

Welcome

Monday, 07 October 2019 | 08:00 - 08:30 | Room 1 **András Náhlik**
Rector of the University of Sopron, Hungary

Andrea Reithmayer

Vice-Rector of the University of Natural Resources and Life Sciences, Vienna, Austria

Imre Czupy

Head of Organising Committee of FORMEC 2019 in Sopron, Hungary

Karl Stampfer

President of FORMEC Network, Vienna, Austria

Woodam Chung

Coordinator, IUFRO Division 3, Forest Operations Engineering & Head of Organising Committee of FORMEC COFE 2020 in Oregon, USA

Keynote 01

Monday, 07 October 2019 | 08:30 - 10:00 | Room 1
Chair: Woodam Chung

A-0190 Opportunities in remote sensing of forests related to the arrival of the Sentinel-2 satellite

Clement Atzberger
BOKU

A-0191 Traction versus Ground Protection

Josef Primus
PEWAG Austria

A-0192 Conducting sustainable forest operations while minimizing environmental impacts: a compilation of research

Chad Bolding
Virginia Tech, USA

Tech4Effect

Knowledge and technologies for effective wood procurement

Monday, 07 October 2019 | 10:30 - 12:30 | Room 1
Chair: Dirk Jaeger

A-0061 Assessing Cable Tensile Forces and Machine Tilt of Winch-Assisted Forwarders on Steep Terrain under Real Working Conditions

Thomas Holzfeind, Christian Kanzian, Karl Stampfer, Franz Holzleitner
Institute of Forest Engineering, University of Natural Resources and Life Sciences, Vienna, Austria

A-0071 Productivity and fuel consumption of heavy forwarders under different configurations: benchmarks from fleet-level long-term records (one million loads)

Raffaele Spinelli^{1,2}, Angelo Conrado de Arruda Moura³

¹CNR IVALSA, Firenze, Italy; ²University of the Sunshine Coast, Maroochydore, QLD, Australia; ³Suzano, SP, Brazil

A-0115 Factors Affecting Productivity and Utilisation of Winch-Assist Machines: Six Case Studies in New Zealand and Canada

Cameron Leslie¹, Rien Visser¹, Dominik Roeser², Colin Koszman³, James Hunt³, Hunter Harrill¹

¹University of Canterbury, Christchurch, New Zealand; ²University of British Columbia, Vancouver, Canada; ³FPIInnovations, Vancouver, Canada

A-0117 Productivity and Environmental Impacts of Cable-assisted Logging – A case study in southern Oregon, USA

Woodam Chung, Brett Morrisette, Preston Green, Ben Leshchinsky, Kevin Bladon, Jeff Hatten, John Sessions

Oregon State University, Corvallis, USA

A-0152 A micro-catchment approach to monitoring sediment flows after cable logging

Bruce Talbot¹, Omar Mologni^{1,2}, Rasmus Astrup¹, Stephanie Eisner

¹Division for Forestry and Forest Resources, NIBIO. The Norwegian Institute for Bioeconomy Research, Ås, Norway; ²Department of Forest Resources Management, The University of British Columbia, Vancouver Campus

A-0054 Flat and wet: Cable yarding on sensitive soils in Europe – motivations, challenges and potential

Gernot Erber¹, Raffaele Spinelli², Giovanna Ottaviani Aalmo³, Dirk Jaeger⁴, Marian Schönauer⁴, Stephan Hoffmann⁵, Bruce Talbot⁶, Karl Stampfer¹, Christoph Pucher⁷

¹University of Natural Resources and Life Sciences Vienna – Institute of Forest Engineering, Vienna, Austria; ²Consiglio Nazionale delle Ricerche - Istituto per la Valorizzazione del Legno e delle Specie Arboree, Florence, Italy; ³Norwegian Institute of Bioeconomy Research – Division of Food Production and Society, Ås, Norway; ⁴Georg-August-Universität Göttingen - Department of Forest Work Science and Engineering, Göttingen, Germany; ⁵University Freiburg, Chair of Forest Operations, Freiburg, Germany; ⁶Norwegian Institute of Bioeconomy Research – Division of Forest and Forest Resources, Ås, Norway; ⁷University of Natural Resources and Life Sciences Vienna – Institute of Silviculture, Vienna, Austria;

Soil Disturbances

Down and Dirty

Monday, 07 October 2019 | 10:30 - 12:30 | Room 2

Chair: Tomas Nordfjell

A-0094 Enhanced sustainable forest management of the Brazilian secondary Atlantic Forest by innovative and adapted technologies

Pedro C. Britto¹, Dirk Jaeger¹, Stephan Hoffmann², Renato C. G. Robert³, Alexander C. Vibrans⁴, Alfredo C. Fantini⁵

¹University of Göttingen, Göttingen, Germany; ²University of Freiburg, Freiburg, Germany; ³Federal University of Paraná, Curitiba, Brazil; ⁴University of Blumenau, Blumenau, Brazil; ⁵Federal University of Santa Catarina, Florianópolis, Brazil

A-0017 Wet area mapping using remote sensing data in Latvia

Janis Ivanovs, Ainars Lupikis, Andis Lazdins

LSFRI Silava, Salaspils, Latvia

A-0111 Response of soil physical properties following the application of soil restoration techniques on machine operating trails

Siegfried Waas^{1,2}, Eric R. Labelle¹, Herbert Borchert²

¹Assistant Professorship of Forest Operations - Department of Ecology and Ecosystem Management - Technical University of Munich, Freising, Germany; ²Bavarian State Institute of Forestry (LWF) - Department 4 – Forest Technology, Business Management and Timber, Freising, Germany

A-0150 Quantifying soil disturbance in a whole-tree operation method

Alex. K George, Anil Raj Kizha

School of Forest Resources, University of Maine, Orono, ME-04469, USA

A-0039 Soil Disturbance from Tethered Forwarding on Steep Slopes in Brazil

Austin M. Garren¹, M. Chad Bolding¹, W. Mike Aust¹, Angelo Moura², Scott M. Barrett¹

¹Department of Forest Resources and Environmental Conservation, College of Natural Resources and Environment, Virginia Tech, Blacksburg, Virginia USA; ²Suzano Pulp and Paper, Jacareí, São Paulo, Brazil

A-0103 Soil Degradation and Wood Extraction Operations: Comparing Skidding And Forwarding

Francesco Neri, Elena Marra, Giovanni Mastrolonardo, Andrea Laschi, Cristiano Foder, Enrico Marchi

DAGRI - Dipartimento di Scienze e Tecnologie Agrarie, Alimentari, Ambientali e Forestali, Università di Firenze, Firenze, Italy

Human factors

It's still hard work out there

Monday, 07 October 2019 | 10:30 - 12:30 | Room 3

Chair: Nike Krajnc

A-0053 Acquire and management of Chainsaw tree felling and bucking work by ICT - Smart Chainsaw and utilization

Toshio Nitami¹, Sooil Suk², Yasufumi Maruyama¹, Tetsuya Matsumura¹

¹University of Tokyo, Tokyo, Japan; ²Co-Lab., Daegu, Korea

A-0073 Ageing workforce – a challenge for work science, job design and human resources development

Edgar Kastenholz, Andrea Teutenberg, Ute Seeling

Kuratorium für Waldarbeit und Forsttechnik (KWF) e.V.

A-0130 Comparisons between battery and gasoline chainsaws in terms of noise exposure, energy efficiency, and cutting performance

Christoph Huber, Nikolaus Nemestóthy

Austrian Research Center for Forests - Forest Training Center Traunkirchen, Austria

A-0161 Forestry Edu Trainer - Cooperation for Innovation in Education and Training

Andrea Teutenberg, Joachim Morat, Ute Seeling

KWF e.V. - Kuratorium für Waldarbeit und Forsttechnik e.V., Groß-Umstadt, Germany

A-0166 Movement analysis of a worker in the forest cleaning activities

Marin Bačić, Matija Landekić, Marijan Šušnjar, Mario Šporčić, Zdravko Pandur

Faculty of Forestry, University of Zagreb, Croatia

A-0171 Analysis of risks caused by vibrations and noises in small-scale firewood production

Andrea R. Proto¹, Stefano Grigolato², Salvatore Papandrea¹, Maria Francesca Cataldo¹, Raffaele Cavalli², Giuseppe Zimbalatti¹

¹Department of AGRARIA - University Mediterranea of Reggio Calabria, Italy ²Department of Land Environment Agriculture and Forestry - University of Padova, Italy

CTL harvesting optimization

Bit-and-Pieces

Monday, 07 October 2019 | 14:00 - 16:00 | Room 1

Chair: Raffaele Spinelli

A-0002 Characteristics analysis of deformation about V-honeycomb with wing for feeding rollers of forest harvester

Wang Dong^{1,2}, Wang Dian^{1,2}, Liu Jinghao^{1,2}, Huang Qingqing^{1,2}

¹School of Technology, Beijing Forestry University, China; ²Key Laboratory of Forestry Equipment and Automation of State Forestry and Grassland Bureau, China

A-0033 Multi-stem CTL harvesting of short rotation poplar plantations

Nataschia Magagnotti¹, Piotr Mederski², Raffaele Spinelli¹

¹CNR Ivalsa, Sesto Fiorentino (FI) - Italy; ²Poznań University of Life Sciences, Faculty of Forestry, Department of Forest Utilisation, Poznań - Poland

A-0020 Impact of tree marking and silvicultural treatment on harvester performance in early thinning operations – an experiment

Franz Holzleitner¹, Magdalena Langmaier^{2,3}, Bernhardt Obermayer¹, Eduard Hochbichler², Christian Kanzian¹

¹Institute of Forest Engineering, Department of Forest and Soil Sciences, University of Natural Resources and Life Sciences Vienna, Austria ²Institute of Silviculture, Department of Forest and Soil Sciences, University of Natural Resources and Life Sciences Vienna, Austria ³Austrian Research Centre for Forests, Department of Forest Growth and Silviculture, Seckendorff Gudent Weg 8, A-1130 Vienna, Austria

A-0086 Worldwide share of cut-to-length harvesting method and explaining factors

Mikael Lundbäck, Carola Häggström, Tomas Nordfjell

Swedish University of Agricultural Sciences, Umeå, Sweden

A-0088 Influence of alternative machine relocation options on Cut to Length loggings in Eastern-Finland

Kari Väättäinen, Juha Laitila, Tuula Packalen, Pekka Hyvönen, Hannu Hirvelä
Natural Resources Institute Finland (Luke)

Bioenergy

Final destination?

Monday, 07 October 2019 | 14:00 - 16:00 | Room 2

Chair: Tom Gallagher

A-0035 QUANTIFICATION OF LOGGING LOSSES RELATED TO BIOMASS SUPPLY OF FOREST RESIDUES CAUSED BY ADDITIONAL DELIMBING OF HARVESTING HEADS

Markus Riebler, Elke Dietz, Herbert Borchert
Bavarian State Institute of Forestry, Freising, Germany

A-0072 Evaluation of screening and drying to improve fuel properties of low quality wood chips for the use in small wood gasifier CHP-plants

Simon Lesche¹, Daniel Kuptz¹, Thomas Zeng², Anett Pollex², Georg Kuffer³, Jana Mühlenberg², Volker Lenz², Hans Hartmann¹
¹Technology and Support Centre in the Centre of Excellence for Renewable Resources (TFZ), Schulgasse 18, D-94315 Straubing, Germany ²DBFZ Deutsches Biomasseforschungszentrum gemeinnützige GmbH, Torgauer Straße 116, 04347 Leipzig, Germany ³Spanner Re² GmbH, Niederfeldstr. 38, 84088 Neufahrn i. NB, Germany

A-0102 Forest Biomass Harvesting and Chip Quality in Mixed Hardwood Forests for Bioenergy Production

John Vance¹, Jingxin Wang¹, Shawn Grushecky¹, Raffaele Spinelli²
¹Division of Forestry and Natural Resources, West Virginia University, Morgantown, WV, USA jxwang@wvu.edu ²CNR Ivalsa, Via Madonna del Piano 10, 50019 Sesto Fiorentino (FI), Italy spinelli@ivalsa.cnr.it

A-0108 Influence of storage on properties of Scots pine bark

Johanna Routa, Hanna Brännström, Jarkko Hellström, Juha Laitila
Natural Resources Institute Finland, Luke

A-0168 Marginal cost of biomass utilization in mechanized forest restoration treatments in the Southwestern USA

Elizabeth Dodson¹, Nathaniel Anderson²
¹WA Franke College of Forestry and Conservation, University of Montana, USA; ²Rocky Mountain Research Station, US Forest Service, MT, USA

A-0173 Synergies between the New Bioeconomy and Forest Operations for Fuel Treatment and Forest Restoration

Nathaniel Anderson¹, Woodam Chung², Elizabeth Dodson³
¹Rocky Mountain Research Station, United States Forest Service, Missoula, USA; ²Oregon State University, Corvallis, USA; ³WA Franke College of Forestry and Conservation, University of Montana, Missoula, USA

Wood transportation & Simulation

Playing with model trucks

Monday, 07 October 2019 | 14:00 - 16:00 | Room 3

Chair: Hubert Dürstein

A-0056 Implementation of computer vision algorithms for automated detection and diameter estimation of logs on trucks

Mauricio Acuna¹, Amanda Sosa², Mark Brown¹
¹University of the Sunshine Coast, Hobart, Australia ²Waterford Institute of Technology, Waterford, Ireland

A-0012 Wood Transportation Planning 4.0

Peter Rauch, Christoph Kogler
University of Natural Resources and Life Sciences, Vienna

A-0018 Modeling timber truck speed and fuel consumption in Finland based on CAN bus data and auxiliary information

Perttu Anttila, Tuomas Nummelin, Kari Väättäinen, Juha Laitila

Natural Resources Institute Finland (Luke)

A-0062 Agent-Based Simulation in Cable Yarding and Transport Operations

Thomas Holzfeind¹, Manfred Gronalt², Christian Kanzian¹

¹Institute of Forest Engineering, University of Natural Resources and Life Sciences, Vienna, Austria ²Institute of Production and Logistics, University of Natural Resources and Life Sciences, Vienna, Austria

A-0041 Optimal transport scheduling: Demonstration of Software Capability and Potential Gains

Mauricio Acuna¹, Glen Murphy²

¹University of the Sunshine Coast, Hobart, Australia; ²GE Murphy & Associates Ltd, Rotorua, New Zealand

A-0104 Innovation in the field of wood transport in France

Thomas Carrette, Christophe Ginet

Technology Institute for the French forest-based sector – FCBA

Wood transportation & New technologies

Roll on

Monday, 07 October 2019 | 16:30 - 18:30 | Room 1

Chair: Ewald Pertlik

A-0051 Handling Labour Shortage by Efficient Supply Chain Solutions - Container Terminal

Robert I Radics, Carel Bezuidenhout, Ginny Christians

Scion Forest Research, New Zealand

A-0011 Loading rates and compaction factors for woodchip vessels visiting Australian ports

Glen Murphy^{1,2}, Mauricio Acuna², Michael Berry², Rick Mitchell²

¹GE Murphy & Associates, New Zealand; ²University of the Sunshine Coast, Australia

A-0030 Wireless crane scale to improve round wood transport efficiency

Franz Holzleitner, Christoph Santner, Christian Kanzian

Institute of Forest Engineering, Department of Forest and Soil Sciences, University of Natural Resources and Life Sciences, Vienna, Austria

A-0083 How to deal with an upcoming shortage of wood transporting capacity in Germany?

Herbert Borchert, Sebastian Gößwein, Marina Schusser

Bavarian State Institute of Forestry (LWF), Freising, Germany

A-0042 Logistics of suppling woody biomass long distance using railroad transportation

Jeff Halbrook, Han-Sup Han

Ecological Restoration Institute, Northern Arizona University, Flagstaff, AZ, USA

A-0180 Operational evaluation of a timber trailer with the hybrid drive

Tomáš Zemánek¹, Jindřich Neruda¹, Radomír Ulrich¹, Ondřej Vítek², Petr Procházka²

¹Department of Engineering, Faculty of Forestry and Wood Technology, Mendel University in Brno, Czech Republic ²Department of Power Electrical and Electronic Engineering, Faculty of Electrical Engineering and Communication, Brno University of Technology, Czech Republic

Trafficability

Can we get over it?

Monday, 07 October 2019 | 16:30 - 18:30 | Room 2

Chair: Charlie Blinn

A-0067 Innovative Forest Wheel Design for low Inflation Pressure

Felix zu Hohenlohe

HSM Hohenloher Spezial-Maschinenbau GmbH

A-0077 Rutting on skid trails - Static and dynamic pressure allocation

Bastian Hinte, Katharina Meyer-Schulz
Georg-August-Universität, Göttingen, Germany

A-0092 Measuring of wheel ruts depth in forest terrain with drone and digital stereo photogrammetry

Tomas Nordfjell, Rasmus Wictorsson
¹Swedish University of Agricultural Sciences, Department of Forest Biomaterials and Technology, Umeå, Sweden

A-0060 Operations Protocol for assessing trafficability prior to logging operations – key findings from the EFFORTE project

Jori Uusitalo
Natural Resources Institute Finland (Luke), Tampere, Finland

A-0096 Evaluation of a (the HSM) triple bogie system for forwarders

Michael Starke¹, Felix Heubach², Martin Ziesak¹
¹Bern University of Applied Sciences (BFH) – School of Agricultural, Forest and Food Sciences (HAFL), Bern, Switzerland ²Public enterprise Sachsenforst, Pirna, Germany

A-0125 Comparison of different estimation methods to wheel ruts and soil compaction during harvesting operations.

Elena Marra¹, Martina Cambi¹, Andrea Laschi¹, Fabio Fabiano¹, Francesco Neri¹, Cristiano Foderi¹, Enrico Marchi¹, Tomas Nordfjell²
¹Dipartimento di Gestione dei Sistemi Agrari, Alimentari e Forestali (GESAAF), Università di Firenze, Firenze, Italy; ²Department of Forest Biomaterials and Technology (SLU), Swedish University of Agricultural Sciences, Skogsmarksgränd, Umeå, Sweden

CTL harvesting & Quality improvement

We make it better

Monday, 07 October 2019 | 16:30 - 18:30 | Room 3

Chair: **Natascia Magagnotti**

A-0122 Ranging system for a forwarder and a cutting slope of a logging road for autonomous driving

Sho Ono¹, Masahiro Iwaoka², Takeshi Matsumoto², Midori Uenohara³
¹Graduate School of Agriculture, Tokyo University of Agriculture and Technology ²Institute of Agriculture, Tokyo University of Agriculture and Technology ³United Graduate School of Agricultural Science, Tokyo University of Agriculture and Technology

A-0139 Towards understanding the effect of tree size uniformity on harvester productivity using machine StanForD data in a South African context

Simon Ackerman¹, Rasmus Astrup², David Drew¹
¹University of Stellenbosch, South Africa; ²The Norwegian Institute of Bioeconomy Research, Ås, Norway

A-0141 Estimating the Potential of Tree Selection Tutorial System of Harvester Operator in Thinnings

Mika Vahtila¹, Kalle Kärhä², Heikki Ovaskainen³, Ville Kankari¹, Timo Melkas³, Asko Poikela³, Veli-Pekka Kivinen¹, Markus Holopainen¹, Juha Hyypä⁴, Jarmo Hämäläinen³
¹University of Helsinki, Helsinki, Finland; ²Stora Enso Wood Supply Finland, Helsinki, Finland; ³Metsäteho Ltd, Vantaa, Finland; ⁴Finnish Geospatial Research Institute at National Land Survey, Helsinki, Finland

A-0143 Harvesting head calibration: efforts and benefits

Daniel Beaudoin^{1,2}, Luc LeBel^{1,2,3}
¹Consortium de recherche FORAC, Université Laval, Québec, Canada ²Département des sciences du bois et de la forêt, Université Laval, Québec, Canada ³Centre interuniversitaire de recherche sur les réseaux d'entreprise, la logistique et le transport (CIRRELT)

A-0145 Development of a Small-scale Harvester for Biomass Operations

Kleydson Diego da Rocha¹, Thomas Gallagher¹, Timothy McDonald², Dana Mitchell³
¹School of Forestry and Wildlife Sciences - Auburn University, Auburn, United States; ²Department of Biosystems Engineering - Auburn University, Auburn, United States; ³USDA Forest Service - Southern Research Station, Auburn, United States

A-0149 Evaluation of Processing Head Measurement in Merchandizing Southern Yellow Pine in Southeast US

Marisa Sitanggang¹, Thomas Gallagher¹, Timothy McDonald¹, Dana Mitchell²
¹Auburn University; ²US Forest Service

Keynote 02

Tuesday, 08 October 2019 | 08:00 - 10:00 | Room 1

Chair: Karl Stampfer

A-0193 Digitalization of forest harvesting: the potential for improved environmental and production efficiency

Rasmus Astrup

NIBIO

A-0194 Smart Forestry - Smart Forest Operations Engineering and Management

Hans R. Heinimann

ETH Zürich, Switzerland

A-0195 Life Cycle Assessment (LCA) in Forestry

Martin Kühmaier

BOKU Vienna, Austria

A-0196 Future of forest engineering and its sustainability

Woodam Chung

Oregon State University, USA

Steep terrain harvesting

Hold on tight

Tuesday, 08 October 2019 | 10:30 - 12:30 | Room 1

Chair: Dominik Roeser

A-0029 Using conjoint analyses to improve cable yarder design characteristics: An Austrian yarder case study to advance cost-effective extraction

Martin Kühmaier¹, Hunter Harrill², Mohammad Reza Ghaffariyan³, Manfred Hofer⁴, Karl Stampfer¹, Mark Brown³, Rien Visser²

¹Institute of Forest Engineering, University of Natural Resources and Life Sciences, Vienna, Austria ²New Zealand School of Forestry, University of Canterbury, New Zealand ³Forest Industries Research Centre, University of the Sunshine Coast, Australia ⁴Koller Forsttechnik GmbH, Austria

A-0105 Share of steep slope worldwide

Mikael Lundbäck, Henrik Persson, Carola Häggström, Tomas Nordfjell

Swedish University of Agricultural Sciences

A-0107 Skyline tensile forces in cable logging: field measurements vs. theoretical calculations

Omar Mologni¹, Luca Marchi¹, C. Kevin Lyons², Stefano Grigolato¹, Raffaele Cavalli¹, Dominik Roeser³

¹Università degli Studi di Padova - Department of Land, Environment, Agriculture and forestry. Padua - Italy ²Oregon State University - College of Forestry - Department of Forest Engineering, Resources and Management. Corvallis, OR USA ³The University of British Columbia - Department of Forest Resources Management. Vancouver, BC Canada

A-0113 Whole-tree helicopter yarding productivity analysis for fuels reduction thinning in northern Arizona

Dylan Whitaker, Jeff Halbrook, Han-Sup Han

Ecological Restoration Institute, Northern Arizona University, Flagstaff, Arizona, USA

A-0136 Experimental tests on trees used as anchors in cable-supported harvesting systems

Luca Marchi, Omar Mologni, Stefano Grigolato, Raffaele Cavalli

Department of Land, Environment, Agriculture and Forestry, University of Padova, Viale dell'Università 16, 35020 Legnaro (PD), Italy

A-0026 Applying the Delphi method to select the sustainable forest harvesting system

Nopparat Kaakkurivaara

Faculty of Forestry, Kasetsart University, Bangkok, Thailand

Environmental impacts

Not quick and dirty

Tuesday, 08 October 2019 | 10:30 - 12:30 | Room 2

Chair: Janine Schweier

A-0006 Minnesota Loggers and Invasive Forest Plants: Attitudes, Behaviors and Concerns

Charlie Blinn¹, Stephanie Snyder², Rachel Peterson³

¹Department of Forest Resources, University of Minnesota, St. Paul, MN, USA; ²USDA Forest Service, Northern Research Station, St. Paul, MN, USA; ³Minnesota Logger Education Program, Cloquet, MN, USA

A-0023 Environmental Impact of Mechanized Harvesting in Large-Dimension Hardwoods

Lorenz Breinig, Caroline Bennemann, Peter Aurenhammer, Eric R. Labelle

Assistant Professorship of Forest Operations, TUM School of Life Sciences Weihenstephan, Technical University of Munich

A-0140 Modelling Fuel Consumption in Cut-to-length Wood Harvesting Operations in Nordic Conditions

Hanna Haavikko¹, Kalle Kärhä², Heikki Kääriäinen^{1,2}, Kimmo Roininen², Teijo Palander¹

¹University of Eastern Finland, Joensuu, Finland; ²Stora Enso Wood Supply Finland, Helsinki, Finland

A-0036 Influence of the extraction line's distance on the value of the tree stand

Marcus Hennek

Institute of Forest Utilisation and Forest Technology, Chair of Forest Technology, TU Dresden, Germany

A-0151 West Virginia Timber Harvesting Activities – Landownership influences on Harvest Types, Compartment Sizes, and Best Management Practices Compliance

Ben Spong

West Virginia University, Morgantown, WV, USA

A-0167 Residual stand damage under different silvicultural prescriptions

Evan Ross Nahor, Anil Raj Kizha, Libin Thaikkattil Louis

University of Maine, Orono, USA

Supply chains

Puzzles to optimize

Tuesday, 08 October 2019 | 10:30 - 12:30 | Room 3

Chair: Hans Rudolf Heinemann

A-0032 Comparison of the productivity and cost of four harvest systems operating in a eucalypt plantation in Western Australia

Martin Strandgard¹, Rick Mitchell¹, John Wiedemann²

¹University of the Sunshine Coast; ²WA Plantation Resources P/L

A-0050 Harvesting Productivity, Cost, and Timber Utilization in Conventional and Processor Harvesting Systems in Georgia, USA

Joe Conrad

Warnell School of Forestry & Natural Resources, University of Georgia, Athens, GA, USA

A-0183 Motor manual and mechanized WTS biomass harvesting in Spanish Quercus coppices. Productivity, cost and environmental analysis

E Tolosana, R Laina, R Spinelli, G Aminti, I López-Vicens

A-0153 Applying the System integrator concept to forest supply chain

Luc LeBel¹, François Morin¹, Luis de Santa Eulalia², Denise Dubeau³

¹Université Laval; ²Université de Sherbrooke; ³MFFP

Infrastructure & market

On the way

Tuesday, 08 October 2019 | 14:00 - 16:00 | Room 1

Chair: Eduardo Tolosana

A-0007 Heavy metal leaching from forest roads reinforced with fly ash

Antti-Jussi Lindroos¹, Kira Ryhti², Tomi Kaakkurivaara¹, Jori Uusitalo¹, Heljä-Sisko Helmisaari²

¹Luke, Finland; ²University of Helsinki, Finland

A-0068 Legal, social and economic requirements for integration of harvester data in logistics chains in Germany

Julia Kemmerer, Florian Hartsch, Lorenz Breinig, Eric R. Labelle

Assistant Professorship of Forest Operations Department of Ecology and Ecosystem Management Technical University of Munich Hans-Carl-von-Carlowitz-Platz 2 85354 Freising Germany

A-0084 Determining the resilient moduli of HRB stabilized soils by the cyclic CBR method

Péter Primusz, Balázs Kisfaludi, József Péterfalvi

University of Sopron, Faculty of Forestry, Institute of Civil Engineering, Sopron, Hungary

A-0090 Consideration of near optimal forest road densities for Switzerland

Moritz Dreher, Michael Starke, Julia Menk, Christoph Schaller, Lorenz Diefenbach, Patrick Dietsch, Luuk Dorren, Martin Ziesak

Bern University of Applied Sciences (BFH) - School of Agricultural, Forest and Food Sciences (HAFL), Bern, Switzerland

A-0172 An agent-based Modell of wood markets

Stefan Holm¹, Renato Lemm¹, Lorenz Hilty², Oliver Thees¹

¹Swiss Federal Institute for Forest, Snow and Landscape Research WSL, Switzerland; ²University of Zurich, Switzerland

A-0176 Optimizing the Layout of an Existing Forest Road Network in Hilly and Flat Terrain

Leo Bont, Fritz Frutig, Christoph Fischer, Marielle Frafel

WSL, Birmensdorf, Switzerland

The future of forest engineering

No borders

Tuesday, 08 October 2019 | 14:00 - 16:00 | Room 2

Chair: Luc LeBel

A-0031 Forest machines for the future – learning from nature

Richard Parker, Peter Clinton, Brionny Hooper

Scion - NZ Forest Research Institute Christchurch New Zealand

A-0057 Estimating the need for pre-harvest clearing by multispectral airborne laser scanning.

Blanca Sanz¹, Jukka Malinen¹, Jussi Heiskanen², Timo Tokola¹

¹University of Eastern Finland, Joensuu, Finland; ²Savonia University of Applied Sciences, Varkaus, Finland

A-0052 Planterbot (Planting robot)

Robert I Radics, Linh N. K. Duong

Scion Forest Research, New Zealand

A-0022 A forecast of silviculture re-establishment technologies of the future in plantation forestry

Muedanyi Ramantswana¹, Michal Brink², Keith Little¹, Raffaele Spinelli³, Paxie Chirwa²

¹Nelson Mandela University, South Africa; ²University of Pretoria, South Africa; ³CNR IVALSA, Italy

A-0095 Measuring Log Piles with Photo-optical Mono Camera Systems

Hans-Ulrich Dietz

Kuratorium fuer Waldarbeit und Forsttechnik (KWF); Gross-Umstadt, Germany

Standards, conversion, measurement

Speak the same language

Tuesday, 08 October 2019 | 14:00 - 16:00 | Room 3

Chair: Dinko Vusić

A-0014 European Standard for Round and Sawn Timber (Method of Measurement of Dimensions) – Influence on Volume Losses

Andreja Đuka¹, Tomislav Poršinsky², Tibor Pentek³, Mirna Sertić², Dinko Vusić¹

¹Faculty of Forestry University of Zagreb; ²Croatian Forests Ltd. Zagreb

A-0097 Elektro WZ – electronic conversion factors for volume calculation of stacked sawmill timber

Piotr S. Mederski¹, Krzysztof Rosiński², Martyna Rosińska¹, Zbigniew Karaszewski³, Mariusz Bemberek¹

¹Poznań University of Life Sciences, Poland; ²individual IT contribution, Poland; ³Wood Technology Institute, Poznań, Poland

A-0043 Development and validation of a measurement system used to calculate the debarking percentages of processed logs

Joachim B. Heppelmann^{1,2}, Eric R. Labelle¹, Thomas Seifert³, Stefan Seifert³, Stefan Wittkopf²

¹Assistant Professorship of Forest Operations, Department of Ecology and Ecosystem Management, Technical University of Munich, Hans-Carl-von-Carlowitz-Platz 2, D-85354 Freising, Germany ²University of Applied Science Weihenstephan-Triesdorf, Hans-Carl-von-Carlowitz-Platz 3, D-85354 Freising, Germany ³Scientes Mondium, Ruppertskirchen 5, D-85250 Altomünster, Germany

A-0118 A proposal of new formulation on investment and achieved cost or environmental load reduction: Trial applications on logging residue transportation and infrastructure development for broad-leaved tree harvesting

Yasushi Suzuki¹, Tetsuhiko Yoshimura²

¹Faculty of Agriculture and Marine Science, Kochi University, Japan; ²Faculty of Life and Environmental Science, Shimane University, Japan

A-0164 Global sensitivity analysis of integrated harvesting cost under various stand conditions and machine attributes

Libin T Louis, Anil Raj Kizha, Adam Daigneault

School of Forest Resources University of Maine Orono 5755 Nutting Hall, Orono, Maine, United States

Machine-Soil-Interaction

Digging up the dirt

Tuesday, 08 October 2019 | 16:30 - 18:30 | Room 1

Chair: Ben Spong

A-0010 How does soil compaction influence the growth of spruce seedlings?

Eric R. Labelle, Max Kammermeier

Assistant Professorship of Forest Operations, Department of Ecology and Ecosystem Management, Technical University of Munich, Germany

A-0063 Contamination of wood chips with mineral soils – fuel quality and combustion behaviour

Carina Kuchler¹, Daniel Kuptz¹, Elisabeth Rist¹, Robert Mack¹, Claudia Schön¹, David Zimmermann², Elke Dietz², Markus Riebler², Uwe Blum², Herbert Borchert², Hans Hartmann¹

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A-0049 Nutrient saving effects of roughly delimbed energy roundwood in comparison to biomass supply of whole coniferous crowns caused by harvesting method and bucking

Elke Dietz, Markus Riebler, Herbert Borchert

Bavarian State Institute of Forestry, Freising, Germany

A-0155 Soil Failures Under Tracked Forestry Machines as a Function of Slope and Soil Wetness

D H McNabb

ForestSoil Science Ltd. Edmonton, Alberta Canada

A-0047 Mechanized pre-commercial thinning by uprooting

Karri Uotila

Natural Resource Institute Finland, Kuopio, Finland

A-0156 Ground-Based Forest Machinery and Tactics Improving Wildland Fire Suppression Operations in Western North America

Chris Bielecki¹, Obie O'Brien²

¹Supervisory Civil Engineer, USDA Forest Service; ²Logging Engineer and Owner of Forest Operations Engineering LLC. Retired Logging Engineer, USDA Forest Service.

Decision Support & Virtual Reality

Simplify your decisions

Tuesday, 08 October 2019 | 16:30 - 18:30 | Room 2

Chair: Ute Seeling

A-0081 Analysis of rut formation using particle-based terrain simulation

Viktor Wiberg¹, Martin Servin¹, Tomas Nordfjell²

¹Umeå University, Umeå, Sweden; ²Swedish University of Agricultural Sciences

A-0037 Multicriteria Decision Analysis for Selecting the Sustainable Logging System in Teak Plantation

Nichmon Plodchum, Nopparat Kaakkurivaara, Wanchai Arunpraparut

Department of Forest Engineering, Faculty of Forestry, Kasetsart University, Bangkok, Thailand

A-0116 Using virtual reality to improve operational planning and teaching

Dominik Roeser¹, Tim Caldecott², Holger Griess¹

¹University of British Columbia, Vancouver, Canada; ²FPIInnovations, Vancouver, Canada

A-0070 Manipulating chain type and flail drum speed for increased productivity and value recovery in CFDDC operations

Raffaele Spinelli^{1,2}, Rick Mitchell², Mark Brown², Natascia Magagnotti^{1,2}, Andrew McEwan³

¹CNR IVALSA, Firenze, Italy; ²University of the Sunshine Coast, Maroochydoore, QLD, Australia; ³Nelson Mandela University, George, Republic of South Africa

A-0135 AVATAR: Advanced virtual aptitude and training application in real time

Dirk Jaeger¹, Marian Schönauer¹, Bruce Talbot², Rolf Björheden³, Eva Skagestad⁴, Michael Corsano⁵, Gerhard Rinkenauer⁶, Thilo Wagner⁷

¹Department of Forest Work Science and Engineering, Georg-August-Universität, Göttingen, Germany; ²Norwegian Institute of Bioeconomy Research, Ås, Norway; ³Skogforsk, Uppsala, Sweden; ⁴Skogbrukets Kursinstitutt, Biri, Norway; ⁵Optea, Oslo, Norway; ⁶Leibniz Research Centre for Working Environment and Human Factors, Dortmund, Germany; ⁷Wald und Holz NRW, Arnsberg, Germany

Harvesting operations

Incremental innovation vs. business revolution

Tuesday, 08 October 2019 | 16:30 - 18:30 | Room 3

Chair: Bruce Talbot

A-0038 Work safety improvement for motor-manual felling operations - General thoughts and presentation of a prototype tool

Patrick Dietsch, Michael Starke, Martin Ziesak

Bern University of Applied Sciences (BFH) - School of Agricultural, Forest and Food Sciences (HAFL), Bern, Switzerland

A-0175 Economic feasibility of timber harvesting in lowlands

Alex Kunnathu George¹, Anil Raj Kizha¹, Laura Kenefic²

¹School of Forest Resources, University of Maine, Orono, ME-04469, USA; ²Northern Research Station, U.S. Forest Service, ME-04411, USA

A-0147 SELECTING SUCCESSFUL HARVESTER OPERATORS THROUGH APTITUDE TESTS AND DEMOGRAPHICS

Kylle Schwegman¹, Raffaele Spinelli², Natascia Magagnotti², Andrew McEwan³, Muedanyi Ramantswana¹

¹Nelson Mandela University, South Africa; ²CNR IVALSA, Italy; ³CMO, South Africa

A-0178 Comparison of Electric Cordless and Petrol Chainsaws in Terms of Efficiency in Real-World Conditions

Matevž Mihelič, Anton Poje

University of Ljubljana, Biotechnical Faculty, Department of Forestry and Renewable Resources, Ljubljana, Slovenia

A-0066 Hardwood mechanization: state of the art and perspectives based on 20-years experience in France

Emmanuel Cacot, Philippe Ruch, Chloé Boldrini

FCBA, Verneuil-sur-Vienne, FRANCE

Closing & Award Ceremony

Tuesday, 08 October 2019 | 18:30 - 18:45 | Room 1

E-Posters

E-posters are available during the conference days. You can browse pdf versions of the posters through the internet on e-poster stations in the conference venue and on laptop or mobile phone.

A-0004 Mechanization strategy of small-scale contractors in Japan

Akie Kawasaki¹, Katsuhisa Kohroki²

¹Kyushu University, Japan; ²University of Tsukuba, Japan

A-0005 Estimating availability of forest biomass resources in the whole of Japan

Kazuhiro Aruga¹, Battuvshin Biligt², Yusuke Matsuoka¹, Takahisa Yamamoto¹, Hiroaki Shirasawa³

¹Utsunomiya University, Japan; ²Tokyo University of Agriculture and Technology, Japan; ³Forestry and Forest Products Research Institute, Japan

A-0008 Dosing of physical load for hiking infrastructure users in the forests of the Krka national park

Matija Landekić, Ivan Martinić, Mario Šporčić

Forestry Faculty of Zagreb University, Department of Forest Engineering, Zagreb, Croatia

A-0015 Low-cost GNSS applications to area surveying under forest canopy: possibilities and limitations

Tetsuhiko Yoshimura¹, Yasushi Suzuki²

¹Faculty of Life and Environmental Science, Shimane University; ²Faculty of Agriculture and Marine Science, Kochi University

A-0016 Automatic generation of shallow ditch network in forest using LiDAR data and multicpectral satellite imagery

Raitis Melniks, Janis Ivanovs, Andis Lazdins

Latvian State Forest Research Institute "Silava", Salaspils, Latvia

A-0021 Smart sensing technology for predicting forest road's bearing capacity

Franz Holzleitner¹, Michael Fritz¹, Wolfgang Sokol², Fritz Zott³, Christian Kanzian¹

¹Institute of Forest Engineering, Department of Forest and Soil Sciences, University of Natural Resources and Life Sciences, Vienna, Austria ²Institute of Hydraulics and Rural Water Management, Department of Water, Atmosphere and Environment, University of Natural Resources and Life Sciences, Vienna, Austria ³Institute of Mountain Risk Engineering, Department of Civil Engineering and Natural Hazards, University of Natural Resources and Life Sciences, Vienna, Austria

A-0024 An Innovative Timber Felling System Based on Japan's Traditional Technique

Yuko Shirai

Keio University, Tokyo, Japan

A-0025 Application of modern technology for tree growth monitoring

Narongdet Detkong, Nopparat Kaakkurivaara, Roongreang Poolsiri

Department of Forest Engineering, Faculty of Forestry, Kasetsart University, Bangkok, Thailand 10900

A-0027 Natural Language Processing and Identifying Characteristics of Japan's Regional Forests, Forestry and Policies

Ryotaro Okada, Yuko Shirai

Keio University, Tokyo, Japan

A-0028 The efficacy of Chondrostereum purpureum in the sprout control in mechanized pre-commercial thinnings

Tiina Laine¹, Leena Hamberg², Veli-Matti Saarinen¹, Timo Saksa¹

¹Natural Resources Institute Finland (Luke), Suonenjoki, Finland ²Natural Resources Institute Finland (Luke), Helsinki, Finland

A-0034 Logging planning via aerial forest survey

Angkana Thongkam, Nopparat Kaakkurivaara, Payattipol Narangajavana

Department of Forest Engineering, Faculty of Forestry, Kasetsart University, Bangkok, Thailand

A-0048 Incorporating stand properties and bucking objectives for bucking-to-demand harvesting

Jukka Malinen, Markus Mennala

University of Eastern Finland, School of Forest Sciences, Joensuu, Finland

A-0058 Thinning optimization in beech pole stands

Domen Arnič¹, Jurij Diaci², Janez Krč³

¹Slovenian Forest Institute, Department of Forest technique and Economics, Ljubljana, Slovenia, ²University of Ljubljana, Biotechnical Faculty, Department of Forestry and Renewable Forest Resources, Ljubljana, Slovenia

A-0059 Log detection based on deep convolutional neural networks

Kengo Usui, Masahiro Mozuna, Takumi Uemura, Masahiko Nakazawa

National Research and Development Agency Forest Research and Management Organization Forestry and Forest Product Research Institute, Tsukuba, Japan

A-0064 Best Practice Harvesting Procedures to Meet Nature Protection Requirements in Germany

Ute Seeling, Hans-Ulrich Dietz

Kuratorium für Waldarbeit und Forsttechnik, Gross-Umstadt, Germany

A-0065 Unlocking the potential of harvester on-board-computer data in the South African forestry value chain

Marius Terblanche, Simon Ackerman, Pierre Ackerman

Stellenbosch University, Stellenbosch, South Africa

A-0069 Estimation of Forest Road Network Maintenance Cost Considering Collapse Risk : an Application in the Japan Mountainous Region

Masaru Watanabe, Masashi Saito, Hiroaki Shirasawa, Tatsuhiro Ueki

Shinshu University Graduate School, Ina, Japan;

A-0074 Oak Lace Bug in Eastern Slavonia (Croatia), Integrated Forest Protection in FSC Certified Forests and Precautions in Oak Timber Production

Milivoj Franjević, Antonija Kolar, Andreja Đuka, Boris Hrašovec

Faculty of Forestry, University of Zagreb, Zagreb, Croatia

A-0075 The effect of tree plantation-managing technologies on biodiversity

Nóra Szigeti, Imre Czupy, Andrea Vágvölgyi

University of Sopron, Faculty of Forestry, Institute of Forests- and Environmental Techniques, Sopron, Hungary

A-0076 Timber harvests due to abiotic and biotic damage by the example of Egererdő PLC.

Viktória Papp¹, László Babiczki², Szilárd Grédcics², Dóra Szalay¹

¹University of Sopron, Sopron, Hungary; ²Egererdő Plc., Eger, Hungary

A-0078 Datenbasis Waldarbeit - planning tool for average time consumption and costs of standardised forest working procedures

Markus Dög¹, Andrea Hauck², René Maxeiner³

¹Georg-August-Universität Göttingen, Abt. Forstökonomie, Göttingen, Germany; ²Kuratorium für Waldarbeit und Forsttechnik e.V., Groß-Umstadt, Germany; ³Georg-August-Universität Göttingen, Abt. Arbeitswissenschaft und Verfahrenstechnik, Göttingen, Germany

A-0080 Developing and evaluating logistics chains when using debarking processor heads (Debarking Heads II)

Andrea Hauck¹, Jochen Grünberger¹, Bernd Heinrich¹, Joachim B. Heppelmann^{2,3}, Ute Seeling¹, Stefan Wittkopf²

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Germany; ³Department of Ecology and Ecosystem Management, Technical University of Munich, Freising, Germany;

A-0082 Forest Work in the Tropics in the Focus of Work Science

Siegfried Lewark

Chair of Forest Work Science, University of Freiburg, Germany

A-0085 Dendromass4Europe (D4E) - Securing Sustainable Dendromass Production with Poplar Plantations in European Rural Areas

Nataschia Magagnotti, Raffaele Spinelli

CNR Ivalsa, Sesto Fiorentino (FI), Italy

A-0091 Multi-function machine's work qualification

Katalin Szakálosné Mátyás, Ferenc János Sudár, Attila László Horváth

Institute of Forest- and Environmental Techniques, Sopron, Hungary

A-0093 Cost and productivity optimization using different mound preparation methods

Kristaps Makovskis, Dagnija Lazdina, Edgars Dupuzs

Latvian State Forest Research Institute "Silava"

A-0098 Indicator based assessment of trafficability of forest roads

Marian Schönauer¹, Franz Holzleitner², Dariusz Pszeny³, Jarosław Kikulski³, Gernot Erber², Dirk Jaeger¹, Markus Riegler², Stephan Hoffmann^{1,4}

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A-0099 Applicability of harvesters in selective cutting

Attila László Horváth, Mihály Rátky, Katalin Szakálosné Mátyás

University of Sopron, Hungary

A-0100 New method of young stands tending of Douglas fir in North Rhine-Westphalia

Marian Schönauer, Dirk Jaeger

Department of Forest Work Science and Engineering, Georg-August-Universität, Göttingen, Germany

A-0106 Optimization of wood transportation through trucks from wood cutting areas to custom center using GIS technologies

Tihomir Krumov

University of Forestry, Bulgaria

A-0109 Opportunities and Challenges of Forest Biomass Utilization

Dóra Szalay, Viktória Papp

University of Sopron, Faculty of Forestry, Institute of Forest - and Environmental Techniques, Sopron, Hungary

A-0110 The current state of the Russian forest industry complex and calculation of costs of forest operations on the basis of activity-based costing in the Russian Federation.

Evgeny A. Tikhomirov¹, Maxsim A. Bykovskiy²

¹Bauman Moscow State Technical University, Russia; ²Faculty of Forestry, Forest Harvesting, Wood Processing Technologies and Landscape Architecture, Moscow State Forest University, Russia

A-0119 Influence of environmental factors on sedimentary sand of cross drain in operation road

Masashi Saito, Tokito Takezawa, Masaru Watanabe, Shirasawa Hiroaki, Tatsuhito Ueki

Shinshu University, Minamiminowa, Japan

A-0121 INFORMATION-SHARING SYSTEM FOR A NEW HARVESTER EQUIPPED FOR AUTOMATIC ASSESSMENT OF LOG QUALITIES

Masahiko Nakazawa¹, Yukari Matsumura¹, Wataru Tanaka¹, Takumi Uemura¹, Hideo Kato¹, Hiroko Muneoka¹, Chikashi Yoshida¹, Seishiro Taki¹, Kengo Usui¹, Yuji Ikami¹, Kiyohiko Fujimoto¹, Yosuke Matsuda¹, Yutaka Kanazawa², Norio Shirai³

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A-0124 Biomass yield and fuel properties of different poplar SRC clones

Dinko Vusić, Davorin Kajba, Ivan Andrić, Ivan Gavran, Tin Tomić, Ivana Plišo Vusić, Željko Zečić

University of Zagreb, Faculty of Forestry, Zagreb, Croatia

A-0127 SOIL COMPRESSION DEGREE IN STUDIES OF VIBROCOMBINATOR TILLAGE TECHNOLOGIES

Nicutor Boja¹, Florin Boja¹, Dan Vidrean¹, Alin Teuşdea², Adrian Pica³, Ilie Popescu³

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A-0129 Assessment of Costs in Harvesting Systems Using the WoodChainManager Web-based Tool

Matevž Triplat, Nike Krajnc

Slovenian Forestry Institute, Ljubljana, Slovenia

A-0134 Combined rail and truck traffic for raw wood - results and recommendations from a Swiss case study

Lorenz Diefenbach, Martin Ziesak

Bern University of Applied Sciences (BFH) - School of Agricultural, Forest and Food Sciences (HAFL), Bern, Switzerland

A-0137 The impact of weather conditions on production of cost of wood fuels in Estonian conditions - a case study

Marek Irdla, Allar Padari, Peeter Muiste

Estonian University of Life Sciences, Tartu, Estonia

A-0138 Soil preparation mechanization - devices made in Latvia for future forests.

Dagnija Lazdina, Andis Lazdins, Karlis Dumins, Toms Arturs Stals, Kristaps Makovskis, Janis Liepins

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A-0142 Informal Work in a New Book on Tropical Forestry

Siegfried Lewark

Chair of Forest Work Science, University of Freiburg, Germany

A-0148 Quantification of metabolic strain during cable works with a mini forestry crawler

Ferréol Berendt¹, Stephan Hoffmann^{1,2}, Dirk Jaeger², Stephan Prettin³, Janine Schweizer¹

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A-0157 Formulation of the impact on yarding cable using spring-dashpot model

Midori Uenohara¹, Takeshi Matsumoto², Masahiro Iwaoka²

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A-0158 Mechanized harvesting operation in windthrow damaged stands: a case study in the Northeast Italy

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A-0159 Analysis of the Black Locust Stands' Biomass Product in Hungary

Tamás Major, Richárd Iski, Tamás Pintér, Andrea Tünde Kiss, Imre Czupy

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A-0160 Forestry Edu Trainer - Cooperation for Innovation and the Exchange of Good Practices

Andrea Teutenberg, Joachim Morat, Ute Seeling

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A-0162 How can agroforestry improve the success of afforestation and contribute to meeting the growing demand for wood?

Klaudia Kovács, Andrea Vityi

University of Sopron, Institute of Forest and Environmental Techniques, Sopron, Hungary

A-0163 Calculating the cost of integrated harvesting of small-diameter trees dominated stand using various apportioning methods

Libin Thaikkattil Louis, Anil Raj Kizha
School of Forest Resources, University of Maine, Orono, Maine, USA

A-0169 Planning of forest roads network: case study in the mountain natural forests area of Bosnia and Herzegovina

Vladimir Petković¹, Igor Potočnik², Dane Marčeta¹

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A-0170 Distribution of Dead Wood at Different Distances from Forest Roads

Mohsen Mostafa¹, Aidin Parsakhoo², Sima Mohtashami³

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A-0174 A QGIS Plugin for optimized cable road layout planning

Leo Bont¹, Patricia Moll², Laura Ramstein¹, Hans Rudolf Heinemann³

¹WSL, Birmensdorf, Switzerland; ²Patricia Moll, Zurich, Switzerland; ³ETH, Zurich, Switzerland

A-0179 Coppice After 3 Different Cutting Systems: Growth Capacity and Mortality

Carolina Lombardini, Raffaele Spinelli

CNR IVALS, Sesto Fiorentino, Italy

A-0182 A COMPARATIVE LIFE CYCLE ASSESSMENT (LCA) OF FOSSIL OIL AND A NEW INNOVATIVE SOLID BIOMASS CHAINS FOR SMALL-SCALE SPACE HEATING SYSTEM

Raghu KC, Jarno Föhr, Tapio Ranta

Lappeenranta-Lahti University of Technology LUT, Laboratory of Bioenergy, Mikkeli, Finland

A-0186 Manual Cultivation Operations in Poplar Stands: A Characterization of Job Difficulty and Risks of Health Impairment

Tiberiu Marogel-Popa¹, Marius Cheța¹, Marina Viorela Marcu¹, Cristian Ionuț Duță¹, Florin Ioraș², Stelian Alexandru Borz¹

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A-0187 Operational Performance of Partly Mechanized Planting in Willow Short Rotation Coppice

Nicolae Talagai¹, Marina Viorela Marcu¹, Andrea Rosario Proto², Stelian Alexandru Borz¹

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A-0189 Simulation of Harvester Logging Processing and Dynamic Driving Motion Using Unity3D

Zhang Jianting, Huang Qingqing, Liu Jinhao, Cheng Bowen, Xie Danmu

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