

## **Production of Quality Potato Seed Tubers through Apical Rooted Cuttings (ARCs) Technology.**

### **Background and Context:**

The establishment of the basic seed system in Meghalaya during first phase of the “Seed Secure Meghalaya Project”, initiative, has transformed the state and favourably positioned it to become a seed hub in the Northeast Himalayan (NEH) region in next 5 years. With the current infrastructure of TC labs and Polyhouses, the production capacity exceeds state’s requirement, as it can produce >1 lakh TC plants and over 7 lakhs ARCs annually. This capacity far surpasses the requirement for producing 35,000 tons of early generation seeds set to achieve within 3 years, making the state self-sufficient and is poised to generate surplus for sale to neighbouring states within 5 years from now. The state’s established ARC based potato seed production system is designed to be farmers driven and is equipped to produce locally and supply high-quality potato seeds, including G0, G1, G2 (Breeder seed), FS (Field seed), and CS (Commercial seed) of new varieties. This initiative has the potential, not only to fulfil local demand but also positions Meghalaya to address the seed needs of neighbouring states, thereby contributing to regional agricultural development, and ensuring a sustainable supply of quality potato seeds, a possibility that the second phase aims to bring closer to realisation by further capacity building and facilitating smooth functioning of the established ARC system in the state.

### **Problem Statement and Baseline Indicator:**

Potato is the second most important crop in Meghalaya followed by Paddy. The Khasi tribal farmers of Meghalaya grow potato as an important cash crop. Potato cultivation in the state, however, is primarily confined to the central plateau consisting of two hill districts - East Khasi Hills (EKH) and West Khasi Hills (WKH) - which are primarily inhabited by the Khasi tribe. These two hill districts account for more than 90 percent of the acreage and production in the state. The agro-ecology of the state supports potato cultivation two seasons a year: summer season (February – March to June – July) is the main potato growing season and autumn season (August – November/ December). In low lying areas, some farmers take up potato cultivation during spring (planting in late January to mid-February to April-May).

Potato is cultivated in the state under rainfed conditions with average productivity of 10 tons per hectare (in 2017/18) which is less than half of the national average. According to a scoping study conducted by the FoodSTART+ project coordinated by CIP, results showed that the main cause of the potato sector’s low performance is due to the limited production of and access to quality planting material of improved varieties, followed by poor soil fertility and other environmental stresses such as climate change, absence of postharvest processing, inadequate transportation and storage of potatoes, and lack of organized marketing (CIP-FoodSTART+, 2016). Despite a total annual seed requirement of about 45,000 tons, the Department of Horticulture (DoH) is only able to meet less than 2% of the total certified seed requirement in Meghalaya. This state being situated far from the northern seed producing areas cannot afford to procure healthy and expensive seed every year. Hence, farmers are compelled to use their own, mostly degenerated

farm-saved seed stock, year after year and to store it using traditional practices such as heap, bamboo baskets (polo), and spread on wooden floors in locally built dark and rusty stores in the homestead. Poor quality seed potato and storage practices result in very low yields.

Non-availability of quality seed is a serious issue not only in Meghalaya but in most of the adjoining states including the entire northeast region. There is great demand for quality seed of both table and processing varieties from these states. Meghalaya offers a great advantage for the supply of quality seed to the region including Assam where potato is primarily cultivated in Rabi season. Potato seed harvested in Meghalaya during summer (June-July) can be directly used for the cultivation in Rabi season without any need for storage. Because of the cold climate cost of early generation (G0 and G1) seed production in Meghalaya is likely to be less as no cooling is required under controlled conditions. The needs of the state alone could then also generate a potential 160 crore INR potato seed business (before considering export opportunities to neighboring states) which would also be a potential important source of new employment and new investment into Meghalaya in the medium to long term.

### **Best Practice:**

In order to solve the seed availability problem in the state the project aim to promote a low-cost seed multiplication technology instead of Aeroponic technology, which requires high capital and a long gestation period. A project by the name “ Seed Secure Meghalaya” was initiated by MBMA on September 2021 which was funded by IFAD . This is a collaborative project with different department playing different roles. It collaborative partners are DoH, BRDC, MBMA with CIP being the technical partners.

Apical Rooted Cutting (ARC) is a low-cost potato seed production technology which was first introduced at Hassan, Karnataka in India with the main objective to make quality potato seeds readily available. Under Phase I of the project BRDC have produced over 100000 TC Plantlets of the different potato varieties which have been transplanted to different poly houses for production of Apical Rooted Cuttings Saplings. Over 6Lakhs ARCs saplings have been distributed to different Registered Growers and IVCS which was coordinated by MBMA where GO seeds have been produced.



### **Impact:**

Under Phase I of the project, BRDC have produced over 100000 TC Plantlets of the different potato varieties in the Centre Tissue Culture Laboratory which have been transplanted to different poly houses for production of Apical Rooted Cuttings Saplings. Over 6Lakhs ARCs saplings have been distributed to different Registered Growers and IVCS which was coordinated by MBMA where GO seeds have been produced.

This project is currently under phase II, focusing on expanding production capacity for both Tissue culture Plantlets and ARCs saplings to significantly increase the output of seed tubers. The project also aims to encourage Entrepreneurship by supporting the production of ARCs saplings in nurseries , both to meet the state's demand and to facilitate sales in neighboring states within the North east regions.

### **Key takeaways:**

- Focus on significantly boosting the production of seed tubers through enhanced tissue culture and ARCs sapling techniques, while fostering local entrepreneurship to support nursery based ARC production , meeting both state and regional demands in Northeast.
- By leveraging the new ARC production technology, the project envisions producing a large quantity of high- quality seed tubers.



### **Implementation challenges faced:**

- The success of ARCs technology is highly dependent on timing, with certain seasons being more favorable than others. The window and area for propagation require careful planning and scheduling.
- Scaling up the production require significant man power, training and time management which can be a logistical challenge.