



# **CONTINENT-WISE IMPACT – SUPER EL NIÑO EFFECTS ON AGRICULTURE IN 2024**

## **What is El Nino?**

El Niño is a natural climate phenomenon wherein surface waters of the Central and Eastern Pacific become unusually warm, leading to changes in weather patterns globally. This phenomenon occurs every 2-7 years, persisting for 9-12 months each time.

## **Purpose of the Report:**

This report aims to capitalise on the unique slow onset, periodic nature, and predictability of El Niño. By providing a lead time of a few months, it enables the design of anticipatory policies and facilitates emergency preparedness for individuals and companies involved in the farm sector.

## **Usefulness for Farm Support Chemical Companies:**

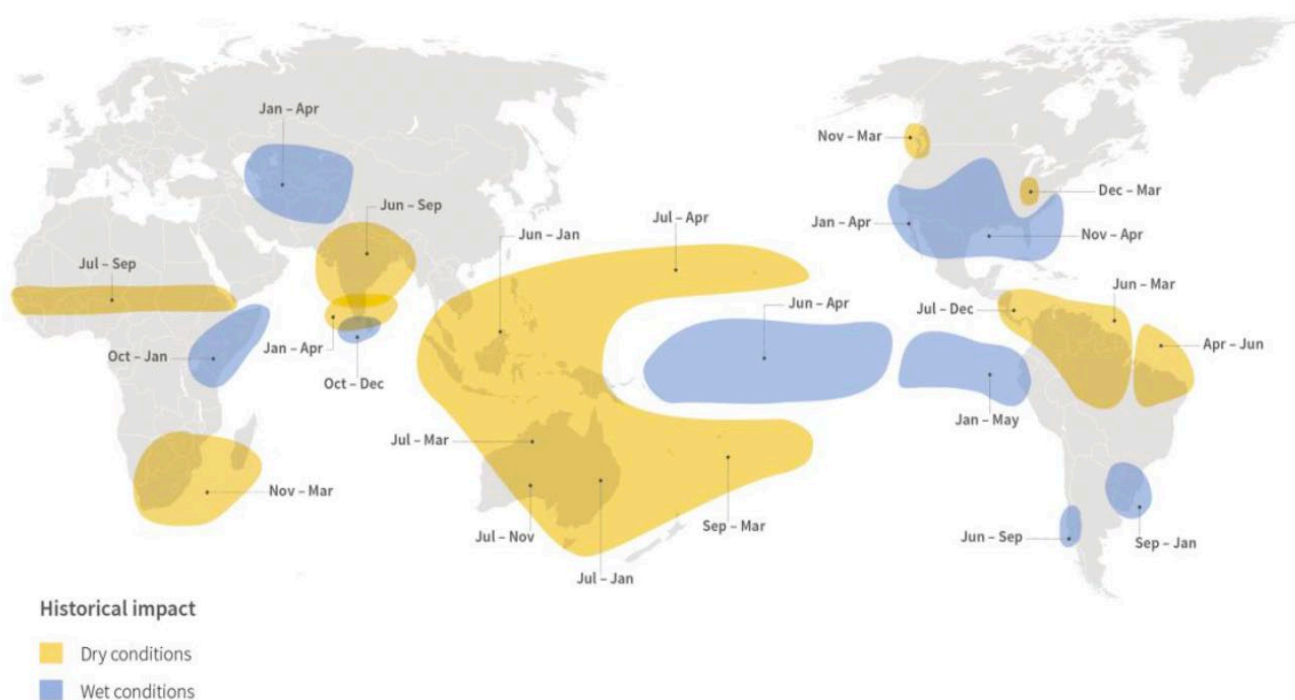
Fertilizer usage is directly influenced by soil and moisture levels, whether due to excess rainfall or efficient irrigation. Furthermore, drought conditions in the previous year can impact farmers' ability to invest in chemical fertilizers for the following year. These costs can constitute a significant portion, ranging from 15-20% of total farm expenses in some cases. By understanding rainfall distribution, companies specialising in farm products can regulate production and inventory distribution, leading to a substantial reduction in lead times and associated costs.

## **The major regions globally likely to be affected are as below:**

- **Less Than Average Rainfall**
  - Central America
  - The Caribbean
  - Northern South America
  - Parts of Western and Northeastern Africa
  - Southern Africa
  - India
  - Northern China
  - Australia
- **Excess Rainfall Regions**
  - Central Asia
  - Southern North America
  - South-Eastern South America
  - Southern Europe
  - Eastern and Southern East Africa
  - Southern and Eastern China

Region	Below Normal Rainfall	Above Normal Rainfall
Asia Pacific	Bangladesh, Cambodia, Lao People's Democratic Republic, Timor-Leste, Vietnam, The Philippines, and Papua New Guinea	Fiji
Southern Africa	Madagascar, Malawi, Mozambique and Zimbabwe	
Latin America and the Caribbean	The Pluractional State of Bolivia, Colombia, El Salvador, Guatemala, Honduras, Nicaragua, Peru and the Bolivarian Republic of Venezuela	Ecuador
East Africa		Ethiopia (eastern), Kenya, Somalia and Uganda (southern)

Figure 1. Historical El Niño trends.



**Source:** Columbia Climate School International Research Institute for Climate and Society. 2023. El Niño and rainfall. In: *ENSO Resources*. [Cited 3 August 2023]. <https://iri.columbia.edu/our-expertise/climate/enso/>

## **East Africa:**

El Niño-induced above-average rainfall could support the recovery from the ongoing drought conditions experienced in the region, improving crop and livestock production. However, such rains can also result in heavy rainfall episodes, flooding, and landslides, especially in eastern Ethiopia, Kenya, Somalia, and southern Uganda.

June to September rainfall tends to be suppressed in western and northern areas during El Niño years. During the 2023 season through early August, areas in Ethiopia, South Sudan, Uganda, Rwanda, Kenya, and southern Somalia received below-average rainfall. Poor yield outcomes are expected for Long Rains cereals in parts of the region.

Compared to the 2015 El Niño drought, rainfall conditions are much better across the region, but highly above-average temperatures are a cause for concern, particularly regarding crop stress during dry spells, extreme high temperatures in northern areas, and accelerated drying of pastoral resources in the eastern Horn.

## **Asia And Pacific:**

El Niño has contrasting impacts across Asia and the Pacific. It can bring both too much rain and too little to the region. Historically, and depending on the strength of the El Niño, sub-regions face the following conditions:

- Southeast Asia: drier conditions and heightened typhoon activity
- South Asia: a mix of both drier and wet conditions depending on the time of year and geography
- Pacific Islands: located in the epicenter of El Niño, the region experiences all key climatic forms of the event. Fiji, Samoa, Palau, Papua New Guinea, the Marshall Islands, and the Federated States of Micronesia can experience drier conditions
- Conversely, the Solomon Islands, Vanuatu, Tuvalu, and Kiribati can experience much wetter conditions. Overall, the sub-region can also experience heightened cyclone activity

## **India:**

Deficient rainfall is prevalent in Northwestern plains, Central India, and Eastern India, while Northern India, the Southern Peninsula, and Western Arid regions experience excess rainfall.

In the Northwestern plains, where irrigation waters from the river system are abundant, the impact of lower rainfall is mitigated. However, excess rainfall in hills and drier regions can adversely affect crops. In areas of Central India with limited irrigation accessibility, lower moisture content and higher mean temperatures may have detrimental effects.

The late onset of rainfall has delayed the rice and maize cropping activities in southern and eastern India. Drier-than-normal conditions are observed in the following regions around the Indian subcontinent:

- Cambodia
- Laos
- The Philippines
- Vietnam



## **Latin America and the Caribbean:**

Latest forecasts indicate below-normal precipitation in northern South America (Colombia, the Bolivarian Republic of Venezuela) and Central America (El Salvador, Guatemala, Honduras Nicaragua), consistent with El Niño impacts. Additionally, below-normal rainfall is expected in the Pluractional State of Bolivia and eastern Peru. Conversely, above-average rains are forecast for the coastal areas of Ecuador towards the end of the year.

In the Pluractional State of Bolivia, below-normal precipitation could affect the summer planting season. This could cause delays in planting and losses of key crops such as maize, potatoes, and quinoa.

According to the Government of Colombia, about 3.8 million hectares of crops are under high threat of El Niño-induced drought, posing risks to animals and potentially displacing them.

In Ecuador, the Ministry of Agriculture and Livestock identified 36 cantons as being at high or very high-risk levels from potential floods occurring at the end of the year, with estimated crop and livestock losses amounting to USD 136 million.

In the Dry Corridor of Central America (El Salvador, Guatemala, Honduras, Nicaragua), below-average rains are expected to delay planting for the postrera season, reducing surface water availability for irrigation and leading to lower crop yields. The livestock sector may be affected, with a potential increase in the incidence of animal diseases and mortality rates.

In Peru, El Niño is expected to cause rainfall deficits in some regions, especially in the highlands of Puno, Moquegua, and Tacna, affecting staple crop and livestock production.

In the Bolivarian Republic of Venezuela, drought is expected to cause partial or total loss of crops in the arid zones of La Guajira, Zulia, and Falcon states, particularly affecting small farmers.

## **South Africa:**

In Southern Africa, El Niño-induced drought in 2023 could impact the performance of the main agricultural season between October 2023 and March 2024, especially in countries and areas that registered below-average cereal production in 2022-23 because of climate extremes (cyclones). Croplands in countries likely to face dry conditions are highly susceptible to water stress, with potentially adverse implications on crop yields in the 2023-24 season. Drought could also lead to an increased incidence of plant and animal pest and disease outbreaks.

Countries like Malawi, Zimbabwe, Mozambique, DR Congo, and Madagascar would face adverse effects of El Niño due to below-average rainfall coupled with last year's weather leftovers.

## **Crop Specific Impacts:**

- **Wheat:**

Historically, the impact of El Niño events on wheat yields has been modest at the country scale. Average yield declines relative to expected yields are around 5% or less in countries like India, China, Australia, southeastern South America, and parts of Europe and North Africa. However, Morocco tends to experience yield deficits of up to 15%. With the looming conflict in wheat-producing countries like Russia and Ukraine, combined with

the compounded effect of increased temperatures in the Southern Hemisphere, especially Australia, the wheat output is expected to take a severe hit.

- **Rice:**

Past El Niño events have reduced rice yields in major production regions of South and Southeast Asia. The strongest impacts of El Niño events have been in India and Thailand, which were the world's two leading rice exporters in 2022-23. Average yield declines in India and Thailand during El Niño events have been 2 to 4% with declines of 5 to 10% possible. Large rice-producing areas in Southeast Asia are likely to come under stress due to severe weather patterns and higher-than-normal temperatures leading to damage to planted crops.

- **Soybeans:**

El Niño events tend to improve soybean yields in both the United States and Argentina while reducing yields in India. Yields tend to be around 3% and 8% above expected levels in the United States and Argentina, respectively, while they are around 9% below expected levels in India on average. The production of Soya, the second largest in the world, is likely to be adversely affected in India. This impact is attributed to below-average rainfall and warmer winters.

- **Maize:**

Past El Niño events have led to deficit maize production in India, China, southeastern Africa, and parts of Central America and northern South America (Figure 6). The effects tend to be strongest in southeastern Africa where average deficits are around 10 to 15% relative to expected yields in Zimbabwe and South Africa, with some events resulting in deficits of over 50%.

- **Palm**

El Niño doesn't immediately impact palm oil supplies since it takes about nine months to a year for oil palm trees to exhibit stress due to drought. However, rising demand from top importers like India and China, coupled with concerns over potential supply tightening due to any crop stress, is expected to drive prices up. Approximately 90 percent of palm oil, constituting 35 percent of the global edible oil supply, is produced in Indonesia and Malaysia. The increased temperatures are anticipated to adversely affect the yield of palm in these two major producing countries, potentially exerting an upward pressure on pricing.

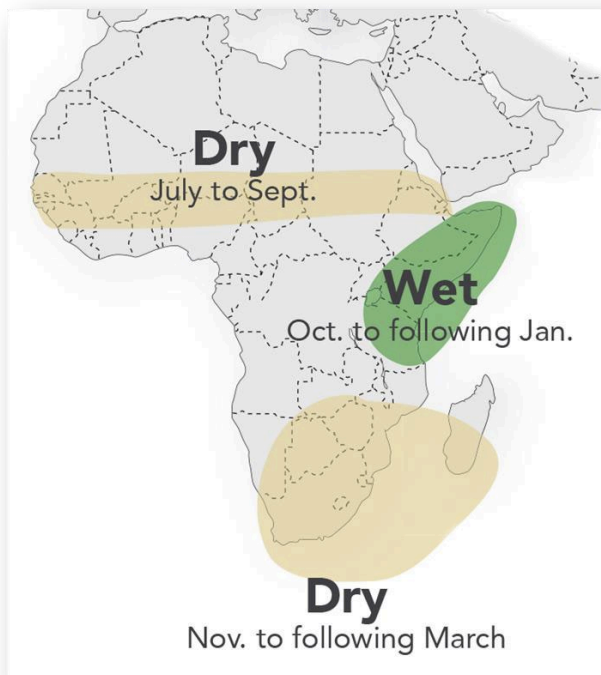
- **Corn**

Yields in India may be adversely affected due to the crop's dependence on water. The current situation is concerning, as even after the monsoon, most of the Indian reservoirs are only at half capacity. This could result in curtailed irrigation in the fed regions.

## Comparing Trends with last El Niño in 2016

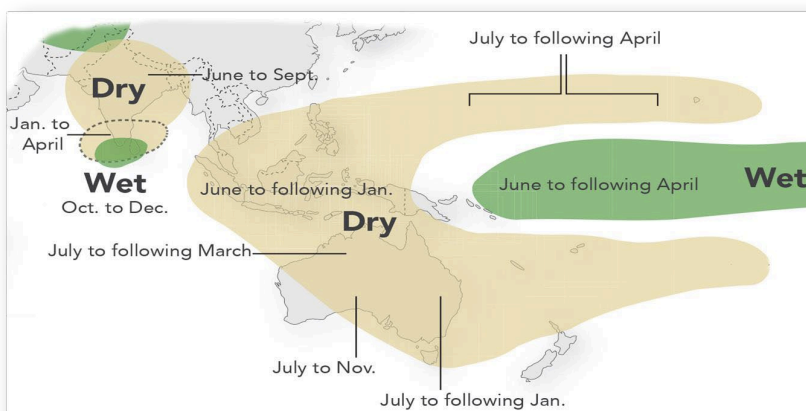
Upon comparing the current conditions with those during the last El Niño event in 2016, striking similarities in weather patterns across continents have been identified. This observation validates the theory of the replication of patterns during El Niño years and, consequently, the potential impact on crop production.

### Africa



**Drought** – Somalia, Sudan, Northeastern Ethiopia, Zimbabwe, Angola, Malawi, Madagascar, Mozambique, Lesotho, Swaziland

**Flood** - Flooding in northeast, southeast, and southwest Ethiopia, and northern Mozambique



### Asia and Australia

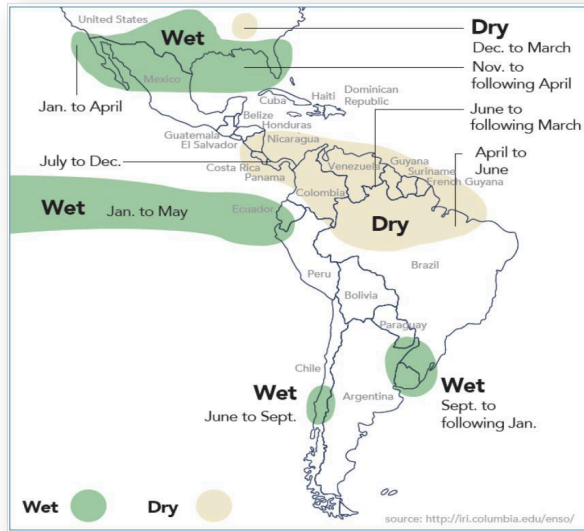
Drought-Papua New Guinea, Timor-Leste, Vietnam, India, Bangladesh, Cambodia, Lao People's

Democratic Republic, and The Philippines.

Floods

Southern India and Northern Pakistan.

Latin America and Caribbean



**Drought-** The Pluractional State of Bolivia, Colombia, El Salvador, Guatemala, Honduras, Nicaragua, and the Bolivarian Republic of Venezuela.

Floods- Southern Brazil and Chile, Southern Part of North America, and Mexico.

## Conclusion:

These are standard areas of impact under El Niño conditions worldwide. Given its cyclical nature, the effects on agricultural output can be predicted, leading to increased demand for related fertilisers and chemicals. Examining historical crop production data during El Niño years provides valuable insights into changing cultivation patterns and the possibility of crop failures during extreme weather events. Providing fertilisers capable of supporting crops even with low water availability can assist cultivators in achieving higher yields with less water.



**Resources:**

1. FAO. 2023. El Niño: Anticipatory Action and Response Plan, August–December 2023. Mitigating the expected impacts of El Niño-induced climate extremes on agriculture and food security. Rome. <https://doi.org/10.4060/cc7267en>
2. Special report on El Niño 2023/2024 Anticipated Climate and Agricultural Yield Impacts by GEOGLAM Community of Practice Coordinated by the University of Maryland

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