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Carbon Farming: A Farmer-Friendly Tool for Climate Mitigation

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Farmers have been caretakers of the land. But today, rising temperatures, irregular rainfall, prolonged droughts, and unexpected floods are making farming increasingly difficult. In such times, carbon farming offers a practical and farmer-friendly solution that not only protects the climate but also improves soil fertility, crop yields, and farm income. Carbon farming is one of the evolving agricultural methods to cut greenhouse gas emissions. It is a system of agricultural practices specifically designed to capture and store atmospheric carbon dioxide (CO_2) in plants, trees, and soil. Carbon Farming is a new terminology to describe land management practices, both in the agriculture and allied sectors, aimed at uptaking the C out of the air by using soils and living biomass as natural sinks and/or reducing the C emissions towards the atmosphere. It has been proposed as an effective measure to reduce and offset green house gas (GHG) emissions in several countries (Kyriakarakos *et al.*, 2024).

Benefits of carbon farming

Environmental benefits	Socio-economic benefits
Enhances soil Health	Enhances carbon credits
Biodiversity conservation	Indigenous land management
Enhances the functioning of ecosystems	Community development
Improves farm productivity	Increased farm income
Judicious livestock management	Scope for carbon credit market

Farmer friendly components of carbon farming

Conservation Agriculture

- Conservation agriculture, as defined by the United Nations' Food and Agriculture organization (FAO), is "a farming system that promotes maintenance of a permanent soil cover, minimum soil disturbance, and diversification of plant species, thereby enhances the soil carbon content.

Mulching and Crop Residue Recycling – Improves soil organic matter and locks carbon.
Cover Crops and Legumes – Build soil organic matter and prevent soil erosion.

Agroforestry

- Agroforestry that integrates trees in the agricultural landscape is regarded as a strategy for both adaptation and mitigation of climate change. Agroforestry plays an important role in reducing the level of GHG emissions through carbon sequestration.

Composting and organic amendments

- Compost made from organic waste (e.g., plant residue or municipal waste) is frequently used as an organic amendment to improve soil fertility on farms or city landscapes.
- Organic matter amendments have been proposed as a means to enhance soil carbon stocks on degraded soils, particularly under arid climate. Soil organic carbon (SOC) plays a critical role in terrestrial carbon cycling and is central to preserving soil quality.

Bio char

- Biochar is a carbon-rich substance, produced when organic materials, such as agricultural and wood waste, decompose thermally in the absence of oxygen (Ghassemi-Golezani & FarhangiAbriz, 2021). Because it can be made from organically derived fuel, biochar application is an economical and environmentally friendly too (Alam et al., 2020).

Rotational grazing

- Rotational grazing is a method of managing livestock where animals are moved periodically between different pastures or paddocks. This practice allows each section of pasture to rest and regrow which adds carbon thereby, improving soil, plant, and animal health.
- By grazing one area at a time, the remaining pasture can recover, leading to better forage quality and sustainability in farming practices

SWOT analysis of carbon farming

Strength	Weakness	Opportunity	Threat
Enhances soil health and fertility	High initial cost of adoption and implementation	Growing global demand for climate-smart agriculture	Policy uncertainties related to carbon markets
Promotes biodiversity and ecosystem resilience	Requires technical knowledge and training	Potential for government incentives and subsidies	Climate variability affecting carbon sequestration potential
Reduces greenhouse gas emissions	Monitoring and verification of carbon sequestration can be complex	Expansion of carbon credit markets	Market fluctuations in carbon credit prices
Provides additional income through carbon credits and Improves long-term farm productivity	Benefits may take time to become visible	Increased collaboration with NGOs and environmental organizations	Risk of mismanagement or incorrect carbon accounting
Encourages sustainable and regenerative agriculture practices	Limited access to carbon markets for small farmers	Opportunities for rural development and job creation	Lack of awareness among farmers and local communities

Conclusion

Carbon farming offers farmers a practical and profitable pathway to fight climate change while improving their own land productivity. By adopting simple practices like using organic manures, growing cover crops, conserving soil moisture, adding agroforestry, and reducing tillage, farmers can naturally increase soil carbon and enhance soil health. These practices help retain water, improve soil fertility, and increase crop yields—directly benefiting farm income and resilience during droughts or unpredictable weather. At the same time, farmers can earn additional revenue through carbon credit markets, where the carbon they store in soils and vegetation is rewarded financially. Thus, carbon farming not only supports national and global climate goals but also empowers farmers as key contributors to environmental protection. In the long run, embracing carbon farming can secure healthier soils, stable harvests, and sustainable livelihoods for farming communities.

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