

## Visit Report Graham Thiele, “RTB: Making it work in Uganda” – 9-18 April 2013

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The trip had four objectives:

1. Contribute to RTB Global Musa Expert Workshop: Production constraints, yield gaps, and research strategies for smallholder banana production
2. Learn about RTB field research and farmers in Uganda
3. Learn about work of IITA, Bioversity, CIP and NARO at the Namulonge and Kawanda Research stations
4. Share knowledge about the RTB program and contribute to improved collaboration amongst partners and stakeholders in Uganda – **Seminar: Making it Work in Uganda**

### **Seminar Recommendations: Key issues to make RTB work in Uganda**

1. Promotion and awareness of RTB products and technologies.
2. Strengthen innovation brokerage, connecting innovators with users.
3. Commercialize RTB seed systems to meet the triple challenge of quality, quantity and timeliness of RTB planting material.
4. Work from production and consumption ends of the value chain to manage the high perishability of RTB products.
5. Support Uganda's integrated farming systems through integrating crop and livestock research.
6. Integrate farmers in all steps of the research process – co-creation of approaches and solutions by researchers, farmers and other stakeholders.
7. Align with national agriculture policy and investment planning (DSIP).
8. Build RTB partnerships with key stakeholders in the value chain.
9. Strengthen information flows and learning across ongoing RTB-related projects and programs.
10. Link research with training institutions to strengthen RTB technical capacity in agricultural service sectors (including research, extension).

## **Meeting: Global Musa Expert Workshop: Production constraints, yield gaps, and research strategies for smallholder banana production, 9-12 April**

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This was organized by Bioversity as part of the RTB priority assessment following the six step process agreed. On the second day I gave a presentation about the RTB and Dietmar Stoian gave a presentation of the flagships which have been proposed for banana. The idea was to allow the participants to identify principal constraints and research options before presenting the RTB flagships to avoid biasing their responses. The research options which were selected as the most important during the workshop were highly aligned to the banana flagships and linked products. The workshop was successful in characterizing different production systems by banana cultivar type. It was harder than expected to elicit research parameters and gender concerns in a workshop format. But this was still a chance to learn a lot about the banana expert community and strengthen linkages amongst them. A workshop report will be made available.

## **Learn about RTB research and farmers in Uganda , 15-16 April**

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This visit was organized by Simon Heck. We made a transect from Kampala to Mbale on the border with Kenya in the east, stopping at RTB linked activities in different cropping systems. Simon and I were joined on the trip by David Bukasa (IITA), who works with mixed banana and coffee cropping systems, Gerard Kyalo (CIP, field and crop agronomist), Sam Namanda (CIP) and Julius Okello (CIP). Gerard and Sam are part of the CIP team working with the HarvestPlus project which began in 2012 and centers on distribution and promotion of Vita, Kakamega and Ejumula and Kabode OFSP varieties, as well as iron rich beans.

## **VEDCO, NGO collaborating with Harvest Plus in Nama Sub-County, Mukono District**

Grace Babirye is an extensionist with VEDCO an NGO which collaborates with CIP in HarvestPlus project. Grace explained that each direct farmer beneficiary receives 15kg of vines. To increase outreach each direct beneficiary has to provide this quantity of vines after multiplication to two other farmers. The Community Based Trainers (CBT) support and oversee the process. This year in Mukono District they should reach 1800 farmers directly plus 3600 indirectly. We went with Grace to Buyuki village.



Proscovia Nakiyini, one of the direct beneficiaries of HarvestPlus in Buyuki village is planting vines of Vita with a forked stick to push the vine into the mound. Farmers use staggered (i.e., relay) planting so that OFSP roots are available longer.



Annet Kyojo is a CBT. Last December VEDCO brought her vines of Vita. She can get some Kabode from neighbours but Vita yields more. Children prefer Vita, whilst adults generally prefer Kabode because of its higher dry matter, and sweeter taste.



The Del's womens group sang to thank VEDCO for OFSP, stressing its value for eyesight, boosting immune system, helping children grow well and the importance of iron rich beans in building the body.



We ate in the house of Chairperson Jane Naroge a meal of OFSP roots, Vita and Kabode, chapatis made with OFSP and bananas (photo S. Heck)



## Sweetpotato production along main road corridor in Iganga District



Christine plants a varietal mix including Silk, Bunduguuza and Mulu Aduduma. She has heard of “yellow” varieties but doesn’t plant them. She plants from March through July. Sweetpotato is the second most profitable crop here after rice. The production is hers as her husband is retired. She grows between half and one acre and says each acre produces about 20 bags. She rents part of the land and hires in some labour for mounding, harvesting. Mostly she uses her own planting material. Sometimes she sells vines. This is a commercial farm with small amount for consumption. Her business is sweetpotato. The price is now Shs 50,000 per bag, and she sells varieties mixed in the bag. From July-September prices are high, around Shs 80,000 per bag. She takes the main harvest to the Nakawa market in Kampala. What’s left over local people buy.

She also plants maize for home use and has rice. She lost her planting material for cassava (probably because of CBSV). She grows bananas for home use but said that weevils eat the base and they collapse, She thought the wilt problem had gone down.

### **Akazalibwa Rural Agro-processors and Trainers Association (RAPTA) – Womens Group Rural Agroprocessors – Namalemba Subcounty, Iganga District**

We met Harriet Nkoobe in the RAPTA office, they had a project with IITA from 2007-9. Next season they plan to work with yam and sweetpotato. We visited the Tema (Tulawanise ebizibu minani abegaizi) group in Nakamini village with Ronald Meseye an extensionist with RAPTA. Tema have 33 members, 21 women and 12 men.

Mwanja Mayongole explained that because of many problems decided to come together to form organization. They made a study tour to RAPTA center and were trained in growing cassava. IITA was working with RAPTA. They had problems getting planting material and IITA brought TMA14, Akena, Omongole, NASE 3 and NASE 10.





Mwanja and Ibrahim Mayongole explained how cassava processing stopped when brownstreak arrived

Ibrahim Mayongole said “they taught us good agronomic practices, one metre by one metre planting, short stakes with 4-5 nodes and heaping during weeding. In 2004 Rapta helped us process cassava. We used their chipping machine and grater. It was easier to grate dry for flour, then we used the press. RAPTA showed us other uses for cassava including, gari, tapioca, starch, flour and cakes. Rapta made study tours to show us the price and helped with marketing. We usually sold chips and flour. If the flour was not sold then we made cakes. If we made good gari, then they took it to Ghana. This continued

up to 2008. In 2009 the cassava got disease (CBSV). This affected us seriously it made the cassava bitter. After the problem with cassava we began planting yams and sweetpotato.”



Nabirye Zainabalu chairperson of Tema with cassava root



Nabirye is trying yam cultivation as an alternative to cassava

The cassava gives a low yield but some roots can be used for home use after sorting. Farmers are now eating more sweetpotato before they used to eat cassava. I asked them what can you do about the problem with cassava and Ibrahim said “the only way out is to get resistant varieties.”

### **Potato seed producers in Wanale Mbale District**

Waniaye Jawali Agricultural Extensionist from NAADS, explained how farmers are producing their own seed in Wanale on a plateau leading up to Mt Elgon (over 2000 masl). They get seed of the Victoria variety from Kalenge Research station. They use the seed plot technique and select seed of most vigorous plants at harvest, those with more than 10 tubers. CIP had collaborative activities here previously and he learned from Sam Namanda about clean seed, We saw a diffused light store in Wanale which can hold 3 tonnes of seed. There are 9 seed stores in the area



Waniaye Jawali of NAADS explains seed plot technique in field of seed potatoes of Victoria variety

.Bacterial wilt is the main problem. Farmers end up entering natural forest to find clean soils. Some seed is certified locally. ,

There are two seed producers associations: the Wanale Seed Potato Producers Association with 5 groups 20 people each and the Budwale Seed Potato Producers Association with 75 members.

### **Intensive mixed farming in Wanale Mbale District**

We visited Wojje Subahili who farms lower on the slopes of Mt Elgon at around 1700

masl. He has worked with programs on soil conservation, trained to conserve soil. Then he grew passion fruit, and went into potatoes. He has a diffused light store for 0.5 tonnes. Wojje has a more intensive mixed cropping system. He keeps a cow in a stall with zero grazing, using napier grass, banana pseudo stem, legumes, and cassava as feed.



	
<p>Wojje Subahili feeding Napier grass to a cow under zero grazing</p>	<p>Wojje had removed the central mother plant the day before because it was infected with BXW</p>

He has about 800 banana plants. He says he can live with bacterial wilt. He removes flowers, keeps plot clean, and uses plenty of manure (animals are part of the system). Where there is infected BXW plant he removes the sick stem by cutting in pieces and then removes the base with hoe. Puts soil on top of cut plant. This happens about every 3 months (a frequency of infection of 4 per 800). Wojje had seen that when he removed a diseased plant that the other plants could still be healthy.

Waniaye Jawali of NAADS points out that the new approach is not to uproot the whole plants, rather to cut the diseased stem being careful to avoid wounds.

Wojje also mentioned that yams and cocoyams/aroids are an important food crop in Wanale. Darkness came in before visiting the field of yams.

### **Kachumbala, Kidongole and Butebo (KAKIBU) Association, Bukedea District.**

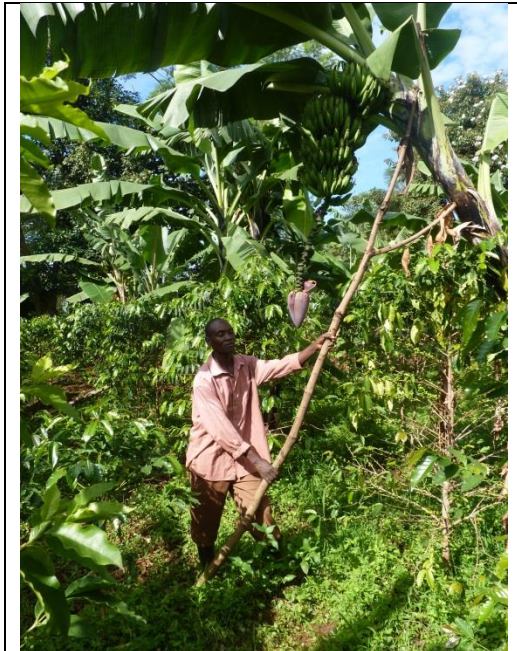
Charles Otuda, is a member of the KAKIBU Association set up in 2007 with support from the Reaching End Users Project (HarvestPlus). They received vines of OFSP varieties, short training on seed system, demand creation and vitamin A. In 2008 they got a bumper harvest of roots and vines. They began selling OFSP roots in the market in Mbale, 4800 bags in 2008 and 6400 bags in 2009. A talk show on radio in Mbale creates knowledge of OFSP and Vitamin A.

Charles through KAKIBU mobilizes many farmers to sell, all OFSP varieties. Kakamega, Kabode, Vita and Ejumula in the Mbale market. Kakamega is most popular variety. Charles likes Kabode as do his four kids (4-18). Market traders prefer Kakamega and Ejumula for taste. Farmers bag the varieties separately for sale. In 2012 Charles sold 254 100kg bags for 25-30,000 shillings per bag in Mbale. Bicycle traders buy from him in smaller quantities. The Parish Committee helps select and sort roots.

Sam pointed out that Ejumula is highly susceptible to SPVD and is disappearing. It ranks best in taste. Using tunnel nets, farmers can keep seed clean on farm to address SPVD.

KAKIBU producers also sell OFSP vines to the institutional market. Charles plants seed plots with rapid multiplication as well as dual purpose for both vines and roots. He pointed out that the problem with vines is that you are never sure of market, whereas you can always sell roots.

### **Mount Elgon banana and coffee growers –Buyaka village, Mbale District**



Patrick Mukamba in his coffee and banana field

We visited a mixed banana and coffee field of Patrick Mukamba, located at the base of Mount Elgon. The plot had about 700 Arabica coffee plants, 50x100m and 80 banana plants wide spacing. Mixed banana and coffee systems are a farmer innovation, IITA has been looking at how to improve the system

<http://fr.slideshare.net/CIALCA/van-asten-cialcas-efforts-in-farming-systems-r4d#btnNext>

David Bukasa explained that this was a project site of IITA with the USAID APEP project which included bananas and coffee and provided banana tissue culture plants to some of the farms in the area. IITA surveyed farmers took soil and foliar samples to make specific recommendations about fertilizer applications in coffee (400g per coffee tree per year in two doses). David explained that the bananas can have a share of nutrients applied to coffee bushes because of their roots that can grow to length of more than a meter.

Banana provides shade which gives bigger beans and

better taste. Patrick uses his own banana shoots for seed (he didn't get tissue culture seed from the project).



David Mukasa explained that here there are too many plants That is reason why bananas are losing.

Thomas Nangumba a neighbour told us that after some seasons with coffee the bananas die. Banana is outcompeted by coffee, after the third cycle about 4 years. David Mukasa explained that it depends on management. Farmers need to manage suckers and keep three plants per mat. One reason for this is that farmers want to leave suckers for animal feed. Bulambuli and Kapchorwa are districts with well managed banana and coffee systems.

Thomas said there is a lot of banana wilt in the area. Plants become yellow. If it enters



a garden, you have to give up whole garden and then later come back. He said “Uprooting is a punishment the roots go far down”. Fortunately wilt is not here but it is nearby in the forest area with pure banana stands. He said. “There are a lot of losses there. I lost a lot of banana.”

Patrick says that he cuts down leaves for feed, although he is aware that cow dung could transmit wilt to another garden. Usually he cuts male flowers as he knows this can help prevent the disease although he hadn’t done that on all the plants here (recommendation is to break with a forked stick as cutting can transmit infection to another plant on blade).

Previously there was strong support for coffee from cooperative movement, Bugisu Union. In 2010 coffee prices picked up. Now a private processor Kyagalanyi is buying their coffee <http://www.kyagalanyi.co.ug/>. However, banana growers are much less well organized than coffee growers.

### **Sweetpotato trader Sois Odeke**

Sois lives 5km from Kumi town (Teso area). Sois is chairman of the sweetpotato traders in Kampala and a graduate of the FFS in sweetpotato. He explained to us how he got interested in sweetpotato. He told us there was an insurgency in 1990 and when Teso came back from the camps they only had sweetpotato. He began growing sweetpotato in 1992. “Sweetpotato was the only crop which helped us get out. There was a harvest in 3 or 4 months and we could get money. We were given planting materials in the camps (Tanzania variety)”.



Boy variety on sale in Kumi market

Sois organizes sales of sweetpotato with brokers who come in with lorries from Kampala for the harvest. Sois explained that his group of producers (ASPA) handle 3 trucks per day 6 days a week, during the harvest period, resting only on Sunday. They load 50 bags of 200kg per truck.

Six years ago when I last visited the Kumi area and spoke with Sois, Tanzania was the dominant sweetpotato variety (yellow fleshed). Sois said that Tanzania got diseased (SPVD) then the Boy variety appeared. He said “this yields well but the

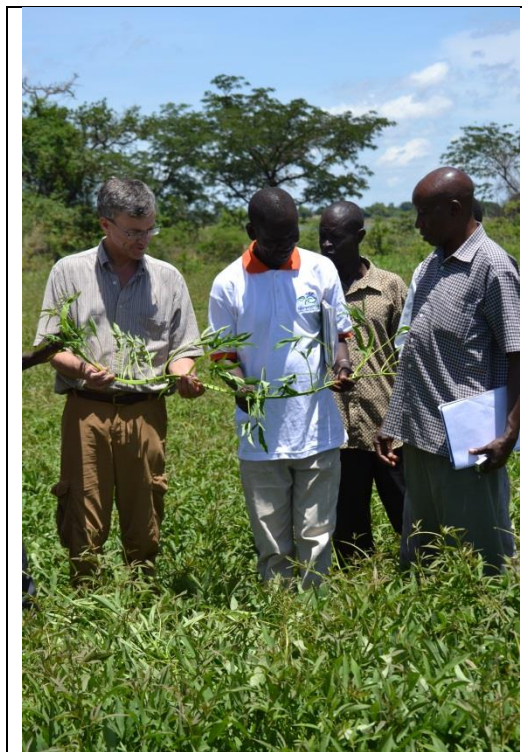
taste is not so good. Amongin is now nearly extinct. If we can recover the Tanzania variety we can recover the market. Also we are now trying Araka”.

Sois pointed out “Me as a person I know the value of OFSP but its not welcome in Kampala. We are consuming Kakamega in the village. But the consumers in Kampala like Tanzania. Its yellow. They call it Soroti potato. Boy looks the same. Its called Boy because its very fast. Its out in 3 months. We put Araka on the top of the bag because it looks good and Boy in the middle”.

Most traders in Kampala can't tell the difference between the Tanzania and Boy. So the traders sell Boy as Tanzania in Kampala, where both are called Soroti potato. But the two have different tastes.

### **Soroti Sweetpotato Producers and Processors Association (SSOSPA), Odo village, Serere District**

Eugene Ekenyu is the leader of SSOSPA and his wife Christine is Chairperson for the Value Added Committee. There are also Committees for Hygiene and Quality Assurance and Security. Many of the groups linked to SSOSPA were formed during FFS training provided in 2004 (with CIP and NRI). SSOSPA is collaborating with HarvestPlus and also with the CAVA project of NRI.



We saw 2 acres of old Kakamega planting material in multiplication for vines. This was planted in December through January and irrigated with water pumped from swamp (photo S. Heck)

SSOSPA has been multiplying the original Kakamega OFSP planting material received during FFS training in 2004. In 2012 they sold 3000 bags of OFSP vines to institutions. The problem with this market is that they are not sure how much to plant.

SSOSPA received cuttings of clean Ejumula, Kabode and Kakamega produced in screen houses from tissue culture from Biocrops (Kampala) with HarvestPlus. These cuttings will be multiplied up for distribution mostly to institutions.

Eugene commented: "According to the white man's machine it is clean. Ejumula is highly susceptible and I have not seen any virus in this material. We were the first of group of five beneficiaries in the whole country"

Eugene also hopes to revive the yellow fleshed Tanzania variety. He explained that they could sell this to local farmers not to NGOs: "This is a sustainable vine market. Who is going to pay, personally I detest free things. If I have money I buy". SSOSPA plans to put up demo plots to show the advantages of clean planting materials for the commercial market. "If this is just for local consumption farmers won't pay. Farmers don't care about quality. Sweetpotato competes against itself".





Eugene commented: "According to the white man's machine it is clean. Ejumula is highly susceptible and I have not seen any virus in this material."



Re-multiplication of clean material, 1m x 1m three vines together. Plant in ridges using ox plough, then break ridges into mounds to improve weed and water management, and ease of harvest.



OFSP is a regular part of farmers' diets in Oko. We saw Sam Oluka (8 years old) eating amukeke



Amukeke is a local sun dried and then rehydrated sweetpotato food. This was made of Kabode and Kakamega OFSP varieties

Farmers had planted the improved Akena and 2961 cassava varieties. These were tolerant to cassava mosaic disease. Brownstreak wiped out these varieties when it appeared. Eugene explained that some farmers had gone back to planting older varieties which tolerate BSV and are affected by CMD but which still yield. The farmers no longer trust what comes from research stations. Most have gone through heavy losses planting new varieties that end up being wiped out by BSV and/or CMD





Field of Migyera cassava variety tolerates BSV



But has some cassava mosaic disease

SSOSPA received clean materials of 4271 which is tolerant to BSV. Eugene got stem cuttings from the NARO experimental station in Serere. This is the second year and so far he has no brownstreak or CMD. He is multiplying for distribution.



Eugene was proud of his field of 4271 cassava variety planted with clean stem cuttings from NARO



Sois Odeke was skeptical he said: "The farmers are angry with the researchers, they won't take their clones even if they are free (photo S. Namanda)"

SSOSPA is working with NRI and the CAVA project to produce high quality cassava flour (HQCF). They use Migyera and 4271 varieties. There is a market for biscuits. They need National Bureau of Standards certification for their HQCF, This requires fencing, a peeling table, drying within 12 hours of grating on raised open sun drying table and trying to be hygienic. After drying and milling the flour has to be sieved. 1kg of flour sells for 2000 shillings. They are selling to small bakeries





Grating peeled cassava roots with equipment provided by CAVA



Christina Ekinyu: “sieving 100kg of the flour takes us all day from dawn to dusk. Can SSOSPA help with some machinery?”

## Learn about work of IITA, Bioversity, CIP and NARO at the Namulonge and Kawanda Research stations April 18

### Kifu forest research site of Bioversity International

I visited the Kifu forest research site with Simon Heck, Robert Mwanga (CIP), Valentin Nakato (IITA) and Evans Were (IITA). The forest is gazetted for agriculture. We visited a field simulated experiments with inoculation of BXW with the forest as a buffer to avoid infection spreading. We also visited a trial on disease transmission and the systemicity of spread from mother plants to suckers.



Walter Ocimati and Denis Ochola of Bioversity explained the different trials being conducted.



This BXW epidemiological trial looked at interaction of the disease with nutrients and the



The Too cultivar has fully persistent bracts reducing chance of infection

The work in Kifu work was linked to CIALCA. Bioversity has brought materials from ITC with persistent bracts (male flowers) so insects cannot get to the moist area of the plant to cause infection, although damage from monkeys is another route to infection. The ABB type is very susceptible and the Central area of Uganda is most affected by BXW, here insects play a major role in transmission. Now the west is succumbing here transmission is mostly transmitted by farm tools. Collective action and village bye-laws have a big role in managing the disease through male flower removal and other practices.

### **Namulonge Experimental Station (National Agricultural Crops Resources Research Institute - NACCRI)**

We met the Station Director Dr James Ogwang who welcomed us and carefully explained the different RTB related programs at NACCRI. Our first visit was to the screenhouses of the Sweetpotato program with Dr Gorrettie Ssemakula.



Bernard xyz (PhD student at N. Carolina) explained work on a mapping population with 289 accessions using SSR and FLP markers. He has screened for resistance to SPVD, alternaria, weevils and nutritional traits. He will phenotype in 3 field sites for weevil resistance.



Runyararo Rukarwa (PhD Student) working on sweetpotato with Cry gene for managing weevils. Despite low expression of BT in the roots work will continue with different promoters and full length proteins.





Gorrettie Ssemakula explained that breeding is for SPVD resistance, OFSP and dry matter and they attempted weevil resistance. At the first stage seedlings are selected for SPV. Then clones are evaluated using an accelerated breeding scheme at three locations. SPK 004 (Naspot 7) is near to release



Robert Mwanga CIP sweetpotato breeder explained that this CIP/NaCCRI crossing block has 100 genotypes and 20 replications. It is one of two crossing blocks selected to maximize hybrid vigour.



NaCCRI cassava program is collaborating with CIAT (Hernan Ceballos) and Danforth Center in utilization of double haploids to accelerate breeding



Robert Kawuki, NaCCRI cassava breeder explained that in this cassava crossing block breeding targets are for increasing beta carotene and harvest index in collaboration with IITA and Cornell.



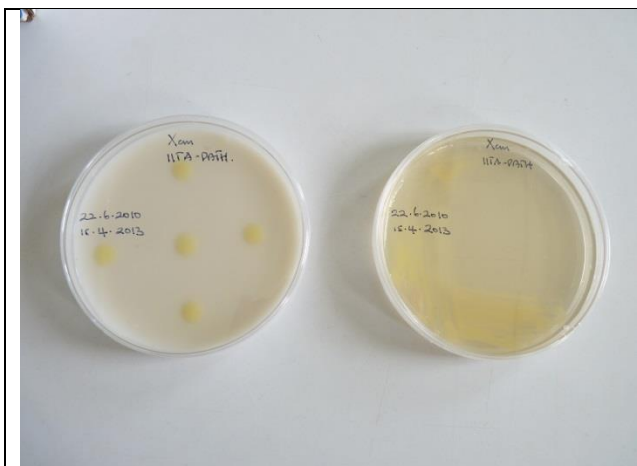
Michael Batti Research Associate explained how IITA/NaCCRI took Calcuta a wild parent with Sigatoka resistance and crossed it with Matooke (EAH)



This led to an improved male parent and eventually to the triploid seed-free Kabana (Kawana Banana) 6H variety with Sigatoka resistance released in 2010.

### Kawanda Experimental Station (NACRRI)

Dr David Talengera (NACRRI breeder) guided us on the visit. Kawanda houses laboratories and the banana program. Dr Wilberforce Tushmireirw “Tush” acting Director, who I had met at the Musa experts meeting, greeted us enthusiastically and explained his own priorities for banana research: 1. Weevils 2. Black sigatoka 3. Nematodes and 4. BXW.



In the IITA pathology lab Valentin Nakato and Evans Were explained how simple extraction kits



The lab a space for collaboration with colleagues from Bioversity and NACRRI.



for BXW were provided to 7 countries	
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Confined field trial of NaCRRI with IITA in collaboration with the University of Leeds. Annet Babirye explained that this is based on a GM event with a repellent peptide. Plants had already been inoculated with nematodes to see if it was effective.



Confined field trial of NaCRRI with Bioversity part of the ABSP coordinated by Cornell University. Walter Ocati explained this used stacked Cry 5B gene and cystatin inhibitor from papaya to give weevil resistance.

## Biocrops (U) Limited

Biocrops is a private Uganda registered agro-based company producing disease free planting materials of banana, OFSP and fruit crops.



Doreen Anayayo, manager, explained they were multiplying banana variety Kabana 6H from tissue culture. The main client was NAADs some farmers also bought at agricultural shows



OFSP plants being multiplied for distribution to private seed multipliers through the HarvestPlus project including the SSOSPA group I visited earlier.

## **Share knowledge about the RTB program and contribute to improved collaboration amongst partners and stakeholders in Uganda, 18 April**

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CIP and partners organized a seminar called “RTB: making it work in Uganda”. I gave a presentation about the RTB program and its interest to engage partners in Uganda, which is a very important country for our crops. There was a question and answer session. Those organizations which we hadn’t visited previously gave a short presentation and others shared a one page summary of their activities. Workshop participants concluded with key recommendations (presented on first page). The full seminar report is available at: <http://www.rtb.cgiar.org/>