

# PLANT-BASED VACCINES, ANTIBODIES & BIOLOGICS

5-7 June 2013, University of Verona, Italy

# FINAL ORAL PROGRAMME & POSTER PROGRAMME PBVA 2013

## SCIENTIFIC ADVISORY PANEL

Conference Chairman: Julian Ma (*St. George's University of London, London, UK*)

Charles Arntzen (*Arizona State University, USA*)

George Lomonosoff (*John Innes Centre, Norwich, UK*)

Kevin Whaley (*Mapp Biopharmaceutical Inc., USA*)

Ralph Bock (*MPI/MPP, Potsdam-Golm, Germany*)

Rainer Fischer (*RWTH Aachen, Germany*)

Maurice Moloney (*BBSRC Rothamsted Research, UK*)

Pascal Drake (*St. George's University of London, London, UK*)

Ed Rybicki (*University of Capetown, South Africa*)

Local Organizer: Mario Pezzotti (*University of Verona, Italy*)

Sun Lee (*Nexgen Biotechnologies Inc., Seoul, Korea*)

Yuri Gleba (*Icon Genetics GmbH, Halle, Germany*)

Hugh Haydon (*Kentucky BioProcessing, Owensboro, Kentucky, USA*)

Jim Larrick (*Panorama Research Inc., USA*)

Scott Deeter (*Ventria Bioscience, Fort Collins, Colorado, USA*)

Marc-Andre D'Aoust (*Medicago Inc., Quebec, Canada*)

Andres Wigdorovitz (*INTA, Buenos Aires, Argentina*)



08.55-09.00

**Welcome to Verona & Opening Remarks**

Mario Pezzotti (*University of Verona, Verona, Italy*)

**SESSION 1:  
OPENING PLENARY SESSION**

Moderator: Mario Pezzotti (*University of Verona, Verona, Italy*)

09.00-09.30

**'Taliglucerase alfa for treating Gaucher disease, the first plant derived approved product'**

Einat Almon (*Protalix Biotherapeutics, Carmiel, Israel*)

09.30-10.00

**'Commercializing plant-based therapeutics and bioreagents'**

Scott Deeter (*Ventria Biosciences, Fort Collins, Colorado, USA*)

10.00-10.30

**'Transient expression for the rapid production of virus-like particles in plants'**

George P. Lomonosoff (*The John Innes Centre, Norwich, UK*)

10.30-11.00

**'Plant-derived Non-Hodgkins lymphoma vaccine: Preliminary results & lessons learned'**

John-Edward Butler Ransohoff

(*Bayer Innovation GmbH, Leverkusen, Germany*)

11.00-11.30

Coffee Break & Poster Set-Up

**SESSION 2:  
VACCINES I**

Moderator: George P. Lomonosoff (*The John Innes Centre, Norwich, UK*)

11.30-12.00

**'Norovirus vaccine formulation to avoid cold chain requirements and mucosal delivery'**

Charles J. Arntzen (*Arizona State University, Tempe, Arizona, USA*)

12.00-12.25

**'Technology progress in PMP research'**

Yuri Gleba (*Icon Genetics GmbH, Halle (Saale), Germany*)

12.25-12.50

**'Plant made veterinary vaccines: Our experience over the last decade'**

Andres Wigdorovitz (*INTA, Buenos Aires, Argentina*)

12.50-13.10

**'Expression and purification of beak and feather disease virus capsid protein in tobacco using elastin-like polypeptide fusions'**

Ann E. Meyers, Lucian Duvenage, Inga I. Hitzeroth and Edward P. Rybicki (*University of Cape Town, Cape Town, South Africa*)

13.10-13.30

**'Expression of rotavirus capsid proteins in *N. benthamiana* using an *Agrobacterium*-mediated transient expression system'**

Inga I. Hitzeroth, David L.R. Mutepefa and Edward P. Rybicki (*University of Cape Town, Cape Town, South Africa*)

13.30-14.30

Lunch Break & Posters

**SESSION 3:  
TECHNOLOGY ADVANCES**

Moderator: Rainer Fischer (*RWTH Aachen, Aachen, Germany*)

14.30-14.55

**'Virus-derived ssDNA vectors for the expression of foreign proteins in plants'**

Edward P. Rybicki (*University of Cape Town, Cape Town, South Africa*)

14.55-15.15

**'Protein expression systems based on 'full virus' strategy may yet be improved'**

E.V. Sheshukova, T.V. Komarova and Y.L. Dorokhov (*N.I. Vavilov Institute of General Genetics RAS, Moscow, Russia*)

15.15-15.35

**'Exploiting virus homologous interference for the production of complex mixes of recombinant proteins'**

Diego Orzaez (*IPMCP-CSIC, Valencia, Spain*)

15.35-15.55

**'Investigation of the role of elastin-like polypeptides, hydrophobin fusion tags and recombinant protein accumulation levels as critical elements of protein body biogenesis in *Nicotiana benthamiana* leaves'**

Reza Saberianfar, J. Joensuu and Rima Menassa (*Agriculture and Agri-Food Canada, London, Ontario, Canada*)

15.55-16.15

**'Hydrophobin fusion technology assisted production of recombinant proteins in tobacco BY-2 suspension cells'**

Lauri Reuter, Michael Bailey, Jussi J. Joensuu and Anneli Riotala (*VTT-Technical Research Centre, Finland*)

16.15-16.30

Tea Break & Posters

**SESSION 4:  
PERSPECTIVES**

Moderator: Charles J. Arntzen

(*Arizona State University, Tempe, Arizona, USA*)

16.30-16.55

**'Anti-fragility: Big picture issues in pharmaceutical development'**

Jim W. Larrick (*Panorama Research, Mountain View, California, USA*)

16.55-17.20

**'Commercial paths to introducing molecular farming – an analysis of 15 case studies'**

Mathew Paul, Harry Thangaraj and Julian Ma (*St. George's University of London, London, UK*)

17.20-17.40

**'Current issues on patent protection – a comparative overview of issues pertaining to plant related protection considering the US, Europe and Canada'**

Konrad Sechley (*Gowling Lafleur Henderson LLP, Vancouver, British Columbia, Canada*)

17.40-18.00

**'COST Action Update'**

Stefan Schillberg (*Fraunhofer IME, Aachen, Germany*)

18.00-18.15

**'Society for Molecular Farming – A Proposal'**

Julian Ma (*St. George's University of London, London, UK*)

18.15-19.15

PBVA 2013 Welcome Reception & Poster Session

**SESSION 5:  
ANTIBODIES I**

Moderator: Jim W. Larrick (*Panorama Research, Mountain View, California, USA*)

09.00-09.30

**'Pharma-Planta – The European project to introduce plant-derived monoclonal antibodies to the clinic'**

Rainer Fischer (*RWTH Aachen, Aachen, Germany*)

09.30-09.50

**'Development of a Nicotiana-derived version of Synagis (anti-RSV)'**

Larry Zeitlin, Ognian Bohorov, Natasha Bohorova, Charles Goodman, Andrew Hiatt, Do Kim, Michael Pauly, Jesus Velasco, Kevin J. Whaley, Dale L. Barnarda, James E. Crowe, Jr, Pedro A. Piedra, Brian E. Gilbert (*MAPP Biopharmaceuticals, San Diego, California, USA*)

09.50-10.05

**'Development of a passive immunization cocktail for HIV using plant-based antibodies'**

Wing-Fai Cheung, Erin Gilbert, John Treat, Jessica Rouleau, Linda Veldhuis, Fang Lui, Zacherie LeBlanc, Haifeng Wang, Michael Marit, Michael D. McLean, David Willer, Kelly MacDonald and J. Christopher Hall (*PlantForm Corporation/University of Guelph, Guelph, Ontario, Canada*)

10.05-10.20

**'Functional analysis of plant-derived MAb therapeutics for West Nile Virus with multiple specificities'**

Qiang 'Shawn' Chen, Huafang Lai, Matthew Dent, Junyun He, Xiachong Zhou, Kahlin Leuzinger, Jake Stahnke, Jonathan Hurtado, Reshma Kumar and Christopher Brock (*Arizona State University, Tempe, Arizona, USA*)

10.20-10.35

**'Biogeneric antibodies made in plants'**

Victor Klimyuk (*Icon Genetics GmbH, Halle (Saale), Germany*)

10.35-10.50

**'Lama antibodies inspired simple porcine IgAs produced in Arabidopsis seeds reduced enterotoxigenic Escherchia coli infection on oral administration in piglets'**

Vikram Viridi, Annelies Coddens, Sylvie De Buck, Sam Miller, Bruno Goddeeris, Eric Cox, Henri De Greve and Ann Depicker (*VIB, University of Gent, Gent, Belgium*)

10.50-11.05

**'Production of bivalent VHH-Fc antibodies in Arabidopsis thaliana seeds, Nicotiana benthamiana leaves and Pichia pastoris'**

Thomas De Meyer, Jonah Nolf, Sylvia De Buck and Ann Depicker (*VIB-PSB/University of Gent, Gent, Belgium*)

11.05-11.30

Coffee Break & Posters

**SESSION 6:  
VACCINES II**

Moderator: Julian Ma (*St. George's University of London, London, UK*)

11.30-12.00

**'Developing plant-made influenza vaccines: From discovery to commercial scale production'**

Marc-Andre D'Acoust (*Medicago Inc., Quebec, Canada*)

12.00-12.30

**'Preclinical evaluation of VLP-based malaria transmission blocking vaccine'**

Konstantin Musiychuk and Vidadi Yusibov (*Fraunhofer USA Center for Molecular Biotechnology, Newark, Delaware, USA*)

12.30-12.55

**'PRX-102, modified alfa-galactosidase enzyme for treating Fabry disease- Product development'**

Yoseph Shaaltiel (*Protalix Biotherapeutics, Carmiel, Israel*)

12.55-13.15

**'Testing an HIV vaccine using live Vaccinia virus and plant-produced Gag and dgp41 virus-like particles'**

Lydia R. Meador, Sarah A. Kkessans, Jacquelyn Kilbourne, Karen L. Denzler, Karen Kibler, Bertram L. Jacobs and Tsafrir S. Mor (*Arizona State University, Tempe, Arizona, USA*)

13.15-13.35

**'Safety and efficacy of plant-produced Griffithsin for antiviral indications'**

Daniel Tusé (*Intrucept Biomedicine, Owensboro, Kentucky, USA*) and Kenneth E. Palmer (*Intrucept Biomedicine/University of Louisville School of Medicine, Owensboro, Kentucky, USA*)

13.35-14.30

Lunch Break & Posters

**SESSION 7:  
MANUFACTURING & PRODUCTION SYSTEMS  
DEVELOPMENTS**

Moderator: Edward P. Rybicki (*University of Cape Town, Cape Town, South Africa*)

14.30-14.50

**'Plant virus-based systems in autoimmune diseases: From screening to treatment'**

Linda Avesani, M. Merlin, R. Zampieri, E. Tinazzi, E. Gecchele and M. Pezzotti (*University of Verona, Verona, Italy*)

14.50-15.10

**'BryoTechnology™ en route to the clinic'**

Andreas Schaaf (*Greenovation Biotech GmbH, Freiburg, Germany*)

15.10-15.25

**'CoMoFarm – Contained molecular farming: Controlled contained systems for high yield and consistency'**

Stefan Schillberg (*Fraunhofer IME, Aachen, Germany*)

15.25-15.40

**'Hydroponic cultivation of tobacco for the production of recombinant pharmaceutical proteins by rhizosecretion'**

Pascal Drake (*St. George's University of London, London, UK*)

15.40-15.55

**'Genetic engineering of Nicotiana benthamiana to improve recombinant protein production'**

Ling Yuan, Sanjay Singh, Muqiang Gao, David Zaitlin, Rich Mundell and Orlando Chambers (*KTRDC, University of Kentucky, Lexington, Kentucky, USA*)

15.55-16.10

**'Development of suspension cells as a competitive production system for antibodies'**

Bertrand Magy, Jeremie Tollet, Marc Boutry and Catherine Navarre (*University Catholique de Louvain, Louvain, Belgium*)

16.10-16.25

**'Molecular farming: Regulatory developments'**

Juergen Drossard (*RWTH Aachen, Aachen, Germany*)

16.25-16.45

Tea Break & Posters

...continued overleaf

**SESSION 8:  
INTERACTIVE DISCUSSION SESSION:**

16.45-18.00

**'Commercialisation of molecular pharming products – objectives and targets for the next 5 years'**

**Lead Moderators:**

Hugh Haydon (*Kentucky Bioprocessing LLC, Owensboro, Kentucky, USA*)

Julian Ma (*St. George's University of London, London, UK*)

*Including:*

**'Solmab, Inc., an integrated PMP Development and commercialization enterprise'**

Hugh Haydon (*Kentucky Bioprocessing LLC, Owensboro, Kentucky, USA*)

**Expert Panel:**

Einat Almon, John Butler, Kevin Whaley, Scott Deeter and Marc-Andre D'Aoust

*Evening: PBVA 2013 Conference Dinner*

FINAL CONFERENCE PROGRAMME · FRIDAY 7TH JUNE

**SESSION 9:  
ANTIBODIES II**

Moderator: Kevin Whaley (*MAPP Biopharmaceuticals, San Diego, California, USA*)

09.00-09.30

**'Upstream process optimization and GMP production of recombinant monoclonal antibodies in the SYNLEX duckweed-based expression platform'**

Vincent Wingate

(*Synthon Pharmaceuticals Inc., Research Triangle Park, North Carolina, USA*)

09.30-09.50

**'Non-human primate testing of Nicotiana-derived monoclonals for Ebola virus therapy'**

Larry Zeitlin (*MAPP Biopharmaceuticals, San Diego, California, USA*)

09.50-10.05

**'Production and characterisation of rabies monoclonal antibody in tobacco'**

Craig van Dolleweerd, Leonard Both, Audrey Teh, Tony Fooks, Ashley Banyard and Julian Ma (*St. George's University of London, London, UK*)

10.05-10.20

**'Generation of biologically active IgMs with human-like N-glycans in plants'**

Andreas Loos, Clemens Gruber, Frank Hensel, Cesar Costa, Alexandra Castilho, Michael Rudolf, Friedrich Altmann and Herta Steinkellner

(*University of Natural Resources and Life Sciences, Vienna, Austria*)

10.20-10.35

**'Hepatitis B, Nicotiana, and Alpaces: Towards a plant-based antibody display platform'**

Hadrien Peyret, Eva C. Thuenemann and George P. Lomonosoff

(*John Innes Centre, Norwich, UK*)

10.35-10.50

**'Expression and characterisation of VRC01, a potent and broadly neutralising anti-HIV Mab, in tobacco'**

Audrey Teh and Julian Ma (*St. George's University of London, London, UK*)

10.50-11.05

**'IgA versions of three blockbuster antibodies have high mannose type glycans and are poorly secreted in planta'**

Ruud Wilbers, Lotte Westerhof, Debbie van Raaij, Aska Goverse, Maurice Henquet, Thamara Hesselink, Dirk Bosch, Jaap Bakker and Arjen Schots (*Wageningen University, Wageningen, The Netherlands*)

11.05-11.20

**'Engineering antibodies in plants: Addressing next generation biopharming'**

Eugenio Benvenuto, Marcello Donini, Cristina Capodicasa, Mariasole Di Carli, Marcello Catellani, Raffaele Lombardi and Maria Elena Villani (*ENEA, Rome, Italy*)

11.20-11.35

Coffee Break & Posters Breakdown

**SESSION 10:  
BIOLOGICS**

Moderator: Yuri Gleba (*Icon Genetics GmbH, Halle (Saale), Germany*)

11.35-11.55

**'A chlamydomonas-derived human papillomavirus 16 E7 vaccine induces specific tumor protection'**

Olivia C. Demurtas, Silvia Massa, Paola Ferrante, Aldo Venuti, Giovanni Giuliano and Rosella Franconi (*ENEA, Rome, Italy*)

11.55-12.15

**'A completed clinical trial of 'edible canine interferon' using transgenic strawberry fruits in the closed-plant factory system'**

Noriko Tabayashi, Akira Ito, Ko Sato, Toru Gotanda, Noriko Itchoda, Uiko Kagaya, Naomi Himeno, Kuniaki Yoshioka and Takeshi Matsumura (*Plant Biotechnology Center, Hokusan C., Ltd, Hokkaido, Japan*)

12.15-12.35

**'Plant-produced butyrylcholinesterase variants as versatile bioscavengers'**

Tsafrir Mor (*Arizona State University, Tempe, Arizona, USA*)

12.35-12.55

**'Plant-derived recombinant human butyrylcholinesterase: The synthesis of multi-sialylated glyco-forms'**

Jeannine D. Schneider, Alexandra Castilho, Laura Neumann, Friedrich Altmann, Andreas Loos, Latha Kannan, Tsafrir Mor and Herta Steinkellner (*University of Natural Resources and Life Sciences, Vienna, Austria*)

12.55-13.10

**'Production of a subunit vaccine candidate against porcine post-weaning diarrhea in high-biomass transplastomic tobacco'**

Rima Menassa, Igor Kolotilin, Angelo Kaldis, Berty Devriendt, Jussi Joensuu and Eric Cox (*Agriculture and Agri-Food Canada, London, Ontario, Canada*)

13.10-13.25

**'Production of antimicrobials using plant-based transient expression systems'**

Anatoli Giritch, Luisa Bortesi, Steve Schulz, Anett Stephan and Franziska Jarczowski (*Nomad Bioscience GmbH, Halle (Saale), Germany*)

13.25-13.35

**PBVA 2013 Wrap-Up & Closing Remarks**

Yuri Gleba (*Icon Genetics GmbH, Halle (Saale), Germany*)

13.35

Lunch & Departure



Poster 101

**'Agroinfiltration-mediated transient foreign gene expression in medicinal plant (*Melissa officinalis*)'**

Hamideh Ofoghi et al. (*IROST, Tehran, Iran*)

Poster 102

**'Transient expression of monoclonal antibody against rabies virus protein G in tobacco leaves'**

P. Ehsani et al. (*Pasteur Institute of Iran, Tehran, Iran*)

Poster 103

**'Production of human butyrylcholinesterase-based cocaine hydrolases in *Nicotiana benthamiana*'**

Katherine E. Larrimore et al. (*Arizona State University, Tempe, Arizona, USA*)

Poster 104

**'Expression of EPO-Fc in plants with highly sialylated N- and O-linked glycans'**

Alexandra Castilho et al.

(*University of Natural Resources and Life Sciences, Vienna, Austria*)

Poster 105

**'In planta chloroplast engineering of the avian influenza vaccine candidates through the gateway cassettes of a reporter'**

Sandy Hwei-San Loh et al.

(*University of Nottingham Malaysia Campus, Selangor, Malaysia*)

Poster 106

**'Production of dimeric hybrid-IgA specific for Shiga toxin 1 in *Arabidopsis thaliana*'**

Katsuhiro Nakanishi et al. (*University of Shizuoka, Shizuoka, Japan*)

Poster 107

**'High yield production of transgenic *N. benthamiana* expressing antibody by using hydroponics in closed plant factory'**

Yasushi Tasaka et al. (*AIST, Toyohira, Hokkaido, Japan*)

Poster 108

**'Expression of consensus dengue virus envelope domain III and mucosal adjuvant fusion protein in transgenic rice calli'**

Moon-Sik Yang (*Chonbuk National University, Republic of Korea*)

Poster 109

**'Expression of mucosal adjuvant-neutralizing epitope from porcine epidemic diarrhea virus fusion protein in transgenic rice calli'**

Moon-Sik Yang (*Chonbuk National University, Republic of Korea*)

Poster 110

**'Production and characterization of human pepsin I in transgenic plant cell suspension culture'**

Nan-Sun Kim and Moon-Sik Yang

(*Chonbuk National University, Republic of Korea*)

Poster 111

**'Expression of recombinant monoclonal antibody against rheumatoid arthritis in *Nicotiana benthamiana* using an *Agrobacterium*-mediated transient expression system'**

Nan-Sun Kim and Moon-Sik Yang

(*Chonbuk National University, Republic of Korea*)

Poster 112

**'Improvement of recombinant trypsin by utilization of an alternative carbon source in transgenic plant cell culture'**

Nan-Sun Kim and Moon-Sik Yang

(*Chonbuk National University, Republic of Korea*)

Poster 113

**'Evaluation of the efficacy of *Nicotiana*-derived monoclonal antibodies in animal models'**

Natasha Bohorova et al.

(*Mapp Biopharmaceuticals Inc., San Diego, California, USA*)

Poster 114

**'Antibody-based multipurpose prevention technologies: HIV-1 neutralization capacity and mucosal pharmacokinetics of MB66'**

Ognian Bohorov et al. (*Mapp Biopharmaceuticals Inc., San Diego, California, USA*)

Poster 115

**'Biosynthesized gold nanoparticles as potential vaccine adjuvants and delivery systems'**

Vincent B.S.-Lee et al. (*Monash University, Clayton, Victoria, Australia*)

Poster 116

**'Transgenic *Nicotiana benthamiana* expressing a part of cucumber mosaic virus (CMV) genome complement to express a foreign gene using agroinfection for amplification of CMV-vector based constructs'**

Noriho Fukuzawa et al.

(*National Institute of Advanced Industrial Science, Sapporo, Japan*)

Poster 117

**'Production of the high quality, natural-like recombinant allergens needed for high efficiency of allergy treatment'**

Loic Faye et al. (*ANGANY Genetics, Rouen, France*)

Poster 118

**'Ectopic protein bodies, a novel strategy for oral delivery of recombinant proteins'**

Anna Hofbauer et al. (*BOKU, Vienna, Austria*)

Poster 119

**'Engineering rice suspension cells for production of pharmaceutical recombinant glycoproteins with inducible human-like N-glycan structure'**

Li-Fen Huang (*Yuan Ze University, ChungLi, Taiwan*)

Poster 120

**'Producing mouse granulocyte-macrophage colony stimulating factor in sweet potato'**

Chung An Lu et al. (*National Central University, ChungLi, Taiwan*)

Poster 121

**'Expression and purification of Horseradish Peroxidase (HRP C) transiently expressed in *Nicotiana benthamiana*'**

Suzanne M. Huddy et al. (*University of Cape Town, Cape Town, South Africa*)

Poster 122

**'Folium: Tobacco as a platform for foliar biosynthesis of advanced hydrocarbon fuels'**

Richard Mundell et al. (*University of Kentucky, Lexington, Kentucky, USA*)

Poster 123

**'Expression of hepadnavirus capsid proteins in *N. benthamiana* using transient expression system'**

Milena Mazalovska et al. (*University of Plovdiv, Plovdiv, Bulgaria*)

Poster 124

**'Expression of envelope domain III (EDIII) based dengue antigens in tobacco chloroplasts and their molecular analyses'**

Hanne Skomedal et al.

(*Norwegian Institute for Agriculture and Environmental Research, As, Norway*)

Poster 125

**'Development of closed plant factory for plant-made pharmaceuticals'**

Mariko Hayakumo et al. (*Kajima Corporation, Tokyo, Japan*)

Poster 126

**'Environmental optimization of strawberry cultivation for production of biopharmaceuticals in a closed plant factory system'**

Hiroyuki Takasuna et al. (*Kajima Corporation, Tokyo, Japan*)

Poster 127

**'Improvements in the efficiency of expression of the protein E2Tof the BVDV in transgenic alfalfa plants in a context of development transference'**

Andres Wigdorovitz et al. (*Virology Institute, INTA, Buenos Aires, Argentina*)

Poster 128

**'Immunogenicity of recombinant E2 protein of bovine viral diarrhea virus expressed in transgenic alfalfa plants'**

Andres Wigdorovitz et al. (*Virology Institute, INTA, Buenos Aires, Argentina*)

Poster 129

**'Expression of VP8d fused to Brucella spp. Lumazine synthase in tobacco chloroplasts as a low-cost platform for highly immunogenic antigen production'**

Andres Wigdorovitz et al. (*Virology Institute, INTA, Buenos Aires, Argentina*)

Poster 130

**'Co-expression of an elastin-like protein as a strategy to improve accumulation of a full antibody in *N. benthamiana* leaf tissue'**

Silvana Petrucci and Gonzalo Acevedo

(*Universidad Nacional de La Plata, La Plata, Argentina*)

Poster 131

**'Vacuolar transport and deposition of mAbs in *N. benthamiana* leaves'**

Silvana Petrucci et al. (*Universidad Nacional de La Plata, La Plata, Argentina*)

Poster 132

**'Confining human tissue transglutaminase (htTG) into plant secretory pathway as strategy to increase protein yields'**

Silvana Petrucci et al. (*Universidad Nacional de La Plata, La Plata, Argentina*)

Poster 133

**'Plant production of BPV L1 VLPs, and their modification to allow presentation of sheep scab mite antigens on their surface'**

Andrew J. Love et al. (*The James Hutton Institute, Dundee, Scotland, UK*)

Poster 134

**'Effects of temperature and photosynthetic photon flux density on hemagglutinin content in *Nicotiana benthamiana* leaves in a viral vector-mediated transient gene expression system'**

Ryo Matsuda et al. (*The University of Tokyo, Tokyo, Japan*)

Poster 135

**'Catalog of translational enhancers for recombinant protein production in plant cells'**

Takeshi Matsui et al. (*Idemitsu Kosan Co. Ltd., Chiba, Japan*)

Poster 136

**'Hydrophobin fusion as a tool to produce a soluble influenza vaccine in *Nicotiana benthamiana*'**

Nicolas Jacquet et al.

(*Universite Catholique de Louvain, Louvain-la-Neuve, Belgium*)

Poster 137

**'A plant produced PRRSV subunit vaccine'**

Robin Piron et al. (*University of Gent, Gent, Belgium*)

Poster 138

**'Agriculture process for manufacturing cellulases in plants using *Agrobacterium* spray-based transient expression'**

Simone Hahn et al. (*Nomad Bioscience GmbH, Halle (Saale), Germany*)

Poster 139

**'Effects of nitrate and sodium chloride concentrations of nutrient solution on accumulation of hemagglutinin in *Nicotiana benthamiana* in viral vector-mediated transient expression'**

Naomichi Fujiuchi et al. (*The University of Tokyo, Tokyo, Japan*)

Poster 140

**'Towards the improvement of a rhizosecretion-based recombinant protein production system: Developing protease-depleted lines of *Arabidopsis thaliana*'**

J. Lallemand et al. (*University of Liege, Liege, Belgium*)

Poster 141

**'The yield of IgG expression in plant suspension cells depends on the isotype'**

Bertrand Magy et al. (*University of Louvain, Louvain, Belgium*)

Poster 142

**'Mucin-type O-glycosylation engineering in plants'**

Richard Strasser et al.

(*University of Natural Resources and Life Sciences, Vienna, Austria*)

Poster 143

**'Strategies for enhancing efficacy of plant-made vaccines and therapeutics'**

Jorge Ayala et al. (*Arkansas State University, Jonesboro, Arkansas, USA*)

Poster 144

**'Oral vaccination with plant-derived VP2 against IBDV'**

Evangelina Gomez et al. (*CICVyA, INTA Castelar, Argentina*)

Poster 145

**'Expression of human mini-insulin protein in transgenic tobacco plant'**

Ky Young Park et al. (*Sunchon National University, Suncheon, South Korea*)

Poster 146

**'Expression of a tolerizing antigen in soybean seeds for use in treating multiple sclerosis'**

Ken Pillier (*SoyMeds Inc./University of North Carolina, Charlotte, North Carolina, USA*)

Poster 147

**'A novel one-step purification of recombinant proteins from plants using genetic fusion to soybean agglutinin'**

Shengwu Ma et al. (*Plantigen Inc., London, Ontario, Canada*)

Poster 148

**'Downstream processing strategy for purification of hGAD65mut from tobacco leaf material'**

E. Gecchele et al. (*University of Verona, Verona, Italy*)

Poster 149

**'CPMV-HT: A transient expression system for high-level production of proteins in plants'**

Pooja Saxena et al. (*John Innes Centre, Norwich, UK*)

Poster 150

**'Developing plant-based biologics at CSIR Biosciences'**

Martha M. O'Kennedy et al. (*CSIR Biosciences, Pretoria, South Africa*)

Poster 151

**'Developments in plant-derived therapeutic vaccines against HPV-related cancers'**

Rosella Franconi et al. (*ENEA, Rome, Italy*)

Poster 152

**'Plant-derived recombinant IgA for human infectious diseases'**

Cristina Capodicasa et al. (*ENEA, Rome, Italy*)

Poster 153

**'RNA thermostability – An approach for enhancing heterologous protein expression in plants'**

James M. Maclean et al. (*Planet Biotechnology Inc., Hayward, California, USA*)

Poster 154

**'A CMG2-Fc fusion produced in transgenic tobacco protects rabbits and cynomolgus macaques from a lethal aerosolized challenge with *Bacillus anthracis* Ames spores'**

Keith L. Wycoff et al. (*Planet Biotechnology Inc., Hayward, California, USA*)

\* This final programme is correct at the time of printing. However the organisers reserve the right to make any alterations that may be required in the interests and integrity of the final programme.