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El Niño Article Series

Securing Crop Yields through El Niño Awareness and Timely Action

Authors: Manisha Tamta, Sanjeev Kumar, Shivani, and Anup Das

Agricultural success depends on weather patterns. Over the past few years, several major changes in weather have been observed, such as extreme heat and cold, drought, untimely rains, excessive or deficient rainfall, and so on. Due to these weather uncertainties, farmers often suffer heavy losses. This year, a similar major weather challenge, “El Niño” has once again put agriculture in crisis. During this phase, it is crucial for farmers to understand what “El Niño” actually is, how it affects crops, and how crops can be saved from its adverse impacts.

El Niño is not a natural disaster, but a disruption in the ocean miles away from India. It is the process of abnormal warming of the sea surface temperature in the equatorial region of the Pacific Ocean. As a result, the trade winds weaken, warm water moves eastward (towards the coast of Peru), and the global weather balance is disrupted (**Figure 1**). Conversely, when the water in the Pacific Ocean becomes abnormally cold, this phenomenon is called “La Niña”. In this situation, India receives above-normal rainfall, which proves to be a boon for our crops. Centuries ago, fishermen in South America recognized this warming cycle of the Pacific Ocean and named it El Niño (meaning “little boy” or “the Christ Child” in Spanish). El Niño does not just mean drought; it refers to the uncertainty of rainfall. This phenomenon usually occurs once every 2 to 7 years and lasts for about 9 to 12 months.

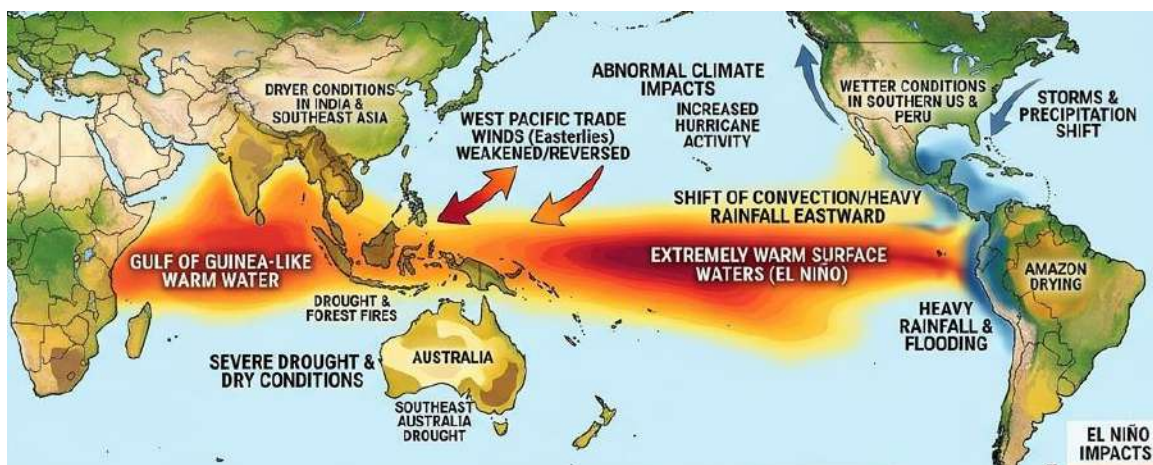


Figure 1: Global impacts of El Niño (Source: AI generated image)

In the context of India, whenever El Niño is active, it directly impacts monsoon rainfall. The clouds that were supposed to bring good rain to India weaken or change their path. A weakened monsoon results in below-normal rainfall, delayed onset, or drought-like conditions. When El Niño is active, it is the “Indian Ocean Dipole (IOD)” that acts as a savior for our monsoon. This is also an oceanic phenomenon representing the sea surface temperature difference between two parts of the Indian Ocean: the western part (near the Arabian Sea/Africa) and the eastern part (near Indonesia). It is also known as the “Indian Niño”. It has two main

phases: a positive IOD leads to excellent rainfall in India, whereas a negative IOD weakens the Indian monsoon and worsens drought conditions. A strong positive IOD can largely offset the drought-inducing effects of El Niño.

India receives about 75- 80% of its rainfall during the monsoon (June to September), during which Kharif crops are primarily cultivated in the country. Any change in the amount or geographical distribution of rainfall during this period directly affects crops. According to the India Meteorological Department, average rainfall across the country during this monsoon season is estimated to be slightly below normal (around 90% of the Long Period Average). The IOD condition has also remained neutral so far this year and is expected to turn positive in the final months of the monsoon, potentially bringing some improvement in rainfall during August and September. Although the southwest monsoon has reached the entire country, rainfall distribution has been highly uneven due to the active El Niño and other weather changes. At the all-India level, rainfall recorded from early June to the first week of July was about 14-15% below normal. In Bihar, the pace of the monsoon remains quite slow and concerning this time. Most parts of the state recorded significantly below-normal rainfall (around 51% less) from June to early July, causing severe difficulties for farmers in preparing, protecting, and transplanting paddy nurseries.

When the monsoon weakens, it directly impacts crops in the following ways:

1. **Delay in Sowing:** Due to untimely rains, the sowing of Kharif crops (such as paddy and maize) gets delayed. Under drought conditions caused by water scarcity, plants begin to die in their initial stages. Without proper management, there is a risk of losing the entire crop.
2. **Increased Pest and Disease Infestation:** Higher temperatures and a lack of moisture lead to a rapid increase in sap-sucking pests (such as thrips and aphids) and various crop diseases.
3. **Depletion of Groundwater and Increased Costs:** Reduced water levels in ponds and wells cause groundwater levels to drop rapidly, increasing irrigation expenses and raising the overall cost of farming.
4. **Price Hike in Markets:** When the yield of main crops declines, the prices of food grains and vegetables skyrocket in the market.

Effective Strategies to Deal with El Niño:

Weather changes are beyond our control, but with proper preparation, we can certainly protect our crops from potential damage. The following strategies should be adopted:

1. **Choosing the Right Crops and Varieties:** In case of delayed or deficit rainfall, choose low-water-requiring crops instead of paddy, such as pearl millet (bajra), sorghum (jowar), maize, green gram (mung), or pigeon pea (arhar). Based on local conditions, plant short-duration (110–120 days) and drought-tolerant paddy varieties like Sahbhagi Dhan, Swarna Shreya, etc.
2. **Efficient Water Management and Irrigation Methods:** Every drop of water is precious; irrigate only when light cracks appear on the soil surface. Adopt drip or sprinkler irrigation, which saves up to 50% of water. Practice the Direct Seeded Rice (DSR) technique wherever possible, as it saves up to 40% of water. Instead of keeping the field continuously flooded,

adopt the Alternate Wetting and Drying (AWD) method. When the crop is on the verge of drying out, provide light life-saving irrigation to save it.

3. **Soil Moisture Conservation and Nutrient Management:** Avoid frequent plowing. Excessive plowing allows the remaining soil moisture to evaporate into the air. Instead, adopt reduced tillage, zero tillage, or direct seeding techniques. Spread dry grass, straw, or plastic sheets (mulching) between crop rows to prevent soil moisture from evaporating under the sun, helping it last longer. Avoid excessive use of chemical fertilizers (like urea). For proper nutrient management, use farmyard manure or vermicompost. These organic fertilizers enhance the water-holding capacity of the soil.
4. **Rainwater Harvesting:** Construct a small pond in a section of the field. Whenever it rains even a little, harvest that water. During critical periods, this stored water can be used for life-saving irrigation to protect the entire crop. Increase the height of field bunds (boundaries) to retain rainwater.

Special Advice: El Niño is certainly a challenge, but we must not panic; instead, we need to adapt strategies that help to tackle these challenges. Regularly check for the weather forecast broadcasted on mobile phones, television, newspapers, and radio, and carefully follow messages or advisories issued by Krishi Vigyan Kendras (KVKs) and research institutes. Avoid the indiscriminate application of urea in fields during El Niño, as excessive urea under water-scarce conditions can burn the crops. Apply an appropriate dose of potassium (potash), which helps plants build resistance against drought. No matter what the weather is, thorough preparation ensures minimal losses and thriving crops.