SECTION 1: PROJECT DETAILS

<table>
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<tr>
<th>Grant Reference</th>
<th>Capacity Building Grant Reference</th>
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<tr>
<td>BB/F004028/1</td>
<td>BB/H531743/1</td>
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**Project Title**

How resistant plant varieties avoid suppression of RNA silencing by viruses as exemplified by sweetpotato: Better food security through virus control

**Principal Investigator**

Dr Richard W Gibson

**Lead Research Organisation & Department**

University of Greenwich, Natural Resources Institute

**Co-Investigator(s)**

<table>
<thead>
<tr>
<th>Name</th>
<th>Research Organisation</th>
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<tr>
<td>Dr Settumba Mukasa</td>
<td>Makerere University, Uganda</td>
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<tr>
<td>Prof Sir David Baulcombe</td>
<td>University of Cambridge, UK</td>
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<tr>
<td>Dr Jan Kreuze</td>
<td>International Potato Center [CIP], Peru</td>
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<tr>
<td>Dr Neil Boonham</td>
<td>Food &amp; Environment Research Agency [FERA], UK</td>
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<tr>
<td>Dr Gorrettie Ssemakula</td>
<td>National Crops Resources Research Institute [NaCRRI], Uganda</td>
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SECTION 2: OUTPUTS

Agricultural technologies of relevance to the poor (the practical application of research to develop new tools, skills and ways of working)

**Participatory plant breeding**: A participatory plant breeding (PPB) approach to sweet potato previously developed in Uganda with funding by the Crop Protection Programme of DFID was validated. PPB is a particularly appropriate tool for developing new crop varieties for marginal agro-ecologies and for poorer farmers, especially women. This, the first ever PPB of sweet potato, therefore represented a potential major breakthrough. Varietal attributes (53) were identified as particularly important for sweetpotato farmers. Data were collected with mainly women farmers [the majority of sweetpotato farmers] belonging to the Tusitukire wamu Kabulanaka Farmers’ Association (TUKAFA) in Luwero District to examine how the new variety selected by PPB, the main local variety and the main conventionally bred variety fitted these farmer criteria. The PPB-bred variety best fitted the broad range of farmer criteria. Papers describing the process and outcome have been published in international journals. In a film, farmers, again mainly women, explain how the new variety has improved their lives, sales of planting material and higher prices for the roots paying school fees, clothes and even building land. The new variety, NASPOT 11 was released in Uganda in late 2010. Of further relevance to the project is that we have shown it possesses a well developed ability to maintain itself free from virus infection, probably based on RNA silencing.

**Reversion from infection by SPFVM**: Sweetpotato genotypes with an ability to maintain themselves free from infection with viruses particularly SPFVM provide a way by which low input farmers, of which women are a major component, can obtain virus-free planting material. Such genotypes tend to have an unusually low virus titre. The use of ELISA or qPCR to detect plants which have a low virus titre has been developed and is starting to be used at NaCCRI funded by the Bill & Melinda Gates Foundation.
New scientific collaborations involving developing country partner(s) established during the reporting period (collaborations consisting of at least one day per week)

The CIP-led ‘Sweetpotato Action for Security and Health in Africa (SASHA)’ project was funded by the Bill & Melinda Gates Foundation in 2009. It includes an East African sweetpotato seed systems research component which funded Dr Barker and Dr Kreuze, Dr Gibson. This additional collaboration enabled an Ugandan PhD student at Makerere University to be supervised by Dr Mukasa and capacity building at NaCCRI for the Ugandan Sweetpotato program including greenhouses, PCR and qPCR, vital for extending project outputs. As well as enabling Dr Gibson to spend more time in East Africa with project partners, valuable additional crop samples have been collected and the Ugandan student’s research builds on the ability of RNA-silencing based resistance in local Ugandan varieties to eliminate virus infection. Another project funded Dr. Kreuze and Dr. Cuellar during the no-cost extension period of the project through the BREAD (Basic Science to Enhance Agricultural Development) program by the Bill and Melinda Gates Foundation and the National Science Foundation was initiated by CIP and the Boyce Thomson Institute enabled collaboration with scientist from 10 African countries to determine the pan-African sweetpotato ‘virome’ using siRNA deep-sequencing and assembly.

Publications - production of research information (e.g. journal papers, book, book chapter, conference paper, policy brief, in-house publication\(^1\), in-house published products\(^2\)

**Publications in peer reviewed international journal**


De Souza, J., Cuellar, W.J. 2011. Sequence analysis of the replicase gene of 'sweetpotato caulimo-like virus' suggests that this virus is a distinct member of the genus Cavemovirus. *Archives of Virology* 156:535-537.

Gibson, R.W., Mpembe, I., Mwanga, R.O.M., 2011. The role of participatory plant breeding as exemplified by the release of the sweetpotato variety NASPOT 11 in Uganda in 2010. *Aspects of Applied Biology* 107, Systems improvements to crop improvement, pp7 -76.


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*1* Including working papers, newsletter, internal series.

*2* Including toolkits in CD form; videos
Other publications

Gibson, R.W., Mpembe, I., Mwanga, R.O.M., 2011. The role of participatory plant breeding as exemplified by the release of the sweetpotato variety NASPOT 11 in Uganda in 2010. *Aspects of Applied Biology* 107, Systems improvements to crop improvement, pp7 -76.

Papers read:


Flores, M., Silvestre, R., Kreuze, J., Cuellar W.J. 2011. Evaluation of virus indexed plant material by deep sequencing. (In Spanish) Presentations at the XXX Colombian and XVI Latinamerican Congress of Phytopathology


Film:

All authors who are from a developing country are in red

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**Infomedia – requests for research information** (infomedia is the means used to share knowledge, e.g. newspaper, TV, radio, mobile phones, websites, magazines). This indicator is about measuring outreach in line with spend on research communications. It measures the requests for research information as opposed to the production of research information.

*Record any infomedia you have used during the reporting period to disseminate information directly related to this project.*

<table>
<thead>
<tr>
<th>Data</th>
<th>Number &amp; Details</th>
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<tbody>
<tr>
<td>Keyword/thematic area/headline statements from research appearing in infomedia</td>
<td>Total number of places where the keyword/thematic area/headline statements appears as a result of requests</td>
</tr>
<tr>
<td>actual radio interviews</td>
<td>NASPOT 11 (Tomulabula) was mentioned in local Ugandan newspapers. Dr Gorrettie Ssemakula is</td>
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</table>
actual television interviews planning to write a more extensive article on it.

actual features in newspapers, magazines, other similar publications

infomedia websites that provide links to research programme

Other - please state A film at: http://www.nri.org/work/tomulabula.html

**Training** (knowledge/skills-based short courses; PhD; research fellowships; workshops; exchange visits; mentoring; knowledge-based networks/communities of practice; on the job training; self-study/guided reading)

A course on Deep sequencing, data analysis for virus identification and characterization was provided at Makerere University, Kampala, Uganda. May 2011. The course consisted of laboratory training in plant RNA purification and computer sessions on data analyses and visualization of results.

Participants: 6 students from Makerere University, 1 Postdoctoral fellow from NRI, 1 postdoctoral fellow from Cambridge University, 1 Postdoctoral fellow from Mikocheni Laboratory, 1 postdoctoral fellow from Makerere University, 2 Graduate students from NaCRI. [Capacity building grant BB/H531743/1]

**Mentoring**


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3 To find which websites link to your site, use the ‘link’ function in Google. Type an entry in Google search: Link:www. link:www.yourwebsite.ac.uk -site:www.yourwebsite.ac.uk. This will return the number of links currently indexed by Google that point to your website minus the number of links that arise from the site itself.