

India's Rise as a Global Rice Power– Achievements, Challenges & Way Ahead.

India, a country known for its rich agricultural heritage, has achieved a historic milestone in rice cultivation. With an estimated production of over 149 million tonnes in 2024-25, India has become the world's largest producer of rice, surpassing China. This achievement not only highlights the strength of Indian agriculture but also reflects India's growing influence in global food security.

India's Achievement in Rice Cultivation

India's emergence as the top rice producer and exporter is a remarkable feat considering its population of over 1.4 billion and the dominance of small and marginal farmers in its agrarian structure.

Key achievements include–

1. 149 million tonnes of rice produced in 2024-25
2. Over 40% share in global rice exports since 2012
3. Government stock of 59.5 million tonnes, far above the buffer norms.
4. Expansion of rice-growing area to 51.5 million hectares
5. Rise in average yield from 3.6 to 4.32 tonnes/hectare in a decade

Reasons Behind the Achievement

Several interconnected factors have contributed to this rice revolution–

1. Agricultural Research & Innovation– Development of high-yielding varieties like IR-8, Jaya, and Ratna.

Continuous innovation by Indian research institutions in pest resistance and climate-resilient varieties.

2. Green Revolution Legacy– Building on the 1960s' gains, rice followed wheat in adopting scientific farming methods.

3. Government Policies–

1. Minimum Support Price (MSP) for paddy procurement.
2. Subsidised seeds, fertilisers, electricity, and irrigation.
3. Public distribution system supporting rice growers.

4. Farmer Adaptability– Willingness to adopt new technologies despite landholding constraints.

5. Strong Export Ecosystem– Parboiled and basmati rice exports make India a global player.

Problems in Rice Cultivation in India

Despite these accomplishments, rice farming in India faces significant structural and environmental challenges–

1. Water Inefficiency – Rice is a water-intensive crop requiring 15,000 litres of water per kg, much higher than necessary. 45–50% of irrigation water in India is consumed by paddy fields alone.

2. Groundwater Depletion – Particularly alarming in states like Punjab and Haryana due to excessive flooding and tubewell irrigation.

3. Environmental Impact – Methane emissions from flooded rice fields contribute to greenhouse gases.

4. Climate Vulnerability – Irregular monsoons, heatwaves, and floods are increasingly affecting yields.

5. Soil Degradation & Chemical Use– Over-reliance on fertilisers and pesticides harms long-term soil health.

Sustainable Development Challenges

To ensure long-term food security, India must address the sustainability of rice cultivation.

Key Concerns–

1. Unsustainable use of water in traditional transplantation methods.
2. Soil erosion and reduced biodiversity in mono-cropping systems.
3. Greenhouse gas emissions and carbon footprint of conventional rice farming.

Solutions Through Sustainable Practices

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India has begun implementing alternative, sustainable farming techniques–

- 1. Direct Seeded Rice (DSR)** – Seeds are sown directly in the field instead of transplanting. Saves up to 60% water, reduces methane emission and labour.
- 2. Alternate Wetting and Drying (AWD)**– Fields are allowed to dry intermittently instead of constant flooding. Improves water-use efficiency and decreases GHG emissions.
- 3. Climate-Resilient Varieties**– Use of heat, drought, and flood-tolerant strains developed by ICAR and IRRI.
- 4. Integrated Nutrient & Pest Management**– Balanced fertiliser use and biological pest control over chemical inputs.
- 5. Agri-Tech Integration**– Use of drones, AI-based monitoring, and satellite-based crop health tracking.

Government Measures

To promote sustainable rice production, the Indian government has undertaken several initiatives–

National Food Security Mission (NFSM)– Focus on improving productivity, reducing yield gaps, and promoting sustainable methods.

Pradhan Mantri Krishi Sinchayee Yojana (PMKSY)– Aims at ‘more crop per drop’ through micro-irrigation and better water management.

Soil Health Card Scheme– Encourages balanced fertiliser usage based on soil health diagnostics.

Agri Export Policy– Strengthens India’s position in global trade with infrastructure and logistics support.

Fasal Bima Yojana– Offers insurance coverage to reduce financial risks of crop failure.

Conclusion

India’s success in rice cultivation is a global example of agricultural resilience, innovation, and policy support. However, with rising environmental concerns and water crises looming large, the country must now shift towards climate-smart agriculture and sustainable intensification of rice production. By promoting direct-seeded rice, improving irrigation efficiency, investing in research, and scaling up farmer education, India can ensure not only food security for its own people but also continue to support global markets.

The challenge now lies in transforming the rice revolution into a sustainable green legacy that nurtures both people and the planet.

Main Practice Question (GS Paper III – Agriculture / Environment / Economy)–

1. “India has emerged as the world’s largest rice producer and exporter, yet faces grave sustainability challenges. Examine the factors contributing to its success and critically evaluate the sustainability of its rice cultivation practices.” (30 words)

Answer Guidelines

I. Introduction (Approx. 50 words)

Briefly introduce India’s achievement in rice cultivation–

1. World’s largest producer and exporter of rice.
2. Achieved production of 149 million tonnes (2024-25).
3. Importance in global food security and domestic food grain self-sufficiency.

2. Body

II. Factors Contributing to India’s Success (Approx. 150 words)

A. Technological Innovations – Development of high-yielding varieties (IR-8, Jaya, Ratna). Extensive rice breeding programs and pest-resilient strains.

B. Policy Support – MSP-based procurement and public distribution system. Input subsidies– fertilisers, irrigation, electricity.

C. Farmer Adoption – Small and marginal farmers adopting new technologies. Expansion of rice area– 43.5M ha → 51.5M ha. Productivity growth– 3.6 → 4.32 tonnes/ha.

D. Export Ecosystem – India’s consistent role in global rice markets since 2012. Sustainability Concerns in Rice Cultivation (Approx. 200 words)

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A. Water Overuse – 15,000 litres used to grow 1 kg paddy (vs. optimal 6,000). 45–50% of irrigation water consumed by paddy. Groundwater depletion in Punjab, Haryana.

B. Environmental Issues – Methane emissions from flooded rice fields. Soil degradation due to overuse of chemicals.

C. Climate Vulnerability – Rice yield exposed to monsoon failure, floods, and heatwaves.

Sustainable Practices and Technological Alternatives (Approx. 150 words)

A. Direct Seeded Rice (DSR) – Reduces water use by 30–60%, lowers methane emissions.

B. Alternate Wetting and Drying (AWD) – Intermittent irrigation increases water-use efficiency.

C. Climate-Resilient Varieties – Drought, flood, and heat-tolerant rice breeds.

D. Agri-tech Integration – Use of AI, drones, and satellite monitoring.

Government Measures (Approx. 100 words)

1. NFSM, PMKSY, and Soil Health Card Scheme to improve productivity and water-use efficiency.
2. Fasal Bima Yojana to reduce risk.
3. Export support under Agri Export Policy.
4. Promotion of resource-conserving technologies via extension services.

3. Conclusion (Approx. 50–70 words) – India's rice revolution is a remarkable success but is not sustainable without reform. Transition from volume-centric to sustainability-centric agriculture is critical. With policy incentives and technological adoption, India can continue to lead the world while conserving natural resources.

