



Circular Economy Lab & Observatory

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# SOIL AND AGRICULTURE

Principles of sustainable and smart agriculture  
**Lithuania-3.2**



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Principles of sustainable and smart agriculture

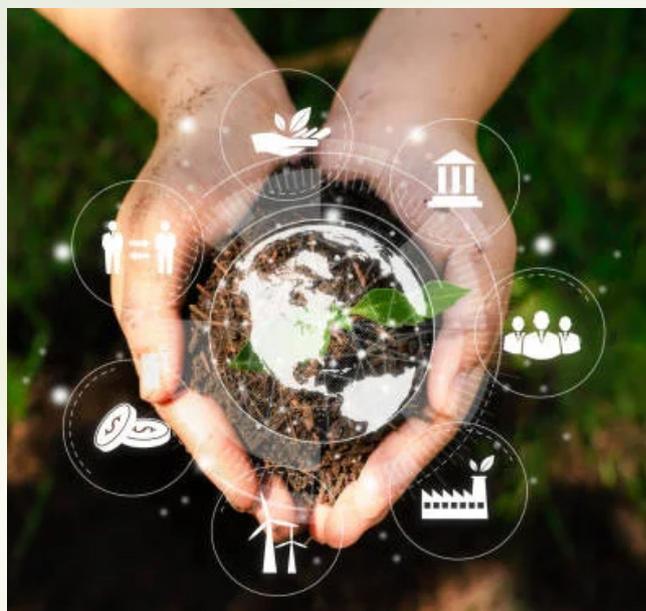
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Soil is the upper loose layer of the Earth's crust that is formed in rocks under the influence of soil-forming factors like living organisms, water, air temperature, and capable of yielding plants. Soil is very important part of agriculture; it helps the nutrients move through the roots into the plants. Soil is classified according to their physical, chemical and biological properties. Soil is divided in six categories: sand, clay, silt, peat, chalk and loam.

**Sand** – This type of structure, having high porosity and low aggregation, does not retain water, so its organic matter content is low. Therefore, this soil is poor and unsuitable for sowing. **Clay** – fine-grained and yellowish in color. This type of soil retains water by forming puddles and when mixed with humus can be suitable for agriculture. **Silt** – fine, soft sediments at the bottom of water bodies and on the surface of the earth.

It is formed due to weathering of rocks, the minerals contained in them, and soil formation processes. Silt is a dense, which is transported and deposited by water, ice, and wind. Rock and mineral particles larger than clay but smaller than sand make up silt.

**Peat** – organic flammable sedimentary rock formed from the remains of swamp that has not completely mineralized due to excess water and lack of oxygen. **Chalk** – sedimentary rock, a soft white variety of limestone composed of the mineral calcite.



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Chalk is formed from the hard calcium carbonate skeletons of microorganisms. When the microorganisms died, their skeletons settled on the bottom of the sea and over time, large layers of chalk were formed. Loam – sedimentary rock, sediment consists of mainly clay-sized particles and siltstone, sand and larger particles.

Very similar to clay. In agriculture, soil health and condition is very important because soil is a nonrenewable agricultural resource that is the basis for food, fiber production and other circular economy resources.



Soils also contribute to biodiversity, are particularly important for carbon storage, and provide many other ecosystem benefits, such as contributing to water regulation and nutrient metabolism. Agricultural land accounts for about 50 percent of the EU area, so good soil condition is extremely important for agriculture. However, soil faces a number of threats, including erosion, degradation and desertification, as well as organic matter loss and biodiversity loss<sup>1</sup>. So, what is the main problems of sustainable and smart agriculture?

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The problems of sustainable and smart agriculture: the most important problem that we face is climate change; climate change is the most important issue that we have to deal with to have sustainable and smart agriculture. Climate change can cause damage to the earth's environment and this is very dangerous, it slows the development of plants, plants can die from non-favorable weather conditions from too frequent heat, rain and we will not get as much harvest as we need to for the economy.

It's hard to imagine sustainable and smart agriculture if the air, water, and soil is polluted and again it comes down to the climate change, when humans pollute the water air and soil, we throw so much garbage into the ocean and land thinking there is no consequences to are actions.



The third is Insufficient communication, if we want to improve sustainable agriculture, students, farmers, politics, residents need to discuss of what exactly do we need to communicate this complex and vital topic in order to instigate change. Towards sustainable and smart agriculture is not just the concern of decision to markers or farmers; it must become the responsibility of each of us.



Village areas depopulation and aging there is a lot of land that we do not use and there just being without purpose. Alternatively, we have too much residence there are so much city's growing the land that could have been good for growing crops has been demolished by new buildings or residents. Lack of innovation and financing to poorer countries around the world there is a lot of country's that won't be able to afford financing to all big and small farms to help them be more eco-friendly. It is actually cheaper to be non-ecofriendly to use cheap products.

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And there's still a lot of farmers who use old mechanisms like old tractor, harvesters because they can't afford new healthier, eco-friendly more sustainable tools, mechanisms and some are oldfashioned that they believe they do not need new stuff because the old one still works.

Let us address another issue that is not talked about.

In Europe we live in self-deception, we do not produce enough food for ourselves. We are completely dependent on imported proteins that are shipped from South and North America.

Every day huge ships arrive at European ports.



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The biggest problem for soil and agriculture is climate change. Transport is an important driver of climate change for the relatively simple reason – fossil fuels are essential for the vehicles that are prevalent today. To reduce this problem, first, we should choose public transport more often or if its possible travel by bicycle or walking.

Second, if you are using your car before driving, check the tire pressure, when the tire pressure of the car decreases by 0.5 bar, fuel consumption increases by 2.5 percent, so avoid driving on improperly inflated tires<sup>2</sup>.

If you are planning on buying a new car instead of choosing high-litre petrol or diesel-powered cars, invest in environmentally friendly electric, hybrid or low-litre economy vehicles. In order to reduce climate pollution, we should also choose renewable energy sources more often, such as solar energy, geothermal energy, wind energy, biofuel energy.



Of course, we should sort and recycle all possible waste in order to minimize the amount of rubbish that ends up in landfills.

Every day, an ordinary person can greatly contribute to the reduction of climate pollution in ways such as turning off light when you do not need it or even better – choosing energy-saving light bulbs, living in a heated house, and an economical heating or water supply system.

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If you live in a house and not in apartment, do not allow rainwater to flow into the sewer pipes, store it in barrels and use it for watering flowers and other garden plants. In addition, climate change is greatly affected by water pollution; water is mostly polluted by industry, cities and transport. If the mineral fertilizers and pesticides are used inappropriately and carelessly in agriculture, it can also pollute water.



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Some of them are carried away by rainwater into streams and lakes, and the conditions for pollution of water bodies are formed. A big problem for water pollution is pollution from ships, especially cargo ships.

Cargo ships can spill oil for many reasons, such as negligence, for example improper maintenance of equipment, or an accident or incident, such as ship collisions, pipeline ruptures or ship breakdowns. Ship pollution affects coastal residents; about 40 percent of Europeans who live up to, 50 kilometers from the sea may have health changes due to sulfur, nitrogen oxides, solid particles, carbon monoxide emissions from ships.

Considering everything – we need to understand the importance of agriculture and the soil to us, because our needs and health depend on them. We can see, that the soil is degrading and its condition is deteriorating due to the inappropriate/intensive application of farming methods, the use of heavy machinery, pollution of the soil with chemicals (such as pesticides, heavy metals, drugs, plastic, etc.).



These factors lead us to climate change. Considering these issues, we believe that each person should start with themselves. We can all start with simple things: changing plastic bags to reusable ones, not taking unnecessary flyers, using reusable dishes, straws, donating clothes we no longer wear, collecting more natural cosmetics, and trying to fix broken electronics instead of throwing them away.

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The less waste we leave behind, the less it will end up in the soil. In addition, the state should support eco-friendly agriculture more, because many farmers choose the cheaper option and pollute the soil without thinking about the damage they cause.

With the use of modern agricultural techniques, it is plowed deeper and the barren layer is brought to the top. In addition, improper plowing increases the spread of weeds, and heavy machinery driving around the fields further compacts the soil. To restore degraded soil it is recommended to use biological preparations that increase its microbiological diversity and activate the processes occurring naturally in it.

It is also suggested to use biological preparations intended for the fight against plant diseases. In addition, the most important thing – using biological preparations does not pollute the environment at all, there is no negative impact on plants, animals and people.

These are soil activators that are created using the same technologies that nature has successfully used for millions of years. However, these methods are more expensive to use for the farmers, so if they get more support from the state, it will be easier for them to adapt and act more sustainably. Overall, if we want to reduce soil pollution and have sustainable agriculture, everyone should take actions and create a better future for ourselves.



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