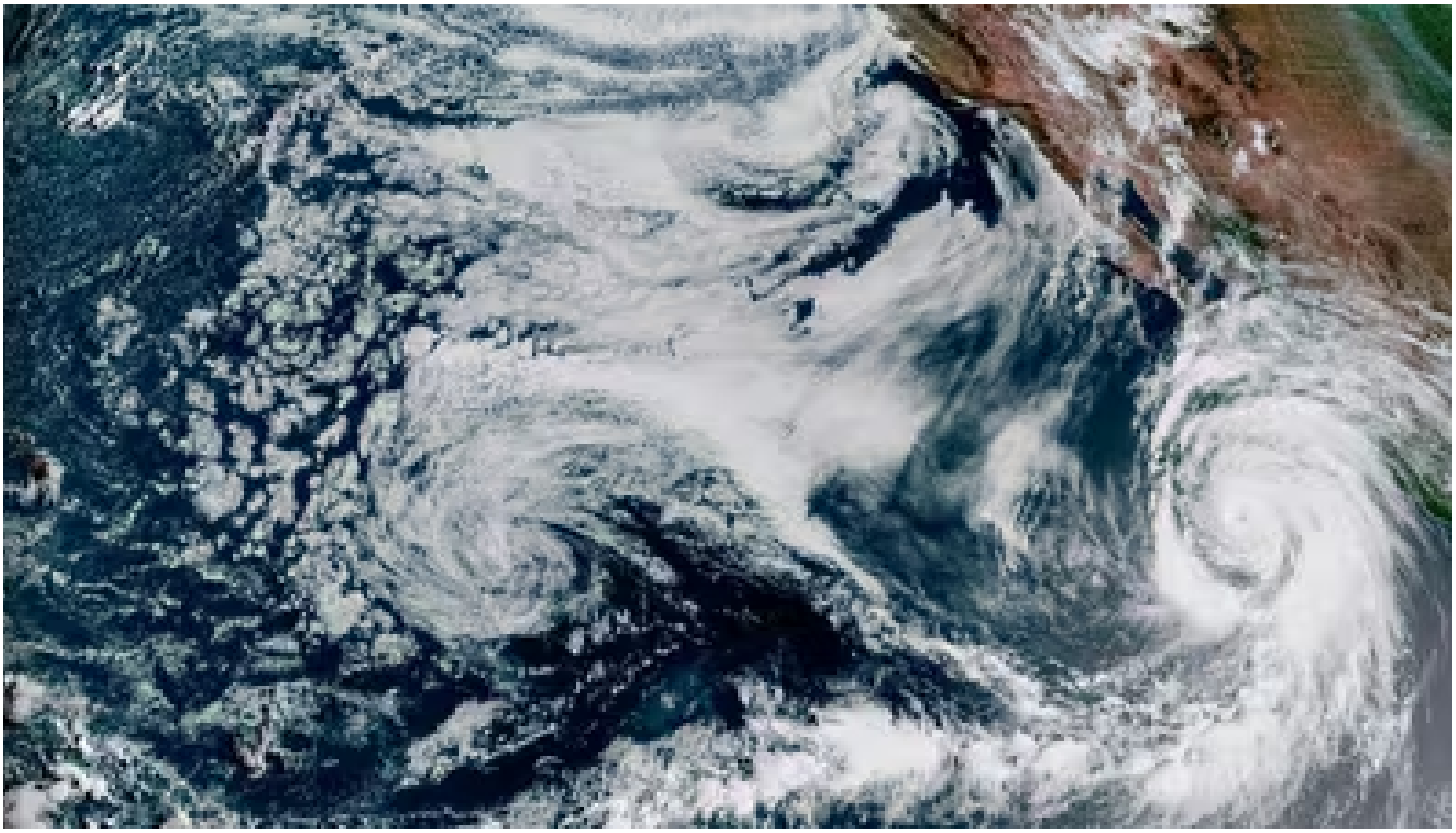
Direct Seeded Rice: Climate-Smart response to El Niño

This article is authored by Simon Wiebusch, chairman, managing director & CEO, Crop Science Division, India, Bangladesh & Sri Lanka, Bayer.

Published on: Jun 24, 2026 3:08 PM IST
By Simon Wiebusch

India's rice farmers have always worked in close rhythm with nature. Today, that rhythm is becoming increasingly unpredictable. Early climate signals point to return of El Niño, a phenomenon that typically weakens monsoon circulation, delays its onset, and brings erratic rainfall punctuated by prolonged dry spells and higher temperatures. For Indian agriculture, where nearly half of cultivated land remains rainfed, even a modest deviation from normal rainfall can have far-reaching consequences.



El Niño (AP)

Forecasts indicate a growing probability of El Niño conditions during the monsoon months, with rainfall expected to be around 92–94% of the long-period average (LPA). For India, even a modest deficit can have significant consequences.

The experience of 2023 offers a preview. According to the India Meteorological Department, the country received about 94% of its LPA rainfall, but the real challenge lay in its uneven

distribution. August, critical for crop growth, was among the driest in over a century. Eastern and central India, the backbone of India's rice production, faced significant deficits, disrupting sowing, and crop establishment. These patterns highlight a crucial shift: climate risk is no longer defined solely by how much rain falls, but increasingly by when and how it is received.

Such variability exposes the vulnerabilities of traditional puddled transplanted rice systems that rely on raising seedlings in nurseries and transplanting them into flooded fields, making it highly dependent on the timely availability of water. When the monsoon is delayed or erratic, land preparation and transplanting are pushed back, narrowing the effective planting window.

These delays have cascading effects. Critical growth stages such as flowering and grain filling are then pushed into hotter parts of the season, increasing exposure to terminal heat stress and ultimately affecting yields. In eastern India, where climatic variability is already pronounced, this can translate into significant production instability.

As climate risks intensify, building resilience in rice systems will require more than incremental changes in farm practices. It will depend on a stronger alignment between improved crop varieties, adaptive agronomy, and integrated crop systems. Given this, Direct Seeded Rice (DSR) is emerging as part of a broader climate-smart approach to farming.

In Direct Seeded Rice, seeds are sown directly into the field, eliminating the need for nurseries and transplanting. This reduces dependence on both water and labour, two resources that are often constrained during erratic monsoon years. Also, the DSR crop matures around seven days early, enabling farmers to plan the rabi crop.

The effectiveness of DSR is closely linked to the use of suitable varieties and hybrids. Crops bred for early vigour, rapid root development, and weed competitiveness perform significantly better under direct seeding conditions. This highlights the importance of aligning breeding with agronomy to deliver consistent outcomes under climate stress.

While reducing water usage by 30–40%, DSR allows farmers to establish crops using available soil moisture, rather than waiting for fields to be fully flooded. This enables timely sowing, a critical factor in safeguarding yields.

DSR also helps in managing yield risk. While yields may be comparable to transplanted systems under normal conditions, in El Niño years DSR helps farmers avoid major losses by reducing exposure to delayed planting and late-season heat stress. Flexibility is another

major advantage. In uncertain monsoon conditions, DSR allows farmers to act quickly on early rainfall events rather than waiting for full monsoon establishment or canal water supply. This shift from reactive to proactive decision-making is crucial in a climate-uncertain environment.

An integrated, risk-mitigation approach to DSR can significantly ease the transition for farmers. Systems must enable farmers to adopt DSR with greater confidence and help address key challenges including weed management and crop establishment, while ensuring that productivity is not compromised. In doing so, it can reduce the perceived risks that often deter farmers from shifting away from traditional puddled transplanting methods.

Beyond individual farm benefits, such an approach aligns closely with global priorities around climate-smart agriculture. Improving water-use efficiency and lowering methane emissions are critical for both adaptation and mitigation, and DSR offers a viable pathway to achieve these goals. Its relevance is especially pronounced in regions like eastern India, where farmers frequently contend with irregular rainfall and delayed irrigation despite adequate groundwater levels. Labour efficiency further strengthens the case. DSR reduces labour requirements by up to 50%, enabling not only faster and more efficient crop establishment, but also overall reduction in cost of cultivation.

Beyond immediate productivity gains, DSR also contributes to long-term sustainability. By eliminating repeated puddling, it helps preserve soil structure and improve soil health while reducing methane emissions.

As climate variability becomes the norm, El Niño is no longer an occasional disruption but part of a broader pattern of uncertainty. The lessons from recent years underscore a simple truth: Water, labour, and time are becoming increasingly constrained.

(The views expressed are personal)

This article is authored by Simon Wiebusch, chairman, managing director & CEO, Crop Science Division, India, Bangladesh & Sri Lanka, Bayer.