Q13

What are the major factors responsible for making rice-wheat system a success? In spite of this success how has this system become bane in India?

UPSC Civil Services Mains 2020 · GS III · 15 marks · Indian Economy

Indian Economy and issues relating to planning, mobilization of resources, growth, development and employment.

Core demand of the question

- What are the major factors responsible for making rice-wheat system a success? In spite of this success how has this system become bane in some erstwhile green revolution states?
- Keep the explanation within a 15-mark length

Revision summary

Rice-wheat worked because HYV seed, irrigation, fertiliser, MSP, and procurement aligned.

Punjab-Haryana-western UP became India's grain insurance.

The same incentives mined aquifers with paddy on a semi-arid plain.

Stubble burning, soil nutrient imbalance, and cereal-heavy public buying are the other costs.

Diversification needs price and offtake, not only a technical residue machine.

Introduction

The rice-wheat rotation on the Indo-Gangetic plains, especially Punjab, Haryana, and western Uttar Pradesh, is India's most famous food-security machine. It succeeded because seed, water, price, and procurement lined up. The same lineup became a bane when groundwater, soil, air, and fiscal cost could no longer hide in the yield chart.

Body

Factors that made it a success

- **Semi-dwarf HYV wheat and rice** that responded to fertiliser and irrigation, backed by **ICAR**, State universities, and a public seed chain.
- **Assured irrigation:** Bhakra and later canal commands, then a dense **tube-well** grid powered by cheap or free electricity.
- **Chemical package:** nitrogen-heavy fertiliser, pesticides, and later herbicides that fitted a mechanised calendar.
- **Price and offtake: MSP** plus **FCI / State agency procurement** turned paddy and wheat into quasi-cash crops with a government cheque.
- **Extension and machinery:** tractors, combines, and a rural engineering culture that could sow wheat after a late paddy harvest (including zero-till in some pockets).

• **Public research on the rotation itself:** short-duration rice so wheat still fitted the winter window.

• **Political economy:** surplus States became the granary of **PDS** and buffer stocks, which rewarded the rotation year after year.

How it became a bane in Green Revolution States

• **Groundwater collapse:** paddy is a water-guzzling crop on a semi-arid Punjab-Haryana landscape. Free power and a paddy MSP made mining the aquifer rational for the farmer and lethal for the next decade.

• **Soil fatigue:** rice-wheat-rice-wheat without enough organic matter, micronutrient deficit, zinc and manganese issues, and a **chemical treadmill**.

• **Residue and air:** combine-harvested paddy straw is hard to manage in the short window before wheat; **stubble burning** became a regional air-health crisis for Delhi-NCR as well as the fields.

• **Monoculture risk:** pest shifts, falling water tables, and climate extremes hit a system with little crop diversity.

• **Fiscal and nutritional distortion:** public money buys rice and wheat the country already stores, while oilseeds, pulses, and millets stay under-incentivised - a **C2+50 / MSP** debate that is also a cropping-pattern debate.

• **Labour and social:** migrant labour dependence, then COVID-year shocks; a generation locked to a procurement crop rather than horticulture or industry.

• **Ecological dead-ends:** uranium and other geogenic worries in some Punjab waters, canal-water quality, and loss of indigenous basmati niches to a procurement-grade grain.

Rebalancing without romantic yield-suicide

• Diversification toward **maize, pulses, oilseeds, horticulture**, with **procurement and processing** that actually show up, not only a pamphlet.

• **Direct seeding of rice**, shorter-duration varieties, **Happy Seeder / SMS** for residue, and **electricity/water pricing** that tells the truth about the aquifer.

• **PM-KUSUM** and solarisation must not become a new subsidy to pump the last of the water.

• **MSP plus open-ended paddy procurement** is the political core of the bane; technical fixes without a price signal will leak.

Flow diagram

HYV canal tube-well MSP -> Rice-wheat success

Rice-wheat success -> Groundwater soil air

Rice-wheat success -> Fiscal cereal lock-in

Groundwater soil air -> Bane in GR states

Fiscal cereal lock-in -> Bane in GR states

Diversify residue price -> Rebalance

Conclusion

Rice-wheat succeeded through HYV seed, irrigation, chemicals, MSP, and FCI offtake. In the old Green Revolution States it became a bane by mining groundwater, exhausting soils, burning straw, and locking farmers and the exchequer into two cereals. Success was food in the godown. The bane is water, air, and a future crop map that cannot stay paddy-wheat forever.

Facts & figures

MSP plus FCI

Assured paddy and wheat offtake that made the rotation a commercial certainty in procurement States.

Tube-well paddy

Groundwater irrigation of rice in Punjab-Haryana: high yield, unsustainable draft.

Stubble burning

Post-combine paddy residue practice that feeds winter air pollution in the northwest.

Happy Seeder

In-situ straw management tool; adoption lags when the paddy calendar and labour economics still favour fire.

Crop diversification schemes

State and Union attempts to shift area out of paddy; weak while open-ended paddy purchase continues.