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MORALITY BEFORE KNOWLEDGE

Carbon farming as a future strategy for climate change: A literature review

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ABSTRACT
Background: This research aims to know about carbon farming and strategies for storing carbon in the soil. **Methods:** The research method used is qualitative data analysis where this method describes the research conducted by the author by collecting data from scientific journals, books, and research journals. **Finding:** Respiration plants absorb carbon dioxide and give off oxygen. However, the balance of plants and humans/animals is now disturbed along with the massive and excessive use of fossil fuels. The result is global warming and uncomfortable conditions and health risks to humans and the planet globally. We are currently paying attention to how carbon dioxide is present in the air due to pollution and industrial waste. Various ways are done, including reducing the consumption of petroleum or fossil fuels. Instead of decreasing, the consumption of fossil fuels has not decreased but has increased along with the pace of industrialization in developing countries. Carbon farming is one method that can be a solution, with the principle that problems are solutions. **Conclusion:** Many strategies for storing carbon in the soil that we already know. As carbon is absorbed by the soil, the health of the soil will improve so that the health of plants will also increase and yields will increase.

KEYWORDS: carbon farming; climate change; literature review; strategy.

1. Introduction

Carbon sequestration is a term used in science to describe the process of storing carbon in a solid and stable state. In other words, the opposite is true for carbon dioxide, which is a gas which is free to fly to a lower pressure and in excess. However, the quantity of carbon dioxide (CO2) building up in the atmosphere has remained constant during this time frame due to the removal of surplus CO2 by oceans, forests, soils, and other ecosystems (Battle et al. in Lal, 2008). Carbon sequestration occurs when plants absorb carbon dioxide gas by converting it into inorganic chemicals such as calcium and magnesium through a chemical process. Photosynthesis is the process through which plants transform carbon dioxide gas into biomass or organic matter. Soil organic carbon (SOC) is absorbed and compacted into the soil through the process of decomposition or decomposition of organic matter from dead plants or plant parts. Although there is debate about how much carbon can be absorbed by soil, it is generally agreed that in agriculture, forestry and conservation can be used to increase the ability of carbon sequestration into soil. Carbon farming is a viable strategy for more sustainable food and production and related products. It aims to produce a variety of natural farming methods as well as

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commercial products at the same time. Carbon farming refers to agricultural practices, including methods, techniques and strategies that aim to increase crop yields while contributing to the capture and sequestration of carbon into the soil. In many ways, this practice benefits farmers. Because with the absorption of carbon by the soil, the health of the soil will increase so that the health of plants will also increase and crop yields will increase. However, changing the paradigm of industrial agriculture into carbon farming practices is not easy, it involves habits, knowledge, access to information and resources, and so on (see Figure 1).

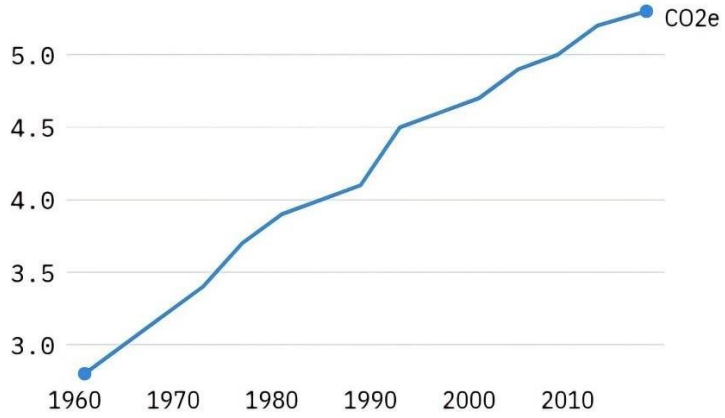

Fig. 1. Global agriculture emissions, gigatonnes, 1961–2015

There is no doubt that carbon is very dangerous, and decarbonization and emission reductions in agriculture are very important. Nature has devised her own set of carbon capture and storage techniques. Agricultural producers can increase soil carbon sequestration capacity through conservation, which helps improve soil health, promotes biodiversity, minimizes erosion, and serves as a flood barrier, all of which help ameliorate climate disasters in the long term.

2. Methods

The writing method used is a literature review which is reviewed from several journals and articles related to the topics taken, namely carbon. Journals are searched through online articles, as well as Google Scholar, which is taken from national journals which are then selected according to the topic to be discussed. The results and discussion discuss the namely carbon farming as a future strategy for climate change. Finally, conclusions and suggestions for the future are explained.

3. Results and Discussion

3.1 Strategies for storing carbon in the soil

The objectives of carbon farming are to (1) increase the amount of biomass in agricultural land, and (2) facilitate the natural decomposition process of plant material to increase soil organic carbon. Organic matter decomposition occurs in the soil in temperate regions, while it happens more quickly above the soil surface in tropical temperatures. (3) Lifestyle changes. The first strategy to achieve the above objectives are as follow.

1. Plant tress

Annual crops, such as vegetables and grains such as rice and corn, are the most important part of our agriculture. Farmers expect fast results and not in a natural cycle but as the basis of a discontinuous linear system. Unlike the short-lived annuals, which dominate our agriculture today, trees can grow large and form enormous amounts of biomass. Trees always produce deciduous and fallen leaves throughout the year which become organic carbon material that is sent to the soil. Planting trees in turn can create green open spaces. Ulfa et al. (in Hardiansyah et al., 2024) define green open space as a blend of natural and human-made elements within urban settings, offering advantages for environmental quality, such as aiding in fulfilling oxygen requirements.

2. Changing perennial plants

Some vegetables, herbs and seeds, as well as beans and legumes, are also sources of flour, which are perennial plants. In this way, farmers no longer carry out a linear cycle but can develop a long-term agricultural cycle. Perennials have minimal tillage requirements and require less upholstery, live longer (thus absorbing more carbon dioxide), produce more biomass, and produce a steady harvest. So this transformation not only changes annual monoculture farming into perennial polycultures, it also changes people's diet and diet. Some types of vegetables and herbs can be converted into perennial vegetables and perennial herbs, so can annual grain food sources be changed, or at least varied, with some legumes and perennial carbohydrate sources. For example, rice is preferred to plant mountain rice which is up to 6 months old, and can grow to a height of 2 meters, or sorghum, jali-jali, barley and varied rice diets with cassava, sweet potato, taro, and other sources of carbohydrates that are good sources of carbohydrates.

3. Plant live mulch or green manure

With mulching and the application of legumes that propagate on the ground as living mulch, we will always get additional carbon that will be stored in the soil, besides we can harvest the work of rhizobium to fix nitrogen and produce crops that can be used by humans or animal feed. By planting cover crops, it also minimizes grafting on the land. Soil nurturing, as mentioned above, has harmed the soil's ability to hold organic carbon, causing it to be released back into the atmosphere. Cover crops are used in the hoe-free farming approach to limit weed competition while allowing organic matter to enter the soil.

4. Changing lifestyle

In the end, carbon farming will change the lifestyle of farmers and farming partners. The rice-based diet will be varied with non-rice staple foods. Rice consumption patterns are also limited because rice is planted once a year and is 6 months old. The use of perennial vegetables and sustainable spices will also change the menu and various recipes. The end result of carbon farming is human health by improving diet and food consumption patterns. Also, carbon farming encompasses various agronomic practices, including alterations in land use and the adoption of technological solutions (McDonald et al., 2021).

5. Composting

Compost is a type of fertilizer that comes from weathering organic matter. Its popularity is increasingly widespread during this pandemic because many millennials are doing gardening at home. Compost popularity is not without reason, it has many benefits. From an economic point of view, composting can save costs because it uses organic waste and has a higher selling value than the original. From an environmental perspective, it can

reduce pollution and the need for land in the landfill. In addition, it can increase soil fertility and improve soil structure and characteristics. Through composting activities, we can reduce more than 50% of waste, and we can reduce greenhouse gases available, but it is also part of positive carbon efforts, often referred to as carbon farming, which is an important requirement for the regenerative cycle of the planet and its contents.

4. Conclusion

Carbon farming is based on the idea that agroforestry methods can be changed from clean carbon emitters to clean carbon sinks. It is a new term for a cultivation practice that extracts carbon dioxide from the atmosphere (where it causes global warming) and converts it in the soil into carbon-based molecules that aid plant growth. Such strategies require the use of proven measures to increase the rate of CO2 emissions from the atmosphere and convert it into plant matter and soil organic matter. Carbon farming can be a solution in reducing carbon dioxide in the air due to pollution and industrial waste and if carbon farming can be applied properly then this can also be one of the strategies used to overcome climate change. Carbon farming has many benefits and goals to be achieved. In summary, the objectives of carbon farming are to: 1) increase the amount of biomass in agricultural land, and 2) facilitate the natural decomposition process of plant material to increase soil organic carbon. In temperate climates the decomposition of organic matter occurs in the soil, while in tropical climates it occurs more rapidly above the soil surface. 3) Lifestyle changes. In achieving this goal, there are several strategies that must be achieved, namely: planting trees, replacing annual crops, planting live mulch or green manure, changing lifestyles.

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