

TRADITIONAL CROPS: A CLIMATE-SMART APPROACH FOR SUSTAINABLE FOOD PRODUCTION

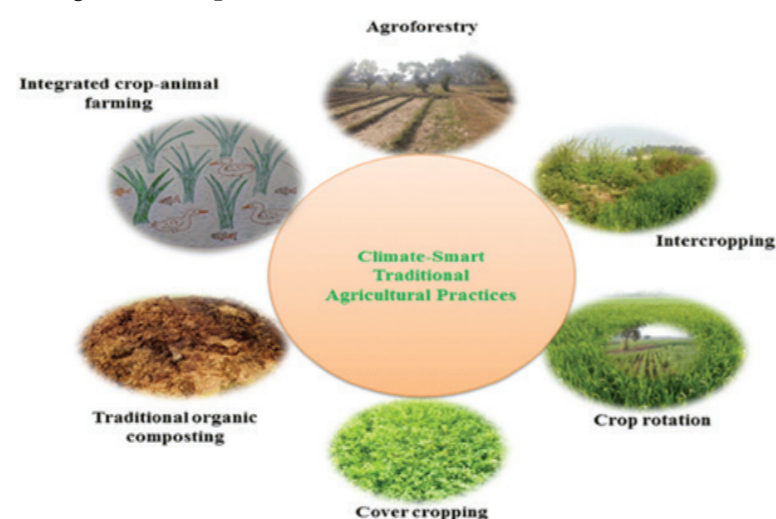
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Sustainable food production is one of the major challenges of the 21st century alongwith global environmental problems such as increasing population, climate change, soil degradation and biodiversity loss. Human-induced changes are major drivers for current climate change and the evidences can be seen through the global warming, glacier melting, sea level rising, ocean acidification, precipitation variability and extreme weather events. Average global temperature is expected to increase through 0.5–8.6 °F by the end of the twenty-first century. Green Revolution though multiplied agricultural production several folds but at the huge environmental cost. Therefore, a climate-smart approach to sustainable food production is the need of hour. Climate-smart agriculture (CSA) is based on the objectives of sustainably enhancing food production, climate adaptation, resilience and reduction in GHGs emission. Agroforestry, intercropping, crop rotation, cover cropping, traditional organic composting and integrated crop-animal farming are prominent traditional agricultural practices.



Climate-smart traditional agricultural practices

Agroforestry

Trees are well-known sink for carbon dioxide through the process of photosynthesis and store excess carbon as biomass. The integration of trees with crops is an age-old practice to exploit the ecological and economic interactions. It is widely adopted as a climate-smart practice due to its potentials for climate change mitigation, adaptation, crop productivity and food security. Trees in fields serve as the windbreaks and shelter belts.

Intercropping

Intercropping, the concurrent cultivation of more than one crop species on the same field. Intercropping reduces the climate-driven crop failure as variety of crops has different climatic adaptability. Legumes make a symbiotic association with rhizobium bacteria that help in nitrogen fixation. Leguminous crops not only reduce the N₂O emission but also enhance the release of mineralizable N-containing compounds in soil.

Crop rotation

Crop rotation refers to the practice of growing a sequence of plant species on the same land. When rice was cultivated in rotation with corn and sweet sorghum in dry season, there was a significant reduction in GHG emission (combined CH₄ and NO₂ in CO₂ equivalent) by 68–78% as compared to double rice cultivation.

Cover cropping

Cover crop refers to the crop that is grown to cover the ground for reducing soil erosion and nutrient loss. They are usually non-cash crops and harvested before planting of the main crops or they can be grown alongside the main crop to provide living mulch. Cover crops can be leguminous (e.g. pea, vetch and clover) or non-leguminous (e.g. rye, sorghum and brassicas). Cover crops are sustainable farming tool that increase SOM and improve soil water dynamics and recognized as the green manure.

Traditional organic composting

Organic composting process begins after putting the organic waste in a pit for several days or months, undergoes microbial degradation that converts organic waste into compost through the thermophilic phase (45–65 °C) that kills numerous pathogenic microorganisms due to release of CO₂, water and heat. It is a low-energy, cost-efficient and sustainable approach to address the issues of soil fertility, waste management and reducing chemical fertilizer inputs.

Integrated crop-animal farming

Rice-fish culture is an important farming practice that increases diversification, intensification, productivity, profitability with sustainable food. After flooding, oxygen is swiftly depleted in the rice fields and this reducing condition promotes the methanogenic process. Fishes raised in the paddy fields obstruct the methanogenic process during their search of feed and consequently mitigating CH₄ emission.

Traditional agriculture can be adopted as an alternative method for sustainable food production in changing climate. Besides mitigating climate change, traditional agriculture is also helpful for human health safety, natural resource management, energy conservation, socio-ecological integrity and enhances agricultural sustainability.