Microcutting of *Hevea* Rubber Genotype 78 and 91

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Planting material

**Rubber planting materials:**
- Important factor
- In Indonesia need in large number (± 60 millions/year) for 5% replanting & new planting)
- Mass propagation, high quality
Rubber planting materials
1918 - now
Clone from budding

Introduced by van Helten (1917)

Rootstock
From seed

Scion
From breeding & selection
Rootstocks

Always needed for budding and propagation of rubber scion clones

Rootstocks (root system function):
• Support the upper part (scion)
• Absorb nutrients and water from the soil
• Interact with soil microbes, some of which pathogen

Rootstocks are important part of rubber planting material
Seed problems:

- Recalsitran, could not keep for a long time
- Recommended seed as rootstocks were very limited, only seed from AVROS 2037, GT1, PB 260, RRIC 100
- These clones are limited in the field
- Seeds production reduce from time to time
- Seeds season one a year

↓

The availability of seeds not enough
New hope

**Microcutting** gives an opportunity to produce rubber clonal rootstocks

Selection of rootstocks could be done

What is **Microcutting**?

“…. can be defined as micropropagation process which utilizes tissue culture-based technology to propagate plants by using axillary buds as explants ….”
Starting material for microcutting
Microcutting of rubber plant

Explant: axillary bud → New shoots → Multiplication

Vitroplant ← Acclimatization ← Plantlet

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Rubber clonal rootstocks
Genotype selection as rootstocks candidate

Genotype population at Sungei Putih, IRRI (2005)

Selected genotype

Genotype duplication

Duplicate genotype at IBRIEC, Bogor (2006)

Duplicate genotype at CIRAD, Montpellier (2006)

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Indonesian Biotechnology Research Institute for Estate Crops (IBRIEC)
Indonesian Research Institute for Estate Crops (IRIEC)
Genotypes multiplication

Mean multiplication rate at the 3rd (2nd or 1st) subculture

General mean value
### Genotypes multiplication

#### Best 10 genotypes

<table>
<thead>
<tr>
<th>Genotype</th>
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<tbody>
<tr>
<td>5</td>
<td>54</td>
</tr>
<tr>
<td>7</td>
<td>58</td>
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<tr>
<td>15</td>
<td>63</td>
</tr>
<tr>
<td>26</td>
<td>78</td>
</tr>
<tr>
<td>43</td>
<td>91</td>
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Genotypes multiplication

Increasing of explant during microcutting process of 10 rubber genotypes (2007-2009)

Increase of explant (x)

Genotype

Initial explant
Explant increase (x)
## Genotypes multiplication

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<tbody>
<tr>
<td>78</td>
<td>463</td>
<td>6315</td>
<td>2147</td>
</tr>
<tr>
<td>91</td>
<td>273</td>
<td>6703</td>
<td>2084</td>
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Genotypes multiplication
Rubber plantlets produced

<table>
<thead>
<tr>
<th>Year</th>
<th>Plantlets</th>
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<tbody>
<tr>
<td>2007</td>
<td>649</td>
</tr>
<tr>
<td>2008</td>
<td>4799</td>
</tr>
<tr>
<td>2009</td>
<td>3367</td>
</tr>
<tr>
<td>2010 (Sept)</td>
<td>2000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>10815</strong></td>
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</tbody>
</table>
Acclimatization of Genotype 78 and 91
The survival rate of rubber plantlets genotype 78 from all experiments conducted in 2008, 2009 and 2010.
The survival rate of rubber plantlets genotype 91 from all experiments conducted in 2008, 2009 and 2010.
The growth curve of plantlet height of rubber plantlets genotype 78 and 91.
Rubber plantlets genotype 78 and 91 at different acclimatization stages (left) and as rootstocks budded with scions of recommended clones (right).
(A) Rubber vitroplants planted in the field for rootstocks, (B). Vitroplant roostocks were budded with five recommended clones as scions, (C). The bud was inserted into the rootstocks and wrapped with plastic.
Rootstocks of vitroplant genotype 78 budded with scions of BPM 24 (left) and genotype 91 budded with IRR 118 (right).
Research developments at IBRIEC

• Plantlets could be produced continuously

  Rubber plantlets

  Sending of plantlet for acclimatization process

• As a research laboratory, produced: 500 plantlets/month

• At the end of 2008, PT Perkebunan Nusantara III (Medan), involved in these activities. The laboratory started to produce rubber plantlets on September 2009

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Conclusion

- Rubber clonal rootstocks could be produced through *microcutting* technique.
- It opens the way to select superior rootstocks and propagate them clonally.
- Opportunity to reach the potential production of scion clone.
- Currently in Indonesia, this innovation technology is adopted by PT Perkebunan Nusantara III (estate company belong to the government).
Microcutting team

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Nani  Nurul  Tati  Aldi  Nita  Yadi  Gunawan