



Radio Marš, Slovenia

THE ORIGIN AND CHARACTERISTICS OF SOIL IN SLOVENIA AND HOW CAN WE ANALYZE SOIL IN OUR GARDEN

When observing nature, we see that good growth and development of plants or other organisms depend on intertwining with different natural factors. They supplement each other and are in coexistence. No matter which species of plant we want to grow in our garden, we must realise the importance of good quality soil, seeds and water source. In today's show we are going to talk about the origin of the soil and why the quality of the soil is so important to produce healthy crops. We will also learn, how can we analyse our garden soil and what can we do to improve it. But in order to understand the important characteristic and functions of the soil, we must first understand the process of soil formation.

Ground is a natural formation of the dynamic coexistence of animate and inanimate nature and is composed of different soil layers. They enable the development and existence of different organisms. They also provide physical support to the plants and represent the source of nutrients and water. Soil contains organic matter and mineral particles that originates from inorganic parent material – rock. Due to this structure, soil presents one of the living habitats of plants and animals, allowing them to perform their life associated processes.

Soil formation is a long process, determined by pedogenic factors like parent material, climate, relief, living organisms and time. Parent material can be a solid rock like limestone or granite, or it can be a deposit of water, glacier, wind or sea, like gravel or sand. Most soil, under different circumstances, develops from its parent material by weathering. Therefore less developed or formed soils have more physical and chemical characteristics of their parent material in the comparison of more developed ones. If we look at the surface of Slovenia we see that 43 percent of its surface is composed of carbonate rocks, of which are 35 percent limestone and 8 percent dolomite. The soil resulting from weathering of carbonate rocks usually has a neutral to alkaline reaction. Such rocks are permeable to water. A smaller proportion, about 12 percent of the Slovenian earth's surface, is composed of silicate rocks that are impermeable to water and give the soil acidic reaction.

No matter if you are a big farmer or a small gardener, we all wish to have good quality soil in which our vegetables will flourish in optimum conditions and will produce high quality yield. So, if we wish

to produce quality food, we must first carry out the analysis of soil in order to find out about its quality. The basic soil analysis can be done at home, while for more complex analysis, such as determination of macronutrients, micronutrients or the exact content of organic matter etc., additional test must be carried out. These complex tests are carried out by specialized laboratories.

Homemade soil analysis is much cheaper and we can find out a lot about the quality of soil in the garden. First, we must take a representative sample of the soil. With a shovel, remove an upper layer of soil in a thickness of five centimetres (about two inches), then take a small sample of soil. Take at least three samples in different places in your garden, to give a total amount of ½ litre of soil. Don't take soil from the edges of your garden. Place the soil in a glass jar and seal it tight. Now we are ready for our soil analysis.

The first characteristic that we are going to examine is the colour of the soil. Take a small amount of soil. If a soil is very dry, soak it in water for one second. Then take a white paper and paint it with soil like you would paint it with colour pencil. Now observe the colour on the paper. If the colour on the paper is dark, then your examined soil contains a lot of humus. If the colour on the paper is bright, then the soil contains less humus and needs to be improved. Give this soil some sort of organic mass, like good quality compost.

The second characteristic is the consistency of the soil. By soil consistency we can estimate soils hardness, porousness and its fertility. Take a piece of soil and tear it in half. Soil with high sand content will be very crumbly. Soil with high silt content will stick to our fingers. And soil with high clay content will be very high in plasticity. Clay soils are compacted and undesirable, so sand, compost or other organic matter must be added.

The third characteristic is the size of rock fragments or skeleton particles in the analysed soil. Take a small sample of soil and sift the soil with your fingers through 2 mm sieve. Look at the remaining hard particles in the sieve. More rock fragments or skeleton particles the sieve contains, more nutrients will be washed out of the soil and will be inaccessible to plants. But also too little skeleton particles in the soil prevent the absorption of nutrients. Nutrients stick to the hard soil and become inaccessible to plants.

You probably heard that pH of the soil is very important soil characteristic. But do we really know the importance of soil pH and what it really refers to? Soil pH generally refers to the degree of soil acidity or alkalinity. It affects the soil's physical, chemical and biological processes and is very important for successful cultivation of vegetable crops and other plants. Soil pH has an effect on microorganisms, on soil structure, allows the decomposition of minerals and makes them available or unavailable to plants. So in other words, if the soil pH values are very alkaline or very acidic, then plants can't absorb nutrients from the soil even though soil contains all necessary nutrients for optimal plant growth. In my opinion, soil pH is one of the most important soil characteristics that every gardener should measure. All you need are pH strips or pH test kit that is also financially very accessible. Microorganisms work best in the range of between 6 and 8; maximum availability of the majority of the nutrients is in the range of between pH 6 and 7. Therefore we wish our soil is neutral (pH of 7). The soil in Slovenia ranges between pH 3.5 and 8. We add limestone sand to acid soils and flint sand to alkaline soil.

Another very important characteristic are soil structure and soil texture. For additional help in determine these properties, you can check the literature published online. Soil structure refers to the arrangement of soil separates into units called soil aggregates. To see soil the structure, gently take a sample of soil and don't squeeze it. Now, examine the soil. Soil in Slovenia mostly contains granular and crumb structural types. Granular structure has very small friable lumps and rounded surfaces. This soil contains a high proportion of organic matter and is also the most desirable soil in our garden. Similar to granular is crumb structure, with rounded surfaces but larger than granular and more edges that reduce its porosity. Very compacted and impermeable soils are blocky and platy soil. There is no columnar structure in Slovenia and prismatic structure is very rare.

The texture of the soil in Slovenia is determined according to soil textural triangle and textural classes, the American textural classification. There are 12 classes of soil texture. The optimum ratio for growing plants is loam. Loam consist somewhere between 8 and 25 percent clay, 28 to 50 percent silt and 25 to 50 percent sand. In determining soil's texture take about one tablespoon of the soil. Slightly wet the sample and shape it into a roll. If we can't create a roll, than we deal with sand or sandy loam soil. If we can create roll, but it breaks up quickly, than we deal with loam, the optimal soil for our garden. Try to create a ring with roll of soil. If you can create a ring and it is compact, unbreakable with slight plasticity, then we deal with clay. Soils with high content of clay are heavy, bulky and moist. Nutrients in this soil are less available to the plants because it sticks to the soil. This soil needs to be improved with the addition of sand and organic matter. It is strongly recommended to add some limestone sand.

Calcium carbonate, which has a significant impact on soil fertility, can also be measured at home. This measurement is accomplished by using 10 percent of hydrogen chloride, which can be purchased in specialized stores for agriculture.

Types of soil in Slovenia

Slovenia is a small country (20.273 km² of surface) with a lot of different soil types which were developed due to the diversity of Slovenia's natural factors. The most common soil types in Slovenia are rendzina soil, brown soil, jerovica soil and peat soil.

Rendzina soil is the most common soil type in Slovenia. They are found in alpine mountain regions of Slovenia, especially on limestone, dolomite and also marl. Such soils are generally shallow, with little organic matter.

The second type of soil is brown soil. Brown soils have different depths and amount of organic mass. This is the soil in which we grow most of our vegetables and other crops. They prevail in most parts of North Eastern and Eastern Slovenia.

Jerovica soil, also known as terra rossa or jerina, is located in the Slovene littoral and karst. Jerovica is a typical red colour soil, named after Italian word for red colour – terra rossa. This soil is very fertile, but has a high content of iron oxides and low capacity of water absorption. In Jerovica soil genuine and well known Slovenian wine Teran is produced.

The fourth type of soil is called peat soil. Peat soil is located near the capital Ljubljana, a region called Ljubljana marshes. Peat is an accumulation of partially decayed vegetation, especially peat moss. Because of high water and an anaerobic environment (lack of oxygen) vegetation didn't decay in humus but rather decayed in black, extremely light weighted soil with acid pH called moss. There are three types of marshes in Slovenia - high marsh, lowland marsh and marsh somewhere in between high and lowland.

It is up to us to decide the quality of soil we are going to use for our garden crops. We must be aware that soil is the primary medium where plants absorb their food in the form of nutrients and, that later on, plants are food which you serve on our plate. Therefore the preparation of soil and the quality of seeds are very important factors. Today there are many books and guidelines on how to collect and store healthy in high quality seeds so you can collect and store seeds by yourself. You don't have to collect the seeds from all species that you grow on your garden but rather join with your gardening friends, neighbours, relatives and exchange different varieties of seeds. You will not depend on large seed houses which they grow their crops under different climate conditions such as we have in Slovenia. And by cultivating your own healthy plant seeds, you will also contribute to the preservation of cultivated plants and make this species available for our future descendants.

Another essential factor of gardening is our gardening method. We must choose the method that will have a positive effect on our health and the production will not jeopardize nature. We must realize that we are not the only ones who have a close contact with soil. Through thoughtless interventions we can do a lot of damage for us humans as well as for all other organisms and the water that comes in contact with soil and plants. If we set up a good gardening plan that leans on the principles of sustainable production and taking into account all the elements on Earth, then the ecosystem will work for us in a benefit of high quality production and not the other way around.

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Seed Guardians of Slovenia, the association to preserve the biodiversity of cultural plants