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EL Nino effect on Elephant Foot Yam and Contingency Plans for Andhra Pradesh

V. Sivakumar and [1]A. V. V. Koundinya

AICRP on Tropical Tuber Crops, Regional Horticultural Research Station, Dr. YSRHU, Kovvur, Andhra-Pradesh
[1]Central Horticultural Experiment Station, ICAR-IIHR, Bhubaneswar, Odisha

siva200619@gmail.com

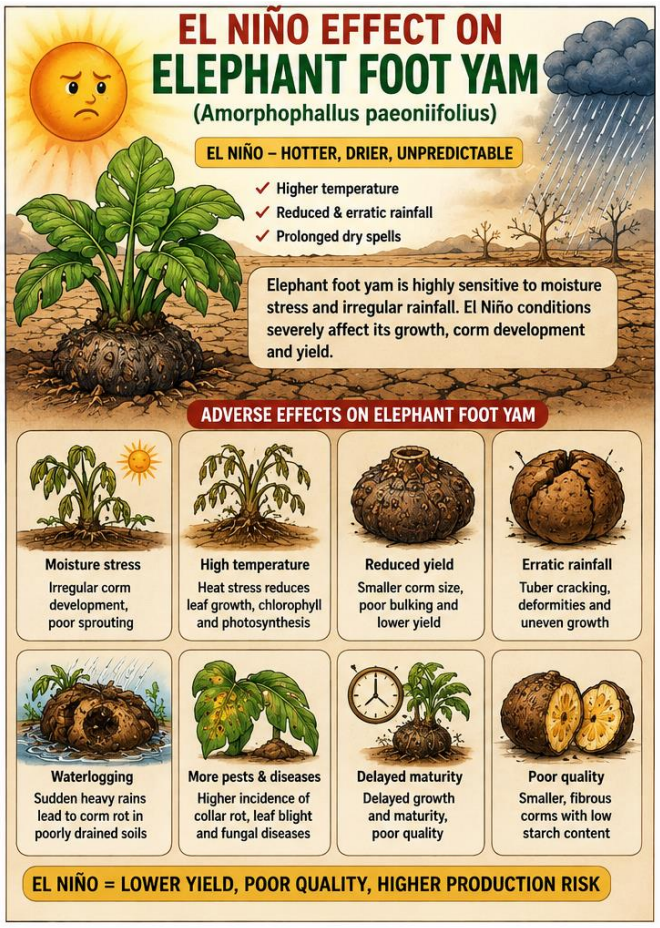
Tuber crops play a vital role in agriculture, food security, and rural livelihoods. Crops like Elephant foot yam, Cassava, Sweet potato and Potato are widely cultivated and contribute significantly in several ways in Andhra Pradesh. Tuber crops are highly valuable in terms of food security and famine resistance, high yield per unit area, income generation and employment, and also in the industrial sector. Nutritionally, tuber crops contribute not only carbohydrates but also vitamins and minerals. For instance, sweet potato is rich in vitamin A, while other tubers provide potassium and dietary fibre. They are also important in cropping systems, as they fit well into crop rotations and intercropping systems, improving soil utilization and farm productivity.

El Nino causes a rise in temperature, reduced and erratic rainfall, and prolonged dry spells, which strongly affect tuber crops. Since tuber crops depend on consistent soil moisture, El Niño conditions lead to moisture stress, resulting in poor sprouting, delayed tuber initiation, and reduced tuber bulking. Under severe drought, crop failure may also occur.

The increase in temperature causes heat stress, which reduces leaf growth and chlorophyll content while increasing respiration. This ultimately lowers photosynthesis and carbohydrate accumulation in tubers, leading to reduced yield and smaller tuber size. Crops like Potato are particularly sensitive, as tuber formation is inhibited at high temperatures.

Erratic rainfall further worsens the situation, as alternating drought and heavy rains can cause tuber cracking, deformities, and uneven growth. Waterlogging during sudden heavy rains leads to rotting of tubers, especially in poorly drained soils. In crops like Elephant foot yam, moisture stress results in irregular corm development, while Cassava shows some drought tolerance but is highly affected by waterlogged conditions.

Additionally, plants under stress become more vulnerable to pests and diseases, leading to increased incidence of fungal infections such as rot and blight. Growth and maturity are often delayed, and the final produce is of poor quality, with smaller, fibrous tubers and reduced starch content. Overall, El Niño leads to decreased yield, poor quality, and increased production risk in tuber crops.



By following some of the following contingency plans, we can avoid or reduce the effect of EL Nino effect on tuber crops:

A. Crop Planning:

- Advance planting before peak heat i.e. April–May planting with irrigation support instead of waiting fully for monsoon.
- Early establishment helps the crop avoid severe mid-season drought stress.

B. Soil and Land preparation:

- It is suggested that 2-3 deep ploughings at 30 cm depth for better soil aeration, moisture retention, root penetration and rhizome development are required.
- Recommended to application of FYM @ 15 t ha^{-1}+ green manuring with Sunhemp, *Pillipesara* or cow pea to generate 15-20 t ha^{-1} of green matter in 45-60 days + biofertilizers (Azospirillum @ 3 kg ha^{-1}, mycorrhiza @ 5 kg ha-1and phosphobacteria @ 3 kg ha^{-1}) for improving organic manure status in soil to hold moisture and there by long term soil moisture retention in root zone.
- Follow ridge and furrow system of planting to retain water during rainy season and maintain moisture for longer time at root/tuber zone.
- Use planting material that has been dipped in cow dung slurry+ *Trichoderma harzianum* (@5g/kg of corm) and shade-dried to help protect against rot and encourage rapid sprouting.

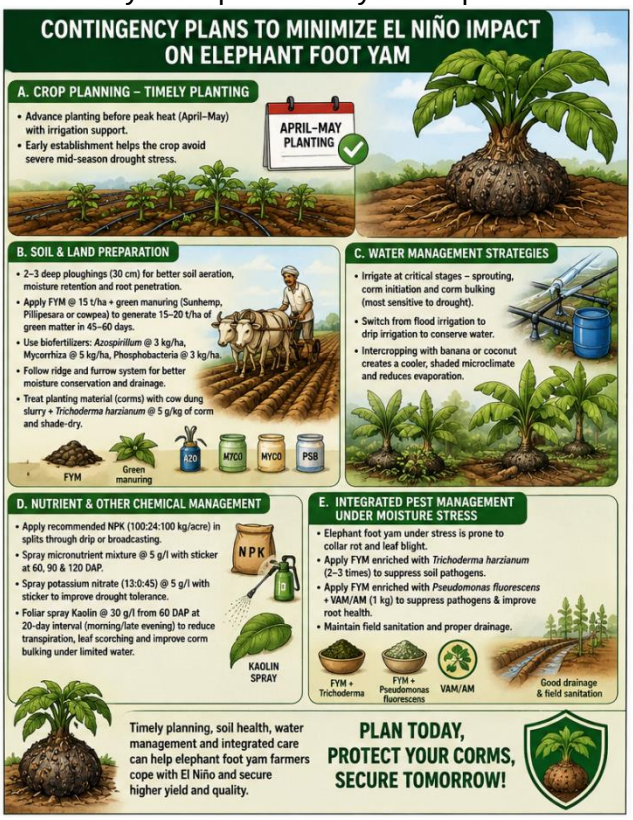
C. Water Management Strategies:

- Water stress during 4–6 months after planting drastically reduces yield up to 78% under severe stress. Irrigation should be given during critical stages of the crops for watering i.e. sprouting stage, tuber formation stage and tuber bulking stage (most sensitive for drought conditions).
- Switch from flood irrigation to drip irrigation to conserve ground water and utilize the water during drought conditions.
- Intercropping with banana or coconut can help to create a cooler, shaded microclimate that reduces evaporation.

D. Nutrient and other chemical management practices:

- Apply recommended dose NPK fertilizers (100: 24: 100 kg/acre) in low quantities at more intervals through drip irrigation or broadcasting for effective utilization and reduction of nutrient requirement. Suggested to spray micro nutrient mixtures @ 5 grams per litre along with suitable sticker at 60, 90 and 120 Days after planting for proper growth of plants.
- In adverse conditions, recommended to spray potassium nitrate (13:0:45) @ 5 grams per litre along with suitable sticker to improve the drought tolerance of plants.

As elephant foot yam has large leaf canopy and high transpiration rate, it is sensitivity to heat and moisture stress. As per the research findings, the foliar application of Kaolin @ 30g/lit from 60 Days after planting at 20 days interval during morning or late evening is a highly effective, low-cost strategy to reduced transpiration loss, temperature leads to enhance drought tolerance, reduce leaf scorching, better canopy retention during stress, improved tuber bulking under limited water and maintain productivity in elephant foot yam crop.



E. Integrated pest management under moisture stress conditions:

Under moisture stress conditions elephant foot yam plants are physiologically weak and more prone to diseases like collar rot and leaf blight. Application of FYM enriched with *Pseudomonas florescence* along with VAM/AM 1 kg is highly recommended as *Pseudomonas florescence* improves the plant root system along with protection from harmful microbes. In drought conditions, mycorrhizal hyphae supply water and essential nutrients from deeper layers of soil. It helps in mitigating drought stress during El Nino conditions.

Control measures for Collar rot disease:

- Seed treatment with FYM + neem cake + *Trichoderma harzianum* slurry
- Adopting cultural practices like crop rotation, removal of plant debris, proper drainage along with the soil application of *Trichoderma harzianum* amended with FYM and neem cake in an interval of 2-3 weeks.
- Drenching with copper oxy chloride @ 3g/lit or Carbendazim @ 1g/lit or Metalaxyl + Mancozeb @ 2g/lit.

Control measures for Leaf spot disease:

- Foliar application of *Pseudomonas fluorescens* @ 5g/ litre of water as preventive measure

help suppress pathogen development in early stages.

- Foliar application of Mancozeb@ 2.5g/lit or Chlorothalonil@ 1g/lit or Carbendazim @ 1g/lit or Metalaxyl + Mancozeb @ 2g/lit at 10–15 days depending on disease pressure.