Research Program on Roots, Tubers and Bananas

CGIAR

ROOTS TUBERS & BANANAS

Workshop Report:

Strategic Planning Workshop on '*Recovering Banana Production in BBTD Affected Areas: Community & Farm Household Approaches*'

Bujumbura, Burundi

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ISABU Institut des Sciences Agronomiques du Burundi

Bioversity International

IITA Research to Nourish Africa

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About the CGIAR Research Program on Roots, Tubers and Bananas (CRP-RTB)

Within the new structure of the Consultative Group on International Agricultural Research (CGIAR), new defined Research Programs should bring together the research synergies, strengths, and resources from multiple centers to increase efficiencies and enhance impacts in achieving global development goals. The **Roots, Tubers, and Bananas Research Program** (RTB Research Program) is one of these initiatives; it is led by the International Potato Center (CIP) together with its sister centers Bioversity International, International Center for Tropical Agriculture (CIAT), and the International Institute for Tropical Agriculture (IITA).

About the workshop

This workshop is part of the CRP-RTB complimentary project 'Banana Bunchy Top Disease Containment and Recovery in Sub-Saharan Africa: Building Capacity and Piloting Field Recovery Approaches through a Learning Alliance' with the purpose of bringing together scientists from different disciplines to develop country specific action plans to control BBTD in the eight pilot sites in sub-Saharan Africa (SSA). The workshop also intended to serve as platform for information sharing and update latest research available to better understand BBTD epidemiology and innovations to control BBTD in SSA, in addition to an introduction to integrating gender and social community analysis for greater effectiveness and impact.

Acknowledgements

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Authors of the report

This report compiles the background situation, presentations and workgroup discussion of participants from the following countries with BBTD: Benin, Burundi, Cameroun, Congo Brazzaville, Democratic Republic of Congo (DRC), Gabon, Malawi and Nigeria. Participants represented the following organizations: Bioversity International, CIRAD, IITA, IRAF, Ministry of Agriculture (Benin, Burundi, Cameroon, Congo Brazzaville, DRC, Malawi, NAQS and NIHORT Nigeria) and Universities: Université d'Agronomie de Kétou (UAK), Université du Burundi, Université de Kinshasa and Université de Kisangani. Agrobiotec (Burundi), Phytolabu (Burundi) and Vitropic (France) represented the private sector tissue culture industry at the workshop. Scientists based in France and Uganda also attended.

This report was prepared by P. Lepoint, C. Staver, S. Ajambo, A. Rietveld, P. Lava Kumar, R. Hanna and M-L. Caruana with contributions from presenters and work group rapporteurs.

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Acronyms

ADKIS	Association pour le Développement de KISangani
ADP	Agricultural Development Project
APETETRA	Association des Personnes Rénovatrices des Technologies Traditionnelles (Benin)
APDM	Association Pour le Développement de Masako (Kisangani, DRC)
BBTD	Banana Bunchy Top Disease
BBTV	Banana bunchy top virus
BXW	Banana *Xanthomonas* Wilt
CARBAP	Centre Africain de Recherches sur Bananiers et Plantains
CECOMAF	CEntre de COmmercialisation des produits MAraîchers et Fruitiers (Kinshasa)
CGIAR	A Global Agricultural Research Partnership
CIAT	International Center for Tropical Agriculture
CIP	International Potato Center
CIRAD	Centre de coopération Internationale en Recherche Agronomique pour le Développement
CERAG	CEntre de Recherche sur l'Amélioration Génétique des plantes (Congo Brazza)
CRAL	Centre de Recherche Agronomique de Loudima (Congo Brazza)
CRP	CGIAR Research Program
CSSV	Cacao swollen-shoot virus
EAHB	East African Highland Banana
DAGRI	Direction de l'AGRIculture (Benin)
DPQC	Direction de la Promotion de la Qualité et du Conditionnement des produits agricoles (Benin)
DRC	Democratic Republic of Congo
ELISA	Enzyme-linked Immunosorbent Assay
FABI	Faculté d'Agronomie et de Bio-Ingénieurie (Burundi)
FFS	Farmer Field Schools
FGD	Focus Group Discussion
FHIA	Fundación Hondureña de Investigación Agrícola
FUPRO	Fédération des Unions de PROducteurs du Benin
GERME	Groupe d'appui, d'Encadrement et de Recherche en Milieu rural
GIC	Groupement d'Intérêt Communautaire
GPS	Global Positioning System
IFA	Institut Facultaire des Sciences Agronomiques de Yangambi
IFAD	International Fund for Agricultural Development
IGAD	Institut Gabonais d'Appui au Développement
IITA	International Institute of Tropical Agriculture
INERA	Institut National pour l'Etude et la Recherche Agronomique (DRC)
INRAB	Institut National des Recherches Agricoles du Bénin

IRAF	Institut de Recherche Agronomique et Forestière (Gabon)
ISABU	Institut des Sciences Agronomiques du Burundi
ITC	International Transit Center (Leuven, Belgium)
KAP	Knowledge-Attitude-Practice
KUL	Katholieke Universiteit Leuven (Belgium)
MP	Macropropagation
NA	Non Applicable
NARES	National Agriculture Research and Extension Services
NAQS	Nigerian Agriculture Quarantine Services
NGO	Non-Governmental Organization
NIHORT	National Horticultural Research Institute, Nigeria
NPPO	National Plant Protection Organization
PRA	Pest Risk Analysis
PRA	Participatory Rural Appraisal
PCR	Polymerase Chain Reaction
PDAR	Projet de Développement Agricole et Rural (FIDA Gabon)
PNVRA	Programme National de Vulgarisation et Recherche Agricole
PRFP	Programme de Relance de la Filière Plantain
PROMUSA	Mobilizing Banana Science for Sustainable Livelihood
qPCR	Quantitative PCR
R4D	Research for Development
REPROBAP	REseau des PROducteurs de la BAnane et du Plantain (Bas-Congo, DRC)
RPA	Radio Publique Africaine
RRA	Rapid Rural Appraisal
RTB	Roots, Tubers and Bananas
RTNB	Radio Télévision Nationale du Burundi
SPV	Service de Protection des Végétaux (Benin)
SSA	sub-Saharan Africa
TC	Tissue culture
UAK	Université d'Agronomie de Kétou (Benin)
UI	University of Ibadan
UNIKIN	Université de Kinshasa
UNIKIS	Université de Kisangani
UPDEKIS	Union Paysanne pour le DEveloppement de KISangani

Executive summary

Banana bunchy top disease (BBTD) caused by the *Banana bunchy top virus* (BBTV, genus *Babuvirus*, family *Nanoviridae*) renders plants unproductive and eventually kills affected plants. BBTD spreads into new fields along with infected planting material and through the banana aphid, *Pentalonia nigronervosa*, which is widespread in all banana and plantain-producing areas. BBTD was first reported from Africa in 1901, however, extensive spread into new production areas has been observed during the last two decades. The disease has very recently invaded Benin and Nigeria in West Africa in addition to limited spread within the Kivu provinces (Democratic Republic of Congo, DRC), neighbor to the largest banana-producing country in Africa - Uganda. Currently, Bunchy top has been recorded in 35 countries across Africa, Asia, Australia and the South Pacific Islands, including Hawaii (USA), but not in the Americas. In Africa, occurrence has been confirmed in 14 countries, namely Angola, Benin, Burundi, Cameroon, Central African Republic, Congo Republic, DRC, Egypt, Equatorial Guinea, Gabon, Malawi, Nigeria, Rwanda and Zambia.

The spread of bunchy top into new areas can initially remain undetected, complicating timely eradication work and prevention of new outbreaks. Once the disease is present in a region, it is extremely difficult to eradicate. No durable sources of resistance have yet been identified. Laboratory techniques for virus detection and establishment of virus-free planting material are not widely available in SSA. On-going efforts by a range of national and international partners are fragmented and inadequate in halting the expansion of the BBTD pandemic and in recovering banana production in BBTD-endemic areas.

Considering the urgent need for collective action to tackle the escalating BBTD threat to banana in SSA, the CGIAR Research Program on Roots, Tubers, and Bananas (CRP-RTB) granted a project titled 'Banana bunchy top disease containment and recovery in SSA: Building capacity and piloting field recovery approaches through a learning alliance'. This project, implemented by Bioversity, IITA and CIRAD together with a range of national partners in Benin, Nigeria, Cameroon, Gabon, Congo Brazzaville, DR Congo, Burundi and Malawi, focuses on: (i) the piloting of community and farm household recovery strategies, informed by gender role and household typology understanding, in BBTD-affected areas; (ii) testing alternative approaches to develop supply chains for virus-free planting material and; (iii) building knowledge and predictive tools of virus-vector-host interactions, cropping system and farmer management.

As part of this initiative, a workshop on 'Strategies for Recovering Banana Production in BBTD-affected Areas: Community and Farm Household Approaches' was held from 20th to 25th January 2014 by Bioversity International and the IITA, with CIRAD and ISABU. The workshop enabled the project implementing team to come together to develop a cohesive 3-year strategy for an impact-oriented initiative to recover banana production affected by BBTD in Africa.

The workshop objectives were to (i) share learning and knowledge on BBTD (virus, vector, spread and detection), (ii) share learning and knowledge on social structures in relation to cropping systems and to establish a basic understanding of the importance of social and gender analysis in household and production system studies for technology adoption, (iii) exchange experiences on BBTD control strategies and farmer and community approaches, (iv) gain hands-on experience with basic participatory tools for social and gender analysis and participatory action research and technology development, (v) develop a consensus on the framework and content elements of a curriculum for community and farmer experimentation and learning for recovery of banana production in areas affected by BBTD in the pilot zones, and (vi) complete plans for each pilot site (surveys, formal studies, baselines, experimentation groups) and for overall information and experience sharing approach to the collaboration.

The workshop was organized in various sessions containing a combination of presentations and work group discussions with the objective of drafting action plans leading to the formulation of a pilot-site specific work plan for the recovery of banana and forming a strong 'Global Learning Alliance' for implementation of the work plans.

Primary expected workshop products include:

(i) a 3-year plan for development of a more complete farmer and community learning and experimentation process for the recovery of BBTD-infected areas, incorporating well documented and data driven gender and generational integration,

(ii) a draft curriculum detailing year 1 for farmer and community learning and experimentation for the recovery of BBTD-affected banana production (detailing the numbers and intervals of farmers and community meetings, the themes of the meetings, the methods to be used and the field activities to be carried out for the recovery of banana production).

In addition, more specific products projected encompass:

(i) identification and exploration of strategies for group and within-project learning and sharing,

(ii) proposals for PhD and MSc studies that contribute to the overall project objectives,

(iii) topics for further study on gender roles in crop production and BBTD management in the household and community identified and formulated and protocol for collection of baseline data on gender and cropping systems developed and integrated into work plans, and

(iv) site specific work plans for each pilot site covering community and farmer process, baseline studies on gender and cropping systems and BBTD distribution and formal studies of BBTD epidemiology by MSc and PhD students.

The group concluded to take an alliance approach to conduct and coordinate research to:

- better understand BBTD epidemiology and ecology (including factors that drive the field spread),
- clarify the role of insect vector(s) and alternate hosts,
- develop capacity for disease recognition and knowledge of control options,
- develop appropriate management packages to delay spread and manage the disease in endemic areas,
- train scientists to continue surveillance of disease incidence and update distribution maps,
- develop and distribute sensitive diagnostic tools,
- put in place location-specific clean banana production and distribution systems,
- train farmers and entrepreneurs in production of clean planting material.

The impact of the research and capacity development programs will enable continued and enhanced production of banana along the value chain in SSA. The primary beneficiaries will be smallholder farmers, partners in NARES, regional and national quarantine organizations, NGOs and the seed production industry (both tissue culture and alternative propagation systems). The broader international community will benefit from the international public goods (IPGs) developed by the Alliance.

This workshop provided opportunities to present latest knowledge on BBTD in addition to identifying the priorities for short, medium and long-term research for an impact oriented initiative to recover banana in Africa. Draft work plans were developed for each of the eight pilot sites and will serve as a base for future fine-tuning. Participants expressed their interest in coming together as an Alliance to fight BBTD and recover banana production in Africa.

1. Introduction

1.1 Background & workshop objectives

Banana bunchy top disease (BBTD) is the most devastating virus disease of banana. The spread of *Banana bunchy top virus* (BBTV) has negatively impacted the livelihoods of farm households in sub-Saharan Africa (SSA). BBTD stunts the plant and results in erect, narrow and small leaves giving a bunchy appearance. Infected plants produce few deformed fingers or no fruits at all. Sources of resistance have not yet been identified. The disease spreads into new fields' primarily through infected suckers and within fields by the banana aphid, *Pentalonia nigronervosa.* BBTD has been recognized so far in 14 countries in Africa, including, Angola, Bénin, Burundi, Cameroon, Gabon, Central African Republic, Congo, Democratic Republic of Congo, Egypt, Equatorial Guinea, Malawi, Nigeria, Rwanda and Zambia.

To contain BBTD spread, with the support of the CGIAR Research Program on Roots, Tubers and Bananas (RTB) a project titled 'BBTD containment and recovery by building capacity and piloting field recovery approaches through a learning alliance' has been formulated by Bioversity, IITA, CIRAD and national partners to implement BBTD control measures, whilst studying disease ecology and strengthening local capacity. This project focuses on (i) the piloting of community and farm household recovery strategies, informed by gender roles and household typology understanding, in BBTD-affected areas; (ii) testing alternative approaches to develop supply chains for virus-free planting material and; (iii) building knowledge and predictive tools of virus-vector-host interactions, cropping system and farmer management. This learning alliance brought together advanced research partners globally with national partners from countries in SSA affected by BBTD.

With the support of the CGIAR Research Program on Roots, Tubers and Bananas (RTB), a 'Global Alliance' was established for a collective action to tackle the escalating threat of BBTD. The alliance is piloting a model R4D initiative for 'BBTD containment and recovery by building capacity and piloting field recovery approaches through a learning alliance'. This initiative by Bioversity International, IITA, and CIRAD, along with national programs planned to implement a framework for a participatory approach to eradicate infected plants and recover banana production across nine pilot sites in Benin, Nigeria, Cameroon, Gabon, Congo Brazzaville, Democratic Republic of Congo (DRC), Burundi and Malawi. This first continent-wide action plan is expected to pave the way for expanding control efforts and eventually nullify BBTD in the continent.

In connection to this initiative, a workshop on **'Recovering Banana Production in BBTD-affected Areas: Community and Farm Household Approaches'** is planned to develop pilot zone vision and skills for the prototyping of banana recovery in zones with BBTD, including the preparation of operational strategies. Special attention was also given to mainstreaming gender and social relations perspectives into the BBTD management work.

The objectives of the workshop were to:

(i) share learning and knowledge on BBTD (virus, vector, spread, detection),
(ii) share learning and knowledge on social structures in relation to cropping systems and to establish a basic understanding of the importance of social and gender analysis in household and production system studies for technology adoption,
(iii) exchange experiences on BBTD control strategies and farmer and community approaches, iv) gain hands-on experience with basic participatory tools for social and gender analysis and participatory action research and technology development,
(iv) develop a consensus on the framework and content elements of a curriculum for community and farmer experimentation and learning for recovery of banana production in areas affected by BBTD in the pilot zones, and
(v) complete plans for each pilot site (surveys, formal studies, baselines, experimentation groups) and for overall information and experience sharing approach to the collaboration.

The workshop was held from the 20th to 25th January 2014 at the Sun Safari Club Hotel, Bujumbura, Burundi. The workshop enabled pilot site representatives to come together in an alliance to develop a cohesive 3-year strategy for an impact-oriented initiative to recover banana production in areas affected by BBTD in Africa. This built on an initial framework proposed in August 2009 and February 2013 by the IITA, Bioversity International and the Food and Agriculture Organization (FAO) in a workshop attended by representatives from several African countries in Arusha, Tanzania.

1.2 Workshop format

The workshop contained a combination of technical presentations, work group discussions / exercises and a field trip. Presentations encompassed (i) introduction to the project and workshop, (ii) status of BBTD in Africa, (iii) better understanding of BBTD (transmission, spread, aphid vector and symptoms), (iv) introduction to social relations, cropping systems, and community mobilization, (v) mass communication methods, (vi) introduction to role of mapping banana systems and monitoring the spread of associated pests and diseases, and (vii) pilot site experience sharing on BBTD management.

Work group discussions were oriented towards (i) prototype development and elaboration of a detailed work plan for each site, (ii) designing discovery exercises and application to BBTD, (iii) social analysis, gender, community perceptions and mobilization, (iv) identifying science knowledge gaps and opportunities for MSc and PhD research, and (v) defining the objectives and methods of the 'Learning Alliance'.

A field trip was organized to test community social analysis tools, familiarize participants with BBTD symptoms and proof prototype discovery exercise protocols.

All presentations made throughout the workshop, work group guides, work group documents and extras are available on the following **Dropbox link**:

https://www.dropbox.com/sh/xg9kf2akm09s2xx/AAD3bGkoUwdVp3q1Y9v7B2Vda

The detailed name list of Dropbox documents available is listed in **Annex 6.10**.

2. Session summaries

2.1 Inaugural session

The inaugural session was opened by the Director General of the *Institut des Sciences Agronomiques du Burundi* (ISABU) and chaired by Dr Célestin Niyongere, Head of the Fruit and Legume programme at ISABU. The DG emphasized the importance of agriculture and bananas for Burundi and highlighted the increasing importance of agricultural research for increasing the welfare of rural communities. He said that BBTV and BXW were high priority threats to banana production and welcomed the group of Africa-wide scientists. He added that the group was welcome back at any time. Dr Charles Staver from the Sustainable *Musa* Production and Utilization Programme of Bioversity International followed up with a short presentation. He first welcomed participants to an RTB event, introduced the CRP-RTB flagship and complementary fund concept and the efforts in the identification of BBTD as a priority production constraint. Dr Eldad Karamura, Regional Coordinator for Bioversity International, Dr Marie-Line Caruana of CIRAD and Dr Lava Kumar of IITA each highlighted the importance of addressing this priority threat to smallholder banana production in SSA. They expressed their commitment to taking a collaborative approach with national partners and other advanced research institutes to resolving the problem.

Programme (**Annex 6.1**, p 47), workflow and objectives of workshop were shared by Dr Staver. He presented an introduction to the Roots, Tubers and Bananas Consortium Research Program, pointing out that BBTD is rated quite high as a threat to banana in Africa – southern and western and central regions and also in Southeast Asia. The effort to address the disease through a sub-Saharan approach began with a workshop in 2009 (**Annex 6.2**, p 50) followed up with a second workshop in 2013 (**Annex 6.3,** p 52). This effort has culminated in the current project financed through RTB for the period 2013-2015. He highlighted to the participants their shared responsibilities to ensure that future generations in Africa continue to have banana as a highly appreciated food. He shared a key phrase that should serve as food for thought for all of us, *"if Africans have no bananas in 10 years due to the spread of BBTD, we in this workshop are all personally responsible. We had the opportunity to address the problem and we did not take our work seriously enough*". The session was concluded with the self-introduction of participants (**Annex 6.4**, p 54) and a group photo (**Annex 6.5**, p 57).

2.2 Threat of banana bunchy top disease to banana production in sub-Saharan Africa

The threat and status of BBTD in SSA was presented by Dr Kumar. Banana and plantain (*Musa* spp.) are important food security crops in Africa. According FAO production data of 2011, they are produced in area of ~6.1 million ha with a production of ~44 million tons. Compared to 2001, banana and plantain area has increased by 25.6% and 5.2%; and production by 45.4% and 22.0%, respectively. This trend indicates an increase in banana production compared to plantain. Banana and plantain (referred hereafter as banana) production is threatened by a number of biotic and abiotic factors. BBTD is one of the most important production constraints to banana, endemic in Central Africa, and emerging as a major threat in Western and Southern Africa. To date, BBTD occurrence is reported in 14 countries: Angola, Benin Burundi, Cameroon, Central African Republic, Congo Republic, DRC, Egypt, Equatorial Guinea, Gabon, Malawi, Nigeria, Rwanda and Zambia. The disease is transmitted by the banana aphid, *Pentalonia nigronervosa,* and also through infected planting material. Infected plants are stunted and do not produce fruits or result in a deformed fruit bunch and infected mats are eventually killed. Genealogy studies demonstrated that the BBTV isolates prevalent in Africa are of the 'South Pacific' strain and that exchange of infected planting material is the major reason for long distance spread of the virus, whilst banana aphid contributing to the local spread.

BBTD is prevalent in >50% of banana production areas in Burundi, DRC, Congo, Gabon, Equatorial Guinea, and Malawi. Whereas about <1-20% production areas are affected by BBTD in Cameroon, Nigeria, Benin, Zambia, Angola, Rwanda, CAR and Egypt. Anecdotal evidence suggests that BBTV is responsible for wiping banana production in Central Malawi and reduction in banana production by 30 to 90% in the disease-affected areas. Lack of awareness about disease and inability to detect early symptoms are the key causes for failing to nip

BBTD outbreaks. Once the disease establishes in a region, it is extremely difficult to eradicate. No durable sources of resistance have yet been identified. Disease control measures are focused on eradication of infected mats and production and distribution of clean planting material. Laboratory techniques for virus detection and establishment of virus-free planting material are not widely available in SSA. On-going efforts by a range of national and international partners are fragmented and inadequate in halting the expansion of the BBTD pandemic and in rehabilitating banana production in BBTD-endemic areas.

2.3 Better understanding banana bunchy top disease

Pascale Lepoint (Bioversity International) portrayed how BBTD gets into a banana plant and moves. Three fundamental elements are required for BBTD, and more generally any disease, to develop in a plant; namely a susceptible plant (banana in this case), a pathogen capable of causing the disease (BBTV) and a favorable environment (the aphid vector associated to *Musa* spp.). Disease does not occur if any one of these three elements is absent. BBTV, being a systemic virus, moves through the phloem cells (within the plant) and from an infected mother plant to its suckers (within a mat). Transmission of the virus occurs solely through two sources, the vector (i.e. the banana aphid *P. nigronervosa*) and infected planting material. Fortunately, it is not transmitted mechanically (e.g. by tools) or through soil. Aphid transmission of the virus is persistent (i.e. once the aphid acquires BBTV through feeding on the sap of an infected plant, it retains the virus for life) and circulative (i.e. the virus crosses numerous membranes within the aphid including its digestive tract, haemocoel and salivary glands from its initial ingestion to its reinjection into a new host upon feeding). The infectious aphid does not transmit the virus to its progeny and BBTV will only be acquired after feeding 4-18h on an infected plant and will be retained for the lifetime (13-20 days). It is only after 15min to 2h of virus acquisition that aphid will be able to transmit it to a healthy host. Once the virulent aphid feeds on a healthy plant and injects the virus, it is locally multiplied before migrating to the meristem of the plant (i.e. corm located at the base of the plant at soil level) via the phloem cells. All new tissue formed is subsequently infected with the virus and symptoms observed on newly formed leaves. This has a direct implication on the sampling strategy for detection (i.e. sampling of tip of youngest leaf containing the phloem-rich midrib). To this day, no variety has been identified as resistant to BBTD, however, some varieties encompassing the B genome were found to be tolerant BBTD. In addition, the systemicity (i.e. complete or partial) of the disease in the case of 'megamats' as found in Burundi may require additional studies that would impact local BBTD management practices to recommend to farmers.

How BBTD spreads within a field, from field to field and from one area to another was presented by Dr Kumar (IITA). BBTV is transmitted from an infected plant to a healthy plant by the aphid vector. This mechanism is generally known as 'horizontal' transmission. BBTV also spreads through vegetative propagules (suckers, corms and tissue culture plants) developed from infected sources (mother plants). This mode of spread is generally termed as 'vertical transmission'. Both these modes are responsible for natural spread of virus from zone to zone, from field and to field and within the field. BBTV is not known to spread through agriculture tools and cutting implements, or through botanic seed. The banana aphid, *P. nigronervosa* (Hemiptera, Aphididae), is the natural vector of BBTV. This aphid is highly specific to banana and known to occur in all the banana production regions where banana is grown. Another aphid, *P. caladii*, also found on banana and other plant species has been shown to transmit BBTV under experimental conditions. This species also seems to be widely distributed but frequency of occurrence on banana is not known. For instance in Nigeria, *P. caladii* was detected in 1 out of 60 samples collected from banana in about 50 diverse locations. Based on low-frequency of occurrence on banana it can be assumed that *P. caladii* may not be the dominant species in BBTV transmission in the field. However, significance of this species in BBTV epidemiology needs to be clarified through further studies. Spread of viruliferous aphids from infected plants to healthy plants results in plant-to-plant and field-to-field spread. Aphid-assisted spread is thought to be restricted to a few meters from the source plants. Vertical transmission of virus through infected planting material between farmers, through markets and even exchanges between researchers, are thought to be the major contributors for widespread distribution of BBTD in SSA. There are no alternative host plants for BBTV, which means infected banana is the only source for virus inoculum. Knowledge on influence of vegetation between banana mats on aphid movement and culture of human exchange of planting material is required to improve our understanding on BBTV dispersal.

Life of the banana aphid (Hanna) pending

The production of certified and safe *Musa* germplasm as well as disease control requires accurate and sensitive tests in order to make a reliable viral detection. Numerous methods have been set up and optimized. In the last presentation of the session, Dr Marie-Line Caruana presented a lecture on the detection methods available for BBTV and the relationship between symptoms and virus within the plant.

BBTV is a multipartite virus with isometric particles of 18nm in size. Its DNA genome is composed of at least 6 single stranded circular molecules of 1kb each. Molecular studies indicate two geographic lineages for BBTV isolates: the South Pacific group comprising isolates from Africa, Australia, Hawaii, South Asia, Myanmar and Tonga; and the Asian group comprising the isolates from China, Indonesia, Japan, Philippines, Taiwan and Vietnam.

BBTV diagnostics based on symptom observation could be a relevant approach to control disease propagation, as symptoms are characteristic of the disease and common to a wide range of cultivars. Infected banana plants are dwarfed and emerging leaves are small and narrow with brittle and yellow edges. The leaves grow upright and have a stunted, bunched appearance at the top of the plant. Leaf symptoms include dots and dashes similar to 'Morse code' along the secondary midribs forming a hook at the junction with the central midrib. The petioles and pseudostems show dark-green mottling streaks typical of the disease. Fruits are stunted and deformed. Banana plants may bear fruit if the plants are infected late enough in their development. However, in such cases bunches and fruits may be stunted, twisted or otherwise deformed and of little use.

Serological and molecular tests are available to detect both BBTV groups. The outlines of the principles were exposed in view of the BBTV diagnosis training course planned for mid-2014 in Montpellier. Serological tests developed to date include a triple and double antibody sandwich/TAS and DAS-ELISA, which constitute the first BBTV diagnostic tools available and still relevant for routine diagnosis in basically equipped lab facilities. However, antiserum is expensive and even if the test is efficient, it is not possible to bulk large numbers of samples as carried out with molecular tests. Molecular tests mainly focus on PCR approaches using specific primers based on the replicase (Rep) BBTV gene, and can either be (i) direct PCR from total DNA extraction, (ii) combined with antiserum to perform an immunocapture PCR (IC-PCR) from grinded plant extract, or (iii) direct PCR amplification DB-PCR on plant grinding extract. All these techniques, including novel tools developed recently such as Loop-mediated Isothermal Amplification (Lamp), real time PCR and Rolling Circle Amplification (RCA) will be exposed during the training course and their specific finalities will be explained.

The above presentations were followed by a reflection exercise by Anne Rietveld and Susan Ajambo (Bioversity International). The exercise focused on the role of knowledge in BBTD recovery and containment. Drawing from the presentations, important types of knowledge were identified to be (i) symptoms of BBTD in bananas, (ii) detection of BBTV in suckers used for multiplication, and (iii) the risk of BBTV in suckers without symptoms in BBTD affected mats. Participants then identified stakeholders who most need to acquire the knowledge and skills to recover banana production in BBTD affected areas (**Table 2.1**). The discussion that followed, explored the types of knowledge that cross cut the impact pathway and those that should be confined to particular sections of the pathway for better planning with a view of having impact.

Table 2.1. List of stakeholders to include in the recovery process of bananas affected by BBTD.

Symptoms of BBTD	Detection of BBTV in suckers for multiplication	Risk of BBTV in asymptomatic suckers in BBTD-affected mats
• Farmers • Extensionists • Quarantine officials • Seed certification • Nursery owners and employees • School children • All stakeholders	• Detection / TC lab staff • Extension and quarantine researchers • Seed system actors and household level • Banana farmers • Plant pathologists • Scientists and lab based workers • Agronomists • Biotechnologists • Inspectors • Seed multiplication companies	• Policy makers • Farmers • Seed multiplication companies • Seed system actors • Agronomists • Extension workers • Research institutions and researchers • TC labs • Pathologists / Virologists • Biotechnologists

2.4 Introduction to social relations, cropping systems and impact

Anne Rietveld and Susan Ajambo (Bioversity International) shared with participants the importance of integrating gender and social aspects into projects. Integration of these aspects leads to increased understanding of gender roles that will therefore enable us to improve technology development and targeted interventions for increased adoption by farmers. This was achieved by illustrating the relevance of gender and social analysis for this project to participants, providing methods and tools for social and gender analysis and monitoring in cropping systems and scientific support from staff (Anne Rietveld, Susan Ajambo and Holger Kirscht of IITA) and enabling specific gender studies by providing extra funds.

Potential studies to be carried out could include students (MSc) in all the pilot sites that can provide additional insights into the role of gender in banana cropping systems and in BBTD control and recovery. In addition, a comparative social analysis to establish household and community typologies can be carried out and the monitoring of performance related to typologies (feedback loop to planning and curriculum development) shared. The funds available for these studies are just enough to pay small student stipends, a limited operational budget (4000 USD/site) and supervision by Anne Rietveld (Bioversity International) and Holger Kirscht (IITA).

Anne and Susan also shared with participants the importance of understanding complex social relationships for improving technology development and for targeting of interventions for increased adoption by farmers. Social analysis enables the identification of opportunities and constraints embedded in the social context and can therefore inform the development of strategies that make a positive impact and foster sustainability. A clearer understanding of gender roles specifically enables the design of strategies that are inclusive and work towards achieving social equity.

It is vital to this project to have a good understanding of how households operate. This is because a large proportion of banana farming activities take place at the household level. Also, allocation of productive resources like land and labor often happens within the household. Allocation of resources and the way decision-making processes work are household specific but at the same time subject to dominant gender norms that are culturally specific.

In order to understand households, we have to examine the everyday dynamics within households. We have to recognize that within households there are individuals of different sex, ages, marital status, and position in relation to the household head, education and labor productivity that vary with regards to the access they have

to assets, resources information and the degree of decision making power. Although we can speak of household livelihood strategies, members within the household often have specific individual livelihood strategies as well. This means that we always need to collect data on the different household members and we should not assume that one person could give a valid perspective on all different livelihood strategies that are pursued within the household. Also we have to be familiar with the dominant cultural norms that enable and constrain individual behaviour.

The household, or the individuals within, is not the only possible units of analysis. The community is another platform in which individuals and households operate. The households within a community can vary significantly with regards to the way they are organized (monogamous, polygamous, single parent, child headed, extended families etc.), as well as their vulnerability context, social status and power. At community level, data should be disaggregated on the basis of different types of households.

Gender is not the same as sex or equivalent to women, it refers to the social and cultural meaning that is ascribed to being a 'man' or a 'woman'. What gender entails is specific to societies and dynamic as it can change over time. Other social factors such as age, education and marital status often influence what it means to be a 'man' or 'woman'; we can say that individual gender roles vary and also change over time. It is important to focus on gender when advocating for change as gender norms often limit or support access to opportunities for either men or women. Gender-analysis enables us to learn more about the kinds of support both women and men will need if they are to benefit from and/or adapt to change.

As such, the social analysis part of the study will focus on social relations of different kinds and on gender norms at household and community level as they are often intertwined in the production and reproduction of disadvantage.

2.5 Role of mass communication

Dr Andrea Gros (IITA) shared her insights on 'Communication Planning & Message Development in BBTD Control: Promoting Participatory Communication Tools'.

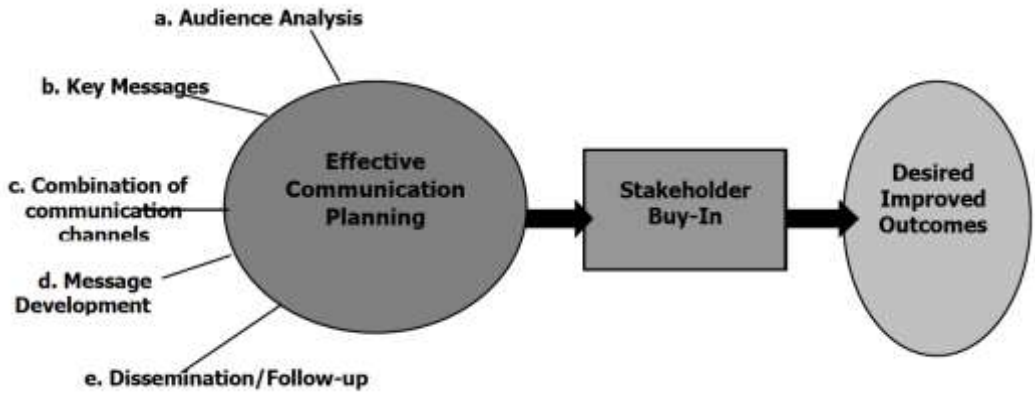
Effective communication is vital to achieving the goals and objectives of BBTD control activities, whether trying to improve diagnostic services at the farm level, shape policy at the national level, or secure funding at the donor's level. Failure to communicate well can result in negative outcomes and missed opportunities.

The project 'BBTD containment and recovery by building capacity and piloting field recovery approaches through a learning alliance' has launched an initiative to raise awareness of the issue by using improved communication tools in the control of BBTD, shape effective policies and practices, and support the role of researchers, including providing training opportunities and resources for disease control specialists who wish to enhance their communication skills.

As part of this process, 'BBTD containment and recovery by building capacity and piloting field recovery approaches through a learning alliance' is providing communications insight and resource materials to help researchers to become better communicators and advocates on the issue of BBTD. A model for communications strategies and key messages, which can be adapted by individuals or organizations at the local levels, is provided here under.

Communications planning and message development process

Effective communications should be incorporated into any strategic plan for disease control and involves a number of steps.



a. Audience analysis

Identify your audiences. Audiences may vary at the state and local level. In our case, the project's main audiences include farmers, government officials, allied research professionals (NARS-employed & community-employed), opinion-makers (advocacy groups, leading experts, religious leaders etc.) and donors.

Primary audiences: Primary audiences are the main group of individuals whose behaviour you would like to influence and support. For example, in BBTD control, the primary target population is banana producers, since they can provide researchers with most useful information and help in participatory diagnostic tools.

Secondary audiences: The groups of secondary audiences are those who can affect the BBTD control activities or be affected by them, even though these activities were not designed to reach them directly. They are often people or groups whose support or neglect determines whether or not the primary audience responds to communication messages. They can include opinion leaders (such as government officials), gatekeepers (such as media) and policy-makers. In the case of banana producers, the secondary audiences may include the private sector (traders), village chiefs and religious leaders. There are often several secondary audiences around one primary group, requiring different communication approaches and messages.

Audience analysis: Audience analysis is any communication research that is conducted on specific audience segments to gather information about their demographics, media habits, needs, attitudes, knowledge, interests, preferences, practices or behaviours.

Audience analysis is undertaken at the initial stages of a communication plan to understand the intended audience's needs, knowledge, attitudes and behaviours, barriers or constraints to a recommended basket of options. At this stage, information is also obtained on audience preferences for communication channels or formats and usage frequency and schedule. Audience analysis enables the communication planner to determine the types of incentives and barriers that the audience perceives to exist, their most preferred channels or formats, the most credible sources, etc. It is recommended to segment an audience into groups with similar information needs and preferences, select the objectives most appropriate for an audience, select the best media channels to reach an audience, develop concepts or messages to achieve the communications objectives and plan for communication impact assessment.

The whole process involves the use of focus group discussions (FGD), literature and document reviews, community consultations, rapid rural appraisals, scoping studies, and knowledge-attitude-practice (KAP) surveys.

b. Key messages

Your audience analysis has given you the background information to understand what changes need to be achieved within the different audiences for BBTD programs to be successful. Once these changes have been defined, you will package them into messages for your audiences.

Address your audience priorities. Messages, even on the same issue, should be tailored to the specific needs of the audience because they have different concerns and perspectives. Recognize your audience's:

- Level of knowledge/awareness
- Primary concerns/expectations
- Professional and cultural perspective
- Possible barriers to understanding
- Ability/likelihood and motivation to take action.

Strong messages: A message is the information conveyed to the audience with the aim of motivating them to change and stimulating dialogue. A good message contains two parts, a desired behaviour and a benefit for the person adopting those behaviours. It is tailored and appropriate to the audience, as opposed to generic global and population-wide BBTD messages. To develop effective messages, one should identify barriers and identify key benefits.

Identify barriers. There are very often barriers to adopting a new behaviour. These could include lack of knowledge, distance to a quarantine service, lack of access to commodities, etc. Identification of the barriers will guide the development of messages and interventions.

Identify key benefits. Finding out what could help to motivate a person or a community to change is an important step in developing an effective and convincing message. Data from the formative assessment and audience analysis, including information about their hopes and fears, are used to develop key benefit statements. A key benefit statement is used with a statement of desired behaviours to form a message '*If I do X, I will get Y*'.

c. Combination of communication channels

Identify and combine communication channels. These are the vehicles that present, deliver and explain messages. Channels can range from face-to-face interactive activities to community-level interventions and mass media. It is important to choose the channels most readily available and acceptable to the audiences and to keep cost-effectiveness in mind.

The communication channels should complement and reinforce each other through shared themes and messages, as well as through a unified look, feel and tone. An effective BBTD communication strategy should include some combination of the following communication materials and media listed in **Table 2.2**.

Table 2.2. List of possible communication channels available.

	Communication channel	Use?
1	**Support materials**	a. Interpersonal channels (peer education, counseling, support groups) including flipcharts, cue cards, video documentaries, pamphlets, manuals, etc.
		b. Training, workshops, games, discussion groups, etc.
2	**Programme guidelines**	Lessons learned, fact sheets, press releases, etc. (for advocacy)
3	**Mass media**	a. Print materials, (brochures, flyers, pamphlets, posters, press kits, stickers, postcards, photo stories)
		b. Broadcast media (TV/radio spots, programs, talk shows, documentaries, entertainment programming)
		c. Signage (billboards, murals, banners)
4	**Traditional media (+ community mobilization-related materials)**	a. Theatre/drama/dance support materials (decorations, scripts, sets)
		b. Banners
		c. Costumes for local events such as carnivals, ceremonies and rituals, marathons, marches, parades
5	**Electronic media**	Internet web pages, social media (Facebook, Twitter, Instagram, Flickr, LinkedIn, etc.), mobile phone messages and applications
6	**Gadgets**	T-shirts, coffee mugs, key-rings, pens, playing cards, calendars, umbrellas

d. Message development

BBTD communication materials should be based on a communication strategy. The strategy will define an action plan, timeline, channels, and which materials to develop. Development of materials and messages should always correspond to the research conducted with the audiences and through stakeholder consensus. Communication budgets will need to take into account the development of support materials and the multiple steps linked to this process. Communication budgets often refer only to material production, without considering the importance of other steps such as pre-testing.

Pre-Testing. Once prototypes of the materials have been developed, they need to be pre-tested. Pre-testing is a process of determining an audience's reaction to, and understanding of, messages or behaviour change information before materials are produced in final form. Regardless of which channels you choose, you will confirm the effectiveness of what you have developed through pre-testing (**Table 2.3, next page**).

After developing, pre-testing and revising the materials, you will need to distribute and monitor them. Further revision and modification may be necessary at a later stage. Given the time, money and effort required to produce effective BBTD communication materials, it is not uncommon for programmers to plan and budget insufficiently for distribution and effective monitoring of communication products.

Every type of item you plan to produce needs to be pre-tested, assuming that various items will utilize the same basic design concept. For example, if you are producing banners and posters for a village and they are all targeting the same audience, you can pre-test just one image for all materials. Once the materials have gone through the pre-testing and revision process to ensure a good-quality product, you can produce and distribute the material on a larger scale.

Table 2.3. What do I measure through pre-testing?

Factor	Measure
Comprehension	Is the content of the material clearly explained? Is the visual presentation clear?
Attractiveness	Is the material interesting enough to attract and hold the audience's attention? Do they like it?
Acceptability	Does the message contain anything offensive/distasteful by local standards? Does it contain factual information?
Involvement	Does the audience identify with the material? Do they feel it speaks to them and their experiences?
Relevance/Persuasion	Does the material/message convince target audience to want to take up the desired behavioural change?

More issues to consider when developing support communication materials include:

- hiring and working with communication professionals, advertising or public relations agencies,
- including stakeholders in the entire process,
- providing information that is clearly and simply stated in order to enhance the response,
- repeating your messages frequently,
- making your materials as specific as possible for the audience to understand, taking into account appropriate language, culture, dress, setting, etc.
- being careful not to select images and words that promote negative behaviours.

e. Dissemination and follow up

While it is true that it is not possible to know what the research will show prior to actually engaging in the research, dissemination managers can project what might be learned and the audiences that would potentially benefit from knowing those outcomes. Once that is done, they can plan activities that would facilitate the outreach to those audiences during the course of the research project(s).

Appropriately timing the planning for dissemination is important in order to:

- give sufficient 'lead time' to affiliate with other organizations, associations, and institutions as may be beneficial,
- organize and develop information sharing opportunities with key audiences,
- involve expertise that may be resident on your project staff, and
- allocate budget for public awareness campaigns and other strategies to successfully reach out to the audiences.

Effective dissemination does have staff time and budget implications that need to be projected and included in your initial proposal planning and development efforts. Dissemination planning provides an opportunity for dissemination goals, strategies, and activities to be conceptualized and carefully considered. So, already during the preparation of the dissemination work package, it is important to define the events and the product dissemination.

A thoughtful dissemination strategy allows moving beyond the simple listing of events and products. The most effective dissemination outreach efforts are not designed in broad-brush fashion to equally reach any and all of the designated target audiences through a single training event or product. An effective dissemination planning

process will select from the wide range of dissemination tools that are available and identify one or more that are 'tailored' to promote achievement of the dissemination goals with each specific group within the audience.

Monitoring. Measuring progress in your communication activities and achieving communication objectives and determining whether the program is on track requires monitoring of activities and reactions. Once you have developed your audience analysis, the communication strategy and designed interventions, you will be ready to establish a monitoring plan. Monitoring must take place continually throughout the life of the communication program. Activities, such as pre-testing and formative research though KAP studies and focus group discussions will support an effective and well-designed monitoring plan. The monitoring plan and tools are specific to the program being implemented, and they are designed specifically for those who are collecting the data and for the audience, which means the communication monitoring is an inclusive one and based on the feedback of stakeholders and the audiences. The monitoring tools should be simple enough to be understood by those implementing them. They should also be comprehensive enough to ensure that the information gathered is relevant and that the program objectives are being met. The monitoring plan should make sure that the information collected is used to improve the project. Monitoring results also provides a bigger picture of the program, facilitating an understanding of its goals and objectives and are relevant to adapt the communication plan during the process of its implementation.

2.6 Role of mapping banana systems

Hein Bouwmeester (GeoSpace, IITA Consultant) highlighted that we survey or sample to get information about a spatial population. With this information we can answer questions about the distribution of BBTD, on the spread of BBTD in time or on the success of management practices. The presentation aimed to give the work groups the tools necessary to add a spatial paragraph to each of the pilot-site work plans. Firstly, it was demonstrated that coordinates are very simple to understand and to use. However, this is often accompanied by some common spatial errors in sampling that can easily be avoided. Hein underlined questions that should be an essential part of any survey. He ended the presentation by introducing and demonstrating the use of an interactive tool commonly known as the 'banana mapper' (www.crop-mapper.org), which stores spatial information on banana systems provided by country experts.

2.7 Monitoring the spread of banana diseases, including BBTD, and related factors

Dr Guy Blomme from Bioversity International presented the 'Risk Assessment' project. The RTB-funded project 'Management of RTB-critical pests and diseases under changing climates, through risk assessment, surveillance and modeling' will develop Pest Risk Analyses (PRA) in order to mitigate the likelihood of introduction, emergence, spread and evolution of RTB pests and pathogens due to increased globalization of trade, human movement, farming practices and climate change. Studies will be undertaken to monitor the current distribution and impact of pests and diseases on the livelihoods of farmers to supplement existing data to develop PRAs and models. Surveillance strategies will be implemented and supported by fit for purpose diagnostic methods and information platforms, alongside pest and disease modeling tools to predict future impacts. Collectively, these outcomes will inform and support policy makers in the preparation of national and regional adaptation and quarantine plans. Capacity will be built in CG partners and national institutions to facilitate integrated and pre-emptive management of pests and diseases.

3. Learning Alliance – Sharing pilot site experiences

In 2009, Bioversity and partners undertook a practical exercise designed to determine if banana production could be recovered in areas severely affected by BBTD based on existing information on its epidemiology and simple ELISA reading equipment. Rather than conducting additional basic research to generate more research results in the pipeline towards an eventual technology for banana recovery, partners undertook the practical challenge of working with villages where BBTD had destroyed banana production. This is referred to as 'prototype building' in which diverse stakeholders (scientists, farmers, rural organizations, etc.) marshal existing knowledge and technology to develop field scale alternatives to practical problems. Based on this experience, scientists can respond to the following questions:

(i) What knowledge and technologies are missing to find a solution?
(ii) Are other capacities and stakeholders needed to accelerate banana recovery?
(iii) What can we learn about the disease and its management by studying the prototype building process?

Other groups undertaking a similar challenge can build on the prototypes as a starting point for their own particular cases.

Four pilot sites respectively shared their experience to date on BBTD management activities. Malawi and Kisangani and Kinshasa in DRC began their work financed by US AID through Bioversity, while Burundi undertook work initially through CIALCA. All four sites have had additional funding from later 2012 to undertake expanded prototype building.

3.1 Kisangani, Democratic Republic of Congo (DRC)

In Kisangani (Northeastern region of the Congo basin, DRC), a study on the recovery of banana production in the BBTD-affected site of Masako was carried out. Four villages (Batiambale II, Batiabongena, Bachabongena and Bachamaega) located Northeast of Kisangani were selected on the old Buta road respectively at kilometers 13, 14, 15 and 16. Selection criteria for these sites include their proximity to the city, isolation from other villages (1-2 km), active banana cultivation, a neighboring forest reserve, as well as the presence of schools, staff accommodation, and introduction of livestock and pisciculture activities.

BBTD surveys indicate an average incidence of the disease on 49.7% of mats observed. On these mats, advanced symptoms (leaf narrowing and bunchy top aspect) were observed in 17.8% of the cases. BBTV TAS-ELISA carried out on samples with advanced symptoms was positive for all cases. The vector, *P. nigronervosa*, was present in all of the 4 villages (73.3% of mats surveyed) and on all plant parts including bunches. Observation of winged individuals in colonies was rare and the aphid was also found on alternate Zingiberales hosts (i.e.; *Cana* spp., *Costus* spp., *Heliconia* spp.).

Community mobilization was initiated through meetings with village leaders and local associations '*Association pour le Développement de Masako*' (APDM) and '*Association pour le Développement de Kisangani*' (ADKIS). Information on BBTD (i.e.; role of BBTD in banana production, reduction of *Musa* diversity, symptom identification, aphid vector, control methods, importance of clean planting material) was highlighted. Out of the 50 participants, 67% were women. The meetings revealed that women are more involved in the choice of planting materials, weeding, harvesting and marketing in the region. On the other hand, men are more involved in the laborious fieldwork (opening new fields, making planting holes, etc.).

A dual source of clean planting material for the pilot site was sought. On one hand, macropropagation under screenhouse conditions was coupled to TAS-ELISA. On the other hand, *in vitro* micropropagation of virus-indexed vitroplants from the International Transit Center (ITC, KUL Belgium) was used. In each of the 4 contiguous villages involved, three one-hectare trials surrounded by a *Musa*-free buffer zone of 500m to 1km were established and separated by 1 to 2km. To date, 2000 plants have already been established for the demonstration and another 1000 are waiting optimal planting season. Participatory macropropagation, BBTD monitoring, destruction of infected plants and vector host plants around plots will be carried out with farmers.

Lessons learned include the fact that BBTD and the vector are omnipresent in the pilot site, on *Musa* on other Zingiberales (for the aphid). Farmers are open to adopt new practices when they are well informed and coached. A greater involvement of women is key for banana cultivation and the management of BBTD.

3.2 Kinshasa DRC

A survey conducted in 2007, motivated by the observation of BBTD in variety testing trials run by INERA, confirmed the presence of the disease in the Bas-Congo Province. In Masende village, *Musa* production virtually dropped to zero within two years, eliminating a major source of farmer income. Bioversity, together with the University of Kinshasa and INERA, tested a local seed system approach with the aim of reducing the risk of BBTV presence in planting material by i) raising awareness of farmers across the Bas Congo province on BBTD epidemiology and good cultural practices against BBTD, ii) developing and implementing a clean *Musa* seed system based on serological testing, and iii) multiplying highly productive clones of preferred cultivars.

- A five-step approach was used to establish the local seed system: (i) identify zones which are potentially BBTV-free; (ii) extract suckers from plants without visual symptoms; (iii) identify and select BBTV-free suckers (TAS-ELISA); (iv) multiply BBTV-free suckers in high humidity macropropagation chambers; and (v) establish plantlets in a BBTD-free field.
- Results showed that (i) 1.8% of suckers extracted from BBTD asymptomatic mats were tested as BBTV-positive using TAS-ELISA (June 2010); (ii) 100% of plantlets produced via macropropagation were TAS-ELISA negative for BBTV (December 2010); and (iii) no case of reinfection (no visual symptoms) were observed on macropropagated plants established in isolated plots in Masende two years after planting.
- Three important lessons learnt from the Bas Congo experience includes (i) the Bas-Fleuve district has been identified as a main source of potentially BBTV-free Musa planting material, (ii) ELISA analysis should be compulsory to insure that suckers collected in the field are free from BBTV, and (iii) the proposed local seed system model shows promise for recovery of BBTV-infested zones, with investment in virus detection and training, as a key component.
- Next steps for the on-going research work are firstly the evaluation of intercropping and alley cropping Musa systems, secondly participative farmer experimentations, thirdly gender and socio-economic aspects and lastly improved marketing via a better understanding of the value chain. This includes marketing studies to understand how to increase farmer income and the implementation of methods to monitor costs of alternative practices tested.

3.3 Malawi

Banana production in Malawi continues to collapse with only two districts located in the north of the country maintaining some degree of BBTD freedom. The Cavendish varieties are almost getting extinct, polarizing all farmers who depended on bananas as their only source of livelihood. Currently the ABB genotypes, which are also infested, comprise over 90% of the standing mats in the country. Since they still suffer from the disease and are usually neglected due to their low economic value, they remain a threat for any new plantation to be established.

Through the Bioversity International funded pilot project on recovering the Cavendish plantations in Malawi which is sited in four villages in Nkhotakota and Nkhatabay districts, chemical and physical destruction of mats and creation of a buffer zone has been initiated to prepare for the planting of virus indexed vitroplants. The sites were selected with the assistance of the extension staff based on the impact of the disease and also the ease of implementing a banana free zone.

Local chiefs were included in the farmer mobilization, covering a total of 400 farmers, with 35% females for the 2 pilot sites. Participatory learning which started with the first mobilization of members of the community has been the tool used in teaching the farmers which included walking through their fields with remnant banana mats and looking at infected plants and vectors. From this it was noted that most farmers knew the disease but did not know the details of how it is spread and managed. The project will continue with training of farmers at

every stage of plantation establishment including initiation of macropropagation technics for the expansion of their orchards.

3.4 Burundi

In Burundi, three provinces affected by BBTD were chosen to carry out the activities. The provinces chosen include Cibitoke, Bujumbura and Makamba with respectively four, one and one pilot site per province.

Awareness was created on the use and adoption of clean planting material in the context of BBTD and more particularly the use of macropropagated and *in vitro* plantlets. Success stories were shared between farmers from pilot sites and those based in Muyinga province, notorious for its exemplary large-scale FHIA production using best agricultural practices. The exchange visit motivated pilot site farmers to manage bunchy top in their plantations and to strive to improve their livelihoods.

Farmers were trained on how to manage BBTD through field visits and FFS. This will be an on-going process throughout the project, aimed at reducing impact of BBTD in affected regions.

A survey was completed in December 2013 on BBTD spread in regions suspected to be affected by BBTD. Moreover, an MSc student will initiate work on epidemiological aspects of BBTD starting April 2014 for his thesis, while a second student will focus on the socio-economic and gender aspects of the project.

A training tool (DVD, documentary of the Muyinga field trip) was produced for up-scaling of the farmers' field training. Two radios, including the national public radio (Radio Télévision National du Burundi, RTNB) and a private radio station (Radio Publique Africaine, RPA) were involved in the sensitization aimed at BBTD management.

Lessons learned from the Burundi experience comprise the requirement for (i) better knowledge of farmer needs in term of preferred banana varieties and intercropping systems, (ii) standardization of tissue culture production to meet farmers' requirements and produce sufficient plantlets, (iii) farmer to farmer exchanges to share experiences with how to improve cropping systems, (iv) involvement of medias and policy makers in the successful management of BBTD in order to maximize farmer reach and reduce source of infection, and (v) identify/understand pending knowledge gaps on epidemiology and socio-economic aspects as components of a site-specific approach.

4. Workshop products & Research planning

Main workshop products can be summarized as follow (i) prototype development and establishment of a 3-year plan for the recovery of BBTD-infected areas in 9 pilot sites, (ii) designing farmer curriculum and discovery exercises and application to BBTD, (iii) identification and formulation of a study on gender roles in crop production and BBTD management in pilot site households and communities and integration into specific pilot site workplans, (iv) identification of main knowledge gaps, and (v) fine-tuning the 'Learning Alliance'.

In-depth workgroup exercises based on themes covered in presentations were oriented by guides (**Annex 6.6**, p 52) that facilitated the drafting of the different products, including the 3-year action plan for the development of a more complete farmer and community learning and experimentation process for the recovery of BBTD-infected areas.

4.1 Prototype development and establishment of pilot site-specific work plans

From day 1 to day 6 each pilot zone team completed a series of planning steps with the final objective of drafting a cohesive workplan of activities. Based on their existing understanding of banana, they worked on five consecutive group sessions covering the:

(i) Mapping of a time sequence (moving from current declining banana production to a reestablished clean banana garden),
(ii) Calculation of banana growth cycles according to rainfall distribution for proposed work sites and the likely moment for each key stage in recovery,
(iii) Planning of studies on gender/household relations in banana cropping and knowledge of BBTD,
(iv) Planning of specific learning and discovery exercises for each stage of BBTD and banana-free fallow, supply of BBTD-free planting material, and re-establishment of banana garden with clean planting material, and
(v) Compilation of a four-dimensional work plan (community banana recovery prototype, strengthening gender understanding and incorporation into community recovery prototype, researcher-led studies of BBTD epidemiology with PhD, MSc and other student studies during the process).

Each working group session was introduced with a general presentation followed by a question-answer session and then concluded by a summary of results or by a presentation.

After having seen the presentations by the four pilot zones (section 3. Learning Alliance: Sharing Pilot site experience, p 19) that had already begun to prototype recovery of banana production in the presence of BBTD at the end of day one, pilot zone teams were introduced to an initial planning format based on four phases (**Table 4.1**). These phases include (i) mobilization of the community which will partner in the prototype building process, (ii) putting into place a supply of BBTV-free planting material, (iii) establishing a banana-free fallow which eliminates the presence of the banana aphid and any bananas which still may act as a host for BBTV or the banana aphid, and finally (iv) planting a new banana garden and managing re-infection.

Table 4.1. Starting and ending points for four components of the prototype building for recovery of banana production in a BBTD affected zone.

Component	Starting point	Ending point
1. Community mobilization / monitoring	Village severely affected by BBTD interested in recovery of banana production	Village completes plan for recovering more banana production areas after evaluation of the prototype experience
2. Supply of BBTV-free planting material	Village working group nominated to organize preparation of clean planting material for new fields	Planting material free of BBTV available for test plots
3. Implement a banana/BBTV/banana aphid free fallow	Village working group nominated to implement a *Musa*-free fallow in preparation for planting new field	Area within *Musa*-free fallow ready for planting BBTV-free planting material
4. Plant new field with BBTV-free plants	Clean plants and field within *Musa*-free fallow	Harvest first bunches from banana garden

For each of these phases, the group was asked to consider the needs for new learning by the different members of the household implicated in each phase (**Table 4.2**). Summaries of group discussions are shared in **Annex 6.7** p 69).

Table 4.2. Format for pilot zone initial visioning of sequence of changes by prototype building phase and knowledge needed by household members.

	1	2	3	4	5
Describe stage or action					
Describe change					
What knowledge is needed?					
Who in community or household should have knowledge?					
What is role of gender in stage?					
Children (male or female) who play a role?					

In day two, workshop participants continued to reflect on the process for bringing together rural communities, scientists and other stakeholders to put into practice prototypes at field scale. They first reflected on their experience (difficulties and insights) with visioning the process of banana recovery from the perspective of users. For some of the groups, the workshop was their first time to meet. For some the process of understanding the client perspective created insight, while for others the challenge was to come to a common understanding about such terms as 'banana-free fallow' and 'village'.

The group then reflected on why 'participation' had become such a common word in rural and agricultural development by reviewing the numerous terms starting with participatory – diagnostic, training, technology evaluation, technology development, action research. Charles Staver closed the discussion with a presentation on participatory farmer group learning and experimentation by crop phase, an approach illustrated from his work in Nicaragua with banana growers. He reflected with the workshop participants on the value of participatory group approaches, learning and experimentation to increase retention, the learning cycle from observation to reflection to action and again reflection at each stage in the crop cycle. He illustrated the

learning exercises in a crop cycle for plantain in Nicaragua. Finally he proposed the basic steps for designing a similar process for new areas. This process is described in detail (Staver, 2005) in articles distributed at the workshop (Dropbox folder "Workshop Presentations & Work Groups" → "Extra materials" → "FFS").

The groups then undertook to modify their original plan according to the rainfall distribution with the approximate dates for each of the four phases. Each group was then able to identify tentative moments for community and farmer meetings (**Table 4.3**). They also identified their proposed strategy for a supply of BBTV-free planting material (**Table 4.4**).

Table 4.3. Sequence of key stages in the banana recovery process by pilot zone.

Pilot site	Planting date (new field)	Period from planting to harvest	Month of first harvest	Length of fallow (*Musa*–free)	Time from Community mobilization to first bunches
1. Benin	Jun-2014	14 months	Aug-2015	3 months	19 months
2. Burundi	Nov-2014	14 months	Jan-2016	No fallow	25 months
3. Cameroon (southern)	Sep-2014	15 months	Nov-2015	3 months	20 months
4. Congo Brazzaville	Oct-2015	15 months	Oct-2016	15 months	27 months
5. DRC Kinshasa	Mar-2014	16 months	Jun-2015	15 months	36 months
6. DRC Kisangani	Sep-2013	14 months	Nov-2014	1 month	22 months
7. Gabon	Sep-2014	15 months	Nov-2015	3 months	20 months
8. Malawi	Dec-2014	11 months	Oct-2015	8 months	26 months
9. Nigeria	Jun-2014	14 months	Aug-2015	3 months	19 months

Table 4.4. Proposed approach for the supply of BBTV-free planting material by pilot zone (S = Sucker, MP = Macropropagation, MG = Mother garden, TC = Tissue culture).

Pilot site	Multiplication method				Location of nursery
	S	MP	MG	TC	
1. Benin	✓	✓		✓*	Village
2. Burundi		✓	✓		Village
3. Cameroon		✓			Village
4. Congo Brazzaville				✓	Research station
5. DRC Kinshasa		✓			Village
6. DRC Kisangani		✓			University & Village
7. Gabon		✓			Village
8. Malawi	✓			✓	Research station (initially)
9. Nigeria	✓	✓		✓*	Village

* In a second step.

4.2 Designing discovery exercises and application to BBTD

During the course of Day 3, Charles Staver addressed the role of training and learning in prototype building. He asked the group what they associated with farmer field schools, informal adult education and discovery learning. Such approaches build on the life experience of participants, stimulate problem solving based on priorities of end users and often use methods suited for a group approach. The learning cycle moves through analysis, observation, action and back to analysis and observation. Emphasis was put to restrain from falling into the 'teacher-student' pitfall and to focus on trying to make the discovery as visual as possible using simple materials and known ecological principles. He illustrated the approach using examples from pest management in banana used in Nicaragua in which farmers observed the status of existing plantain fields of different ages, dug up good and poor quality suckers, planted out experiments with suckers of different qualities and other activities depending on the crop stage of nearby fields. They made repeated measures of factors such as weed cover, pest and disease presence and crop vigor to identify those influencing crop performance. These may not all be discovery exercises, but they use the learning cycle through observation, analysis, action and observation. Typical discovery exercises encompass six elements listed in **Table 4.5**. The case of the spread of a virus (Cacao Swollen-Shoot Virus, CSSV) by a vector (i.e., mealy bug) was shared as an illustration of how such a principle can be easily communicated to a non-specialist audience (**Annex 6.6 E**, p 66).

Seven principles illustrating key aspects of BBTD understanding were proposed to the work groups (**Annex 6.6 D**, p 64). Five were further developed by participants and distributed across French and English-speaking groups as shown in **Table 4.6**. Draft discovery exercises for each group can be consulted in **Annex 6.8** (p 74). Before integration into the final curriculum, BBTD specific exercises will need to be further fine-tuned and adapted to context with additional key principles also illustrated.

Table 4.5. Suggested structure to use when designing a discovery exercise.

	Element	Description
1	**Background**	Short description of proposed exercise which can be quickly understood
2	**Duration**	Time need for the preparation, observational component, discussion and conclusion of exercise (*should not exceed half a day*)
3	**Learning objectives**	What we aim to discover from an exercise
4	**Materials**	What equipment, supplies, and materials you will need to collect or prepare in advance
5	**Methodology**	List of non-formal education methods or approaches used to facilitate an exercise (e.g., field walks and observations, sharing of experiences, brainstorming, participatory discussions in small or big groups, role-playing, hands-on or simulation exercise, etc.)
		Key questions to be proposed to the participants to stimulate observation, processing, analysis and conclusions
6	**Steps**	Numbered list of steps that you will take to complete an exercise (introduction, initial discussion, exercise itself, processing, analysis and conclusion included)

Table 4.6. BBTD discovery exercise workgroups.

BBTD Principle	English	French
1. *Musa*-free fallow	✓	✓
2. BBTD symptom development		✓
3. Life of the banana aphid	✓	
4. Spread of virus by vector	Not carried out	
5. Source of infection & BBTD risk in a nursery	✓	✓
6. Presence of BBTV in asymptomatic suckers from infected mats	Not carried out	
7. Reconstruction of BBTD village history		✓

These discovery exercises can be organized in a series of farmer meetings to build the elements of BBTD management, but to also unleash the interest of farmers in testing, experimentation and finding solutions adapted to their economic and social conditions. The learning exercises prepared by the working groups during the workshop contributed to the formulation of a community-learning curriculum shown below. Several community meetings are proposed to culminate in two community work commissions (formed by up to 10 persons with cross section gender and age) addressing a banana-free fallow (**Table 4.7**) and a supply of clean planting material (**Table 4.8**).

Pilot-site specific work plans elaborated during the workshop are presented in **Annex 6.9** (p 87).

Table 4.7. Steps in household and community learning and experimentation approach to building prototype to recover banana lost to BBTD (banana-free fallow).

	Community mobilization		Work commission: Banana-free fallow			Community monitoring
	Past and future of BBTD in community	**Can we learn to recover banana production?**	**What is a banana-free fallow?**	**How to evaluate sites for fallow?**	**Costs – benefits for fallow**	**Plan to test recovery tactics**
Who participates	Village leaders, leaders of CBOs, men, women, children Other organizations present in village/community	Village leaders, leaders of CBOs, men, women, children Other organizations present in village/community	Commission members	Commission members	Commission members	Village leaders, leaders of CBOs, men, women, children Other organizations present in village/community
Objectives of meeting	Is community interested in recovering banana? What has community learned about the disease? What is their perception about the decline of banana?	Understand opportunities to recover banana Establish commissions for banana-free fallow and supply of BBTV-free planting material	Identify criteria to plan banana-free fallow	Identify advantages/ disadvantages for alternative fallow sites; Test techniques for eradication;	Complete estimate for cost/benefit for different sites	Identify sites for banana-free fallow Identify sites for MP/nursery Plan to planting
Key questions	• What are symptoms of BBTD? • When did BBTD first appear? • What measures did we take? • How much has production declined?	• How much disease is in suckers? • *Experiment* – Plant asymptomatic suckers • How does virus reach a clean plant? (life cycle, habitat and movement of aphid)	• How long does banana-free fallow need to be? • How wide is the buffer needed to protect new field?	• Is replanting near existing mats possible? • How fast does disease progress? (review experiment) • Which site has higher cost for eradication?	• Is replanting near existing mats possible? • How fast does disease progress? review experiment) • Which method is easiest for eradication?	• What happened with asymptomatic suckers? (review experiment) • Do clean plants have virus? (review experiment) • Are symptoms more advanced in other mats in field with clean plants?

Community mobilization		Work commission: Banana-free fallow			Community monitoring
Past and future of BBTD in community	**Can we learn to recover banana production?**	**What is a banana-free fallow?**	**How to evaluate sites for fallow?**	**Costs – benefits for fallow**	**Plan to test recovery tactics**
• How have we compensated? • Will banana production continue to decline in next 5-10 years? • Map of community (Where is BBTD? Banana? • What are the key symptoms for BBTD? • When did BBTD first appear in our community? • From where did it come? • How much has banana declined in yield and production since the disease was first identified? • Will banana production and yields continue to decline? • What options have we tested to reduce losses to BBTD?	• *Experiment* – Plant clean plant in field with BBTD/observe appearance of symptoms in established mats and in clean plant • *Reflect on* who in the household selects suckers and whether they recognize disease symptoms? • Map to discuss possible sites for banana-free fallow and nursery • What sacrifices can be envisioned with banana free fallow? Who will be affected – men or women? • Are there opportunities with banana free fallow? For men or women?	• What are important criteria to evaluate sites for banana-free fallow? • Evaluate experiment with clean planting material in infected field • Map possible site for banana-free fallow • How many mats (cultivar, disease aphid presence, how to eradicate)? • How many fields and owners? • Are there natural barriers? • Estimate cost to eliminate banana and risks of re-infection	• Which site has lower risk of infection? (compare results of site visits) • What are costs to eradicate different cultivars? (experiment with slashing of ABB) • What are options for alternative crops during banana-free fallow? (seasonal cropping based on rain fall – timing for fallow and cropping, planting)	(review results of slashing experiment and propose follow up actions) • What are costs and returns of possible alternative crops? • What are costs of eradication? • Work in slashing and re-slashing • Lost bunches? • What are benefits? • Alternative crops? • Increased banana production?	• Where should we put banana-free fallow? • What is the risk of re-infection? • How difficult will eradication be? • Costs and benefits? • Which site for MP/nursery? • Advantages/disadvantages

	Community mobilization		Work commission: Banana-free fallow			Community monitoring
	Past and future of BBTD in community	**Can we learn to recover banana production?**	**What is a banana-free fallow?**	**How to evaluate sites for fallow?**	**Costs – benefits for fallow**	**Plan to test recovery tactics**
	• Which households in the community have suffered more?					
Proposed follow up actions	Commission to complete map of community (highlight zones with and without banana)	Commissions to implement banana-free fallow and supply BBTV-free planting material	Commission maps two more sites based on one site mapped	Slash other mats tracking time and method Seek additional information on alternative crops – seeds, markets, women versus men views	Complete comparison of three sites for banana-free fallow to present to community meeting	Commissions implement plan agreed on with community
Gender actions	• Ensure that many poor as well as rich households are invited to the community meeting • Extend invitation to household and not just household head • Ensure that women's organizations are represented as official organizations in community	• In discussions of sucker selection, focus on different household members who select suckers and their knowledge • In discussion on banana free fallow reflect on who gains and loses with banana destruction and the planting of temporary crops?	• In each site, fine tune focus on who gains and loses by also asking about crop associations, who selects planting material, who has been in training about disease? • Commission to include men and women	• In reflection on banana destruction, reflect on who will do the work in the household? • Ask about how alternative crops can be used to provide key household costs like dietary diversity, • Who makes the decision?	• Formalize cost – benefit to include intra-household costs and benefits based on reflections in earlier meetings	• Clarify and plan the role of different households in the banana free fallow site and the role of different members in the household (men, women, teenage boys and girls, younger children of both sexes) • Identify specific approaches which seek diverse opinions in the monitoring and evaluation

	Community mobilization		Work commission: Banana-free fallow			Community monitoring
	Past and future of BBTD in community	**Can we learn to recover banana production?**	**What is a banana-free fallow?**	**How to evaluate sites for fallow?**	**Costs – benefits for fallow**	**Plan to test recovery tactics**
	• Ensure that women and men have opportunity to speak in meeting • Understand everyday household dynamics to improve targeting of interventions (not necessarily the household head) • Involve children (boys and girls) for the future of BBTD	• Include women in commissions for clean planting material and banana free fallow to ensure opinions and views from different household members • What farming activities are responsibilities of men and which ones are responsibilities of women?	• Develop indicators of gender responsive site selection • Gender and social factors that influence adoption of control and recovery measures	• Can crops for both men and women be identified? • Who controls income?		• Develop gender monitoring plan/ indicators to measure progress and success of gender actions • Involve women groups in pilot sites • Establish monitoring committees at community level

Table 4.8. Steps in household and community learning and experimentation approach to building prototype to recover banana lost to BBTD (BBTV-free material).

	Community mobilization		Work commission: Supply of BBTV-free planting material			Community monitoring
	Past and future of BBTD in community	**Can we learn to recover banana production?**	**What cultivars are important to us?**	**Where to locate MP chamber / nursery?**	**Plan for supply of BBTV-free material**	**Plan to test recovery tactics**
Who participates	See Table 4.7 above	See Table 4.7 above	Commission members	Commission members	Commission members	See Table 4.7 above
Objectives of meeting	See Table 4.7 above	See Table 4.7 above	Identify tentative cultivars Identify possible sources of clean suckers Training on macropropagation (MP)	Understand risk and sources of reinfection in MP and nursery Make plan for clean suckers Training on MP	Prepare proposal for community including: 1. Cultivars 2. Site for MP/nursery 3. Clean sucker source	See Table 4.7 above
Key questions	See Table 4.7 above	See Table 4.7 above	• What are preferred market cultivars? • What are reliable and hardy food cultivars? • Do we have banana genetic heritage to conserve? *Experiment* – Are asymptomatic suckers free of BBTV? • What are sources of clean suckers?	• What are criteria for MP chamber? • What are criteria for MP nursery? • How do we minimize risk of BBTV infection in plants? • *Exercise* – Evaluate one site using criteria	• What are merits of different sites for MP? • What are merits of different sites for nursery? • How many suckers do we need to plant field? • How big is MP chamber? Nursery? What is source? (review experiment)	

	Community mobilization		Work commission: Supply of BBTV-free planting material			Community monitoring
	Past and future of BBTD in community	**Can we learn to recover banana production?**	**What cultivars are important to us?**	**Where to locate MP chamber / nursery?**	**Plan for supply of BBTV-free material**	**Plan to test recovery tactics**
			• Can we multiply locally? • *Experiment* – MP small tub/2-3 clean suckers	• *Experiment* - Are asymptomatic suckers free of BBTV? (review) • What is multiplication rate for MP? • (review mini-MP)?	• How many suckers? (review mini-MP) • When are plants ready for planting?	
Proposed follow up actions	See Table 4.7 above	See Table 4.7 above	Consultation on cultivars Maintain MP experiment	Evaluation of 2 additional sites Maintain MP experiment	Meet with community to discuss alternative plans	See table 4.7 above
Gender actions	See Table 4.7 above	See Table 4.7 above	See Table 4.7 above	See Table 4.7 above	See Table 4.7 above	See table 4.7 above

On the fourth day of the workshop, participants were taken on a field trip to Cibitoke province located two hour-drive from Bujumbura, the capital of Burundi. This region is noted for its banana production and derives its name from banana, locally called '*Ibitoke*'.

The field day started by a joint visit to a local banana-brewing site (Rusagara). Participants were taken through the various approaches and steps used traditionally to make banana beer. Visibly seen in the site, and along the way, were numerous banana plantations and BBTD-infected plants.

Subsequently, participants were split into three groups (i) socio-economy (cf. section 4.3), (ii) French BBTD discovery learning, and (iii) English BBTD discovery learning. Each group was taken to a different site for their activities.

The English group's first point of call was a farmer that had totally eradicated his infected plot and replanted with healthy bananas (FHIA) under the guidance of ISABU. The farmer shared his experiences about his neighbors who refused to remove their infected plants. This constitutes a point of concern for him, as he considers that these could be new sources of infection for his farm. Indeed, symptomatic plants were observed at the border of his farm, close to the neighboring infection source. A second site located in the Rusizi valley (Munyika) and equally heavily hit by BBTD was visited. The group spoke to farmers about their different experiences with the infection. From the interaction, participants were convinced that farmers are aware of the disease and its implication in significant yield reduction. However, farmers do not seem to have complete information about the disease in terms of impact of infected suckers and role of aphid vectors. A particular farmer tried to explain that he thought weevils were responsible for transmission of the virus (instead of the aphid vector). After several attempts, aphids were identified in the field and the role-playing exercise on 'life of the banana aphid' was carried out. The experience allowed participants to polish up the tool (clear formulation of questions to farmers, remove excessive scientific explanations, etc.) and discover that the best way for farmers to learn is to answer their own questions using what they have observed. This facilitator becomes a formulator of questions in response to farmer questions, reinforcing farmer capacity to observe and to reason ecologically. Symptoms were visibly seen all over the site visited and were thoroughly analyzed through questioning with the group and farmers.

The French discovery learning group involved 19 participants and carried out their activities in Gitebe (Mugina commune, Cibitoke province). Two major discovery exercises were tested, namely (i) life of the banana aphid (biology and ecology) and (ii) BBTD symptom development. The first exercise was lead by entomologist Dr Rachid Hanna from IITA. The aphid's morphology, reproductive mode, life cycle, flight and feeding patterns in addition to preferred habitat was described, followed by hands on experience finding the elusive winged (alatae) and non-winged (apterous) forms of *Pentalonia nigronervosa* in the field. Specimens of both forms were collected and placed in plastic Petri dishes for ease of observation with a hand lens by participants. Virologist Dr Marie-Line Caruana from CIRAD guided the second discovery exercise. Characteristic BBTD symptoms including bunchy top aspect of foliage, narrow leaves and stunting were described and illustrated to participants. More specific symptoms were also shown such as initial brown spots and the dark green dot-dash streaks found on the leaves and petiole. Dr Caruana explained the differential expression of symptoms based on plant age and the difference between primary and secondary infections. Both exercises were concluded with the role-playing of the discovery exercise with participants as farmers. This was tested by Mr Bangata and Mr Ngama of DRC for the aphid and BBTD symptoms cases respectively.

The field day was concluded by a joint visit and experience sharing around a farmer-led *Musa* tissue culture nursery established by ISABU. Planting material for this trial was sourced through the local TC laboratory Agrobiotec and maintained by surrounding beneficiary farmers. Main observations include among others proximity of existing *Musa* plantations, use of polybags of excessive caliber, use of a systemic insecticide versus use of insect-proof netting, and witches broom on roots (sign of nematode infestation). The visit was an excellent discovery exercise of Do's and Don'ts in a nursery when striving for the production of disease/pest-free planting material.

4.3 BBTD related social and gender studies

During the second day of the workshop, Anne Rietveld and Susan Ajambo lead a workgroup session on 'Social Communities' (**Annex 6.6 C** p 62). Six gender-mixed workgroups were identified and each assigned the identity of an individual of specific gender and age (**Table 4.9**). Collectively, each group then proceeded to give shape to the individual assigned within a selected BBTD pilot site. Impersonating their character, workgroups proceeded to characterizing the role and interactions they have within the community and the importance of banana in social status (**Table 4.10**). Results of the work groups are presented in the tables below.

Table 4.9. Characteristics / Collective identities attributed to characters.

	Gender	Age	Name	Pilot site	Civil status	# Children	Land Ownership	Land Access	Plot size	Village authority
1	Female	18	Lifeta Abeti	Masako (Kisangani, DRC)	Married	2	No	Access rights	3ha	Traditional (chief)
2	Male	23	Femi	Ogun State (Nigeria)	Single	0	No (family)	Yes	0.5ha	Traditional (chief)
3	Male	34	Jean	Congo Brazza	Married	2	Yes	Yes	1ha	Traditional (chief)
4	Female	45	Nyandwi Beatrice	Cibitoke (Burundi)	Married	5	No (husband)	Yes	0.5ha	Traditional (chief)
5	Male	53	Jean	Ambam (Cameroun)	Married (homosexual)	3	Yes	Yes	2ha	Traditional (chief)
6	Female	67	Iya-Ibeji Grace	Nigeria	Widow	6	Yes	Yes	5acres	Traditional (chief)

Table 4.10. Community level relationships / interactions *(1=low, 2=medium, 3=high).*

	Identity1	Identity2	Identity3	Identity4	Identity5	Identity6
Personally informed about important village issues	Yes	Yes	Yes	No	No	No
Level of influence on village authority	1	1	2	1	1	2
Likelihood to be selected to participate	2	1	3	2	3	3
Likelihood to give your opinion in meetings	1	2	3	1	1	2
Importance of banana plantation for social status	3	1	3	1	-	2

Table 4.11. Household level relationships *(1=low, 2=medium, 3=high).*

Character	Identity 1	Identity 2	Identity 3	Identity 4	Identity 5	Identity 6
Ease to attend a whole day project meeting	1	1	3	2	3	1
Likelihood relatives will disagree you follow a several-day BBTD training in another location	3	1	1	1	3	2
Degree you have of decision-making power about banana cultivation	2	1	3	1	3	3
Degree you control money you gain from banana sales	3	1	2	1	1	3
Constraints to participating in project	-Lack of time -Opposition from partner	-Little access to decision-making process -Low likelihood of financial gains -Not always present in village	-Appropriate financial availability -Lack of knowledge -Generational conflict	-Lack of time (HH chores) -Female discriminant culture -Analphabetism	-	-Break away from daily activities -Access to transport -Age/health considerations
Advantages of participating in project	+Motivation to participate due to the awareness of the problem	+Improved social status: seen as a more responsible member of the community +Better job prospects: possible work on other projects as an early adopter	+Availability of material, knowledge and assets +Increase in productivity +Increase of well-being of HH +Sharing of acquired community innovations	-	+Increase in my know-how +I own my own land +I am open-minded and innovative +Family support	+Increase in income and food security +Increase in crop production and protection knowledge/skill +Increased influence in the village as doing public good (disease reduction)

From the tables above we see that different individuals have different roles and interact differently in distinct communities and households. The likelihood to be selected for community activities or to be heard in a meeting for example is often dependent on social-cultural characteristics such as age, sex and marital status. It is important to take this into account when trying to mobilize communities as these factors will not only influence the selection you make but also the dynamics in the group you will have.

Frequently used participatory tools include:

- **Semi-Structured Interviews** - One-on-one interviews with key community members to get more information about specific elements of the issues and resources discussed during mapping activities
- **Focus Group Discussions** – Collects information from people whose perspective might not come out in gatherings of the whole community (e.g. women or youth groups)

One way to engage further with a community, learn and develop community strategies is by using Participatory Rural Appraisals (PRA). PRA helps groups analyze local problems and formulate tentative solutions with local stakeholders. It makes use of a wide range of visualization methods and mainly deals with a community-level scale of analysis. PRA can bring out answers on questions such as:

- What really motivates the community?
- What are the main interests among community members at this particular time?
- What are their hopes for the future?
- What cultural practices are positive for the community that the mobilization process can reinforce?
- Whose voices are missing from decision-making in the community?
- Are there external influences that are helpful or harmful for the community that projects should take into consideration?

Examples of PRA tools that can be used when formulating farmer groups include:

- **Community Mapping** - Community members make a physical map of their community that identifies the resources available in it as a basis to start a discussion about existing resources and gaps
- **Seasonal Cropping Calendar** - Community members make a calendar illustrating time in the year where they perform specific crop activities. Ideally, it is recommended to carry out separate calendars for women and men in order to highlight difference in labor allocation, workload and control over resources
- **Social Relationship Mapping** - Analyzing the groups and influential individuals within and outside the community and identifying constructive relationships and possible tensions among actors.

Additional guides to PRA can be found on the DVD distributed during the workshop. The documents have also been added to the Dropbox link (workshop folder 'BBTD WS Bujumbura 2014_01/Workshop Presentations & Work Groups/Extra materials/Communities & Gender').

General rules of thumb:

- Establish mixed-gender field teams
- Select appropriate meeting locations
- Schedule activities at convenient times
- Seek appropriate approvals
- Manage group dynamics
- Adapt to differing levels of education and literacy
- Have clear project objectives and know that the community(ies) shares those objective in order to building common ground
- Thorough understanding by each team member of the concepts, opportunity to ask questions, and practice discussing the objectives prior to starting work with communities
- Meaningful participation stems from addressing peoples felt needs, not cash/gifts incentives.

The 'Seasonal Cropping Calendar' tool was tested in Munyika village (Cibitoke) by participants under the guidance of Anne and Susan in the course of the fourth day of the workshop. Three distinct farmer groups

(1 women's group, 1 men's group, 1 mixed group) were interviewed, results of the exercise for the men's group is described here under.

The activity was conducted with a group of eight male banana farmers and was undertaken as a learning activity aimed at providing participants of the planning workshop on BBTD recovery with an opportunity to gain hands on experience with basic participatory tools for social and gender analysis. A gender-disaggregated seasonal activity calendar was used to visualize the seasonal patterns of household labor by gender and age as shown in the matrix below (**Table 4.12**). The visual was then used to discuss the patterns focusing on:

- busiest months of the year
- men's and women's activities and the reasons
- productive and reproductive roles of men and women
- implications of the division of labor for food production and livelihoods.

Table 4.12. Seasonal calendar matrix for male farmer group in Cibitoke, Burundi*.

Seasons	Wet			Warm/Wet	Wet				Hot/ Dry			
Activities	O	N	D	J	F	M	A	M	J	J	A	S
Land preparation									MWmw			
Digging	WG											
	MB											
Manuring	WGB											
Planting	WG											
	MB											
Weeding	MWGB								MWGB			
Pruning	M											
Disease Observation	MWGB											
Disease Control	M											
Livestock	MB											
Shop keeping	W											
	M											
Cooking	WG											
Child care	WG											
Marketing	W											
	M											

* **Key:** **M**: Men, **W**: Women, **G**: Girls, **B**: Boys
... Intermittent activities
__ Continuous activities.

General impressions by participants underline the usefulness of the tool and its ability to (i) be participative and flexible allowing reflections and discussions among farmer's (this has direct implications for data quality due to evidence and consensus), (ii) reveal community perceptions about gender relations (men farmers ensured that women head household's experiences were captured in the discussion, despite there being no women represented in the group) and (iii) usefulness and quality of data generated that can feed into planning and designing of BBTD recovery measures.

For example, seasonal activities can inform on:

- appropriate time for supplying seeds
- who to target for what activity
- appropriate times for community meetings, etc.

After the presentation of the proposals for gender studies, participants were asked to reflect on their contexts and suggest probable areas to target with the gender (MSc) studies. The following 11 research areas were suggested and added to the gender proposal for consideration in the development of the gender studies protocol:

1. How to keep gender equality (as in this area we visited women work much more than men) and how to fight against poverty
2. How does gender influence the behaviour and practices of men and women and what are the implications for the BBTD project?
3. Managing BBTD in local context (socio-economic and cultural practices)
4. Role of gender in BBTD control
5. Studying the local economic status of the communities in relation to gender
6. How do we convince farmers to completely eradicate plantains/bananas?
7. What are the effects of BBTD on revenues of affected producers and communities?
8. How to complete destruction of banana mats in the community context?
9. What is the impact in socio-economic relationships in the recovery of bananas?
10. What is the best way of eradicating BBTD?
11. How do gender-based behaviours and practices at community level create and maintain opportunities and or constraints for the recovery and containment of BBTD?

4.4 Identifying key knowledge gaps

Dr Kumar led a session to identify key knowledge gaps in BBTD etiology and epidemiology in SSA and means to bridge these gaps. This interactive session commenced with an introductory presentation by Drs Kumar and Caruana on knowledge gaps and presented some knowledge gaps such as:

- Causes for differential infection of suckers originating from the same mat
- How does the fallow period influence the rate of re-infection?
- Is the emergence of a more severe BBTV strain possible?
- Biological role of recombinants?
- Existence of tolerant plants?
- Studies on epigenetic regulations of the viral multiplication
- What is the impact of BBTV on banana production / livelihoods?
- Determine the severity, fruit production in infected mats compared to health
- Which parameters are influencing the dynamics of BBTV in a region and how to measure it?
- Infection and reinfection rate; role of aphid in local spread
- Local exchange of planting materials, including replanting with their own sources?
- Agro-ecological influencers; cultural practices
- Aphid preference transmission bottlenecks

Following the introductory presentation, a group session was organized to discuss knowledge gaps on the following thematic areas:

1. Virus-plant interaction
2. Virus vector interaction
3. First field infection
4. Contamination inside the field

Participants' feedback on knowledge gaps can be summarized as follows:

Symptoms and disease control

- Effect of the environment (context) in the development of BBTD
- Spatial distribution and evolution of the disease in the context of different ago-ecosystems
- Influence of vegetative materials in the propagation of BBTD
- Effect of the association of ago-forestry systems on disease severity
- How to reduce disease incidence to recover production in heavily affected areas?
- What role does symptomatic suckers play in infected mat, even sometimes with bunches?
- Do plants showing symptoms have more dose (virus) than those on the same mat? What happens when removed?
- Influence of symptoms on final yield
- Why farmers are not eradicating diseased plants even they know how to manage the diseases? Why farmers are not doing it? What is the problem?
- What are the causes for the different performance/infection rate within the same mat?
- Why do some suckers form the same mat have symptoms and others not?
- Develop simple monitoring approaches which link to disease presence and trends.

Fallow-period

- How to establish a banana-free fallow in a zone where BBTD is not established?
- How to put in place the banana fallow within the community?
- What would be the most appropriate sign of the buffer zone on the reinfection rate?
- Utilization of *Musa* fallows – will this be a solution?

Virus-Vector

- What is the role of intercrops such as taro, cocoyam, cassava, groundnut, etc. in the dynamics of aphids and BBTD epidemiology?
- Role of associations of banana with other crops on the dynamics of the vector?
- Biological control of the aphid
- How to reduce the proliferation of the vector?
- Biology of the vector and what are its relationship with the virus and the plant?
- Should research concentrate on vector control and diagnosis of new suckers for the eradication of BBTD?

Sociological

- How to keep gender equality (as in this area we visited women work much more than men) and how to fight against poverty?
- How do gender name influence the behaviour and practices of men and women and what are the implications for BBTD project?
- Managing BBTV in local context: Socio-economical and cultural practices context

- Role of gender in BBTV control?
- Studying the local economic status of the communities in relation to gender
- How do we convince farmers to completely eradicate plantains/bananas
- What are the effects of BBTD on revenues of affected producers and communities
- How to complete destruction of banana mats in the community context?
- What is the impact in socio-economic relationships in the recovery of bananas? What is the best way of eradicating BBTV?

Management

- How do different varieties respond to BBTV?
- Can BBTV be eradicated from fields?
- What is the best way of eradicating BBTV?
- Can BBTV be cured by eradicating single mats? Or do entire fields have to be uprooted?
- How can BBTV be managed in the context of mixed crops?

4.5 Learning Alliance

In order to better tailor the alliance to the needs and requests of its members, on the last day of the workshop (day 6), Charles Staver led an interactive discussion on participants understanding of:

- What a learning alliance is?
- What are the objectives?
- What methods, activities, tools, and mechanisms are necessary for it to be successful?

A 'Learning Alliance' was defined by participants as 'bringing different stakeholders together', 'a knowledge platform', or 'training and information exchange'. Indeed, each of these definitions reflects an aspect composing a 'Learning Alliance'. Additional discussion is needed to apply the concept to the challenges of recovering banana production from BBTD.

Participant feedback underlined that the 'Learning Alliance' should have, as its global objectives, to:

- Use a collaborative approach (with partnerships at local, national and international levels)
- Share information (i.e. knowledge and experience) on a large panel of themes such as effective management options, strategies for quarantine and reduction of spread of the disease, recovery options of affected production zones, updated BBTD distribution
- Harmonize research approaches and identify knowledge gaps and best concerted approach to fill the gaps
- Effectively build capacity across all stakeholders involved, with an emphasis on the training of young scientists.

Specific objectives to strive for when establishing a 'Learning Alliance' include:

- Improving and regularly updating methods and protocols shared
- Managing participant input in English and French.

Methods proposed by participants to achieve the objectives consist of:

- Workshops (training, strategic planning, etc.)
- Meetings (face-to-face, exchange, annual, etc.)
- Exchange field visits (pilot site coordinators, overall coordinator, etc.)
- Informal exchange of information and findings (email, Dropbox, website, etc.)

- Common protocols (research, socio-economic, survey, lab detection, data collection templates, sample collection kits, data entry, data analysis, etc.)
- Common databases (field data, datasheets, literature, etc.)
- Demonstration plots.

The participants agreed that the convening CG centers should propose an approach for the learning alliance to be discussed by the leaders of each pilot site team.

5. Way forward, follow up points & evaluation

5.1 Way forward and follow up points

Participatory experimentation and learning – Main points:

- Feedback to pilot site teams on three-year site specific work plans for every site for development of farmer and community learning and experimentation process, baseline studies on gender and cropping systems and BBTD distribution
- Preparation of draft curriculum detailing year 1 for farmer and community learning and experimentation
- Curriculum and discovery exercise development – need for technical assistance in the field to fine tune methods that address BBTD learning linked to community mobilization, household engagement and gender and generational differentiation.

Gender, social relations and cropping systems in banana recovery – Main points:

- Standard core protocols to be used by each pilot site for comparative cross site study on the role of gender and generation in banana cropping system, knowledge about banana and BBTV
- Topics for further study on gender roles in crop production and BBTD management in the household and community identified and formulated
- Plan for site visits by gender team
- Identification of socio-economic component in teams for sites.

Epidemiology of BBTD – Main points:

- Common protocols elaborated for BBTV survey at country level, affected subcountry level and community;
- Common protocol to sample BBTV presence prior to establishment of banana free fallow, for monitoring banana aphid presence in virus-free supply chain and for re-infestation of new fields established with clean planting material in banana-free fallows
- Proposals for PhD and MSc studies elaborated on effects of cropping system and associated cropping on BBTV epidemiology and on cultivar differences for virus-vector interactions with formal participation in committees of scientists from different centers
- Training on identification of aphids and associated fauna with aphids
- Montpellier training workshop on virus detection methods and seed systems – dates, content, approach to bilingual training and documentation, format for course content to be used in later training in national programs and universities.

Identification and exploration of strategies for group and within-project learning in a Learning Alliance framework – Main points:

- Identification and exploration of best format options for BBTD literature database
- Approach to monthly exchange of progress – how to manage English- French
- Protocol database and blog for question and answer

- Data collection sheet database, data entry database, data analysis
- Facilitated electronic thematic working groups on gender and cropping systems, epidemiological modeling, clean seed systems, participatory learning and experimentation, strategies for scaling out and local and national policy decision-making
- Links to regional banana networks, ProMusa tools, banana mapper and RTB
- Approach to quarantine players in Africa who attended Arusha workshop
- Links to other RTB grants in risk assessment, seed degeneration and cropping systems.

In addition, cross cutting opportunities to expand advanced research partners in alliance through PHD studies or complementary funds for ongoing PhDs through CIRAD, Belgian universities and others should be explored.

5.2 Participant evaluation of workshop

At the end of the intensive week in Bujumbura, participants were asked to evaluate the workshop and share their views. Aspects covered during the workshop that participants found to be most useful for their work and country include the participative approach used and the introduction to social sciences and associated tools (**Table 5.1**).

Table 5.1. List of most useful topics covered during the workshop and cited by workshop participants

	Topic	Number
1	Participative approach (interaction and exchange of views / experience via work groups, field, informal exchanges, etc.)	11
2	Social science (socio economic and gender aspect and their integration within the project)	9
3	Field visit (link between theory & practice)	5
4	Community and Farmer Learning / Discovery exercises	4
5	Rehabilitation / Recovery of BBTD affected zones (*Musa*-free fallows, clean planting material, etc.)	4
6	Identification & harmonization of gaps / priority research themes	2
7	Work plan activities calendar and Systematic approach used to draft it	2
8	Aphid identification, ecology and dynamics	2
9	BBTD symptoms (different stages)	2
10	Buffer zone creation in the community approach (including experimentation approaches)	1
11	Nursery activities	1
12	Identification of actors implicated in project implementation	1

When asked to identify one aspect of the workshop participants would have liked to see improved, they replied that despite the interesting content of the workshop, there was a lot of information to absorb. Participants suggested that a shorter workshop (4 days instead of 6) with fewer hours per day would be more agreeable. Even though a local simultaneous translation service was used for the workshop, participants echoed that a second aspect to improve for the next workshop would be to cater for French and English participants via effective translation services (simultaneous translation and translation of all the supports, **Table 5.2**).

Table 5.2. List of points for improvement for the next workshop cited by participants.

	Topic	Number
1	Time keeping (hectic/tight schedule with too much material and not enough time to contemplate issues), shorter sessions (work days too long), shorter workshop (4 versus 6 days)	8
2	French-English translation (presentation, work guides, simultaneous translation, etc.)	4
3	Preparation of sessions (expected output of work groups not always clear)	2
4	Lack of facilitation / management for group work (organizing participative discussions)	2
5	Budget available for work plan (excluding gender component which was described) & Roles and responsibilities of different stakeholders	2
6	Field trip (exchanges with farmers / producers and tool testing too short)	2
7	BBTD detection methods (including ELISA)	2
8	Logistics (admin / financial / technical help so that organizers can focus on presentations & workgroups)	1
9	Importance of clean planting material (virus indexing, multiplication and distribution at a national/regional level)	1
10	How to create a FFS	1
11	Organize a similar workshop in other pilot sites	1

Participants engaged themselves to several action points within the next month following the workshop (**Table 5.3**). The main activities listed include the mobilization of farmers and communities in addition to revising their work plans.

Table 5.3. Follow up points to be carried out by workshop participants in the course of February 2014.

	Follow up action	Number
1	Community and farmer mobilization	9
2	Team meeting and fine-tune work plan	5
3	Banana-free fallow	5
4	Clean planting material supply and virus surveillance	4
5	Mapping of proposed pilot sites	3
6	Household and gender survey	2
7	Plant bananas	2
8	Finalize topics for MSc and PhD	1
9	Partner / Farmer training on BBTV-free planting material production (macropropagation)	1
10	Organize partners	1

Participants proposed that organizers focus particularly on the establishment / sharing of common protocols and the collaborative follow-up of activities with pilot site teams during the coming months (**Table 5.4**).

Table 5.4. Follow up points to be carried out by workshop organizers in the course of February 2014.

	Topic mentioned	Number
1	Collaborative follow-up with pilot site teams	11
2	Common protocols to be used across sites (aphid / virus sampling at different stages, social relations and gender, etc.)	6
3	Timely release of funds	2
4	Special research and training themes: • Virus detection • Alternate hosts for BBTV and banana aphids	 2 2
5	Mapping of BBTD in potential pilot zones	2
6	Organization of follow up workshop and exchange among pilot site teams	2
7	Support to virus indexing and clean planting material supply	2
8	Provide expert advice on research methods which contribute to disease control	1
9	Create a web site	1
10	Share documents and workshop report with participants	1

6. Annexes

Annex 6.1 – Workshop Programme

TIME	TOPIC	PRESENTER
DAY 1 – Monday 20th January		
08.30 - 08.50	Opening / Welcome	Célestin Niyongere / Director ISABU / Bioversity / IITA / CIRAD
09.00 - 09.45	Introduction Project & Workshop • Threat of BBTV to banana production in SSA • CRP RTB BBTV flagship and complementary fund • Social relations and cropping systems	IITA / Bioversity Lava Kumar Charles Staver Anne Rietveld
09.45 - 10.30	Introductions with participant participatory experience, BBTD	Anne Rietveld Susan Ajambo
10.30 - 10:45	Housekeeping	Pascale Lepoint
10.45 - 11.15	BREAK and Group picture	
11:15 - 11:30	Workshop program and work flow	Charles Staver
11.30 - 11.50	How does banana bunchy top virus get into a banana plant and move within the plant?	Pascale Lepoint
11.50 - 12.15	What is the life of the banana aphid and how does it contribute to the spread of BBTD?	Rachid Hanna
12.15 - 12.35	How can we detect BBTV and how are symptoms related to virus in the plant?	Marie-Line Caruana
12:35 - 13:00	How does BBTD spread from zone to zone, from field to field and within a field?	Lava Kumar
13.00 - 14.00	LUNCH BREAK	
14.00 - 14.30	Reflection – role of new knowledge in having impact	Anne / Susan
14:30 - 14:50	Community and farm approaches to recovering banana production affected by BBTD – role of prototypes and knowledge gaps	Charles Staver
14.50 - 15.10	BBTD Experience on BBTD management in DRC Kisangani	Kisangani Team (Dhed'a)
15.10 - 15.30	BBTD Experience on BBTD management in Malawi	Malawi Team (Soko)
15.30 - 16.00	BBTD Experience on BBTD management in DRC Kinshasa	Kinshasa Team (Mobambo)
16.00 - 16.30	BREAK	
16.30 - 17.00	BBTD experience on BBTD management in Burundi	Burundi Team (Niyongere)
17.00 - 18.00	Work Groups What do farmers and communities need to know to recover BBTD affected areas? – clean seed supply, creating a banana free fallow, reinfection of a new field What key information is missing?	Working groups by pilot site
DAY 2 – Tuesday 21st January		
8.15 - 10.00	Presentation of working groups (6 groups x 12min = 80min + 20min discussion)	Charles Staver
10.00 - 11.00	Participatory experimentation and learning	Charles Staver
11.00 - 11.30	BREAK	
11.30 - 12.15	Social analysis – Exercise	Anne / Susan
12.15 - 12.45	Social analysis	Anne / Susan
12.45 - 13.00	Working groups: Thinking social Communities: What do we need to know to ensure effective work with all members? Households: What do we need to know?	Anne / Susan Mixed working groups across pilot sites

TIME	TOPIC	PRESENTER
DAY 2 – Tuesday 21st January (cont'd)		
14.00 - 14.45	Working group continues	Anne / Susan
14.45 - 15.30	Reporting back and participatory dynamics	Work groups
15.30 - 16.00	BREAK	
16.00 - 17.00	Working groups - How long will it take to produce first bunches from BBTV-free planting material in your pilot site?	Charles Staver
17.00 - 18.30	Presentations by working groups *(8 groups x 10min)*	Charles Staver

DAY 3 – Wednesday 22nd January		
8.30 - 9.15	Pilot zone calendars from community mobilization to first harvest	Charles Staver
9.15 - 10.00	Designing learning exercises in learning and experimentation to test prototypes (+ form work groups): • Discovery learning • Observation of variability and analysis • Observation of treatment effects and analysis	Charles Staver
10.00 - 10.30	BREAK	
10.30 - 11.30	Work groups to design exercises	Groups by language – prepare methods for field day
11.30 - 12.00	How do exercises fit into our stages?	Charles Staver
12.00 - 13.00	Mass communication methods for community awareness and mobilization	Andrea Gros (IITA)
13.00 - 14.00	LUNCH BREAK	
14.00 - 15.30	Community mobilization – reflections	Anne / Susan
15.30 - 16.00	Adding activities to community mobilization	Charles Staver
16.00 - 16.30	BREAK	
16.30 - 17.30	Plan and preparations for field day Social relations and cropping systems Learning exercises in each station: • Symptom recognition BBTV • Life of aphids • Banana free fallow • Presence of BBTV in suckers without symptoms • Risk analysis of infection of nursery	CG team

DAY 4 – FIELD DAY – Thursday 23rd January		
07.30 - 17.00	Parallel sessions: • Cropping systems and household social relations • BBTV learning approaches in the field	Anne / Susan / Alice / Privat Charles / Célestin / François / PLP

TIME	TOPIC	PRESENTER
DAY 5 – Friday 24th January		
8.30 - 9.30	Discussion – field day Reflections on study of cropping systems and household roles, knowledge, decisions and resource control	Anne / Susan Group reporting
9.30 - 10.30	Study – background and expected outputs	Anne
10.30 - 11.00	BREAK	
11.00 - 12.30	Working groups: preliminary plan for study	All
12.30 - 14.00	LUNCH BREAK	
14.00 - 15.00	Science Knowledge gaps and opportunities Report back from working group, discussion of possible MSc and PhD themes Group work (4 groups : 2 Francophone + 2 Anglophone) Identify top 3 knowledge gaps concerning BBTD control and why they are important	Lava Kumar, Marie-line Caruana, Rachid Hanna
	Group work reporting in plenary Summary presentation	All
15.00 - 16.00	RTB Risk assessment project - Overview BBTV mapping and survey - Overview Group work on survey experience – what went well, what not and what kind of support is required?	Guy Blomme Hein Bouwmeester
16.00 - 16.30	BREAK	
16.30 - 17.30	Working groups by pilot sites	All

DAY 6 – Saturday 25th January		
8.30 - 10.30	WGs by pilot site: Plan for development of farmer and community learning and experimentation process, formal studies on epidemiology, study on cropping systems	Charles Staver
10.30 - 11.00	BREAK	
11.00 - 13.00	Presentations by pilot sites – current situation and plans	All
14.00 – 16.30	Strategy for sharing and learning within project Plan for future workshops in years 2 and 3	All

Annex 6.2 – Summary and recommendations from the Arusha 2009 workshop

Summary and recommendations on BBTV from the 'International Workshop on Banana Bunchy Top Disease and Banana Xanthomonas Wilt: Meeting the Challenges of Emerging Disease Threats to Banana and Strategies for Raising Awareness, Surveillance and Management of these Diseases in sub-Saharan Africa' - 24 to 28 August 2009, Arusha, Tanzania

In response to the emergence of banana bunchy top disease (BBTD) and banana bacterial wilt disease (BBW, also known as banana Xanthomonas wilt or BXW), the Southern African Development Council (SADC) with support from the UN Food and Agriculture Organization (FAO), International Institute of Tropical Agriculture (IITA) and Bioversity International convened an international workshop from 24-28 August 2009 in Arusha, Tanzania. Experts from 15 sub-Saharan African banana and plantain growing countries and international experts from Australia, Belgium, India and United Kingdom reviewed the current status and scientific knowledge on BBTD and BXW, and recognized the need to plan strategies to manage the diseases in countries where they are already established and to prevent spread to those that are not yet affected. The specific objectives of the workshop were to:

- update the current status of BBTD and BXW risk of further spread and national capacity for response.
- bring experiences from global partners on BBTD, BXW and banana aphid control to the planning and development of the SSA strategy.
- develop country/regional strategies to control BBTD, BXW and banana aphid in endemic areas and restrict spread into unaffected zones.
- strengthen regional capacity for quarantine, research and extension with respect to surveillance and management tools and approaches on BBTD and BXW in SSA.

The workshop contained a mix of presentations, discussions and a two day training session on design of surveillance and management activities for banana diseases including. The first working group session involved mixed groups from different countries to identify strategic issues and activities needed to improve preparedness for, or management of, banana diseases under four components:

- Surveillance and plant quarantine
- Supply of clean planting material
- Disease control and management measures
- Advocacy and socioeconomic assessment.

Workshop resulted in the following recommendations to combat threats:

In countries where production systems are already affected, arrangements must be made to provide safe replanting material on a sufficient scale to encourage farmers to take the necessary action to destroy diseased plants. For disease-free but threatened countries, there is urgent need to increase vigilance in order to take pre-emptive action to destroy infected bananas as soon as they appear. Monitoring strategies and the capacity to recognize the diseases and to deploy rapid eradication responses are vital.

Farmers and other stakeholders, especially policy makers must be sensitized to the importance of these diseases and mobilized to do whatever they can to combat the diseases at the first signs of appearance. Large-scale community-level action will be needed, supported by local and national governments and sub-regional organizations.

Countries with banana and plantain production – whether at commercial or subsistence level - should allocate funds to put in place:

• **Large-scale campaigns** for disease awareness, surveillance, the training of sufficient staff in sampling, field disease recognition and laboratory diagnosis, and the production and distribution of clean planting material in order to respond to any disease outbreaks.

• **Community-level measures** to support actions in a response to the diseases, helping to ensure local adherence to recommended practices.

• **Reporting and communication systems** to ensure an early and appropriate reaction once the diseases have been recognized at field level, and to monitor the success of eradication and management practices.

• **Improved arrangements for production of *clean* banana planting materials**, through training and facilities to improve the quality of materials, and ensure these are made available on a sufficiently large scale to farmers.

• **National contingency plans**, developed with the involvement of all concerned in banana disease management, including the creation or strengthening of national task forces to ensure country preparedness to implement disease eradication campaigns and monitor the impact of these efforts.

• **Other longer term programs** to improve field practices for disease eradication (for countries where invasion is recent) and management (where diseases are already established); and also to include review, information sharing and updating of policy frameworks such as plant health/quarantine legislation.

These actions are essential and need to be deployed as a matter of urgency and then sustained. International research and development partners, regional and sub-regional organizations and the national authorities must affirm their commitment to collaborate on regional responses to banana diseases, to ensure coordination of activities and optimal use of resources to provide technical advice, develop sustainable new technologies and deploy eradication and management practices across SSA.

At the conclusion of the workshop, the participants issued a statement, alerting international, regional and national institutions of the serious threat posed by BXW and BBTD to income and food security for small scale banana and plantain farmers in sub-Saharan Africa and to the genetic resource heritage in the secondary centres of diversity of *Musa*. This workshop noted that livelihood conditions for the poor resource communities in SSA, already aggravated by the effects of HIV-AIDS and climate change will continue to get worse if nothing is done to address the disease threat to banana/plantain productivity in the region. In this regard, FAO, IITA and Bioversity International undertook to work with the relevant regional organizations, such as SADC and ASARECA, to further develop a **banana disease management framework** for SSA. A high level meeting was proposed for early in 2010 to endorse the framework and take steps towards operationalizing it. The aim of this framework is to support effective networking and coordination for information gathering and sharing, and to identify national needs and gaps in funding. It will support efforts to increase awareness and raise funds so that disease eradication and management activities contribute to a common goal. Further details about this workshop are available on web portals http://r4dreview.org/2009/10/save-african-bananas/ and http://www.bananadiseasesframework.org/.

Annex 6.3– Summary and recommendations from the Arusha 2013 workshop

Summary and conclusions from the 'International Workshop on Banana Bunchy Top Disease and Banana Xanthomonas Wilt: Meeting the Challenges of Emerging Disease Threats to Banana and Strategies for Raising Awareness, Surveillance and Management of these Diseases in sub-Saharan Africa' - 24 to 28 February 2013, Arusha, Tanzania

Banana bunchy top disease (BBTD) caused by the *Banana bunchy top virus* (BBTV) is a great threat to food and income security of millions of people. The disease renders plants unproductive, eventually killing them. BBTD spreads into new fields along with infected planting material and also through an insect, the banana aphid (*Pentalonia nigronervosa*), which is widespread in all banana and plantain-producing areas. The spread of bunchy top into new areas can initially remain undetected, complicating timely eradication work and prevention of new outbreaks. Once the disease is present in a region, it is extremely difficult to eradicate. No durable sources of resistance have yet been identified.

Bunchy top is a great threat to banana production and productivity. Over 50% of the global banana (and plantain) production comes from Africa, where it is one of the key staple crops supporting the livelihoods of an estimated 100 million people, most of whom live in sub-Saharan Africa (SSA). BBTD was first reported from Africa in 1901, however, extensive spread into new production areas was observed during the last two decades. The disease has very recently invaded Benin and Nigeria in West Africa in addition to limited spread within the Kivu provinces (Democratic Republic of Congo, DRC), neighbor to the largest banana-producing country in Africa - Uganda. Currently, BBTD has been recorded in 35 countries across Africa, Asia, Australia and the South Pacific Islands, including Hawaii (USA), but not in the Americas. In Africa, occurrence has been confirmed in 14 countries, namely Angola, Benin, Burundi, Cameroon, Central African Republic, Congo Republic, DRC, Egypt, Equatorial Guinea, Gabon, Malawi, Nigeria, Rwanda and Zambia.

Laboratory techniques for virus detection and establishment of virus-free planting material are not widely available in SSA. On-going efforts by a range of national and international partners are fragmented and inadequate in halting the expansion of the BBTD pandemic and in rehabilitating banana production in BBTD-endemic areas. There is an urgent need for collective action to tackle the escalating threat of BBTD.

The International Workshop to develop strategies for an integrated control of Banana Bunchy Top Disease in Sub-Saharan Africa was therefore proposed as part of the CGIAR Research Program on Roots, Tubers, and Banana (CRP-RTB) complimentary project entitled 'Building a collaborative, public-private R4D alliance for an integrated control of Banana Bunchy Top Disease in Sub-Saharan Africa'. This workshop took place from the 2nd to 4th February 2013 and was organized by the International Institute of Tropical Agriculture (IITA) and Bioversity International, under the aegis of the CRP-RTB together with CORAF/ECOWAS, FAO-RAF, CARBAP, Inter-African Phytosanitary Council and the Department of Rural Economy and Agriculture of the African Union Commission, and Ministry of Agriculture (Benin, Cameroon, Congo Brazzaville, Ghana, Malawi, Nigeria, and Zambia) and research partners from Asia, Europe, India, Kenya, Pakistan, New Zealand, Tanzania, and USA. This workshop enabled global experts to come together in an alliance to develop a cohesive medium and long-term strategy for an impact-oriented, initiative to control BBTD in SSA.

The objectives of the workshop were to review the state of knowledge, lessons learned and new developments relating to BBTD/BBTV in Africa and other parts of the world, and further build on an initial framework proposed in August 2009 by IITA, Bioversity International, and FAO in a workshop attended by representatives from several SSA countries in Arusha, Tanzania [http://r4dreview.org/2009/10/save-african-bananas/]

The workshop considered three thematic areas based on different country and local contexts in terms of BBTD presence and severity, cultivar and production system and implementation infrastructure. These are (i) diagnostics, surveillance, quarantine and awareness raising; (ii) potential of emerging technologies in controlling the virus and aphid vector, and (iii) integrated management and farm/community recovery strategies based on clean planting materials and integrated pest and disease control. The workshop was organized as various sessions containing a mix of presentations and group discussions to identify priorities and

action plans leading to the formulation of a research framework for BBTD control and form a 'Global Alliance on BBTD Control in Africa' for implementation of the workshop recommendations.

The group concluded to take an alliance approach to conduct and coordinate research:

- to understand disease epidemiology and ecology;
- develop and distribute sensitive diagnostic tools;
- augment host resistance to the virus and the insect vector;
- explore biocontrol options to manage aphid vector;
- put in place location specific clean banana production and distribution systems;
- develop capacity for disease recognition and knowledge of control options;
- train farmers and entrepreneurs in production of clean planting material;
- train scientists to continue surveillance of disease incidence and update distribution maps
- get a better understanding of factors that drive the field spread; and
- develop appropriate management packages to delay spread and manage the disease in endemic areas.

The Alliance will also put in efforts to obtain/increase the necessary resources for a sustained and long term effort to achieve this mission.

The impact of the research and capacity development programs will enable continued and enhanced production of banana along the value chain in SSA. The primary beneficiaries will be smallholder farmers, partners in NARES, regional and national quarantine organizations, NGOs and the seed production industry (both tissue culture and alternative propagation systems). The broader international community will benefit from the international public goods (IPGs) developed by the Alliance.

This workshop was an accomplishment with regards to knowledge and experience sharing across CGIAR centers and their partners, providing opportunities to present latest research results in addition to identifying the priorities for short, medium and long-term research proposal for an impact oriented, public-private initiative to control BBTD in Africa. A draft log frame of products, milestones and outcomes was developed for future fine-tuning under the putative form of a joint proposal to RTB and for bilateral funded research projects. Participants expressed their interest in coming together as an Alliance to fight BBTD in SSA and more generally in Africa and belonging to a common entity such as the Global Alliance whose vision is to 'Rescue and protect African bananas from banana bunchy top disease'.

The workshop concluded to take an 'alliance' approach to conduct and coordinate research:

- to understand disease epidemiology and ecology;
- develop and distribute sensitive diagnostic tools;
- augment host resistance to the virus and the insect vector;
- explore biocontrol options to manage aphid vector;
- put in place location specific clean banana production and distribution systems;
- develop capacity for disease recognition and knowledge of control options;
- train farmers and entrepreneurs in production of clean planting material;
- train scientists to continue surveillance of disease incidence and update distribution maps
- get a better understanding of factors that drive the field spread; and
- develop appropriate management packages to delay spread and manage the disease in endemic areas.
- put in efforts to obtain/increase the necessary resources for a sustained and long term effort to achieve this mission.

Annex 6.4 - List of Participants

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Annex 6.5 - Group photo

Annex 6.6 - Group discussion guides

A. DAY 1 - WORK GROUP GUIDE – FARMER & COMMUNITY KNOWLEDGE BY STAGE

Facilitator : Charles Staver

Knowledge needed to recover banana production in areas affected by BBTV

For your component of the approach to banana recovery complete the actions proposed below, adding content to the matrix. This can be done electronically or on a flipchart.

For this exercise each of the components have starting points and ending points which can focus the discussion.

Starting and ending points for each of the components:

Component	Starting point	Ending point
1. Community mobilization and monitoring	Village severely affected by BBTD interested in recovery of banana production	Village completes plan for recovering more banana production areas after evaluation of the prototype experience
2. Supply of planting material free of BBTV	Village working group nominated to organize preparation of clean planting material to plant new fields	Planting material free of BBTV available for test plots
3. Implement a banana /BBTV /banana /aphid free fallow	Village working group nominated to implement a banana free fallow in preparation for planting new field	Area within banana free fallow ready for planting BBTV free planting material
4. Plant new field with BBTV-free plants	Clean plants and field within banana-free fallow	Harvest first bunches from banana garden

Steps for the discussion:

1. Identify the stages or the sequence of actions from the starting point to the completion of the task
2. Briefly describe the changes occurring at each stage
3. Identify what knowledge is needed for the change
4. Who in the community and household must have the knowledge
5. What is the role of gender in each stage which should be taken into account

	1	2	3	4	5
Describe stage or action					
Describe change					
What knowledge is needed?					
Who in community or household should have knowledge?					
What is role of gender in stage?					
Children (male or female) who play a role					

B. DAY 2 - WORK GROUP GUIDE - How long from "community mobilization" to "harvest of bunches" from fields planted with BBTV-free planting material?

Facilitator: Charles Staver

Steps in calculation of total period needed for work:

1. What is rainfall distribution in zone? What date is normal planting?
2. To have BBTV free plants of appropriate cultivar, when do we need to begin process? What method will be used?
3. To plant in optimum time, when do we need to begin to create banana / aphid / virus free fallow?
4. What alternative crops might be planted in period of banana free fallow? Whose resources – men, women?
5. How long to first bunches if we plant in normal date?
6. What intercrops might be used with bananas based on local cropping systems?
7. When must community mobilization begin to ensure timely banana fallow, BBTV-free planting material?
8. When are key moments for community monitoring of prototype testing through first harvest of bunches?

For your pilot site, prepare calendar of events based on rains and proposed activities below:

Event	Year 1												Year 2												Year 3											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Months with rain for crop growth																																				
Period for planting bananas																																				
Period for preparing planting material																																				
Period for creating banana free fallow																																				
Period for new field from planting to harvest																																				
Period for alternative crops fallow and field																																				
Period for community mobilization and monitoring																																				

C. DAY 2 - WORK GROUP GUIDE – SOCIAL COMMUNITIES

Facilitators : Anne Rietveld & Susan Ajambo

Form two Anglophone and four Francophone groups, pilot site teams mixed, men and women mixed, equal numbers.

Your group will collectively take on the identity of a woman/man of X years living in pilot site Y. All questions can be answered on the softcopy of this document. There are guidelines as what you should present.

Please Sir/Madame give shape to your identity by deciding on the following issues (5 min):

- What's your name and in which pilot site are you living?
- What is your marital status and do you have children? If yes how many?
- Do you own land? Do you have access to land? How many acres?

Presentation guideline: one slide with table containing this information

Answer the following questions (as your character) about your community (25 min)

1. What kind of village authority do you have in your village?	
2. Are you personally informed about important issues such as the starting of a BBTD control and recovery project by the village authority?	
3. Give a score of 1-3 (1=low, 3 = high) presenting the level of influence you have on the village authority	
4. Give a score of 1-3 (1=low, 3 = high) to show the likelihood that you personally would be selected to participate in the BBTD project	
5. You are selected for the BBTD project. Give a score of 1-3 (1=low, 3 = high) to show the likelihood that you will give your opinion, on an important issue for you, in the first meeting, without being asked.	
6. Give a score of 1-3 (1=low, 3 = high) to show to the importance of a banana plantation for your social status	

Presentation guideline: one slide with table containing the scores and three issues below

Please give the three main issues we should take into account in the BBTD project with regards to farmers' participation on community-level

1)

2)

3)

Answer the following questions (as your character) about your household (25 min)

Give a score of 1-3 (1=low, 3 = high) to illustrate the ease in which you can be free a whole day for a project meeting	
Give a score of 1-3 (1=low, 3 = high) to illustrate the likelihood your spouse, parents or children will disagree when you want to follow a BBTD training in another location of several days	
Give a score of 1-3 (1=low, 3 = high) to show the degree to which you have decision-making power about banana cultivation	
Give a score of 1-3 (1=low, 3 = high) to show to which degree you control the money you gain from banana sales	

Presentation guideline: one slide with table containing the scores and 3 constraints and advantages below

Please list 3 possible constraints to you for participating in the project

1)

2)

3)

Please list 3 possible advantages to you for participating in the project

1)

2)

3)

D. DAY 3 - WORK GROUP GUIDE – DISCOVERY EXERCISE

Facilitator: Charles Staver

Title of exercise:

Background:

Short description of proposed exercise which can be quickly understood

How long will this exercise take?

How much time for preparation of the exercise, how much time for observational component, how much time for discussion and conclusion

Learning objectives

What we aim to discover from an exercise

Materials

What equipment, supplies, and materials you will need to collect or prepare in advance

Methodology

A list of non-formal education methods or approaches used to facilitate an exercise (e.g., field walks and observations, sharing of experiences, brainstorming, participatory discussions in small or big groups, role-playing, hands-on or simulation exercise, and others)

Key questions to be proposed to the participants to stimulate observation, processing and analysis and conclusions

Steps

A numbered list of steps that you will take to complete an exercise. Included should be introduction, initial discussion, exercise itself, processing and analysis and conclusion.

Possible themes or principles for discovery exercises – BBTD

1. Mapping a potential site for establishment of **banana-free fallow** – distribution of mats and level of infection with BBTV, what would be the work needed to complete elimination, what would be the sacrifice in terms of production, what households would win and lose, who in the household would win and lose
2. **Symptom** development of BBTV
   - When can we see first symptom
   - Stages to advanced disease
   - Associated damage
   - Symptoms which might confuse
3. The life of banana **aphids**
   - How do they feed themselves
   - Where are they
   - How do they multiply
   - How long do they live
   - How do they move and how far?
4. How does aphid **transmit** BBTV from one plant to another
5. Sources of infection from BBTV and level of risk of banana plants in a **nursery**?
6. What is presence of BBTV infection in **asymptomatic suckers** in infected mats?

Reconstruction of **history of BBTD in village** and the losses in production and analysis about the future of banana production in the community – what would be the effects

E. DAY 3 - WORK GROUP GUIDE – DISCOVERY EXERCISE "CACAO VIRUS INSECT SPREAD" EXAMPLE

Objective

Demonstrate (symbolically) the spread of pathogens by insects, e.g. CSSV by mealy bugs

Materials

- A syringe or a drinking straw
- 5 transparent drinking glasses
- Instant coffee
- Clean water

Optional:

- Samples of healthy and diseased plants.
- Samples or photos of sucking insects.
- Procedure

Fill a glass with coffee and the others with clean water. The syringe or straw represents a sucking insect. The glass with coffee represents a diseased cocoa tree with a virus. The glasses of water represent healthy cocoa trees. Suck a bit of coffee into the syringe and go to the first healthy tree (glass of water). Dip the syringe into it, squirting ("spitting") a bit of coffee before sucking from the tree (the glass of water). Observe the colour of the water.

The healthy tree (the glass of water) gets a dose of virus (coffee). Go from glass to glass, squirting a bit of coffee into each one, "infecting" them. "Suck" a little water from each glass ("feeding"). Observe the colour of the water in the glasses, and that there is less inoculum in the syringe, because it has been diluted by the "healthy trees".

Guide questions for analysis

1. Which diseases are transmitted by sucking insects?
2. Which sucking insects do you know?
3. How can we avoid spreading diseases from one tree to another? (Emphasize deterring vectors through cultural practices. If infection is low, rogueing of diseased plants may be considered only when there is no further infection expected from outside the field.
4. Why can't insecticides prevent spread of insect vectored viruses effectively? (To caution farmers against making unnecessary applications of insecticides: generally speaking insects transmit the virus to sprayed trees before dying of the pesticide).

Spread of insect-vectored disease (Bolivia). Note the added samples to illustrate the symptoms of infected versus healthy plants. Photo by J. Bentley

F. DAY 5 - WORK GROUP GUIDE – BBTD RELATED SOCIAL & GENDER STUDIES IN 9 SITES IN AFRICA

Authors: Anne Rietveld, Susan Ajambo and Holger Kirscht

Facilitator: Anne Rietveld, Susan Ajambo

Background

[BBTD is the most devastating viral disease of banana in Africa and Asia. The virus (BBTV) is efficiently transmitted by the banana aphid, *Pentalonia nigronervosa*. BBTV infects all suckers of a mat, causing production to collapse and making it increasingly difficult for farmers to find BBTV-free planting material locally. An additional challenge lies in the fact that to date, no source of varietal resistance has been identified. In SSA, BBTD affects the livelihoods of 6–12 million smallholder households and could threaten another 10–15 million if its spread is not checked through adequate, between and within country, quarantine and containment.

The RTB project on BBTD containment and recovery focuses on 1) the piloting of community and farm household recovery strategies, informed by understanding of gender roles and households; 2) testing alternative approaches to develop supply chains for virus-free planting material and; 3) building knowledge and predictive tools of virus-vector-host interactions, cropping system and farm management.]

The project products defined in the proposal document make clear that, in order to achieve the goals set, we need to have a thorough understanding of how communities, households, men and women, boys and girls interact and behave with regards to banana and plantain cultivation and management. Currently we lack this understanding and therefore space was created within the project to do a series of social and gender studies in the different pilot sites.

Main objective: To understand how different gender norms at intra-household, household and community levels relate to and/or effect production in banana farming systems in BBTD affected regions in Central and West Africa

Working mode: In every site there will be at least one student doing a study on social and gender issues related to the project. This student will be part of a wider team of scientists involved in the project. A general methodology will be developed for all the sites that will provide us with comparable data and a baseline. The student will need to follow and conduct this methodology but will have the option to deepen a particular area of interest within the framework. Supervision will be provided by Anne Rietveld and Susan Ajambo (Bioversity) and Holger Kirscht (IITA). The students will also need a supervisor from the partner organization to facilitate logistics and operations.

Budget: There is a budget available of 4000 USD for every site to pay the student a stipend and contribute to operational costs. Student budgets will need to be approved by partner organization supervisor and by Anne Rietveld. The RTB supervisors have some travel money to make one visit to the students for interaction.

General Research questions:

1) How do gender norms influence and/or shape behaviour of men and women within communities and households?
    - What are gender norms related to behaviour of men and women at community level?
    - What are gender norms related to behaviour of men and women on household level?
    - What are gender norms related to reproductive tasks?
    - What are gender norms related to productive tasks in the domain of agriculture?
    - What are gender norms related to access and control of agricultural/ farm resources?
    - How do gender norms change with age?
    - Are there examples of men and women that do not live according to dominant gender norms?

- What are obstacles for inclusive community and household mobilization related to gender norms?
- What are obstacles to smooth, effective and inclusive participation of men and women of different ages on community-level?
- What are the consequences of gender based constraints on cropping systems and farm management practices?

2) Is it possible to characterize households based on gender norms in a way that is useful both on community and regional (Africa) level?
   - What are main indicators to be used for household characterization based on gender norms?
   - Should we adapt project strategies to different household types and if yes how?
   - Is there a relation between local dominant household types and success of the project?
3) What are the implications of participation of different household members in the following elements of the project on recovering banana production from BBTD
   - Key change in knowledge to carry out creation of banana free fallow, produce supply of BBTV-free planting material, to delay or avoid re-infection of new garden with BBTV;
   - Learning and experimentation at community level to mobilize collective response;
   - Learning and experimentation in work groups dedicated to building prototypes for banana recovery;
   - Improved marketing efforts to generate more value for banana which can justify the increased cost of activities for banana production

(Some) outputs individual site studies:

- Understanding different objectives for participating in the project
- Description of the cropping systems for production of banana, including all crops, time duration from when bananas are planted until the field is converted into another crop or into bush fallow, labor activities for planting, managing and harvesting all the component crops; Roles of men, women and male and female children in planting, managing and harvesting the crop.
- Description of household dynamics and interaction with regards to decision-making on crop management, rhythm of harvesting, use of harvest and use of and control over cash from sales harvest
- Description of level of access and control of men and women over resources
- Description of community organization and resources (establishing community profile)

(Some) Outputs project level

- Comparable data from all pilot sites
- Identification of performance indicators

Methods

- Focus group discussions
- Individual surveys

Observation participants interaction during community meetings.

Annex 6.7 – Work group report – Farmer & Community knowledge by stage

Component 1. Community mobilization and monitoring

Work group 1 : Akinyemi S., Karamura E., Kumar L., Mandoloma S., Mwamlima L., Rietveld A., Zandjanakou-Tachin M.
Facilitator: *Kumar L.*
Rapporteur: Zandjanakou-Tachin M.

	1	2	3	4	5
Describe stage or action	Engagement with community for their agreement *(meeting key informants and community meeting)*	Site characterization (*Biophysical/PRA)*	Selection of participants and setting up of coordination & monitoring committee	Community sensitization (motivate by reconstructing pre-BBTV situation; recovery methods; and benefits of participation)	Documentation site specific plan
Describe change	Improved awareness about disease threat; contact between Researcher & farmers; Increased priority for banana recovery by farmers	New Biophysical and demographic knowledge including baseline data on BBTV distribution and its impact on livelihood	Cohesive group working towards banana recovery	Motivated community	Other community can use the document, proper guide for community to work with
What knowledge is needed	Culture; engagement protocol; role of men and women in the community in banana production system in the action site	Disease level (incidence, severity), socio economic impact, importance of banana, cultural practices, roles of different gender	Role and responsibility of stakeholders/ Participants (by gender)	History of BBTV outbreak; cultural practices; role of male and female stakeholders; effective means (tools /procedures) to communicate and raise awareness	
Who in community or household should have knowledge?	farmers; NARES/NGOs officials; and all the key value chain actors involved in banana production system in the action site	All value chain actors, coordinator and monitoring committee	All value chain actors	All value chain actors	All value chain actors
What is role of gender in stage	Carry information to household, influence the level of engagement at community level	Role of men and women in farming, marketing, landownership, decision making	Carry information to household, influence the level of engagement at community level	Carry information to household, influence the level of engagement at community level	
Children (male or female) who play a role	Same as above				

Component 2. Fourniture de matériel végétal exempt de BBTV

Groupe de travail 2 : Abaga Obiang, Bagata JC., D'heda Djailo B., Hanna R., Ibanda B., Mobambo P., Moundzeo L., Simbare A., Tossou C., Vangu G.
Rapporteur : *Simbare A.*

	1	2	3	4	5
Décrire l'étape ou l'action	Enquêtes (Diagnostique/Identification des cultivars préférés et du matériel disponible)	Formation en multiplication et en vérification de l'état sanitaire des plants	Collecte et analyse du matériel végétal préféré par les agriculteur / région	Multiplication et vérification de l'état sanitaire des plants	Livraison (Mise à disposition des rejets sains)
Décrire le changement	- Identification des variétés préférées - Identification de la source de matériel de plantation	- Maitrise des techniques de multiplication et vérification - Connaissance des techniques de gestion des pépinières	Obtention du matériel de plantation sain	Matériel de plantation disponible en quantité et en qualité	Nouveaux champs établis avec des plants sains
Quelles connaissances sont nécessaires ?	Le milieu, les variétés de bananier, la maladie, la méthodologie de collecte des données	Connaissance des techniques de multiplication et vérification de l'état sanitaire des plants	- Les variétés préférées, - Maitrise des techniques d'analyse	- Le taux de multiplication - Les critères standards d'acceptation des rejets sains	Les demandeurs du matériel de plantation
Qui, dans la communauté et les ménages, doit avoir la connaissance ?	- Les fermiers cibles - Les leaders communautaires - Les Vulgarisateurs	- Agri-multiplicateurs - Les fermiers cibles - Les leaders communautaires - Les Vulgarisateurs	- Les fermiers cibles - Les leaders communautaires - Les Vulgarisateurs	- Agri-multiplicateurs - Les fermiers cibles - Les leaders communautaires - Les Vulgarisateurs	- Agri-multiplicateurs - Les fermiers cibles - Les leaders communautaires - Les Vulgarisateurs
Quel est le rôle du genre à prendre en compte dans cette étape	Informateurs	- Apprenants - Formateurs	Informateurs	- Multiplicateurs - Vérificateurs	- Livreurs - Consommateurs
Quels enfants (sexe masculin ou féminin) jouent un rôle	Les deux sexes	Les deux sexes	Les deux sexes	Les deux sexes	Les deux sexes

Component 2. Fourniture de matériel végétal exempt de BBTV

Groupe de travail 3 : Cishahayo A., Kimanda M., Lienou J., Mvila AC, Nintije P., Niyongere C., Shemezimana A.

Rapporteur : *Niyongere C.*

	1	2	3	4	5
Décrire l'étape ou l'action	Identifier les bénéficiaires	Identifier le matériel de plantation et faire de tests préalables d'adoption (variétés & quantités)	Identifier la source d'approvisionnement du matériel de plantation (tests de certification)	Multiplier le matériel de plantation et faire la certification des plants	Distribuer le matériel de plantation dans le respect de la saison culturale
Décrire le changement	- Approche participative - Implication des pouvoirs publics	Changements de mentalités des agriculteurs en faveur de l'innovation	La modernisation des outils de détection des maladies	Adoption du système de certification (respect des procédures de certification)	Disponibilité des champs indemnes de BBTV
Quelles connaissances sont nécessaires ?	- Aspects socio-économiques (la place de la culture - Potentiel de production - Systèmes de production	- Maîtrise de la symptomatologie du BBTV - Connaissance des moyens de propagation	Connaissance des zones d'approvisionnement indemnes de BBTV	- Maîtrise des techniques de détection - Quel substrat à utiliser	- Systèmes de transports à utiliser - Disposer des fiches techniques de production
Qui, dans la communauté et les ménages, doit avoir la connaissance ?	- Les chercheurs - Les encadreurs - vulgarisateurs (Ministère en charge de l'Agriculture) - Les représentants des producteurs	- Les chercheurs - Les encadreurs - vulgarisateurs (Ministère en charge de l'Agriculture) - Les producteurs pilotes	- Les chercheurs - Les encadreurs - vulgarisateurs (Ministère en charge de l'Agriculture) - Les représentants des producteurs	- Les chercheurs - Les représentants des producteurs	- Les chercheurs - Les encadreurs - vulgarisateurs (Ministère en charge de l'Agriculture) - Les médias - Les représentants des producteurs
Quel est le rôle du genre à prendre en compte dans cette étape	Implication de la femme dans la prise de décision	Implication de la femme dans la prise de décision	Implication de la femme dans la prise de décision	Implication de la femme dans la prise de décision	Implication de la femme dans la prise de décision
Quels enfants (sexe masculin ou féminin) jouent un rôle	Tous les enfants quelque soient le sexe	-	-	Tous les enfants quelque soient le sexe (arrosage, remplissage des sachets, autres petites manutentions)	Tous les enfants quelque soient le sexe (transport des plants, déchargement et plantation)

Component 3. *Musa* / BBTV / *Pentalonia* free fallow
Work group 4: Blomme G., Caruana ML., Gros A., Iradukunda F., Mapangu-Divassa S., Mathieu Y., Ngama F., Nitunga E., Ntahiraja V.
Facilitator: *Caruana ML.*
Rapporteur: *Iradukunda F.*

	1	2	3	4	5
Décrire l'étape ou l'action	Constitution du groupe de travail (selon le genre, les compétences, etc)	Compréhension de l'objectif de la **jachère *musa*** (focus groupe discussion, etc)	Choix du terrain et type de la jachère en fonction de: 1. Antécédents culturaux (présence bananier ou pas) 2. Disponibilité de terrain (propre ou à louer) 3. Localisation du terrain (proche des autres bananiers ou pas)	Les étapes de mise en place de la jachère : 1. Distribution des taches 2. Destruction de la bananeraie 3. Destruction des espèces herbacées 4. Préparation du sol (enfouissement des résidus)	Diagnostic de la jachère
Décrire le changement	-Changement de mentalité de leaders sur regroupement des terres (au niveau du village) - Implication des autorités administratives	Acceptation d'avoir une zone ou le bananier a été détruit	Evolution des pratiques culturales pour la mise en place de la jachère	Zone sans bananier	Vérification de l'objectif (pas de repousses bananier sur le terrain)
Quelles connaissances sont nécessaires ?	Connaissance sur la propagation du vecteur (puceron) selon les écosystèmes et les systèmes de cultures	Compréhension du mode de propagation de la maladie et du mode transmission du puceron	Connaissance sur le mode partages et collaboration entre les gens	Connaissance sur les techniques de destruction du bananier et de préparation du terrain	Connaissances sur les techniques d'assainissement de la jachère
Qui, dans la communauté et les ménages, doit avoir la connaissance ?	- Les membres de famille - Les services agricoles de proximité	XXX	XXX	XXX	XXX
Quel est le rôle du genre à prendre en compte dans cette étape ?	XXX	XXX	XXX	XXX	XXX
Quels enfants (sexe masculin ou féminin) jouent un rôle	XXX	XXX	XXX	XXX	XXX

Component 4. Plant new fields with BBTV-free plants
Work group 5 : Adediji A., Ajambo S., Bouwmeester H., Onyeani C., Soko M., Tinzaara W.
Facilitator: *Amah D.*
Rapporteur: *Adediji A.*

	1	2	3	4	5
Describe stage or action	Field layout/ land preparation	Planting	Management - weeding - pest management - disease management - fertilizer application - sucker selection	Surveillance & monitoring	Demo field visit
Describe change	A well laid-out, designed orchard	Field established with clean planting materials	- Field free of weeds & pests - Aphid populations under check - Highly productive orchards (fruits & suckers)	A BBTD-free field and/reduced infection	Attitudinal change
What knowledge is needed	- Variety types - General agronomy (spacing, irrigation, etc) - Surrounding fields	- Knowledge of BBTD symptoms	- Proper agronomic practices - Alternative hosts (aphids)	- BBTV Identification & diagnosis - BBTD Epidemiological knowledge	- Sociology - Technology transfer
Who in community or household should have knowledge?	XXX	XXX	XXX	XXX	XXX
What is role of gender in stage	XXX	XXX	XXX	XXX	XXX
Children (male or female) who play a role	XXX	XXX	XXX	XXX	XXX

Annex 6.8 – Work group report – BBTD Discovery exercises

Theme 1. Mapping a potential site for the establishment of banana free fallow

Work group 1 : Amah D., Bouwmeester H., Onyeani C.

Rapporteur: *Bouwmeester H.*

Background

There are farmers with BBTD on their farms in the community. The BBTD causes yield loss and impacts those farmers directly, but also poses risk to other farmers in the vicinity. Therefore the infected mats have to be eradicated, creating a banana free fallow. The eradication plan is to uproot all bananas in the field and leave fallow for XXX months. This has implications on your farm and on neighbouring farms.

How long will exercise take?

2 hours / exercise for small groups

Learning objectives

To map distribution of BBTD in the community and to demonstrate to farmers how to establish a banana free fallow

Materials

- flipchart
- marker

Methodology

- Sharing of experiences
- Participatory discussions in small groups
- Exercise to quantify the problem/map distribution

Steps:

1. Meet in community with 'N' number of farmers
2. Introduce problem *(use background)*
3. Ask all farmers present for information to fill table here under *(on flipchart)*

Farmer	BBTD Presence on farm	# BBTD-free Mats	# BBTD Mats	Advantage of eradication	Disadvantage of eradication
1					
2					
3					
…					
N					

4. Ask volunteer farmer to step forward and together try to map his field *(on flipchart)*
    - Mark banana area as subplot, Mark neighbours plots
5. If necessary, redraw and make nice and clean map *(example below)*

Now mark the eradication area and thus make a eradication plan, including the marked banana area surrounded by a **50m buffer**. What is the Musa fallow-free period proposed? This will influence choice of frop planted to replace (short cycle such as bean, mid cycle such as maize or long cycle. Ask for *alternative crop* that farmer wants to plant in eradication zone.

6. Now go back to the table and ask each farmer for the **advantages** and **disadvantages** of that particular eradication plan.
7. Summarize the advantages and disadvantages that were posed and add those not mentioned. Make list on flipchart.
    a. In two years you will have higher banana production.
    b. This year you will have 0 production.
    c. You can try othercrop
    d. Etc.
8. Discuss the summary and add the following questions:
    - What are the advantages of an eradication plan to the community?
    - What are the disadvantages of an eradication plan to the community?
    - How do you deal with people that only lose?

Theme 1. Mapping a potential site for the establishment of banana free fallow (in French)

Work group 2: Kimanda A., Lienou J., Mvila AC., Ndemba BA., Nitunga E., Ntahiraja V.

Rapporteur: *Mvila AC.*

Background

Étude menée dans le cadre de la réhabilitation des plantations de bananiers infestées par le BBTD

How long will exercise take?

Learning objectives

Faire comprendre au producteur l'intérêt de la jachère comme alternative de récupération des bananeraies

Materials

- parcelle à mettre en jachère
- matériel de localisation/délimitation (GPS; ruban métrique; piquets; etc.)
- matériel de prise de note (fiches de collecte des données; stylos/crayon, écritoire (clipboard), carnet, gomme, flipchart, etc.)
- équipement corporel (combinaison, bottes, imperméables, sac à dos, etc.)
- instruments aratoires (machette, pelle, pioche)

Methodology

- focus groups (identification des producteurs, les cultures alternatives éventuelles, discussions avec les producteurs)
- prospection et observations au champ (choix du site approprié; collecte des données nécessaires à la cartographie)
    - Key questions
- Comment se comporte les bananiers dans le champs ?
- Êtes-vous satisfaits du comportement des bananiers ?
- Y a-t-il des bananiers malades ?
- Comment les reconnaissez-vous ?
- Y a-t-il des parcelles fortement attaquées par les maladies ?

Steps:

XXX

Theme 2. Symptom development of BBTD (in French)

Work group 3: Abaga Obiang, Bangata JC., Caruana ML., Mobambo P., Moundzeo L., Ngama F., Simbare A., Vangu G.

Facilitator: *Caruana ML.*

Rapporteur: *Simbare A.*

Background:

- Signalement d'un début de BBTD dans une zone bananière
- Premiers contacts avec un groupe de paysans

Combien de temps va prendre cet exercice?

XXX

Learning objectives :

Confirmer la présence du BBTV et avoir un relai fiable après des paysans pour suivre et contrôler la maladie

Materials

XXX

Methodology

XXX

Key questions:

XXX

Steps

A. Présentation de photos typiques de la maladie au paysan

Montrer au fermier les photos illustrant un plant sain et atteint de BBTD :

1. Expliquer les symptômes caractéristiques
   (i) aspect touffu avec des feuilles étroites en haut du plant

   (ii) nanisme important

   (iii) stries vert- foncé discontinues sur la nervure principale et les gaines du pseudo-tronc.

2. Expliquer les symptômes de l'infection primaire au niveau d'une souche
   (i) sur plants adultes: apparition de taches brunes, des stries sur la nervure centrale des dernières feuilles étroites, aspect érigé des dernières feuilles

   (ii) sur jeunes plants: stries puis combinaison de tous les symptômes.

B. Indication par le paysan du plant infecté

Aller voir dans le champ avec le paysan pour qu'il nous indique les plants infectés et poser les questions suivantes :

1. Pourquoi la plante est infectée?
2. Lui demander de décrire les premiers symptômes observés et la date d'observation
3. A partir des photos et des observations faites dans son champ, quelle est sa conclusion ?

C. Apprentissage du groupe

Demander au groupe d'aller individuellement chercher les plants infectés et chacun va dire comment il a fait un diagnostic

A partir du diagnostic individuel, on va les amener à donner le vrai diagnostic, sans confusion avec d'autres symptômes.

D. Informations complémentaires

Dégâts: Tous les rejets sont infectés

Aucune production

Plaquette/Images montrant les rejets infectés et les plants avec absence de régime.

Theme 3. The life of the banana aphid

Work group 4: Adediji A., Hanna R. (review), Kumar L., MIsheck S., Zandjanakou-Tachin M.

Facilitator: *Kumar L.*

Rapporteur: *Adediji A.*

Background:

We want to explain:

1. what a banana aphid looks like (tiny, brownish or blackish insects)
2. the different parts of the banana plant where they can be found (young unformed leaves, neck and base of pseudostem)
3. how they feed (piercing and sucking)
4. their morphology (winged/wingless, sizes)
5. how they reproduce (via parthenogenesis) and disseminate (flying/gliding or walking)
6. their life cycle (15 days and can be expected to live for over 50 days depending on temperature)

How long will this exercise take?

Preparation: 1 day

Observation: 1 h (depends on the number of participants/groups)

Discussion/conclusion: 0.5 h

Learning objectives :

To show the importance of the banana aphid

Materials

Field experiment : Aphid-colonized banana plant, magnifying glass 10x, brush, small plastic Petri dish, Parafilm, tissue paper, water, piece of banana leaf, 70% ethanol, vials.

Class-based: Miniature banana plants, picture/slides, microscope, aphids, Petri dishes, tissue paper, magnifying glasses, straws, glasses of water

Methodology

Field Methods & Approaches:

- Generalized discussions

- Field walks and observation (show them plant parts where the aphid can be found, the different stages of growth and colonies, association with ants)

- Hands-on/simulation exercises (individual/group participation*)*

- Response/feed-back

- Generalized discussions.

Class-based Methods & Approaches:

- Group-based discussions

- Lab demonstrations (to show the aphid, demonstrate how they feed via the straw system, add pictures, show the aphids in the petri dishes and highlight the parts of the plant where they are located)

- Participatory observations (find themselves and suck themselves Fanta juice to simulate; use the syringes as explained in the presentation)

- Response from the groups

- Generalized discussions.

Key questions:

1. Have you seen any insects associated with your banana plants? Mention them?
2. Do you think these insects *(those cited)* are linked to unhealthy plants / diseases in your field?
3. Do you know how a banana aphid looks like *(Yes/No)*? Have you seen this *(show sample picture)* on your bananas before?
4. Why do you think they are there?
5. Where do you find them on your banana plants?
6. Do you know how they feed, reproduce or move?
7. Do you know the relationship between ants and aphids?

Steps

Introduction: Generalized discussion initiated by questions

Initial discussion: Introduce the subject matter: THE BANANA APHID

Exercise: Group based and general participation

Processing/Analyses: Feedback from participants

Conclusion: General lessons learnt/take-home on the ecology and life-cycle of the banana aphid.

Theme 4. Sources of infection from BBTV & Level of risk of banana plants in nursery

Work group : Akinyemi S., Blomme G., Mandoloma S., Mwalima L., Tinzaara W.

Rapporteur: *Akinyemi S.*

Background

Availability of clean non-infected planting materials is a strong key in the control of BBTD. Since the main source of BBTV is through banana aphids and infected planting materials, the selection of initial materials for multiplication and site selection for nurseries are very important as nurseries close to the infected plants are at risk of BBTV.

How long will this exercise take?

Preparation: XXX

Observation: XXX

Discussion/conclusion: XXX

Learning objectives

To help farmers have a better informed decision of where to locate the nurseries to prevent BBTV infection.

Materials

- GPS Units
- Digital Camera
- Measuring tape
- Sprayers
- Nursery gears
- Stationery
- Fund.

Methodology

1. Meeting to discuss the source of BBTV and risks of re-infection of banana plants in a nursery
2. Field walks and observations
3. Participatory discussions.

Key questions

- What is the distance from the nursery to existing diseased fields?
- What is the origin of the planting materials?
- What steps were taken to get the planting materials into the nursery?
- Is there presence of aphids on the nursery plants?
- Is there need to remove banana mats at close proximity to the nursery?

Steps

1. Identification of farmers
2. Introducing the exercise to the farmers
3. Forming groups for field observations

4. Establishing origin of the plants in the nursery and steps that were taken to transport them to the nursery
5. Establishing the distance from the nursery to existing diseased fields
6. Observing presence of aphids in the nursery
7. Processing of the observations / findings
8. Analyzing and concluding of the matter.

Theme 5. Sources of infection from BBTV & Level of risk of banana plants in nursery (in French)

Work group 6: Cishahayo A., Ibanda B., Moudzeo L., Niyongere C., Shemezimana A., Tossou C.

Rapporteur: *Niyongere C.*

Background:

Expliquer que:

- Le BBTD est une maladie virale transmise par le vecteur *Pentalonia nigronervosa*
- BBTD occasionne des pertes économiques sur le bananier
- Sa gestion exige l'utilisation du matériel de plantation sain en quantité suffisante *(réduire le coût par plantule)* produit dans les bonnes conditions des pépinières *proches des agriculteurs*
- Toutefois, il y a toujours risque d'infection des plantes encore en pépinières

Combien de temps prendra cet exercice ?

Préparation descente: 3h

Discussion participative: 2h (dépend du nombre de participants/groupes)

Observation / Pratique avec les fermiers : 3h.

Learning objectives

Rendre les producteurs capables de produire des plants indemnes de BBTV et en quantité suffisante en pépinières

- Identifier la source potentiel d'infection (distance entre pépinière et champs affectés)
- Connaître les modes d'infection
- Prendre les dispositions nécessaires pour protéger la pépinière du vecteur *(filets, insecticides systémiques).*

Materials

- plants sains à mettre dans la pépinière
- sachets & substrat
- tonneaux & bois de chauffe pour stériliser substrat
- outils aratoires *(houes, pèles,..)*
- filets de protection *(« insect-proof »)*
- insecticides systémiques et pulvérisateurs
- outils de mesure de distances *(mettre ruban)*
- matériel de formation (flipcharts, marqueurs, etc.).

Methodology

- discussion participative avec les agriculteurs
- séance des démonstrations pratiques.

Key questions

XXX

Steps

Phase préparatoire :

Sur base des connaissances disponibles.

Phase de déroulement:

1. Explication du sujet, intérêt du sujet, objectif et méthodes (SIOM) à utiliser pour établir la pépinière : Introduction au groupe
2. Cartographie participative pour l'identification du site de pépinière (source d'eau proche, distances avec d'autres plantations affectées par BBTV, …)
3. Evaluation des connaissances par méthode questions-réponses
4. Discussion en groupes avec des démonstrations pratiques
5. Synthèse de l'état des connaissances
6. Evaluation de la session avec les agriculteurs.

Theme 6. Village history and production losses (case of Kisangani) (in French)

Work group 7: Dhed'a B., Iradukunda F., Mapangou-Divassa S., Mathieu Y., Ndayihanzamaso P., Nintije P.

Rapporteur : *Mathieu Y.*

Background

Entretien participatif, avec l'ensemble des agriculteurs du village, permettant de restituer l'histoire de la maladie et imaginer l'avenir

Combien de temps prendra cet exercice ?

Préparation descente: XXX

Descente, Discussions et Conclusions: ½ journée (4h)

L'entretien a lieu avec l'ensemble des agriculteurs. Il faut choisir une journée pendant laquelle ils sont le moins occupés (par exemple le samedi).

- ½h entretien avec le chef du village (préparation de l'exercice)
- 1h discussion
- 1h de visite au champ
- 1h de synthèse et conclusions
- ½h de déplacement dans les champs

Learning objectives

Au travers de la restitution, par les agriculteurs eux-mêmes, de l'histoire de la maladie, les amener à :

- Identifier la nature du problème
- Evaluer son impact et son importance économique, sociale, etc.
- Evaluer l'efficacité des efforts qu'ils ont consenti et des méthodes qu'ils ont tentées pour lutter contre la maladie
- Imaginer l'avenir de la production

En conclusion de la réunion, on souhaite ouvrir des perspectives de lutte efficace contre la maladie.

Materials

- 1 cadeau symbolique adapté à la réunion (vin de palme, etc.)
- Support photographique (symptômes de la maladie, photos de plants sains portant un régime normal/commercialisable, photo présentant un plant malade du même âge, sans régime)
- 1 guide d'entretien (à rédiger)
- 1 carnet de notes, appareil photographique (*photo souvenir*).

Methodology

1. Entretien individuel
2. Entretien en group
3. Questions / réponses
4. Utilisation de supports visuels (photos et dessins)
5. Promenade au champ

6. Partage d'expérience
7. Réflexion individuel et de groupe
8. Discussions participatives
9. Jeux de rôles
10. Exercices concrets ou de simulations
11. Questions-clés.

Key questions

1. Avez-vous des problèmes de production avec la banane ?
2. Comment se manifeste-t-il ? Quels sont les signes ?
3. Depuis quand avez-vous observé pour la première fois le problème ? (*Chez vous ?, Dans le village ?, Dans un autre village ?)*
4. Est-ce que le problème s'amplifie ou diminue ?
5. Quelle était la production avant l'arrivée du problème, en terme de nombre de régime ? Actuellement ?
6. Savez-vous d'où, ou de quoi, provient le problème ?
7. Comment nommez-vous ce problème ?
8. Qu'avez-vous fait, au début du problème, et que faîtes-vous actuellement, pour y faire face ? *(Pour lutter contre la maladie ?, Pour compenser les pertes de production ?)*
9. Quels sont les effets des méthodes de lutte que vous avez employées ?
10. D'après votre expérience, comment va évoluer le problème ?

Steps

1. Entretien avec le chef du village
2. Entretien avec l'ensemble des agriculteurs sur la place du village (*Questions / Réponses, avec l'aide de supports photos, schémas, etc.*)
3. Visite au champ (vérification de la compréhension de la nature du problème)

Retour en réunion, synthèse et conclusions. Une liste des méthodes ou approches d'éducation non formelles utilisées pour faciliter un exercice (par exemple, promenades au champ et observations, partage d'expériences, réflexion, discussions participatives en petits ou grands groupes, jeux de rôle, exercice concret ou de simulation, etc.).

Annex 6.9 – Pilot site-specific work plans

Pilot site 1. Benin

Work group: Tossou C., Zandjanakou-Tachin M.

Steps in calculation of total period needed for work

- Rainfall distribution: **March to October**
- Normal planting date: **April**
- Beginning of process to obtain BBTV free plants (appropriate cultivar): **February 2014**
- Multiplication method: Combination of MP + TC + suckers from clean fields
- BBTV-screening method: **XXX**
- Banana / aphid / virus free fallow period duration: **XXX**
- When create banana/aphid/virus free fallow (for optimum planting): **March 2014**
- Alternative crops fallow period: **Maize, melon, and vegetables**
- Whose resources (men, women): **Resources for all**
- Time till first harvest (if optimum planting): **14 months**
- Possible *Musa* intercrops: Maize, cassava, cocoyam, melon, groundnuts, and cowpea
- Beginning of community mobilization (fallow, BBTV-free planting material, etc.): **February 2014**
- Key "community monitoring of prototype testing" moments: **6 months after planting + just before harvest**

1. Building prototype for recovery of banana in BBTD affected zones:

Products 2014:

1.1 Community and farmer groups organized
1.2 Guides for community and farmer meetings documented
1.3 Discovery learning methods and results documented

Number of community groups & banana-free fallows? **10 communities and 3 pilot sites**

Local field organizations to partner with for "prototype building" effort? **Carder, DPQC, Dagri/SPV, Inrab, APETETRA, GERME, FUPRO**

Who will coordinate "prototype building " activities? **XXX**

Sequence of community and farmer learning meetings for Benin

	Year 1												Year 2												Year 3										
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Rain months		x	x	x	x	x	x	x	x					x	x	x	x	x	x	x	x					x	x	x	x	x	x	x	x			
Banana planting				x	x	x	x									x	x	x	x									x	x	x	x					
Planting material preparation			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Banana-free fallow preparation			x	x	x																														
New field (planting to harvest)						x	x	x	x	x	x	x	x	x	x	x	x	x	x	x																
Alternative crop planting (fallow and field)																																			
Community mobilization and monitoring		x	x								x								x																
Key events (community and farmer learning groups)		x		x		x		x		x		x																							
Sensitization & awareness		x																																	
Community meeting & Demonstration field						x				x					x					x				x			x					x				x
Key events (documenting approach)						x				x					x					x				x			x					x				x

2. Integrating improved understanding and monitoring of community and household social relations into banana recovery in BBTD affected areas

Products 2014:

2.1 Study carried using cross site protocol on social relations, cropping systems with banana, disease management and banana marketing

2.2 Results of study integrated into prototype building activities

2.3 Indicators of improved approach to social relations in prototype building identified and implemented

University for "social relations" study? University of Abomey Calavi & University of Kétou

Who will coordinate "social relations" activities? **C. Tossou (+ C. Holger - IITA & one Lecturer)**

Key activities to achieve improved understanding of community and social relations in banana recovery

	Year 1												Year 2												Year 3											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Community mobilization and monitoring		x																																		
Key events (community & farmer learning groups)		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Key activities for improved understanding																																				
Social aspects / Participative diagnostic (survey, inventory, gender analysis)		x	x	x	x	x	x																													
GAP		x																																		

3. Researcher implemented studies of epidemiology, costs and productivity of banana free fallows, clean seed supply and new field establishment

Products 2014:

3.1 Cross site monitoring of effectiveness of banana free fallow, multiplication of clean planting material supply to planting and reinfection rate of new fields

3.2 XXX

Initiation of studies? **February 2014**

How will data be collected? Questionnaires, data sheets, GPS, weather station, photos, etc.

Who will coordinate "epidemiology, fallow clean seed and new field establishment " activities? **Zandjanakou-Tachin Martine & Lecturer?**

	Year 1												Year 2												Year 3											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Normal months with rain		x	x	x	x	x	x	x	x					x	x	x	x	x	x	x	x					x	x	x	x	x	x	x	x			
Normal banana planting				x	x	x	x									x	x	x	x									x	x	x	x					
Planting material preparation			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Banana-free fallow preparation			x	x	x																															
New field (planting to harvest)						x	x	x	x	x	x	x	x	x	x	x	x	x	x	x																
Alternative crop planting (fallow and field)																																				
Key activities in monitoring epidemiology and other aspects ?																																				

4. Additional studies on recovery of banana production in BBTD affected areas primarily through MSc and PhD students

Products 2014:

4.1 Protocols for student studies, budgets and supervision planned and studies initiated

4.2 Surveys of BBTD distribution and consolidation of previous information into spatial formats

Studies proposed: Topics available for 1 PhD and several (#?) Master student

Potential MSc topics:

1. Socio economic and gender profile of banana farmers in the action site

2. BBTD epidemiology in the action site

3. More topics will come later

At what universities? University of Kétou; University of Abomey Calavi

	Year 1												Year 2												Year 3											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
BSc?																																				
MSc		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
PhD			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
BBTD distribution survey																																				

Pilot site 2. Burundi

Work group: Cisahayo A., Iradukunda F., Ndayihanzamaso P., Nintije P., Nitunga E., Niyongere C., Ntahiraja V., Shemezimana A., Simbare A.

Steps in calculation of total period needed for work

- Rainfall distribution: **October to April**
- Normal planting date: **November to February**
- Beginning of process to obtain BBTV free plants (appropriate cultivar): Nov - Feb (suckers), April (in vitro,6 month cycle), June (MP, 4 months cycle)
- Multiplication method: Combination of macropropagation, TC, suckers from clean fields
- BBTV-screening method: **XXX**
- Banana / aphid / virus free fallow period duration: **XXX**
- When create banana/aphid/virus free fallow (for optimum planting): **NA**
- Fallow period alternative crops: **NA**
- Whose resources (men, women): **XXX**
- Time till first harvest (if optimum planting): 14 months (varies from 9 -18 depending on altitude, variety, soil fertility, type of planting material, etc.)
- Possible *Musa* intercrops: **Maize, taro, bean**
- Beginning of community mobilization (fallow, BBTV-free planting material, etc.): **February 2014**
- Key "community monitoring of prototype testing" moments: **Not discussed**

1. Building prototype for recovery of banana in BBTD affected zones:

Products 2014:

Community and farmer groups organized

Guides for community and farmer meetings documented

Discovery learning methods and results documented

Number of community groups & banana-free fallows? six communities (Cibitoke-4, Nyanza-Lac-1, Bujumbura-1)

Use of alternative crops in agreement with farmers

Number of *Musa* free fallows may be problematic for Burundi

Local field organizations to partner with for "prototype building" effort? **Extension agents (Moniteurs Agricoles)**

Who will coordinate "prototype building " activities? **XXX**

Sequence of community and farmer learning meetings for Burundi

	Year 1												Year 2												Year 3										
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Rain months	x	x	x	x						x	x	x	x	x	x	x						x	x	x	x	x	x	x						x	x	x
Banana planting	x	x									x	x	x	x									x	x	x	x								x	x
Sucker preparation	x	x									x	x	x	x									x	x	x	x								x	x
In vitro preparation				x x	x x	x x	xx	x	x	x	x	x	x			x x	x x	x x	x x	x	x	x	x	x	x			x x	x x	x	x	x	x	x	x	
Macropropagation preparation						x x	xx	x x	x x	x	x	x	x					x x	x x	x x	x x	x	x	x	x					x x	x x	x	x	x	x	
Banana-free fallow (if farmer agreement)						x	x	x	x									x	x	x	x									x	x	x	x			
New field (planting-P to harvest-R)	P	P	C	C	C	C	C	C	C	C	C	C	C	R	R								P	P										P	P
Alternative crop planting (fallow & field)										x												x											x		
Period for intercrops - Maize - Bean - Taro										P									R			P									R			P		
										P				R								P				R								P		
										P			R									P			R									P		
Community mobilization and monitoring	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

	Year 1												Year 2												Year 3										
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Key events (community and farmer learning groups) - Nursery - Planting - Intercropping	x	x						x	x	x	x	x	x	x						x	x	x	x	x	x	x						x	x	x	x	x
	x	x									x	x	x	x									x	x	x	x									x	x
	x	x	x	x	x					x	x	x	x	x	x	x	x					x	x	x	x	x	x							x	x	x
Sensitization & awareness																																				
Community meeting & Demonstration field																																				
Key events (documentation of approach)																																				

NB: Need to quantify the banana production within the community (evaluate production changes in virus free site)

x: Beginning of planting initiation (vitroplants & macro-propagation)

2. Integrating improved understanding and monitoring of community and household social relations into banana recovery in BBTD affected areas

Products 2014:

2.1 Study carried using cross site protocol on social relations, cropping systems with banana, disease management and banana marketing

2.2 Results of study integrated into prototype building activities

2.3 Indicators of improved approach to social relations in prototype building identified and implemented

University for "social relations" study? Université du Burundi (FABI, student Emile Nitunga)

Who will coordinate "social relations" activities? **FABI Professor (Socio-economist)**

Key activities to achieve improved understanding of community and social relations in banana recovery

	Year 1												Year 2												Year 3											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Community mobilization and monitoring				x	x	x	x	x	x	x	x	x	x																							
Key events (community & farmer learning) - Focus groups - HH survey - Individual survey - Synthesis				x	x	x	x																												
								x	x	x																										
								x	x	x	x																										
												x	x	x																							
Key activities for improved understanding - Training - Evaluation	x	x	x	x	x	x	x	x	x	x	x	x																								
															x	x																					
Social aspects / Participative diagnostic (survey, inventory, gender analysis)																																				

3. Researcher implemented studies of epidemiology, costs and productivity of banana free fallows, clean seed supply and new field establishment

Products 2014:

3.1 Cross site monitoring of effectiveness of banana free fallow, multiplication of clean planting material supply to planting and reinfection rate of new fields

3.2 XXX??

Initiation of studies? December 2013 (survey carried out)
April 2014+ (epidemiology studies with FABI student Shemezimana Abraham)

How will data be collected? Yellow traps (aphids), BBTD detection (symptom dynamics, ELISA, PCR) for reinfection and quality of planting material

Who will coordinate "epidemiology, fallow clean seed and new field establishment " activities? **Dr Célestin Niyongere**

	Year 1												Year 2												Year 3										
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Rain months	x	x	x	x						x	x	x	x	x	x	x						x	x	x	x	x	x	x						x	x	x
Banana planting	x	x									x	x	x	x									x	x	x	x									x	x
Sucker preparation	x	x									x	x	x	x									x	x	x	x									x	x
In vitro preparation				x x	x x	x x	x x	x	x	x	x	x	x			x x	x x	x x	x x	x	x	x	x	x	x			x x	x x	x	x	x	x	x	x	
Macropropagation preparation						x x	x x	x x	x x	x	x	x	x					x x	x x	x x	x x	x	x	x	x					x x	x x	x	x	x	x	
Banana-free fallow (with farmers)						x	x	x	x									x	x	x	x									x	x	x	x			
New field (planting to harvest)	P	P	C	C	C	C	C	C	C	C	C	C	C	R	R								P	P											P	P
Alternative crop planting (fallow & field)										x												x												x		

	Year 1												Year 2												Year 3											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Period for intercrops - Maize - Bean - Taro										P									R			P									R			P		
										P				R								P				R								P		
										P			R									P			R									P		
Key activities in monitoring epidemiology and other aspects - Field visits - Sampling & testing - Data processing - Reports	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

4. Additional studies on recovery of banana production in BBTD affected areas primarily through MSc and PhD students

Products 2014:

4.1 Protocols for student studies, budgets and supervision planned and studies initiated

4.2 Surveys of BBTD distribution and consolidation of previous information into spatial formats

Studies proposed: Topics available for 2 MSc and 1 PhD

Potential MSc topics:

1. XXX
2. XXX

Potential PhD topics: XXX

At what universities? Université du Burundi (FABI and other University to be determined (for PhD)

	Year 1												Year 2												Year 3											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
MSc									x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x				
PhD									x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Other (short trainings, experience sharing) / Site exchange visits			x					x							x					x							x				x					
BBTD distribution survey												x												x												x

Pilot sites 3 & 4: Cameroun & Gabon

Work group Cameroun: Hanna R., Lienou JA., Ndemba BA.

Work group Gabon: Abaga Obiang, Mbondji H.

Steps in calculation of total period needed for work

- Rainfall distribution: **Bimodal**
- Normal planting date: At initiation of each rainy season
- Beginning of process to obtain BBTV free plants (appropriate cultivar): **February 2014**
- Multiplication method: **Macropropagation**
- BBTV-screening method: **XXX**
- Banana / aphid / virus free fallow period duration: **XXX**
- When create banana/aphid/virus free fallow (for optimum planting): **February 2014**
- Fallow period alternative crops: **Maize, groundnut, cucumber**
- Whose resources (men, women): **Women crops**
- Time till first harvest (if optimum planting): **15 months**
- Possible *Musa* intercrops: **Cassava**
- Beginning of community mobilization (fallow, BBTV-free planting material, etc.): **February 2014**
- Key "community monitoring of prototype testing" moments: **All year round**

1. Building prototype for recovery of banana in BBTD affected zones:

Products 2014:

1.1 Community and farmer groups organized
1.2 Guides for community and farmer meetings documented
1.3 Discovery learning methods and results documented

Number of community groups & banana-free fallows? **For each country : 4 communities, 1 fallow/community**

Local field organizations to partner with for "prototype building" effort?

Cameroun: Programme de Relance de Filière Plantain (PRFP), Programme National de Vulgarisation et Recherche Agricole (PNVRA), Chef de Poste Phytosanitaire ; Centre Africain de Recherche sur le Bananier et Plantains (CARBAP)

Gabon: Institut de Recherche Agronomique et Forestière (IRAF), Projet de Développement Agricole et Rurale (PDAR)/FIDA, Direction Régional du Développement Rural, Groupements des Paysans (GIC), Institut Gabonais d'Appui au Développement (IGAD)

Who will coordinate "prototype building " activities? **XXX**

Sequence of community and farmer learning meetings for Cameroun & Gabon

	Year 1												Year 2												Year 3											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Rain months			x	x	x	x			x	x	x				x	x	x	x			x	x	x				x	x	x	x			x	x	x	
Banana planting			x	x					x	x					x	x					x	x					x	x					x	x		
Planting material preparation		x	x	x	x	x	x				x	x	x	x	x								x	x	x	x	x									
Banana-free fallow			x	x	x	x	x	x																												
New field (planting to harvest)			P 1	P 1	P 1			P 2	P 2						P 3	P 3		H 1	H 1	H 1 P 4	P 4			H 2	H 2					H 3	H 3					H 4
Alternative crop planting (fallow and field)			x	x				x	x	x					x	x				x	x	x							x	x		x	x	x		
Community mobilization and monitoring		x	x	x	x	x	x	x	x	x	x	x																								
Key events (community and farmer learning)			x	x			x			x			x			x			x			x			x			x			x			x		
Sensitization & awareness																																				

	Year 1												Year 2												Year 3											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Community meeting & Demonstration field																																				
Key events (documentation of approach)				x	x	x																														

2. Integrating improved understanding and monitoring of community and household social relations into banana recovery in BBTD affected areas

Products 2014:

2.1 Study carried using cross site protocol on social relations, cropping systems with banana, disease management and banana marketing
2.2 Results of study integrated into prototype building activities
2.3 Indicators of improved approach to social relations in prototype building identified and implemented

University for "social relations" study? Université of Yaoundé (Cameroon), Université Omar Bongo (Gabon)

Who will coordinate "social relations" activities? Dr Holger Kirscht (assisted by site coordinators for Cameroon and Gabon

Key activities to achieve improved understanding of community and social relations in banana recovery

	Year 1												Year 2												Year 3											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Community mobilization and monitoring			x	x	x	x	x																													
Key events (community and farmer learning)							x	x	x	x	x	x																								
Key activities for improved understanding			x	x	x	x	x	x	x	x	x	x	x	x	x	x																				
Social aspects / Participative diagnostic (survey, inventory, gender analysis)																																				

3. Researcher implemented studies of epidemiology, costs and productivity of banana free fallows, clean seed supply and new field establishment

Products 2014:

3.1 Cross site monitoring of effectiveness of banana free fallow, multiplication of clean planting material supply to planting and reinfection rate of new fields
3.2 Spatial distribution of reinfection in plantain plots (after fallow)
3.3 Germplasm evaluation for BBTD susceptibility and aphid preference (40 improved and local varieties) in Cameroun
3.4 Effect of intercropping with cassava on aphid colonization / spread and BBTD epidemiology in Cameroun
3.5 Germplasm evaluation for BBTD susceptibility and aphid preference (local germplasm collection) in Gabon

Initiation of studies? **3.2 August 2014**

3.3 & 3.4. Initiated in September 2013

3.5. March 2015

How will data be collected? 3.2 Protocols to be developed and harmonized with other sites (July 2014)

3.3-3.5 Based on existing protocols (aphid abundance, BBTD incidence, incidence of other pests and diseases, sampling for BBTV detection, plant growth, yield, suckering ability, etc.)

Who will coordinate "epidemiology, fallow clean seed and new field establishment " activities? **Pilot site coordinators & IITA staff**

	Year 1												Year 2												Year 3										
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Rain months			x	x	x	x			x	x	x				x	x	x	x			x	x	x				x	x	x	x			x	x	x	
Banana planting			x	x					x	x					x	x					x	x					x	x					x	x		
Material preparation		x	x	x	x	x	x				x	x	x	x	x								x	x	x	x	x									
Banana-free fallow			x	x	x	x	x	x																												
New field (planting to harvest)			P 1	P 1	P 1			P 2	P 2						P 3	P 3		H 1	H 1	H 1 P 4	P 4			H 2	H 2					H 3	H 3				H 4
Alternative crop (fallow and field)			x	x				x	x	x					x	x				x	x	x							x	x		x	x	x		
Key activities in monitoring epidemiology and other aspects ?	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

4. Additional studies on recovery of banana production in BBTD affected areas primarily through MSc and PhD students

Products 2014:

4.1. Protocols for student studies, budgets and supervision planned and studies initiated

4.2. Surveys of BBTD distribution and consolidation of previous information into spatial formats

Studies proposed

Potential MSc topics:

1. Effect of *Musa* intercrops on aphid (*Pentalonia* spp.) dynamics and BBTD epidemiology (Gabon)

2. XXX

Potential PhD topics:

1. XXX (Gabon, CG/CIRAD proposal for local funding?)

2. XXX (Cameroun, CG/CIRAD proposal for local funding?)

At what universities? Institut National Supérieur d'Agronomie et de Biotechnologie (Franceville), Université de Yaoundé I (Yaoundé)

	Year 1												Year 2												Year 3											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
BSc?																																				
MSc Cameroun								x	x	x	x	x	x	x	x	x	x	x	x	x	x															
MSc Gabon															x	x	x	x	x	x	x	x	x	x	x	x	x	x	x							
Other Cameroun	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Other Gabon															x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
BBTD distribution survey		x	x	x	x	x	x	x																							x	x	x			

Pilot site 5: Congo Brazzaville

Work group: Caruana ML., Mapangou-Divassa S., Moundzeo L., Mvila AC.

Steps in calculation of total period needed for work

- Rainfall distribution: March to May + October to December
- Normal planting date: **October to November**
- Beginning of process to obtain BBTV free plants (appropriate cultivar: **Feb 2014 to Mar 2015** (including indexation and in vitro multiplication)
- Multiplication method: **Tissue culture**
- BBTV-screening method: **XXX**
- Banana / aphid / virus free fallow period duration: **XXX**
- When create banana/aphid/virus free fallow (for optimum planting): April 2014 to April 2015 (including pilot site identification + fallow)
- Fallow period alternative crops: **NA**
- Whose resources (men, women): **NA**
- Time till first harvest (if optimum planting): **10 months**
- Possible *Musa* intercrops:Bush bean (cultivated in action site, does not interfere with banana growth, and does not need a lot of maintenance)
- Beginning of community mobilization (fallow, BBTV-free planting material, etc.): **February 2014 (continuous)**
- Key "community monitoring of prototype testing" moments: **April 2014 (pilot site ID + fallow)**
- July 2015 (pre field establishment)
- October 2015 (new field planting)
- July 2016 (new field harvest)
- Marie-line's visits : June 2014, December 2015

1. Building prototype for recovery of banana in BBTD affected zones:

Products 2014:

1.1 Community and farmer groups organized
1.2 Guides for community and farmer meetings documented
1.3 Discovery learning methods and results documented

Number of community groups & banana-free fallows? **Max 3 groups (south of country), 1 fallow/group**

Local field organizations to partner with for "prototype building" effort? **Minagri, NGO, CARBAP, CORAF/WECARD**

Who will coordinate "prototype building " activities? **XXX**

Sequence of community and farmer learning meetings for Congo Brazzaville

	Year 1												Year 2												Year 3										
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Rain months			x	x	x					x	x	x			x	x	x					x	x	x			x	x	x					x	x	x
Banana planting										x	x											x	x											x	x	
Planting material preparation		x	x	x	x	x	x	x	x	x	x	x	x	x	x																					
Banana-free fallow				x	x	x	x	x	x	x	x	x	x	x	x	x																					
New field (planting to harvest)																		x	x	x		x	x	x	x	x	x	x	x	x	x					
Alternative crop planting (fallow and field)				x	x	x				x	x	x				x	x	x				x	x	x				x	x	x				x	x	x
Community mobilization and monitoring		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Key events (community and farmer learning groups)					x	x	x												x																	
Sensitization & awareness																																				
Community meeting & Demonstration field																																				
Key events (documentation of approach)		x	x																																	

2. Integrating improved understanding and monitoring of community and household social relations into banana recovery in BBTD affected areas

Products 2014:

2.1 Study carried using cross site protocol on social relations, cropping systems with banana, disease management and banana marketing
2.2 Results of study integrated into prototype building activities
2.3 Indicators of improved approach to social relations in prototype building identified and implemented

University for "social relations" study? To be determined (socio-economic survey master student with Anne)

Who will coordinate "social relations" activities? **Lambert Moundzeo (Recherche)**

Key activities to achieve improved understanding of community and social relations in banana recovery

	Year 1												Year 2												Year 3											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Community mobilization and monitoring																																				
Key events (community and farmer learning)																																				
Key activities to achieve improved understanding					x	x	x																													
Social aspects / Participative diagnostic (survey, inventory, gender analysis)																																				

3. Researcher implemented studies of epidemiology, costs and productivity of banana free fallows, clean seed supply and new field establishment

Products 2014:

3.1 Cross site monitoring of effectiveness of banana free fallow, multiplication of clean planting material supply to planting and reinfection rate of new fields

3.2 XXX??

Initiation of studies? **February 2014**

How will data be collected? **Initiation October 2015**

Who will coordinate "epidemiology, fallow clean seed and new field establishment " activities? **Armand Mvila (Recherche)**

	Year 1												Year 2												Year 3											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Normal rain months			x	x	x					x	x	x			x	x	x					x	x	x			x	x	x					x	x	x
Normal banana planting										x	x											x	x											x	x	
Planting material preparation		x	x	x	x	x	x	x	x	x	x	x	x	x	x																					
Banana-free fallow				x	x	x	x	x	x	x	x	x	x	x	x	x																					
New field (planting to harvest)																		x	x	x		x	x	x	x	x	x	x	x	x	x	x				
Alternative crop planting (fallow and field)				x	x	x				x	x	x				x	x	x				x	x	x				x	x	x			x	x	x
Key activities (monitoring epidemiology and others)																						x	x	x	x	x	x	x	x	x	x	x	x	x	x

4. Additional studies on recovery of banana production in BBTD affected areas primarily through MSc and PhD students

Products 2014:

4.1 Protocols for student studies, budgets and supervision planned and studies initiated

4.2 Surveys of BBTD distribution and consolidation of previous information into spatial formats

Studies proposed: Topic available for 1 MSc

Potential MSc topics:

1. Study of the process and cultural methods to produce BBTV-free planting material

2. XXX

At what universities? Université Marien Ngouabi (Brazzaville)

	Year 1												Year 2												Year 3											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
BSc?																																				
MSc			x	x	x					x	x	x	x	x	x	x	x	x																		
PhD?																																				
Others																																				
BBTD distribution survey																						x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

Pilot site 6: DRC Kinshasa

Work group: Bangata JC., Kimanda M., Mobambo P., Vangu G.

Steps in calculation of total period needed for work

- Rainfall distribution: October to May (small dry season mid-January to mid-March)
- Normal planting date: **October**
- Beginning of process to obtain BBTV free plants (appropriate cultivar): **January 2014 to September 2015 (21 months)**
- Multiplication method: Macropropagation with TAS-ELISA
- BBTV-screening method: **XXX**
- Banana / aphid / virus free fallow period duration: **XXX**
- When create banana/aphid/virus free fallow (for optimum planting): **March 2014 to July 2015 (17 months)**
- Fallow period alternative crops: Cover crop such as niebe (nièbe rampant)
- Whose resources (men, women): **All resources**
- Time till first harvest (if optimum planting): **12 months (September 2016)**
- Possible *Musa* intercrops: **Niebe (rampant)**
- Beginning of community mobilization (fallow, BBTV-free planting material, etc.): **January 2014 to September 2015 (21 months)**
- Key "community monitoring of prototype testing" moments: **Planting, Flowering, Harvesting**

1. Building prototype for recovery of banana in BBTD affected zones:

Products 2014:

1.1 Community and farmer groups organized
1.2 Guides for community and farmer meetings documented
1.3 Discovery learning methods and results documented

Number of community groups & banana-free fallows? 3 (Kinshasa N'djili-brasserie, Bas-Congo Masende, Bas-Congo Mbubu)

Local field organizations to partner with for "prototype building" effort? **CECOMAF Kinshasa, REPROBAP Bas-Congo**

Who will coordinate "prototype building " activities? **Dr Patrick Mobambo**

Sequence of community and farmer learning meetings for DRC Kinshasa

	Year 1												Year 2												Year 3											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Rain months										x	x	x	x		x	x	x					x	x	x	x		x	x	x							
Banana planting										x												x												x		
Planting material preparation								x	x											x	x											x	x			
Banana-free fallow			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x																	
New field (planting to harvest)										x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			
Alternative crop planting (fallow and field)			x	x	x	x									x	x	x	x											x	x	x	x				
Community mobilization and monitoring		x	x																																
Key events (community and farmer learning)		x	x	x																															
Sensitization & awareness																																			
Community meeting & Demonstration field																																			
Key events (documenting approach)		x	x	x																															

2. Integrating improved understanding and monitoring of community and household social relations into banana recovery in BBTD affected areas

Products 2014:

2.1 Study carried using cross site protocol on social relations, cropping systems with banana, disease management and banana marketing
2.2 Results of study integrated into prototype building activities
2.3 Indicators of improved approach to social relations in prototype building identified and implemented

University for "social relations" study? **Université de Kinshasa (UNIKIN)**

Who will coordinate "social relations" activities? MSc student + 2 Professors (Production végétale + Economie rurale)

- Remarks on 2.2:
- Field visit to identify BBTD, effect on yield with farmers, awareness raising
- Testing of different cultural systems (intercropping and agroforestry)
- Evaluation of economic aspect of clean planting material production
- Calculation of production benefits for farmers (production costs – marketing costs)
- Remarks on 2.2:
    - Gender aspect in improvement of BBTD management
    - Productivity as a function of production system in place
    - Number of bunches available at local market
    - Increase of revenue for farmers leading to an increase of livelihood in pilot site

Key activities to achieve improved understanding of community and social relations in banana recovery

	Year 1												Year 2												Year 3											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Community mobilization and monitoring			x																																	
		x																																		
- Survey Kin		x																																		
- Survey Masende			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
- Survey Mbubu																																				
- Follow up																																				
Key events (community and farmer learning groups)		x																																		
Key activities to achieve improved understanding		x																																		
Social aspects / Participative diagnostic (survey, inventory, gender analysis)																																				

3. Researcher implemented studies of epidemiology, costs and productivity of banana free fallows, clean seed supply and new field establishment

Products 2014:

3.3 Cross site monitoring of effectiveness of banana free fallow, multiplication of clean planting material supply to planting and reinfection rate of new fields

3.4 XXX??

Initiation of studies? **February 2014**

How will data be collected? Survey questionnaires and Focus group discussions

Who will coordinate "epidemiology, fallow clean seed and new field establishment " activities? **MSc student + 2 Professors**

- Remarks on 3.1:
- Protocol on production cost of clean planting material is needed (including cost of multiplication, ELISA tests, inputs for growth, marketing costs, etc.)

	Year 1												Year 2												Year 3											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Rain months										x	x	x	x		x	x	x					x	x	x	x		x	x	x							
Banana planting										x												x												x		
Planting material preparation								x	x											x	x											x	x			
Banana-free fallow			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x																	
New field (planting to harvest)										x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			
Alternative crop planting (fallow and field)			x	x	x	x									x	x	x	x											x	x	x	x				
Alternative crop planting (fallow and field)																																				
Key activities (monitoring epidemiology and others																																				

4. Additional studies on recovery of banana production in BBTD affected areas primarily through MSc and PhD students

Products 2014:

4.1 Protocols for student studies, budgets and supervision planned and studies initiated

4.2 Surveys of BBTD distribution and consolidation of previous information into spatial formats

Studies proposed: Topics for MSc, Engineer, PhD

Potential MSc topics:

1. XXX
2. XXX

Potential Ir topics:

1. XXX
2. XXX

Potential PhD topic:

1. XXX

At what universities? Université de Kinshasa (UNIKIN)

- Remarks on 4.1:
- Complete protocol made available across sites for each study (protocol, data collection sheets, database, etc.)

	Year 1												Year 2												Year 3											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
BSc?																																				
Other (Ir agro)		x	x	x	x	x	x	x	x	x	x	x																								
MSc		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
PhD			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
BBTD distribution survey		x	x																																	

Pilot site 7 : DRC Kisangani

Work group: Blomme G., D'heda B., Ibanda B., Ngama F.

Steps in calculation of total period needed for work

- Rainfall distribution: Mid-March to mid-December
- Normal planting date: Mid-March to mid-November
- Beginning of process to obtain BBTV free plants (appropriate cultivar): **March to mid-September 2014**
- mid-September to mid-March 2015
- mid-March to mid-September 2015
- Multiplication method: **To be clarified**
- BBTV-screening method: **XXX**
- Banana / aphid / virus free fallow period duration: **XXX**
- When create banana/aphid/virus free fallow (for optimum planting): March to August 2014, September to February 2015, March to August 2015
- Fallow period alternative crops: **To be clarified**
- Whose resources (men, women): **To be clarified**
- Time till first harvest (if optimum planting): **14 months (1st harvest November 2015)**
- Possible *Musa* intercrops: **To be clarified**
- Beginning of community mobilization (fallow, BBTV-free planting material, etc.): **January/February 2014 (every 2 months after that)**
- Key "community monitoring of prototype testing" moments: **Planting, Flowering, Harvest, Fallow**

1. Building prototype for recovery of banana in BBTD affected zones:

Products 2014:

1.1 Community and farmer groups organized
1.2 Guides for community and farmer meetings documented
1.3 Discovery learning methods and results documented

Number of community groups & banana-free fallows? 4, organized in an association APDM (Association pour le développement de Masako, Kisangani)

Local field organizations to partner with for "prototype building" effort? **APDM (Development Association, member of famers NGO, UPEDEKIS)**

Who will coordinate "prototype building " activities? **XXX**

Sequence of community and farmer learning meetings for DRC Kisangani

	Year 1												Year 2												Year 3										
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Rain months			x	x	x	x	x	x	x	x	x	x			x	x	x	x	x	x	x	x	x	x			x	x	x	x	x	x	x	x	x	x
Banana planting			x	x	x	x	x	x	x	x	x				x	x	x	x	x	x	x	x	x				x	x	x	x	x	x	x	x	x	
Planting material preparation			P1	P1	P1	P1	P1	P1	P1 P2	P2	P2	P2	P2	P2	P2 P3	P3	P3	P3	P3	P3	P3															
Banana-free fallow			F1	F1	F1	F1	F1	F1	F2	F2	F2	F2	F2	F2	F3	F3	F3	F3	F3	F3																
New field (planting to harvest)									P1						P2						P3		H1						H2						H3	
Alternative crop planting (fallow and field)																					x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Community mobilization and monitoring	x	x	x		x		x		x		x		x		x		x		x		x		x		x		x		x		x		x		x	
Key events (community and farmer learning groups)														x		x		x		x		x		x		x		x		x		x		x		x
Sensitization & awareness																																				
Community meeting & Demonstration field																																				
Key events (documentation of approach)															x			x			x			x			x			x			x			x

2. Integrating improved understanding and monitoring of community and household social relations into banana recovery in BBTD affected areas

Products 2014:

2.1 Study carried using cross site protocol on social relations, cropping systems with banana, disease management and banana marketing
2.2 Results of study integrated into prototype building activities
2.3 Indicators of improved approach to social relations in prototype building identified and implemented

University for "social relations" study? **Université de Kisangani (UNIKIS)**

Who will coordinate "social relations" activities? Local project site coordinator + Qualified researcher (socio-economic department UNIKIS)

Key activities to achieve improved understanding of community and social relations in banana recovery

	Year 1												Year 2												Year 3											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Community mobilization and monitoring (Socio eco study)																x	x	x	x	x	x															
Key events (community and farmer learning groups) : Data analysis & recommendations																					x	x	x													x
Key activities to achieve improved understanding*																							x	x			x			x			x			x
Social aspects / Participative diagnostic (survey, inventory, gender analysis)																																				

* Translation of recommendations into new strategies & monitoring of impact.

3. Researcher implemented studies of epidemiology, costs and productivity of banana free fallows, clean seed supply and new field establishment

Products 2014:

3.1 Cross site monitoring of effectiveness of banana free fallow, multiplication of clean planting material supply to planting and reinfection rate of new fields

3.2 XXX??

Initiation of studies? **January 2014**

How will data be collected? **BSc students, technicians**

Who will coordinate "epidemiology, fallow clean seed and new field establishment " activities? **Local supervisor, head of technicians**

	Year 1												Year 2												Year 3										
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Normal rain months			x	x	x	x	x	x	x	x	x	x			x	x	x	x	x	x	x	x	x	x			x	x	x	x	x	x	x	x	x	x
Normal banana planting			x	x	x	x	x	x	x	x	x				x	x	x	x	x	x	x	x	x				x	x	x	x	x	x	x	x	x	
Planting material preparation			P1	P1	P1	P1	P1	P1	P1 P2	P2	P2	P2	P2	P2	P2 P3	P3	P3	P3	P3	P3	P3															
Banana-free fallow			F1	F1	F1	F1	F1	F1	F2	F2	F2	F2	F2	F2	F3	F3	F3	F3	F3	F3																
New field (planting to harvest)									P1						P2						P3		H1						H2						H3	
Alternative crop planting (fallow and field)																					x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Key activities in monitoring epidemiology and other aspects	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

4. Additional studies on recovery of banana production in BBTD affected areas primarily through MSc and PhD students

Products 2014:

4.1 Protocols for student studies, budgets and supervision planned and studies initiated

4.2 Surveys of BBTD distribution and consolidation of previous information into spatial formats

Studies proposed: Topics proposed for 3 BSc's, 3 MSc's, 1 PhD

Potential BSc topics:

1. XXX
2. XXX
3. XXX

Potential MSc topics:

1. XXX
2. XXX
3. XXX

Potential PhD topics: 1. XXX

At what universities? Université de Kisangani (UNIKIS) and Institut des Sciences Agronomiques de Yangambi (IFA)

	Year 1												Year 2												Year 3											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
BSc?			x	x	x	x									x	x	x	x									x	x	x	x						
MSc				x	x	x	x	x	x							x	x	x	x	x	x							x	x	x	x	x	x			
PhD	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
BBTD distribution survey																																				

Pilot site 8: Malawi

Work group: Mandoloma S., Mwalima L., Soko M.

Steps in calculation of total period needed for work

- Rainfall distribution: **X**
- Normal planting date: **X**
- Beginning of process to obtain BBTV free plants (appropriate cultivar): **X**
- Multiplication method: **X**
- BBTV-screening method: **XXX**
- Banana / aphid / virus free fallow period duration: **XXX**
- When create banana/aphid/virus free fallow (for optimum planting): **X**
- Fallow period alternative crops: **X**
- Whose resources (men, women): **X**
- Time till first harvest (if optimum planting): **X**
- Possible *Musa* intercrops: **X**
- Beginning of community mobilization (fallow, BBTV-free planting material, etc.): **X**
- Key "community monitoring of prototype testing" moments: **X**

1. Building prototype for recovery of banana in BBTD affected zones:

Products 2014:

1.1 Community and farmer groups organized
1.2 Guides for community and farmer meetings documented
1.3 Discovery learning methods and results documented

Number of community groups & banana-free fallows? **4 communities, 1 fallow/community**

Local field organizations to partner with for "prototype building" effort? **World Vision International (Nkhatabay site)**

Who will coordinate "prototype building " activities? **XXX**

Sequence of community and farmer learning meetings for Malawi

	Year 1												Year 2												Year 3											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Rain months	x	x	x	x								x	x	x	x	x								x	x	x	x	x								x
Banana planting												x												x												x
Planting material preparation									x	x	x										x	x	x													
Banana-free fallow				x	x	x	x	x	x	x	x																									
New field (planting to harvest)												x	x	x	x	x	x	x	x	x	x															
Alternative crop planting (fallow and field)				x	x	x	x	x	x	x	x																									
Community mobilization and monitoring				x							x	x			x			x			x		x	x												
Key events (community and farmer learning)			x	x								x			x			x			x			x												
Sensitization & awareness																																				
Community meeting & Demonstration field																																				
Key events (documentation of approach)			x	x								x			x			x			x			x												

2. Integrating improved understanding and monitoring of community and household social relations into banana recovery in BBTD affected areas

Products 2014:

2.1 Study carried using cross site protocol on social relations, cropping systems with banana, disease management and banana marketing
2.2 Results of study integrated into prototype building activities
2.3 Indicators of improved approach to social relations in prototype building identified and implemented

University for "social relations" study? Lilongwe University of Agriculture and Natural Resources (Bunda College)
Who will coordinate "social relations" activities? **Sarah Mandoloma (+ Professor)**

Key activities to achieve improved understanding of community and social relations in banana recovery

	Year 1												Year 2												Year 3										
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Community mobilization and monitoring				x							x	x			x			x			x		x	x												
Key events (community and farmer learning groups)			x	x								x			x			x			x			x											x
Key activities to achieve improved understanding			x					x	x			x				x					x															
Social aspects / Participative diagnostic (survey, inventory, gender analysis)			x					x	x			x				x					x															

3. Researcher implemented studies of epidemiology, costs and productivity of banana free fallows, clean seed supply and new field establishment

Products 2014:

3.1 Cross site monitoring of effectiveness of banana free fallow, multiplication of clean planting material supply to planting and reinfection rate of new fields

3.2 XXX??

Initiation of studies? **August 2014**

How will data be collected? Using protocol developed by scientists, deploy technicians / extension staff to collect data

Who will coordinate "epidemiology, fallow clean seed and new field establishment " activities? **Misheck Soko + Professor**

	Year 1												Year 2												Year 3											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Normal rain months	x	x	x	x								x	x	x	x	x								x	x	x	x	x									x
Normal banana planting												x												x													x
Planting material preparation									x	x	x										x	x	x														
Banana-free fallow				x	x	x	x	x	x	x	x																										
New field (planting to harvest)												x	x	x	x	x	x	x	x	x	x																
Alternative crop planting (fallow and field)				x	x	x	x	x	x	x	x																										
Key activities in monitoring epidemiology*								x	x	x	x	x	x	x	x	x	x	x	x																		

* Includes monitoring nursery, fallow, new field, etc.

4. Additional studies on recovery of banana production in BBTD affected areas primarily through MSc and PhD students

Products 2014:

4.1 Protocols for student studies, budgets and supervision planned and studies initiated

4.2 Surveys of BBTD distribution and consolidation of previous information into spatial formats

Studies proposed: Topics for XX MSc and XX PhD

Potential MSc topics:

1. XX

2. XX

Potential PhD topics:

1. XX

2. XX

At what universities? Lilongwe University of Agriculture and Natural Resources (Bunda College)

	Year 1												Year 2												Year 3											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
BSc?																																				
MSc								x	x	x	x	x	x	x	x	x	x	x	x																	
Other?		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
PhD?																																				
BBTD distribution survey*		x								x				x								x				x								x		

* Once during rainy season, once during dry season

Pilot site 9: Nigeria

Work group: Adediji A., Akinyemi S., Amah D., Kumar L., Onyeani C.

Steps in calculation of total period needed for work

- Rainfall distribution: **March to October**
- Normal planting date: **April**
- Beginning of process to obtain BBTV free plants (appropriate cultivar): **February 2014**
- Multiplication method: Combination of MP + TC + suckers from clean fields
- BBTV-screening method: **XXX**
- Banana / aphid / virus free fallow period duration: **XXX**
- When create banana/aphid/virus free fallow (for optimum planting): **March 2014**
- Alternative crops fallow period: **Maize, melon, vegetables**
- Whose resources (men, women): **Resources for all**
- Time till first harvest (if optimum planting): **14 months**
- Possible *Musa* intercrops: Maize, cassava, cocoyam, melon, groundnuts, cowpea
- Beginning of community mobilization (fallow, BBTV-free planting material, etc.): **February 2014**
- Key "community monitoring of prototype testing" moments: **6 months after planting + just before harvest**

1. Building prototype for recovery of banana in BBTD affected zones:

Products 2014:

1.1 Community and farmer groups organized
1.2 Guides for community and farmer meetings documented
1.3 Discovery learning methods and results documented

Number of community groups & banana-free fallows? **10 communities affected and 3 pilot sites**

Local field organizations to partner with for "prototype building" effort? Youth organizations, ADPs, Grower associations, National Plant Protection Organization (NPPO), National Horticultural Research Institute (NIHORT)

Who will coordinate "prototype building " activities? **XXX**

Sequence of community and farmer learning meetings for Nigeria

	Year 1												Year 2												Year 3											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Rain months			x	x	x	x	x	x	x	x					x	x	x	x	x	x	x	x					x	x	x	x	x	x	x	x		
Banana planting				x	x	x	x									x	x	x	x									x	x	x	x					
Planting material preparation		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Banana-free fallow preparation			x	x	x																															
New field (planting to harvest)						x	x	x	x	x	x	x	x	x	x	x	x	x	x	x																
Alternative crop planting (fallow and field)																																				
Community mobilization and monitoring		x	x								x								x																
Key events (community and farmer learning)																																				
Sensitization & awareness		x	x																																	
Community meeting & Demonstration field						x				x					x					x				x				x				x				x
Key events (documentation of approach)		x	x			x				x					x					x				x				x				x				x

2. Integrating improved understanding and monitoring of community and household social relations into banana recovery in BBTD affected areas

Products 2014:

2.1 Study carried using cross site protocol on social relations, cropping systems with banana, disease management and banana marketing
2.2 Results of study integrated into prototype building activities
2.3 Indicators of improved approach to social relations in prototype building identified and implemented

University for "social relations" study? **University of Ibadan, Ibadan**

Who will coordinate "social relations" activities? **To be determined after follow up meeting**

Key activities to achieve improved understanding of community and social relations in banana recovery

	Year 1												Year 2												Year 3											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Community mobilization and monitoring		x																																		
Key events (community and farmer learning groups)		x		x		x		x		x		x		x		x		x		x		x		x		x		x		x		x		x		x
Key activities to achieve improved understanding																																				
Social aspects / Participative diagnostic (survey, inventory, gender analysis)																																				

3. Researcher implemented studies of epidemiology, costs and productivity of banana free fallows, clean seed supply and new field establishment

Products 2014:

3.1 Cross site monitoring of effectiveness of banana free fallow, multiplication of clean planting material supply to planting and reinfection rate of new fields

3.2 Costs analysis for plantation establishment, sucker production (macro and micro propagation), analysis (ELISA, etc).

3.3 XXX??

Initiation of studies? **February 2014**

How will data be collected? Questionnaires, Periodical measurement, etc.

Who will coordinate "epidemiology, fallow clean seed and new field establishment" activities? **To be determined after follow up meeting**

	Year 1												Year 2												Year 3											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Rain months			x	x	x	x	x	x	x	x					x	x	x	x	x	x	x	x					x	x	x	x	x	x	x	x		
Banana planting				x	x	x	x									x	x	x	x									x	x	x	x					
Planting material preparation			x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Banana-free fallow preparation																																				
New field (planting to harvest)						x	x	x	x	x	x	x	x	x	x	x	x	x	x	x																
Alternative crop planting (fallow and field)																																				
Key activities in monitoring epidemiology and other aspects?		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

4. Additional studies on recovery of banana production in BBTD affected areas primarily through MSc and PhD students

Products 2014:

4.1 Protocols for student studies, budgets and supervision planned and studies initiated

4.2 Surveys of BBTD distribution and consolidation of previous information into spatial formats

Studies proposed: Topics available for XX MSc and XX PhDs

Potential MSc topics:

1. Socio-economics (Gender studies)

2. XXX

3. XXX

Potential PhD topics:

1. Dynamics of virus-plant interaction, spread and latent infection

At what universities? To be determined after follow up meeting (University of Ibadan, Ibadan.?)

	Year 1												Year 2												Year 3											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
BSc?																																				
MSc																																				
PhD																																				
Other (diploma students)																																				
Short term training																																				
BBTD distribution survey																																				

Annex 6.10 – List of Dropbox documents available

Dropbox link https://www.dropbox.com/sh/xg9kf2akm09s2xx/AAD3bGkoUwdVp3q1Y9v7B2Vda

<BBTD WS Bujumbura 2014_01> folder contains the following folders and items:

Pictures (number of documents)

- Group Photo (14)
- Anne (90)
- Celestin (158)
- Charles (44)
- Jean Prosper (95)
- Lava (176)
- Pascale (297)
- Patrick (2)

Report

- BBTD Bujumbura Workshop Report_VF

Workshop Presentations & Work Groups

- BBTD Learning Alliance Workshop - 20 - 25 Jan Burundi_VF Fr
- BBTD Learning Alliance Workshop - 20to25 Jan Burundi_VF En

DAY 1

- LKumar - Threat of BBTV to banana production in SSA
- CStaver - CRP RTB BBTD introduction
- ARietveld - Introduction social relations & cropping systems
- ARietveld - Introduction of Participants
- CStaver - Program sessions and products
- PLepoint - BBTV transmission
- RHanna - Banana aphid
- MLCaruana - BBTV detection.pdf
- LKumar - BBTD spread
- SAjambo - Refections Role of knowledge on having impact
- CStaver - Role of prototypes & Knowledge gaps
- BBTD Pilot Project - DRC Kisangani
- BBTD Pilot Project - Malawi
- BBTD Pilot Project - DRC Kinshasa
- BBTD Pilot Project - Burundi
- BBTD Pilot Project - Congo Brazza
- CStaver - WG Intro knowledge by stage
- Abstract1. LKumar - Threat of BBTV to banana production in SSA.docx
- Abstract3. ARietveld - Introduction social relations & cropping systems.docx
- Abstract6. PLepoint - BBTV transmission.docx
- Abstract9. LKumar - BBTD spread.docx
- Abstract12. BBTD Pilot Project - DRC Kisangani.docx
- Abstract13. BBTD Pilot Project - Malawi.docx
- Abstract14. BBTD Pilot Project - DRC Kinshasa.docx
- Abstract15. BBTD Pilot Project - Burundi.doc

DAY 2

- CStaver - Participation in prototype building
- SAjambo - Social Analysis
- ARietveld - Gender Perception Exercise
- ARietveld - Social Community WG Presentation template
- CStaver - Calendar for pilot zone
- Abstract2. SAjambo - Social Analysis.docx

- DAY 1 - Knowledge by stage - Guide WG_ENG.doc
- DAY 1 - Knowledge by stage - Guide WG_FRE.docx
- DAY 1 - Knowledge by stage - WG 1 C1.Community mobilization_En.docx
- DAY 1 - Knowledge by stage - WG 2 C2.Clean PM1.docx
- DAY 1 - Knowledge by stage - WG 2 C2.Clean PM1.pptx
- DAY 1 - Knowledge by stage - WG 3 C2.Clean PM2.docx
- DAY 1 - Knowledge by stage - WG 4 C3.Musa free fallow_Fr.docx
- DAY 1 - Knowledge by stage - WG 5 C4.New planting_En.doc

- DAY 2 - Calculation community first bunches - Guide WG_ENG
- DAY 2 - Calculation community first bunches - Guide WG_FRE
- DAY 2 - Calculation community first bunches - WG Benin & Nigeria.doc
- DAY 2 - Calculation community first bunches - WG Burundi.doc
- DAY 2 - Calculation community first bunches - WG Cameroun & Gabon.doc
- DAY 2 - Calculation community first bunches - WG Congo Brazza.doc
- DAY 2 - Calculation community first bunches - WG Kinshasa.doc
- DAY 2 - Calculation community first bunches - WG Kinshasa.pptx
- DAY 2 - Calculation community first bunches - WG Kisangani.doc
- DAY 2 - Calculation community first bunches - WG Kisangani.pptx
- DAY 2 - Calculation community first bunches - WG Malawi.doc
- DAY 2 - Social Communities - Guide WG_ENG.docx
- DAY 2 - Social Communities - Guide WG_FRE.docx
- DAY 2 - Social Communities - WG A.18Y Female.docx
- DAY 2 - Social Communities - WG A.18Y Female.pptx
- DAY 2 - Social Communities - WG B.23Y Male.docx
- DAY 2 - Social Communities - WG C.34Y Male.docx
- DAY 2 - Social Communities - WG C.34Y Male.pptx
- DAY 2 - Social Communities - WG D.45Y Female.doc
- DAY 2 - Social Communities - WG E.53Y Male Homosexual.docx
- DAY 2 - Social Communities - WG F.67Y Woman.docx
- DAY 2 - Social Communities - WG Summary.docx

- ***DAY 3***
- CStaver - Pilot site timeline summary
- CStaver - Designing learning exercices
- AGros - Mass Communication Outline
- ARietveld - Community mobilization
- Abstract3. AGros - Mass Communication Outline.pdf

- DAY 3 - Discovery Exercise - Cocoa example_ENG.doc
- DAY 3 - Discovery Exercise - Cocoa example_FRE.doc

- DAY 3 - Discovery Exercise - Guide WG_ENG.doc
- DAY 3 - Discovery Exercise - Guide WG_FRE.doc
- DAY 3 - Discovery Exercise - T1 WG1.Mapping Musa free fallow.docx
- DAY 3 - Discovery Exercise - T1 WG2.Mapping Musa free fallow.docx
- DAY 3 - Discovery Exercise - T1 WG2.Mapping Musa free fallow.pptx
- DAY 3 - Discovery Exercise - T2 WG3.BBTD symptoms.doc
- DAY 3 - Discovery Exercise - T2 WG3.BBTD symptoms.pptx
- DAY 3 - Discovery Exercise - T3 WG4.Aphid.doc
- DAY 3 - Discovery Exercise - T5 WG5.Nursery infection risks.doc
- DAY 3 - Discovery Exercise - T5 WG6.Nursery infection risks.doc
- DAY 3 - Discovery Exercise - T5 WG6.Nursery infection risks.pptx
- DAY 3 - Discovery Exercise - T7 WG7.Village History.doc

- ***DAY 4 Field Trip***
- PLepoint - Field Trip Program
- SAjambo - Seasonal labour calendar
- ARietveld - Reflection field day Seasonal calendar.pptx

- DAY 4 - Field trip report - WG A.Seasonal Calendar Female.docx
- DAY 4 - Field trip report - WG A.Seasonal Calendar Male.docx
- DAY 4 - Field trip report - WG A.Seasonal Calendar Male.pptx
- DAY 4 - Field trip report - WG A.Seasonal Calendar Male2.docx
- DAY 4 - Field trip report - WG C.Discovery Eng.docx
- DAY 4 - Field trip report - WG C.Discovery Fr.docx

- ***DAY 5***
- ARietveld - Working group Social & gender integration
- LKumar & ML Caruana - Knowledge Gaps.pdf
- GBlomme - Pest Risk Assessment
- HBouwmeester - Mapping Banana Systems

- Abstract1. ARietveld.docx
- Abstract3. GBlomme - Pest Risk Assessment
- Abstract4. HBouwmeester - Mapping Banana Systems

- DAY 5 - Knowledge gaps - Summary cards.docx
- DAY 5 - Knowledge gaps - Summary WG
- DAY 5 - Knowledge gaps - WG 1.Virus-Plant interaction
- DAY 5 - Knowledge gaps - WG 2.Virus-Vector interaction.docx
- DAY 5 - Knowledge gaps - WG 3.First infection
- DAY 5 - Knowledge gaps - WG 3.First infection.pptx
- DAY 5 - Knowledge gaps - WG 4.Within field contamination.docx
- DAY 5 - Knowledge gaps - WG 5.Spread out of field.docx
- DAY 5 - Methodology BBTD related Social and gender studies_EN.docx
- DAY 5 - Methodology BBTD related Social and gender studies_FRE.docx
- DAY 5 - Social & Gender integration studies - WG Benin.doc
- DAY 5 - Social & Gender integration studies - WG Burundi.doc
- DAY 5 - Social & Gender integration studies - WG Cameroun & Gabon.doc

- DAY 5 - Social & Gender integration studies - WG Congo Brazza.doc
- DAY 5 - Social & Gender integration studies - WG Kinshasa.doc
- DAY 5 - Social & Gender integration studies - WG Kisangani.doc
- DAY 5 - Social & Gender integration studies - WG Malawi.doc
- DAY 5 - Social & Gender integration studies - WG Nigeria.doc

- ***DAY 6***
- Status of surveys for site selection
- C Staver - BBTD Learning Alliance

- DAY 6 - Complete Work Plan Benin.doc
- DAY 6 - Complete Work Plan Burundi.doc
- DAY 6 - Complete Work Plan Cameroon & Gabon.doc
- DAY 6 - Complete Work Plan CongoBrazza.doc
- DAY 6 - Complete Work Plan Kinshasa.doc
- DAY 6 - Complete Work Plan Kisangani.doc
- DAY 6 - Complete Work Plan Malawi.doc
- DAY 6 - Complete Work Plan Nigeria.doc
- DAY 6 - Next steps BBTD workshop Bujumbura.doc

- Workshop evaluation - Format.docx
- Workshop evaluation - Summary Q1 & Q2.docx
- Workshop evaluation - Summary Q3 & Q4.doc

- ***Extra materials***

BBTD

- BBTD Brochure-PRFP.pdf
- BBTD CIACLA Factsheet_En.pdf
- BBTD CIACLA Factsheet_Fr.pdf
- BBTD CIALCA Pamphlet_Fr.pdf
- BBTD Distribution Africa Map-IITA.jpg
- Depeches de Brazzaville-BBTD Alert_20140110.pdf
- Inibap Factsheet - BBTD_En.pdf
- Inibap Factsheet - BBTD_Fr.pdf

Communication

- AGros - Participatory Comunication.pptm
- *+Communities & Gender*
- _List of Social & Gender materials
- bird_life histories.pdf
- capriwp113.pdf
- FAC%20Gender%20&%20social%20difference%252c%20v21.pdf
- FAO 2011 - Role of women in Agriculture.pdf
- Focus Groups.doc
- focus11_04_IFPRI collective actions communities.pdf
- gender_ag_extension_services_2013.pdf
- Handbook_promoting self-help groups.PDF

- IFPRI 2012 - GAAP toolkit.pdf
- informational contraints 1999.pdf
- Innovation%20systems%20and%20gender.pdf
- Laurent et al_HHtypology.pdf
- Manuel_Promoteur de groupe.PDF
- MercyCorps - Guide to Community Mobilization Programming.pdf
- Oxfam 2012 - Protecting Communities in DRC.pdf
- PARTICIPATORY RURAL APPRAISAL.pdf

FFS

- CABI 2005 - Source Book-Participatory approaches to Sustainable Production.pdf
- Staver - Designing training - Long version_Eng.pdf
- Staver - Designing training - Long version_Fre.pdf
- Staver - Designing training - Short Version_Eng.pdf
- Staver - Designing training - Short Version_Fre.pdf
- Staver - Infomusa article draft 2 figures tables.doc

Reports

- Arusha Banana Diseases Workshop Report 2009 Joint Statement_En.pdf
- Arusha Banana Diseases Workshop Report 2009 Joint Statement_Fr.pdf
- Arusha Banana Diseases Workshop Report 2009.pdf
- Arusha RTB Report 2013.pdf