

## India's Rice Production Surge and Concerns over Food Security and Sustainability

**Mains:** GS III - Economy| Agriculture

### Why in News?

India recently became the world's largest producer and exporter of rice, which has raised several concerns over food security and sustainability.

### What is the status of production and consumption of rice in India?

- **Production and export** - India is the world's largest producers and exporters of rice, and the crop occupies a central place in the country's food security architecture.
- **Consumption pattern** - Rice is the staple food for nearly 65 per cent of India's population and about half of the global population.
- **Advantages** - Rising rice production has ensured:
  - Availability,
  - Stable buffer stocks, and
  - Export competitiveness.
- **Concerns** - The increase in rice production has also led to persistent challenges related to:
  - groundwater depletion,
  - ecological stress,
  - low productivity,
  - lack of crop diversification, and
  - nutritional concerns.

### What are the historical roots of rice cultivation in India?

- **IVC evidence** - Archaeological evidence suggests that rice was domesticated in the Indian subcontinent as early as the Indus Valley Civilisation (IVC).
- **Earlier beliefs** - It was believed that rice cultivation originated solely in China, but research has challenged this, indicating parallel domestication in different regions.
- **Developmental of local variety** - While rice in China was predominantly a winter crop, rice in the Indus Valley was cultivated during both summer and winter seasons.
- This led to the development of a local rice variety, *Oryza sativa indica*.
- **Varieties in India** - India's rich agro-biodiversity is reflected in the fact that around 60,000 rice varieties have been discovered within the country, out of nearly 1,23,000 varieties globally.
- However, despite this diversity, policy-driven agricultural practices in the post-Green

Revolution period have increasingly favoured a limited number of high-yielding rice varieties.

## What is the status of rice as a staple crop and export commodity?

- **Asian scenario** - Rice is produced largely by Asian countries such as India and China and forms the dietary backbone for a significant share of the population.
- **Categories in India** - In India, rice can be classified into four broad categories:
  - Basmati rice,
  - Non-basmati parboiled rice,
  - Non-basmati white rice, and
  - Broken rice.
- **Exports of non-basmati rice** - In 2024-25, non-basmati rice constituted nearly 70% of India's total rice export volume but contributed only about 48% cent of export value due to its lower unit price compared to premium basmati rice.
- **African scenario** - Countries such as Benin, Côte d'Ivoire, Guinea, Cameroon, and Kenya import more than half of India's parboiled and non-basmati white rice.
- **Neighbouring importers** - Nepal, Bangladesh, and Sri Lanka are also major importers of non-basmati rice.
- **Exports of basmati rice** - In contrast, premium basmati rice is exported mainly to the Middle East, Europe, and the United States, while broken rice is exported to China for animal feed and ethanol production.

## What is the geographical distribution of rice production?

- **Climatic requirements** - Rice cultivation requires hot and humid climatic conditions, abundant water availability, and alluvial soil.
- **Geographical concentration** - River flood plains are among the most productive rice-growing regions.
- In India, rice cultivation is widely dispersed across different river basins and climatic zones.
- The Brahmaputra basin in the north-eastern region records the highest rice cultivation.
- **Eastern India** - The Ganga and Mahanadi river basins exhibit high intensity of rice cultivation, particularly in Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Odisha, Uttar Pradesh, and West Bengal.
- **Southern India** - The delta regions of the Godavari, Krishna, and Cauvery rivers constitute major rice-producing areas, covering Telangana, Andhra Pradesh, Tamil Nadu, and Kerala.
- **Northern states** - Punjab and Haryana are also significant producers, while in Himachal Pradesh and Jammu & Kashmir, low winter temperatures restrict rice cultivation to a shorter seasonal window.

## What are the concerns with rice cultivation?

- **Water Intensity** - Rice is a water-intensive crop, requiring approximately 3,000-4,000 litres of water to produce one kilogram of rice.

- This has resulted in severe over-exploitation of groundwater in many rice-growing regions.
- **Ecological stress** - The expansion of rice cultivation into water-stressed regions has intensified ecological stress.
- **Risk of monoculture** - In 2019, the Food and Agriculture Organisation (FAO) noted that only nine plant species account for 66 % of global crop production and cautioned against excessive reliance on monoculture.
- **Unintentional impacts of green revolution** - In India, paddy and wheat benefitted disproportionately from the Green Revolution, which led to significant production gains but also caused long-term ecological and environmental concerns.

### **Preservation of Subsoil Water Act in 2009**

- To address groundwater depletion, Punjab and Haryana enacted the *Preservation of Subsoil Water Act in 2009*.
- The Act prohibits sowing of paddy seeds before 10 May and transplantation before 10 June to shift irrigation dependence from groundwater to monsoon rainfall.
- However, this intervention created a narrow window between rice harvesting and sowing of the next crop, prompting farmers to resort to stubble burning.
- Consequently, crop residue burning has become a major contributor to seasonal air pollution in northern India.

### **What are the policy measures taken by India?**

- **Food Security and the National Food Security Act** - The enactment of the National Food Security Act (NFSA), 2013 marked a significant shift in India's food security framework.
  - The Act made it legally binding for the government to provide highly subsidised foodgrains to nearly two-thirds of the population through the Targeted Public Distribution System.
  - This includes 75% of the rural population and 50 % of the urban population, amounting to around 81.35 crore beneficiaries.
  - Rice occupies a dominant position in foodgrain allocations under government schemes.
  - In 2025-26, rice accounted for approximately 40.6 million tonnes, or more than 65 per cent, of total foodgrains distributed.
  - As of January 1, 2026, rice stocks in the central pool stood at 63.06 million metric tonnes, significantly higher than the prescribed buffer stock norm of 7.61 million metric tonnes.
  - In addition, about 37.2 million tonnes of rice are required annually to meet NFSA and other welfare programme obligations.
- **Nutrition and Rice Fortification** - While rice ensures calorie security, it does not adequately address micronutrient deficiencies.
  - To tackle issues such as anaemia, the government-initiated pilot projects for rice fortification with iron, folic acid, and vitamin B12 in 2019.
  - This initiative was approved for nationwide implementation by the Union Cabinet in 2022, integrating nutritional objectives into the food security framework.
- **Productivity Constraints and Policy Incentives** - Despite high production volumes, India's average rice yield remains around 2,929 kg per hectare, far below China's yield of nearly 7,100 kg per hectare.

- Nearly 90% of agricultural land is owned by marginal, small, and medium farmers, limiting the scope for mechanisation and productivity enhancement.
- Rice cultivation continues to be encouraged through subsidies on electricity, water, and fertilisers, along with minimum support prices that guarantee returns.
- Some states, such as Chhattisgarh, provide additional bonuses over the MSP.
- While these incentives ensure farmer income security, they also reinforce the dominance of water-intensive rice cultivation.
- **Crop Diversification** - Recognising the ecological stress caused by the paddy-wheat cycle, a committee chaired by economist S S Johl in 1986 recommended diversifying at least 20% of Punjab's cropping area to alternative profitable crops.
- In 2002, it was further recommended that one million hectares of farmland be shifted towards less water-intensive crops.
- More recently, in 2025, the Punjab government introduced a pilot scheme providing ₹17,500 per hectare as financial assistance for paddy-to-maize diversification across six districts, covering 12,000 hectares.
- Despite these measures, crop diversification remains a work in progress, as alternative crops such as maize and ragi often yield lower output per hectare compared to rice.

## What are the climate risks and solutions?

- **Risk to global market** - Climate change and unpredictable weather patterns in South and South-East Asia pose risks to the stability of global rice markets.
- In 2023, India restricted exports of white and broken non-basmati rice due to weak monsoon conditions and domestic demand pressures, leading to a sharp increase in global rice prices.
- **Adoption of sustainable techniques** - To ensure sustainability while maintaining competitiveness, there is a growing emphasis on adopting improved cropping techniques that reduce water consumption and enhance productivity.
- **Climate-resilient practices** - Experts suggest incentivising methods, such as Direct Seeded Rice and encouraging the cultivation of pulses, millets, and other nutrient-rich crops.

## What lies ahead?

- India's rice production surge has played a crucial role in ensuring food security and maintaining large buffer stocks.
- However, it has also intensified challenges related to groundwater depletion, environmental degradation, low productivity, and nutritional outcomes.
- Government interventions—from NFSA and buffer stocking to diversification incentives and rice fortification—reflect ongoing efforts to address these concerns.
- The central challenge lies in reconciling food security objectives with ecological sustainability and long-term agricultural resilience.
- Examining India's rice production trajectory alongside government interventions reveals the complex balance between food security imperatives and sustainability concerns.

## Reference

[The Indian Express| India's Production & Export of Rice](#)

