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## *India holds on to its rice as an anxious world looks on*

Climate change has hit rice yields in India. This has become everyone's problem since the South Asian nation is the world's largest rice exporter, accounting for around 40 per cent of the global rice trade.



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Rice production is pegged 3.8 per cent lower at 106.31 million tonnes (MT) against last season's 110.51 MT. PHOTO: REUTERS

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**NEW DELHI** – It is the grain that goes into your crisp dosa. It is also the perfect accompaniment for a delectable Thai curry, and the popular West African dish of jollof would not exist without it.

It is rice we are talking about, the primary staple for more than half the world's population.

So intrinsic is this cereal in parts of South Asia, a key rice-consuming region, that when Bengali speakers want to know if you have eaten, many simply ask, "Bhaat kheyechho?" or "Did you eat rice?"

But our addiction to rice has come at great cost as well as risk.

Yields are failing to keep pace with demand. The soil health and groundwater that nourish our padi are declining rapidly, making farms less fertile and more dependent on agrochemicals.

Virulent outbreaks of pests are further cutting yields. So is climate change. Rising temperatures and droughts shrivel crops, while increasingly frequent downpours wash them away.

India, the world's second-largest rice grower – after China – but also its largest exporter, is especially vulnerable. An El Nino-induced erratic south-west monsoon that ended in October has cut production estimates of key crops, including rice, for the country's 2023 to 2024 growing season.

Rice production is pegged 3.8 per cent lower at 106.31 million tonnes (MT) against last season's 110.51 MT, according to estimates released on Oct 27 by India's Ministry of Agriculture.

Reuters even reported that India's rice output is expected to drop for the first time in eight years in 2023, with some estimates suggesting it could fall by 8 per cent.

## Global impact

This loss in yield is not just a problem for India, whose government must keep a lid on food inflation and feed millions of its hungry people, especially ahead of the country's general election in 2024.

It is a problem with global repercussions. India accounts for around 40 per cent of the global trade in rice, with more than 22 MT being exported in the financial year ending March.

Any decline in rice yield in India, accompanied by restrictions on exports, affects supplies in more than 100 countries that import the grain from India, including Singapore.

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Since India restricted its rice exports, including through a ban on shipments of non-basmati white rice in July, global prices have jumped to a 15-year high, fuelling concerns about food security for billions of rice eaters in Asia and Africa.



Eight of the 10 top destinations for India's rice are African nations that typically import the cheapest non-basmati variety and were the worst hit by the ban. India, however, exempted certain African countries such as Cameroon and Ivory Coast from the ban in October. Other countries granted exemptions include Singapore.

The current episode has revived memories of the 2008 global rice crisis when the global trading price of the grain more than tripled in just four months. It was also triggered by restrictions on exports from India, along with others such as Vietnam, Pakistan and Egypt.

At the vortex of this latest crisis are farmers like Mr Prakash Singh in northern India's Haryana state. The 42-year-old planted padi on his 32.4ha farm in June, but heavy rainfall washed away significant portions of the fledgling crop in July – not once but twice – as the state received 59 per cent excess rainfall that month.

“It seemed as if the clouds had burst. There was water everywhere,” Mr Singh told The Straits Times. The average yield on his farm, in Kurukshetra district's Bachki village, could fall from around 3,500kg per 0.4ha to 2,700kg in 2023.

Rice farmers also faced prolonged dry periods in August, which went down in the records as the driest and warmest month of August for India since 1901.

### Cost of exporting rice



Reuters even reported that India's rice output is expected to drop for the first time in eight years in 2023. PHOTO: REUTERS

But rice is not just a victim of climate change. Its cultivation contributes to global warming and exacts a high toll on the environment.

A water-guzzling crop, it has a vast ecological footprint with the cultivation of each kilogramme of rice needing around 3,000 to 5,000 litres of water. The ongoing annual air pollution crisis in north India is also linked to large-scale mechanised paddy farming with farmers burning crop stubble that is left behind on their farms after harvest.

Rice production releases methane, too, which has 20 times the warming potential of carbon dioxide. It is released as rice is grown in stagnant water that also causes organic matter to decompose. After livestock, padi fields are India's second-biggest source of methane.

India's rice production has grown nearly sixfold since the 1950s. It is an increase driven by the introduction of high-yielding rice varieties, along with heavy reliance on irrigation and agrochemicals, that marked India's Green Revolution.

While the grain feeds millions, rice planting has depleted groundwater, particularly in Punjab and Haryana that produce a significant chunk of the country's rice supply.

In Mr Singh's farm, the groundwater table has dropped from 11m in 2000, when he started farming, to around 40m now. India's north-western region is predicted to experience "critically low" groundwater availability as early as 2025, according to a study cited in a recent United Nations report.

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Such a high ecological cost, which also includes dangerously high pesticide residues in the soil, has led experts to push for reducing padi acreage, even if it means cutting exports.

Mr Devinder Sharma, a food and agricultural policy analyst, told ST that India should impose a permanent ban on the export of non-basmati rice to conserve water. "We need such a ban so that we don't export trillions of litres of water," he said. "In the context of India's food security, I think it is of paramount interest."

Despite its small share in global exports, India is the biggest exporter of virtual water, a term that refers to water contained in exported agricultural food products.

### An 'evergreen' revolution

Projections by the International Rice Research Institute, based in the Philippines, anticipate that rice production needs to increase by 25 per cent in the next 25 years to meet global demand.

But this revolution can no longer be just green. It has to be greener with more efficient use of water, energy and agrochemicals to minimise the environmental footprint of rice, something Indian scientists are working on.

An alternative method of rice-growing that is being promoted is direct seeded rice (DSR), which involves sowing rice directly into a pre-irrigated field. The widespread conventional practice is growing seedlings in a nursery, which are then transplanted into padi fields flooded with ankle-deep water to prevent growth of weeds.

While DSR reduces water consumption, methane emissions and farm labour needs, it is vulnerable to weeds. In 2022, India released two herbicide-tolerant rice varieties suited for DSR cultivation, allowing farmers to control weeds without affecting their rice yield.

“This will take care of one of the major problems with DSR,” said Dr Ashok Kumar Singh, director of the Indian Agricultural Research Institute. He leads a group of scientists who are developing herbicide-tolerant rice varieties.

Rice grown using the DSR method was launched in India in 2023.

Off the field, India’s food export policies need to be tweaked to protect export markets for India’s farmers, something that knee-jerk export bans, such as the one on rice, can destroy.

The Indian Council for Research on International Economic Relations (ICRIER) suggested in a recent policy brief that India, instead of suddenly banning the export of non-basmati rice, could have commenced restrictions with a duty of around 10 to 15 per cent, while gradually increasing it to calibrate the impact on domestic prices.

Sudden policy shifts such as these export bans dent India’s credibility as a reliable food exporter, contradicting claims from Prime Minister Narendra Modi that India could “feed the world”.

India’s rice stocks were at nearly three times its target at the start of August, and on Nov 4, Mr Modi announced the country will extend its free food grains programme, which benefits around 800 million people, by five years. The compulsion to insulate the poor from rising food prices ahead of an election year, along with ongoing climate-risks, means the ban is unlikely to be lifted any time soon.

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Yet export bans offer only short-term, inefficient fixes. In the long run, the government must increase investments in agricultural research and development, which currently stands at merely 0.48 per cent of the agriculture gross domestic product, added the brief from ICRIER.

This is necessary to boost productivity in the face of growing environmental stress and to make India’s rice production, including its exports, sustainable.

“Unless India invests large amounts in agricultural R&D, it cannot generate large surpluses,” said Dr Ashok Gulati, a distinguished professor at ICRIER.

Much of the surplus rice in the country is produced through exploitative farming practices that rely on high state subsidies on power, water and fertiliser. “You rationalise these subsidies, and large surpluses of rice will dramatically come down,” he added.

Every cropping season, the Indian government purchases padi from farmers at lucrative guaranteed prices to stock its granaries. This rice is either distributed free or sold at heavily subsidised rates. Together with subsidies for farmers, this entrenched setup has promoted rice production, including in water-stressed regions of north India where local diets are more wheat-based.

In recent years, the government has tried to diversify crop production by promoting climate-hardier and more nutritious cereals such as millets. But changing diets and farmer preferences that have set in over decades will take time and incentives.

### Looking back for lessons

Solutions to the present crisis, however, do not always have to come from present-day laboratories where scientists are developing high-yielding varieties that are more resistant to climate shocks and pests, as well those that can absorb nutrients more efficiently. Since humans began cultivating rice around 10,000 years ago in China, and then in India, they have developed thousands of varieties, each adapted to grow well in local conditions.

Around 110,000 varieties of rice were grown in India until the 1970s but most disappeared with the push for a few high-yielding ones during the Green Revolution.

According to Dr Debal Deb, who set up Vrihi, a seed bank in eastern India’s Odisha state, this diversity has dwindled to less than 6,000, making the country’s rice production more vulnerable to climate shocks and pest attacks.

Vrihi currently stocks 1,440 rice varieties, including those resistant to droughts, flooding and saline water incursion.

When Cyclone Aila devastated the Sundarbans coast of West Bengal in May 2009, Dr Deb distributed some of Vrihi’s salinity-tolerant rice varieties such as Matla, Lal Getu and Nona Bokra, to a few farmers on island villages there.

In this coastal region where most farmers have long switched to mainstream rice varieties more suited to the inland plains, Vrihi’s varieties were the only ones, he said, that yielded a sizeable amount of grain on the salinated farms in that disastrous season.

“If we have such a wide genetic mixture of different varieties, including ones that are fine-tuned to marginal environmental conditions, we will always find some that will survive severe droughts, sudden flooding or sea water incursion... This is the true meaning of climate resilience.”



Sustainability is indeed key to ensure India meets its domestic rice needs, including for the production of biofuel, in the face of climate change. But as the exporter of more rice than the next three nations combined, India's actions have global ramifications – from access to food for Africa's poor to beloved rice dishes being within reach of the rest of the world.

As recently as Nov 6, at the World Food India 2023 conference in Delhi, the government described India as the “food basket of the world”. But, with its export ban on rice as well as wheat, it is difficult to see how India can lay claim to that tag.

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