

### Applications of in vitro Methods for the Multiplication of New Planting Material

Pascal Montoro, Keng-See Chow, Philippe De Groote, Nor Mayati, Thitaporn Phumichai, Piyanuch Piyatrakul, Eriberto Salang, Emma Sales, Kanikar Teerawattansuk, Arjunan Thulaseedharan, Sekar Woelan, Chen Xiongting, Abdul Aziz B S A Kadir

#### Abstract

Hevea clones are propagated by grafting scion clones on seedling rootstocks. Cutting and microcutting were long supposed to provide plant material with poor root system. Thanks to the French-Indonesian research collaboration and development in China, microcutting is now reconsidered as useful technology for Hevea clonal propagation and production of rootstocks. Somatic embryogenesis is a cost-effective clonal propagation method that has potential for large-scale production of elite material from several woody species. In rubber, research studies have been maintained in China, India, France and Malaysia for more than 30 years. This long-term investment led to applications on genetic engineering and large-scale productions of in vitro plants in China by CATAS. In the recent years, Indonesian and Thai institutions renewed interest in this research area. Rejuvenation of rubber clones by somatic embryogenesis is an essential factor for successful horticultural multiplication and improving the vigour of planting material. Using rejuvenated in vitro plants from somatic embryogenesis, grafting and cutting led to the multiplication of thousands plants in Nigeria and Ivory Coast by CIRAD-Michelin-SIPH and University of Gand-Socfinco consortium, respectively. Effect of clonal root system and somaclonal variation must be taken into consideration. Evaluation of this new planting material remains necessary for further recommendations. Given the low rubber price, other latex by-products should also be considered to attract farmers to the cultivation of rubber. Natural organic compounds as well as new recombinant proteins could lead to a better attractiveness to stakeholders and a better acceptance of genetically modified rubber plants.

### Biometrical Analysis of Carbon for Rrim 2020 and Rrim 2025 Clones Planted in Different Planting Densities

Rasyidah binti Mohamad Razar<sup>1</sup> and Mohd. Nasaruddin bin Mohd. Aris<sup>2</sup>  
Malaysian Rubber Board

#### Abstract

Carbon pool can be found in all four spheres of earth and the flux of carbon from one pool to another would result in climate change. An increased awareness to offset release of carbon in the atmosphere is emphasized in The United Nations Framework Convention on Climate Change through Kyoto Protocol. The current study analysed carbon concentration and carbon content in all plant parts of RRIM 2020 and RRIM 2025 planted in four planting densities; 500, 1000, 1500 and 2000 plants/ha. Carbon concentration is found the highest in leaf of RRIM 2020 at 500 plants/ha density ( $53.3 \pm 0.2\%$ ). This could be explained by the presence of photosynthetic activity and the resulted high amount of lignin. Carbon content is found the highest in large branch of RRIM 2020 at 500 plants/ha density ( $93.04 \pm 11.22$  kg), because of the high biomass weight of large branch and the abundant amount of lignocellulosic material. Trend analysis of total carbon sequestered in plant parts with planting density was found to be in negative pattern; quadratic and cubic regression for RRIM 2020 and RRIM 2025, respectively. However when total carbon content per hectare was calculated it was found that carbon content was the highest at 1500 plants/ha density ( $140,355 \pm 9888$  kg, clone RRIM 2025). Even though high density planting gave higher carbon sequestration per hectare, planting at 500 plant/ha is still recommended as this gives more biomass weight to rubber plant parts and thus subsequently benefits timber industry.



# 2014 IRRDB International Rubber Conference and Annual Meetings



November 24-28, 2014  
Hyatt Regency Hotel  
Manila, Philippines

*Developing and Sharing Innovations for Sustainable  
Growth of the Natural Rubber Industry*

*Souvenir Program*



# PROGRAM

November 24-28, 2014  
Hyatt Regency Hotel, Manila, Philippines

## CONCURRENT SESSIONS 8 and 9 – Conference Room A and Room B

### Conference Room A

#### Session 8 - Biotechnology

Chairman: Prof Zhou Jiannan, Deputy Director, *International Cooperation, Dept. of CAAMS*

2:00- 2:15 PM	<i>Paper 1: Identification of Signalling Factors involved in the Regulation of Laticifer Metabolism by Tapping and Ethephon Stimulation in Hevea brasiliensis</i>	<b>Retno Lestari</b> , et. al <i>CIRAD, UMR AGAP (France)</i>
2:15 – 2:30 PM	<i>Paper 2: Insights of Hevea Latex Serum Proteins Using Shotgun Proteomics Analysis</i>	<b>Norazreen Abd Rahman,</b> <b>Siti Arija Mad Arif</b> <i>MRB</i>
2:30 – 2:45 PM	<i>Paper 3: Applications of In Vitro Methods for the Multiplication of New Planting Materials</i>	<b>Pascal Montoro</b> , et. al <i>IRRDB Member-Institutes</i>
2:45 – 3:00 PM	<i>Paper 4: Molecular Profile of Recommended Cultivars from Philippine Rubber Genetic Resources as Characterized by Simple Sequence Repeats</i>	<b>Aldrin Y. Cantila</b> <i>UPLB</i>
3:00 – 3:15 PM	<i>Paper 5: Validation of Varietal Integrity of Promising Rubber Clones through DNA Finger Printing</i>	<b>Dr. Emma Sales</b> <i>USM</i>
3:15 – 3:30 PM	Discussion	
3:30 – 4:00 PM	<b>COFFEE BREAK</b>	

### Conference Room B

#### Session 9 - Environmental Sustainability

Chairman: Dr. SWG Seneviratne, Director, *RRI Sri Lanka*

2:00 – 2:15 PM	<i>Paper 1: Mitigation of Greenhouse Gas Emissions in the Primary Processing of NR Latex in India through Integrated Waste Water Treatment System (IWWTS)</i>	<b>Jacob Mathew</b> , et. al <i>RRI India</i>
2:15 – 2:30 PM	<i>Paper 2: Biometrical Analysis of Carbon from RRIM 2020 and RRIM 2025 Clones Planted in Different Planting Densities</i>	<b>Dr. Mohd Nasaruddin Bin Mohd Aris</b> <i>MRB</i>
2:30 – 2:45 PM	<i>Paper 3: Development of EnviroSmart Calculator to Measure Natural Rubber Sustainability Levels</i>	<b>Siti Hawa Sulong</b> , et. al <i>MRB</i>