

APICAL ROOTED CUTTING (ARC) TECHNOLOGY FOR RAPID POTATO SEED PRODUCTION

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India ranks second both in production and consumption of potato in the world. Potato is vegetatively propagated through seed tubers, which account for nearly half of the total cost of production. The conventional seed production technique through repeated use of tubers makes the crop susceptible to viral diseases and, therefore, leads to faster degeneration of the crop. Also, seed potato production in India is largely confined to the north and then it is transported to the potato-growing belts of the country, thus adding to high transportation costs. Of late, due to climate change, there has been a shift in the time of seed potato planting due to delayed paddy harvesting, which makes the crop more prone to insects and diseases and thus, leads to decreased production of reliable potato seed.

Challenges faced by farmers in acquiring good quality seed

1. Less area under potato cultivation
2. Poor quality seed
3. Huge transportation cost

4. Limited access of farmers to good potato varieties
5. Long time required to multiply any new variety
6. Exploitation by the local seed traders
7. Seed price is always unpredictable and high

There is, therefore, an urgent need to revive the potato sector through decentralising seed production areas and developing alternate seed system which ensures good quality seeds at affordable prices to farmers. Apical rooted cuttings (ARCs) could serve as a simple, effective and low-cost alternative to this problem.

What is Apical Rooted Cutting (ARC)?

Apical cuttings are rooted transplants produced from tissue culture plantlets in a screenhouse. Instead of allowing tissue culture plantlets to mature and produce mini-tubers, cuttings are produced from the plantlets. Apical cuttings are an alternative to mini-tubers in current production seed systems for potato.

How ARC technology work?



1. Procurement of disease-free mother cultures (from CPRI) and their *in vitro* multiplication in TC lab



2. Multiplication of mother plants in polyhouse



3. Production of ARC (seedlings) in polyhouse



4. Seed production (Season 1) in open field



5. Seed production (Season 2) in open field



6. Commercial potato production

Table 1: Conventional vs ARC seed production technology

Particulars	Conventional seed production	ARC seed production
Investment	Cost intensive	Low cost
Technology	Complicated	Simple
Suitability	For only large-holding resource-rich farmers	Even small farmers can become seed producers
Gestation period	At least six seasons are required	Only two seasons
Risk	High	Low
Scope for expansion	Low	High
Seed system	Centralised	Decentralised

Conclusion

Once planted in the field, an apical cutting produces 10 to 25 or more seed tubers, compared to 5 to 10 seed tubers per mini-tuber at low cost. Given the high productivity of rooted apical cuttings, it is economical for multipliers to sell quality seed after two seasons of field multiplication, and after three seasons, it is highly profitable. It takes a multiplier who starts with mini-tubers, a minimum of six months to produce a commercial crop of seed tubers, whereas those who start with rooted apical cuttings produce a crop within two or three months. Using cuttings as starter material for seed production reduces the time taken to produce commercial seed by one year compared to minitubers, boosting the profitability of

seed multiplication and the supply of quality seed available for farmers.

The benefits of seed potato production using ARC technology can be summarised as follows:

1. Farmers can manage decentralized local seed production.
2. Saving 'Seed Miles' - Local seed production avoids transportation of large volume of seeds from long distances and thus, minimizes cost of production.
3. Additional employment generation through seed production.
4. More returns to farmers and seed growers
5. Availability of desired seeds locally.
6. Strengthened 'Seed Potato Value Chain'.

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