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Economics of Carbon Farming and Carbon Credits Market

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Carbon farming is the adoption of agricultural practices to mitigate climate change by removing greenhouse gas emissions (GHG) from the atmosphere, storing it in soils and plant material, and reducing GHG emissions during agricultural production. Farmers adopting such practices can receive soil carbon credits representing the amount of carbon they sequestered in their soils or the GHG emissions they avoided. Intermediaries buy these credits from farmers, aggregate them, and sell them to corporations, nations, and individuals interested in offsetting their GHG emissions. While the potential supply of carbon credits from agriculture can meet the demand, several factors limit farmer enrollment in carbon credit programs. Carbon farming involves upfront costs and potentially lower crop yields in the short run. In the long run, it generates benefits such as increased soil health that can increase yields and farm climate resilience. Carbon farming is only profitable to farmers if the carbon credit payments they receive and long-term soil benefits outweigh their immediate costs and unintended short-term yield reductions. In addition, farmers' decision to adopt carbon farming is affected by the uncertainty in carbon prices, their variation over time and across programs, and the uncertainty of benefits generated by carbon-sequestering and GHG emission-mitigating practices. Other challenges to carbon farming include the difficulty of accurately measuring soil carbon at scale, carbon programmatic requirements to ensure additionality and permanence and avoid leakage, contract design, and land tenure. Opportunities to address these challenges include technological developments in soil carbon measurement, new crop varieties integrated into plant-microbe-soil systems that are optimized for carbon farming and yields, and increased carbon program flexibility to induce higher farmer participation.

What is Carbon Farming?

Carbon farming involves agricultural practices designed specifically to sequester atmospheric carbon dioxide (CO₂) in the soil and vegetation, thereby reducing greenhouse gas emissions. Key practices in carbon farming include regenerative agriculture, cover cropping, no-till farming, agroforestry, composting, and improved grazing management.

The Economics of Carbon Farming Explained

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In recent years, carbon farming has emerged as a crucial practice in the pursuit of sustainable agriculture and climate mitigation. While traditionally viewed through an environmental lens, carbon farming also offers substantial economic benefits for farmers, landowners, and the broader agricultural sector. By understanding and implementing carbon farming strategies, stakeholders can unlock new revenue streams, reduce costs, and enhance long-term farm profitability.

What is a Carbon Credits Market?

A carbon credit market is a trading system where carbon credits are produced, bought, and sold. This type of market allows companies or individuals to purchase carbon credits from entities that reduce or remove greenhouse gas emissions. This market approach creates a balance between greenhouse gas emitters and those whose activities contribute to storing carbon. For example, certain land-use strategies and management approaches often enhance soil carbon. Two kinds of carbon credit markets exist:

- (a) Compliance Carbon Markets, and
- (b) Voluntary Carbon Markets

Financial Incentives: Monetizing Carbon Credits

One of the primary economic benefits of carbon farming lies in the generation and sale of carbon credits. Carbon credits represent verified reductions or removals of greenhouse gases, quantified as one metric ton of CO₂-equivalent emissions per credit. Farmers adopting carbon farming practices can verify and sell these credits on voluntary or compliance carbon markets, creating significant supplemental income. For instance, verified regenerative agriculture projects can sell carbon credits certified by reputable standards such as the Verified Carbon Standard (VCS) or Gold Standard. As the global carbon market expands, the price per carbon credit is likely to rise, enhancing the potential profitability for farmers engaged in carbon farming.

Who are the Key Players in the Agricultural Carbon Credits Markets?

In agriculture, carbon credits are created from projects that aim to remove/reduce greenhouse gas emissions from the atmosphere, such as reforestation and regenerative agriculture efforts, engineered solutions (e.g. combustion of methane emissions from landfills, new solar and wind power plants), and implementation of climate-smart agri-cultural practices (e.g. cover crops, no-till, reduced tillage...etc)²⁷. However, generating a tradable carbon offset in the voluntary carbon credit markets is a complex process that requires detailed protocols, quality checks, certifications, and interventions of third parties in addition to the carbon farmer and the final purchaser:

- **Carbon credit companies:** Carbon credit companies are the carbon credit program generators. These entities create carbon credit projects that growers contract. Each company has its methodologies (e.g., measuring quantifying sequestered carbon), protocols (requirements/rules that a company sets to ensure the quality of its programs), payment structure, and regional coverage.