**ANNEX 9 – WORKSHOP TRAINING REPORT AND PROGRAMME**: Banana research in Africa: Modern breeding techniques, regulatory and biosafety issues; 19th-30th September 2016; NARL, Kawanda, Uganda.

**TRAINING REPORT**

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| ***TITLE/TOPIC*** | **Banana research in Africa: Modern breeding techniques, regulatory and biosafety issues** |
| ***ORGANIZING UNIT/PROJECT*** | Banana breeding unit.International Plant Biotechnology Outreach of VIB, Ghent University and KU Leuven, in collaboration with Uganda's National Agricultural Research Organization (NARO) and International Institute of Tropical Agriculture (IITA), and linked to the IITA-led Project: *Improvement of banana for smallholder farmers in the Great Lakes Region of Africa* |
| **DATE AND LOCATION** | 19th – 30 September, 2016, Kawanda Research Station, Kampala, Uganda |
| **RATIONALE OF THE TRAINING**  | To create a network of scientists across Africa to share lessons and build on successes and learn about the regulatory and risk assessment principles relevant to Africa. To train decision makers to faster approve and assist with the release of new hybrids and GM bananas. |
| OBJECTIVES | Train participants on modern breeding techniques, how to collect relevant and reliable data to perform risk analysis, and on how to communicate scientific results and goals. |
| COURSE OUTLINE/DESCRIPTION | Workshop included some formal presentations as well as field and practical demonstration and training; attendees worked together with each other. See below table |
| ***PARTICIPANTS ATTENDED*** (please break down by gender, and grouping (country, research centers, community, private professional, civil society, government professional, etc.) | 28 participants 14 female, 14 male;See table-Nigeria: 6; Kenya: 2; Malawi: 1; Ghana: 2; Cameroon: 1; Tanzania: 2; Uganda: 14-University: 4; Research institute: 19; National agency: 5 |
| CORE COMPETENCY | Students, scientists and professionals from the public and industrial sector, who are involved in local crop (banana) improvement or GM regulatory programs. |
| CRP | RTB |
| HUB | Eastern |
| PREREQUISITE | Researchers and breeders involved in breeding programmes and especially Banana BreedingHolder of Bachelor (or equivalent) in Science, Plant Biotechnology, Agricultural or Bioengineering SciencesGood knowledge of English |
| ***TRAINING LANGUAGE*** | English |
| **LIST OF MATERIALS DISTRIBUTED**  | De Buck, S. and Swennen, R. 2016. Bananas the Green Gold of the South. VIB Fact Series. IPBO, Ghent, Belgium. 55 pages |
| **TRAINING METHODS APPLIED** (Methods include: lecture, field visit, panel discussion, multimedia presentation, group practice, etc.) | lectures, demonstrations, group session, field sessions,  |
| **EXPECTATIONS EXPRESSED BY THE PARTICIPANTS AT THE BEGINNING OF THE COURSE** | To understand what is banana breeding and why the impact is so slow.  |
| HOW FAR HAVE THE EXPECTATIONS BEEN MET? | Participants have learned that banana hybrids exists and that through better policymaking, communications, results interpretation, that existing banana hybrids and GM plants can be faster released to farmers. |
| **CHALLENGES/BARRIERS ENCOUNTERED** | Decision making and rules are not clear for each country |
| **LESSONS/RECOMMENDATIONS** | Provides an opportunity for scientists in Africa to advance their research and communication skills and by networking they can learn on progress from each other. |
| **OVERALL COST OF HOLDING THE TRAINING** | $26,237.20 USD  |
| ***ATTACHMENT:***1. Calendar
2. List of training materials
3. List of Participants
4. Result of training evaluation
5. Photos

Others | See: <http://www.isaaa.org/kc/cropbiotechupdate/article/default.asp?ID=14836>See below |
|  De Buck S. and Swennen R. 2016. Bananas the green gold of the South, VIB Fact seriesDropbox: <https://www.dropbox.com/sh/409zpvd2ic3szy5/AACiYubEnjAL1RI7J7pHKwMya?dl=0> |
| See below |
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| **Participants** |  |  |  |
| **Aderinola Patrick****Adu-Gyamfi Monica Ode****Ali Milton****Amumpaire Doreen****Arogudade Olawale****Buregyeya Henry****Emerenini Emilymary****Kemigisa Juliet****Meke Gerald****Monono Ekwa Yawa****Muoma John****Musiime Deneth****Musungu Sally****Mwami Charles****Mwangi Mary****Mulongo Martha****Namuddu Mary Gorreth****Nansamba Moureen****Nkansah Bella Rosaling****Nwachukwu Emmanuel Chika****Nyangwire Betty****Olaniyi Monioluwa Omolara****Oragwa Leonard****Oyesigye Naboth****Oweitu Celsus Ceasar****Rwakaharuza Alivan****Samanya Lillian****Swai Digna** | NigeriaGhanaUgandaUgandaNigeriaUgandaNigeriaUgandaMalawiCameroonKenyaUgandaKenyaUgandaKenyaUgandaUgandaUgandaGhanaNigeriaUgandaNigeriaNigeriaUgandaUgandaUgandaUgandaTanzania | National Biotechnology Development Agency (NABDA)CSIR-CROPS Research InsituteNational Agricutltural Research Laboratories (NARL)NARLNational Horticultural Research InsituteNARLNational Biotechnology Development AgencyNARLNational Biosafety Regulatory CommitteeInstitute of Agricultural Research for Development (IRAD)Masinde Muliro University of Science and TechnologyNARLUniversity of NairobiNARLKenyatta UniversityNARLNARLNARLFood and Drugs AuthorityNABDANARLNational Open University of NigeriaNABDANARLNARLNARLNational Crops Resources Research Institute (NaCCRI)International Institute of Tropical Agriculture | paderynola@gmail.comKonashiela2005@yahoo.comMalibiotech18@gmail.comamumpadoreen@gmail.comArogundade\_olawale@yahoo.co.ukrodneyb@kari.go.ugemereniniemilymary@gmail.comkemij25@gmail.comgmeke@hotmail.comymekwado@yahoo.comjmuoma@mmust.ac.kedenmusiime@yahoo.commrnmusungu@gmail.commukcharles@gmail.commwangi.mary@ku.ac.kemerciemulo@gmail.commariegorreth@gmail.commoureen.nansamba@gmail.combella.nkansah@fdaghana.gov.ghmrechika@gmail.combettynyangwire@gmail.commolaniyi@noun.edu.ngleojy4real@yahoo.comnabothoyesigye@ymail.comoweitu@gmail.comrwakaharuza@gmail.comsamanya.lillian@gmail.comdignaswai@yahoo.com |

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| **Organizers** |  |  |  |
| **De Buck Sylvie****Gheysen Godelieve****Heijde Marc****Kubiriba Jerome****Magala Annette Nakitende****Swennen Rony** | BelgiumBelgiumBelgiumUgandaUgandaBelgium | IPBO/VIB-UGentIPBO and UGentIPBO/VIB-UGentNARONAROKULeuven and IITA | sylvie.debuck@vib-ugent.begodelieve.gheysen @ugent.bemarc.heijde@vib-ugent.beJkubiriba2012@gmail.comamagala@kari.go.ugRony.swennen@kuleuven.be |  |

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| **Lecturers** |  |  |  |
| **Arinaitwe Geoffrey****Bua Stephen****Brown Allan****Coyne Danny****Iraki Bibiana****Kikulwe Enoch****Kimunye Janet****Mbabazi Ruth****Nguthi Faith****Rüdelsheim Patrick****Ssali Tendo****Tinzaara William****Tripathi Leena****Tumuhimbise Robooni****Uwimana Brigitte****Vuylsteke Marnik** | UgandaUgandaTanzaniaKenyaKenyaUgandaKenyaUSAKenyaBelgiumUgandaUgandaKenyaUgandaUgandaBelgium | NARONAROIITAIITAISAAABioversity InternationalIITAMSUISAAAPerseusNAROBioversity InternationalIITANAROIITAGnomixx | aggarinaitwe@gmail.combuahs@yahoo.comA.brown@cgiar.orgD.coyne@cgiar.orgbiraki@isaaa.orge.kikulwe@cgiar.orgj.kimunye@cgiar.orgmbabazi@msu.edufnguthi@isaaa.orgpatrick.rudelsheim@perseus.eutendo@kari.go.ugw.tinzaara@cgiar.orgL.Tripathi@cgiar.orgrtumuhimbise@kari.go.ugB.Uwimana@cgiar.orgMarnik@gnomixx.com |

**Detailed Programme**



**Banana research in Africa: Modern breeding techniques, regulatory and biosafety issues**

19th-30th September 2016

**Program**

Venue: National Agricultural Research Laboratories, NARO-Kawanda, P.O. Box 7065, Uganda

**Room: NARL-Conference Hall Kawanda**



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| Sunday September 18, 2016 |
| Arrival of the participants, registration hotel |

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| Monday September 19, 2016 |  |  |
| 10:30 – 11:00 | Bus trip from Hotel to NARO |  |
| 11:00 – 12:00 | Formalities for scholarship students only |  |
| 12:00 – 13:30 | Lunch |  |
| 13:30 – 14:00 | Administrative opening of the training courseOverview of the course objectives + Introduction to the group work that has to be prepared and presented on the last day of this course  | Godelieve Gheysen; Rony Swennen; Brigitte Uwimana; Jerome Kubiriba; Marc Heijde |
| 14:00 – 17:00 | Individual presentation by each of the participants (5 min/participant)What is their background, why do they follow the course; what do they expect from the course, etc… | Chair: Marc HeijdeThe participants |
| 17:00 - … | Official opening of the course + Reception |  |

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| Tuesday September 20, 2016 |  |  |
| 08:15 – 08:45 | Bus trip from Hotel to NARO |  |
| 09:0009:00 – 09:3009:30 – 10:0010:00 – 10:30 | Overview of the most important banana diseases (part I)NematodesWeevilsPanama Disease | Chair: Rony SwennenDanny CoyneWilliam TinzaraTendo Ssali |
| 10:30 – 11:00 | Coffee break |  |
| 11:0011:00 – 11:3011:30 – 12:0012:00 – 12:3012:30 – 13:00 | Overview of the most important banana diseases (part II)Black SigatokaBacterial WiltVirusesDiscussion | Chair: Rony SwennenJanet KimunyeJerome KubiribaLeena Tripathi |
| 13:00 – 14:00 | Lunch **+ Group picture** |  |
| 14:00 – 15:30 | Concepts of banana breeding (part I) | Rony Swennen |
| 15:30 – 16:00 | Coffee break |  |
| 16:00 – 17:30 | Concepts of banana breeding (part II) | Robooni Tumuhimbise |
| 17:30 | Bus trip from NARO to Hotel |  |
| Wednesday September 21, 2016 |  |  |
| 08:15 – 08:45 | Bus trip from Hotel to NARO |  |
| 09:00 – 10:30 | Modern breeding techniques and the use of molecular markers (part I) | Brigitte Uwimana |
| 10:30 – 11:00 | Coffee break |  |
| 11:00 – 12:30 | Modern breeding techniques and the use of molecular markers (part II) | Allan Brown |
| 12:30 – 13:30 | Lunch |  |
| 13:30 – 15:30 | Genetic transformation principles: General introduction | Godelieve Gheysen |
| 15:30 – 16:00 | Coffee break |  |
| 16:00 – 18:00 | Genetic transformation of banana | Geofrey ArinaitweLeena Tripathi |
| 18:00 | Bus trip from NARO to Hotel |  |

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| Thursday September 22, 2016 |  |  |
| 08:15 – 08:45 | Bus trip from Hotel to NARO |  |
| 09:00 – 11:00 | Global regulatory developments for GMOs | Patrick Rüdelsheim |
| 11:00 – 11:30 | Coffee break |  |
| 11:30 – 13:00 | Regulatory status for crop improvement in the East and Central African region | Ruth Mbabazi |
| 13:00 – 14:00 | Lunch |  |
| 14:00 – 15:30 | General principles and aspects of GM crop safety assessement | Patrick Rüdelsheim |
| 15:30 – 16:00 | Coffee break |  |
| 16:00 – 18:00 | Problem formulation | Patrick Rüdelsheim and Ruth Mbabazi  |
| 18:00 | Bus trip from NARO to Hotel |  |

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| Friday September 23, 2016 |  |  |
| 08:15 – 08:45 | Bus trip from Hotel to NARO |  |
| 09:00 – 11:00 | Study design and data collection (Part I) | Patrick Rüdelsheim and Ruth Mbabazi |
| 11:00 – 11:30 | Coffee break |  |
| 11:30 – 13:00 | Study design and data collection (part II) | Patrick Rüdelsheim and Ruth Mbabazi |
| 13:00 – 14:00 | Lunch |  |
| 14:00 – 15:30 | Decision and management (part I) | Patrick Rüdelsheim and Ruth Mbabazi |
| 15:30 – 16:00 | Coffee break |  |
| 16:00 – 18:00 | Decision and management (part II) | Patrick Rüdelsheim and Ruth Mbabazi |
| 18:00 | Bus trip from NARO to Hotel |  |

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| Saturday September 24, 2016 |  |  |
| 08:15 – 08:45 | Bus trip from Hotel to NARO |  |
| 09:00 – 11:00 | Field trial visit (Breeding) | Tendo Ssali |
| 11:00 – 11:30 | Coffee break |  |
| 11:30 – 13:00 | On farm evaluation of hybrids | Robooni Tumuhimbise |
| 13:00 – 14:00 | Lunch |  |
| 14:00 – 15:30 | Field trial visit (GMO) | Stephen Bua |
| 15:30 – 16:00 | Coffee break |  |
| 16:00 – 18:00 | Registration of new varieties | Tendo Ssali |
| 18:00 | Bus trip from NARO to Hotel |  |

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| Monday September 26, 2016 |  |  |
| 08:15 – 08:45 | Bus trip from Hotel to NARO |  |
| 09:00 – 10:30 | Metabolomics of banana | Allan Brown |
| 10:30 – 11:00 | Coffee break |  |
| 11:00 11:00 – 13:00 | Molecular tools in breeding (part I)The banana genomePhenotyping  | Brigitte Uwimana |
| 13:00 – 14:00 | Lunch |  |
| 14:0014:00 – 16:00  | Molecular tools in breeding (part II)Linkage QTL analysisGWAS | Marnik Vuylsteke |
| 16:00 – 16:30 | Coffee break |  |
| 16:30 – 18:00 | Molecular tools in breeding (part III)Genomic selection | Brigitte Uwimana |
| 18:00 | Bus trip from NARO to Hotel |  |

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| Tuesday September 27, 2016 |  |  |
| 08:15 – 08:45 | Bus trip from Hotel to NARO |  |
| 09:00 – 10:30 | Banana processing – Banana industry | Enoch Kikulwe |
| 10:00  | Bus trip to IITA |  |
| 11:00 – 17:00 | Visiting Local Farmers + IITA field trials | Robooni Tumuhimbise and IITA staff in Namulonge |
| 17:00 | Bus trip to Hotel |  |

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| Wednesday September 28, 2016 |  |  |
| 08:15 – 08:45 | Bus trip from Hotel to NARO |  |
| 09:00 – 10:30 | GMO perception in Europe: History, present situation and perception | Marc Heijde |
| 10:30 – 11:00 | Coffee break |  |
| 11:00 – 13:00 | Principles of effective and risk communication (Part I)Introduction to principles of effective communicationPrinciples of risk communication | Bibiana Iraki and Faith Nguthi |
| 13:00 – 14:00 | Lunch |  |
| 14:00 – 16:00 | Principles of effective and risk communication (Part II)Group exercise: understanding audiences – banana stakeholder identification – information needs – concerns identification | Bibiana Iraki and Faith Nguthi |
| 16:00 – 16:30 | Coffee break |  |
| 16:30 – 18:00 | Principles of effective and risk communication (Part III)Message mapping | Bibiana Iraki and Faith Nguthi |
| 18:00 | Bus trip from NARO to Hotel |  |

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| Thursday September 29, 2016 |  |  |
| 08:15 – 08:45 | Bus trip from Hotel to NARO |  |
| 09:00 – 11:00 | Principles of effective and risk communication (Part IV)Introduction to effective media relations | Bibiana Iraki and Faith Nguthi |
| 11:00 – 11:30 | Coffee break |  |
| 11:30 – 13:00 | Principles of effective and risk communication (Part V)How to handle a media interview (TV & Radio)Handling challenging biotechnology and biosafety issues Mock media interviews | Bibiana Iraki and Faith Nguthi |
| 13:00 – 14:00 | Lunch |  |
| 14:00 – 15:30 | Principles of effective and risk communication (Part VI)Current trends in science communicationHandling challenging biotechnology and biosafety issues | Bibiana Iraki and Faith Nguthi |
| 15:30 – 16:00 | Coffee break |  |
| 16:00 – 18:00 | Principles of effective and risk communication (Part VII)Developing a communication strategy – guides you through the choices that must be made to put a succesful plan in place | Bibiana Iraki and Faith Nguthi |
| 18:00 | Bus trip from NARO to Hotel |  |

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| Friday September 30, 2016 |  |  |
| 08:15 – 08:45 | Bus trip from Hotel to NARO |  |
| 09:00 – 10:30 | Presentation of the group work (part I) | Chair: Marc Heijde; Brigitte Uwimana; Allan Brown |
| 10:30 – 11:00 | Coffee break |  |
| 11:00 – 12:30 | Presentation of the group work (part II) | Chair: Marc Heijde; Brigitte Uwimana; Allan Brown |
| 12:30 – 13:00 | Round table discussion | Chair: Marc Heijde; Brigitte Uwimana; Allan Brown and Jerome Kubiriba |
| 13:00 – 14:00 | Lunch |  |
| 14:00 – 16:00  | Evaluation of the participants |  |
| 16:00 – 16:30 | Evaluation of the course by the participants |  |
| 17:00 –  | Closing the course |  |
| 18:30 | Bus trip from NARO to Hotel |  |

