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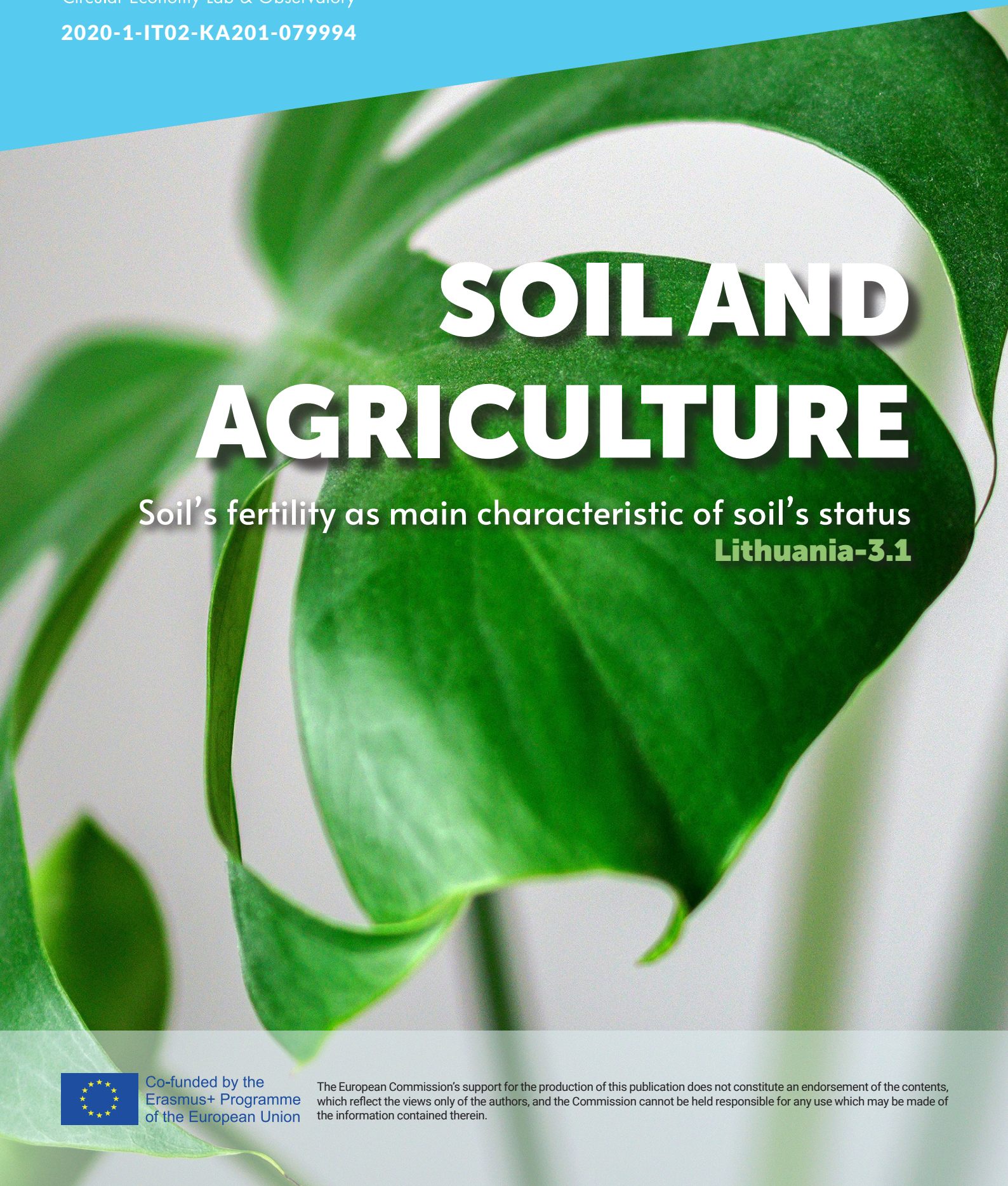

SOIL AND AGRICULTURE

Soil's fertility as main characteristic of soil's status

Lithuania-3.1

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The shift from hunter-gatherer societies to an agrarian way of life drastically changed the course of human history and irreversibly altered natural nutrient cycling within soils. The early use of fire to flush out wild game and to clear forested land provided the first major anthropogenic influence on the environment.

By burning native vegetation, early humans were able to gain access to herbivores grazing on the savanna and in nearby woodlands, and to suppress the growth of less desirable plant species for those easier to forage and eat. These and other factors (e.g., population pressures, climate change, encouraging/protecting desirable plants), help to lay the groundwork for the Agricultural Revolution and caused a dramatic shift in the interactions between humans and the earth.

When humans sowed the first crop seeds at the dawn of the Neolithic Period, the soil provided plant-essential nutrients and served as the foundation for human agriculture. Soil fertility is the ability of the soil to provide plants with mineral substances, moisture, provide their roots with enough air and create a favorable environment for growth. Fertility depends on various soil properties: soil-forming rock, grain size, humus content, humidity, human economic activity.

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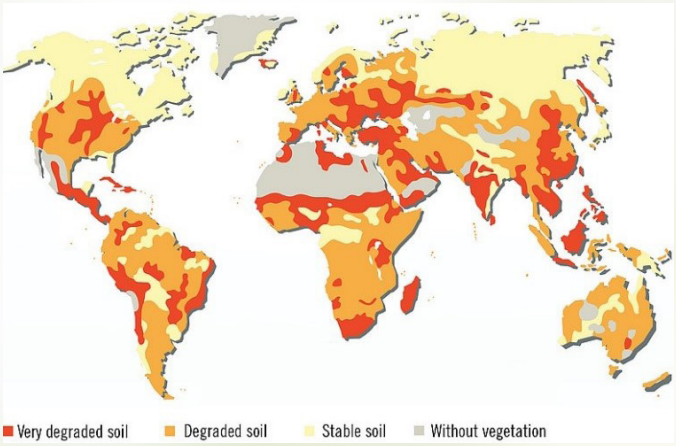
Soil is the upper layer of the Earth's crust, made up of mineral particles, organic matter, air and organisms. It is one of the oldest environmental formations. In addition, soil is one of the main natural resources on which the quality of the environment, food supply, and the country's income depend.

Finally, it is the main production medium in agriculture and forestry. Soil consists of mineral, organic and organic-mineral substances. The source of mineral substances is native rock. Organic matter in soil is of plant and animal origin. Complex organic-mineral compounds are formed due to the mutual interaction of mineral and organic. The mineral part of soils is usually 80-90%, and the organic part is less than 10%.

The organic part of the soil consists of organic remains and humus – dark-colored organic matter that evenly permeates the upper part of the soil horizon. The source of humus is the remains of higher plants, animals and microorganisms.

The loss of soil fertility is an important problem in large areas that have been utilized for agricultural production during the last 20 years. Enhanced concentration, intensification and specialization of crop and livestock production without sufficient consideration of the natural site-specific soil and climate conditions caused pronounced degradation and partly irreversible damage of the soil including such processes as soil compaction, water and wind erosion, water logging, chemical degradation and humus loss.

Advancing food security and environmental sustainability in farming systems requires an integrated soil fertility management approach that maximizes crop production while minimizing the mining of soil nutrient reserves and the degradation of the physical and chemical properties of soil that can lead to land degradation, including soil erosion.



Such soil fertility management practices include the use of fertilizers, organic inputs, crop rotation with legumes and the use of improved germplasm, combined with the knowledge on how to adapt these practices to local conditions.
Soil fertility decline occurs when the quantities of nutrients removed from the soil in harvested products exceed the quantities of nutrients being applied.

In this situation, the nutrient requirements of the crop are met from soil reserves until these reserves cannot meet crop demands.

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Earth's fertility is a non-renewable or finite resource and is the bank of nutrients for plant growth. Most soils in the tropical region including Ethiopia are highly weathered and infertile due to lower organic matter content and open nutrient cycling systems.

These led to soil fertility depletion and crop productivity reduction in the country by different soil degradation agents. Therefore, the objective of this paper is to review soil fertility depletions and its management options under crop production perspectives in Ethiopia.

The major drivers of soil fertility depletion are population pressure, land use pattern, free grazing of animals, lack of energy sources, land ownership and poor government policy problems. The major causes of soil fertility depletion are inadequate fertilizer use, complete removal of crop residues, continuous cropping systems, climate and soil types, lack of proper cropping systems and soil erosion and continuous cultivation.

The promising technologies for improving soil fertility are integrated nutrient management, crop residue management, green manuring and cropping sequences, management of farmyard manure, applications of chemical fertilizers and soil amendments, agroforestry practices, applying conservation agriculture and application of soil-water conservation practices.

Therefore, it needs a great attention by the community and the government to use innovative soil fertility management options to sustain soil fertility and crop productivity for the coming generations in the country, forever enhancing nutrient input and recycling through following closed nutrient management systems in the cultivated lands. Misuse and abuse of soils happens very often.

It is high time for the planners and policy makers to frame laws to protect arable soils from ruination. Many agricultural lands are brought under urbanization or industrialization.

One can find numbers of brick kilns set up on fertile agricultural lands along highways. As these lands are privately owned, the government has practically no control on their use. Forestlands are also brought under urbanization and industrialization. Only about 17.09% of the total land area is under forest cover now.

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A great alternative to improving the soil is growing perennial grasses. As the area of crops increases and livestock on farms decreases, perennial grasses occupy a smaller and smaller share in the structure of agricultural land. Although perennial grasses increase soil fertility, they account for only 27% of land.

The protective function of perennial grasses in soils eroded by wind and water is especially important. The soil structure and humus content are also influenced by the method of tillage. If deep plowing is abandoned, the physical properties of the soil would change, its structure would improve, and more earthworms would appear in the soil.

Also, one of the ways to restore the structure of the soil in the fields is biological preparations that stimulate and intensify microbiological processes in the soil. Biological preparations not only improve the structure of the soil, but are also beneficial for the plants themselves, as they strengthen their immune system, increase their resistance to diseases and pests, especially when used together with the amino acid complex.

In addition, using biological preparations requires less insecticides for plant care.

The introduction of straw is one of the means to increase the amount of organic minerals in the soil, especially in farms of crop production.

Another source of soil organic matter is catch crops.

In the climatic conditions of some countries, during the long autumn and spring period, when positive air temperatures prevail and the soil is saturated with moisture, favorable conditions are created for nutrients to leach into deeper soil layers or drainage waters.

A catch crop left over the winter reduces nitrogen leaching during the autumn-spring period, when there is a large excess of rainfall. The nitrogen stored in the plant biomass during the winter is broken down by microorganisms and released just when the plants can already use it during intensive development.

The source of organic matter can also be manure, sapropel. Manure is the most important organic fertilizer – 4-10% of manure turns into humus in the soil.

Litter manure is the best, and its value depends not only on the number of materials in the litter, but also on the species, age, and feed composition of the animals.

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Sapropel excavated during the cleaning of water bodies can be used to enrich the organic matter of nearby fields, but it should be checked for heavy metal contamination.

Also, governments should promote sustainable agricultural practices, technologies and management in order to improve soil fertility and nutrient management as a whole, such as Integrated Soil Fertility Management (ISFM) and Sustainable Soil Management (SSM).

The International Code of Conduct for the Sustainable Use and Management of Fertilizers promotes practices including nutrient recycling, and agronomic and land management to improve soil health; it recommends regulation related to the sale, distribution and labelling of fertilizer products, wherever appropriate.

It also promotes capacity development and education programs for all stakeholders involved in the fertilizer value chain, and encourages developed countries to assist others in developing infrastructures and capacity to manage fertilizers throughout their life cycle.

All things considered; soil fertility is main characteristic of soil's status. Fertility depends on numerous aspects. Adverse effects of plant growth: Primarily, it affects how arable land is. When unsuitable to support plant life, none will flourish when planted on such soil.

No matter the efforts put in, the garden will yield unfavorable results. Increased desertification: Drought and aridity set in when soil fails to support plant life. Consequently, the desertification process is highly amplified, and previously productive areas become arid. Increased flooding: The soil has less ability to hold water.

More flood instances occur as a result because the land is unable to soak and retain water. Based on this, it is clear how soil fertility can be a sensitive issue when it comes to landscaping. Nothing should be left to chance.

A qualified landscaping company with years experience can save you a great deal by helping your soil maintain its fertility through proper management. Because it is composed of a variety of inorganic minerals and the minority organic minerals that are unevenly distributed, it causes the complication of infertility we have raised.

But it is comprehensible that every problem has a solution by which we can reduce it or eliminate it altogether. By understanding the value of soil fertility, we can avoid related problems as much as possible and continue to take care of our health and the health of others.

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The importance of soil fertility for our survival is very high. Living organisms depend on it. Also, without mentioning other slightly smaller complications like soil pollution, erosion and more, we can strongly claim that soil fertility is the reason for the survival.

There are many cases, often forgotten, perceptions that predate present-day concepts that are accepted as essential for sound management of natural resources such as that of sustainability. The great progress in plant nutrition, which has been observed in recent years, is a result of the achievements in, among other things, sciences such as chemistry, chemical technology, physics, biology, physiology of mineral nutrition, and in the use of modern analytical techniques and using precise research equipment.

New, innovative research methods have revolutionized the possibilities of measurement of plant nutrition processes, from which proper conclusions can be drawn, thus eliminating the errors. The development of studies on mineral plant nutrition results, among other things, from the necessity to increase food production whose goal is to feed approximately 9 billion people by the half of this century.

It is an obligation to the society, and it must be met by, among others, farmers, biologists and chemists. One should agree with the opinion of Arnold Fink, an outstanding German agricultural chemist, that "Scientific theories and hypotheses can be used in agriculture as long as they find confirmation when confronted with nature".

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GROUP
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