Towards Viksit Bharat@2047
Technological Innovations and Policy Options for Eastern Region

भाकृअनुप
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Towards Viksit Bharat@2047: Technological Innovations and Policy Options for Eastern Region

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Climate Resilient Agriculture Practice in Rice- Fallow Ecosystems of East India Plateau

Period of Development: 2018 - 2022

Developers:

SK Naik, BK Jha, SS Mali, Rakesh Kumar, Surajit Mondal, Rachana Dubey, KK Rao, JS Mishra

Background:

India's Eastern Hill and Plateau eco-region is a less developed region and, therefore, has a great scope for improvement in food production by adoption of scientific agricultural practices. Therefore, an immediate attention is required for identification of suitable management and to devise practical solution for improving soil quality, water profitability and sustainability of rice fallows system. To enhance crop yields and yield stability of succeeding winter crops after rice, CA is presently being emphasized in rice-fallow system. This calls for precise and accurate assessments on energy and carbon budget of diversified CA-based cropping systems in Eastern Hill and Plateau region. This will facilitate designing of better cooping systems and energy and carbon efficient cropping systems in region.

Description of the technology:

The CA-based crop management practices can address the issues of deteriorating soil health, declining system productivity, water availability and greenhouse gas emissions The present research concludes that climate resilient agriculture practice (conservational agriculture) caused a significant improvement in TSOC both in labile and non-labile carbon fractions that led to an increase in carbon retention efficiency. The practice of conservational agriculture enhanced the very labile C in all of the soil depths and stabilized the SOC as a non-labile recalcitrant fraction in 0-0.30 m soil depth. This has larger implications on the water-stressed Eastern Hill and Plateau region where water availability is a major concern. A cropping system having direct seeded rice (DSR)-mustard blackgram under conservation agriculture was adjudged as the best practice in terms of C-sequestration, C-stabilization, biological activity with higher system productivity, energy use efficiency and reduced carbon footprints. This technology was unique as it was developed for the rice-fallow ecosystems of eastern plateau and hill region of India for the first time. In the Eastern Plateau and Hill regions, where natural resources are fragile and agriculture is heavily reliant on environmental conditions, conservation agriculture-based farming systems will offer a sustainable and climate-resilient alternative. By improving soil health, water conservation, and biodiversity, CAFS supports long-term agricultural productivity and rural livelihoods.

Impact:

This technology was unique as it was developed for the rice-fallow ecosystems of eastern plateau and hill region of India for the first time. In the Eastern Plateau and Hill regions,

where natural resources are fragile and agriculture is heavily reliant on environmental conditions, conservation agriculture-based farming systems will offer a sustainable and climate-resilient alternative. By improving soil health, water conservation, and biodiversity, CAFS supports long-term agricultural productivity and rural livelihoods.

Rice

Mustard

Black gram

Direct seeded rice (DSR)–mustard–black gram under conservation agriculture

Commercial potential:

The technology can be offered through consultancy services or outsourced design to private companies, State Agricultural Department, Development agencies like Millets Mission, RKVY, NGOs, and farmers' groups.

Agro-ecoregions suitability:

Rice fallow areas of India's Eastern Hill and Plateau

Reference:

Naik SK, Mali SS, Jha BK, Kumar R, Mondal S, Mishra JS, Singh AK, Biswas AK, Choudhary AK, Choudhary JS, Hans H, Das A, Babu S, Layek J, Upadhyaya A, Bhatt BP, Chaudhari SK. 2023. Intensification of Rice-Fallow Agroecosystem of South Asia with Oilseeds and Pulses: Impacts on System Productivity, Soil Carbon Dynamics and Energetics. *Sustainability*, 15(2): 1054. https://doi.org/10.3390/su15021054