



## **TOOLS4SEEDSYSTEMS: WORKING TOWARDS RESILIENCE THROUGH ROOT, TUBER AND BANANA CROPS IN HUMANITARIAN SETTINGS**

**CAPACITY NEEDS ASSESSMENT FOR ROOT, TUBER AND BANANA SEED  
INTERVENTIONS IN HUMANITARIAN SETTINGS: CAMEROON AND DRC  
TECHNICAL REPORT**

**OCT 2022 - MAR 2023**



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**October 2022 – March 2023**

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**Cover photo:** RTB Tools4SeedSystems survey team with members of the AFDIP members group, Kavumu, Kabare territory DRC.  
Photo credit: K. Ogero.

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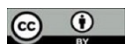
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## List of Acronyms

ABC	Alliance Bioversity-CIAT
AFDIP	Action de Fraternité pour le Development Integral des Paysans
ADEVESSE	[humanitarian organization working in DRC]
ADRA	Adventist Development and Relief Agency
CIP	International Potato Center
BHA	Bureau of Humanitarian Assistance
CNA	Capacity needs assessment
DDA	Direction du Développement de l'Agriculture
DRC	Democratic Republic of the Congo
DRCQ	Direction de la réglementation et du contrôle des intrants et des produits agricoles
EAC	East African Community
EKE	Expert knowledge elicitation
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FEWSNET	Famine Early Warning Systems Network
FFS	Farmer field school
Fh	Food for the Hungry
GAP	[humanitarian organization working in DRC]
IDP	Internally displaced person
IITA	International Institute of Tropical Agriculture
IRAD	Agricultural Research Institute for Development
IRC	International Rescue Committee
INERA	Institut National pour l'Etude et la Recherche Agronomiques
LAMP	Loop-mediated isothermal amplification
MINADER	Ministry of Agriculture and Rural Development
NPPO	National Plant Protection Organisation
NRC	Norwegian Refugee Council
OFSP	Orange-fleshed sweetpotato
QDS	Quality declared seed
R2M	Rapid Risk & Mitigation Meta Tool
RECCNUT	Réseau des Communes du Cameroun pour la Nutrition
RTB	Roots, tubers and bananas
SENASEM	National Seed Service (DRC)
SPNC	[humanitarian organization working in DRC]
ToT	Training of trainers
UEA	Université Evangelique en Afrique
UF	University of Florida
USAID	United States Agency for International Development
WFP	World Food Programme

## Extended summary (English)

This report presents the findings of capacity needs assessment (CNA) for root, tuber and banana (RTB) seed interventions in humanitarian settings. This was conducted as part of the project “Tools4SeedSystems: working towards resilience through root, tuber, and banana (RTB) crops in humanitarian settings”, which aims to strengthen the capacities of United States Agency for International Development (USAID) Bureau of Humanitarian Assistance (BHA) implementing partners and national institutions to improve the design and implementation of RTB humanitarian agricultural interventions. The overall objective of the CNA was to explore whether there is a disconnect between the agri-food system context and the agricultural response in humanitarian settings. In preparation for the CNA, we developed hypotheses about why implementing RTB agricultural programmes is a challenge in humanitarian contexts. The hypotheses were grouped into three themes: RTB crop characteristics; awareness, knowledge, and skills; and procurement systems. The findings from the CNA will inform the design of an appropriate and demand-driven capacity-strengthening programme.

The CNA was conducted from October 2022 until March 2023 and included five activities.

- A **mini workshop** was conducted in October 2022 in Cameroon. The objective was to introduce the USAID BHA Tools4SeedSystems project and understand current agricultural programmes and areas where BHA implementing partners are working.
- An **online survey**. Twenty-three humanitarian and national organizations from DRC (12) and from Cameroon (11) were invited to fill out an online survey. They were asked to characterize the humanitarian interventions of their organizations, evaluate the knowledge and skills in RTB crops of their organization, and express their interest in strengthening their capacity for the design and implementation of RTB interventions in humanitarian contexts.
- Key informant **interviews with international and national organizations and field visits** in the Democratic Republic of the Congo (DRC) (14-19 November 2022) and Cameroon (21-26 November 2022). This activity was conducted by a team of nine scientists from the International Potato Center (CIP), the Alliance Bioversity-CIAT, the International Institute of Tropical Agriculture (IITA), and the University of Florida (UF). Questions were grouped according to the type of organization: organizations that implement humanitarian interventions; national agricultural research institutes, the provincial ministry of agriculture for DRC and the national ministry of agriculture for Cameroon; and regulatory agencies for quality seed assurance.
- An **expert knowledge elicitation (EKE) on RTB disease and pest risk** with the purpose of developing an interactive meta-tool that will allow an organizing expert to collect data from other humanitarian experts to evaluate the risk of agricultural damage in a humanitarian location or to help countries develop their invasive crop pest and pathogen management strategies. RTB crops experts working in several regions of Cameroon were invited to a one-day workshop in November 2022 in Yaoundé. They were asked to characterize the grower population, agricultural system crop varieties and annual yield loss, report the most critical pests, pathogens, and diseases, characterize the seed system and seed degeneration, and determine the trade paths of seed, harvested products, and agricultural materials within the country and with neighbouring countries.

- A series of **online discussions to identify in-country target areas, training institutions, focus crops, varieties, etc. to inform the capacity strengthening** plan to be implemented by the USAID BHA Tools4SeedSystems project.

## Main results

The **online survey** showed that most of the respondents in Cameroon and DRC considered RTB crops as extremely important, very important, or important and highlighted key successes in working with RTB crops. These successes included that RTB crops are adapted to the agro-ecological conditions of their intervention areas and are among the food preferences of the beneficiaries; that RTB crops have a short-growth duration and harvest ranges between 4-12 months; the double consumption of leaves & tubers of cassava & sweetpotato improved their profitability; the introduction of the orange-fleshed sweetpotato & biofortified cassava varieties in rural communities improves the nutrition of beneficiaries; and that despite challenges related to access to land in their intervention areas, beneficiaries are able to produce a variety of RTB crops on small plots for their household food consumption. **Almost half of respondents note that the availability of planting material and the quality of that planting material were challenges.** Other challenges included: the transport and storage of seeds to keep the quality; the lack of funding; the low quantity of planting material purchased by the beneficiaries; the slow rate of adoption of new varieties of some RTB crops by farmers; the shortage of arable land due to persistent insecurity in the territories where IDPs live.

The **in-country interviews** with BHA implementing partners and key actors in the formal seed system deepened our understanding of key bottlenecks:

1. *Insufficient capacity of the regulatory bodies in terms of personnel and of plant disease diagnostic equipment for seed testing/diagnostic equipment as well as equipment to control pests/diseases in the field*
2. *The difficulty in distinguishing between what is seed or not for RTB crops*
3. *Implementing partners do not have demonstration plots for farmers to evaluate new varieties*
4. *Differences in access to the internet*
5. *No specific protocol or assessment tool to guide RTB seed interventions.*

In **DRC** there is no national seed law, and research and certification agencies have limited technical competencies. Seed enterprises have inadequate technical and financial capacities and there is poor management of the seed trade and regulation system. In **Cameroon**, the liberalisation of the seed system market often brings in non-registered seed producers/distributors. There is limited knowledge among available producers and inadequate capacity (technical and financial) to carry out seed inspections.

The insights from the **Expert Knowledge Elicitation (EKE) for rapid assessment of RTB crop pests and diseases** showed that diseases and pests constitute 31% to 45% of annual yield loss in all regions where RTB crops are grown. The Central and South regions were the most affected regions (with the highest numbers of pests and pathogens) for cassava, banana-plantain, and sweetpotato, with twelve, nine, and ten pests and pathogens reported, respectively. For potato, the West, Northwest, and Southwest regions are the most infested, with eight pests and pathogens reported. Seed degeneration in RTB crops is a problem in Cameroon because growers mainly use seeds recycled from season to season with limited attention to quality. The EKE found that there is a trade of seeds, harvested products and agricultural equipment between the different regions of the country, as well as a large movement of agricultural workers. It also highlighted that there is a strong informal trade network between Cameroon and neighbouring countries. This trade of agricultural commodities and the movement of

agricultural workers are major risk factors for the long-distance spread of diseases. Although this information is not based on precise data collected in the field, it gives us a quick overall idea and baseline of expert knowledge about the phytosanitary risk associated with these crops. It can inform decision-making by humanitarian organizations about where to buy clean seeds for beneficiaries and to have an idea of the pests and diseases that beneficiaries will face in their target areas. These results can also inform regional and national surveillance and mitigation strategies for crop pathogens and pests and serve as a baseline for more in-depth studies.

**Team discussions and reflection** led to the following priorities for capacity strengthening to respond to these findings:

1. **Rapid Multiplication Technologies (RMTs)** for RTB crops – *in-vitro*, early generation seed (EGS), field production depending on country. RMT allows the production of large quantities of planting material within a short time.
2. **Diagnostics for seed-borne diseases:** taking advantage of the foundation provided by other projects European Union support to National Plant Protection Organisations (NPPO) in the East African Community (EAC), continued training in the use of Loop-mediated isothermal amplification (LAMP).
3. **Seed Regulations** need to be adapted to be more applicable for humanitarian settings – e.g., Quality Declared Seed (QDS) type. Plant health issues need to be considered from the beginning by ensuring that starter material is sourced from documented pathogen-tested sources and ideally has genetic resistance or tolerance to main diseases.
4. **Increase availability of information about improved varieties:** through demonstration plots and improved access to catalogues for RTB.

In the initial phase of the project, **the proposed target crops and regions** for Cameroon and DRC are summarised in Table A below:

**Table A** Overview of proposed target crops and regions for Cameroon and DRC

Country selection	1st crop	2 <sup>nd</sup> crop	Region	Institution	Comments
Cameroon (2023)	<i>Sweetpotato</i>	Plantain	<i>Northwest (NW) and Southwest (SW) regions</i>	<i>CPF Mbouo, West Region to provide ToT for BHA IPs, IRAD and MINADER in NW/SW</i>	Although Adamawa ranked 1 <sup>st</sup> region – plantain is not as common there, as in the NW/SW. CIP has office and staff in West region. BHA partners from NW and SW can travel to the West Region to participate in trainings
Cameroon (2023-24)	<i>Sweetpotato</i>	Under discussion	Adamawa and East regions	<i>University of Ngaoundere, Adamawa Region</i>	To support BHA IPs in East and Far North Regions. Potential link with WFP school garden support for dissemination of OFSP planting material
DRC (2024-26)	<i>Cassava</i>	Banana	South Kivu and Kasai	<i>INERA</i>	

Source: CIP, IITA, ABC, UoF, WUR project team

Nearly all the organizations that participated in this survey expressed interest in strengthening their capacity to design and implement RTB crop interventions in humanitarian contexts. They also mentioned that the most

appropriate modality for capacity strengthening is in-country capacity strengthening opportunities (with demonstrations) followed by learning networks, on-line webinars, and e-learning modules.

**In conclusion three points of note:**

1. Among respondents, there is recognition of the important role that RTB crops can play in responding to the needs of populations in humanitarian settings. Based on the findings, we can confirm the hypotheses that the reasons for limited RTB crop interventions are multi-faceted and relate to the crop characteristics, awareness and knowledge, and procurement systems. Key challenges are the availability of RTB planting material and assuring and maintaining its quality.
2. The CNA focused on national institutions, and there is currently limited understanding of how farmer-managed seed systems function in humanitarian settings, in particular gender roles and constraints.
3. Training in seed production technologies and quality assurance practices are the priority areas for support. The diagnostic tools available through the RTB Toolbox, are not an immediate priority for capacity strengthening, however, selected tools can be used to better understand the potential interaction between the formal seed system and farmer-managed seed systems.

## Extended summary (French)

Ce rapport présente les conclusions de l'étude sur l'Évaluation des besoins en capacités (CNA) pour les interventions en matière de semences de Racines, Tubercules et Bananes (RTB) dans les contextes humanitaires. Cette évaluation a été réalisée dans le cadre du projet « Boîte à outils Tools4SeedSystems: renforcer la résilience grâce à la culture des racines, tubercules et bananes dans les situations humanitaires » dont le but est de développer les capacités des partenaires de mise en œuvre du Bureau pour l'assistance humanitaire (BHA) de l'Agence des États-Unis pour le développement international (USAID) et des institutions nationales afin d'améliorer la conception et la mise en œuvre des interventions agricoles humanitaires en faveur des racines, tubercules et bananes. L'objectif global de la CNA était d'explorer la possibilité d'un décalage entre le contexte du système agroalimentaire et la réponse agricole dans les situations humanitaires. Pendant la préparation de la CNA, nous avons développé des hypothèses sur les raisons pour lesquelles la mise en œuvre de programmes agricoles RTB est un défi dans les contextes humanitaires. Les hypothèses ont été regroupées en trois thèmes : Les caractéristiques des cultures RTB ; la sensibilisation, les connaissances et les compétences ; et les systèmes d'approvisionnement. Les résultats de la CNA serviront de base à la conception d'un programme de renforcement des capacités approprié et axé sur la demande.

La CNA s'est déroulée d'octobre 2022 à mars 2023 et comprenait cinq activités.

- Un **mini-atelier** organisé en octobre 2022 au Cameroun. L'objectif était de présenter le projet Tools4SeedSystems du BHA de l'USAID et de comprendre les programmes agricoles actuels ainsi que les domaines dans lesquels les partenaires de mise en œuvre du BHA travaillent.
- Une **enquête en ligne**. Vingt-trois organisations humanitaires et nationales de la RDC (12) et du Cameroun (11) ont été invitées à répondre à une enquête en ligne. Il leur a été demandé de caractériser les interventions humanitaires de leurs organisations, d'évaluer les connaissances et les compétences de leur organisation en matière de cultures RTB, et d'exprimer leur intérêt pour le renforcement des capacités de conception et de mise en œuvre des interventions RTB dans les contextes humanitaires.
- Entretiens avec des informateurs clés **d'organisations internationales et nationales et visites de terrain** en République démocratique du Congo (RDC) (14-19 novembre 2022) et au Cameroun (21-26 novembre 2022). Cette activité a été menée par une équipe de neuf chercheurs du Centre international de la pomme de terre (CIP), de l'Alliance Bioversity-CIAT, de l'Institut international d'agriculture tropicale (IITA) et de l'Université de Floride (UF). Les questions ont été regroupées en fonction du type d'organisation : organisations de mise en œuvre des interventions humanitaires ; instituts nationaux de recherche agricole, ministère provincial de l'agriculture pour la RDC et ministère national de l'agriculture pour le Cameroun ; et organismes de réglementation pour l'assurance de la qualité des semences.
- Une **Élicitation des connaissances d'experts (EKE) sur les risques de maladies et de ravageurs des cultures RTB** dans le but de développer un méta-outil interactif qui permettra à un expert organisateur de collecter des données auprès d'autres experts humanitaires afin d'évaluer le risque de dommages agricoles dans un lieu humanitaire ou d'aider les pays à développer leurs stratégies de gestion des ravageurs et des pathogènes des cultures envahissantes. Les experts en cultures RTB travaillant dans plusieurs régions du Cameroun ont été invités à un atelier d'une journée en novembre 2022 à Yaoundé. Il leur a été demandé de caractériser la population de cultivateurs, les variétés de cultures du système

agricole et la perte de rendement annuel, de signaler les ravageurs, les pathogènes et les maladies les plus critiques, de caractériser le système semencier et la dégénérescence des semences, et de déterminer les voies commerciales des semences, des produits récoltés et des matières agricoles à l'intérieur du pays et avec les pays voisins.

- Une série de **discussions en ligne pour identifier les zones cibles dans le pays, les institutions de formation, les cultures cibles, les variétés, etc. pour informer le plan de renforcement des capacités** à mettre en œuvre par le projet Tools4SeedSystems du BHA de l'USAID.

## Principaux résultats

L'**enquête en ligne** a montré que la plupart des personnes interrogées au Cameroun et en RDC considéraient les cultures RTB comme extrêmement importantes, très importantes ou importantes et ont mis en évidence les principales réussites dans le travail avec les cultures RTB. Ces succès incluent le fait que les cultures RTB sont adaptées aux conditions agroécologiques de leurs zones d'intervention et font partie des préférences alimentaires des bénéficiaires ; que les cultures RTB ont une courte durée de croissance et que la récolte s'étale sur 4 à 12 mois ; la double consommation de feuilles et de tubercules de manioc et de patate douce a amélioré leur rentabilité ; l'introduction de variétés de patates douces à chair orange et de manioc biofortifiées dans les communautés rurales améliore la nutrition des bénéficiaires ; et que malgré les défis liés à l'accès à la terre dans leurs zones d'intervention, les bénéficiaires sont en mesure de produire une variété de cultures RTB sur de petites parcelles pour la consommation alimentaire de leur ménage. **Près de la moitié des personnes interrogées ont indiqué que la disponibilité du matériel de plantation et la qualité de ce matériel constituaient des défis.** Parmi les autres difficultés, citons : le transport et le stockage des semences pour en préserver la qualité ; le manque de financement ; la faible quantité de matériel de plantation acheté par les bénéficiaires ; la lenteur de l'adoption de nouvelles variétés de certaines cultures RTB par les agriculteurs ; la pénurie de terres arables due à l'insécurité persistante dans les territoires où vivent les personnes déplacées à l'intérieur de leur pays.

Les **entretiens menés dans le pays** avec les partenaires de mise en œuvre du BHA et les acteurs clés du système semencier formel ont permis d'approfondir notre compréhension des principaux goulets d'étranglement :

1. *Capacité insuffisante des organismes de réglementation en termes de personnel et d'équipement de diagnostic des maladies des plantes pour les tests de semences/équipement de diagnostic ainsi que l'équipement pour contrôler les ravageurs/maladies sur le terrain.*
2. *La difficulté à distinguer ce qui est semence ou non pour les cultures RTB*
3. *Les partenaires de mise en œuvre ne disposent pas de parcelles de démonstration permettant aux agriculteurs d'évaluer les nouvelles variétés.*
4. *Différences d'accès à l'internet*
5. *Pas de protocole spécifique ou d'outil d'évaluation pour guider les interventions en matière de semences RTB.*

En **RDC**, il n'existe pas de loi nationale sur les semences et les agences de recherche et de certification ont des compétences techniques limitées. Les entreprises semencières ont des capacités techniques et financières inadéquates et la gestion du commerce des semences et du système de réglementation est médiocre. Au **Cameroun**, la libéralisation du marché des semences entraîne souvent l'arrivée de producteurs/distributeurs de

semences non enregistrés. Les connaissances des producteurs disponibles sont limitées et les capacités (techniques et financières) d'inspection des semences sont insuffisantes.

Les résultats de **l'évaluation rapide des ravageurs et des maladies des cultures de RTB par des experts** ont montré que les maladies et les ravageurs représentent 31% à 45% de la perte de rendement annuelle dans toutes les régions où les cultures de RTB sont cultivées. Les régions du centre et du sud sont les plus touchées (avec le plus grand nombre de ravageurs et de pathogènes) pour le manioc, la banane-plantain et la patate douce, avec respectivement douze, neuf et dix ravageurs et pathogènes signalés. Pour la pomme de terre, les régions de l'Ouest, du Nord-Ouest et du Sud-Ouest sont les plus infestées avec huit ravageurs et pathogènes signalés. La dégénérescence des semences dans les cultures RTB est un problème au Cameroun parce que les producteurs utilisent principalement des semences recyclées d'une saison à l'autre et ne prêtent qu'une attention limitée à la qualité. L'EKE a constaté qu'il existe un commerce de semences, de produits récoltés et d'équipements agricoles entre les différentes régions du pays, ainsi qu'un important mouvement de travailleurs agricoles. Elle a également mis en évidence l'existence d'un solide réseau commercial informel entre le Cameroun et les pays voisins. Ce commerce de produits agricoles et les mouvements de travailleurs agricoles sont des facteurs de risque importants pour la propagation de maladies sur de longues distances. Bien que ces informations ne soient pas basées sur des données précises collectées sur le terrain, elles nous donnent rapidement une idée générale et une base de connaissances d'experts sur le risque phytosanitaire associé à ces cultures. Elles peuvent aider les organisations humanitaires à prendre des décisions quant à l'achat de semences propres pour les bénéficiaires et à se faire une idée des ravageurs et des maladies auxquels ces derniers seront confrontés dans les régions qu'ils ciblent. Ces résultats peuvent également éclairer les stratégies régionales et nationales de surveillance et d'atténuation des pathogènes et des ravageurs des cultures et servir de référence pour des études plus approfondies.

**Les discussions et la réflexion de l'équipe** ont permis de dégager les priorités suivantes en matière de renforcement des capacités pour répondre à ces conclusions :

1. **Technologies de multiplication rapide (RMT)** pour les cultures RTB - in-vitro, Semences de première génération (EGS), production sur le terrain en fonction du pays. Les technologies de multiplication rapide permettent de produire de grandes quantités de matériel de plantation en peu de temps.
2. **Diagnostic des maladies transmises par les semences** : profiter de la base fournie par d'autres projets (soutien de l'UE aux ONPV de la Communauté d'Afrique de l'Est (EAC), formation continue à l'utilisation du LAMP).
3. **Les réglementations sur les semences** doivent être adaptées afin d'être plus applicables aux situations humanitaires - par exemple, le type de Semences de qualité déclarée (QDS). Les questions phytosanitaires doivent être prises en compte dès le départ en veillant à ce que le matériel de départ provienne de sources documentées et testées sur les agents pathogènes et, idéalement, qu'il présente une résistance génétique ou une tolérance aux principales maladies.
4. **Augmenter les informations disponibles sur les variétés améliorées** : par le biais de parcelles de démonstration et améliorer l'accès aux catalogues pour la RTB.

Dans la phase initiale du projet, **les cultures et régions cibles proposées** pour le Cameroun et la RDC sont résumées dans le tableau A ci-dessous :

**Tableau A** Aperçu des cultures cibles et des régions proposées pour le Cameroun et la RDC

Pays	1ère culture	2ème culture	Région	Institution	Commentaires
Cameroun (2023)	<i>Patate douce</i>	Plantain	<i>Nord-Ouest (NO) et Régions du sud-ouest (SO)</i>	<i>CPF Mbouo, Région Ouest pour fournir une formation aux Partenaires d'exécution (PE) du BHA, à l'IRAD et au MINADER dans le Nord-Ouest et le Sud-Ouest</i>	Bien que l'Adamaoua ait été classée première région, le plantain n'y est pas aussi répandu que dans le Nord-Ouest et le Sud-Ouest. Le CIP a un bureau et du personnel dans la région Ouest. Les partenaires BHA du Nord-Ouest et du Sud-Ouest peuvent se rendre dans la région Ouest pour participer aux formations.
Cameroun (2023-24)	<i>Patate douce</i>	En cours de discussion	Régions de l'Adamaoua et de l'Est	<i>Université de Ngaoundéré, région de l'Adamawa</i>	Soutenir les PE du BHA dans les régions de l'Est et de l'Extrême-Nord. Lien potentiel avec le soutien du PAM aux jardins scolaires pour la diffusion du matériel de plantation de l'OFSP.
RDC (2024-26)	<i>Manioc</i>	Banane	Sud Kivu et Kasai	<i>INERA</i>	

Source : CIP, IITA, ABC, UoF, équipe de projet WUR

Presque toutes les organisations qui ont participé à cette enquête ont exprimé leur intérêt pour le renforcement de leurs capacités à concevoir et à mettre en œuvre des interventions de cultures RTB dans des contextes humanitaires. Elles ont également mentionné que la modalité la plus appropriée pour le renforcement des capacités était les opportunités de renforcement des capacités dans le pays (avec des démonstrations), suivies par les réseaux d'apprentissage, les webinaires en ligne et les modules d'apprentissage en ligne.

**En conclusion, trois points sont à noter :**

1. Les personnes interrogées reconnaissent le rôle important que les cultures RTB peuvent jouer pour répondre aux besoins des populations dans les situations humanitaires. Les raisons pour lesquelles les interventions dans ce domaine sont limitées, multiples et concernent les caractéristiques des cultures, la sensibilisation et les connaissances, ainsi que les systèmes d'approvisionnement. Les principaux défis sont la disponibilité du matériel végétal de RTB et l'assurance et le maintien de sa qualité.
2. La CNA s'est concentrée sur les institutions nationales, et il y a actuellement une compréhension limitée de la façon dont les systèmes de semences gérés par les agriculteurs fonctionnent dans les contextes humanitaires, en particulier les rôles et les contraintes liés au genre.
3. La formation aux technologies de production de semences et aux pratiques d'assurance qualité sont les domaines prioritaires pour le soutien. Les outils de diagnostic disponibles dans la boîte à outils RTB ne constituent pas une priorité immédiate pour le renforcement des capacités. Toutefois, des outils sélectionnés peuvent être utilisés pour mieux comprendre l'interaction potentielle entre le système semencier formel et les systèmes semenciers gérés par les agriculteurs.

# 1 INTRODUCTION

Root, tuber, and banana (RTB) crops are versatile and nutritious staples that produce more food per unit of land area than many other crops. They are often managed by women and are generally less affected by climate change than cereal crops. Yet humanitarian actors are often unaware of these crops' current role and contribution to local agricultural systems to rebuild sustainable livelihoods. Moreover, the long crop cycle of some of these RTBs and the characteristics of their seeds can pose specific challenges for supply systems. This can significantly reduce the performance of their RTB-based agribusiness interventions.

The International Potato Center (CIP), in collaboration with other partners, was awarded a grant from the USAID Bureau for Humanitarian Assistance (BHA). This project aims to improve the effectiveness and relevance of USAID-BHA agricultural programming investments in countries with RTB-based agrifood systems to achieve food security and resilience. This will be achieved by assessing existing interventions and needs and providing advanced training and technical support in partnership with local training institutions and other public and private sector actors for relevant value chains.

The [Toolbox for RTB seed systems](#) is one of the resources to improve the capacities of BHA partners to include RTB crops effectively in their interventions. This toolbox is a collection of methodologies to study and improve seed systems of RTB crops. This toolbox has been used in research and development contexts but not in humanitarian contexts. During this project, we will determine if the methodologies from this toolbox can be adapted to humanitarian contexts or if new methodologies are needed, based on the needs of BHA partners.

This document presents the findings from a capacity needs assessment (CNA) for the design and implementation of RTB interventions in humanitarian settings. The CNA aimed to explore whether there is a disconnect between the agri-food system context and the agricultural response in humanitarian settings? If so, why, and how does it present itself? This information would help in designing an appropriate and demand-driven capacity strengthening programme. In preparation for the CNA, we developed the following hypotheses about why implementing RTB agricultural programmes is a challenge in humanitarian contexts. The hypotheses were grouped into three themes: RTB crop characteristics; awareness, knowledge, and skills; and procurement systems.

## **RTB crop characteristics**

- Seed and crop production cycles for some RTB crops are too long to show impact within the typical length of humanitarian intervention. The exceptions are potato and sweetpotato that take between 3 to 4 months.
- Time windows and timelines of harvest – procurement/storage - distribution – planting difficult to organize (compared to seed of grain crops).

## **Awareness, knowledge & skills**

- Inadequate awareness/capacity of potential for RTB programmes in humanitarian contexts and access to expertise.
- Implementing partners have an inadequate technical and institutional capacity for RTB programme design and implementation.
- Needs assessments do not reflect an understanding of existing agri-food systems.

### **Procurement systems**

- Procurement systems are not organized to purchase perishable and bulky planting material.
- Few organized (formal/informal) sources of planting materials of RTB crops with adequate capacity (volumes) available.
- Procurement systems use tender processes with registered seed companies that are not appropriate for sourcing from RTB seed producers.

The **outputs** from the CNA are intended to:

- Contribute to the design of capacity strengthening plan to support improved design and implementation of root tuber and banana agricultural interventions in humanitarian contexts
- Inform identification of training institutions to co-host demo plots and TOT in RTB Toolbox
- Inform selection of priority crop/s (varieties), and confirm quantities and sources for EGS and inputs for demo plots
- Assess data availability for sweetpotato/potato/banana seed requirement estimate tool
- Pilot proto-type plant disease and pest risk assessment tool for use in humanitarian contexts
- Inform the timeline of key activities until August 2023

The CNA was conducted from October 2022 until March 2023 and included five activities.

1. Mini-workshop (Cameroon)
2. Online survey
3. Interviews with international and national organizations and field visits
4. Expert knowledge elicitation (EKE) on RTB disease and pest risk
5. Post-visit discussions to define training institutions, main crops, varieties, etc.

## 2 METHODOLOGY

### 2.1 Mini workshop

In Cameroon, 14 colleagues (21% female) from government departments (MINADER, IRAD), non-government organizations and USAID Bureau of humanitarian assistance (BHA) partners implementing agricultural programmes in humanitarian contexts, and CGIAR centers participated in a half-day workshop in October 2022. The objective was to introduce the USAID BHA Tools4SeedSystems project and understand current agricultural programmes and areas where BHA implementing partners were working. Participants made brief presentations of their activities, followed by a general discussion to clarify the scope of activities of the new project, timeline, and key issues to consider during implementation.

### 2.2 Online survey

We surveyed 12 humanitarian (financed by BHA), and national organizations from DRC and 11 humanitarian organizations (financed by BHA) and national organizations from Cameroon (See Annex 1a and 1b). The most appropriate respondent was selected by the head of the organization to complete the online survey. Respondents were asked to 1) confirm their consent to participate in the survey, 2) provide information about their organization and their position in the organization, 3) characterize the humanitarian interventions of their organization, 4) evaluate the knowledge and skills in RTB crops of their organization, and 6) express their interest in strengthening capacity for the design and implementation of root, tuber, and banana interventions in humanitarian contexts. The online survey is available in Annex 2 and in this link: [online survey](#).

### 2.3 Interviews with international and national organizations and field visit

Visits were made by a team of nine scientists from CIP, the Alliance Bioversity-CIAT, the International Institute of Tropical Agriculture (IITA), and the University of Florida (UF) to South and North Kivu provinces in the Democratic Republic of the Congo (DRC) (14-19 November 2022) and Cameroon (21-26 November 2022) (See Annex 3 for in-country schedule). Face-to-face interviews with representatives of international and national organizations that are funded by BHA were conducted to complement information collected on the online survey and to explore in more detail the capacity needs and interest of BHA partners to use RTB crops in humanitarian interventions. Key informant interviews or focus group discussions were conducted in English or French and took between 60 to 90 minutes each. We had a check list of open-ended questions that guided the discussions. Each interview started with participants' self-introduction. Then one of the interviewed team briefly described the organization. Similarly, one from our team briefly described the importance of RTB crops, their seed systems, and then the project. Thereafter, the check list was followed to guide the interview. Questions were grouped according to the type of organization: organizations that implement humanitarian interventions; national agricultural research institutes, the provincial ministry of agriculture for DRC and the national ministry of agriculture for Cameroon; and regulatory agencies for quality seed assurance. Information on partners interviewed is available in Annex 1a for DRC and Annex 1b for Cameroon. The questions are available in Annex 4.

In DRC the visit was conducted by the team of six persons: two from IITA, one from Alliance Bioversity CIAT and three from CIP. Five organizations were visited in South Kivu and three in North Kivu. In Cameroon the visit was conducted by a team of six persons: one from UF, one from the Alliance Bioversity-CIAT and four from CIP. In Cameroon the Expert Knowledge Elicitation (EKE) for the R2M was conducted after the main visit by the UoF

team member. Eight organizations were visited in Yaoundé. The schedule of interviews for each country is presented in Annex 3.

#### **2.4 Expert knowledge elicitation (EKE) on RTB disease and pest risk**

Considering the limited database on agriculture in humanitarian settings, it is possible to collect data from experts (i.e., expert knowledge elicitation, EKE) as a rapid and efficient way to acquire baseline data. The goal is to develop an interactive interface (a Rapid Risk and Mitigation (R2M) meta-tool, [link](#)) that would allow any expert around the world to set up a quick and efficient survey of experts. This meta-tool would allow an investigator to collect data from other experts to evaluate the risk of agricultural damage in a humanitarian setting or to help countries develop their invasive crop pest and pathogen management strategies. We conducted the EKE exercise to design and validate questions that will be available in our meta-tool. This exercise will take place in several countries around the world to build an efficient, interdisciplinary, intercultural, and inclusive R2M meta-tool.

To conduct this exercise, 13 RTB crops experts working in several regions of Cameroon were invited to a one-day workshop in November 2022 in Yaoundé. These experts were drawn from governmental organizations, private sector and CGIAR centers (IITA, CIP, and Alliance Biodiversity-CIAT). After a brief presentation of the project and its objectives (Annex 5). Four separate instruments were prepared on pest and pathogen risks for cassava, banana-plantain, potato, and sweetpotato (Annex 6). The experts were encouraged to complete the surveys individually, each according to his or her crop of expertise. In each survey, the experts were asked to 1) confirm their consent to participate in the survey, 2) provide some information on their expertise, 3) Characterize the grower population, agricultural system crop varieties and annual yield loss 4) report the most critical pests, pathogens, and diseases, 5) characterize the seed system and seed degeneration, and 6) determine the trade paths of seed, harvested products, and agricultural materials within the country and with neighbouring countries.

#### **2.5 Post-visit discussions**

Several online meetings were held with experts from CIP, IITA, the Alliance Bioiversity-CIAT and the University of Florida to review the findings and implications for the preparation of the capacity-strengthening plan. This included criteria for identifying training institutions, focus crops, varieties, for in-country training events, demonstration plots, and a virtual training event that will be conducted in late May 2023.

### 3 RESULTS AND DISCUSSION

#### 3.1 Mini workshop

Table 1 shows regions in Cameroon where BHA implementing partners are implementing humanitarian agricultural activities. Humanitarian interventions are targeting the Far North, North, Southwest, and Northwest regions. However, all regions have populations affected by different humanitarian crises, either directly or through displacement. Table 2 shows the main agricultural interventions by organisations which participated in the workshop.

Plenary discussion highlighted the following issues:

- ✓ The importance of linking new varieties for different contexts and all the information that accompanies these varieties.
- ✓ Finding intervention strategies that meet both long-term and short-term needs.
- ✓ Capacity building.
- ✓ Seed quality assurance.
- ✓ Knowing what others are doing and seeing what synergies exist.

**Table 1** Geographical regions where organisations have agricultural programmes in Cameroon.

Organisation	BHA funding	Northwest	Southwest	West	East	Adamawa	North	Far North
Nascent Solutions	In the past	X	X		X	X	X	
Peace Corps	No							
IRC	Yes		X					X
Intersos	yes							X
RECCNUT	No				X	X	X	X
WFP	yes	X	X		X	X		X
FAO	??							
FEWSNET	??							
MINADER (DRCQ)	No	X	X	X	X	X	X	X
IRAD	No							
MINADER (DDA)	No	X	X		X	X	X	X
ABC	No							
IITA	??							
CIP	Yes	X		X		X		

Source: Tools4SeedSystems: working towards resilience through root, tuber and banana crops in humanitarian settings. Cameroon introductory workshop: Yaoundé, 5 October 2022

**Table 2** Brief description of agricultural activities undertaken by organisations participating in mini-workshop, Yaoundé, Cameroon. October 2023.

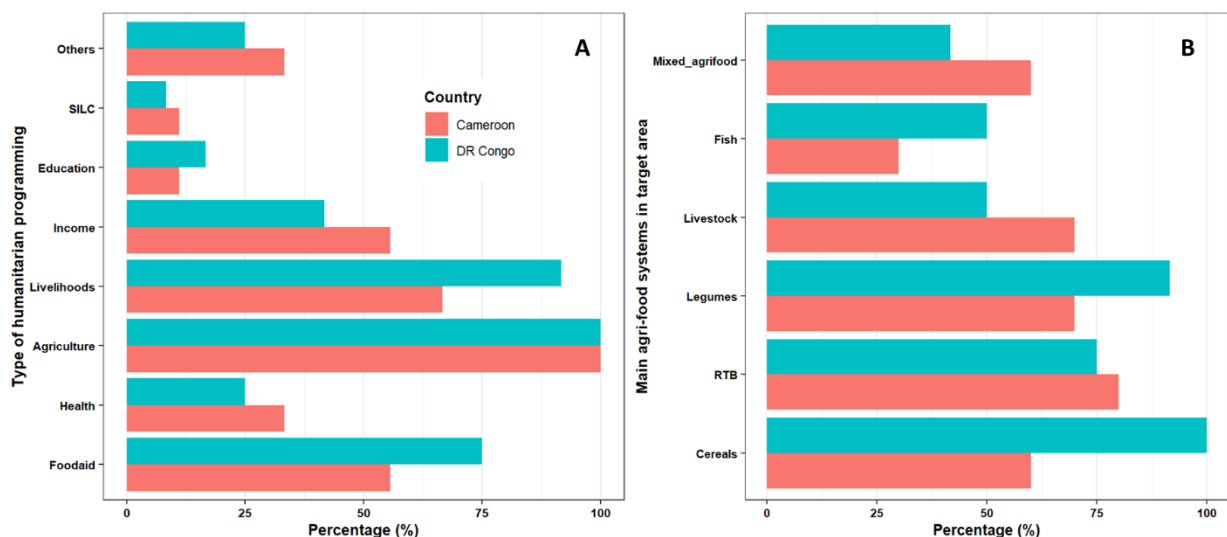
Organisation	Type of activities
Nascent Solutions	Work from a development perspective, but they respond to humanitarian needs, especially in the context of economic recovery. Work in partnership with local NGOs and enable communities to be resilient by accompanying them in accessing inputs and development tools. The NGO has a school feeding program funded by USDA in which they would like to introduce orange-fleshed sweetpotato (OFSP) to strengthen the nutrition component.
Peace Corps	Capacity-building of small-scale producers through farmer field schools. Introduced OFSP varieties in Cameroon from CIP Nairobi and recommended upscaling Ejumula and Vita varieties. Working on the promotion of cassava varieties.
IRC	They work with beneficiaries selected based on real needs, using local resources. They wish to access the clean seed. The seed is normally obtained from the ministry in charge of agriculture and local dealers.
Intersos	They work with beneficiaries selected based on real needs, using local resources (seed from the market) Beneficiaries work in groups.
RECCNUT	Contribute to the prevention of malnutrition among children and pregnant women through the production and consumption of orange sweet potatoes; own plots for seed production but lack clean plating materials.
WFP <sup>1</sup>	Home based school feeding programme using cassava-based bread. Opportunity and interest to use OFSP if consistent supply of roots
FAO	
FEWSNET	Conducts food security needs and policy analyses
MINADER (DRCQ)	Seed inspection. Cassava and plantain regulations under revision
IRAD	Basic seed production for RTB crops
MINADER (DDA)	Administrator of seed production in Cameroon. Cassava, potato, and banana are flagship products identified in the national development strategy. <b>In 2023, MINADER will implement a project in the humanitarian sector, financed by the World Bank at about 60 billion FCFA.</b>
ABC	involved in landscape restoration projects
IITA	promotion of crop varieties such as cassava, plantain, banana, and many others.
CIP	Two GIZ funded projects, CIP supports IRAD with early generation seed potato production, works with the government of Cameroon in updating the National Strategy for the development of the potato sector. A GIZ regional project is also supporting NPPOs in disease diagnostics for seed potato. New USAID-BHATools4SeedSystems project.

Source: Tools4SeedSystems: working towards resilience through root, tuber and banana crops in humanitarian settings. Cameroon introductory workshop: Yaoundé, 5 October 2022

### 3.2 Online survey

Twenty-three organizations (12 in DRC and 11 in Cameroon) completed the online survey. All the organizations mentioned that agriculture represents the main type of humanitarian interventions implemented both in DRC and in Cameroon (Figure 1A). In DRC, the main agri-food systems in the target areas include cereals, legumes and RTB crops (Figure 1B). In Cameroon, the main agri-food systems in the target areas include RTB crops, legumes, and livestock (Figure 1B). The main beneficiaries in DRC are farmers, displaced, and local NGOs, and in Cameroon are farmers, local NGOs, and refugees. Women constitute the main gender group of beneficiaries, and most beneficiaries live in communities.

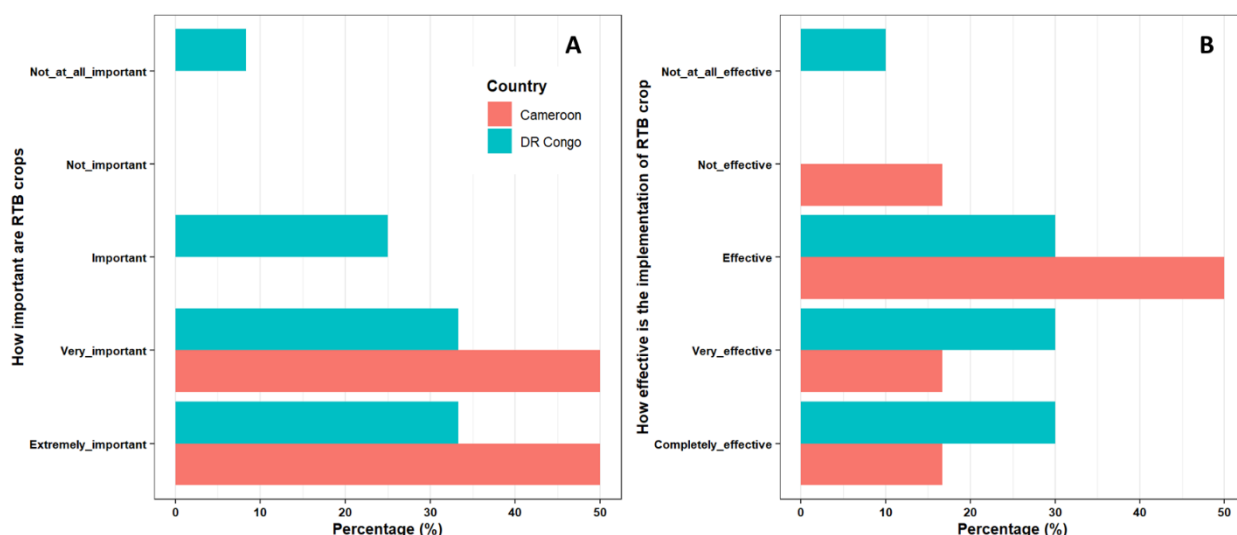
<sup>1</sup> WFP did not participate in the mini workshop, but McEwan had informal meeting with Country Director Ms. Wanja Kaaria.



**Figure 1.** Characteristics of humanitarian interventions: (A) type of humanitarian programming; (B) main agri-food systems in target area.

### 3.2.1 Awareness, knowledge, and skills of humanitarian organizations

All the humanitarian organizations considered RTB crops as extremely important or very important in Cameroon, while in DRC more than 90% of humanitarian organizations considered RTB crops as extremely important, very important, or important, and less than 10% considered RTB crops as not important at all (Figure 2A). Regarding the implementation of activities with RTB crops, more than 80% of humanitarian organizations in Cameroon and more than 90% in DRC considered that they are completely effective, very effective, or effective, and less than 20% considered that they are not effective in Cameroon and around 10% are not effective at all in DRC (Figure 2B).



**Figure 2.** Importance of RTB crops (A) and effectiveness of implementation of activities with RTB crops (B).

Table 3 summarises the key challenges of working with RTB crops mentioned by online survey respondents. These included: invasion of crop pests and diseases, crop diseases in coco-yams (*Colocassia*) blight affecting production; inavailability of a healthy field because pests and diseases infest target area; availability of clean planting material, the lack of seeds; access of quality seed material for smallholder farmers; the transport and the storage of seeds to keep the quality; the lack of funding; the low quantity of planting material purchased by

the beneficiaries; slow rate of adoption of new varieties of some RTB crop by farmers; the shortage of arable land due to persistent insecurity in the territories where IDPs live.

**Table 3** Percentage of respondents reporting different challenges

Challenges	% responses (n=17)
1. Diseases (and finding areas with low disease pressure)	29%
2. Availability of (clean) planting material	18%
3. Transportation (of cassava)	12%
4. Seed Fair modality: i) means that farmers purchase small quantities of many crops; (ii) only improved varieties with high productivity and disease resistance	12%
5. Land issues	6%
6. Other: no funding (i), no monitoring (i), not undertaken (i), slow adoption of new varieties (i)	23%

Source: CNA on-line survey, November-December 2022.

Humanitarian organizations also indicated the key success in working with RTB crops, such as: RTB crops are adapted to the agro-ecological conditions of their intervention areas (Adamawa, East, Central, South, Littoral, Northwest, Southwest, Far North (district of Mokolo)); RTB crops are food preferences of the beneficiaries; the collaboration with extension services (like IRAD and CIP) sometimes provide good quality of seeds for beneficiaries; RTB crops have a short-growth duration and harvest ranges between 4-12 months; the double consumption of leaves and roots of cassava and sweetpotato improved their profitability; the introduction of the orange-fleshed sweetpotato and biofortified cassava varieties in rural communities improved the nutrition well-being of beneficiaries; despite all the challenges related to access to land in their intervention areas, beneficiaries were able to produce a variety of RTB crops on small plots for their household food consumption.

(More [results and R codes here](#))

### 3.2.2 Interest in support to strengthen capacities for the design and implementation of RTB interventions in humanitarian contexts

Nearly all the organizations that participated in this survey expressed interest in strengthening their capacity to design and implement RTB crop interventions in humanitarian contexts. They also mentioned that the most appropriate modality for capacity strengthening is in-country capacity strengthening opportunities (with demonstrations) followed by learning networks, on-line webinars, and e-learning modules.

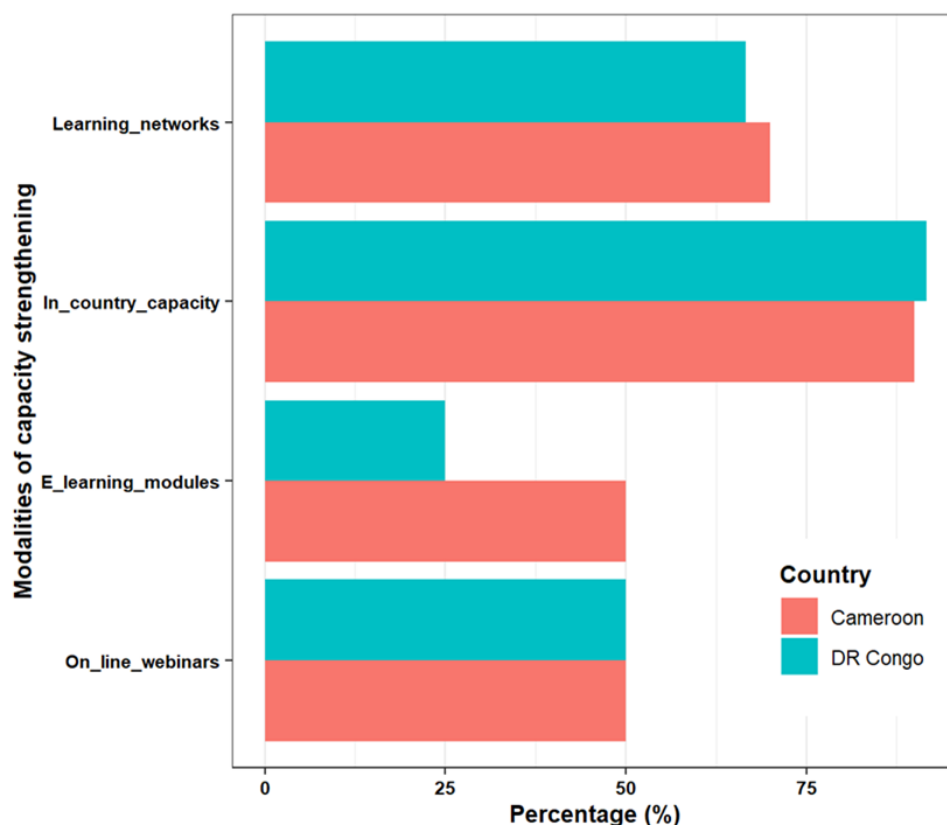


Figure 3. Appropriate modalities for capacity strengthening reported by humanitarian organizations.

### 3.3 In-country interviews

#### 3.3.1 Background, activities, and constraints for organizations implementing RTB crop interventions in humanitarian settings

(See Annex 7 for details)

**In Cameroon**, the cropping season varies from a single rainy season (in the Far North) to a more humid tropical rainforest in the south. Production is mostly rain-fed but support for irrigation is also given. Some farmers own pumps and can produce off-season by irrigating. The main crops are cereals, RTB crops exist in certain areas like Mokolo (e.g., sweetpotato, potato and cassava). In the Northwest and Southwest there are two seasons, however, there is no seed provision currently due to the crisis.

**The South-Kivu province, DRC** is characterized mostly by equatorial vegetation and land extending from high altitudes and plateau areas reaching closely 3,500m alongside the western coast of Lake Kivu and descending westward down to a less densely populated area at approximately 500m and equatorial forest area. In this region, soils are very acidic with abundant rainfall, allowing for two extended growing seasons, primarily from

September to December, and March through May. South Kivu has a tropical savanna and warm summer climate, with an average monthly temperature of 21°C. Production is mostly rain-fed with no irrigation investment. The average annual rainfall is over 1,600mm and the minimum average is 1,000mm. Farmers produce mainly cassava, beans, maize, soybeans, groundnuts, banana, sorghum, Irish potato, taro, sweetpotatoes, onions, tomatoes and other horticulture products as food crops, and coffee, tea, cinchona and palm oil as cash crops depending on their agro ecological zone.

**The beneficiaries include internally displaced persons (IDPs), refugees, host families, returnees** (i.e., persons who are going back to their communities after war or other crises). Humanitarian institutions work with local authorities to identify the beneficiaries in each area. In both countries, the interventions depend on vulnerability assessments of the beneficiaries/ clients. In Cameroon, for example, InterSOS reported conducting surveys to characterize farmer preferences (main crops are cereals) and associate it with local weather conditions (Foire approach). Crops and varieties are selected by beneficiaries and by area (e.g., in area where there is high malnutrition) they distribute sweetpotato.

Many local NGOs are working with humanitarian organizations in both countries. In the DRC, organizations like ADEVESS, GAP, SPNC, etc are involved. In Cameroon, food security and nutrition clusters work at the national level, coordinated by FAO and WFP. In South-Kivu, DRC humanitarian organizations provide food, planting materials and sometimes cash to beneficiaries. While emergency-focused projects distribute food or cash, development projects distribute planting materials. Sweetpotato, potato and cassava are the RTB crops most distributed. In Cameroon, interventions include school feeding programs and the provision of food, money, and seed material (mostly cereals) and agricultural inputs. Variety choices are guided by SENASEM and INERA variety catalogues, but these are not accessible online. In South-Kivu, the partners generally do not have **demonstration plots**. They simply distribute planting materials from the seed producers to farmers. In Cameroon, InterSOS has demonstration plots in villages and used farmer field school (FFS) approach to compare technologies and interventions for cereals. The relevant regulatory boards do seed quality control, while in Cameroon, NASCENT depends on MINADER for technical support, including demo trials.

The **quantity of planting material** supplied varies from one organization to another. The BHA organizations have a guideline that defines the minimum package to distribute to beneficiaries. While some organizations were not able to recall the quantities of planting material distributed in the previous year, however in South Kivu last season, FAO distributed a total quantity of sweetpotato planting materials was 500,000 cuttings (30-cm long) estimated to plant around of 17 ha. In Cameroon, only InterSOS provided seed (*crops not specified*) which was enough to plant 1500 ha serving 1000 households.

The organizations interviewed generally followed due process in **procuring the planting material**. In South-Kivu, DRC, a call for bids is followed by an assessment of the bidding seed multipliers and the seed supplied. The variety supplied should be registered in the catalogue, and the farm certified by SENASEM. The suppliers selected must also be registered and evaluated by SENASEM. Before purchasing planting materials, humanitarian organizations request SENASEM for the list of seed multipliers of the area to SENASEM. A field evaluation and verification is done by a joint SENASEM and partner team. INERA provides the basic and pre-basic seed from where multipliers produce certified seed. In Cameroon, seed is sourced from IRAD with certification by the Ministry. IRAD provides multipliers with basic seed to produce certified seed. Multipliers work in groups to produce certified seed in collaboration with MINADER technical staff. MINADER then certifies the seed quality based on quality standards. Certified seed can be recycled for three generations by growers. Farmer-based seed systems are dominant but in areas of conflict farmers eat their seed.

NGO respondents recognized that the **regulatory bodies** are central to the functioning of the seed systems. However, respondents reported that there are issues around capacities and that the regulatory bodies could perform better with more staff and better equipment for standard seed quality control. For RTB crops, for example, sometimes there is a difficulty in differentiating ware and seed material. Respondents were not aware or used any specific protocol or assessment tool to guide RTB seed interventions.

Access to the internet for on-line training/capacity building is evaluated as generally good in DRC, where staff also have personal computers, but as 'not very good' in Cameroon.

**Key capacity bottlenecks identified by NGO respondents:**

1. *Insufficient capacity of the regulatory body (SENASA) in terms of personnel and of plant disease diagnostic equipment for seed testing/diagnostic equipment as well as equipment to control pests/diseases in the field*
2. *The difficulty to distinguish between what is seed or not for RTB crops*
3. *Implementing partners do not have demonstration plots for farmers to evaluate new varieties*
4. *Differences in access to internet*
5. *No specific protocol or assessment tool to guide RTB seed interventions.*

### **3.3.2 National agricultural research institutes and ministries of agriculture**

**(Annex 8 for details)**

In DRC, respondents from the national institutions explained that they did not use a methodology to estimate the quantity of seed required, instead, this depended on funds and land available for the institution. In Cameroon respondents explained that the agricultural officer at the farm level interacts with the farmer to estimate acreage by farmer by crop, then this information is consolidated at subdivisional, divisional and regional levels. The production of seed is based on a budget allocated by the Ministry of Agriculture. There were no specific technologies used for early-generation seed production. **The following training needs** were highlighted for MINADER extensionists: production techniques (GAPs); seed production techniques; promotion of RTB crops, pest and disease management; Climate/ weather management for production; storage and processing.

### 3.3.3 Seed regulatory agencies

#### (Annex 9 for details)

**Cameroon** has a seed law, and anyone can produce seed as long as they meet the required standards. Seed law is enforced by the Department of Regulations and Control, which issues seed certificates to producers. The seed certificate is issued by season. Seed producers must declare what they produce. These regulations must be followed by organizations that work on humanitarian interventions. They have a decentralized inspection scheme. They get basic seed from IRAD. For cassava they replace seed every three years. Seed for food security crops cashew nuts and for coffee is given for free to incentivize production, and to promote the crops. For the rest of cash crops, like cacao, seed is not for free. They conduct FFS to demonstrate new technologies, starting with ToTs.

**The DRC** does not yet have a seed law. The control and certification of seeds throughout the national territory fall exclusively within the competence of the National Seed Service (SENASEM), which is part of the Ministry of Agriculture. The traceability of seed control results is based on identification by SENASEM of the establishments admitted to the control (establishment code) of the crops put in place (crop numbers, variety, seed category, year, season, plot) and the seed lots (lot numbers) presented for certification. As part of the production of seeds that can be certified by SENASEM, only varieties approved and registered in the varietal catalogue of food crops or registered on an official list of the SENASEM for food crops and/or market gardening, like varieties accompanied by a phytosanitary certificate according to the rules in force and registered on an official list of an organization in the sub-region, such as the SADC and COMESA zones, of which DR Congo is part. The release of varieties in the DRC is generally carried out by a national commission for the release and registration of varieties in the official catalog. Homologation is an official act intended to establish the origin of a variety. To be approved, a variety must pass two types of tests, the Distinction, Homogeneity and Stability (DHS) test and the Agronomic and Technological Values (VAT) test. The purpose of these tests is to verify the conformity of the characteristics of the varieties with the standard sheets provided by the breeder.

#### Key bottlenecks affecting seed systems

##### **DRC**

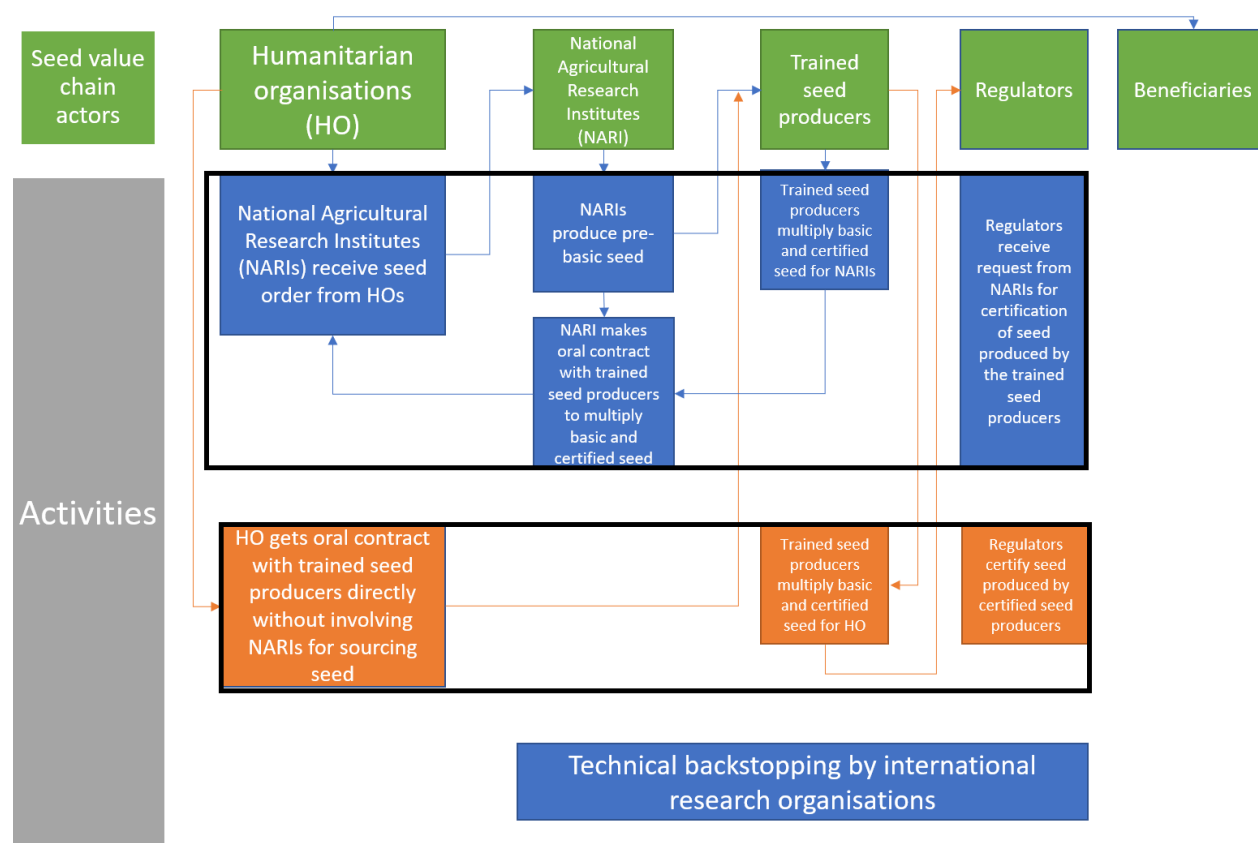
- i. Absence of the seed law in DRC*
- ii. Poor technical competencies of research and certification agents*
- iii. Poor technical and financial capacity of seed enterprises*
- iv. Poor management of the seed trade and regulation system*

##### **Cameroon**

- i. Liberalisation of the seed system market often brings in non-registered seed producers/distributors.*
- ii. Poor knowledge among available producers*
- iii. Inadequate capacity (technical and financial) to carry out seed inspections.*

### 3.3.4 Schema of formal seed distribution channels

Diagram 1 provides a schema of the seed distribution channels as described by formal seed system actors (NARIs, Regulatory Bodies) and humanitarian organisations in Cameroon and DRC. This emphasizes the role of the formal seed system with humanitarian organisations ordering seed from NARIs by. However, as highlighted during interviews, RTB planting material is unavailable, so humanitarian organisations and NARIs make oral contracts with trained seed producers to multiply seed. Respondents noted that the regulators receive requests from the NARIs and humanitarian organisations to certify that trained seed producers produce seed. However, the total quantity of seed which passes through these distributions is not known. Moreover, this schema does not include the farmer-managed seed system and how this may interact with the formal seed system.



**Diagram 1** Schema of RTB seed distribution channels described by respondents in Cameroon and DRC

### 3.3.5 Field visit in DRC

National organizations involved in seed production and quality certification emerged as the linkage between BHA partners and community-based seed producers. However, national institutions were generally limited in the (disease diagnostic) tests that could be done and, in most cases, relied on visual assessment for quality assessment.

In DRC, two such seed producers were visited. Inspection is done four times in the growing season, Before planting, during growth, before harvest and after harvest. There is a linkage with the extension system to conduct training in seed production and to carry out local demonstrations if needed. Seed producers work in groups, one numbering >6000 members in DRC. They must have access to 1 to 3 acres and an interest of seed production. Some producers are linked with local NARS such as the Protestant University in the DRC. Pre-basic seed is supplied by INERA / IITA (if cassava). These organizations also train farmers in seed production and pest control activities. The seed gardens also act as demonstration farms for testing agronomic practices and cultivar performance in the field.

**Group 1: ADEVESS located in Kashusha, Kabare territory:** They sourced basic seed from INERA. Seed certification is done by SENASEM. The cost of certification is met by the farmers (area of farm and distance from SENASEM office matters). Four visits are made (before planting, after crop establishment, at maturity and at harvest). The seed producers' group was organized by FAO. FAO buys the certified seed produced by this group. One of the groups was planting sweetpotato vines during the visit. The seed quality seemed okay. However, the mode of planting was not based on current recommended practice. They were planting vertically, and barely one node entered the ground. We advised them that they should be planting horizontally with 3 – 5 nodes underground. This can form one part of the demonstration plots on good agronomic practices. Other crops produced by the groups included cassava and maize. The sweetpotato varieties included Elengi and Van de Waal, which is yellow-fleshed.



CIP's Kwame Ogero demonstrating proper planting techniques to one of the farmers. Photo credit: S. Rajendran.

**Group 2; AFDIP, located in Kavumu, Kabare territory:** The second group was conducting a variety of adaptability trials in collaboration with Harvest Plus. The group has about 6000 members in 3 territories. One needed to have 1 – 3 acres of land to qualify as a member. Most members (over 70%) are female. There were no gender-based differences in the activities of the group. Members paid for labour (cash and seed for their own gardens). We asked one lady and one man which crop they would prioritize between maize and sweetpotato. The man said that he prefers maize because he can harvest once and take it to the market, while the lady said that she prefers sweetpotato because she can harvest several times and that the crop gives her food to eat and plant material for the next season. Training offered to the members included seed multiplication and good agronomic practices. Whereas the first group planted sweetpotato on ridges, the second one did so on mounds. It was mentioned that mounds are less labour intensive and less vulnerable to mole rats.

In conclusion, the field visit allowed some understanding of activities supporting seed production groups that have received training through projects. However, this raises issues of sustainability of activities, and linkages to sources of new varieties and quality starter material once projects close. It was not possible to visit seed producers in the informal sector to understand their constraints.

### 3.3.6 Expert knowledge elicitation on RTB diseases and pest risk

Cameroonian experts reported that RTB crops are grown in several regions of Cameroon and are considered women's crops. They also revealed that RTB crops in Cameroon are facing many constraints due to diseases and pests (Table 4). Diseases and pests constitute 31% to 45% of annual yield loss in all regions where RTB crops are grown. The Central and South regions were the most affected regions (with the highest numbers of pests and pathogens) for cassava, banana-plantain, and sweetpotato, with twelve, nine, and ten pests and pathogens reported, respectively. For potato, the West, Northwest, and Southwest regions are the most infested, with eight pests and pathogens reported. Seed degeneration in RTB crops is a problem in Cameroon because growers mainly use seeds recycled from season to season with limited attention to quality. Although this information is not based on precise data collected in the field, it gives us a quick overall idea of the phytosanitary risk associated with these crops in Cameroon, using expert knowledge.

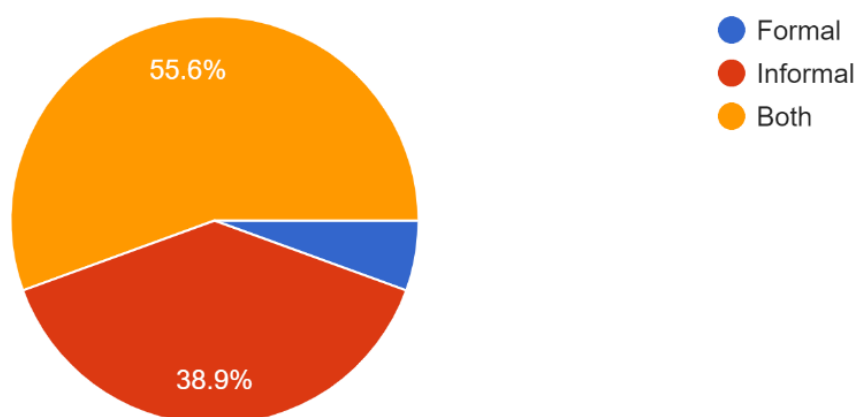
**Table 4** Main pests and diseases damaging crops in Cameroon reported by experts

Crops	Pests*	Diseases/pathogens*
Banana-plantain	Nematode Banana weevil Banana aphid <i>Cosmopolites sordidus</i>	Yellow sigatoka Black sigatoga <i>Fusarium oxysporum</i> Anthracnose Banana Bunchy Top
Cassava	Cassava root scale Cassava mealybugs Cassava whitefly Cassava aphids Cassava green mite	Cassava mosaic disease African cassava mosaic Cassava brown streak virus Anthracnose ( <i>Colletotrichum</i> ) Cassava root rot
Potato	Whitefly Leaf miner Aphids Irish-spider mite Thrips Potato root or potato cyst nematodes Wireworms	Bacterial wilt ( <i>Ralstonia solanacearum</i> ) Potato leafroll virus Potato virus Y potato virus X Fusarium dry rot Common scab Late blight ( <i>Phytophthora infestans</i> ) Early blight ( <i>Alternaria solani</i> )

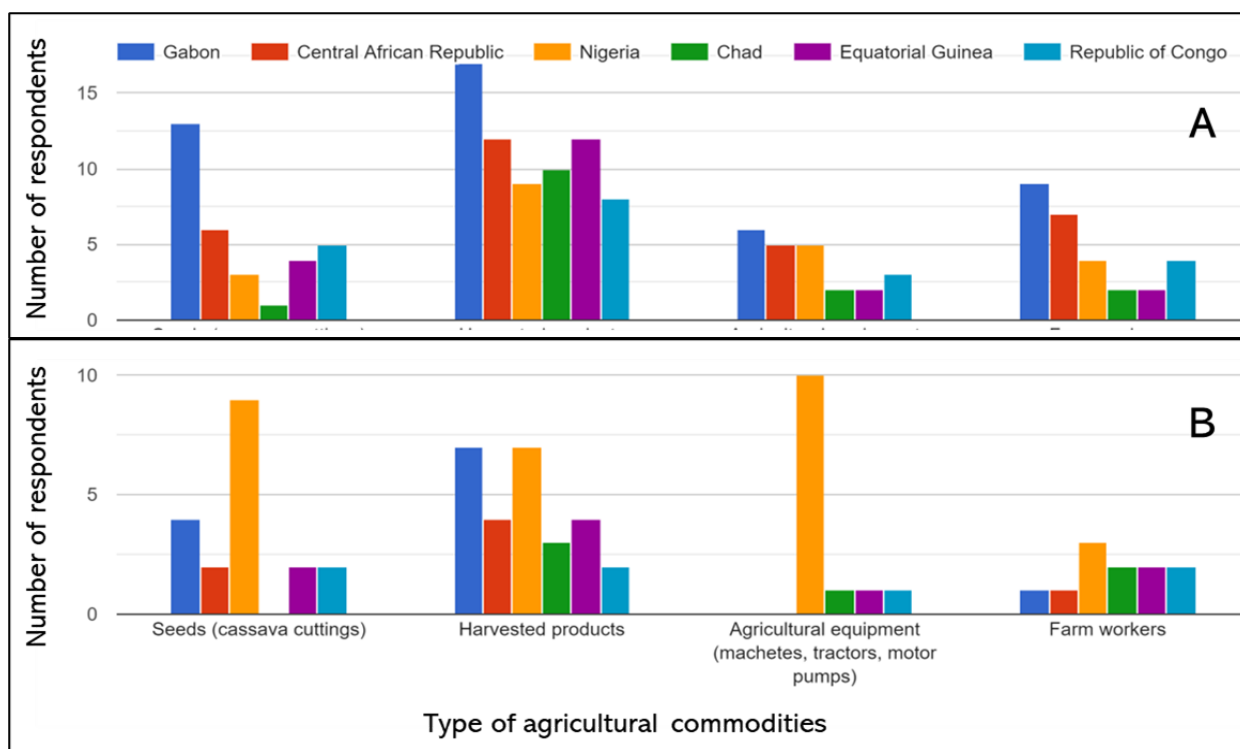
Crops	Pests*	Diseases/pathogens*
Sweetpotato	Sweetpotato weevil White grub ( <i>Phyllophaga</i> ) Sweetpotato stem borer Sweetpotato aphids	Alternaria leaf spot Black rot ( <i>Ceratocystis</i> ) Bacterial wilt ( <i>Ralstonia</i> ) Fusarium root Sweetpotato virus disease

\*Pests and diseases are not in order of importance

Experts indicated that there is a trade of seeds, harvested products and agricultural equipment between the different regions of the country, as well as a large movement of agricultural workers. They have also highlighted that there is a strong informal trade network between Cameroon and neighbouring countries (Nigeria to Cameroon and from Cameroon to Gabon, Equatorial Guinea, and the Central African Republic). Less than 5% of experts reported that exchanges of agricultural commodities (seeds, harvested products and agricultural equipment) are formal, 40% reported exchanges are informal and 56% are both (Figure 4). This trade of agricultural commodities and the movement of agricultural workers (Figure 5) are major risk factors for the long-distance spread of diseases. Although this information is not based on precise data collected in the field, it gives us a quick overall idea and baseline of expert knowledge about the phytosanitary risk associated with these crops. It can inform decision-making by humanitarian organizations about where to buy clean seeds for beneficiaries and to have an idea of the pests and diseases that beneficiaries will face in their target areas.



**Figure 4.** Percentage of experts reporting different types of trade between Cameroon and neighbouring countries.



**Figure 5.** Trade of agricultural commodities between Cameroon and neighbouring countries reported by experts: (A) informal trade from Cameroon to the neighbouring countries; (B), informal trade from neighbouring countries to Cameroon.

### 3.4 Post-visit online meetings and discussions

The RTB Tools4SeedSystems team developed different sets of criteria to identify the most appropriate focus crops for DRC and Cameroon, priority intervention area, and training institutions to partner with. The results are summarized in Table 5 below with full details in Annex 10.

**Table 5** Overview of proposed target crops and regions for Cameroon and DRC

Country selection	1st crop	2 <sup>nd</sup> crop	Region	Institution	Comments
Cameroon (2023)	<i>Sweetpotato</i>	Plantain	<i>Northwest (NW) and Southwest (SW) regions</i>	<i>CPF Mbouo, West Region to provide ToT for BHA IPs, IRAD and MINADER in NW/SW</i>	Although Adamawa ranked 1 <sup>st</sup> for region – plantain is not as common there, as in the NW/SW. CIP has office and staff in West region. BHA partners from NW and SW can travel to the West Region to participate in trainings
Cameroon (2023-24)	<i>Sweetpotato</i>	Under discussion	Adamawa and East regions	<i>University of Ngaoundere, Adamawa Region</i>	To support BHA IPs in East and Far North Regions. Potential link with WFP school garden support for dissemination of OFSP planting material
DRC (2024-26)	<i>Cassava</i>	Banana	South Kivu (Kabare and Kalehe)	<i>INERA (Mulungu)</i>	

Source: CIP, IITA, ABC, UoF, WUR project team

## 4 RECOMMENDATIONS AND CONCLUSIONS

Returning to the hypotheses that we set out at the start of the study our findings indicate the following:

### **RTB crop characteristics**

Respondents raised concerns about **the availability and quality** of planting material. The low multiplication rate for RTB seed is a factor in ensuring that sufficient supplies are available, particularly at short notice. Moreover, an innate characteristic of vegetatively propagated crops (VPCs) is the accumulation of seed-borne pests and diseases, which without appropriate interventions, can lead to reduced yield for the ware crop. The findings from the EKE highlighted some of the key pathogens and the risk of spread, given the significant informal and cross-border trade.

### **Awareness, knowledge & skills**

Most respondents consider RTB crops as **extremely important**, and there were many examples provided of **successes with working with RTB crops**. These included that RTB crops are adapted to the agro-ecological conditions of their intervention areas and are among the food preferences of the beneficiaries; that RTB crops have a short-growth duration and harvest ranges between 4-12 months; the double consumption of leaves & tubers of cassava & sweetpotato improved their profitability; the introduction of the orange-fleshed sweetpotato & biofortified cassava varieties in rural communities improves nutrition of beneficiaries; and that despite challenges related to access to land in their intervention areas, beneficiaries can produce a variety of RTB crops on small plots for their household food consumption.

### **Procurement systems**

Transportation of bulky planting material was considered a challenge. Most respondents referred to seed sourcing from the formal sector, and there were few indications of the informal sector being a potential seed source.

Respondents highlighted the role of formal seed systems, and there was limited discussion on constraints and opportunities in local farmer-managed (or 'informal') seed systems. Further work is needed to understand the existing seed systems for RTB crops.

### **4.1 Priority areas for capacity strengthening**

The findings from the CNA indicate the priority need to improve availability and quality of RTB planting material. Therefore, the following areas are proposed:

1. **Rapid Multiplication Technologies (RMTs) for RTB crops** – in-vitro, EGS, field production depending on country. RMT allows the production of large quantities of planting material within a short time. RMT for sweetpotato uses short three-node cuttings and close spacing (20 cm x 10 cm) in seed beds with appropriate soil fertility and water management practices in screenhouse (pre-basic seed) and open fields (basic seed), to increase multiplication rates. This favours production of vines but compromises production of storage roots. The use of macropropagation technology for rapid production of quality suckers for plantain can also be promoted.
2. **Diagnostics for seed-borne diseases:** taking advantage of the foundation provided by other projects (European Union support to NPPOs in the East African Community (EAC) NPPOs, continued training in the use of rapid, low-cost virus diagnostics like LAMP).

3. **Seed Regulations** –need to be adapted to be more applicable for humanitarian settings – QDS type. Plant health issues will be considered from the beginning by ensuring that starter material is sourced from documented pathogen-tested sources and ideally have genetic resistance or tolerance to main diseases. Negative and positive selection techniques will be used to minimize the presence of pests and diseases. ToTs and demonstrations should highlight on-farm management practices to reduce risk of disease and pest transmission. These practices include the use of isolation distances from fields of the same crops and barrier crops (e.g. sugar cane, Napier grass); are established on sites where that crop has not been grown for at least two seasons; scouting for disease symptoms and roguing out infected plants. We will also promote among the NPPOs the use of pest and disease risk assessment tool (R2M) developed by the University of Florida to understand the presence and potential of key pathogens. Working with NPPOs, social media, and radio can be used to increase awareness about risks and management of pest and disease spread.
4. **Increase availability of information** about improved varieties: through demonstration plots and improve access to catalogues for RTB.

## 4.2 Capacity strengthening approach

Nearly all the organizations that participated in this survey expressed interest in strengthening their capacity to design and implement RTB crops interventions in humanitarian contexts. They also mentioned that the most appropriate modality for capacity strengthening is in-country capacity strengthening opportunities (with demonstrations) followed by learning networks, on-line webinars and e-learning modules.

Therefore, the proposal is to focus on practical hands-on technical training using a ToT approach with national institutions. Introduction to theoretical aspects in seed production manuals through virtual sessions and a special section of Tools4SeedSystems web-site. Regular virtual mentoring and drop-in sessions for Q&A with crop-specific seed production and disease management experts.

## 4.3 Conclusions

We found that among respondents, there is recognition of the important role that RTB crops can play in responding to the needs of populations in humanitarian settings. Reasons for limited RTB crop interventions are multi-faceted and relate to crop characteristics, awareness, knowledge, and procurement systems. Key challenges are availability of RTB planting material and assuring and maintaining its quality. However, the CNA focused on national institutions, and there is currently limited understanding of how farmer-managed seed systems function in humanitarian settings, in particular gender roles and constraints. Training in seed production technologies and quality assurance practices are the priority areas for support. The diagnostic tools available through the RTB Toolbox, are not an immediate priority for capacity strengthening, however, selected tools can be used to better understand the potential interaction between the formal seed system and farmer-managed seed systems.

## 5 ANNEXES

### 5.1 ANNEX 1a. Key stakeholders for on-line survey, meetings and multi-stakeholder workshop in DRC (Bukavu)

Organization	Acronym (highlighted priority)	Function
Action contre la Faim	ACF	
Adventist Development and Relief Agency	ADRA	Directeur Regional Est
		Chargé de liaison
Agency for Technical Cooperation and Development	ACTED	Regional coordinator
		Chargé de projet PR
		Chargé suivi et évaluation zone
Catholic Relief Services	CRS	Program manager
		Admin finance officer
Concern Worldwide	WWF	Coordonnateur WWF/PCI
		Assistant technique au projet WWF/PCI
		Chargé base de données et SIG/projet
Danish Refugee Council	DRC	Country Director
Norwegian Refugee Council	NRC	Area Manager
		Program Manager Area
		Project Coordinator
People in Need	PIN	Country director
		Head of programmes
		HR Coordinator
Samaritan's Purse		
Tearfund	Tearfund	Area Manager
		Logistics Officer
		HR Officer
Welthungerhilfe	WHH	
World Relief International/ World Wide Relief	WRI/WWR	Coordonnateur national
		Administrateur
Mercy corps	MC Bukavu	Acting Area Manager
		Program Quality Manager
		Chief of party
		Responsable des communications
World Vision	WVI	Deputy Chief of party pour le programme
		RH Coordinator Zone Est
		DME Officer
Food for the Hungry	Fh	Chef de bureau

<b>Organization</b>	<b>Acronym (highlighted priority)</b>	<b>Function</b>
Woman for Woman	WfWI	Senior Program Manager
		Director of Operations
		Advocacy Coordinator
Organisation des Nations Unies pour l'Alimentation et l'Agriculture	FAO	Chef de sous bureau
		Assistant Administratif /Logisticien
		Consultante Nationale/Chargée de projet
		Consultant National /Expert en Suivi et Evaluation
Fonds des Nations Unies pour l'enfance	UNICEF	Chef de bureau
		Emmergency officer
		Administrateur Education
		Chargé des Opérations
RIKOLTO	Rikolto	Country Coordinator Systemes alimentaires durables Des villes DRC and Rwanda
World Food Program	WFP	

## 5.2 ANNEX 1b. Key stakeholders for on-line survey, meetings and mini- workshop in Cameroon

ORGANISATION	POSITION
InterSOS	Programme Coordinator
FEWSNET	Country Representative
RECCNUT	National Coordinator
IRAD	DAIQC
MINADER	CSCESP/DRCQ
US-Peacecorps	Agriculture Programme Manager
NASCENT SOLUTIONS CAMEROUN	Country Director
IRC	ERD TC
IITA	Deputy Regional Director
DDA / MINADER	Sub Director Seed and Seedling
ABC	Country Representative
IRAD	Head of Division (Director) Division of Crop Production
WFP	Country Representative
FAO	Country Representative

## 5.3 ANNEX 2. Online survey instrument

[\(link\)](#)

Section 1: INTRODUCTION

*Root, tuber, and banana (RTB) crops (e.g. cassava, potato, sweetpotato, bananas, plantain, yams) are versatile and nutritious staples that produce more food per unit land area than many other crops. They are often managed by women and are generally less affected by climate change than cereal crops. Yet humanitarian actors are often unaware of these crops' current role and contribution in local agricultural systems to rebuild sustainable livelihoods. Moreover, the long crop cycle of some of these RTBs and the characteristics of their seeds can pose specific challenges for supply systems. This can significantly reduce the performance of their RTB-based agribusiness interventions.*

*To this end, the International Potato Center (CIP), in collaboration with other partners, has just obtained funding from the USAID Bureau for Humanitarian Assistance (BHA). This project aims to improve the effectiveness and relevance of USAID/BHA agricultural programming investments in countries with RTB-based agrifood systems to achieve food security and resilience. This will be achieved by assessing existing interventions and needs and providing advanced training and technical support in partnership with local training institutions and other public and private sector actors for relevant value chains.*

We are conducting a capacity needs assessment for the design and implementation of root, tuber and banana interventions in humanitarian settings and would like to kindly invite you to participate.

#### INFORMED CONSENT

Hello,

This survey is conducted by the Consultative Group for International Agricultural Research (CGIAR) and partners (CIP, IITA, ABC, University of Florida and Wageningen University and Research). We are part of a team conducting an assessment of capacity needs for designing and implementing root, tuber and banana agricultural programmes in humanitarian contexts.

We would like to interview you for this study. The information and insights we collect from you are for research purposes only. We will use this information and insights to inform our research only. It will otherwise remain confidential, and your name and organization will not be explicitly or implicitly identified in the analysis produced by our team. We anticipate no risks to your participation in this interview/discussion.

Participation in this interview/discussion is voluntary and you may refuse to participate, discontinue the interview/discussion at any time, or skip any question you do not want to answer.

We are kindly requesting you to complete the 10-15 minute questionnaire by Monday 21st November 2023.

#### CONTACTS

If you have any questions or concerns, please contact Jorge Andrade-Piedra ([J.Andrade-Piedra@cgiar.org](mailto:J.Andrade-Piedra@cgiar.org)) - +51 980 655 570 or Margaret McEwan ([M.McEwan@cgiar.org](mailto:M.McEwan@cgiar.org)) +254 733681155

Please confirm your consent to participate in the survey

- a. Yes (continue to next section)
- b. No (submit the survey)

#### Section 2: Demographics Information

1. Please provide us your country of operation:
2. Your Name: .....
3. What is your gender?
  - a. Male
  - b. Female
  - c. Other .....
4. Name of your organization: .....
5. Your position in the organization: .....
6. Your contact number: .....
7. Number of years your organization has been working in country: .....

#### Section 3: Humanitarian interventions characteristics

1. Geographical target areas of the organization (country and regions/provinces):  
.....
2. Type of humanitarian programming: (tick all that apply)
  - a. Food aid
  - b. Health
  - c. Agriculture
  - d. Livelihoods
  - e. Income
  - f. Other: .....
3. Please provide more details on your agricultural programming:  
.....
4. Main agri-food systems in target area: (tick all that apply)
  - a. Cereals
  - b. Roots Tubes and Banana (RTB)

- c. Legumes
- d. Livestock
- e. Fish
- f. Mixed agri-food systems
- g. Other: .....

5. Type of beneficiaries: (tick all that apply)

- a. Farmers
- b. Migrants
- c. Refugees
- d. Displaced
- e. Local NGOs
- f. Other: .....

6. Percentage of different gender?

	< 25%	25 - 50%	51 - 75%	> 75%
Women				
Men				
Other				

7. Percentage of different beneficiary groups?

	< 20%	20- 40%	41- 60%	61- 80%	>80%
Children <12 years					
Teenagers from 12 to 21 years					
Youth from 22 to 35 years					
Adults from 36 - 65 years					
Adults from > 65 years					
Disabilities					
Other vulnerable groups					

8. Total number of beneficiaries: .....

9. Please rank top three staple preferences for target beneficiaries

e.g.:

i. Target area/group 1 (name): (specify top 3 staple foods in descending order);

ii. Target area/group 2 (name): (specify top 3 staple foods in descending order); ...

.....  
 .....

10. Beneficiaries live: (tick all that apply)

- a. In a camp
- b. In the community
- c. Other: .....

11. Top three languages commonly used by beneficiaries.

- a. French
- b. English
- c. Pidgin
- d. Lingala
- e. Other: .....

**Section 4: Awareness, knowledge & skills**

**Note:** in this survey, with 'seed' we refer to different types of planting material (tubers, suckers, stakes, stems, vines, cuttings)

1. Is your organization implementing any activities with root, tuber and banana (RTB) crops (e.g. cassava, potato, sweetpotato, bananas, plantain, yams)
  - a. Yes
  - b. No
  - c. Sometimes

1.a. If no, are there any reasons why your organization does not include RTB crops in humanitarian activities: (tick all that apply, then skip to question 10)

- a. RTB crops are not part of the agri-food systems of target areas and target groups
- b. RTB cropping systems too complicated for humanitarian interventions
- c. Lack of information about crops, varieties
- d. Lack of information about sources of seed
- e. RTB crops have many pest and disease problems that are difficult to manage
- f. RTB crops have low productivity
- g. The climate is not conducive to RTB crops
- h. Procurement challenges
- i. Logistic challenges (storage and distribution of RTB 'seed')
- j. Beneficiaries do not have conducive conditions for agriculture (e.g. access to land/water, conflict/security)
- k. Not within organizations mandate/expertise
- l. Other: .....

1.b. If yes, provide short description of RTB specific activities: .....

2. How important are RTB crops in your geographical target area and your humanitarian activities

	1	2	3	4	5	
Not at all important	0	0	0	0	0	Extremely important

3. What have been key successes working with RTB crops:

.....

4. What have been key challenges working with RTB crops:

.....

5. Which (RTB) crops and varieties has your organization used? (Please provide the top 3 varieties per crop).

e.g.

Crop 1: name, Varieties:

Crop 2: name, Varieties: ...

.....

6. Where do you obtain the (RTB) seeds from (please provide seed sources for each crop).

e.g.

Crop 1: name, source:

Crop 2: name, source: ...

.....

7. Can you obtain sufficient quantities of (RTB) seed for your humanitarian programmes? (Use "other" to provide the names of insufficient seed crops)

- a. Yes
- b. No

c. Other: .....

8. Based on your experience how effective is the implementation of RTB crop interventions in your humanitarian activities

	1	2	3	4	5	
Not at all effective	0	0	0	0	0	Completely effective

9. How would you rate the RTB crop production by your target beneficiaries in meeting their staple food needs?

	1	2	3	4	5	
Very insufficient	0	0	0	0	0	very sufficient

10. a. Would your organisation be interested in support to strengthen capacities for the **design and implementation** of root, tuber and banana interventions in humanitarian contexts?

- a. No, we cannot commit at this time, but happy to discuss further
- b. Yes
- c. Other: .....
- d.

10.b. If yes, please match the type of capacities required to the type of staff.... require capacity strengthening: (tick all that apply)

	Program managers	Field technical staff	Operations (procurement, admin)	Government implementing partners/NGO implementing partners	Target group beneficiaries
General information on RTB crops					
Crops varieties for specific agro-ecologies					
Crop production technologies					
Seed production technologies					
Pest and disease management					
Processing, utilization technologies					
Designing seed system interventions					
Procurement of quality RTB seed/planting material					

11. What modalities for capacity strengthening are most appropriate: (tick all that apply)
- On-line webinars and workshops
  - E-learning modules for self-learning
  - In-country capacity strengthening opportunities (with demonstration)
  - Learning networks, mentoring and coaching for sharing challenges and experiences

12. What should we learn from you about working in agricultural assistance in humanitarian contexts?

Section 4: Many thanks for your time. We will have a team visiting in-country from mid to end November 2022. Please confirm that you would be happy for a follow-up meeting. If so, please provide your email address and contact number.

Your email address and contact number: .....

END OF ONLINE SURVEY QUESTIONNAIRE

#### 5.4 ANNEX 3. In-country programme for DRC and Cameroon

**Table a.** Program of the face-to-face interviews with USAID-BHA partners in South and North Kivu provinces, DRC, in November 2022.

Day	Activities	Location
Day 1: Monday 14	Visit planning	IITA Kalambo office, Bukavu, South Kivu
Day 2: Tuesday 15	Visits to FAO, WFP and INERA	Bukavu, South Kivu
Day 3: Wednesday 16	Visits to World Relief, ADRA and NRC	Goma, North Kivu
Day 4: Thursday 17	Visit to SENASEM	Bukavu, South Kivu
Day 5: Friday 18	Visit to Food for the Hungry (Fh), 25 km from Bukavu	Nyangezi, South Kivu
Day 6: Saturday 19	Field farming visit	Kabare, South Kivu

**Table b.** Program of the face-to-face interviews with USAID-BHA partners in Yaoundé, Cameroon in November 2022.

Day	Activities	Location
Day 1: Monday 21 Nov	Arrival	Yaoundé
Day 2: Tuesday 22	Morning: team review and planning Afternoon: meetings with IRC InterSOS,	Yaoundé
Day 3: Wednesday 23	Nascent Solutions	Yaoundé
Day 4: Thursday 24	Peace Corps, Chemonics/FEWSNET, Coordonnateur National du Réseau des Communes du Cameroun pour la Nutrition (RECCNUT) ABC	Yaoundé
Day 5: Friday 25	IRAD & MINAG Team debriefing (+ Kwame departure)	Yaoundé
Day 6: Saturday 26	Team departures (except Romaric Armel Mouafo Tchinda)	Yaoundé
Day 7: Tuesday 29th	Expert Knowledge Elicitation (EKE) for R2M	Yaoundé
Day 8: Thursday 02 <sup>nd</sup> Dec	Romaric Armel Mouafo Tchinda Departure	Yaoundé

## 5.5 ANNEX 4. Questions for face-to-face interviews for capacity needs assessment in DRC and Cameroon

### a. Questions for organizations that implement humanitarian interventions:

1. In which form the humanitarian intervention is being done? Do you provide food and/or planting materials for RTB crops?
2. If just food, why not planting materials?
3. If planting materials:
  - a. Key RTB crops/varieties: cassava, banana, yam? Secondary RTB crops/varieties: potatoes, sweet potatoes? Is there a catalogue for crops/varieties?
  - b. In the last season how much planting material did you distribute? How did you estimate that amount?
  - c. What is the process to source and distribute these planting materials for RTB crops? How do you ensure the quality for these planting materials? What are the main bottlenecks for working with seed systems?
4. Is there a protocol to intervene in RTB seed systems for emergency settings? If not, why? If yes, please describe it:
  - a. Profile of target population? Definitions of migrants, refugees, displaced. Direct and indirect beneficiaries (households)
  - b. Profile of agricultural system? Planting seasons? Rainfall pattern? Monocrop, intercrop?
  - c. How are crops, varieties, and locations prioritized?
  - d. Local NGOs you work with
5. Training on RTB crops & Seed Systems:
  - a. Does your organization have demonstration plots to show different crops and crop varieties? Would these types of demonstrations be helpful to your organization?
  - b. How good is Internet access in your location? Does all staff have their own computer?
  - c. Need for training on agribusiness and finances (e.g., "Participatory market approach (PMCA)").

### b. Questions for national agricultural research institutes and ministries of agriculture (seed requirement estimates):

1. Do you estimate what quantity of seed is required?
2. How do you estimate it?
3. What technologies do you use for production of EGS?

### c. Questions for regulatory agencies for quality seed assurance (Questions related to seed health):

1. How do you ensure the quality of planting materials? Is there any seed standards for RTB crops? Process to import planting material? Process to certify seed producers?
2. Main pests and diseases by crop
3. Recommendation on the frequency to replace seed
4. Constraints
5. Partners
6. Training needs

## 5.6 ANNEX 5. Brief presentation of the project: Expert Knowledge Elicitation (EKE) in Cameroon

([Presentation](#))

## 5.7 ANNEX 6. Expert Knowledge Elicitation (EKE): online survey

(links: [Banana-plantain](#), [Cassava](#), [Potato](#) and [Sweetpotato](#))

### Expert Knowledge Elicitation (EKE): Cassava

#### Section 1: INTRODUCTION

Agriculture is currently faced with many challenges, such as climate change, loss of biodiversity, crop pests, and diseases, which can all directly compromise agricultural crop yield, quality, and health. In addition, inadequate agricultural practices, and the current increase in global exchange of agricultural commodities (such as seeds, harvested products) contribute to increased pest and disease risks. Although significant pest and disease risk analysis has been done throughout the world, there are still significant gaps in our knowledge. For example, methods of pest and disease risk analysis differ from one location to another and one research team to another. These methods often do not simultaneously consider cropland and host availability, climate change, pathogen and pest invasion, global increase in trade of agricultural commodities, and willingness and input of stakeholders into the analysis. These factors make modeling of the global risk of pest and pathogen invasion difficult. Consequently, prediction is inefficient for finding locations that are particularly important for monitoring and mitigation.

Because sometimes a database with consistent data is not available, we can collect data from expert knowledge (Expert Knowledge Elicitation (EKE)) as a rapid and efficient way to acquire baseline data. That is why we initiated this project to develop a platform (a Rapid Risk assessment Meta-Tool (R2 Meta-Tool)) that would allow any expert around the world to set up a quick and efficient survey of experts (EKE). This meta-tool would allow an organizing expert to collect data from other experts to evaluate the risks of pests and diseases in a specific location. This platform would have the advantage of standardizing pest and pathogen risk analysis methods and assembling effective questions for comparison of locations globally. It would also allow experts in any domain to connect with those in complementary domains for more inclusive disease risk assessment. Finally, it would allow food security experts to have the best available data for modeling global risks of the most dangerous pests and pathogens.

We are conducting this expert knowledge elicitation (EKE) exercise to design and validate questions that will be available in our meta-tool, and we would like to invite you to participate. This exercise will take place in several countries around the world in order to build an efficient, interdisciplinary, intercultural and inclusive R2 meta-tool.

#### **INFORMED CONSENT**

*This survey is conducted by the Consultative Group for International Agricultural Research (CGIAR) and University of Florida.*

*We would like to interview you for this study. The information and insights we collect from you are for research purposes only. We will use this information and insights to inform our research only. It will otherwise remain confidential, and your name and organization will not be explicitly or implicitly identified in the analysis produced by our team. We anticipate no risks to your participation in this interview/discussion.*

*Participation in this interview/discussion is voluntary and you may refuse to participate, discontinue the interview/discussion at any time, or skip any question you do not want to answer.*

*We are kindly requesting you to complete the 20-30 minute questionnaire.*

#### **CONTACTS**

If you have any questions or concerns, please contact Romaric Mouafo-Tchinda ([rmouafotchinda@ufl.edu](mailto:rmouafotchinda@ufl.edu)) or Karen Garrett ([karengarrett@ufl.edu](mailto:karengarrett@ufl.edu))

Please confirm your consent to participate in the survey

1. Yes
2. No

**Section 2: Characterizing the Experts Untitled Section. (tick all that apply)**

1. What subnational unit (region) do you represent as an expert?
  - a. Far North
  - b. North
  - c. Adamawa
  - d. East
  - e. Central
  - f. South
  - g. Littoral
  - h. West
  - i. Northwest
  - j. Southwest
  - k. National (all regions)
  
2. Please select the answer reflecting your years of experience as an expert in your field in your current subnational unit. (tick all that apply)

	0-3 years	4-7 years	7-10 years	>10 years
Far North				
North				
Adamawa				
East				
Central				
South				
Littoral				
West				
Northwest				
Southwest				
National (all regions)				

3. Which of the following best summarizes your experience as an expert?
  - a. Seed Systems
  - b. Pest and Pathogen Management
  - c. Agronomist/horticulture
  - d. Social sciences
  - e. Other, please specify .....
4. Which of the following best summarizes your affiliate institution? (tick all that apply)
  - a. Public
  - b. Private
  - c. Other, please specify .....
5. What is your gender?
  - a. Male
  - b. Female
  - c. Prefer not to say

6. Name of your organization.....

**Section 3: Characterizing the Grower Population**

1. Indicate the percentage of the population being growers in each region. (tick all that apply)

	0-25%	26-50%	51-75%	76-100%
Far North				
North				
Adamawa				
East				
Central				
South				
Littoral				
West				
Northwest				
Southwest				
National (all regions)				

2. For each region, indicate the most common highest level of education completed by cassava growers according to your experience.

	Primary school	Secondary School	university	No idea
Far North				
North				
Adamawa				
East				
Central				
South				
Littoral				
West				
Northwest				
Southwest				
National (all regions)				

3. What percentage of growers are women in each region?

	<25%	25-50%	51-75%	>75%
Far North				
North				
Adamawa				
East				
Central				
South				
Littoral				
West				
Northwest				
Southwest				
National (all regions)				

4. Is the cassava considered in your region as a women's crop (crop grown by women for family food rather than for sale)?

	Yes	No	No idea
Far North			
North			
Adamawa			
East			
Central			
South			
Littoral			
West			
Northwest			
Southwest			
National (all regions)			

5. Percentage of different cassava grower groups? (tick all that apply)

	<20%	20-40%	41-60%	61-80%	>80%
Far North					
North					
Adamawa					
East					
Central					
South					
Littoral					
West					
Northwest					
Southwest					
National (all regions)					

6. At what level would you consider the average child's (aged 0-15) contribution to the agricultural system in each region?

	0 hour/day	1-4 hours/day	5-8 hours/day	9-12 hours/day	more than 12 hours/day
Far North					
North					
Adamawa					
East					
Central					
South					
Littoral					
West					
Northwest					
Southwest					
National (all regions)					

7. Does formal agricultural training exist in the region?

a. Yes

b. No

8. Estimate the percentage of cassava growers who received a formal training in each region.

μ	<20%	20-40%	41-60%	61-80%	>80%
Far North					
North					
Adamawa					
East					
Central					
South					
Littoral					
West					
Northwest					
Southwest					
National (all regions)					

9. Cassava crop corresponds to which agricultural system in each region?

	Subsistence	Commercial	both
Far North			
North			
Adamawa			
East			
Central			
South			
Littoral			
West			
Northwest			
Southwest			
National (all regions)			

10. Which varieties are grown in each geographical area? (tick all that apply)

	Far North	North	Adamawa	East	Central	South	Littoral	West	Northwest	Southwest
Far North										
North										
Adamawa										
East										
Central										
South										
Littoral										
West										
Northwest										
Southwest										

11. Which other varieties are the most grown in each geographical area of expertise

e.g.:

1. Far North: .....

2. North: .....

.....

12. Please estimate the annual production of tubers (tons) :.....

13. Please estimate the annual percentage of yield loss:

- a. 0-25%
- b. 26-50%
- c. 51-75%
- d. 76-100%

**Section 4: Reporting the Most Critical Pests, Pathogens, and Diseases**

1. Based on your experience, which pests and diseases are present in each region? (tick all that apply)

	Far North	North	Adamawa	East	Central	South	Littoral	West	Northwest	Southwest	National
Cassava green mite (CGM)											
Cassava root scale (Stictococcus vayssierei)											
Cassava root rot											

Cassava mosaic disease (CMD)											
Cassava anthracnose disease (CAD)											
Cassava bacterial blight (CBB)											
African cassava mosaic (ACM)											
Anthraxnose FUNGUS - Colletotrichum											
Cassava brown streak Virus											
Leaf bacterial rot (Xanthomonas)											
Cassava mealybugs											
cassava whitefly											
Cassava aphids											

2. Top 5 most damaging pests and the top 5 diseases.

e.g.:

Top 5 pests : .....

Top 5 diseases: .....

3. Please estimate the percentage of annual yield loss due to pests and diseases

- a. <15%
- b. 15-30%
- c. 31-45%

- d. 46-60%
- e. 61-75%
- f. >75%

4. Which management strategies do farmers use against these pests and diseases? (tick all that apply)

- a. Use of healthy seeds and transplants
- b. Use of resistant varieties
- c. Discarding/Removing of diseased crop
- d. Use of plant extracts
- e. Fungicide applications
- f. Incorporation of organic matter into the soil
- g. Other, please describe.....

5. Based on your experience, how effective are the following pests and diseases control strategies?

	Not at all effective	Not very effective	Moderately effective	Highly effective	Completely effective
Use of healthy seeds and transplants					
Use of resistant varieties					
Discarding/Removing of diseased crop					
Use of plant extracts					
Fungicide applications					
Incorporation of organic matter into the soil					

**Section 5: Assessing Certified Seed Distribution**

*Note: in this survey, with 'seed' we refer to different types of planting material (cassava cuttings, tubers, suckers, stakes, stems, vines)*

1. According to your experience, what is the source of seed in each region? (tick all that apply)

	Personal seed	Neighbors	Local market	Non-governmental organizations	Governmental distributors
Far North					
North					
Adamawa					
East					
Central					

South					
Littoral					
West					
Northwest					
Southwest					
National					

2. According to your experience, what percentage range best describes the contribution of formal and informal trade of cassava seeds in each region? (tick all that apply)

Note:

Formal: obtain from certified governmental distributors, non-governmental organizations

Informal: obtain from Personal seed, Neighbors, Local market, uncertified seed producer

	0% formal and 100% informal	1-25% formal and 75-99% informal	26-50 formal and 50-74% informal	50-74 formal and 26-50% informal	75-99 formal and 1-25% informal	100% formal and 0% informal
Far North						
North						
Adamawa						
East						
Central						
South						
Littoral						
West						
Northwest						
Southwest						
National						

3. Is cassava crop facing the seed degeneration problem in Cameroon?

Note: Seed degeneration is defined as the "reduction in yield or quality caused by an accumulation of pathogens and pests in planting material due to successive cycles of vegetative propagation.

- a. Yes
  - b. No
4. What pest and diseases are of primary concern for seed degeneration in your country? (tick all that apply)
- a. Cassava green mite (CGM)
  - b. Cassava root scale (*Stictococcus vayssierei*)
  - c. Cassava root rot
  - d. Cassava mosaic disease (CMD)
  - e. Cassava anthracnose disease (CAD)

- f. Cassava bacterial blight (CBB)
- g. African cassava mosaic (ACM)
- h. Anthracnose FUNGUS -Colletotrichum
- i. Cassava brown streak Virus
- j. Leaf bacterial rot (Xanthomonas)
- k. Nitrogen deficiency
- l. Cassava mealybugs
- m. Cassava whitefly
- n. Cassava aphids

5. Which regions are facing the problem of cassava seed degeneration in Cameroon? (tick all that apply)

- a. Far North
- b. North
- c. Adamawa
- d. East
- e. Central
- f. South
- g. Littoral
- h. West
- i. Northwest
- j. Southwest
- k. National (all regions)

6. What strategies are applied to manage the risk of cassava seed degeneration in Cameroon? (tick all that apply)

	Using resistant or tolerant varieties	Using formal seed, certified seed	On-farm management of seed	Post-harvest management of seed for the next season
Far North				
North				
Adamawa				
East				
Central				
South				
Littoral				
West				
Northwest				
Southwest				
National				

7. Based on your experience, how effective are the following seed degeneration control strategies?

	Not at all effective	Not very effective	Moderately effective	Highly effective	Completely effective
Using resistant or tolerant varieties					
Using formal seed, certified seed					
On-farm management of seed					
Post-harvest management of seed for the next season					

8. Based on your experience, do these management strategies solve the seed degeneration problem?

- a. Yes
- b. No
- c. Sometimes

9. Which cassava varieties are resistant/tolerant to seed degeneration in Cameroon?

.....

10. Which on-farm management strategy growers are using against seed degeneration? (tick all that apply)

	Removal and destruction of symptomatically infected plants	Fertilization	Pesticides, like fungicides and insecticides	Irrigation	Solanization
Far North					
North					
Adamawa					
East					
Central					
South					
Littoral					
West					
Northwest					
Southwest					
National					

11. Which Post-harvest management strategy growers are using against seed degeneration? (tick all that apply)

	Pesticides (fungicides, insecticides, etc.)	Heat	Selection of healthy seeds by eye
Far North			
North			
Adamawa			
East			
Central			
South			
Littoral			
West			
Northwest			
Southwest			
National			

**Section 6: Determining the Trade Paths of Seed, Harvested Products, and Agricultural Materials**

**Note:** in this survey, with '*seed*' we refer to different types of planting material (*cassava cuttings, tubers, suckers, stakes, stems, vines*)

1. Considering informal trade, please tick the boxes if trade of SEED (cassava cuttings) exists between each region.

Note: Please consider that the regions in the rows are the sources and those in the columns are the sinks.

Tick all boxes that apply, including when intra-regional trade is involved.

	Far North	North	Adamawa	East	Central	South	Littoral	West	Northwest	Southwest
Far North										
North										
Adamawa										
East										
Central										
South										
Littoral										
West										
Northwest										
Southwest										

2. Considering informal trade, please tick the boxes if trade of HARVESTED PRODUCTS exists between each region

Note: Please consider that the regions in the rows are the sources and those in the columns are the sinks.

Tick all boxes that apply, including when intra-regional trade is involved

	Far North	North	Adamawa	East	Central	South	Littoral	West	Northwest	Southwest
Far North										
North										
Adamawa										
East										
Central										
South										
Littoral										
West										
Northwest										
Southwest										

3. Please tick the boxes if there is exchange of AGRICULTURAL EQUIPMENT (machetes, tractors, motor pumps) and movement of farm workers between each region.

Note: Please consider that the regions in the rows are the sources and those in the columns are the sinks.

Tick all boxes that apply, including when intra-regional exchange is involved.

	Far North	North	Adamawa	East	Central	South	Littoral	West	Northwest	Southwest
Far North										
North										
Adamawa										
East										
Central										
South										
Littoral										
West										
Northwest										
Southwest										

4. Which type of agricultural commodities does Cameroon trade with the neighboring countries? (tick all that apply)
  - a. Seeds (cassava cuttings)
  - b. Harvested products
  - c. Agricultural materials (machetes, tractors, motor pumps)
5. How are these trades?
  - d. Formal
  - e. Informal
  - f. Both
6. Considering informal trade, which agricultural commodities or farm workers move from Cameroon to the neighboring countries? (tick all that apply)

	Gabon	Central African Republic	Nigeria	Chad	Equatorial Guinea	Republic of Congo
Seeds (cassava cuttings)						
Harvested products						
Agricultural equipment (machetes, tractors, motor pumps)						
Farm workers						

7. Considering informal trade, which agricultural commodities or farm workers move from neighboring countries to Cameroon? (tick all that apply)

	Gabon	Central African Republic	Nigeria	Chad	Equatorial Guinea	Republic of Congo
Seeds (cassava cuttings)						
Harvested products						
Agricultural equipment (machetes, tractors, motor pumps)						
Farm workers						

**Section 7: Many thanks for your time.**

Do you have any advice to share with us about this study?

If you do, we will be happy to receive them to improve this work

.....  
 Would you like to receive a summary of the results of this study?

If you do, please provide your name and an e-mail address to which we can send the results:

## 5.8 ANNEX 7. Responses from organizations implementing humanitarian interventions (NGOs)

Questions	Summary from DRC	Summary from Cameroon
1. In which form the humanitarian intervention is being done? Do you provide food and/or planting materials for RTB crops?	The humanitarian organizations in South-Kivu provide food, planting materials and sometimes cash to beneficiaries. While emergency projects distribute food or cash, development projects distribute planting materials. Sweetpotato, potato and cassava are the RTB crops most commonly distributed.	School feeding programs; provide food, money, and seed material (mostly cereals); also provide agricultural support materials
2. If just food, why not planting materials?	NA	NA
3. If planting materials:		
a. Key RTB crops/varieties: cassava, banana, yam? Secondary RTB crops/varieties: potatoes, sweetpotatoes? Is there a catalogue for crops/varieties?	Main RTBs: cassava, banana Secondary RTBs: sweetpotato and potato There is a catalogue for varieties at SENASEM and INERA from 2019	Potatoes and sweetpotatoes (OFSP), cassava, plantain. Catalogue available but not online.
b. In the last season how much planting material did you distribute? How did you estimate that amount?	The quantity of planting material varies from one organization to the other. But the BHA organizations have a guideline that defines the minimum package to distribute to beneficiaries. While some organizations that we met were not able to recall the quantities of planting material distributed in the previous year, Last season the total of planting materials of sweet potatoes distributed by FAO was 500 000 vines 30-cm long estimated to plant around of 17 ha.	Only InterSOS provided seed- Seed was provided enough to plant 1500 ha serving 1000 households.
c. What is the process to source and distribute these planting materials for RTB crops? How do you ensure the quality for these planting materials? What are the main bottlenecks for working with seed systems?	In general, the organizations visited followed due process in procuring the planting material. Most of them open a bid for seed multipliers. Criteria for selection include the registration of the variety in the catalogue, the registration of the seed multiplier at SENASEM, the certification of the farm by SENASEM. Before purchasing planting materials, humanitarian organizations request the list of seed multipliers of the area to SENASEM, then a team of organization and SENASEM go to the field to verify and	Seed is sourced from IRAD with certification by the Ministry. IRAD provides basic seed which is given to multipliers' groups to produce certified seed. Multipliers work in groups to produce certified seed in collaboration with MINADER technical staff. MINADER then certifies the seed quality based on quality standards. Certified seed can be recycled for three generations by growers. Farmer-based seed systems are dominant but in areas of conflict farmers eat their seed.

Questions	Summary from DRC	Summary from Cameroon
	<p>certify the quality and quantity of planting materials. The bottlenecks are:</p> <ul style="list-style-type: none"> <li><i>i. Insufficient capacity of the regulatory body (SENASEM) in terms of personnel and of equipment for control</i></li> <li><i>ii. The difficulty to distinguish between what is seed or not for RTB crops</i></li> </ul>	
<p>2. Is there a protocol to intervene in RTB seed systems for emergency settings? If no, why? If yes, please describe it:</p>	<p>No protocol available</p>	<p>No protocol available</p>
<p>a. Profile of target population? Definitions of migrants, refugees, displaced. Direct and indirect beneficiaries (households)</p>	<p>The targeted beneficiaries include refugees, host families, returnees (i.e., persons who are going back to their communities after war or other crises), etc. Humanitarian institutions work with local authorities to identify the beneficiaries in each area</p>	<p>Internally displaced persons (IDPs), refugees, returnees</p>
<p>b. Profile of agricultural system? Planting seasons? Rainfall pattern? Monocrop, intercrop?</p>	<p>The South-Kivu province is characterized mostly by equatorial vegetation and land extending from high altitudes and plateau areas reaching closely 3,500m alongside the western coast of Lake Kivu and descending westward down to a less densely populated area at approximately 500m and equatorial forest area. In this region, soils are very acidic with abundant rainfall, allowing for two extended growing seasons, primarily from September to December, and March through May. South Kivu has a tropical savanna and warm summer climate, with an average monthly temperature of 21o C. Production is mostly rain fed with no irrigation investment. The average annual rainfall is over 1,600mm and the minimum average is 1,000mm. In South Kivu Province, agriculture is an important livelihood for most households and about 73% of the population relies on agriculture as their main source of income while 11% of population lives on trade activities. According to IPAPEL South Kivu, farmers produce mainly cassava,</p>	<p>Seasonal production, with a single rainy season (Far North). Production is mostly rain-fed but support for irrigation is also given. Dry season production occurs, the farmers own pumps and can produce off-season. Main crops are cereals, RTB crops exist in certain areas like Mokolo (sweetpotato, potato and cassava). In the North West and South West there are two seasons. There is no seed provision now due to the crisis.</p>

Questions	Summary from DRC	Summary from Cameroon
	<p>beans, maize, soybeans, groundnuts, banana, sorghum, Irish potato, taro, sweet potatoes, onions, tomatoes and other horticulture products as food crops, and coffee, tea, cinchona and palm oil as cash crops depending on their agro ecological zone. These crops are grown mostly in association. The “Assessment of the DRC’s Agricultural Market Systems : Value Chains in the North &amp; south Kivu and Katanga provinces” (April 2015) conducted by ACDI-VOCA indicates that 91% of south Kivu farming households produce cassava while 52% produce maize, 32% produce beans and 25% produce groundnuts.</p>	
<p>c. How are crops, varieties and locations prioritized?</p>	<p>Crop varieties are selected by beneficiaries and by area, like in areas where there is high malnutrition, they distribute sweetpotato</p>	<p>InterSOS: Conduct surveys to characterize farmer preferences (main crops are cereals) and associate them with local weather conditions (Foire approach)</p>
<p>d. Local NGOs you work with</p>	<p>Many local NGOs work with humanitarian organizations like ADEVESS, GAP, SPNC, etc.</p>	<p>Food security clusters and food security working groups at national level. In both cases FAO and WFP are the coordinators</p>
<p>5. Training on RTB crops &amp; Seed Systems</p> <p>a. Does your organization have demonstration plots to show different crops and crop varieties? Would these types of demonstrations be helpful to your organization?</p>	<p>Not all the humanitarian institutions visited have demo plots. They distribute planting materials from the seed producers to farmers</p>	<p>InterSOS has demonstration plots in villages using the farmer field school (FFS) approach to compare technologies and interventions for cereals. NASCENT depends on MINADER for technical support, including demo trials.</p>
<p>b. How good is Internet access in your location? Does all staff have their own computer?</p>	<p>All of the institutions interviewed accepted to have good internet network access and computers</p>	<p>Not very good</p>
<p>c. Need for training on agribusiness and finances (e.g., “Participatory market approach (PMCA”).</p>	<p>Yes</p>	<p>Not necessary</p>

## 5.9 ANNEX 8. Responses from national agricultural research institutes and ministries of agriculture

Questions	Summary from DRC	Summary from Cameroon
1. Do you estimate what quantity of seed is required?	No, quantity of seed to produce is dependent of money and land available for the institution	Yes
2. How do you estimate it?	No estimate, they are just produce	Bottom-up approach, where information is collected at the local level and then consolidated at higher levels. The agricultural officer at the farm level interacts with the farmer to estimate acreage by farmer by crop, then this information is consolidated at subdivisinal, divisional and regional levels. The production of seed is based on budget allocated by the Ministry of Agriculture.
3. What technologies do you use for production of EGS?	No modern technologies	Not mentioned
4. Training needs (this question was added later. We have information from Cameroon)		Training for MINADER extensionists; production techniques (GAPs); Seed production techniques; promotion of RTB crops, pest and disease management; climate/ weather management for production; storage and processing; <i>(opportunity to conduct INA analysis to identify key organizations and how information, seed and pathogens are moving in the system; this can be done in the food security cluster and working group).</i>

## 5.10 ANNEX 9. Responses from seed regulatory agencies

Questions	Summary from DRC	Summary from Cameroon
<p>How do you ensure the quality of planting materials? Are there any seed standards for RTB crops? The process to import planting material? The process to certify seed producers?</p>	<p><b>Description of the seed system:</b> research institutions such as INERA and IITA produce foundation seed. INERA multiplies pre-basic to get basic seed. Basic seed can be G1 and G2 and then is given to commercial multipliers. SENASEM intervenes in pre-basic, basic and seed multipliers stages. They are also involved in varietal maintenance and participatory varietal selection. They register the seed multipliers that access basic seed to produce certified seed. They do this by visiting their field and in their labs for physical quality control. The seed multipliers can be individuals, associations, organizations, platforms. Protocols for seed standards are available for main crops except for yam. They certify seed, not the multipliers. They also admit multipliers in a seed production contract based on a declaration of the crops for each season, and visit during the cropping season (3 visits for short-season and five visits for long-season crops). Nobody qualifies for these visits unless they are accepted as seed multipliers. Other requisites are: must have a farm of at least 2 ha, ideally much more; financial capacity for seed production (must show proof of financial resources), and must be trained in seed multiplication technologies either by SENASEM or a by a recognized training organization. There is restriction to move VPC seed between provinces. Any movement has to be authorized at the provincial level.</p> <p>Importers pay inspection fee. For PVS SENASEM inspects the whole process. If any imported material is to be distributed, it must first be registered by SENASEM. In the case of importation of a registered variety from a neighbouring country such as Burundi, direct importation can occur because the variety is already in the catalogue. For non-registered</p>	<p>IRAD produces basic and pre-basic seeds to be distributed to seed multipliers. It is also the ones who produce certified seeds that the Ministry of Agriculture distributes to farmers or partners. The Ministry of Scientific Research governs IRAD, but it has to provide seeds to growers as recommended by the Ministry of Agriculture. This overlap creates huge gaps in the country's availability and supply of quality seed. All certified seed multipliers must register at the provincial, departmental, or local offices of the DRCQ. They have to provide proof of training in seed production from an institute approved by the ministry. Once registered, the seed production site must be inspected and approved prior to any production activity. The frequency of inspection and standards depend on the seed class. Seed inspection is done at least three times in the growth cycle: Planting; in the season before flowering and at harvesting (true seeded crops). Tolerance levels for known pests and diseases vary by seed classes (pre-basic and basic seed – 0% for any known pests and diseases); Certified seed 1% or less for market access. The analysis of seed quality is carried out by specialized laboratories of the DRCQ.</p> <p>Are there any seed standards for RTB crops? Yes, VPCs are inspected</p> <p><b>Importing planting material:</b> The seed to be imported must be in the latest catalogue of species and varieties cultivated. An importation permit is required by Law, with an application is made in the source country. Evidence of sampling and analysis by the competent authority of plant health from the source country is needed to grant import authorization. New varieties are registered after agronomic evaluation locally. They need to be distinct, homegenous and stable. The Commission d'homologation des especes et varietes - [CHEV_ (Commission for the registration of</p>

Questions	Summary from DRC	Summary from Cameroon
	varieties, INERA must be involved to test the variety.	species and varieties) carries out this function. Note: there is a regional certification agreement (standards agreed across countries apply in multiple countries)
Main pests and diseases by crop	Stated in the COMESA seed law	Cercosporiose Fusarium Potato Virus Y  See table 8???  <b>Table 8.</b> Main pests and diseases damaging crops in Cameroon reported by experts.
Recommendation on the frequency to replace seed	This is based on seed categories. Currently, Foundation seed is produced by INERA and goes to seed growers who produce certified seed R1 from foundation seed, and R2 from R1 after which, seed producers will need again foundation seed from research	Three generations of certified seed accepted by Law. Other classes are being defined: Elite and super elite: 5 generations of seed production (but with continuous inspection). (Elite and Super Elite categories not yet established for VPCs – expected in Feb 2023). .
Constraints	iv. Absence of the seed law v. Poor technical competencies of research and certification agents vi. Poor technical and financial capacity of seed enterprises vii. Poor management of the seed trade and regulation system	<ul style="list-style-type: none"> <li>• Liberalisation of the seed system market often brings in non-registered seed producers/distributors.</li> <li>• Poor knowledge among available producers</li> <li>• Inadequate capacity (technical and financial) to carry out seed inspections.</li> </ul>
Partners	INERA, IITA, FAO, CIAT, Mercy Corps, World Vision etc.	INRAB, National Universities, IITA
Training needs	New technologies, training of labour, machines and equipment	Plant disease diagnosis, New technologies (molecular biology), Seed production technology (biotechnology),



**Table I0c Criteria and scoring for selection of training institution in Cameroon**

Training institution - Cameroon		West region			Adamawa Region			
Criteria	Faculty of Agronomy (FASA), University of Dschang, West Region	CPF Mbouo, West Region	IRAD, West Region	Other, West Region	University of Ngaoundere, Adamawa Region	APROSPEN (Training centre), Adamawa Region	IRAD Adamawa Region	Other, Adamawa Region
Expertise in RTB crop	5	5			4		3	
Presence in geo-target area	5	5			5		5	
Land availability	5	5			4		2	
Water availability	4	4			4		2	
Training facilities	5	5			5		3	
Experience in ToT	3	5			4		5	
Experience with gender mainstreaming								
Experience with demo plots	5	5			4		3	
Security for field plots	4	4			4		3	
Partnership with or experience in working with CGIAR centres	5	5			5		5	
	41	43			39		31	
Rank per Region	2	1			1		2	

Source: CIP, IITA, ABC, UoF, WUR project team

**Table I0d Criteria and scores for crop selection in DRC**

Criteria for crop selection - DRC	1=lo/5=hi				
Criteria	Cassava	Plantain	Banana	Potato	Sweetpotato
Production importance in country	5	3	4	2	3
Potential contribution to/demand from humanitarian actors	3	3	3	4	5
Agro-ecology suitability	5	5	5	3	4
Short maturity period	1	1	1	5	5
In-country expertise - CGIAR	5	5	5	5	5
In-country expertise - national institutions	4	4	4	4	4
Suitable improved varieties available appropriate for humanitarian target populations	5	5	5	3	3
Pathogen tested EGS available	4	4	4	1	1
Overall project balance of crops	4	4	4	1	2
Availability of seed producers with stock & distribution system	4	2	3	3	3
Total	40	36	38	31	35
Rank	1	3	2	5	4

Source: CIP, IITA, ABC, UoF, WUR project team

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