

CIRAD achievements in Period 1

Activities Conducted, & Perspectives

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CIRAD Summary

(10 to 15 lines of Partner achievement for Period 1)

In Period 1, CIRAD staff was actively involved in the following domains of activity:

- 1- **Methodological development:** inventories of existing methodologies & protocols used by partners (WP2, WP3, WP4), production of methodological manuals for partner use and intended to be shared later with a broader scientific community (WP1 & WP2 manuals);
- 2- **Scientific & technical support to partner activities:** guidance & support in knowledge capitalization & production (WP1, WP2, WP3, WP4), support provided to partners in the implementation of field activities (WP1, WP5), logistical support to workshop & training organization by WP leaders (WP1, WP2).
- 3- **Coordination & monitoring:** visits to partners, organization of regular meetings between PMU & WP leaders and face-to-face meetings with partners in parallel to international conferences or symposiums, facilitation in the organization of regular intra and cross-WP coordination meetings, production of monitoring tools shared with WP leaders.

CIRAD is part of the WP1 coordination team. As such during Period 1, CIRAD researchers were very much involved in the adaptation of an existing methodology to RTBfoods framework and its specific outputs. They largely contributed to the production of a set of guidance documents for partner use. After the organization of a common training on WP1 methodology with all WP1 teams, CIRAD researchers provided methodological support to WP1 partner teams in conducting surveys with RTB users.

CIRAD is involved in the WP2 coordination team. Consequently, CIRAD researchers supported the writing of state of knowledge reports on biophysical measurement of quality characteristics for the 11 targeted

RTB foods products. They also supervised the inventory of methods and protocols used by partner laboratories for biophysical analysis on RTB crops and products. Finally, CIRAD sensory experts led a training workshop to train WP2 partners to set up sensory panels on RTB products in the perspective of sensory profiling activities to be conducted in Period 2. A methodological manual compiling all training material was written by these experts and specifically adapted to meet RTBfoods needs.

CIRAD coordinates RTBfoodsWP3. As such, the team was mainly involved in the training of partner teams on the use of HTP tools. The team was also responsible for a state of knowledge on previous use of HTP protocols on the RTB crops and products targeted within RTBfoods. The CIRAD team also developed templates to centralize the information on existing and ongoing spectral databases on RTB crops and products from all partners involved in breeding activities.

CIRAD coordinates RTBfoods WP4. As such, CIRAD coordinated the production of a state of art on previous examples of breeding for quality in the different partner programs and/or institutes involved in RTBfoods. WP4 CIRAD leader also coordinated the development of a population tracker to be used all project long to inventory and monitor information related to RTB populations to be used within the project framework.

CIRAD is involved in WP5 activities. In Period 1, CIRAD staff supported IITA team in the assessment of Nextgen new cassava hybrids.

WP6 is composed of CIRAD staff responsible for the project coordination. As such, during Period 1, the team developed several tools to manage project budget, to monitor WP activities and progress towards achievements of outputs and outcomes and more globally to facilitate communication and collaboration with and between partner teams.

CIRAD activities

CIRAD participation in the different WPs & cross-WP interactions

In which WPs is the PARTNER team involved? For which activities conducted in Period 1? How is internally organized communication/coordination between WPs?

WP1 & WP5

- **Development of Guidelines:**

The CIRAD WP1 co-leader adapted a methodology s in three steps previously developed by CIRAD in a previous CRP-RTB project in 2015. This methodology was adapted to answer RTBfoods needs and in particular to understand the quality required by each type of stakeholder all along the food chain. It was described in 3 specific manuals (out of the 5 manuals produced by WP1 coordination team) with food science as a major component: one for each step (i.e. surveys on quality characteristics, processing ability and the consumer testing). These manuals were shared with WP1 partners during a workshop on capacity strengthening of all partners in April 2018, Cotonou Benin and are intended to be shared widely once a DOI is generated.

- **Capacity building of WP1 partners through the organization of the WP1 workshop to build a common methodology (Benin, April 2018):**

The CIRAD WP1 co-leader had the responsibility to improve the methodology in three steps by adding with other co-leaders a gender component and a socio-economic component, mainly for the gendered product mapping and user profiles activity. The CIRAD WP1 co-leader and the CIRAD focal point for participatory processing in WP1 participated with other co-leaders in the writing of the 3 guidance manuals for partners to implement each activity, in the preparation of oral presentations, and in the workshop programme and organization.

The focal point for participatory processing activities provided support in terms of logistics and facilitation. There were 31 participants at the workshop from six partner countries.

- **Specific methodological support to WP1 teams:**

After the workshop on capacity strengthening of all partners, the CIRAD WP1 co-leader together with the other WP1 coordinators had the responsibility to provide support to all teams in the production of the State of Knowledge reports on RTB quality characteristics. A manual on SoK with food science, gender, economic parts, was written by WP1 coordination team as a guide for all the partners. This support was mainly in terms of production of a harmonized template, supply of published references and reviewing.

The CIRAD WP1 co-leader participated in several visits to bring specific scientific support to WP1 teams. In September 2018, the CIRAD WP1 co-leader supported CNRA team in fieldwork and surveys. This support was mainly in a better understanding of the questionnaires, in the way to interview groups or individual persons and in the way to take notes for a future qualitative data analysis.

In Benin, in October 2018, the CIRAD WP1 co-leader with WP1 leader visited FSA and IITA teams to launch qualitative and quantitative analysis of their first data on quality criteria of boiled yam. This collaboration was very useful. Indeed a manual on data analysis was written by WP1 coordination team, after that visit, as a guide for all WP1 partners.

In Cameroon, in July 2018, the CIRAD WP1 co-leader visited IITA Cameroon to clarify with the Director the budget allocation from IITA Nigeria to the team, the PhD inscription at the University of a young economist, the collaboration between IITA Cameroon (young economist) and ENSAI (post-doctoral fellow in food science), the funding support from CIRAD to support ENSAI young food scientist, and the contract to be signed between CIRAD and ENSAI with the CIRAD Regional Director in Cameroon. The CIRAD WP1 co-leader supported the team (young economist and young food scientist) in the implementation of the SoK report and activities on gari.

- **Assessment of new hybrids from partner breeding programs:**

The CIRAD team involved in WP5 went to Nigeria to provide support to the IITA team in the participatory assessment of Nextgen cassava hybrids processed in gari and fufu. The CIRAD team based in Guadeloupe supervised the PhD of E. Ehounou from the University Felix Houphouet Boigny (Côte d'Ivoire) for his PhD on the development of NIRS for prediction of textural quality attributes on fresh yam.

WP2

The team has been deeply involved in the organization of meetings for WP2 management.

- **Scientific support to State of Knowledge reports on RTB biophysical analysis:**

As WP2 co-leader, CIRAD was responsible to provide support to WP2 teams working on yam, banana and cassava. In Period 1, CIRAD staff had the responsibility to support these teams in the production of the State of Knowledge reports on RTB biophysical analysis. This support was mainly in terms of production of a harmonized template, supply of published references and reviewing.

- **Laboratory and analytical procedures Inventory:**

In Period 1 and prior to the development of harmonized protocols for physicochemical analyses on RTB crops and products by WP2 partners, CIRAD researchers were responsible to make an inventory of equipment, methods & protocols used by partner laboratories for physicochemical analyses on RTB crops and products. They also took part, with RTBfoods project leader, WP2 leader and some of the partners to a visit to HZPC research center that gave interesting examples of biophysical analyses important for potato quality such as NIRS hyper-spectral imaging, texture analysis of boiled or fried potato or pectin determination.

- **Capacity building of WP2 partners through the organization of the WP2 Sensory Panel Training workshop (Uganda, September 2018):**

The CIRAD WP2 co-leaders were responsible to set up the agenda of this 1-week training together with the WP2 leader and 3 sensory studies experts from CIRAD. The PMU was in charge of logistical issues. Previous training material has been adapted to fit RTBfoods' needs, products of interest and context of implementation (i.e. countries with relatively low-level of equipment). The team trained WP2 partners attending this workshop during theoretical sessions and practical sessions on sensory testing. The PMU provided logistical support to the national partner hosting this workshop (i.e. NARL).

- **Development of Guidance:**

The CIRAD sensory experts produced a methodological guidance including the material presented and used by trainees during the workshop in Uganda. This methodological toolkit is supposed to be used by WP2 partners when setting-up sensory panels on RTB products in the targeted countries. It was shared with WP2 partners after the workshop and is intended to be shared widely once a DOI is generated.

WP3

- **State of knowledge on previous use of HTPP on RTB crops & products:**

The CIRAD WP3 leader coordinated this activity. A chemometrician, recruited in September 2018 to support capacity building of WP3 partners on NIRS use also contributed to this review.

- **Coordination of Inventories (capacity, existing databases and calibrations):**

The CIRAD team coordinated several inventories: an inventory of capacities of laboratory partners (equipment and human resource), an inventory of existing and ongoing spectral database at partner level for the 5 RTB crops, and an inventory of the existing and ongoing calibrations for RTB quality traits. Several CIRAD researchers contributed to these inventories of spectral data on cassava and yam. Such inventories of existing tools and spectral data already or being acquired on RTB crops by partners did not exist prior to RTBfoods project.

- **Capacity building of WP3 partners through the organization of 2 trainings in partner laboratories (NARL/)**

The CIRAD team trained NaCRRI and NARL teams together during a mission in Uganda. This training was organized during a join mission of the project leader and the CIRAD WP4 leader visiting partner facilities and field trials. The main objective of the training was to train technician using NIRS tool on the different operations from sampling preparation to spectral acquisition so as to provide timely information for breeders during the breeding cycle. During this 3-day training, the team provided an extended overview of the principles and theory of NIR spectroscopy with an emphasis on the potential of NIRS as an HTP tool and its different applications. In brief, the trainees increased the understanding of the procedures involved in spectral acquisition and measurement protocols.

- **Development of spectral databases and NIRS calibrations:**

For both WP2 & WP3, CIRAD researchers based in Guadeloupe conducted a study on texture evaluation of yam samples and contributed to the development of spectral databases on fresh yam in Guadeloupe and of on-going calibrations for fresh yam quality traits. More details on the activities carried out by this team are provided in the INRA Synthesis Report for Period 1 due to the close collaboration between CIRAD and INRA teams in Guadeloupe.

The CIRAD WP3 leader also supervised the development of the existing and already very well documented cassava database at CIAT and supervised the development of calibrations for 3 different quality traits on fresh cassava.

WP4

- **State of knowledge on previous works on RTB breeding for quality for RTB crops:**

The CIRAD WP4 leader supervised the production of a synthesis report on previous works on quality traits informing RTB breeding. The CIRAD WP4 leader compiled the contributions from WP4 partners who described how quality traits have been considered in past or on-going RTB breeding programs.

- **Inventory of capacities & RTB populations available for RTBfoods project:**

The CIRAD WP4 leader developed a synthesis population tracker aiming at i) inventorying RTB populations developed by partner breeding programs and that could be used within RTBfoods to breed for quality traits, ii) centralizing key information on RTB populations for the 5 targeted crops.

In addition, the CIRAD WP4 coordinator visited Uganda, Nigeria and Guadeloupe. It was the opportunity to meet all the collaborators working on cassava, sweetpotato and matooke in Uganda and cassava and yam in Nigeria. CIRAD team visited the Food Technology Laboratories, in these countries, to get a better idea of the facilities available for breeders.

WP6

- **Project Coordination & technical support to partner activities:**

During the first 6 months of the project, the team was strongly involved in the contractualisation process with the 14 partner institutes.

CIRAD is responsible for the annual financial reporting to BMGF for the whole RTBfoods project. For this purpose, the team developed templates to be filled in by the financial services of partner institutes at the end of Period 1.

The PMU did several missions to coordinate activities to be carried out by partners and to ensure an effective collaboration between partner institutes working on the same RTB crop. For these coordination purposes, the project leader went to Uganda and to Nigeria where he visited partners from NARL, NaCRRI, NARO, IITA and CIP in Uganda and partners from NRCRI, Bowen University and IITA in Nigeria.

The PMU was strongly involved in the organization of the WP2 workshop on sensory panels in Uganda and in logistical support to the partner (NARL) hosting this workshop.

- **Open access strategy Development:**

The project Management Unit (PMU) produced a report describing how the BMGF open access strategy will be adopted and put in place in RTBfoods and how this strategy would impact partners in the development of their activities. For instance, a template for participant information –no matter the type of participation- and to collect their free and prior consent was customized to RTBfoods project and attached to the Global Access Strategy.

- **Monitoring, Evaluation, Learning & Reporting:**

The project manager for Monitoring Evaluation & Learning developed different tools to monitor partner progress in their work plan and to have a regular follow-up with WP leaders. The project manager went to Nigeria to be trained by R. Ofei, MEL manager at IITA on the mapping of RTBfoods Result Framework under MEL platform, an online platform used by the CRP RTB CGIAR program for reporting purposes.

The PMU developed templates for partners to report on activities carried out and main achievements from Period 1, at 3 levels: partner institute, WP and product champions' level. These are the 3 levels the PMU committed to report on annually to BMGF. For Period 1, the PMU chose to ask their contribution to partner focal points and WP leaders only, the exact role and expectations from product champions still being to be clarified and agreed with them.

- **Development of collaborative tools:**

The PMU put in place several tools to ensure a proper and efficient communication and collaboration between RTBfoods partners. A collaborative platform for documents sharing and secured storage has been set up using the system proposed by CIRAD to its staff and partners. This storage platform could be replaced soon by an online project & knowledge management system with private and public pages. This would allow a single tool (Liferay software) serve both internal and external communication purposes at the same time.

- **Coordination with RTB partner breeding programs (AfricaYam, BBB, Nextgen, Sasha)**

The project leader was invited to participate to AfricaYam, Nexgen and Sasha annual meetings. CIRAD researchers also participated in the brainstorming organized by BBB project in Bruxelles, upstream of the project phase 2.

- **Visit to external partners**

The CIRAD project leader and WP2 co-leader visited HZPC laboratories in the Netherlands by H. van Doorn who is a member of RTBfoods' Advisory Committee. It was the opportunity for them to learn more on physicochemical and sensory analyses carried out on raw and cooked material for potato breeding.

The project leader also met with a delegation of Nestlé during their visit to CIRAD; Nestlé is represented in RTBfoods' Advisory Committee. This was the opportunity for Nestlé representatives to renew their willingness to contribute to RTBfoods activities by making their laboratories and/or human resource in Nigeria available to WP2 partners.

[CIRAD geographic implementation / strategy](#)

In which countries (and sub-regions) is the PARTNER team conducting activities?

In Period 1, CIRAD partners carried-out activities in the countries listed below (activities related to and funded by RTBfoods project other than participation to meetings, conferences or symposiums):

- Nigeria: A. Bouniol (missions for WP5 activities), D. Dufour (missions for WP6 coordination + WP5 activities), H. Chaïr (mission for WP4 coordination), E. Fauvelle (missions for MEL).
- Uganda: D. Dufour (missions for WP6 coordination), H. Chaïr (mission for WP4 coordination), F. Davrieux (mission for WP3 coordination & training), C. Mestres (mission for WP2 workshop), C. Méjean (mission for WP2 workshop support), C. Bugaud (mission for WP2 workshop), N. Forestier-Chiron (mission for WP2 workshop).
- Côte d'Ivoire: G. Fliedel (mission for WP1 support).
- Cameroon: G. Fliedel (mission for WP1 coordination financed by another project).
- Benin: G. Fliedel (missions for WP1 support).
- Colombia: T. Tran (WP2 activities), F. Davrieux (missions for WP3 support & trainings), K. Meghar (mission for WP3 support & training).

- Guadeloupe-France: G. Arnau (WP3 activities), F. Cormier (WP4 activities) & D. Cornet (WP3 activities).

For each mission, more details are provided in the section “PARTNER Travels” below.

The table below illustrates how CIRAD budget for Period 1 was spent across countries for each WP and in total (in Dollars). These expenses concern all cost categories (travels, sub-awards & consultants, other costs) except for salaries.

	WP1 / WP5	WP2	WP3	WP4	WP6	TOTAL
Benin	24 139.36	3 714.58	-	-	22 549.68	50 403.63
Cameroon	4 437.54	8 621.34	6 434.88	6 013.03	56 643.64	82 150.45
Colombia	-	-	14 702.64	2 562.94	-	17 265.58
Côte d'Ivoire	5 834.71	270.37	-	-	158.20	6 263.28
Nigeria	2 658.53	-	-	3 810.80	19 485.21	25 954.55
Uganda	-	25 820.58	5 461.76	3 882.64	14 728.24	49 893.23
France	-	4 920.97	11 634.31	2 407.22	9 336.49	28 298.98
Guadeloupe	-	-	-	23 800.08	-	23 800.08
Netherlands	-	354.55	-	-	902.11	1 256.65
Belgium	-	-	-	-	285.65	285.65
Europe	-	-	-	-	1 499.18	1 499.18
TOTAL	37 070.16	43 702.39	38 233.59	42 476.71	125 588.41	297 071.26

CIRAD Product Profile participation

In which product profiles the PARTNER team has been involved in Period 1? How & Where?

Due to their role of WP leaders and co-leaders, G. Fliedel, C. Mestres, T. Tran, F. Davrieux and H. Chair are supporting teams working on all the 11 food products targeted by RTBfoods. Indeed, all state of knowledge reports edited and methodological guidance developed obviously concerned the 11 RTBfoods products. In the same way, A. Bouniol, focal point of WP1 Activity 4 on processing diagnosis, may work on the 11 RTBfoods products but more certainly on the more elaborated ones, with more than 1 unitary process (e.g. fermentation, cooking, pounding, frying).

Besides scientific support and methodological development activities, some CIRAD staff are more directly involved in knowledge production on some specific products:

- Granulated cassava: for the assessment of Nextgen cassava clones in Nigeria for gari production (as part of WP5).
- Pounded Yam:
 - WP1, WP2 and WP5 activities carried out on yam in Benin;
 - WP2 team in Guadeloupe involved in the assessment of the poundability of CIRAD yam varieties through the co-supervision of a PhD candidate from Côte d'Ivoire (i.e. E. Ehouno);
 - WP3 team in Guadeloupe working on the development of NIRS database and calibrations on fresh yam.

CIRAD Personnel involved & Students activities

List of Personnel involved in RTBfoods project in Period 1 (WPs + Country + Product Profiles implication):
(For more accuracy you can refer to: Tab **"3a) PERSONNEL COSTS"** of **Partner Financial Report**)

WP	NAME of CIRAD staff involved in RTBfoods	Country of intervention	RTBfoods Crop(s) / Product(s) Implication
WP1 /WP 5	BOUNIOLE Alexandre	Based in Benin - Potentially in all 5 targeted countries for Support to WP1 Activity 4	All with a major focus on elaborated products (pounded yam, granulated cassava, matoke)
	FLIEDEL Geneviève	All for support to WP1 partners	All for support to WP1 partners
WP2	BUGAUD Christophe	Based in France - Missions depending on support needs to WP2 partners	Depending on support needs to WP2 partners with major specialization on banana
	DAHDOUH Layal	Based in France - Missions depending on support needs to WP2 partners	Depending on support needs to WP2 partners

	FORESTIER-CHIRON Nelly	Based in France - Missions depending on support needs to WP2 partners	Depending on support needs to WP2 partners
	GRABULOS Joël	Based in France	Depending on support needs to WP2 partners
	MARAVALL Isabelle	Based in France	Depending on support needs to WP2 partners
	MBEGUIE A MBEGUIE Didier	Based in France - Missions depending on support needs to WP2 partners	Major focus on banana plantain + cassava
	MESTRES Christian	All for support to WP2 partners- based in France	Depending on support needs to WP2 partners with a major focus on yam
	OLLIER Léa	Based in France - Missions depending on support needs to WP2 partners	Depending on support needs to WP2 partners
	RICCI Julien	Based in France - Missions depending on support needs to WP2 partners	Depending on support needs to WP2 partners
	TRAN Thierry	All for support to WP2 partners - based in Colombia	All with a major focus on cassava

WP3	DAVRIEUX Fabrice	All for support to WP3 partners- based in Reunion Island (France)	All for support to WP3 partners
	MEGHAR Karima	All for support to WP3 partners- based in France	All for support to WP3 partners
	CORNET Denis	Based in France - Missions depending on support needs to WP3 partners	Major focus on yam
	MALEDON Erick	Based in France	Depending on support needs to WP3 partners
	ARNAU Gemma	Based in Guadeloupe with missions in yam producing countries	Major focus on yam
WP4	CHAIR Hâna	All for support to WP4 partners - based in France	All for support to WP4 partners with major focus on yam
	CORMIER Fabien	Based in Guadeloupe	Yam
	NUDOL Elie	Based in France	Depending on support needs to WP4 partners
WP6	DUFOUR Dominique	All for coordination purposes - based in France	All

	FAUVELLE Eglantine	All for monitoring purposes - based in France	NR
	MEJEAN Cathy	All for logistical support to partners - based in France	NR
	PALLET Dominique	Based in France	NR
	LANTIER Pascale	Based in France	NR
	MARCIANO Delphine	Based in France	NR
	PERIGNON Anne Laure	Based in France	NR
	MILLE Marion	Based in France	NR
	VOLLE Ghislaine	Based in France	NR
	BLUNDO CANTO Genowefa	Depending on evaluation needs- based in France	NR

List of Students involved in RTBfoods activities in Period 1:

NAME Surname	Master Student or PhD or Post- Doc	Subject Title	University of affiliation	Fellowship Starting Date	Fellowship Ending date	Tutor(s) in RTBfoods project
Emmanuel EHOUNOU	PhD	Developpement t of NIRS for prediction of textural quality attributes	Felix Houphouet- Boigny	31/01/2018	31/07/2018	Gemma ARNAU
Franklin NGOUALEM KÉGAH	Postdoc	WP1: Understanding the drivers of quality characteristics and the development of multi-user RTB product profiles	University of Ngaoundéré - ENSAI	15/06/2018	-	Geneviève FLIEDEL

CIRAD Travels: Participation to RTBfoods meetings & International Events on RTBfoods budget

(For more accuracy you can refer to: Tab “3b) TRAVEL COSTS” of Partner Financial Report)

In addition to individual travels listed in the table below, the following persons attended the RTBfoods inception meeting in Buea, Cameroon, from 23 to 28 January: G. Fliedel, T. Tran, C. Bugaud, D. Mbeguie-a-Mbeguie, F. Davrieux, H. Chaïr, F. Cormier, D. Dufour, E. Fauvelle, G. Blundo-Canto, D. Marciano, Lantier P.

Number of People or List of NAMES	RTBfoods meetings	International / Regional Conferences	Country	Dates	
GEMMA Arnau		ISTRC Symposium + RTB Annual Meeting	Colombia	21-Oct.	30-Oct
BOUNOL Alexandre	Participatory evaluation of new cassava clones for Gari production in Imo state in Nigeria with IITA team		Nigéria	16-Jun	21-Jun
	Participatory evaluation of new cassava clones for Gari & Fufu production in Imo state in Nigeria (IITA)		Nigéria	9-Sept.	20-Sept.
BUGAUD Christophe	Sensory Panel Training for WP2 RTBfoods partners		Uganda	11-Sept.	22-Sept.
CHAIR Hanâ	Visits to Banana, Yam, Sweetpotato & Potato breeding programs in Uganda		Uganda	21-May	29-May
	Visits to Yam and Cassava breeding programs in Nigeria (NRCRI & IITA stations)		Nigeria	20-Jul.	27-Jul.
DAVRIEUX Fabrice	Training on spectral analysis and data analysis for RTBfoods WP3 partners		Uganda	20-May	30-May

	Participation in recruitment of the new project chemometrician		Montpellier	3-Jun	18-Jun
		ISTRC Symposium	Colombia	23-Oct.	5-Nov.
	Coordination for WP3 RTBfoods. Support to K.Meghar (RTBfoods chemometrician)		Montpellier	18-Nov.	11-Dec.
DUFOUR Dominique	Sensory profiling & measurements at HZPC - RTBfoods project		Hollande	5-May	9-May
	Inventory of high throughput method needs in Uganda for Cassava, Banana, Sweet Potato and planning of actions - RTBfoods project		Uganda	21-May	29-May
	Participatory evaluation of new cassava clones for Gari production in Imo state in Nigeria with IITA team	Participation to GCP21	Benin + Nigeria	9-Jun.	22-Jun.
	Visits to Yam and Cassava breeding programs in Nigeria (NRCRI & IITA stations)		Nigeria	20-Jul.	27-jul.
	Complementarity between RTBfoods & BBB projects & discussions with R. Sweenen on join activities & CIRAD participation to BBB phase 2		Belgique	5-Sept.	6-Sept.

	Participatory evaluation of new cassava clones for Gari & Fufu production in Imo state in Nigeria (IITA)		Nigéria	12-Sept.	22-Sept.
FAUVELLE Eglantine		Training “Enhancing Results-Based Management in RTB ME&L systems”	Nigeria	20-May	1-Jun.
		Participation to GCP21	Bénin	10-Jun.	17-Jun.
	Visits to Yam and Cassava breeding programs in Nigeria (NRCRI & IITA stations)		Nigeria	20-Jul.	27-Jul.
	RTBfoods monitoring & meeting with partners	ISTRC Symposium + CRP-RTB Annual Meeting	Colombia	21-Oct.	30-Oct.
		Annual Meeting of the MELIA (Monitoring & Evaluation, & Impact Assessment) community of practice at CGIAR	Rome	4-Nov.	8-Nov.
FLIEDEL Genevieve	Workshop on Capacity strengthening of all WP1 partners on a Common Methodology		Benin	13-Apr.	26-Apr.
		Participation to GCP21	Benin	10-Jun.	17-Jun.

	WP1 Coordination: support to CNRA on the implementation of surveys on quality characteristics of attiéke		Côte d'Ivoire	19-Sept.	29-Sept.
	WP1 Coordination: Qualitative & Quantitative Analysis on survey data on quality characteristics of boiled Yam with NRI, UAC-FSA and IITA teams		Benin	15-Oct.	23-Oct.
FORESTIER Nelly	Sensory Panel Training for WP2 RTBfoods partners		Uganda	11-Sept.	22-Sept.
MBEGUIE Didier		Participation to GCP21	Benin	10-Jun.	16-Jun.
MEGHAR Karima	NIRS Calibrations at CIAT	CRP-RTB annual meeting	Colombia	25-Oct.	4-Nov.
MEJEAN Cathy	Sensory Panel Training for WP2 RTBfoods partners		Uganda	11-Sept.	22-Sept.
MESTRES Christian	Sensorial profiling & measurements at HZPC		Hollande	7-May	9-May
		Participation to GCP21	Benin	9-Jun.	24-Jun.
	Sensory Panel Training for WP2 RTBfoods partners		Ouganda	11-Sept.	19-Sept.

CIRAD Capital Equipment or investment (co-investments)

List of equipment acquired on RTBfoods budget (e.g?. texturometer, RVA, pH meter, etc.)

(For more accuracy you can refer to: Tab “3d) EQUIPMENT COSTS” of Partner Financial Report)

The acquisition of the hyperspectral camera was postponed to Period 2. WP3 leader (F. Davrieux) and the recently recruited chemometrician staff (K. Meghar) are still comparing the tools present on the market to identify the best solution according to RTBfoods needs and budget. Several suppliers identified are being asked to perform demonstrations at CIRAD Montpellier.

CIRAD Training participations (within RTBfoods framework and other trainings)

<i>Training Title / Topic</i>	<i>WP concerned (if training within RTBfoods framework)</i>	<i>Country</i>	<i>Dates</i>	<i>List of Participants NAMES</i>
Workshop on Capacity strengthening of all WP1 partners on a Common Methodology	WP1	Benin	16-20-Apr.	FLIEDEL Geneviève BOUNIOLE Alexandre
Sensory panel training	WP2	Uganda	17-21-Sept.	MESTRES Christian FORESTIER-CHIRON Nelly BUGAUD Christophe MEJEAN Cathy (org.)
Near infrared Spectroscopy: Theory and Application	WP3	Uganda	23-28-May	DAVRIEUX Fabrice
Training “Enhancing Results-Based Management in RTB ME&L systems”	WP6	Nigeria	28-31-Jun.	FAUVELLE Eglantine

Annual Meeting of the MELIA (Monitoring & Evaluation, & Impact Assessment) community of practice at CGIAR	WP6	Rome	5-8-Nov.	FAUVELLE Eglantine
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CIRAD Sub-awards & Consultants

*List of Sub-awards + WP concerned + Purpose. (For more accuracy you can refer to: Tab 3c) **CONSULTANT COSTS** and “3f) SUB AWARDS COSTS” of Partner Financial Report)*

- **Robert Ndjouenkeu** from ENSAI-Cameroon, WP1, to supervise WP1 activities on gari in Cameroon conducted by a postdoctoral student.
- **Agnes Rolland-Sabaté** from INRA-France, WP2, to communicate on her activities at the GCP21 in Cotonou, Benin.
- **Richard Ofei** from IITA, WP6, to provide support to E. Fauvelle to RTBfoods results framework under the MEL platform to be used for reporting purposes.
- **Lora Forsythe** from NRI, WP1, in replacement of Hale Tufan for coordination purposes with NRCRI and IITA partners in Nigeria.

CIRAD Other Sources of Support for RTBfoods activities

Which complementary / partner projects (other sources of fundings) contributed to RTBfoods activities in Period 1?

758 637 \$ are reported as CIRAD own contribution for Period 1. CIRAD contributes to the project by supporting 70% of the salaries of CIRAD staff involved and by providing access to its facilities (e.g. pilot processing platform, biophysical and sensory analysis laboratories) with the application of an indirect cost rate. The rate of indirect costs is determined annually after the closing of accounts validated by their auditor, and based on the evaluation of the structural costs of the institution. The overhead costs include all costs linked to the activity of the institute which are not directly attributable to the project but essential to its activity.

CIRAD List of Publications, Conference communications, Manuals, Leaflets, Posters, etc.

- **Conference communications**

Dufour D., Fliedel G., Bouniol A., Davrieux F., Tran T., 2018. Cassava traits and end-user preference. IVth International Cassava Conference - GCP21, Cotonou, Bénin, 11-15 June 2018.

Rolland-Sabate A., Sánchez T., Buléon A., Colonna P., Jaillais B., Ceballos H., **Dufour D.** (2018). The structural characterization of starches: a key to understand various cassava starch functionalities. (Plenary conference). Fourth Scientific Conference of the Global Cassava Partnership for the 21st – GCP21-IV. Cotonou, Bénin, June 11-15, 2018.

Chapuis A., **Tran T.**, Giraldo Cuero F. J., Moreno Santander M. A., Precoppe M., Moreno Alzate J. L., Pallet H., Belalcazar Martinez J. E., **Dufour D.** (2018). Small-capacity flash dryers for cassava-derived products - lessons learned from the development of a pilot equipment at CIAT, Colombia (Best conference Award). Fourth Scientific Conference of the Global Cassava Partnership for the 21st – GCP21-IV. Cotonou, Bénin, June 11-15, 2018.

Ospina M.A., **Tran T.**, Pizarro M., Luna Melendez J.L., Trivino-Palacios W., Belalcazar Martinez J.E., Salazar S.M., **Dufour D.**, Becera Lopez Lavallo L.A., 2018. Diversity of post-harvest phenotypic traits among the CIAT cassava germplasm collection. IVth International Cassava Conference - GCP21, Cotonou, Bénin, 11-15 June 2018.

Nanyonjo A. R., Kyazze F., Esuma W., Wembabazi E., **Dufour D.**, Nuwamanya E., Kawuki R. S., Tufan H. (2018). A comparative assessment of flour-making quality in cassava landraces and breeding lines: a gender-focused case in Zombo district, Uganda. Fourth Scientific Conference of the Global Cassava Partnership for the 21st – GCP21-IV. Cotonou, Bénin, June 11-15, 2018.

Becerra Lopez-Lavalle L. A., Rodriguez F., Ovalle T., Ruiz M., Gkanogiannis A., **Dufour D.**, Thome J. (2018). Capturing next-generation genome wide molecular markers in cassava helps to untangle the crop's genetic improvement history. Fourth Scientific Conference of the Global Cassava Partnership for the 21st – GCP21-IV. Cotonou, Bénin, June 11-15, 2018.

Becerra Lopez-Lavalle L. A., **Dufour D.**, Rodriguez F., Ovalle T., Ruiz M., Gkanogiannis A., Thome J. (2018). DNA-Based cassava variety identification: SNP-type fluidic array. Fourth Scientific Conference of the Global Cassava Partnership for the 21st – GCP21-IV. Cotonou, Bénin, June 11-15, 2018.

Ezeocha V.C., **Dahdouh L.**, Escobar A., **Ricci J.**, Rondet E., Cuq B., Delalonde, M. (2018). Evaluation of Gari Cooking Process at Village Level. Fourth Scientific Conference of the Global Cassava Partnership for the 21st – GCP21-IV. Cotonou, Bénin, June 11-15, 2018.

Dufour D., **Fliedel G.**, **Bouniol A.**, **Davrieux F.**, **Tran T.** & CIRAD/CIAT Food Technologists/quality team. Progress in high-throughput phenotyping for cassava traits and end-user preferences. Harvestplus Cassava Breeders meeting, 19-20 october, CIAT, Cali, Colombia.

Tran T. et al. Recent developments on processing of biofortified cassava. Harvestplus Cassava Breeders meeting, 19-20 october, CIAT, Cali, Colombia.

Becerra Lopez-Lavalle L.A., Ovalle T.M., Ordoñez C., Salazar S.M., Belalcazar J., **Dufour D.**,

Tran T., Ceballos H., Tohme J. (2018). DNA marker strategies for increasing vitamin A and other beneficial carotenoids in cassava. Harvestplus Cassava Breeders meeting, 19-20 october, CIAT, Cali, Colombia.

Chapuis A., **Tran T.**, Giraldo F. J., Moreno M. A., Precoppe M., Moreno J. L., Pallet H., Belalcazar Martinez J. E., **Dufour D.** (2018) Development and trials of a small-capacity pilot flash dryer for cassava-derived products. 18Th triennial symposium of ISTRC International Society for Tropical Root Crops: When, Where and How will tropical root and tuber crops lead the next Agri-Food revolution. 22-25 October 2018. CIAT, Cali, Colombia.

Moreno J. L., Chu-ky Son, Ceballos H., **Dufour D.**, **Tran T.** (2018). No-cook process at very high gravity of various cassava starches for ethanol production. 18Th triennial symposium of ISTRC International Society for Tropical Root Crops: When, Where and How will tropical root and tuber crops lead the next Agri-Food revolution. 22-25 October 2018. CIAT, Cali, Colombia.

Alamu O.E., **Dufour D.**, **Fliedel G.**, **Bouniol A.**, **Davrieux F.**, **Tran T.**, RTBfoods project team (2018) End-users preferred RTB crops quality traits. 18Th triennial symposium of ISTRC International Society for Tropical Root Crops: When, Where and How will tropical root and tuber crops lead the next Agri-Food revolution. 22-25 October 2018. CIAT, Cali, Colombia.

Ospina M.A., **Tran T.**, Pizarro M., Luna Melendez J.L., Trivino-Palacios W., Belalcazar J., Martinez J.E., Salazar S., **Dufour D.**, Becerra Lopez Lavalle L.A., 2018. Phenotyping postharvest physiological deterioration (PPD) in cassava: Implications for selection. 18th Triennial Symposium of the International Society for Tropical Root Crops (ISTRC), Cali, Colombia, 22-25 October 2018.

Luna Melendez J.L., **Tran T.**, Pizarro M., Ospina M.A., Trivino-Palacios W., Belalcazar J., Martinez J.E., Salazar S.M., **Dufour D.**, Becerra Lopez Lavalle L.A., 2018. Diversity of post-harvest phenotypic traits among the CIAT cassava germplasm collection. 18th Triennial Symposium of the International Society for Tropical Root Crops (ISTRC), Cali, Colombia, 22-25 October 2018.

Pizarro M., Ospina M.A., Luna Melendez J.L., Belalcazar Martinez J.E., Salazar S., **Tran T.**, Becerra Lopez Lavalle L.A., **Dufour D.**, 2018. Cyanide content and distribution in cassava plants, in association with physiological age. 18th Triennial Symposium of the International Society for Tropical Root Crops (ISTRC), Cali, Colombia, 22-25 October 2018.

Tran T. et al. Phenotyping postharvest physiological deterioration (PPD) in cassava implication for selection. 18Th triennial symposium of ISTRC International Society for Tropical Root Crops: When, Where and How will tropical root and tuber crops lead the next Agri-Food revolution. 22-25 October.

Ospina M. A., **Tran T.**, Pizarro M., Luna J., Triviño W., Belalcazar J., Salazar S., **Dufour D.**, Luis Augusto Becerra López-Lavalle L.A. (2018). Diversity of post-harvest phenotypic traits among the CIAT cassava germplasm collection. 18Th triennial symposium of ISTRC International Society for Tropical Root Crops: When, Where and How will tropical root and tuber crops lead the next Agri-Food revolution. 22-25 October 2018. CIAT, Cali, Colombia.

- **Publications in Peer-reviewed journals**

Taborda L. A., **Tran T.**, **Dufour D.**, Garcia M. (2018). Main changes in the production of sour cassava starch in Cauca, Colombia over the last 20 years. In preparation.

Taborda L. A., Macombe C., **Dufour D.**, **Tran T.** (2018). Conflict and inequality in the region of Cauca Colombia: comparative analysis of socio economic status in cassava starch value chain 1995 and 2018. In preparation.

Ospina M. A., Pizarro M., **Tran T.**, **Ricci J.**, Belalcazar J., Luna j., Londoño L. F., Salazar S., **Dufour D.**, Becerra López-Lavalle L. A. (2019). Diversity of cyanide content in cassava and association with carotenoid and protein contents. Submitted in: Food Research International

Adinsi L., Akissoé N., Escobar A., Kougblenou N., Prin I., **Dufour D.**, Hounhouigan J., **Flidel G.** (2018). Sensory and physicochemical profiling of traditional gari in Benin. Position of new enriched gari with palm oil and/or soybean. Submitted in: Food Science & Nutrition.

Escobar A., Rondet E., **Dahdouh L.**, **Ricci J.**, Akissoé N., **Dufour D.**, **Tran T.**, Cuq B., Delalande M. (2018). Impact of process scale and cassava variety on product quality attributes during gari making. Submitted in: Food and Bioprocess Technology, manuscript FABT-S-18-01538.

Shen G., Fernández Pierna J. A., Baeten V., Dardenne P., **Davrieux F.**, Ceballos H., **Dufour D.**, Yang Z., Han L., Lesnoff M. (2019). Local Partial Least Square based on global PLS Scores. Accepted in: Journal of Chemometrics

Iragaba P., Nuwamanya E., Wembabazi E., Baguma Y., **Dufour D.**, Earle E. D., Bezner Kerr R., Tufan H. A., Gore M. A., Kawuki R. S. (2018). Development of a consumer-validated phenotyping approach for quantitatively measuring softness of cooked cassava roots. Submitted in: African Crop Science Journal.

Nanyonjo A. R., Kyazze F., Esuma W., Wembabazi E., **Dufour D.**, Nuwamanya E., Tufan H., Kawuki R.S. (2018). A comparative assessment of flour-making quality in cassava landraces and breeding lines: a gender-focused case in Zombo district, Uganda. Submitted in: Journal of the Science of Food and Agriculture.

Karlström A., Belalcazar J., Sánchez T., Lenis J. I., Moreno J. L., Pizarro M., **Ricci J.**, Dufour D., Tran T., Ceballos H. (2019). Impact of environment and genotype-by-environment interaction on functional properties of amylose-free and wild-type cassava starches. *Stärke*, 71(8p), 1700278. <https://doi.org/10.1002/star.201700278>

Aragón I. J., Ceballos H., **Dufour D.**, Ferruzzi M. G. (2018). Pro-vitamin A carotenoids stability and bioaccessibility from elite selection of biofortified cassava roots (*Manihot esculenta*, Crantz) processed to traditional flours and porridges (2018). *Food & Function*. (9): 4822-4835. <https://doi.org/10.1039/C8FO01276H>

Bechoff A., Tomlins K.I., **Fliedel G.**, Becerra López-Lavalle L.A., Westby A., Hershey C., **Dufour D.** (2018). Cassava traits and end-user preference: relating traits to consumer liking, sensory perception, and genetics. *Critical Reviews in Food Science and Nutrition*. 58(4): 547-567. <http://dx.doi.org/10.1080/10408398.2016.1202888>

Escobar A., **Dahdouh L.**, Rondet E., **Ricci J.**, **Dufour D.**, **Tran T.**, Cuq B., Delalande M. (2018). Development of a novel integrated approach to monitor processing of cassava roots into gari: macroscopic and microscopic scales. *Food Bioprocess Technology* 1-11. <https://doi.org/10.1007/s11947-018-2106-5>

Giraldo-Toro A., Briffaz A., Gibert O., **Dufour D.**, **Tran T.**, Bohuon P. (2018). Modelling of heat and water transport in plantain during steeping to predict gelatinization and in vitro starch digestibility. *Journal of Food Engineering*, 235:1-8. <https://doi.org/10.1016/j.jfoodeng.2018.04.022>

- **Posters ISTRC & GCP21**

Gil J. L., Belalcazar J., **Dufour D.**, Gonzales T., **Tran T.** (2018) Biofortified cassava contributes to carotenes enrichment of egg yolks. (poster). 18Th triennial symposium of ISTRC International Society for Tropical Root Crops: When, Where and How will tropical root and tuber crops lead the next Agri-Food revolution. 22-25 October 2018. CIAT, Cali, Colombia.

Ospina M. A., Pizarro M., Luna J., Belalcazar J., Salazar S., **Dufour D.**, **Tran T.**, Becerra López-Lavalle L. A. (2018). Cyanide content and distribution in cassava plants, in association with physiological age. (Poster) 18Th triennial symposium of ISTRC International Society for Tropical Root Crops: When, Where and How will tropical root and tuber crops lead the next Agri-Food revolution. 22-25 October 2018. CIAT, Cali, Colombia.

Ehounou E., Maledon E., **Fabien C.**, **Cornet D.**, Nudol E., Kouakou A., **Chair H.** **Arnau G.** (2018). Breeding for Improved tuber quality in yam *Dioscorea alata* L. (Poster). 18Th triennial symposium of ISTRC International Society for Tropical Root Crops: When, Where and How will tropical root and tuber crops lead the next Agri-Food revolution. 22-25 October 2018. CIAT, Cali, Colombia.

Adinsi L., Akissoé N., Hounhouigan J., **Fliedel G., Dufour D., Tran T.** (2018). Beta-Carotene bio-fortified cassava for Agbeli: processing and consumers perception in Benin. Fourth Scientific Conference of the Global Cassava Partnership for the 21st – GCP21-IV. Cotonou, Bénin, June 11-15, 2018.

CIRAD Gaps & Constraints faced

Which challenges faced in implementation of RTBfoods project within the PARTNER institution? Risks identified & Risk mitigation proposed?

- ***Delay in contract signature & budget transfer to partners***

The first challenge faced was the organization of the inception meeting with partners without any budget due to delay in the signatures of agreements with partners. To solve this issue, CIRAD made advances and got refund when money was transferred. The other challenge was that partners could not start their activities before money was transferred (around May for the last ones). For Period 2, money transfer is planned to happen immediately after Period 2 budget validation, i.e. during the RTBfoods annual meeting (last week of March 2019).

- ***No budget allocated to communication purposes***

No budget was initially dedicated to communication activities within RTBfoods project when the global budget was built. For this reason, PMU now has to cope with limited resource—especially human resource—to communicate regularly on activities carried out and results achieved. This is a considerable constraint since the project impacts on RTB breeders' community (i.e. RTBfoods outcomes) highly depends on its ability to communicate its methodological achievements in particular beyond the breeders involved in the project. An online knowledge management platform is being set-up at CIRAD level that could be adapted to answer RTBfoods communication needs.

- ***Staff Mobilization***

The limited availability of CIRAD researchers involved in many other projects is another challenge faced by the PMU and by researchers themselves. This mainly affected the coordination capacity of CIRAD leaders and co-leaders who have only been able to complete a limited number of visits to partner laboratories and fields. Besides, there were delay in the team building since E. fauvelle, C. Méjean and K. Meghar (i.e. the project manager for monitoring evaluation & learning, the project assistant and the chemometrician involved in WP3) joined the team in April, May and in September respectively.

- ***Cross-WP coordination***

One of the major challenges faced by the CIRAD team is the maintenance of regular cross-WP interactions, This is typically a gap observed at the level of WP coordination teams in which some CIRAD researchers are involved either as leaders (for WP3, WP4 and WP6) or as co-leaders (for WP1 and WP2). The spatial proximity of most of CIRAD staff allowed regular discussions with the coordination team (WP6) but did not favor cross-WP interactions as much as it could have. As an example, CIRAD researchers did not take the opportunity of being based in Montpellier to discuss on their respective deliverables and start thinking

together about a learning process and on the knowledge flow to be supported for the transmission of results from one WP to another. During Period 1, only one meeting was organized by WP6 to bring all CIRAD staff involved in RTBfoods together. Most of people attending were researchers and especially those who have a responsibility as WP leaders or co-leaders. This meeting aimed to review expenses made on the budget for Period 1 by CIRAD staff in each WP and to start planning budget for Period 2 by WP. This meeting was an opportunity for CIRAD staff involved in the different WPs to discuss about their progress toward the achievement of their work plan collectively. Unfortunately, for more efficiency, the exercise was done independently by the CIRAD WP leader or co-leader prior to the meeting and they were too few to organize side meetings with their own team prior to or after this meeting. For future periods, the PMU should initiate more regular global CIRAD meetings to bring all staff involved in RTBfoods together on an occasion other than the annual meeting with all project partners. These meetings would allow everybody to follow-up on activities carried-out by CIRAD staff in each WP and discuss how first results should be shared appropriately with others. Such CIRAD coordination meetings would also allow the WP6 to identify challenges to be addressed at the institution level, for example with the RTBfoods steering committee (see WP6 Synthesis Report for Period 1).

- ***Logistical constraints in workshops organization in African countries***

CIRAD WP leaders and co-leaders faced constraints in the organization of trainings and workshops in Africa. WP6 supported them on logistics and fund transfer was facilitated by CIRAD regional directors. The risks linked to the transfer of huge amounts of cash by CIRAD staff for the organization of such events was discussed within the RTBfoods steering committee. WP6 will keep facilitating the organization of important trainings and workshops through the logistical support provided to WP leaders and host partner by the project assistant and eventually through financial support as well.

CIRAD Perspective & Internal organization for Period 2

Which planification for the PARTNER team in Period 2 across WPs, Product profiles (& countries)?

Cross-WP Coordination:

- Work plans development for Period 2 at WP level (coordinated by WP leaders) and revision of CIRAD narrative during the Annual Meeting 2019 (facilitated by PMU);,
- Review of CIRAD budget by WP and repartition by researcher to be discussed during the Annual Meeting 2019 (facilitated by WP6);
- Verification of the alignment of partners' budgets with their respective narrative for Period 2, after the Annual Meeting 2019 (by WP6);
- Support to scientific accuracy of the methodologies developed / adapted and of the content of deliverables produced by partner teams (especially by CIRAD staff involved in WP coordination).

Methodological support to scientific activities by WPs:

- WP1&WP5: support to partner teams in the following activities: implementation of surveys (key informant interviews, focus group discussions, individual interviews) to understand quality

characteristics, survey data analysis, participatory processing diagnosis, consumer testing; discussions with WP5 coordination team on the development of a new participatory methodology for breeders' use to assess the users' acceptance of new RTB hybrids prior to release;

- WP2: setting-up sensory panels on targeted RTB products in partners countries, follow-up on the implementation of the training workshop for sensory profiling by WP2 teams to be coordinate by CIRAD researchers; harmonization of methods and protocols for physicochemical analysis by partner laboratories to be coordinated by CIRAD team; if relevant biophysical analysis might be conducted by all CIRAD staff involved in WP2 at CIRAD and CIAT laboratories for specific analysis;
- WP3: standardization of HTP protocols to be coordinated by CIRAD leader; trainings of partners on HTP tools, especially on the hyperspectral camera to-be-acquired by CIRAD and some partner laboratories; complementary and specific support to be provided to WP3 partner teams by CIRAD team for spectra acquisition and development of calibration models for specific quality traits;
- WP4: field trials to be coordinated by the CIRAD WP4 coordinator.
- WP6: identification and consolidation of success stories on some RTB products; development of a MEL plan; development of a data management plan, of a communication strategy and setting up an online interface for knowledge management at project level and external communication purposes by the PMU.