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Carbon Sequestration in Indian Agriculture: A Path to Sustainable Development

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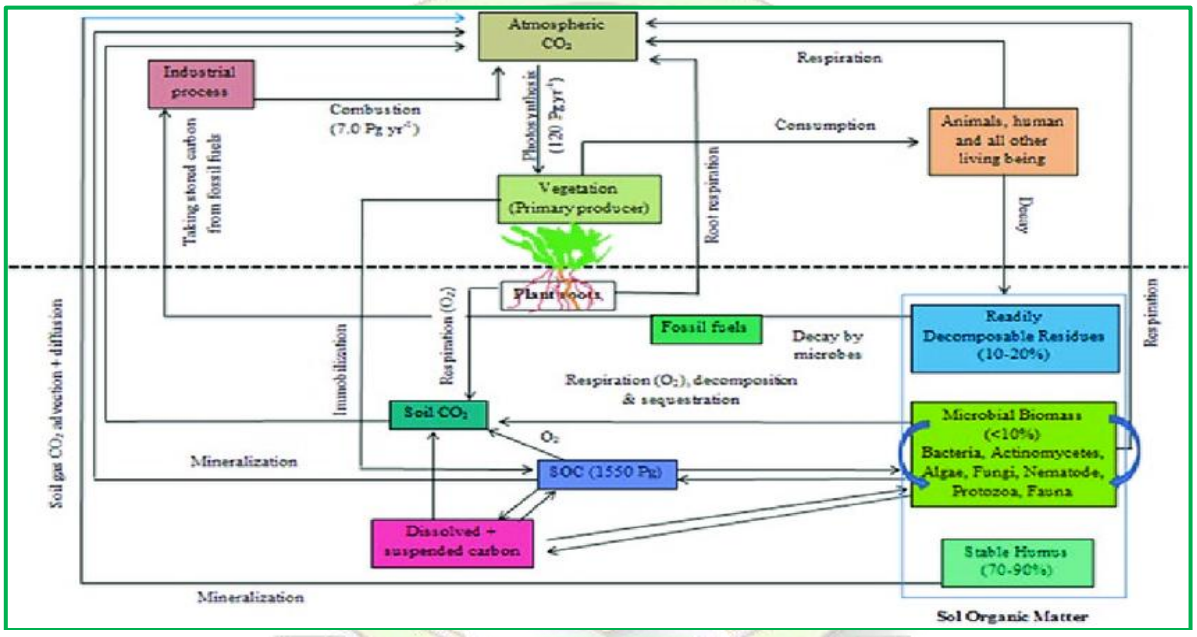
Carbon sequestration is the process of capturing and storing atmospheric carbon dioxide. It is one of the ways countries can help mitigate the effects of climate change1. In the context of agriculture, carbon sequestration involves improving the soil's ability to absorb and hold carbon, thereby reducing the amount of carbon dioxide in the atmosphere1.



Schematic diagram of global Carbon cycle

The Need for Carbon Sequestration in Indian Agriculture

India, with its diverse agro-climatic conditions and extensive agricultural practices, has significant potential for carbon sequestration1. The need for carbon sequestration in Indian agriculture is driven by two main factors. First, to mitigate the effects of climate change by reducing the amount of carbon dioxide in the atmosphere1. Second, to improve soil health and productivity, which in turn can enhance agricultural yield and food security.

Advantages of Carbon Sequestration

Carbon sequestration in agriculture offers several advantages1. It helps in mitigating global warming by reducing greenhouse gas emissions1. It improves the health and fertility of the soil, leading to increased agricultural productivity1. It also aids in maintaining the ecological balance by promoting biodiversity.

Methods of Carbon Sequestration in Indian Agriculture

Several methods can be employed to enhance carbon sequestration in Indian agriculture:

1. **Agroforestry**: Integrating trees into agricultural landscapes can significantly increase carbon sequestration. Trees absorb carbon dioxide for photosynthesis, storing carbon in their biomass and the soil.
2. **Conservation Agriculture:** Practices such as zero tillage, crop rotation, and cover cropping can enhance soil organic carbon content and improve soil health.
3. **Organic Farming:** Use of organic manures and biofertilizers can improve soil fertility and enhance soil carbon sequestration.
4. **Rice Field Management:** Alternate wetting and drying in rice fields can reduce methane emissions, a potent greenhouse gas, and enhance carbon sequestration.
5. **Grassland Management:** Proper management of grasslands, including controlled grazing, can result in increased carbon storage in the soil.

Potential and Cost of Carbon Sequestration in Indian Agriculture

A study analyzed 26 long-term experiments in different agro-climatic zones of India to assess the potential and cost of carbon sequestration. The results showed that in 17 out of 26 long-term experiments, the treatment with recommended N, P, K plus farmyard manure (NPK+FYM) had higher soil organic carbon and also higher net return than that of the recommended N, P, K (NPK) treatment. In the remaining 9 experiments, soil organic carbon sequestration in the NPK+FYM treatment was accomplished with decreased net return, suggesting that these are economically not attractive and farmers have to incur into additional cost to achieve carbon sequestration.

Conclusion

In conclusion, carbon sequestration plays a crucial role in mitigating climate change and enhancing soil health in Indian agriculture. With the right policies and practices, India can significantly contribute to global carbon sequestration goals while also improving its agricultural productivity