

Community Network for African Vector-Borne Plant Viruses

Africa Launch Conference

Skyz Hotel, Kampala-Uganda

May 7-11, 2018

Disclaimer

This report documents the Africa Launch Conference of the Community Network for African Vector-Borne Plant Viruses (CONNECTED) that was held from 7-9 May 2018 at Skyz Hotel in Kampala, Uganda. The report is not a thesis, but a documentation of the proceedings and outcomes of the workshop without interpretation. It serves as a reference document for CONNECTED and workshop participants by providing details of conference proceedings reported as they were presented with minor or no modifications. The opinions expressed herein are those of workshop participants and do not reflect the views of the compiler—they are a compilation of participants' contributions.

Compilation

This report was compiled by Joshua Raymond Muhumuza from Uganda Biosciences Information Center (UBIC). It was reviewed by Dr. Diane Hird—CONNECTED Network Manager.

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List of Acronyms

BMGF	Bill and Melinda Gates Foundation
BXW	Banana Xanthomonas Wilt
CBSD	Cassava Brown Streak Disease
CIP	International Potato Center
CMD	Cassava Mosaic Disease
CMV	Cassava Mosaic Virus
CONNECTED	Community Network for African Vector-Borne Plant Viruses
CRISPR	Clustered Regularly Interspaced Short Palindromic Repeats
EPRV	Endogenous Para retrovirus
GM	Genetic Modification
IITA	International Institute of Tropical Agriculture
IPCC	Inter-continental Panel on Climate Change
IPM	Integrated Pest Management
KALRO	Kenya Agricultural and Livestock Research Organization
KEPHIS	Kenya Plant Health Inspectorate Service
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries (Uganda)
MARI	Mikocheni Agricultural Research Institute (Tanzania)
MLN	Maize Lethal Necrosis
MUZARDI	Mukono Zonal Agricultural Research and Development Institute (Uganda)
NaCRRI	National Crops Resources Research Institute (Uganda)
NARO	National Agricultural Research Organization (Uganda)
NaSARRI	National Semi-Arid Resources Research Institute (Uganda)
NGO	Non-Governmental Organisation
NGS	Next Generation Sequencing
NIAB EMR	National Institute of Agricultural Botany East Malling Research (UK)
NRCRI	National Root Crops Research Institute (Nigeria)
NRI	Natural Resources Institute (UK)
NPPO	National Plant Protection Organisation
SPVD	Sweet Potato Virus Disease
SSA	Sub-Saharan Africa
SSR	Simple Sequence Repeats
UCBSD	Ugandan Cassava Brown Streak Disease
UCMV	Ugandan Cassava Brown Streak Virus
UCU	Uganda Christian University
VBD	Vector Borne Diseases
VIRCA	Virus Resistant Cassava for Africa
WAVE	West African Virus Epidemiology Project
WTO-SPS	World Trade Organisation-Sanitary and Phytosanitary Measures (the "SPS Agreement")
ZARI	Zambia Agriculture Research Institute

Introduction

The Community Network for African Vector-Borne Plant Viruses (CONNECTED) is a Vector-borne Disease Network awarded to the University of Bristol, UK. The network aims inter alia to build a sustainable and long-lasting network of multi-disciplinary international scientists, to address the problems created by plant virus VBDs.

The Africa Launch Conference took place from 7-9 May 2018 at Skyz Hotel Kampala to: officially launch the network in Africa, take stock progress made thus far, and lay strategies towards accelerating progress towards achieving network objectives particularly delivering solutions to devastating crop diseases.

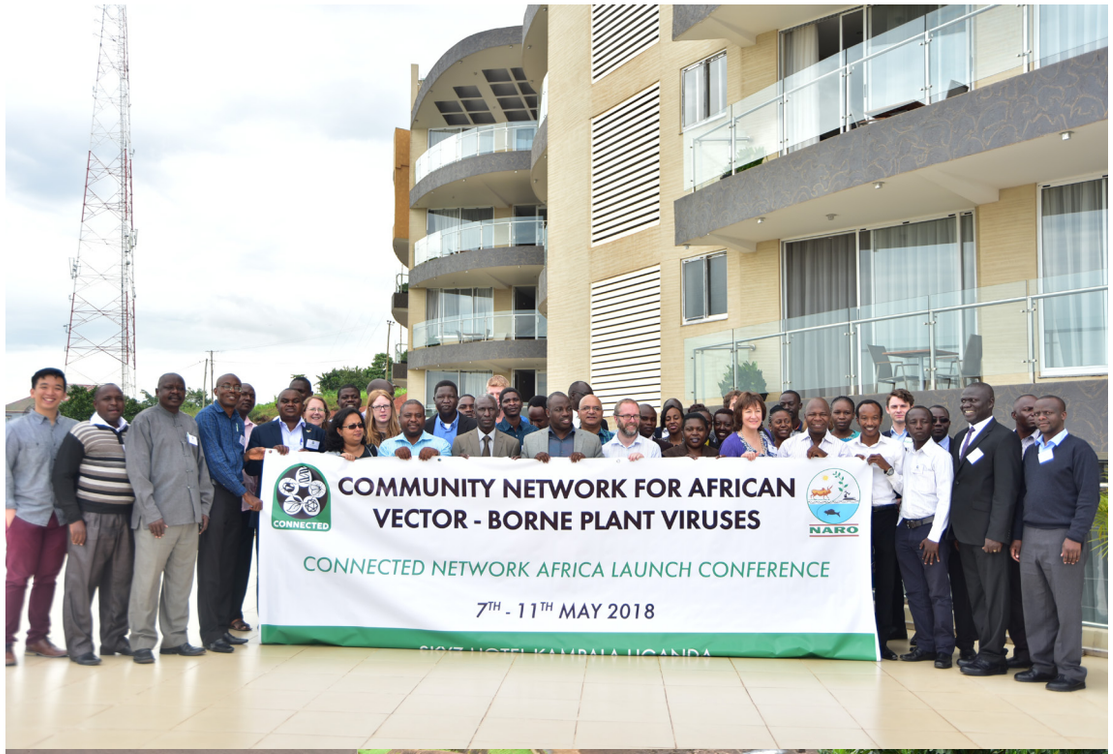
Immediately following the conference was a two-day (10-11 May) early career researchers' training workshop aimed at honing their skills including research grant proposal writing. The conference and workshop offered a timely platform for network members, management and partners to deliberate on critical issues and brainstorm on strategic way forward for the project.



Day I

Monday 7 May 2018







Day I: Monday 7 May 2018

Welcome Remarks

Titus Alicai-National Crops Resources Research Institute | Management Board Member, CONNECTED



Titus welcomed invited guests to Uganda. He was especially grateful to the CONNECTED management team and board for the initiative and hard work that had made the first successes of CONNECTED possible. Guests were invited to refer to the Launch Programme for his full welcome remarks. He further thanked guests for making time to come and be part of the launch. Titus gave brief history of the project. The idea of this launch was conceived at the launch meeting at the University of Bristol in January 2018. CONNECTED management was appreciated for giving NARO/NaCRRI the opportunity to host the Africa launch to NaCRRI.

"Unlike the UK meeting, this one is dominated by early career African scientists in whom the network has a keen interest" he said. The leadership of Prof. Gary Foster — one of the brains behind the conception of the project — was appreciated in his absentia. Titus then led guests through the conference programme before inviting Prof. Neil Boonham to give his remarks.

Neil Boonham-University of Newcastle | CONNECTED Network Co-Director



Neil welcomed the guests to Kampala. He particularly thanked the UK team that forewent a public holiday to be at the conference. He informed the conference that the network hopes to create opportunities for collaboration, facilitate people to write more compelling proposals, and further those ideas with donors to take the work forward.

"Also," he let on, "the network hopes to build a focus around vector borne diseases with early career researchers. What you put into the network is what you get out" he said, with regard to the current remarkable network team. Neil added that CONNECTED greatly appreciates the human resource at the conference and that the Network cannot function without people.

Participants learnt that the project further aims to build capacity through training and this conference in part, hopes to pick out the big ideas that the network can help support. He wrapped up his speech by acknowledging his and the local organising teams for the commendable achievements thus far.

Christopher Omongo-National Crops Resources Research Institute



Christopher conveyed remarks from Dr. Godfrey Asea, the substantive director of NaCRRI who couldn't be at the launch due to other commitments. "When all is said and done, the ultimate beneficiaries of this network will be our small farmers out there" he asserted, in reference to the opportunities that this project will offer.

The key commodities affected by viruses are also the key food security crops in SSA and improving their productivity is the mandate of NARO, he added. He applauded the management and board for this initiative.

Christopher invited and encouraged delegates to network with scientists at NaCRRI. The history of collaboration between NARO and other African and international universities to tackle vector borne challenges was underscored. Conference participants were cautioned against complacency and asked to use this network as an opportunity to stay ahead of the challenges at hand.

He concluded by encouraging sustained support and collaboration with NaCRRI and NARO. He thanked NARO for continued support and invited the chief guest — the Director General-NARO to officially launch the network in Africa.

Yona Baguma-Deputy Director General, NARO



Speaking on behalf of the NARO director general, Yona was delighted that NARO and Uganda was hosting this conference. He appreciated CONNECTED for choosing NARO to host this Africa launch. Guests from the UK, several African countries and the rest of the world were recognized. Participants were challenged to remain connected and informed that Africa expects results from the network.

He acknowledged the UK government for the support to this project which is one of many such packages from the UK government. In an era of several challenges exacerbated by climate change, he requested more support especially as most African states are not yet ready to address these constraints. Pests, diseases, low levels of ag-mechanization, malnutrition which continue to afflict African livelihoods were highlighted as examples of such challenges. He thanked CONNECTED for coming in to address some of these key challenges.



The NARO deputy director general recounted a history of virus epidemics from his time as an active scientist. The conference learnt that CBSD had even caused death in Uganda and UK government was applauded for joining other partners to tackle this challenge. "These challenges are affecting key staples—cassava and maize and effectively food security on the continent" he asserted.

Yona was grateful that CONNECTED is coming in contribute to solutions. He called for human and infrastructural capacity building—key to propelling research and innovation—to continue driving forward research efforts in Africa and beyond.

"This project is coming in to build on past research efforts" he said before highlighting previously built capacity e.g. Dr. Titus Alicai among others. NARO scientists like Titus who have demonstrated leadership and pioneering work were commended. "Such scientists will be an invaluable resource to the network" Yona added.

NARO's contribution to national and regional food security was underscored. "NARO is thus well positioned to provide leadership to the network" he stated. Yona mentioned that he was excited but as leader, expects and demands results. He then officially opened the conference and launched the network in Africa.

Landscape and Stakeholder Mapping Presentation: Outcomes of UK Launch Conference & Current Project Situation-Neil Boonham & Diane Hird

Neil Boonham-CONNECTED Network Co-Director

Neil briefed the conference on the project and its objectives. CONNECTED is funded by a £2 million grant from the UK government's Global Challenges Research Fund (GCRF), to build a sustainable network of international scientists to address challenges of vector-borne plant viruses in Africa.

CONNECTED also aims to provide a collaborative, interdisciplinary approach essential to tackle vector-borne diseases. Network members will be facilitated to successfully apply for research funding. CONNECTED hopes to achieve this by providing pump-prime funding for a broad range of short term research projects which will be used as the basis for future funding applications with national and international funding organisations.



Benefits for members: training network, pump-prime funding, networking.

Other network member benefits such as grant writing support, training and networking were also brought to audience's attention.

Vector borne diseases and their associated challenges including curtailing agricultural productivity and health, disrupting ecosystems and restricting socioeconomic development among others were discussed. Examples of VBD and gaps in knowledge that CONNECTED might be able to help fill such as some viruses that haven't been fully characterized were highlighted.

Research on neglected crop (millet, taro, Bambara nuts etc.) diseases, climate change as well as implications for African agriculture and livelihood systems will be prioritized by the network.

Neil acknowledged team and board members and other partners that have provided critical support to the project. He let on that the network boasted 231 members and 429 twitter followers at the time of his address.

He reiterated the project objectives focusing on a mix of virology and vectors, social science and policy to facilitate impact.

The network co-director further shared budget allocations for different priority activities. Networking and training as well pump-priming research awards were each allocated up to £1m over two years.

Concluding his remarks, he disclosed; "The team is here to build on the work initiated at Bristol and brainstorm ideas to move it forward."
On the project road map, guests learnt that the Africa Launch will be followed by commissioning of Phase 1 projects. "The team at the conference will contribute to drafting of an action plan for this roadmap" Neil remarked.

Diane Hird-CONNECTED Network Manager



Re-echoing Neil's remarks, Diane shared a brief highlight on CONNECTED funding, research priorities, UK launch outputs, funding calls as well as training and networking.

"This launch hopes to bring together thoughts, views and perspectives to inform a working plan tailored to address network strategic goals" she revealed. Diane then discussed the five strategic priority areas CONNECTED will be focusing on funding. These were; control strategies, vector biology, new diseases, vector-virus interactions, in addition to diagnostics, surveillance, and forecasting.

She further briefed guests on potential barriers to research progress such as research capacity, stakeholder interactions and diverse priorities among other constraints.

The conference received an update from the Bristol symposium on Building Global Partnerships for global challenges in which Diane participated and forged networks and partnerships.

Guests were brought up to speed on the UK Launch. This launch brought together stakeholders and explored ideas to apply for concrete funding opportunities. Attendees also deliberated on questions and barriers recurring within and across priority areas. "These same priorities stand for this conference" participants were informed. UK Launch outputs included calls for pump-prime funding, workshops were collated and published, and videos/presentations were made available on different media channels.

Pump-prime funding: Up to £900,000 will be released in smaller chunks to support a number of projects. Eligibility for this funding and the funding call time table were divulged. She mentioned that the first call went out in March 2018. Applicants from several countries including 10 African countries submitted expressions of interest. Applications will be reviewed with projects scheduled to start December 2018. The second call is

set for October 2018.

Diane discussed the network's training needs in priority areas like vector biology, entomology and let on that individual training grants of up to £3000 will be available on competitive basis to network members.

Conference participants were invited to submit short articles on insect vectors and plant viruses needed to populate the Vector Virus information hub on the CONNECTED website.

The Legacy of CONNECTED is to create a network of researchers to address vector borne plant viruses. "You are our legacy!" concluded the network manager.

Next Steps-Neil Boonham

Management was working to develop a programme for quarterly seminar series, the training fund, widen the network, develop an information hub and launch Phase 2 call for pump-prime funding in October. Neil led the audience through the rest of the conference programme. Guests were requested to visit the CONNECTED website and social media channels for more information and updates.

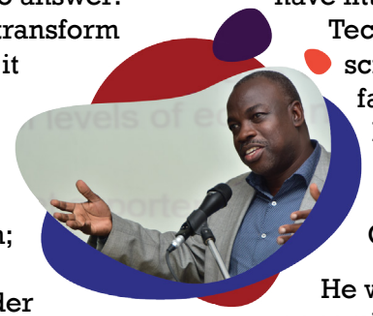
Discussion after Landscape and Stakeholder Mapping Presentation

Question/Concern	Comment(s)
What happens after the 2 years of funding?	There's been some 'positive noises' to continue the initiative but there is a challenge to turn the network into an effective self-sustaining initiative. We need to create momentum in the first 2 years to demonstrate impact.
What do you mean by "serious impact" that the project intends to create? Are the outputs from the Bristol meeting enough to bring about sustainable impact?	Probably not but efforts have been made to involve social science and policy colleagues. A lot more effort is needed to attract sufficient buy-in from different stakeholder groups. For example, the latest funding call had no responses from the social science sector. The Wednesday (May 9, 2018) program has also been focused to encourage interdisciplinary buy-in. We need to explicitly define and describe the challenges CONNECTED is trying to address to different stakeholders and how they can contribute their expertise and resources to help.

Integrating Science in Agricultural Policy Process: Uganda's National Agricultural Extension Policy-Patience B Rwamigisa, MAAIF

Patience Rwamigisa, commissioner for Agriculture Extension Services in Uganda's Agriculture ministry, opened his presentation with a poignant remark: "Scientists are so laid back when it comes to influencing policy." The quip formed the gist of his presentation.

He addressed key fundamental questions scientists need to answer: Why has science failed to transform African agriculture; why is it that countries with the greatest agricultural potential are the ones on the verge on hunger; malnutrition and starvation; why is the microeconomic environment for small holder farmers near uniform across SSA irrespective of individual country's economic status; how did Africa move from a net food exporter (1960s, 1970s) to a net food importer (now)?



Suggested responses to these questions included: some limitations of science in Africa's transformation agenda; inadequate capacity to form a critical mass to conduct research to drive change; inadequate financing despite countries' dedication to the Maputo declaration to dedicate 10% of budget to Agriculture to mention but a few.

Patience led conference delegates through the attributes of a policy process. He defined public policy as what government chooses to do or not to do and the difference it makes. "In the real world, this process isn't linear but very complex and influenced by actors with different resources and values" he said. Guests were informed that policy making is a political process. It is impacted by the existing socio-economic environment. The outcome of a policy making process is a result of trade-offs.

On key Development observations he noted that technology has remained rudimentary at community level and education is still lacking in assimilating functional knowledge. At the policy level, issues pre-occupying decisions have little to do with Science and Technology. "For example, scientists (in Uganda) have failed to effectively brand the National Biotechnology and Biosafety bill and thus have remained behind the anti-GM lobby" he elaborated.

He was disappointed that a general lack of a science culture renders Africa's cultural and socio-economic environment ineffective to drive change though science.

Key tenets of Uganda's production culture at community, business, political and technical levels were enumerated. Poor saving culture which perpetuates poverty due to hand-to-mouth production; enterprising citizens' inclination towards speculative sectors (import trade, NGO formations etc.) as opposed to production related business; market failures; weak farmer associations; and lost trade opportunities due to insufficient investments in Agriculture were highlighted.

"The overall outcome is very few products that go to international/ regional markets as value added goods" he surmised. A need to find ways to integrate science culture into Ugandan systems was voiced. "Growth without transformation is Uganda's dilemma largely because science hasn't been

integrated with economic development to drive high total factor productivity—a key driver of transformation" Patience lamented.

He underscored the economic importance of crop pests and diseases in Uganda. Up to $200m, $60-80m and $10m is lost annually for bananas, cassava and cotton respectively. 10-20% pre-harvest, 20-30% post-harvest and up to 100% loss for perishables due to pests and diseases was also brought to guest's attention. He highlighted key pests and diseases in the country and was excited that this project comes with opportunity to address some of these.

Patience narrated a history of Uganda's agricultural extension system. The system has undergone several transformations but has largely been donor-aid driven. Extension is key in tech and knowledge transfer especially to rural communities and thus vital to the transformation to these areas.

Regarding key policy issues and challenges, regulation, coordination and human resource in addition to limited capacity and lack of inclusiveness were emphasized. "Technologies to encourage the youth to engage in agriculture exist but the sector has not sufficiently been made attractive to them" he said.

He informed the conference that his ministry is working on policy and structural reforms, through the National Agricultural Extension Policy, to address constraints that came as a result of the mentioned challenges. These reforms are being rolled out in a series of programmes as part of the National Development Plan. He shared the new strategic direction and vision of the ministry to promote application of Science Technology and Innovation (STI) for socio-economic development.

Key policy areas including human resource management, agribusiness development services, agriculture knowledge management, farmer organisation and empowerment, regulatory and policy issues etc. were listed.

In his take home message, the commissioner asserted that optimism for integrating science into policy frameworks was rising in view of ongoing government strategies. Noted pointers included an increasing number of government initiatives to support science initiatives and implementation of National Agricultural Extension Policy. He urged scientists to form a coalition of actors to influence the scientific agenda in the policy process.





Integrating Scientific Knowledge into effective Plant Disease Management- Ephrance Timuboine, MAAIF



MAAIF Commissioner Ephrance presented a highlight on the importance of agriculture in Uganda. 72% of Ugandans are employed in agriculture. Priority crops in her ministry's strategic plan including bananas, pulses (beans), grain (maize, rice), roots/tubers were listed.

The impact of vector-borne diseases such as yield loss, declining crop growth, restricting germplasm exchange and wide host range, which are denting national productivity, was discussed.

Measures being taken to reduce this impact include: heightened plant health, seed certification and inspection measures, studies of pest entry, establishment and spread, plant health labs, disease eradication/forecasting, pest monitoring for outbreaks, epidemic control, quality assurance and seed health testing.

The seed certification process in Uganda was explicated. Ephrance discussed the evolution of plant health services including history and policy instruments such as the Plant protection Act 1962, International Plant Protection Convention (IPPC) ratification and National Plant Protection Organization (NPPO) designation (2007) to prevent pest entry and establishment in Uganda. Delegates learnt that a resolution was passed to establish an independent plant protection unit so that decisions made can be effectively and scientifically justified.

Current arrangements, key roles, and functions for phytosanitary services were elucidated. Key roles included pest risk analysis, disinfection and disinfestation treatments, pest diagnosis among others. Roles of phytosanitary services including pest risk analysis, stakeholder consultation in policy formulation among others were pointed out.

She led participants through the legal framework for crop disease management including critical players and stakeholders in Uganda. Stakeholder interest and influence in different scenarios was also discoursed. "Integrated approach where all stakeholders provide a rationale for certain decisions is principal to address strategic issues for sustainable disease management" she stressed.

Wider interdisciplinary input, capturing local knowledge, capacity development, new technology applications, policy enforcement, heightened surveillance measures, improved linkages and regional harmonization were proposed as improvements in plant health for better disease management.

Discussion after Presentation

Guests agreed there was a critical need to involve socio-economists in the research and development process.

A concern was raised on Uganda's readiness for community outreach and involvement. There is a critical need for wider community outreach.

Role of KEPHIS in Regulation; A key to effective pest Management-Isaac Macharia, KEPHIS



Isaac opened his talk with an explanation of the need for phytosanitary regulation and KEPHIS' role in Kenya. He highlighted examples of research in vector-borne diseases and exposited on different viral disease management strategies.

Pest spread pathways that require regulation were discussed. Transportation pathways, globalization, climate change, transboundary trade, myriad vectors that carry/migrate with associated pathogens, and infected germplasm comprised such pathways.

Key disease outbreaks like BXW, potato cyst nematode, CMD, CBSD which create imperative for phytosanitary regulation were listed. He highlighted how MLN has been managed in Kenya owing to phytosanitary regulation and effective responses.

Global phytosanitary players led by World Trade Organization Sanitary and Phytosanitary body (WTO-SPS), IPCC standards among other regulatory measures aimed at ensuring plant health and the role of KEPHIS in Kenya as the lead phytosanitary and plant health body were pointed out. Strategies for import inspection, export certification and their associated procedural tenets were explained. KEPHIS ensures plant materials and products in Kenya meet regional and global standards through a surveillance, identification, clearance and certification system.

Major projects undertaken by KEPHIS include Tomato Spotted Wilt Virus, Sugarcane mosaic virus, Maize chlorotic mottle virus among others. KEPHIS has conducted surveillance and classification of the main vectors of these viruses. Several other vectors are yet to be characterized in continuing projects.

Isaac shared some recommendations for effective phytosanitary processes to mitigate vector-borne disease. These were; Pest risk analysis, seed certification, virus cleaning, pest surveillance, import regulation, increased training and awareness. He further stressed the need for continued capacity building for virus identification, embracing technologies (e.g. microarray, next generation sequencing) for virus identification, surveillance, vector identification and increased collaboration among laboratories and scientists to facilitat resource and expertize exchange.



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Discussion after Presentation

Question/Concern	Comment(s)
A concern was raised over KEPHIS control over porous borders.	The body has inspectors on major entry points. Efforts have been made to sensitize the public on the importance of surveillance and import/export control.
Have there been any training initiatives/ capacity building efforts in phytosanitary procedures?	Centre of Phytosanitary Excellence (COPE) is offering training in surveillance, pest risk analysis as well as several other NPPOs.

CONNECTED for Strengthening Plant Virology in Africa- Titus Alicai, NaCRRI

Titus provided a snapshot of the history of plant virology in Africa. Some diseases like CMD were reported in Africa as early as 1893. Several epidemics continue to emerge and re-emerge. Despite some milestones, progress in plant virology in Africa vis-à-vis the rest of the world has been slow.

What hasn't worked well

Limited research scope compared to the magnitude of problems, range of existing viruses not well known, limited/no information on major viruses in many countries, inadequate resources, weak linkages, collaborations to facilitate knowledge and resource exchange at regional and global levels.

What has worked well

Increasing number of well-equipped laboratories, increasing number of plant virologists appointed by universities, incentive and compensation schemes to motivate virologists, recent multi-country projects e.g. WAVE, CONNECTED etc.

The CONNECTED opportunity

The network offers an opportunity to use experience, expertise and resources of leading scientists in diverse disciplines for management of African VBD. Conference participants were urged to aim at long term management strategies.

Delegates were brought up to speed on plant virus management efforts in Uganda. Work in Uganda is focused on CBSD, CMD, SPVD, rice yellow mottle virus, MLN, banana streak virus, yam viruses and several bean, vegetable and fruit viral diseases. Efforts include detection, understanding, characterization, control and management of such diseases.

The devastation due to CBSD and CMD in Uganda was underscored. Work is ongoing to characterize cassava begomoviruses and map the CBSV genome.

Update on efforts to understand CBSD

Surveys conducted to establish virus spread revealed that 51 out of 54 districts in Uganda have CBSD. Tolerant varieties have been released and declines in virus intensity have been registered. A general decline in CMD incidence has also been registered from 64% in 1992 to just over 30% currently owing largely to deployment of tolerant varieties.

Improved surveillance has allowed detection of CBSD, UCBSD as well as CMV and UCMV. New candidate virus resistant/tolerant varieties in Uganda were discussed. NAROCASS1 released in 2015 is still the best performing CMD resistant and CBSD tolerant variety. It has been shared with other national programmes and several countries are planning to release it.

Efforts to achieve virus resistance and vitamin A biofortication in addition to improved dry matter are ongoing. Results are expected in 2-3 years. Additionally, work is ongoing to address a plethora of Sweet potato viruses and achieve higher nutrient profiles such as Vitamin A.

Guests were informed that a very good proof of concept on effective transgenic control of CBSD had been achieved. Very high CBSD resistance was observed in a stake generation with over 99% resistance recorded in the most outstanding lines. These lines have been crossed with farmer preferred varieties. Seed from these crosses is currently being evaluated.

Efforts to provide farmers with certified, clean planting material is making significant strides. A multi-player framework for cassava seed system in Uganda is now in place.

Sustainable management of plant viruses

Plant virus occurrence is likely to increase in future. There is a need to fully understand viruses, vectors, landscapes and how they evolve in order to develop effective management measures. Understanding causes of virus disease outbreaks, spreading mechanisms, elevation of vector populations and emergence of new strains is critical. Roles of globalization and climate change, current state of science, emerging technologies and collaboration are key for improved understanding and sustainable management of plant viruses in Africa.

Discussion after Presentation

Question/Concern	Comment(s)
A concern was raised on whether work is ongoing on other crop viral diseases (other than cassava and sweet potato) in Uganda?	Yes All plant virus diseases are important and will need due attention.

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Recent Molecular Virology and Entomology Research at NRI: Cassava and yam Virus/Vectors- Susan Seal, University of Greenwich, Natural Resources Institute

Susan shared a brief roundup of NRI especially its mission to discover, apply and share knowledge. She followed this up with her background after she joined NRI. She let delegates in on the various projects she has worked on.

Uganda is currently the centre of diversity for several cassava viruses. She voiced the need for effective surveillance tools as viruses spread to central and west Africa. To illustrate, Susan discussed work on developing tools for virus detection by Habibu Mugerwa-one of her former PhD students under the Enabling Tools project. The work, published in 2018, investigated diversity of cassava whiteflies in Uganda. Phylogenetic history of whiteflies shows enormous whitefly diversity of whiteflies in Uganda while less whitefly diversity has been recorded in West Africa.

In a separate study, plant family host range of *Bemisia tabaci* species complex was conducted in Israel, to understand host diversity for the different whitefly species. This information is important to inform control strategies.

She shared insights on differential gene expression between different whitefly species to identify genes that enable host-switching. Host plant transcriptome studies are ongoing to understand which genes are key to whitefly colonization of cassava so that such genes can be knocked out using CRISPR. Susan reported completion of assembly contiguity from Habibu's work that resulted in published genomes. Efforts to understand phylogenetic evolution of whiteflies are still ongoing.

Assembly of infectious CBSD, UCBSD and CMD begomoviruses using in yeast recombination system to aid efforts to knock out infectious genes that allow cassava host colonization in whiteflies was expounded.

Yam virus toolkits to come up with effective field tests to ease yam virus characterization in a cheap field based diagnostic test are being developed. She highlighted Gonçalo's ongoing work on the 'Yam Chip'—a chip based field diagnostic test.

Efforts to assess risk of Endogenous Para retroviruses (EPRVs) in yam were discoursed. "These viruses have the capacity to spread across hosts without need for a vector" she said. What can we learn from EPRVs in banana? "Integrated sequences are numerous and complex" she added. Several EPRVs have been identified in many yam samples.

NGS has been found to be very effective for virus discovery and diagnostics (Steven Sewe PhD project). A combined approach for studying stress patterns in yam and yam viruses is being worked on.

Important knowledge gaps in virus studies were highlighted including yield losses caused by Badnaviruses (alone and in mixed infections), importance of vector transmission and possible mealy bug vector-virus specificity? Work on Mealy bug transmission, antibodies for yam viruses is progressing.

Knowledge gaps in cassava virus vectors

39 cryptic whitefly species were reported. A need for rapid whitefly species diagnostics, understanding factors influencing CBSD root necrosis, impact of host resistance and climate change were underscored as important knowledge gaps.

Epidemiological models and virus evolution studies suggest more virulent begomovirus variants and more fecund whitefly populations are inevitable co-evolutionary consequences of each other and agricultural intensification. Plant resistance expressed through reducing within-plant virus titre and symptom reducing resistance put a selection pressure on viruses to evolve towards a higher multiplication rate.







Day II

Tuesday 8 May 2018



Day II: Tuesday 8 May 2018

Flash Presentations

Conference delegates travelled to the National Crops Resources Research Institute (NaCRRI) some 27km North of Uganda's capital, Kampala. The second day of the conference began with flash presentations in which guests briefly highlighted their work and potential contributions to the CONNECTED network.



Maimouna S Abass - Zambia Agriculture Research Institute

Maimouna is a food security and nutrition expert with expertise in crop production, food systems, pests and diseases, food safety, standardization and certification, biodiversity and natural resources, in addition to monitoring and evaluation, knowledge management and institutional development.

Her current projects are focused on plant protection and quarantine.

Phillip Abidrabo – National Crops Resources Research Institute

Phillip is a plant pathologist proficient in crop science, molecular diagnostics, virology, epidemiology, disease surveillance and biotechnology. He has conducted research on CBSD and CMD prevalence and identification of fungal pathogens responsible for cassava root rot to mention but a few projects.





Hellen Apio - National Crops Resources Research Institute

A research assistant on the VIRCA Plus project at NaCRRI, Hellen is well practiced in tissue culture and transformation. Her current research areas include production of clean planting materials, validation of gene constructs, micropropagation, somatic embryogenesis, genetic transformation and molecular analysis of transgenics.

Sophie Bouvaine – University of Greenwich, Natural Resources Institute



Her vast research experience has seen Sophie work at various prestigious plant science laboratories including at the University of York and Cornell University. The plant molecular biologist/virologist is presently a research fellow at NRI.

Her current research is focused on insect endosymbiont interactions (*Bemisia tabaci*), African cassava whiteflies, viral transmission assays for *B.tabaci*, molecular determinants and viral receptors in the whitefly. Specifically, She is studying the cassava transcriptome to find resistance genes for CBSV. She is also examining the endosymbiont interactions of *Bemisia tabaci*—the insect vector of CBSV—with a goal of finding innovative solutions to disrupt the transmission of this devastating virus.

Sophie is masterly in plant physiology, gene expression, insect physiology and molecular biology, symbiosis, disease resistance, transcriptomics and transcriptome sequencing.

Stuart Campbell-University of Sheffield



Stuart is a chemical ecologist and evolutionary biologist interested in the evolutionary biology and chemical ecology of plant defence against herbivores including plant insect interactions (herbivory, host selection, plant defence, co-evolution etc.), and plant reproduction. He is an Independent Research Fellow at the P^3 Centre, Animal and Plant Sciences department at the University of Sheffield.

The polestar of his current research has been the evolutionary transitions in plants such as the transition from an outcrossing to a self-fertilizing system. He has been studying adaptive evolution during the shift to selfing using a combination of population genomics, chemical phenotyping and fieldwork. More of his research centres on conflicts between defence and reproduction in plants. Stuart is also interested in the ecology and evolution of plant Volatile Organic Compounds(VOCs).

Mandela Fernàndez-Grandon – University of Greenwich, Natural Resources Institute



Mandela, a Research Fellow at NRI is a Chemical Ecologist and Entomologist has vast experience working with crop pests and human disease vectors. His proficiencies include chemical ecology, behavioural bioassays, volatile analysis, biological control, crop protection,

insect behavioural studies and electrophysiology.

Specific areas of interest include development of novel odour-based control methods for crop protection. He is also studying host manipulation by viruses/parasites and the potential for application.

Current research projects include development of a new attractant lure for Spotted Wing Drosophila, evaluating mosquito oviposition preference and assessing feasibility of a broad spectrum repellent.

Dennis Gayi – National Semi-Arid Resources Research Institute (NaSARRI)



Dennis is a crop scientist and horticulturalist based at NaSARRI in Eastern Uganda. He has conducted research on development of pest management technologies like biological pest management, massive production of biopesticides, evaluation of synthetic pesticides for MAAIF. He is also practiced in post-harvest handling and value addition.

Sita Ghimire – Biosciences eastern and central Africa (BecA)



Plant pathologist Sita Ghimire is a principal scientist and head of research at the Biosciences eastern and central Africa (BecA) program of the International Livestock Research Institute (ILRI) in Nairobi, Kenya.

His research focuses on plant beneficial microbes and plant pathogens of economically important crops and tropical forages. He has extensive experience in plant pathology, sustainable agriculture, and has generated several crop protection technologies targeting the smallholder farmers. Sita is a member of American Phytopathological Society and the Nepalese Society of Agricultural Scientists. He serves as Senior Editor of *Phytobiomes*, the first open access journal of the American Phytopathological Society.

Major areas of expertise include plant pathology, aflatoxins, agriculture, animal feeding, microbiology, molecular biology, biotechnology, genomics, proteomics, plant beneficial microbes and capacity development

Richard Hopkins – University of Greenwich, Natural Resources Institute



Richard Hopkins is a professor of behavioural entomology at the University of Greenwich. A virtuoso insect behaviour specialist and chemical ecologist, Richard has massive experience in plant science, integrated pest management, integrated crop management, biological control, agricultural entomology, plant protection, and vector ecology.

He has worked on insect-plant relationships, investigating how parasitoids transmit viruses between insect hosts as well as habitat selection and egg laying site selection in mosquitoes. The locus of Richard's present work is the oviposition site selection mosquitoes, with a view of contributing to vector management.

Wubetu Bihon Legesse-World Vegetable Center



Legesse is a plant pathologist based at the World Vegetable Center's West and Central Africa office in Bamako, Mali.

He has experience in population genetics, genomics, plant disease identification, characterization, diagnosis, management and academia.

Isaac Macharia - Kenya Plant Health Inspectorate Service (KEPHIS)



As General Manager, Phytosanitary services, Isaac oversees operations for import/export compliance, pest risk analysis, surveillance, virus disease identification and phytosanitary systems at KEPHIS.

He has excellent command of plant virology, pathology, pest risk analysis, pest diagnostics, pest surveillance, virus indexing, plant-pathogen interactions, molecular mycology, nematology and epidemiology among other competences.

Fred Bwayo Masika, Uganda Christian University (UCU)



Fred is a molecular biologist investigating previously neglected pathosystems in Uganda. His current research focuses on viruses affecting Cucurbit crops (pumpkins and watermelons). He has also worked on viruses infecting vegetables in the Solanum complex (*Solanum*

aethopicum). Fred is trained in bioinformatics, virology, molecular biology, Next Generation Sequencing & analysis.

Deusdedith Mbanzibwa – Mikocheni Agricultural Research Institute (MARI)



At his current post at MARI, Deusdedith is the head of department of the Disease Control Unit. The plant virologist is currently studying alternative hosts of common bean viruses besides genetic diversity and molecular characterization of sweet potato viruses.

Among other things, he is proficient in molecular virology, molecular cloning, molecular plant pathology, RNA silencing, applied virology and diagnostics.



Cyrus Micheni – Kenya Agricultural and Livestock Research Organization (KALRO)

Cyrus is a microbiologist and biotechnologist with excellent working knowledge of plant pathology. Other areas of expertise include genetic diversity studies, laboratory analysis and sequencing. He is currently researching insect vectors (aphids), disease diagnosis and surveillance of Maize Lethal Necrosis (MLN), transmission of maize chlorotic mottle virus (MCMV) as well as several bacterial, fungal and viral diseases of important crops. In other research areas Cyrus has a keen interest in crop protection.

Morris Opio – National Crops Resources Research Institute (NaCRRI)

Currently a research assistant with the African Cassava Whitefly Project (ACWP) at NaCRRI, Morris is studying the duration and degree of protection against cassava whiteflies provided by a range of pesticides with an aim of generating virus free planting materials. He is also an expert in cassava disease and pest identification on top of statistical analysis.

Habibu Mugerwa – National Crops Resources Research Institute (NaCRRI)



Habibu has been studying the genetic diversity of *B.tabaci* present on cassava and other plant species in Uganda. His research has determined the biological differences among cassava whiteflies through growth and development studies at different temperature regimes on top of reproductive compatibility and reproductive potential studies. He has generated and compared genome data for biologically distinct cassava whiteflies and also developed and validated diagnostic tools for specific cassava *B.tabaci* populations.

Immaculate Mugisa Ojara - Mukono Zonal Agricultural Research and Development Institute (MUZARDI)



Immaculate is a Research Officer at MUZARDI, one of the zonal research institutes under the leadership of NARO. She is a crop scientist and viral entomologist with a keen interest in ground nuts. She has done epidemiological research of ground nut rosette disease and tomato yellow mottle virus. Immaculate wants to fill the knowledge gaps around ground nut rosette disease, and biotypes of aphid vectors.



Esperance Munganyika – Rwanda Agriculture Board

Esperance is working on cassava virus disease surveillance and responses of cassava cultivars to CBSD in Rwanda using Qualitative Polymerase Chain Reaction (QPCR). She is also studying movement of cassava viruses in tissues.

Sarah Nanyiti – National Crops Resources Research Institute (NaCRRI)



As a virologist, Sarah is developing effective diagnostic tools for detection of yam viruses. Specifically, she is developing diagnostic and diversity tools for yam viruses in Uganda. She is well practiced in biotechnology and molecular biology.

Charlotte Nellist – National Institute of Agricultural Botany East Malling Research (NIAB EMR)



Charlotte—Theme leader, Durable Disease Resistance at NIAB EMR—is currently investigating ways to improve resistance to strawberry crown rot and strawberry red core in strawberries. She is also exploring the nature of resistance to apple canker in apple species. Her previous research involved studies of the deployment and mechanism of broad-spectrum resistance to Turnip mosaic virus in Chinese cabbage.

She is interested in studying plant-pathogen interactions, and using this knowledge to deploy durable disease resistance into economically

important crops.

Charlotte is practiced in molecular biology, applied pathology, QTL mapping, pre breeding research, genomic resources development, molecular plant pathology, Gateway cloning and molecular virology to mention but a few

Chukwuemeka Nkere - National Root Crops Research Institute (NRCRI)



Nkere is a Research Scientist at the National Root Crops Research Institute (NRCRI) in Nigeria. He is involved in micropropation of clean planting materials for NRCRI mandate crops, and molecular characterization of pathogens. He is also doing research on development of robust on-farm diagnostic toolkits for yam virus diseases. Nkere has previously worked various projects such as rapid detection of potyviruses in crude plant extracts and chromogenic detection of Yam Mosaic Virus.

He has excellent command of myriad scientific fields like virology, molecular viral diagnostics, disease monitoring and surveillance, food microbiology and molecular biology. Nkere has a keen interest in developing new tools for on farm diagnostics.



Tsitsi Nyamupingidza - Chinhoyi University of Technology, Zimbabwe

The plant pathologist formerly worked as a plant virologist in Harare, Zimbabwe. Much of her current work revolves around organic herbs, African indigenous crops and wild harvested forest products. She also teaches plant pathology and virology. Tsitsi's vision is to improve food and nutrition security in low input farming systems.

She has a mastery of virology, pathology and crop science among other proficiencies.

Paul Nyamwamu – Kenyatta University



Paul is a PhD student and assistant lecturer at Kenyatta University in Nairobi, Kenya.

He is investigating the transmission mechanisms of Maize Lethal Necrosis Disease. This work involves laboratory rearing of thrip vectors, vector transmission bioassays, virus diagnostics, and (thrip-maize) vector-pollen interaction studies. His interests include virus diagnostics, bioinformatics and soil borne vectors of plant viruses.

Emmanuel Ogwok – National Crops Resources Research Institute (NaCRRI)



The cell and molecular and biologist is working on CBSD, passion fruit germplasm characterization, passion fruit viruses, in addition to seeking to understand cassava virus genetics.

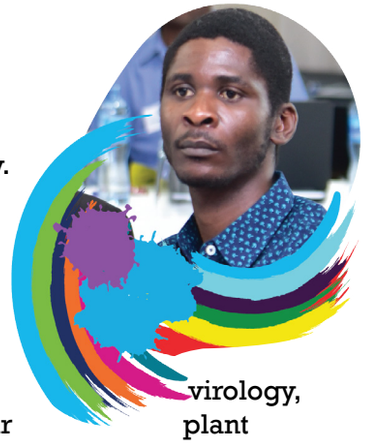
Emmanuel is proficient in gene silencing, molecular biology, cloning, applied virology, plant virus epidemiology, molecular virology, RNA interference and genetic engineering.



Geoffrey Okao Okuja – National Crops Resources Research Institute (NaCRRI)

Geoffrey is an entomologist working on field and laboratory based cassava disease diagnostics at NaCRRI. He is an expert in entomology, agricultural extension, virology and plant pathology.

John Oladeji – Assam Agricultural University



John is a PhD research scholar at Assam Agricultural University. He is currently working on developing a mapping population and using SSR markers for breeding for resistance against tomato leaf curl virus. He previously conducted an assessment of viral diseases in field-grown cucurbit crops and weeds on farms in South-West Nigeria.

John is adept in molecular breeding using SSR, plant virology, phytopathology, IPM, plant disease management and molecular plant pathology.

Tom Omara – National Crops Resources Research Institute (NaCRRI)



Tom is an agroecologist at NaCRRI. He is involved in research on whitefly population dynamics, insecticide application for whitefly control, screening for whitefly resistance, whitefly biology and ecology, and agricultural extension.

He is skilled in entomology, pathology, plant breeding and socio-economic surveys.

Milton Otema – National Crops Resources Research Institute (NaCRRI)



Milton is an entomologist and chemical ecologist. He is working with the Root Crops, horticulture programmes at NaCRRI. His work is mainly focused on sweet potato weevils, whiteflies, mango fruit flies, and biological control using microbes associated with sweet potato. He has conducted research on segregation of hydroxycinnamic acid esters mediating Weevil Resistance in Storage Roots of sweet potato.

Milton is a specialist in entomology, IPM, bioassays, chemical analysis and chromatography.



Sam Wamani – National Crops Resources Research Institute (NaCRRI)

Sam is agroecologist working on whitefly population dynamics in Uganda. He has experience in plant breeding, experimental set up, data collection, data analysis, and seed multiplication.

Peter Shango - Kenya Plant Health Inspectorate Service (KEPHIS)



The Lab analyst is also the head of the molecular laboratory at KEPHIS. At KEPHIS, Peter contributes to several activities such as seed certification, plant inspection, laboratory testing, seed pathology, potyvirus testing in tomatoes and phytosanitary monitoring.

His expertise includes plant pathology, crop protection, nematology, disease resistance, plant biotechnology and disease diagnosis.



Kalpana Sharma – International Potato Center (CIP)

Sharma is a plant pathologist with Sweet Potato program at the International Potato Center. She has over ten years' experience in plant pathology, extension and Research and Development Projects.

Her repertoire of experience includes excellent command of epidemiology, disease diagnostics, seed systems, seed and soil health, integrated seed health strategy as well as regulation and certification.

Rudolph Shirima – International Institute of Tropical Agriculture (IITA)



Rudolph is a molecular biologist studying the pathosystems of cassava brown streak ipomoviruses. Among other skills, he is proficient in molecular biology, diagnostics, disease surveillance, sequencing, cloning, bioinformatics, epigenetics, population genetics, training and functional genomics.



Gonçalo Silva – University of Greenwich Natural Resources Institute

Gonçalo, an evolutionary biologist and epidemiologist, is a research fellow at NRI. He has done research on the evolution, molecular epidemiology and phylodynamics of Citrus tristeza virus, and characterization of bean leaf beetles in Uganda. He is currently working on the development of a low cost on-farm robust diagnostic toolkit for yam viruses. Gonçalo is interested in field based diagnostics of yam and cassava viral diseases.

Mathias Tembo – Zambia Agriculture Research Institute (ZARI)



Mathias is a plant pathologist with ZARI. He is doing research in plant pathology to generate appropriate fungal, viral bacterial disease management technologies for increased crop production and productivity. He maintains an interest in the mode of transmission of CBSV.

He is well practiced in plant disease diagnostics, virology, pesticide evaluation, screening and evaluation of crop germplasm for disease resistance, development of disease diagnostics tool, high quality and disease free cassava seed, and pest management.



Lesley Torrance – The James Hutton Institute, University of St Andrews

Lesley is Director of Science at the James Hutton Institute and Professor of Biology at the University of St Andrews. She is presently investigating a novel resistance to Potato Virus Y (PVY) and other potyviruses that were discovered in potato, the effect of heat stress on virus resistance and the molecular basis of mature plant resistance in potato.

Lesly is collaborating with partners to strengthen potato

production in SSA (Kenya, Malawi). She is also working on several projects to improve the supply clean of seed, control pests and diseases, facilitate knowledge exchange on potato technologies and streamline supply and value chains.

She is a virtuoso in various fields such as virology, emerging infectious diseases and molecular epidemiology.

Sandy Williams - SCRIPTORIA Sustainable communications



SCRIPTORIA Director and co-founder Sandy Williams is a specialist in knowledge and data management, communication, sustainable development strategies, conservation agriculture, agricultural policy and crop modelling to mention but a few.

She also coordinates the AgShare.Today project. AgShare. Today aims to provide African researchers with the tools skills that they need to collaborate with partners, share and publish their data/findings, and efficiently manage their research, in order to increase the impact of the work being done to improve small-scale farmers' root and tuber crop yields in Africa.



Everlyne Wosula – International Institute of Tropical Agriculture (IITA)

Everlyne is a plant pathologist and vector entomologist at IITA in Dar es salaam, Tanzania. She is skilled in vector entomology, plant virus vector interaction, in addition to vector genetic diversity, ecology and behaviour

She is working on developing robust tools in *B.tabaci* diagnostics, genetic diversity of *B.tabaci*, NextRAD sequencing, and exploring the feeding behaviour of *B.tabaci* using electrical penetration graph (EPG) technique.





Juan Paolo Sicat – University of Greenwich Natural Resources Institute



Juan Paolo is a bioinformatics student at the University of Greenwich. He is proficient in web development, bioinformatics, viral informatics and database management. He previously helped improve a data mining tool to facilitate scientific data searches/journal articles, and contributed to work on the chicken genome. He currently examining the evolution of *B.tabaci* using bioinformatics.

Workshop 1: Research Question setting for pump-prime funding

The workshop was intended to identify the most important gaps in the current knowledge base for plant VBD. The workshop was chaired by NARO's Dr Sylvester Dickson Baguma.

Session Objectives

- Review/adapt the research questions identified at the UK launch
- Propose further research questions for funding
- Capture current gaps in the research landscape under CONNECTED's 5 priority areas
- Identify components they include: science, policy, agriculture, extension services
- Highlight barriers to progress

Participants were given some questions to ponder. These guided deliberations in different working groups during the workshop. They included:

- What are the unknowns or challenges for you under each research priority?
- Do you agree with findings from the UK launch?
- Is there anything missing or anything more to add?
- Does anything surprise you? If so, why?

Other questions that guided brainstorming of ideas during the workshop were:

- How could you work in collaboration to address those questions – what could you contribute?
- What different disciplines might need to work together to tackle the questions?
- What barriers might collaborators experience?
- Can you prioritise these? Choose one idea to feed back.

Introduction to National Crops Resources Research Institute (NaCRRI) - Christopher Omongo

Following a successful workshop, delegates were given a tour of the facilities at NaCRRI. Prior to the tour however, acting NaCRRI director Dr Christopher Omongo brought the guests up to speed on the institute. He discussed past and current research, human and infrastructural capacity in addition to history of the institute. The institute mission, vision, mandate and core values were disclosed.

Delegates learnt about the research programmes at NaCRRI— Root Crops, Cereals, Horticulture & Oil palm, Legumes—that handle priority research areas. Priority crops and selected constraints being addressed were discoursed. Important vector borne viral diseases in Maize, SPVD, CBSD, CMD, Rice Yellow Mottle Virus (RYMV), climate change (drought and flooding) among a host of other challenges are being addressed.

Improved resilience, nutrient profile, value addition, capacity building, improved management practices, partnerships and networking are some of the research benefits and results for NaCRRI end users/stakeholders.

Major challenges listed comprised emerging and remerging pests and diseases, limited capacity and capability, low staffing and policy issues.



CONNECTED Africa Launch

Snapshots from the NaCRRI Tour





CONNECTED Africa Launch

Day III: Wednesday 9 May 2018

The final day of the conference began with a recap of Day II. Dickson Baguma asked volunteers to say a word about the previous day's experiences.

What went well

Sandy Williams loved her experience at NaCRRI. Her aha moment was the logistical constraints at the institute (fuel for generator etc.) She thought such logistical needs should be factored into any grants/grant proposals.

NaCRRI's Tom Omara loved the feedback from visitors who had a great experience on Day II

Mathias Tembo applauded the growth in infrastructural capacity at the institute. "It was so gratifying that our fellow African researchers are investing heavily in research. It is so inspiring to the rest of African researchers" he noted.

What didn't go well

John Oladeji was upset with the poor internet connectivity that made it difficult to publicize conference proceedings to the world.

Sita Ghimire was disappointed that several products are ready for commercialization but are stuck at the institute. He advised bringing the private sector on board and working out an IP/benefit sharing system to facilitate product commercialization.

The recap of conference day II was followed by flash presentations in which more participants briefly highlighted their work and potential contributions to the CONNECTED network.

Flash Presentations Continued



Ibrahim Mohammed- Kebbi State University of Science and Technology

Ibrahim is a molecular plant virologist with vast research experience in plant-virus-insect interactions, especially those involving Geminiviruses, potyviruses and their vector—*Bemisia tabaci*—infecting cassava, vegetables and other tropical staples. He has also participated in capacity building efforts for surveillance, diagnosis, characterization and control of viral diseases in cassava in Nigeria.

He is an authority in plant protection, virology, project management, virus disease surveillance, diagnostics, indexing, micropropagation, whitefly population dynamics studies and virus resistance screening.

Adedamola Oresanya – International Institute of Tropical Agriculture (IITA)

Adedamola is a virologist at IITA in Ibadan, Nigeria. He works as Research Supervisor on several cassava, yam, cowpea and banana projects. Current projects include applications of molecular tools for virus diversity and diagnostics, epidemiology and management, understanding banana host BBTV-vector interactions, establishment of virus free germplasm as well as sequence analysis and phylogeny.



Virology, molecular biochemistry, epidemiology, plant biotechnology, plasmid isolation, sequencing and transformation are some of his myriad proficiencies.

Sophie Evison, University of Sheffield

Sophie is an evolutionary biologist investigating a diversity of evolutionary aspects using social insect models. Her principal interests include host-parasite interactions, communication and insect physiology.

Currently, Sophie is studying the role of endosymbionts in insect immune responses using the common bedbug as a model. She is also examining the impact of genetic diversity and how it influences interactions between honey bees and a specific fungal brood parasite that causes 'Chalkbrood'. Further, she is trying to understand how diet influences behaviour and longevity in ants through epigenetic mechanisms.

Workshop II

Workshop II sought to gather network member insights on community needs for training. Questions participants sought to answer are listed below:

Identifying community needs

- What training, capacity building, networking opportunities, shadowing do we need?
- What came out of Workshop I that we could do?
- What training needs were on already on your mind?
- Which of these ideas/activities would you prioritize?

Delegates voted on ideas from Workshop I that they felt CONNECTED should prioritize. Ideas were triaged into short, medium and long term priorities. The network management will sort and classify identified priorities for further consideration and action.

Wrap Up

As the conference wound to a close, key organisers shared some parting thoughts.

Neil Boonham, CONNECTED Network Co-Director, thanked Titus Alicai and his team (Titus, Sarah, communications team) for making this conference such a success.

Titus Alicai who hosted the conference was appreciative to the management team for allowing Uganda and NARO/NaCRRI to host the launch. He was glad that majority of members in the room "are those that can do it now and tomorrow" alluding to the early career researchers who comprised the bulk of the audience.

Guests who felt there was something that had been overlooked were requested to bring it up so that it would contribute to a comprehensive pool of feedback and insights from the conference.

He re-echoed his applause to the management, his team in Uganda and everyone whose effort and commitment ensured a successful Africa launch conference.

He wished the very best for the CONNECTED community going forward and bade Godspeed to delegates travelling back home. Titus was optimistic that the collaborations and networks forged at the conference would be carried forward.





CONNECTED Africa Launch

Day IV: Thursday 10 May 2018

The conference was followed by a two-day training workshop aimed at early career researchers looking to develop critical skills including research grant proposal writing. The workshop was provided by Scriptoria, Sustainable Development Communications, UK. One of the Scriptoria team members also provided attendees with IT training and support throughout the course.



Day V

Friday 11 May 2018



At the end of the two day course Immaculate Mugisa, a participant, extended a vote of thanks to all participants and organisers. She wished the visitors a safe journey back home and invited them to visit Uganda again.

Diane—CONNECTED Network manager—appreciated the Scriptoria team for organising these workshops and the participants for the patience and participation through an otherwise packed schedule.

Next Steps

Neil Boonham asked members to remain connected and share feedback as and when it is available amongst each other, and with the network leadership for appropriate action.

He mentioned plans for bigger network events probably in West Africa and the UK among other locations. Management is working out a big training activity in Bristol. Individual training packages will be available and can be applied for competitively. The next call for applications will be out in October 2018.

He requested members to comply when approached to provide content/resources for the CONNECTED network website. Members were invited to make use of resources available on the website. Delegates were informed that Lesly Torrance has been working on an app that helps with photo identification of insect pests and has allowed the network to expand it to a broader range of crops. The app will available free of charge. Scriptoria is also partnering with CONNECTED to make free journal access available to network members.



Appendix I

Conference Programme

Day I: Monday 7 May | Skyz Hotel Kampala		
Time	**Activity**	**Description**
9:00	Registration	Participants arrive and register with conference clerk
10:00	Break	Coffee/Tea and snacks
10:30	Start—Welcome	Remarks from: Titus Alicai-CONNECTED, NARO/ NaCRRI Neil Boonham-CONNECTED, University of Newcastle Christopher Omongo-NaCRRI Yona Baguma-NARO
11:30	Landscape & Stakeholder mapping presentations	Outcomes of UK Launch Conference & current project situation-Diane Hird
12:30	Lunch & Networking	
13:30	Short Presentations	Crop Protection: Ephrance Timuboine, MAAIF Extension: Patience Rwamigisa, MAAIF Plant Health: Isaac Macharia
15:00	Break	Coffee/Tea and snacks
15:30	Research Focussed Presentations	Presentations/Updates from: Titus Alicai-NARO Susan Seal-University of Greenwich, NRI
17:00	Day I Round up, Closing Remarks	Discussion of day's proceedings & closing remarks
19:00	Dinner at Skyz Hotel	
Day II: Tuesday 8 May | National Crops Resources Research Institute (NaCRRI), Namulonge		
07:45	Travel to NaCRRI	Delegates depart from Hotel for NaCRRI
09:00	Flash Presentations	Participants briefly describe their work & research interests
10:30	Break	Coffee/Tea and snacks
11:00	Workshop I: Research Question setting for pump-prime funding	Participants **identify gaps in research question setting** in break-out groups.
13:00	Lunch	
14:00	Presentation	Brief about NaCRRI-Christopher Omongo
14:30	NaCRRI lab & Field tour	
17:00	Social event with dinner & cocktails at NaCRRI	
20:00	Travel back to Skyz Hotel	
Day III: Wednesday 9 May | Skyz Hotel, Kampala		
9:00	Flash Presentations continued	Participants briefly describe their work & research interests
11:00	Break	Coffee/Tea and snacks
11:30	Workshop II	Participants discuss Network member needs in break-out groups
13:00	Lunch	
14:00	Workshop III	Participants discuss interdisciplinary working in break-out groups
15:30	Break	Coffee/Tea and snacks
16:00	Workshop III continued	
17:30	Wrap up/Official close	Closing remarks from: Titus Alicai-CONNECTED, NARO/ NaCRRI Neil Boonham-CONNECTED, University of Newcastle
18:30	Social event	Cultural entertainment at Ndere Cultural Centre, buffet/barbeque
Days IV and V: Thursday 10 and Friday 11 May | Skyz Hotel, Kampala		
Early Career Researcher Training Workshop facilitated by Scriptoria, Sustainable Development Communications, UK		

CONNECTED Africa Launch

Appendix II

List of Participants

Name	Institution	Contact
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Peter Shango	Kenya Plant Health Inspectorate Service	
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CONNECTED Africa Launch

Buildling resilience to Plant virus Vector-Borne Diseases

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