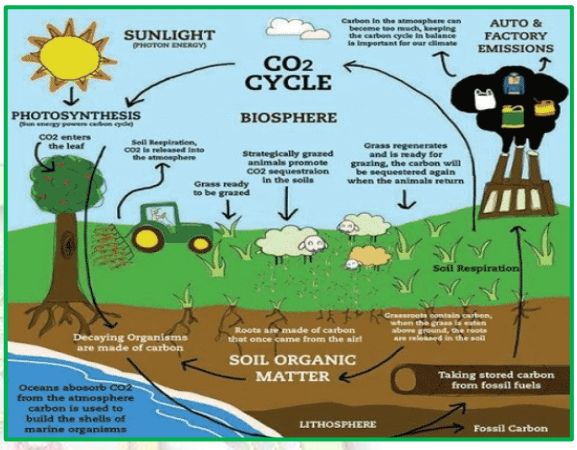
Agri Articles
(e-Magazine for Agricultural Articles)
Volume: 04, Issue: 02 (MAR-APR, 2024)
Available online at http://www.agriarticles.com
©Agri Articles, ISSN: 2582-9882

Agricultural Carbon Credits and Carbon Farming

(*Sheetal Kumawat)
Ph.D. Research Scholar, Department of Agriculture Entomology,
SKN College of Agriculture, Jobner, Rajasthan-303329, India
*Corresponding Author's email: sheetalkumawat24@gmail.com



Overall, carbon credits can play a vital role in incentivizing climate-smart agricultural practices that reduce emissions, enhance carbon sequestration, and promote sustainable land management, thereby contributing to global efforts to mitigate climate change while supporting food security, biodiversity, and rural livelihoods. Plants and crops play a crucial role in the carbon cycle. Cultivating almost any type of plant equates to engaging in small-scale carbon capture. This is because plants utilize carbon dioxide (CO_2) from the atmosphere during photosynthesis. pon the plants' demise, their carbon-based structure initiates decomposition. While some of the CO_2 is emitted back into the atmosphere, a portion remains trapped underground. Grasses and other crops have a rapid capacity to draw down CO_2 from the atmosphere, but they also tend to release it quickly during decomposition. However, with the implementation of proper soil carbon capture techniques and adoption of regenerative agricultural practices, they can effectively sequester CO_2. In carbon farming, carbon can be likened to a harvest akin to the other crops farmers cultivate on their farms or ranches. Agricultural methods offer farmers significant potential to convert carbon sequestration on their land into monetary value through carbon credits.

Methods for Generating Soil-Based Carbon Credits

There are numerous opportunities for creating carbon credits in agriculture. However, before delving into that, let's clarify the concept of soil carbon capture.

Soil Carbon Capture

Soil carbon capture, or sequestration, occurs when plants capture and store atmospheric CO_2 in the soil, thereby increasing soil carbon stocks. When plant matter decomposes, releasing the carbon it contains, some of the captured CO_2 returns to the atmosphere while some remains underground. The duration that carbon remains in the soil before being released back into the atmosphere varies depending on factors such as climate, soil composition, and others. For instance, disrupting soil structure, such as converting forests and grasslands into farmland, can accelerate the release of captured carbon, exacerbating global warming. Conversely, agricultural practices like no-till farming and cover crop planting can slow the rate of soil carbon loss and potentially increase soil carbon levels. The agricultural sector has been buzzing about voluntary carbon markets, where farmers can sell carbon credits to

investors based on the amount of carbon their land sequesters. This market creates new revenue streams for farmers, incentivizing them to transition to sustainable farming practices and adopt regenerative agriculture. On the demand side, companies, governments, and other entities purchase carbon credits for approximately $15–$20 per ton of carbon to offset their emissions and meet their emission reduction goals. This can be done voluntarily as offsets or as part of regulatory markets with emissions reductions mandated by law. While soil carbon capture can be achieved through various methods, some practices have shown remarkable results. Let's first discuss regenerative farming and its potential for earning farmers carbon credits.

Regenerative Farming

Conventional industrial farming practices contribute to global warming and cause significant harm to natural ecosystems. Over-farming, excessive use of chemical inputs, and monoculture cropping degrade water sources, contribute to soil erosion, and destroy habitats, posing a significant threat to biodiversity. Regenerative farming practices aim to restore degraded land to its natural state, allowing ecosystems to store carbon dioxide and use soil as a carbon sink. This approach also promotes wildlife habitat and biodiversity.

Many regenerative farming methods are rooted in traditional farming practices that have been employed for millennia. These include:

- Reducing soil disturbance through no-till farming
- Eliminating synthetic pesticides and fertilizers through methods like mob grazing and composting
- Maximizing soil coverage with living roots and mulching
- Implementing crop rotation to diversify plant species and enhance biodiversity
- Integrating livestock with crops and other plants

By restoring grasslands, peatlands, and implementing cover cropping, carbon can be captured and stored in the soil for extended periods. Moreover, regenerative farming encourages farmers to reduce reliance on government subsidies.

Regenerative Farming and Carbon Credits

As farmers embrace regenerative farming practices, their land transitions from being a net emitter of greenhouse gases (GHGs) to a carbon sink. The reduction or sequestration of CO2 through regenerative farming methods can result in the creation of carbon credits. These credits are generated and brought to market by project developers, who then sell them to companies seeking to offset their emissions while supporting farmers. In return, farmers receive additional revenue for every ton of CO2 reduced or sequestered on their farmlands. However, there's a caveat. Farmers must accurately demonstrate their carbon reduction or sequestration efforts to prevent fraudulent claims. This is where third-party verification comes into play. Independent bodies verify farmers' claims to ensure that genuine reductions or sequestration are occurring. Soil tests and validation of conservation practices through federal crop records and field data are part of carbon credit programs. On the buyer side, investors and companies such as Cargill, JPMorgan Chase, Shopify, and Microsoft are committed to promoting farming practices that regenerate the soil by purchasing carbon credits from farmers. Through various regenerative farming techniques, corporations can invest in improving soil health, increasing farmers' income, and significantly reducing GHG emissions.

Nitrogen Carbon Credits: An Underexplored Concept

Several factors influencing nitrogen or nitrous oxide (N2O) emissions provide opportunities for farmers to adjust their practices and reduce emissions. One approach is to ensure that nitrogen is placed at the correct depth in the soil, such as through no-till farming, to minimize

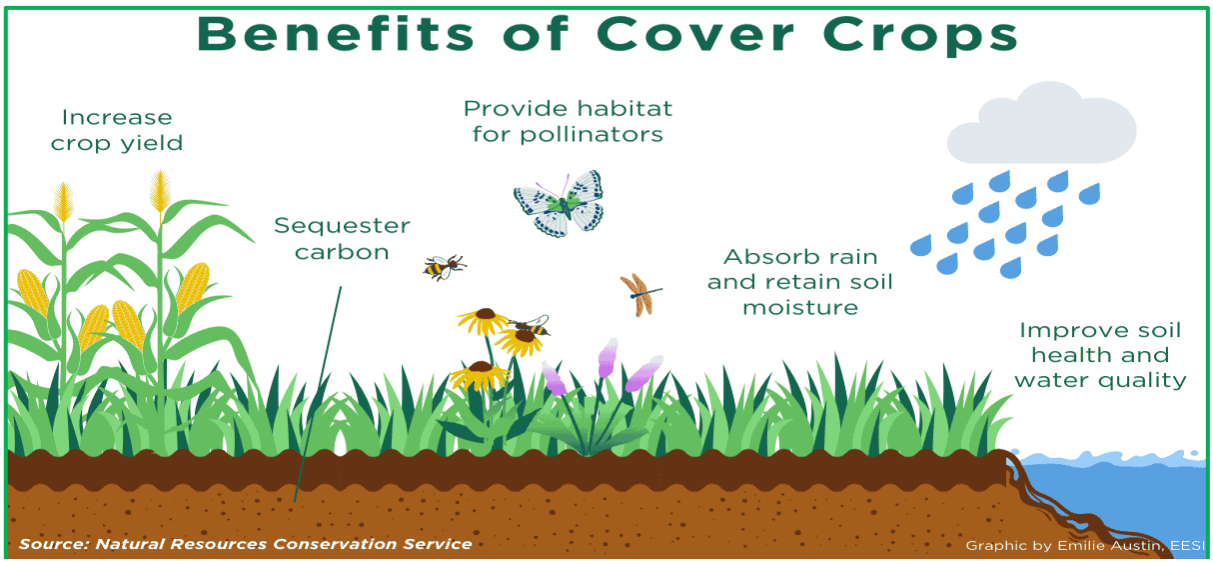
N2O losses and enhance crop growth and yield. No-till farming, a regenerative agricultural practice, reduces N2O emissions by 57% compared to chisel tilling, which mixes crop residue into the soil surface. No-till farming and cover crops, which will be discussed shortly, both contribute to limiting N2O emissions. Given the long lifespan and potent warming effects of nitrogen in the atmosphere, the global warming potential of one ton of N2O is 296 times that of one ton of CO2 emitted. In theory, farmers can adopt no-till and other regenerative farming methods to reduce N2O emissions and quantify the ammount of emissions prevented. Farmers can then sell resulting carbon credits in carbon markets. Carbon emissions trading schemes allow companies to purchase carbon offsets to account for and report those offsets as part of their regulated or voluntary emission reduction targets. A similar approach can be applied when growers use cover crops.

Why Farmers Should Adopt Cover Crops

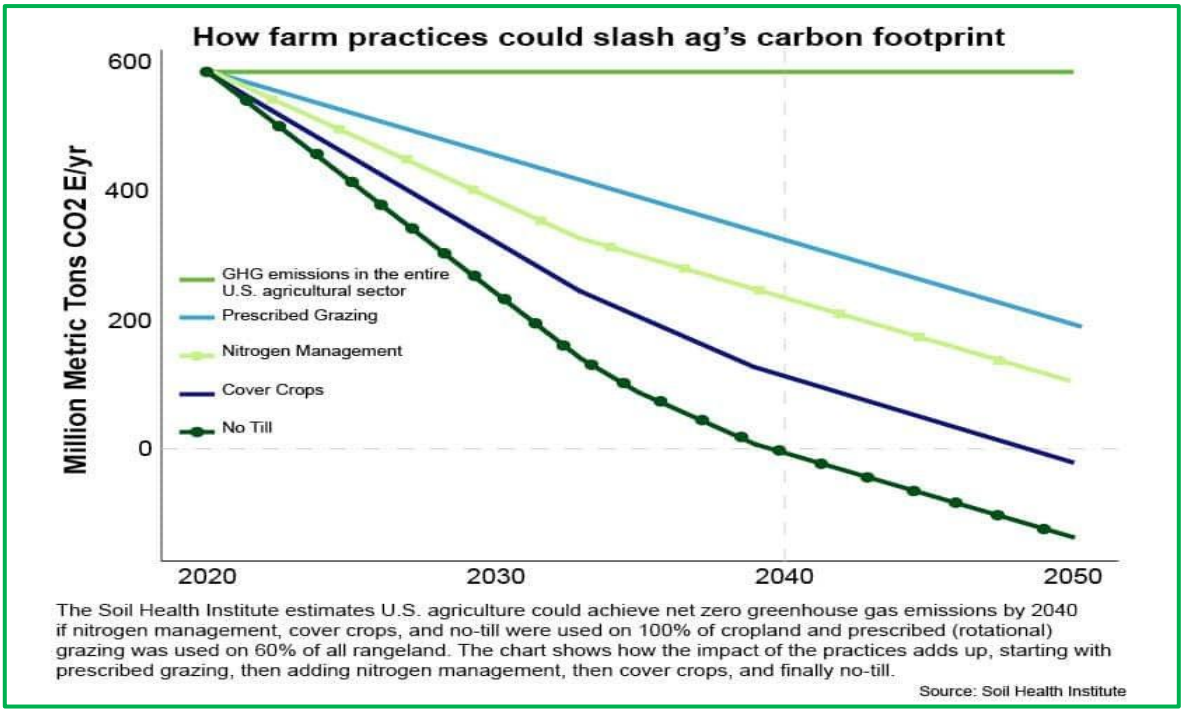
Cover crops, distinct from primary cash crops, are planted without the intent of harvesting. While this may seem counterintuitive, farmers can derive numerous benefits from cover cropping. Cover crops protect soil from erosion, enhance nutrient conditions, and maintain soil integrity against wind, rain, water, and tillage. As the world grapples with climate change, cover crops are increasingly recognized for their role in soil health improvement and carbon sequestration. In fact, cover crops now cover approximately 22 million acres of land, a 43% increase from previous years. Common cover crop examples include barley, oats, legumes, radishes, and rye. While some cover crops may be converted into biofuel or fodder for animals, allowing them to decompose in the soil is optimal for environmental benefits, including carbon sequestration. Therefore, cover crops bolster the capacity of agricultural lands to mitigate carbon emissions.

Potential of Cover Crops for Carbon Credits

Cover crops have significant potential for sequestering carbon dioxide, with 20 million acres capable of capturing 66 million tons of CO2 annually, equivalent to emissions from 13 million vehicles. Combining cover crops with no-till farming enhances this sequestration rate. Farmers adopting cover crops can participate in carbon offset programs, generating additional revenue.



Lawmakers recognize cover crops' role in emissions reduction and have proposed significant funding for land conservation programs. By 2030, 40 to 50 million acres of land are projected for cover crops, sequestering 132–165 million tons of CO2. This presents a market opportunity of $2.6 billion to $3.3 billion, with potential earnings for farmers illustrated in the chart below.



The Current Landscape of Agricultural Carbon Credits Market

The agricultural carbon credits market is dominated by two major players: speculators and pilot project developers. Speculators anticipate significant growth in carbon markets in the coming years. These investors seek to secure contracts for as many acres as possible to trade carbon credits extensively. On the other hand, pilot project developers engage with growers or agribusiness partners, serving as intermediaries between producers and buyers of carbon credits for agricultural projects. Both groups share a common objective of leveraging carbon credits to promote sustainable farming practices while reducing emissions.

Addressing Key Challenges

Agricultural soil carbon capture and sequestration are vital for fighting climate change. However, challenges like measurement and verification persist. To address this, rigorous standards set by international carbon certifiers ensure credibility and transparency. These standards attract investments in regenerative agriculture, supported by technology. Ultimately, markets will establish their own standards for agricultural carbon credits. For more information on carbon credit verification, refer to our article. Explore our ultimate guide for a comprehensive understanding of carbon credits.