

WPC 2026 KENYA

WORLD POTATO CONGRESS

Rooted Apical Cuttings of Potato

Adoption, Use Cases and International Experiences





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and many Partners

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Thematic Working Group on RAC

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Rooted Apical Cuttings

Simple, low cost, low risk option for seed production



Accelerate seed production

Minimum average 20 tubers/cutting



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Rooted Apical Cuttings

Alternative starter material to minitubers

RAC are produced from tissue culture plantlets maintained in a juvenile state in a protected structure













RAC Production Systems

Production of cuttings in protected structure



Two phases



Production of tubers in the field





Each cycle should last 4-6+ months

Number of cuttings per initial TC plant is critical to efficiency

1 initial TC should produce 40-200 cuttings

Screenhouse Production of Cuttings

Mother plants from tissue culture plants

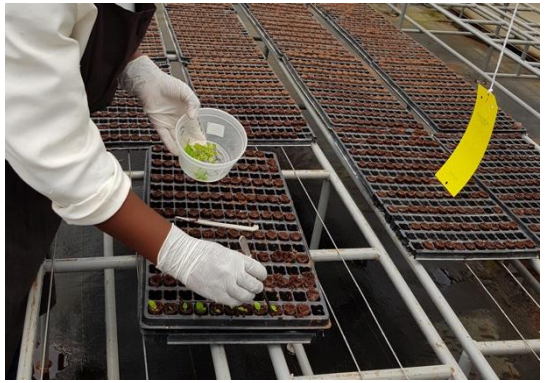
Two phases

RAC from mother plant shoots









Screenhouse Production of Cuttings

Large-scale producers

Stockman Rozen Kenya
Naivasha





Small-scale producers

Rural, isolated areas

Kween nursery
Mt Elgon, Uganda





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RAC to produce seed tubers in the field

Seed growers transplant directly to field to begin seed tuber multiplication







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RAC to produce minitubers in screenhouse

Large-scale seed company – Freshcrop Ltd

Plant RAC in screenhouse to produce internal starter material for field seed multiplication



Low cost seed material

	# RAC per TC	USD per piece	# tubers field yield
Kenya	50-80	0.08	20+
Vietnam	40-50	0.025	20+
Minituber	-	0.2-0.3 (0.7)	10+







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Considerations for apical cuttings

Environment

- Require **warm temperatures** - ideal 18-25C
  - 17-20 days cutting ready to transplant
  - warm temperatures support maintaining juvenile state and accelerate shoot and root development
- **Long days** better suited to produce RAC and maintaining juvenile state of mother plants

Andigena

- **short day potato**
- **better suited for RAC**

Tuberosum

- **long day potato**
- **less ideal for RAC**
  - **variety dependent**

Country use case Cameroon

- Tissue culture: IRAD (NARS) and TOWA, private lab
- RAC production in small-scale screenhouses (~5 x 10 m) located in most major production basins
  - 12 distributed in 3 regions: 6 West, 4 North-west, 2 Adamawa
- Seed growers main users of RAC
- DRCQ (seed quality control) official RAC certification protocol in 2025
- **RAC first introduced in 2021**



Ware farmers prefer to use RAC to produce their own seed as **cheaper and more efficient**

Country use case Cameroon











Country use case Eritrea



- TC: NARI Biotechnology Research Units: Halhale, + Adi-Keih sub-station) sole source
- NARI produce RAC at both units. New screen house at the Potato Innovation Centre to expand capacity
- Field multiplication: NARI produces tubers from RAC
- RAC recognized as Pre-basic I (G1) in Eritrea's Seed Potato Certification Protocol (2025)
- **RAC first introduced in 2022**

Country use case Eritrea











Country use case India

- Introduced in 2019 in Karnataka in southern India
  - seed coming from Punjab 1000's kms
  - RAC transformed seed systems
- Demand for 10's to 100's of millions of RAC
  - Karnataka population 69M
- RAC integrated well into farming system, Karnataka major vegetable region
  - strong nursery and seedling culture
- Private sector driven
  - decentralised approach to RAC production
  - several approaches to distribution









Country use case India

Bringing down the cost

Unrooted apical shoots or semi-rooted cuttings further improve efficiency

- Unrooted 0.01 – 0.2 USD/piece
- Developed in India

Bought by

- Screenhouses to use as mother plants rather than TC
- Seed growers to directly produce own RAC
  - cost would < 0.08 USD/piece if produce internally





Country use case India

- RAC expanding to northern India
- ICAR-CPRI (NARS) provide starter material, larger role in seed production in north
- Haryana - Farmer groups produce RAC and supply to seed growers for early generation seed production
- Meghalaya- state govt supplies RAC to farmer groups, then multiply seed for their own use
- 2025: Technology approved by Central seed certification board to produce certified seed







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TRANSFORMING SEED POTATO PRODUCTION THROUGH APICAL ROOTED CUTTINGS: A SUCCESS STORY FROM MEGHALAYA

मुख्य पृष्ठ / Transforming Seed Potato Production Through Apical Rooted Cuttings: A Success Story From Meghalaya

Transforming Seed Potato Production through Apical Rooted Cuttings: A Success Story from Meghalaya

Country use case Niger

NARS – INRAN in Niger

- One cropping season per year for potato, import seed > 2,000 USD/tonne
- TC: INRAN
- Seed multiplication on Mt Bagzan, multiple cycles per year
- Bring RAC/seed to farmers far from Mt Bagzan
- Importing unrooted apical cuttings from Kenya to trial a new variety in Niger











Country use case Niger









https://www.youtube.com/watch?v=S3Y3cxxIFPM

Country use case Simplot - Tasmania

Simplot Seed System (SSS)

Tuberosum type potato

Nodal cuttings

- ~20% cut from apical tip
- 1 TC produces 640 plants over 129 days
- Cf 1 TC produces 132 RAC over 210 days



- Doubled number of cuttings/m^2 shelf space
  - same capital, hydroponic and power costs
  - produced higher G1 field yield
- Manage night temperature
  - replace expensive refrigeration unit with cheap reverse cycle air conditioner
  - capital and power savings

Vegetable transplanter sowing SSS plants into Valley Beds

- improves transplant establishment under harsh environmental conditions



Country use case Simplot - USA



Operationalising the Boise SSS

Cuts a full year from the Innate line selection process

Provides a faster path to market for deregulated lines

Barossa at 45 DAP







Country use case Yemen

- Seed production entirely private sector led
- TC labs
  - 1 private (Nabat)
  - AREA (NARS)
- Evaluating and use RAC as starter material











Country use case Yemen



Abd-Allah Md Dhaif-Allah with his WPC 2024 award



Abd-Allah and son El Ibrahim ordered 1 million RAC from Dhamar First Center





To enhance survival, transplanted at night



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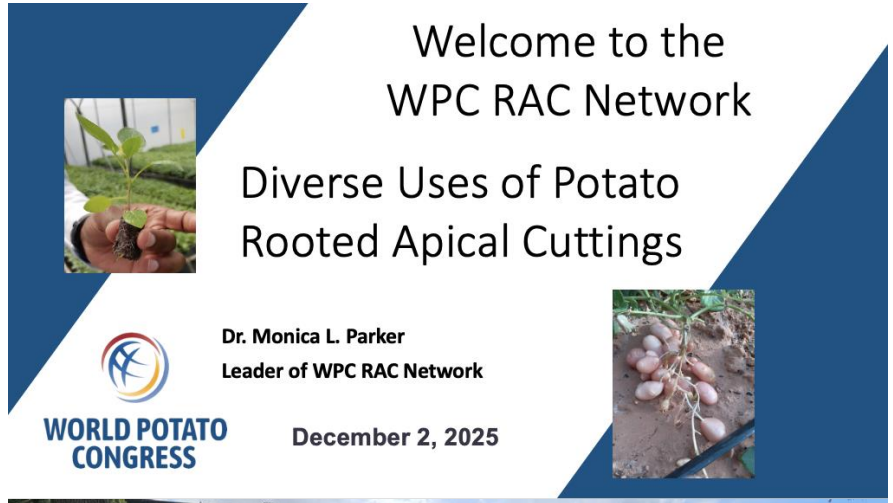
RAC diversify options for seed production

- Fit into diverse seed systems
  - small-to large-scale production systems
  - 1 or multiple seasons per year cropping systems
- Suitable for diverse contexts, rural isolated regions
  - TC/unrooted apicals transport well
  - RAC inherent low phytosanitary risk
    - produced from disease-free tissue culture plants
    - protected structure
    - simple procedures to maintain phytosanitary quality
    - Suitable for decentralised/community-based seed production
- Farmers can use RAC to produce own seed in nursery beds

World Potato Congress Global Thematic Working Group - RAC

- WPC RAC Workshop, 31 countries participated from NARS, private sector, associations, academia
- Beyond the workshop, ongoing interactive webinars for members
  - 100 members from 36 countries in Africa, Asia and Latin America
  - specific technical topics
  - country cases
- Join by contacting myself, Dinah, Derek or Julio





Rooted Apical Cuttings (RAC)



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Rooted Apical Cuttings (RAC) represent an efficient and significant method for producing early-generation seed potatoes in many countries across Africa and Asia. In some cases, this technique is even used directly for market production, combined with on-farm seed saving.



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Thank you

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