

# **Revolutionizing Potato Cultivation: The Journey of Quality Seed Tuber Production Through Apical Rooted Cuttings Technology**

## **Background and Context**

Meghalaya is on the path to transforming its agricultural landscape through the "Seed Secure Meghalaya Project." Launched in its first phase, this initiative has positioned the state as a potential seed hub in the Northeast Himalayan (NEH) region. With well-established tissue culture (TC) laboratories and polyhouses, Meghalaya now boasts the capacity to produce over 1 lakh TC plants and more than 7 lakh Apical Rooted Cuttings (ARCs) annually.

This project is far more than just a biotechnological intervention in agriculture—it is a farmer-driven movement aimed at producing and supplying high-quality potato seeds, not just for Meghalaya but for the entire North Eastern region. By strengthening local production, the state is reducing its dependence on external seed sources while opening doors to new markets and economic opportunities.

With the second phase of the project underway, the focus is now on expanding production capacity, scaling up local seed systems, and ensuring long-term sustainability.

## **Problem Statement and Baseline Indicators**

Potato is the second most important crop in Meghalaya after paddy, grown primarily by Khasi tribal farmers as a cash crop. However, despite its importance, potato cultivation has long faced significant challenges:

- Limited access to quality seed potatoes
- Low productivity (10 tons per hectare in 2017-18, less than half the national average)
- Dependence on farm-saved, often degenerated seed stocks
- Poor storage infrastructure leading to seed deterioration
- High costs of procuring quality seeds from distant northern seed-producing states

A scoping study by the FoodSTART+ project, coordinated by the International Potato Center (CIP), identified that low-quality planting material was one of the primary factors behind the poor performance of the potato sector. The lack of post-harvest processing, inadequate storage, and unorganized marketing further compounded the issue.

With a total annual seed requirement of 45,000 tons, Meghalaya could meet only 2% of this demand through certified seeds. The solution was clear: develop a local, self-sustaining seed system to ensure the availability of high-quality seed potatoes.

The "Seed Secure Meghalaya Project" set out to change this reality by implementing Apical Rooted Cuttings (ARC) technology, an innovative and cost-effective alternative to traditional seed multiplication.

## Best Practices

Recognizing the need for an efficient, low-cost seed production method, the project introduced Apical Rooted Cuttings (ARC) technology—a breakthrough in potato seed production. Unlike aeroponic technology, which demands high capital investment and a long gestation period, ARCs offer a scalable, farmer-friendly approach.

The project, initiated by Meghalaya Basin Management Agency (MBMA) in September 2021, was funded by IFAD and implemented through a multi-agency collaboration involving:

- Department of Horticulture (DoH)
- Bio-Resources Development Centre (BRDC)
- MBMA
- CIP (as the technical partner)

The first phase of the project saw over 1 lakh TC plantlets of improved potato varieties produced at BRDC's Tissue Culture Laboratory. The included highly commercial varieties like Kufri himalini, K. Megha, K. Uday, K. Chipsona 3, K. Surya, K. jyoti, etc These plantlets were transplanted in polyhouses to generate over 6 lakh ARC saplings, which were then distributed to registered growers and Integrated Village Cooperative Societies (IVCS).

This collaborative approach ensured that farmers had access to high-quality planting material while promoting a community-driven seed production system.

## Impact

The first phase of the project marked a significant breakthrough in Meghalaya's potato seed sector.

- Over 1 lakh TC plantlets were successfully cultivated and transplanted into polyhouses for ARC production.
- 6 lakh ARC saplings were distributed to registered growers and IVCS, ensuring that farmers had access to high-quality early-generation (G0) seeds.
- The initiative laid the foundation for scaling up production, focusing on both local demand and market expansion into neighboring states.

Now in its second phase, the project is aiming to:

- Expand production capacity for both tissue culture plantlets and ARC saplings.
- Promote entrepreneurship by supporting nurseries that produce ARC saplings for regional distribution.
- Create a sustainable and profitable potato seed market within Northeast India.
- The ARC technology was introduced to four (4) local potato varieties which are popular amongst the farmers for their own consumption. Field trials of these local varietiesARC ongoing and results looks promising.

By leveraging the natural advantages of Meghalaya's cool climate, the project is reducing the cost of early-generation (G0 and G1) seed production, as no artificial cooling is required. This cost-effective approach could pave the way for a ₹160 crore potato seed industry, creating new employment opportunities and attracting investments into the state.

## **Key Takeaways**

### **1. Scalability Through Innovation:**

- The use of ARC technology has transformed seed tuber production, offering a cost-effective alternative to expensive aeroponic methods.

### **2. Farmer-Driven Growth:**

- By equipping local farmers with ARC technology, the project is creating a self-sustaining seed system that meets both state and regional demand.

### **3. Economic Potential Beyond Meghalaya:**

- Meghalaya's strategic advantage in potato seed production can position it as a leading supplier to neighboring states like Assam, where Rabi-season potato cultivation is widespread.

### **4. Sustainability and Entrepreneurship:**

- Supporting local nurseries in producing ARC saplings can create sustainable business opportunities, strengthening both rural livelihoods and the broader agricultural economy.

### **5. Enhanced Productivity and Market Linkages:**

- The project is bridging gaps in the seed supply chain, ensuring consistent access to high-quality seed potatoes and connecting farmers to better markets.

## **Challenges During Implementation**

Like any transformative initiative, the project has faced several implementation challenges:

### **• Seasonal Constraints:**

- The success of ARC technology depends on optimal growing conditions, requiring precise timing and planning to maximize production.

### **• Scaling Up Production:**

- Increasing output requires significant manpower, extensive training, and efficient time management—all of which pose logistical challenges.

### **• Infrastructure and Market Access:**

- While the production system is improving, further investment in storage, transportation, and organized marketing networks is crucial for long-term success.

## **Conclusion**

The "Seed Secure Meghalaya Project" is more than just an agricultural initiative—it is a transformational movement that is redefining potato cultivation in Meghalaya and beyond. By leveraging innovative ARC technology, the project is:

- Empowering farmers with high-quality seed tubers.
- Strengthening Meghalaya's position as a regional seed hub.
- Building a sustainable and profitable potato seed industry.

As the project enters its next phase, the vision is clear: a future where farmers no longer struggle with low yields and poor-quality seeds, but instead thrive as key players in a flourishing seed market.

This is not just about potatoes—it is about agricultural resilience, economic growth, and a self-reliant farming community that can shape the future of Northeast India.