

Positive Impacts of Land Cover on Sustainable Development

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Generalities

Due to the serious threat of climate change and global warming phenomena, the implementation of good agricultural practices aimed at sustainable agricultural production is urgently required to mitigate the impacts on the planet and as a consequence for living beings, including human beings.

Within this context, maintaining the soils with biodiverse coverage in the productive systems is strictly necessary, with arvenses vegetation and associated crops, which allow a biological exchange between the respective species, causing and maintaining macro, meso and microorganisms in the soil, which ones favoring the assimilation and absorption of nutrients in crops, translating into processes of sustainable agricultural development.

Integrated production systems avoid the high release of greenhouse gases (GHGs), because soils by increasing their levels of organic matter become carbon "sinks" that is, into systems that capture these gases, significantly reducing releasing them into the atmosphere, thus minimizing the effects of climate change and global warming.

Here are the major events that happen in biological systems proposed by some of the major global organizations:

- Organisms and the interactions between them structure the food web of the soil, the energy required for all food webs is generated by primary producers: plants, lichens, mosses, photosynthetic bacteria, and algae that use sunlight to transform carbon dioxide (CO₂) from the atmosphere into carbohydrates. Most organisms depend on primary producers for their energy and nutrients: they are called consumers. (FAO, 2005) [1].
- Respiration is a measure of biological activity integrating the abundance of microbiological life. In addition, it is an indicator of the status of the soil community, which is responsible for accepting and using residues, mineralizing and favoring the availability of nutrients for plants and other organisms, storing nutrients, components shock absorbers to develop a good structure among other important functions. (Cornell University, 2017) [2].
- Just as a human being needs to rest to be healthy and ready to work, rest and rotations are very important to maintaining the health of the soil. But, the amount of rest or nutrition the soil needs is not the same everywhere. Some soils are naturally healthier than others. (USDA, 2015).

Importance of ground covers

Definition

Includes all species of plants and organic materials that cover the earth's crust, including crops, forest and all related.

Soil covers in cultivation

It refers to all species of herbaceous weeds, low growth and of minimal competition with the crop, in addition to all organic materials and harvest residues that must cover the soil for its productive and environmental sustainability.

Methodology for the establishment of a ground cover program

- Comprehensively understand the importance of agro-sustainable systems, involving the positive effects for the subsistence of species and respect for the environment.
- Know in detail the agroecological aspects of the selected arvenses species and simultaneously the cultivation.
- Allow the development of the most appropriate species and only eliminate the most competitive ones that cause negative effects on the crop.
- In addition, increasing the density of the defined species and simultaneously promoting the development of multiple species, and that it has been shown that their biodiversity produces very positive effects on cultivated plantations and on the environment in general.

Benefits of coverage

- Reduction of the impact of laminar erosion, due to reduce the impact of raindrops directly on the ground and in this way the removal of its particles is minor.
- The moisture retention capacity of the soils is increased, due to the infiltration is favored and as a consequence there is less runoff.
- With the ground cover, erosion, mass movements, the volume of sediments in rivers and drainage channels is reduced, avoiding floods and natural disasters in urban areas.
- They favor the filter activity of soils, reducing the contamination of water bodies due to the effect of the use of agrochemicals.
- They significantly reduce the compaction of soils, increasing their porosity, increasing oxygen for better plant development.
- They increase the capacity of the soils to form structure, which favors infiltration, hydraulic conductivity and decreased compaction.
- Increase in the cation exchange capacity of soils and consequently a greater availability of nutrients for crops.
- The presence of humines and humic and fulvic acids is increased as fundamental nutritional contributions for plants (Figure 1).
- Increase in the presence of macro, meso and micro-organisms that participate in the processes of assimilation of nutrients by crops and in general by all plants and animals and their later in the health of human beings.



Figure 1: Features of humines, humic and fulvic acids. Source: Google gallery, 2017.

Soil covers become natural habitats for beneficial insects that help control pests and diseases.

They favor the biotic balance in all ecosystems since the soil cover increases biomass as a fundamental support of natural resources.

They promote a significant increase in the levels of organic carbon (organic matter), which are captured in the soil and in this way the release into the atmosphere of greenhouse gases (GHGs) is reduced.

Reduction in soil temperature, causing a better development of crops and soil organisms, since they reduce the refraction of solar rays.

The presence of weeds promote the development of mycorrhizal fungi.

They improve the capture of atmospheric nitrogen (nitrifying bacteria), especially when the weeds belong to the legume families.

In summary, soil covers provide very favorable conditions for the development and conservation of the biological properties of the soil (soil health), allowing the sustainability of agricultural processes, conservation of biodiversity, reduction of greenhouse gases, and mitigation of climate change and global warming.

Cushions the impact of extreme weather events on soils and the environment in general.

Recommendations for the selection of soil coverage in crops

Depending on the type of crop, creeping, decumbent or short growing species are generally suggested.

Preferably native species already adapted to the environment and hopefully with ease of propagation.

It is suggested that a wide range of species be present in the growing area, which favors biodiversity.

That they have a good soil covering capacity.

Ideally, they do not compete drastically with the crop or that this is minimal in relation to light, water and nutrients.

Not be a host for pests and diseases.

Within the group of weeds there should be a good proportion of atmospheric nitrogen fixing species.

Establishment of cover plants (cover crops) for the purposes of incorporation into the soil

This practice includes the establishment of species called "cover crops", they can be native plants that grow freely, which are simply selected and in other cases systematically planted.

The main objective is to produce large volumes of biomass to incorporate them into the soil at the time of soil preparation, generally in transitory crops and in the case of permanent or semi-permanent crops, said cover plants develop between the furrows or between the crop plants and as they complete their vegetative cycle, then, they are incorporated into the soil or cut and deposited in proximity to the plants. cultivated.

Limitations for the establishment and conservation of ground covers

Lack of regional planning and evaluation of the suitability and potential of soils for different purposes.

Deficiency in the processes of environmental education, agricultural extension and rural development. These processes must be extensive at all levels of society.

Economic, environmental and sustainable analyzes must be carried out to implement a serious coverage program in production systems and development of cover crops, fallow plots to adopt the most convenient one.

Catastrophic projections for the next decades without land cover (FAO, 2017).

If the rate of soil loss due to erosion continues, there would be a total reduction of 10% in potential crop yields by 2050 (FAO, 2017) [3-8]. (Equivalent to 150 million crop production or reduction of 4.5 million ha / year of crops).

Pollution by synthetic fertilizers, especially nitrogenous ones (Emission of N₂O from N-Fertilizer), remains on the soil surface and in groundwater).

Reduction of organic carbon levels, (Organic Matter): Cushions the impact of extreme climatic phenomena on soils and crops, (reduction of erosion, runoff) and favoring the availability of nutrients for plants).

Conclusions and Recommendations

A fundamental change in the conception of conventional agricultural processes is urgently required, adopting the approaches of organic, sustainable, conservation, regeneration, bio-production, clean agriculture, etc.

It is an imperative need to maintain ground cover to guarantee environmental and economic sustainability in agriculture, livestock and in general in all types of projects.

If food production is clean in the field, involving sustainable agricultural practices as a consequence, these processes improve the health of living beings, including animals.

Land cover is one of the ways to mitigate the effects of climate change and global warming.

Favor multivariate agricultural projects with the objective of promoting agro-biodiversity, which, together, allow the conservation of agro-ecosystems and protection of the environment in general.

If we do not think and act with a sustainable vision, in future decades the areas dedicated to monocultures will suffer severe restrictions on their productivity and the associated ecosystems will be increasingly degraded and contaminated due to inappropriate agricultural practices. (Chemical, biological, water, industrial pollution, etc.), which will affect the survival of living beings).

When sustainable agro-productive developments are implemented, pollution of food, air, food, soil and other natural resources can be significantly reduced.

Will it be possible to sacrifice or reduce individual economic benefits in exchange for general and integral contributions to environmental sustainability for the survival of the species in the present and in the future?

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