their terraces and beaches and the deposits of their beds. Erosion and floods continuning into our time have moved quantities of soil from one area to another. The type of rock shown in the the particles of soil may therefore be a mixture of native rock and rock that originated far away, and the soil in your back-yard is the result of the changing topography and climates of yesterday, as well as the climate and topography of today. The particles are only the beginning of the story of the soil. A bucket of wet sand is not a good soil, nor is a bucket of wet silt or clay. If you mix these three together you have a beginning, for a good soil (loam) has a

mixture of various-sized particles. Other ingredients of equal importance would have to be present, however, before a farmer would approve of the mixture for growing plants. The other ingredients necessary to make the mixture a good soil are organic matter, air, and microorganisms. Organic matter makes the soil more porous and increases its air-holding and water-holding capacity. Furthermore, organic matter is a rich storehouse of nutrients for plants growing in the soil, but some of the nutrients would not be available to the green plants without the action of soil bacteria and fungi. These microorganisms feed on the dead material, digesting it and releasing into the soil mineral compounds that can be absorbed by the roots if higher plants.

EFFECT OF PLANTS ON THE SOIL. So far we have been concerned with the contributions of soil to plants. Now let us consider the contributions that the plant cover makes to the soil. During hard rains plants break the fall of raindrops. Their impact is reduced, the soil is not compacted, and splash erosion is retarted. Soils with a good plant cover are porous, hence much of the water enters the ground instead of running off. Trees in a forest shade snow and thereby retard melting. When snow melts gradually, streams flow more evenly. Such evenness of stream flow is beneficial to farmers who depend upon irrigation in July and August, to owners of hydroelectric plants, to trout fishermen, and to cities depending upon rivers for water. We call the process decay. It is part of the never-ending cycle of activity that gives back into the soil the materials used by green plants. And here time plays its role.

Climate, soil, and vegetation are intimately related. Black soils contain a large amount of organic matter, the result of long periods of heavy vegetation. Black soil, subhumid climate, and tall grass go together, and today these three combine to give the rich farm-lands of our contry. Red and gray soils have a sparse amount of organic matter. In nature, light colored, leached soils, a cool, moist climate, and evergreen forests go together, as do brown soils, cool and semiarid climate, and short grass plains. Each soil has three major layers, one above the other. You may see them described in some literature as horizons. The uppermost

layer, the surface or topsoil, is called the A horizon, the middle layer or subsoil, the B horizon, and the weathered material below the subsoil, the C horizon.

Plants play an important role in the development and maintenance of fertile soils. They retard wind and water erosion. Some minerals are taken from deeper layers of soil by roots and moved into the shoots. When roots and shoots decay, the minerals are left in the upper layer of soil. In tropical regions, where the rainfall may be several hundred inches a year, a dense cover of plants is especially important in maintaining soil fertility. As fast as plant debris decays, the liberated minerals are taken up roots and hence can not be leached out by the heavy rains. If such lands are cleared for farming, the minerals are quickly washed out of the soil and the soil becomes impoverished. The area may produce a crop for one or a few years, but then is so exhausted of minerals that it is not profitable to use it for farming. If such soils are to be used, it is necessary to have a dense plant growth at all times.

CHARATERISTICS OF PRODUCTIVE SOIL. A productive soil furnishes plants with the essential minerals in the proper ratio and with a continuous supply of water and oxygen. In addition, a good growing soil is free from such harmful factors as disease organisms, insect pests, and an excess of salts. Such practices as seed treatments and rotation of crops minimize losses due to fungi and insects.

Some seed plants produce chemicals which are injurious to other species. For example, wormwood (Artemisia absinthium) depresses the growth of plants around it. Black walnut (Juglans nigra), guayule (Parthenium argentatum), and brittlebush (Encelia farinose) produce chemicals detrimental to other species in the same soil. In Eucalyptus groves the observer is impressed by the bare soil, which may be partially, if not entirely, due to the influence of chemicals washed out from the fallen leaves and flower buds. The effects of such plants on others has been referred to as chemical warfare among the plants.

The reaction of the soil should be suited to the species which are grown. Soil reaction refers to the degree of acidity or alkalinity of the soil. The pH system is

used to designate soil reactions. The pH is the logarithm of the reciprocal of the hydrogen ion concentration. At pH 7 the soil is neutral. If the pH is less than 7, the soil is acid in reaction, the lower the figure, the more acid the soil. Because pH values are logarithms, a soil with a pH of 5 is ten times as acid as one with a pH of 6. Soils with pH values above 7 are alkaline, and the greater the number, the more alkaline the soil.

Most plants make their best growth at a pH of 6 or 7, but such plants as blueberries, rhododendrons, azaleas, citrus fruits, and African violets prefer a more acid soil, one with a pH of about five.

In some regions, soils are too acid for the best development of crop and garden plants. To make the soils less acid, lime is added. In many parts of the West, soils are too alkaline for the best growth of some crop plants. Such soils may be made neutral by the addition of sulfur or by the incorporation of leaf mold or peat into the soil. It is difficult and expensive to change alkaline soils to neutral or acid soils. In field practice the pH of the soils is not altered, but species and varieties adapted to alkaline soils are selected for culture. For small gardens and for the pot culture of plants, it is feasible to change the soil from an alkaline to a neutral or an acid soil.

SOILS, PLANTS, AND NUTRITION. Animal nutrition begins with the soil. Plants growing on infertile soils have a low mineral content. Animals feeding on such plants may show symptoms of one or another mineral deficiency. For example, phosphorus is often deficient in virgin soils throughout the Atlantic and Gulf Coastal Plains. The phosphorus content of the forage produced on such soils is not sufficient to meet the dietary requirements of cattle. Cobalt, although not required by plants, is essential for animals. If soils are deficient in cobalt, the cobalt content of the forage does not meet the requirements of cattle and sheep. In some areas, the cooper requirements of livestock are not satisfied by forage. Mineral deficiencies of animals may be corrected either by fertilizing the soil or by supplying the animals with minerals.

Human nutrition is also related to soil fertility. Human beings obtain most of their minerals from plant and animal foods. If foods of human beings are deficient in minerals, dietary deficiencies become evident. Increasing attention is being directed to the production of fruits and vegetables to meet dietary requirements as well as to be tasty and attractive.

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