India’s Rice Production Surge and Concerns over Food Security and Sustainability

Mains: *GS III – Economy| Agriculture*

Why in News?

India recently became the worlds 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 observed rice cultivation originated solely in China have been challenged by research 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]