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## Carbon Farming: Turning Indian Agriculture into a Climate Solution

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As climate change intensifies, agriculture stands at a crossroads. On one hand, it's highly vulnerable to changing weather patterns. On the other, it contributes significantly to greenhouse gas emissions. But what if farming could become part of the solution?

That's where carbon farming comes in a climate-smart approach that allows farmers to adopt practices that absorb carbon dioxide (CO<sub>2</sub>) from the atmosphere and store it in soil and plants. For Indian agriculture, this not only means contributing to climate action, but also creating a new source of income for farmers through the sale of carbon credits.

### What is Carbon Farming?

Carbon farming refers to a set of agricultural practices designed to sequester atmospheric carbon in the soil and vegetation. These practices either reduce greenhouse gas emissions or increase the carbon stored in the land. Over time, this improves soil health, enhances productivity, and helps mitigate the effects of climate change. Carbon Sequestration is the process of capturing CO<sub>2</sub> from the atmosphere and storing it in soil organic matter, trees, or crop roots. Even modest improvements in soil carbon can significantly reduce the overall carbon footprint of farming.

### Popular Carbon Farming Practices in India

- 1. Agroforestry:** Integrating trees into farmland is one of the most effective ways to store carbon. Native trees like neem, gliricidia, and moringa sequester carbon while also improving biodiversity and offering additional income from timber, fruits, or fodder.
- 2. Conservation Tillage:** Reducing or eliminating ploughing helps retain carbon-rich organic matter in the soil. It also prevents erosion and supports beneficial microbial activity.
- 3. Crop Rotation and Cover Cropping:** Rotating crops and planting cover crops like legumes or green manure during off-seasons improves nitrogen fixation and adds organic matter to the soil, boosting its carbon storage capacity.
- 4. Use of Organic Inputs:** Applying compost, farmyard manure, and **biochar** (a form of charcoal) increases soil carbon while reducing dependency on chemical fertilizers. Biochar, in particular, can lock carbon in the soil for hundreds of years.
- 5. Water-Efficient Irrigation:** Drip and sprinkler systems lower methane emissions, especially in rice paddies. They also conserve water—another essential resource in climate-resilient farming.

### Scientific Backing and Impact

Soil, often called the "second lung of the Earth," holds massive potential for carbon storage. According to the Indian Institute of Soil Science (IISS), Indian soils can sequester 0.5 to 1.5

tonnes of CO<sub>2</sub> equivalent per hectare annually through sustainable practices. One study from IISS (2022) found that long-term adoption of conservation agriculture could increase soil organic carbon levels by 0.15% per year, enhancing productivity while removing greenhouse gases from the air.

### Carbon Credits: A New Income for Farmers

Farmers who follow carbon-sequestering practices can measure and verify the amount of carbon they remove from the atmosphere. This is then converted into **carbon credits**, which can be sold in global or voluntary markets to companies or countries looking to offset their emissions.

- 1 carbon credit = 1 tonne of CO<sub>2</sub> removed or avoided
- Average market price: ₹500 to ₹2,500 per credit (varies by project and region)
- Farmers can group under Farmer Producer Organizations (FPOs) to register their land for credit programs.

Pilot projects in Madhya Pradesh, Odisha, and Maharashtra have already shown that smallholder farmers can earn revenue through verified carbon farming efforts.

### Benefits Beyond Carbon

Carbon farming is not just about earning credits, it brings multiple long-term benefits to the farming system:

| Benefit                  | How it Helps   |
|--------------------------|--|
| Improves soil fertility  | Higher yields, better root health, and nutrient uptake |
| Reduces input costs      | Lower use of chemical fertilizers and pesticides       |
| Enhances water retention | Soil holds more moisture, reducing irrigation needs    |
| Builds resilience        | Crops withstand drought, heat, and floods better       |
| Opens new markets        | Certified sustainable produce fetches premium prices   |

### Government Support and Policy Landscape

India is increasingly promoting **climate-resilient agriculture**. Key policy and institutional supports include:

- **National Mission on Sustainable Agriculture (NMSA)**: Encourages practices that align with carbon farming.
- **Soil Health Card Scheme**: Helps monitor and manage soil organic carbon levels.
- **Carbon Credit Trading Scheme (2023)**: A move towards formalizing India's domestic carbon market.
- **Public-Private Initiatives**: Organizations like ICAR, NABARD, and state departments are working with startups and NGOs to launch pilot projects and training programs.

### Challenges to Address

Despite its potential, carbon farming in India faces several hurdles:

- **Lack of awareness**: Many farmers have limited understanding of climate-smart practices or carbon markets.
- **Complex verification process**: Measuring soil carbon and verifying it through third-party agencies can be expensive.
- **Limited policy clarity**: National carbon pricing and credit policies are still evolving.
- **Fragmented landholdings**: Small farm sizes make individual participation difficult, highlighting the need for community-based approaches.

### Conclusion

Carbon farming is more than a buzzword, it's a powerful tool to turn Indian agriculture into a climate-positive sector. By capturing carbon in the soil, improving productivity, and unlocking new income streams, it offers a pathway for farmers to become part of the climate solution. As India moves toward its net-zero emissions target by 2070, supporting farmers through awareness, incentives, and carbon credit access will be essential. The future of

farming lies not just in growing crops, but in growing carbon-rich, climate-resilient soils that secure our food and our future.

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