

ICAR's study on Climate Change and Unbalanced Fertilizer

Prelims: Current events of national and international importance | Agriculture

Why in news?

A study conducted by the Indian Council of Agricultural Research (ICAR) reveals that climate change and unbalanced fertilizer use are significantly degrading soil organic carbon across India.

- **Coordinated by** - ICAR's Indian Institute of Soil Science in Bhopal, it was started in 2017.

Key Findings

- **Influence on soil** - Organic carbon influences soil chemistry, physics, and biology—critical for soil health.
- **Decline in soil organic carbon** - It found that unscientific fertilizer use & climate change are degrading organic carbon in arable soils.
- **3 factors** - Decide the organic carbon concentration in the soil irrespective of the crops and cropping patterns - temperature, rainfall and elevation.
- **Micronutrient deficiency** - If the organic carbon is low, then the deficiency of micronutrients in the soil is high, and if the organic carbon is high, the deficiency is low.
- **Effect of elevation** - Higher land elevations tend to have greater organic carbon content in the soil, whereas, as the elevation decreases from hills to lowlands, the organic carbon levels also decline.
- **Influence of temperature** - Temperature negatively correlates—hotter regions like Rajasthan and Telangana have less organic carbon.
- Low carbon leads to less heat absorption, more heat reflection & greater greenhouse gas effect.
- **Importance of cropping system** - Rice & pulse-based systems show higher organic carbon due to water use and microbial activity, whereas, wheat & coarse grains correlate with lower organic carbon.

- **Regional trends** - Wherever imbalanced fertilizer application was there, then the organic carbon in the soil had declined.
 - **Haryana, Punjab, Western UP** - High fertilizer use (urea, phosphorus) leads to decline in organic carbon in soil.
 - **Bihar** - Balanced fertilizer use leads to better soil carbon levels.
- **Suggestions** -
 - **'Agri-ecological base' map** - Developed to assess how cropping patterns & fertilizer usage influence soil organic carbon across 20 agro-ecological regions.
 - **Universal Soil Coverage** - Promote cropping and plantation across all soils to enhance organic carbon levels.
 - **Targeted Carbon Sequestration** - In areas with ***less than 0.25%*** soil carbon, governments should promote organic carbon sequestration through improved cropping systems & irrigation.
 - **Carbon credit** - Offer financial incentives to farmers who successfully trap CO₂ & convert it into organic carbon.
 - **Climate-Smart Crop Management** - Develop and promote region-specific crop management strategies for climate change mitigation.

Reference

[The Hindu | ICAR's study - Climate Change and Unbalanced Fertilizer](#)