

# SUSTAINABLE AGRICULTURE

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## **Context:**

During the 32nd International Conference of Agricultural Economists held recently, Prime Minister Narendra Modi presented India's sustainable farming as a model for others.

## **Background:**

The transition from conventional farming to sustainable farming happens against the backdrop of growing concerns over changing climate patterns, environmental sustainability and a steadily expanding population.

## **Sustainable Agriculture:**

Sustainable agriculture aims to meet current production demands without compromising future generations' ability to meet their needs, focusing on ecological stability, economic viability, and socio-cultural continuity. The global agricultural sector is transitioning from an intensification-based approach to sustainable and environment-friendly methods.

## **Principles and Objectives of Sustainable Agriculture:**

1. **Increasing Productivity:** Enhance agricultural productivity while reducing reliance on chemical fertilizers and pesticides. Also emphasize water- and energy-efficient production systems alongside higher yields.
2. **Protecting Natural Resources:** Sustainable agriculture prioritizes soil fertility, water management, and reducing greenhouse gas emissions. Agricultural production depends directly on natural resources and therefore the sustainability of production depends on the sustainability of the resources themselves.
3. **Improving livelihoods and fostering inclusive economic growth:** Increasing agricultural incomes is key to reducing poverty and food insecurity in rural areas. Agricultural sustainability can only be achieved if it provides decent employment conditions.
4. **Enhancing the resilience of people, communities and ecosystems:** Build resilience against extreme weather events and market volatility to ensure stable productivity and better market economics. Increased focus on making the various agri-stakeholders resilient to threats, both natural and man-made, would contribute to sustainability.

## **Alignment with Sustainable Development Goals (SDGs):**

Sustainable agriculture supports multiple SDGs, including SDG1 (No Poverty), SDG2 (Zero Hunger), SDG6 (Clean Water and Sanitation), SDG8 (Decent Work and Economic Growth), SDG13 (Climate Action), and SDG15 (Life on Land).

## **Methods of Sustainable Agriculture:**

1. **Organic Farming:** Focuses on ecological balance using natural inputs, promoting soil health, and reducing pollution. While yields may be lower, long-term benefits include improved soil fertility and reduced environmental impact.
2. **Crop Rotation:** Alternating crops on the same land enhances soil fertility, breaks pest cycles, and reduces chemical input reliance.
3. **Agroforestry:** Integrating trees with crops or livestock promotes biodiversity, supplements farmer income, and creates a resilient farming system.
4. **Integrated Pest Management (IPM):** Minimizes pesticide use through biological control, habitat modification, and cultural practices, maintaining ecosystem balance.
5. **Zero Tillage:** Preserves soil structure and enhances fertility by avoiding traditional tillage, reducing erosion, and improving water retention.
6. **Hydroponics and Aquaponics:** Hydroponics uses nutrient-enriched water to grow plants without soil, conserving water and reducing land degradation. Aquaponics combines hydroponics with fish farming, creating a symbiotic system where plants and fish support each other.

### **Challenges to Sustainable Agriculture:**

1. **Climate Change:** Rainfed agriculture in India is vulnerable to climate variability, affecting crop yields and food security.
2. **Population Pressure:** Growing populations increase stress on agricultural systems, making the shift to sustainable methods more challenging.
3. **Lack of Knowledge:** Awareness and adoption of new sustainable practices are limited, requiring enhanced education and outreach.
4. **High Capital Costs:** The initial investment in sustainable agriculture is often high, especially for small and marginal farmers lacking credit access.
5. **Market Access and Post-Harvest Losses:** Inadequate infrastructure and market access lead to post-harvest losses, reducing profitability and hindering sustainable practice adoption.

