



RTB Working Paper

Gender mainstreaming in root tuber and banana crops seed systems interventions: identification of lessons learnt and gaps

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Abstract

Over the years the CGIAR Research Program on Roots, Tubers and Bananas (RTB) has conducted research and developed seed systems' interventions to promote the availability, accessibility and utilization of clean seed. As part of this work RTB has developed a seed systems framework for intervening in root tuber and banana systems, as well as conducted work to understand gender-related opportunities and constraints for men and women's participation in RTB seed systems. This report, which is based on the analysis of the publications produced by RTB between 2013 and 2016, seeks to identify the lessons and gaps in mainstreaming gender into seed systems of vegetatively propagated root tuber and banana crops. Evidence from the literature shows that seed systems are socially embedded; so, to develop equitable RTB seed systems researchers and practitioners need to understand the social context in which they aim to intervene. For example, understanding the division of labor in seed production and conservation could help shape the nature of interventions by assisting the managers to identify the methods, measures and strategies to ensure that men and women are able to benefit equally. However, to get this information researchers or project managers need to collect and analyze socioeconomic data, including on gender factors. Additionally, understanding male and female farmers' knowledge will promote the development of seed systems that are sustainable and responsive to farmers' needs and capacities.

Acronyms

DFID	Department for International Development of the United Kingdom
DVM	Decentralized vine multiplier
ECOWAS	Economic Community of West African States
NGO	Nongovernmental organization
RTB	CGIAR Research Program Roots Tubers and Bananas

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INTRODUCTION AND BACKGROUND

The CGIAR Research Program on Roots, Tubers and Bananas (RTB) is a broad alliance led by the International Potato Center (CIP) and incorporating Bioversity International, the International Center for Tropical Agriculture (CIAT), the International Institute for Tropical Agriculture (IITA) and the Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD), along with its research and development partners. RTB's purpose is to tap the underutilized potential of root, tuber and banana crops to improve nutrition, food security and incomes, and foster greater gender equity, especially among the world's poorest and most vulnerable populations.

Between 2013 and 2016 RTB implemented two research projects on seed systems. The first project, named, 'RTB-seed: strategic research on degeneration of planting material and development of a seed system conceptual framework for roots, tubers and bananas', developed a multi-stakeholder framework for intervening in RTB seed systems. The framework was created to assess and improve seed systems' interventions to ensure the availability of low cost, high quality planting materials for farmers. The framework also sought to understand the biophysical and socioeconomic institutions that affect the functionality and sustainability of seed systems. The framework was designed as a tool to not only understand RTB seed systems but also identify entry points for RTB seed systems' interventions. The framework was tested in different case studies across the various RTB crops, as well as in different regions of the world. That work documented case studies on cassava, banana, sweetpotato and potato in different countries in Africa, Asia and Latin America.

Accompanying the development and testing of the framework were a series of gender studies conducted to test the ability of the framework to capture and include gender information (see Mudege and Walsh, 2016; Mudege and Demo, 2016). Other studies recorded experiences with gender in developing seed systems, especially opportunities and constraints in involving women (see Ogero, McEwan & Pamba, 2016). While the user guide for the framework acknowledges that it is important to integrate "gender (e.g. of seed producers and seed users) ... when analyzing seed availability, access and quality ... for example [because] women smallholders may be less able to afford seed, and so have unique problems with access" (RTB, 2016), this has not been captured in much of the seed work conducted in RTB.

The framework also identifies the entry points for reviewing and understanding how seed policies affect seed systems (see Annex 1). At the policy level laws and policies should defend the “rights of breeders and communities over their genetic resources and protect indigenous knowledge and promote gender equity” (Louwaars, 2007:83). This implies that seed systems’ research should go beyond engaging with gender at only the levels of users and access to knowledge for communities, to deal with gender factors throughout the entire seed system, including at the policy level. This report suggests ways in which gender can be integrated into policy frameworks to ensure that both men and women benefit from interventions.

The second project, ‘Integrating gender in RTB thematic research to enhance development outcomes’, investigated the key constraints and opportunities in women and men’s differential participation in and benefiting from key RTB research outputs such as varietal development, quality planting material availability, pest and disease management and postharvest technology development. These areas of focus are part of the seed systems’ impact pathway that starts with access to good quality seed of preferred traits and goes through postharvest value chain development all the way to the achievement of development outcomes and impacts such as increased availability of nutrient-rich foods and closing of yield gaps. In addition to research activities, the second project also evaluated from a gender perspective the multi-stakeholder framework for intervening in RTB seed systems that was developed by the first project and the resultant documented case studies. That work was carried out to identify the opportunities for making the framework more gender equitable and effective to lead to larger scale development outcomes.

This report is based on the analysis of the case studies undertaken using the RTB seed systems framework and of the seed systems and gender research conducted by RTB between 2013 and 2016. It discusses the lessons learnt and identifies the opportunities and gaps in integrating gender in RTB seed systems. This report also provides guidelines for integrating gender in the multi-stakeholder framework for intervening in RTB seed systems and suggests some gender research questions that could accompany the framework’s user guide (see Annex 2).

RELEVANCE

Flagship Project 2, ‘Adapted productive varieties and quality seed of RTB crops’, has the mandate to make available good quality planting materials of a diverse set of high yielding RTB varieties that are adapted to the needs and preferences of different stakeholders in the RTB crops’ value chains. Within Flagship Project 2 there is a cross-cutting cluster on improving smallholder access to healthy and new varieties of RTB planting material. The aim of that cross-crop learning and support cluster is to improve the quality of RTB seed systems’ interventions in crop-specific and system-oriented clusters (flagships 2, 3 and 5) to develop seed systems that are reliable, robust, profitable and sustainable. Documenting the lessons learnt on gender integration in the seed systems is important because the lessons will assist the cluster to be gender responsive in its work and to develop relevant and responsive tools and methodologies.

METHODOLOGY

This report captures the lessons learnt and the gaps in integrating gender in RTB seed systems' research and interventions that were identified from a review of 45 reports, essays and papers submitted to RTB by researchers working on the two seed systems projects between 2013 and 2016 (see Annex 3). The first step of the review process was to categorize the documents into the three content areas defined: (1) documents whose focus was the technical aspects of seed systems such as good crop management and techniques for maintaining seed quality, (2) documents dealing with methodologies and frameworks for intervening in RTB seed systems, and (3) documents in which gender was integrated in the analysis of seed systems or which described how gender was integrated in interventions (Table 1).

Table 1: Categories of the documents analyzed in the study

Document focus	Banana/ plantain	Cassava/ yam	Potato	Sweetpotat o	Cross crop	Total
Technical aspects of seed systems	4	6	7	3	1	21
Methodologies and framework for seed systems' interventions	1	2	1	1	6	11
Gender integration in the analysis of seed systems	1	1	4	7		13
Total	6	9	12	11	8	45

It should be noted that the documents did not exclusively cover the content under which they were classified but could have had content from the other categories. The classification was based on the documents' dominant characteristic. For example, documents categorized under gender analysis were those that focused on the collection and analysis of information on men and women's participation in seed systems and to some extent identified opportunities for and constraints to their participation in seed systems or access to affordable quality planting material.

Once the documents were categorized, they were further analyzed to establish the level of their gender content and were put under four groups: gender blind or with no sex-differentiated data, containing sex-disaggregated data, gender responsive, or gender transformative.

Gender-blind documents were regarded as those that ignored or failed to address the gender dimension in any project or research (European Commission, 1998). Gender-responsive documents were those that were deemed to address issues related to equitable participation of women and men in seed systems or analyzed or developed tools and technologies to address men and women's needs and knowledge. Gender-transformative documents

were regarded as those that focused on empowerment, as well as challenged the distribution of resources, including seed, information and training, between men and women and called for it to be equitable.

RESULTS

Some 62% of the documents reviewed met the minimum gender integration standard of collecting and reporting sex-disaggregated data. But more than 50% of the documents on the seed systems’ technical aspects and on methodologies and the seed systems framework were gender blind (Fig. 1).

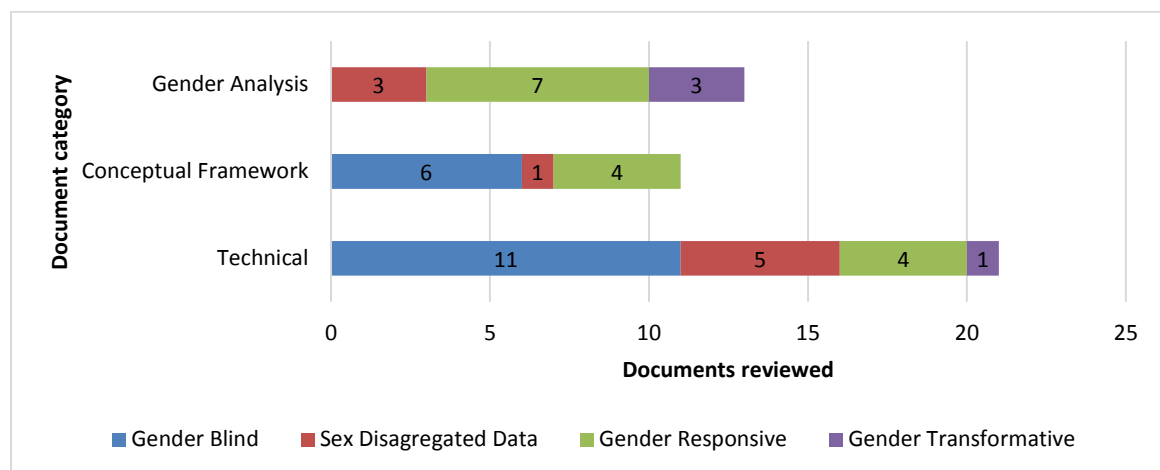


Figure 1: Level of gender integration by document category

Often the documents that contained some sex-disaggregated analysis acknowledged the important role women played in managing RTB crops and seed stock, for example Manrique (2016) and Howeler (2016), but did not articulate or discuss the implications of this or integrate the knowledge in the development of interventions and frameworks.

Most papers on the technical aspects of seed systems did not integrate or address socioeconomic factors such as those related to access to or control of seed and participation of men and women in RTB seed systems. One paper on banana and plantain seed systems in Ghana acknowledged that women owned 34% of the banana farm land and controlled 32% of the income from the plots where plantain was cultivated (Jacobsen and Dzomeku (2016) citing statistic from Doss et al. (2001)), but there was no attempt in the analysis to understand the implications of the high involvement of women in these crops in shaping the banana and plantain seed systems’ intervention design. RTB scientists should realize that technologies are socialized and applied by people and that therefore people need to be brought into technology development and dissemination.

Below we go into detail analyzing the key issues emerging from the review of the RTB seed systems’ documents.

Understanding the social embeddedness of RTB seed systems is important in developing gender-equitable seed systems

Most RTB seed systems' research acknowledges the importance of integrating gender in seed systems' approaches. For instance, RTB research has noted that women may have constraints in acquiring capital and accessing resources and may also have different opportunities for participating in and benefiting from RTB seed systems (Andrade-Piedra et al., 2016). According to Bentley et al. (2016:234), "understanding gender is critical for making a positive impact". Despite this acknowledgement, in an RTB book with 13 seed systems case studies (Andrade-Piedra et al., 2016), only 2 report some data on gender or contain an analysis of the role of gender in seed systems. Many of the case studies do not show how the various processes affect men's and women's access to opportunities in seed systems differently, even when the interventions clearly mention women as a target group. For example, in Nicaragua, while the institutions participating in an intervention to include improved cassava varieties as part of the national seed systems expected that some of the main beneficiaries would be the poorest farmers and women, the project report did not provide any account of the gender impacts of the project (see Ospina, 2016). Similarly, the case study from Peru focusing on the generation of income and employment by producing quality seed and developing markets, which stated that it was interested in gender and social equity issues, did not generate sex-disaggregated data or discuss how gender relations affected the dissemination or appropriation of technology (Orrego and Andrade-Piedra, 2016). In Ecuador, although a potato seed system project stated that indigenous women received quality seed from tissue culture laboratories for the first time, from the data it was clear that women constituted only a small proportion (9.7%) of the seed producers the project trained (Kromann, Montesdeoca and Jorge Andrade-Piedra, 2016).

What also is clear from the RTB reports is the dichotomy between the technical aspects of seed systems and their socialization. For example, when experiences are documented, gender or other experiences related to social factors are usually not mainstreamed but are treated as separate aspects. The reports usually focus on the technical elements of seed systems and rarely acknowledge that seed systems are socialized and that they impact and are impacted by social processes. Only the two cases from Ogero et al. (2016) and Mudege and Demo (2016), focusing on sweetpotato and potato, respectively, discuss the technical and social aspects of seed systems in a synergistic manner. In their analysis of sweetpotato seed systems in Tanzania, for example, Ogero et al. (2016) note that "the perception of sweetpotato as a woman's crop, grown by poor people, has meant that until recently it has not received the research and attention it deserves".

Collecting and analyzing socioeconomic data, including gender analysis, before designing seed systems' interventions and during their implementation is important to achieve equitable outcomes

The review of the RTB seed systems' work shows that data on socioeconomic factors that may affect seed systems and project implementation are generally not collected. The failure to include gender analysis during the design, evaluation or investigation of projects means that the picture of the situation and the understanding of the reality are incomplete. Consequently, the solutions and approaches that could make the seed systems' interventions effective are ignored. For example, a gender analysis in Malawi by Mudege and Demo (2016)

illustrated that the inability of women to afford quality seed put the seed systems at risk if the women ended up using low quality, diseased seed that could result in increased pest and disease burden and lowered crop yields.

Ogero, McEwan and Pamba (2016) give an account of how a gender analysis of a seed system in Tanzania helped them to shape their project strategy. Their project had initially intended to piggyback a sweetpotato seed production intervention on a cassava seed systems project by training farmers who were part of the cassava project to produce quality sweetpotato vines. A gender analysis revealed that cassava was dominated by men and sweetpotato by women and that men lacked interest in multiplying sweetpotato vines and often said, “It is better that you talk with my wife”. If the sweetpotato project had been piggybacked on the cassava project, women, who traditionally are the producers of sweetpotato, would have been excluded from training and information on sweetpotato vine multiplication. Additionally, the project realized that although women were traditionally the main producers of sweetpotato, the selection criteria for vine multipliers excluded them because they did not have access to certain required resources such as land and were not literate. The project then set a target for women’s participation as decentralized vine multipliers (DVMs) and deliberately encouraged women and men to form vine multiplication groups, with the expectation that through the groups women would access the resources they needed. The project’s partners began involving more women’s groups as DVMs, assuming that as a group, women could have better to access land and irrigation equipment. The number of women involved in the DVM activities rose from 56% in October 2010 to 67% in June 2011. Nine months after the intervention, 72% (63) of the DVMs were groups with 940 farmers as members, of whom 51% (479) were female (Ogero, McEwan and Pamba, 2016). In Nicaragua, women’s plantain cooperatives were used as an avenue to foster the involvement of women in and access to training (Staver et al., 2015).

The case below illustrates how the collection of sex-disaggregated data was used to monitor project performance of gender as well as to identify and address the challenges for women to participate in the project.

How collection of and analysis of gender data helped the SUSTAIN project in Mozambique to integrate gender into the project approach

Sex-disaggregated data collected by the DFID funded SUSTAIN project showed very low participation rates for women as sweetpotato decentralized vine multipliers. Between 2014 and 2015 only 14% of the vine multipliers were women. The project made a deliberate effort to engage women. The main obstacles cited were that women did not have access to land and water and other resources such as money to invest to multiply vines. The project adopted several strategies including efforts to register women as vine multipliers instead of their husbands and also involving men and negotiating with them to allow their wives to participate as vine multipliers. Engaging men has been important for Mozambique, which has strong patriarchal structures, and where women may need permission from their head of household to participate in training and engage in development activities. Often, women in Mozambique did not wish to register themselves as vine multipliers for fear of creating conflict in their homes with men household

heads, making it harder to capture the real participation of women in vine multiplication. As a result of concerted efforts by the project, between 2014 and 2017 in Mozambique women participation as vine multipliers increased from 14% to 29%. (SUSTAIN project report, 2017).

The Mozambique SUSTAIN case illustrates that where seed systems' projects go beyond solely focusing on technical aspects such as producing quality seed to include social aspects relating to the communities involved, they get a good understanding of the situation in which they will work, which is necessary to develop more inclusive seed systems and strategies. However, collection and analysis of gender data and other socioeconomic data are only – though important – first steps.

All the RTB publications analyzed had limited information about the engagement of both male and female farmers with the various seed systems' stakeholders such as extension workers, researchers and private seed producers, and also lacked knowledge on exactly how men and women participated in the RTB seed sector. To address issues of women's empowerment in seed systems, it is important to recognize their knowledge and potential not just as seed users but also as producers and traders of quality planting material. Agriculture is a system of human activities that entails understanding the social factors such as gender that affect sustainability and production (Lampkin et al., 2015). Social norms, especially gender norms, can have a negative influence on whether goals are achieved and whether men and women benefit from interventions.

Understanding the social factors that impinge on the functioning of seed systems helps RTB crop researchers to develop equitable seed systems that meet farmers' needs

Within RTB, including the RTB multi-stakeholder seed systems framework and RTB seed systems' work in general, there is an implicit assumption that when farmers are trained and are knowledgeable about seed production, seed quality will improve, and that if all the other stakeholders play their part, seed systems will work well. While these are true to some extent, research shows that social structural factors may impinge on the proper functioning of seed systems. For example, farmers may intentionally sell 'bad seed' (see Mudege and Demo, 2016) or cannot adopt what they learn for lack of land or other resources such as money to purchase the chemicals needed to maintain their planting materials pest and disease free (Mudege and Grant, 2017). Gender-related obstacles such as the inability to make decisions on the adoption of technologies also could affect technology adoption (see Mudege and Demo, 2016). This challenges the inherent assumption that when farmers are trained and are knowledgeable seed quality will improve.

An Irish Aid funded project on 'Rooting out hunger in Malawi through OFSP' identified the lack of access to training by women as a key obstacle to adoption of new seed technologies. The project then deliberately targeted women's farmer groups with training or insisted that women members of groups be selected to attend training. In some instances when women groups were provided with training on how to save vines

it did not always lead to the adoption of the technology by the women farmers. A woman who was hosting a vine conservation plot for a women-only group she belonged to mentioned that she did not adopt the recommended ways of conserving the vines but was conserving her vines using traditional methods such as digging a hole and planting the vines in it, since, as she said, this conserved moisture and was easier than the recommended way of planting vines in lines and irrigating them, which was hard work. Additionally, she did not have the money to purchase irrigation equipment such as electric pumps or drip irrigation kits. Women did not control money from the sale of most agricultural crops and on their own could not save enough money to invest in new technologies and new ways of doing things. From this perspective, it is short-sighted to regard access to training as a panacea to women's low participation in seed multiplication and seed businesses without looking at other issues such as access to resources and ability to make decisions about how these are used and how family income is invested (Mudege et al., 2017).

Social factors may restrict men and women from participating and benefiting from seed markets and seed systems. Therefore, seed systems' work within RTB should take into account how interventions impact social formations (including gender) and not just how interventions affect access to seed or quality seed.

Recognizing and acknowledging the work that men and women do and the knowledge they have in RTB seed systems help to develop relevant and inclusive seed systems' interventions

Work done by women in seed systems is often not recognized. For example, in eastern Uganda Mudege et al. (2016) found that women were responsible for storing potato seed and monitoring seed stores, as men were often not at home. Women and girls were regarded as responsible for conserving sweetpotato vines, for sweetpotato varietal selection and as having more nuanced knowledge on how to prepare vines before planting them. In spite of these important roles, women were often not targeted with training and usually did not benefit from the proceeds of marketing of the seed (Mudege et al., 2015a).

The banana seed systems' research in Uganda indicated that both men and women were engaged in local banana seed systems and women viewed themselves as better placed to source for suckers, since they were naturally politer and humble than the men, which helped with negotiations, and were well networked in their communities (Mayanja, Mudege and Naziri, 2016) –

Women do it mostly because we have networks that we use to look for suckers. Our networks are stronger than the networks the men have, because they are so busy and do not have the time to look for suckers. The men send us to look for suckers so we go and ask our neighbors for suckers. When we find the suckers the men will go to uproot them (women's focus group discussion participants, Lwakaloolo).

Networking was very important in sourcing for suckers, but collaboration between men and women was critical in this activity since men and the youth were responsible for transporting the suckers home. Some focus group discussions indicated that women would identify the suckers, men would uproot them and women would carry them on their heads to the garden for planting (Mayanja, Mudege and Naziri, 2016). This information helped the project ensure that women were actively recruited, engaged and trained on using micropropagation chambers to ensure the quality of the banana planting materials.

Morse and McNamara (2016) acknowledge the important role women played in yam seed systems in Idah, Kogi State, Nigeria, but note that yam seed entrepreneurs were mostly men, who were more actively engaged in yam production than were women. This knowledge influenced the selection of the participants in a seed systems' project to set up seed yam entrepreneurs, which was heavily male dominated. Morse and McNamara (2016) note that women were engaged in marketing, harvesting and transporting yam to storage, and sometimes women owned yam fields, although they relied on men's labor for some of the onerous tasks. There is room in RTB interventions to improve women's participation in projects, especially when the central role they play in seed systems is acknowledged.

Integrating men and women farmers' knowledge promotes the development of seed systems that are sustainable and relevant to farmers' needs

Some RTB cases studies show that farmers have their own knowledge systems with regard to producing seed, but these are often overlooked by technical scientists as they design and develop seed systems' interventions. The focus of many of such interventions is the top-down transfer of knowledge, characterized as "transmitting new technical knowledge to be validated under farmer conditions" (Orrego and Andrade-Piedra, 2016:33). In most cases farmers are not necessarily regarded as co-producers of knowledge but as having "little knowledge" (Mudege and Demo, 2016:160; Atieno and Schulte-Gelderman, 2016) and needing to be taught. Mudege et al.'s (2017) seed systems paper on the adoption of vine multiplication technologies in Malawi demonstrates that in fact farmers have valuable knowledge as they have existed in, and adapted crops to, their environments for hundreds of years. For example, farmers in Malawi use local knowledge to manage pests and diseases. They cultivate their crops alternating between wetlands and uplands, as well as on anthills to reap benefits from agroecological services.

Understanding of farmers' knowledge and how farmer-managed systems work is very important as it can determine the type of interventions that can be introduced. For example, in Malawi Mudege et al. (unpublished) noted that traditionally farmers rotated rice and sweetpotato in wetlands to avoid the spread of diseases. Both men and women farmers mentioned an intricate production system where sweetpotato vines were moved among the wetlands (dambo), river banks and uplands at different times of the year. This is the reason that in Malawi RTB work sweetpotato varieties that failed to thrive in both the wetlands and the uplands were not popular among farmers. This means that introducing seed systems' approaches that fail to take into account the knowledge that men and women have about their environments and about the quality of planting materials may be doing a disservice to farmers and their farming systems.

Seed systems' methodologies and frameworks developed should explicitly integrate gender and provide guidance on gender mainstreaming

The methods and tools in seed systems' research often focus on determining who the actors and stakeholders are and on issues to do with availability, accessibility and quality of seed, but they do not discuss or integrate gender. While it is not possible to mainstream gender in all the work because of human resource considerations, the lack of expansion of gender mainstreaming in seed work beyond the composition of the core gender team, despite the high level of recognition given to gender in RTB, does not bode well for the future of gender integration in seed systems' work. The lack of gender integration in seed systems is the result of two interrelated factors. First is the lack of close collaboration between the more technical scientists and the social/gender scientists in developing intervention frameworks or defining interventions. Second is that there is no guidance on how gender should be mainstreamed in seed systems, although the user guide to the multi-stakeholder framework for intervening in RTB seed systems acknowledges its importance thus, "gender (e.g. of seed producers and seed users) should be considered when analyzing seed availability, access and quality" (RTB, 2016). This may explain why the central importance given to gender in the user guide has not translated into more gender integrated work on seed in RTB.

While the user guide to the multi-stakeholder framework for intervening in RTB seed systems emphasizes the need to understand the perspectives of different stakeholders, it is not clear on how this is to be done for stakeholders such as women or how to integrate gender at the various levels of the seed systems. Additionally, it does not define the ways of investigating gender barriers and facilitators at all the levels of the seed systems, i.e. the individual, community and social structural levels, and for the different stakeholders. Gender issues are mostly mentioned only in relation to end-users, who are often described as both men and women. For example, it is not clear how gender intersects the work done at the various levels by stakeholders such as policy-makers, international and national researchers, traders, the private sector seed systems, farmer organizations, nongovernmental organizations, the national extension, and private sector processors. Mudege et al. (2015b) and Mudege et al. (unpublished) show the behavior of extension workers being skewed in favor of formal or more vocal leaders, who generally are men. The result is the low integration of women in agricultural extension activities and therefore their little application of techniques, limiting the achievement of results within seed systems. This means that while technical competence is important to improve seed quality, for example, seed systems are inherently socialized and the social aspects need to be understood if seed systems are to benefit both men and women. Additionally, there may be need to look at gender issues and how they can be integrated in the formal policy processes surrounding seed systems. Walby (2005:337–338) "finds considerable tension between the goal of integrating gender into the mainstream and that of changing the mainstream" and suggests that "gender mainstreaming theorists and practitioners need to devote greater attention to the link between policies and societal change in gender inequality". This suggests that there is also need to work on gender and seed at the policy level to ensure that changes in the seed systems arena affect men and women farmers equitably.

Formal RTB seed systems may not be cost-effective for small producers including women: integrated seed systems may be more efficient and cost-effective to meet male and female farmers' needs

There are mainly two types of RTB seed systems: formal and informal. Formal seed systems usually strive to meet national and international standards of seed breeding and are governed by national legislation and policies, to ensure the availability of quality seed at the right time. "The formal SS [seed system] usually controls seed multiplication to assure sufficient quantities of breeder, foundation and certified seed of guaranteed quality" (Biemond et al., 2012). Although the formal sector dominates the seed systems in developed countries, in developing countries "90–95% of the world's small holder farmers still obtain seed from informal sources, largely from other farmers" (Ravinder et al., 2007). Within the informal seed system, networks play a very important role (Badstue et al., 2007), and "seed transactions occur within a set of specific social relations" (Badstue et al., 2002).

RTB seed systems' research and interventions have explored different ways to supply quality planting material. For example, the CONPAPAA initiative in Ecuador sought to produce good quality seed by providing producers (farmers) quality seed grown through aeroponics and training them to multiply it as quality declared seed (Kromann, Montesdeoca and Jorge Andrade-Piedra, 2016), which was less expensive than certified seed. Through that initiative more women as well as more indigenous farmers were able to access quality planting material through the merging of formal and informal seed systems than would have been possible with conventional approaches. In Peru the informal system satisfies the seed needs of 99% of the potato growers. That seed is much cheaper than certified seed and is readily available to farmers in the villages. This shows that an integrated seed system can outperform formal and informal types, at least under Ecuadorian conditions. Orrego and Andrade-Piedra (2016) present a case in Peru where the formal sector was able to feed the informal sector with planting material that was multiplied and disseminated through both formal and informal channels. Having locally available clean and cheap seed is particularly important for women, since they have low access to monetary income. Tiwari et al. (2010) note that farmers residing in remote areas and not integrated into markets may not be able to adopt new seed varieties even when they are aware of their existence. They advocate for decentralization of seed production under the so-called community-based seed production systems (i.e. decentralized farmer models), which have been credited with improving access to seed and new varieties in remote communities. Although Tiwari et al. (2010.) focus on cereal systems, where seed is much easier to transport and store, the implication for RTB crops cannot be underestimated: RTB crops have higher planting density, meaning that much more seed volume is needed for planting, and their planting material dies within weeks of leaving the field, making integrated systems that are closer to the end-users important.

RTB crop researchers need to understand the policy framework

Attempts to look at seed policies in RTB have mostly focused on the issue of protocols for certified seed and seed inspection (Kromann, Montesdeoca and Andrade-Piedra, 2016). There has been concern that from a regulation perspective the current regulatory demands are onerous and impractical, making it hard for farmers to gain access to quality seed (Orrego et al., 2016). In Peru, Orrego (2016) found that in some cases farmers

were able to produce seed in their informal systems that might even have been of better quality than seed from the formal system. Lack of training for seed inspectors and lack of funds to allow them to carry out their duties are some of the key obstacles to the effective implementation of seed regulations to maintain seed quality (Jacobsen et al., 2016). Work to understand RTB seed policy frameworks is still in its infancy. This is probably because in many countries regulation may not exist (see Nshimiyimana et al. (2016) for Rwanda) or because most of the seed for many RTB crops is still in the informal sector (Kromann et al., 2016), which is harder to police and regulate. However, since more and more countries are moving towards seed systems' regulation and policies to align with international protocols, there is need for concerted efforts focusing on RTB seed policies. There are many ways in which gender can be integrated at the seed policy level.

The integration of gender in seed systems is considered as an imperative, and particularly the need for seed systems' interventions to address gender equity issues in order to be able to deal with the concerns of food access and poverty reduction (CTA, 2014). As noted by ASARECA & KIT (2014:iv), "women are the main actors in most operations in the informal seed systems that relate to the seed value chain of under-resourced crops. A good understanding of gender roles in the seed sector is therefore essential for the development of a dynamic seed sector that builds on the logic and strengths of this system". As countries and policy pronouncements are increasingly promoting regulation of most of the RTB crops' seed sectors, for example through training, registration and certification of seed producers, it is important to explore if women can engage with the process and successfully register and participate as vine multipliers. RTB gender research could already start engaging with the following research questions related to seed certification and registration processes:

- What are the constraints to and opportunities for men and women to register as seed multipliers? How can these be addressed?
- Examine the impact of seed certification on household relations looking at:
 - Who is most likely to be able to register as a seed multiplier between men and women? And how does this affect women's role and status as managers of planting material?
 - What are the potential impacts of market forces on women's bargaining power in the household and how can the impact of market forces be mitigated?
 - How can insights from gender analysis improve the approaches to scaling up of seed systems through enforcement of seed standards and certification to ensure the quality of the planting material?
 - How can RTB crop specialists and practitioners develop models for women engagement in seed/planting material communities of practice and seed grower associations, as well as registration of women in seed trackers?

LESSONS LEARNT AND GAPS IN KNOWLEDGE

From our examination of the RTB seed systems literature we can draw some lessons and identify gaps in gender integration in RTB seed systems' research and interventions.

LESSONS LEARNT

- There is a link between gender relations and the division of roles in production, postharvest management and marketing on the one hand, and the ability of men and women to accumulate profits and benefits along the RTB seed value chain on the other hand. It is clear from gender analysis research that women have often been regarded as consumers and not producers of seed, which has disadvantaged them and reinforced gender inequality. It is important to make visible the contributions of men and women, since often some activities carried out by women such as storage of seed or identification of varieties are not recognized as part of the productive process. This results in women being denied equal access to technical training and benefits from seed sales.
- The current seed systems' work is geared toward creating demand by developing seed that meets farmer needs; but it neither recognizes nor acknowledges farmers' knowledge. Top-down research and intervention approaches do not promote resilience of seed systems and often fail to acknowledge gender inequities. For example, where the local system is not understood, interventions may cause harm to women if they force them to lose control over seed systems. Gender and gender equity issues should be expanded to include learning from the knowledge that both men and women have, including indigenous knowledge, and understanding how men and women participate in ensuring seed quality, including their involvement in decision-making, as well as their ability to benefit from seed systems and seed marketing. This approach will help RTB seed systems achieve sustainability, resilience and equity by acknowledging that sustainability of seed systems need not only be concerned with environmental aspects but should also be connected with ensuring that both men and women benefit and neither group is harmed.
- It is clear that the frameworks to understand seed systems need to comprehend gender and cultural norms related to resource distribution that may affect the ability of men and women to benefit from the seed systems. And seed systems' interventions should take these norms into account. For example, if women own or are allocated the least fertile and marginal lands, trials conducted on plots managed by men may not address women's needs. Thus, for women to benefit from seed systems the resources available to them need to be understood and taken into account in the design of interventions. Opportunity should be created to integrate and understand social norms and informal rules and regulations governing local seed systems in the RTB seed systems' work.
- Although the issues of seed affordability and accessibility are often looked at from a gender-neutral perspective, the fact is that they are not gender neutral. For women, the lack of money to purchase seed is a major problem. It affects the quality and volume of their seed production and leaves them in a vicious circle that does not allow them to scale up their farming enterprises.
- It is important to understand the social norms that are critical to the survival of RTB seed systems. Social norms, especially gender norms such as the social division of labor, can negatively influence an RTB seed system's achievement of its goal of promoting the adoption of new improved varieties and clean

planting material to increase RTB crop yields and promote gender equity. For example, Ogero, McEwan and Pamba (2016) and Mudege and Grant (2017) note that in Tanzania, although sweetpotato is regarded as a woman's crop, men may take over its marketing when it becomes profitable because marketing is regarded as a men's responsibility, especially selling of crops in markets far from home. In the potato seed markets in Malawi women did not participate from an empowered position as sellers of seed but only as buyers, which meant that the income from quality seed often accrued to only men. Understanding gender norms helps projects in identifying methods, measures and strategies to ensure that men and women benefit equally.

- Formal RTB seed systems are usually not cost-effective for small producers, especially because of the bulkiness and perishability of the planting material. The answer to this predicament can be a system that integrates formal and informal markets, particularly for ensuring that quality seed is available in local markets and communities. Also, the key issues related to the unequal relations in the market between producers and traders, as well as the limited access to market intelligence, need to be addressed in agricultural research for development.
- Extension processes should not just focus on technical programs but must incorporate gender modules that encourage men and women to work together, as many RTB activities, including those on seed systems, need men and women to work in collaboration.
- It is important to train extension workers or equip them with the skills to mainstream gender in their work, especially in recruiting farmers for training and information dissemination. It is important that men and women participate in training activities, but sometimes extensionists recruit only men and expect them to disseminate the information to their wives. This is a source of unequal power relations.
- Researchers need to conduct a gender analysis at the beginning of a project to understand the social context and to devise methods to address gender issues that may arise during the implementation of the project. For example, in cases where women may not have access to land, membership in seed multiplication groups may improve their participation in and ability to benefit directly from research (Ogero, McEwan and Pamba 2016; Mudege, 2015). In such cases groups strengthen women's social networks and foster their access to information and opportunities such as those for training. However, how these groups are constituted and managed needs to be clearly thought out, because, as RTB research has illustrated, farmer groups have the potential of reproducing gender inequalities that favor men.
- Ways of involving women could be co-developed with participating men and women farmers. Gender relations that privilege men's crops may affect seed systems negatively, since women's crops may not get the attention they need when attacked by pests or diseases while men's crops would, meaning that certain pests and diseases might persist in the community.
- Understanding local knowledge systems and integrating them in the development of seed systems should be regarded as key in RTB seed systems' research and interventions.

- Gender analysis of seed systems is important to provide a complete picture of the seed systems. Lack of gender analysis in projects can lead to improper methods being developed and failure to adopt solutions and strategies that could make a seed systems' intervention effective.

GAPS

- RTB seed systems' interventions need to focus more on social factors that affect seed systems not just on technical factors and technologies. Research and interventions in RTB demonstrate an implicit ideological assumption that markets are inherently beneficial in terms of access to good quality seed and profits from seed marketing, but enough attention is not given to the social factors that may restrict men and women from participating and benefiting from seed markets. RTB agricultural research for development focuses on how interventions affect access to seed or seed quality but fails to take into account how interventions impact social formations, including gender relations.
- RTB research thus far has clearly articulated the role of formal sector stakeholders in maintaining seed quality. For example, policy-makers develop policies to prevent cross-border movement of infected seed and deal with variety release issues; researchers deal with the development of effective and reliable diagnostic tools; seed producers develop seed models and rapidly multiply clean seed from research institutions; and seed users – who are mostly farmers – benefit from capacity building to enable them to use and manage planting material. While farmers are engaged in adopting and using clean seed, their role in the generation of knowledge is often not acknowledged or studied. In addition, the different roles that men and women farmers play and how they impact access to seed and socioeconomic development are not well understood.
- Although the multi-stakeholder framework for RTB seed systems includes technical aspects to foster strategic thinking about accessibility and availability of good quality seed, it does not include the methodologies to incorporate and promote strategic thinking from a gender perspective, which would help to steer seed systems in a truly holistic way and to meet the goals of the interventions. Thus, there is need to develop easy-to-use gender tools to accompany the multi-stakeholder framework for RTB seed systems.
- There are only a few studies on gender and other social factors that could limit the productivity or profitability of quality RTB seed. There are not many studies that have conducted a comparative analysis of the impact on men and women of access to and utilization of clean seed or their knowledge and skills in controlling pests and diseases. Such studies are critical to understand whether and how men and women are benefiting equally from clean seed and what factors could limit their ability to benefit fully.

- Although there is a lot of support within RTB to integrate gender in seed systems' work, gender integration approaches are still not widespread in this work. There is need to ensure that all projects collect sex-disaggregated data as a minimum standard for gender integration. Most of the reports analyzed did not report sex-disaggregated data or findings. More often than not research that reports on gender are usually gender-specific studies. While there is a benefit in conducting such studies for seed systems, it is also important to ensure that gender is adequately mainstreamed in research and interventions that may not be gender specific.

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ANNEXES

ANNEX 1: ENTRY POINTS FOR GENDER MAINSTREAMING IN IMPLEMENTING THE MULTI-STAKEHOLDER FRAMEWORK FOR INTERVENING IN RTB SEED SYSTEMS

Table 2: Multi-stakeholder framework for gender mainstreaming in RTB seed systems based on Sperling et al.'s (2013) model

Stakeholder	Availability/supply	Accessibility			Knowledge and quality		Policy and regulation	Sustainability and resilience
		Delivery channel features	Affordability/profitability	Awareness and demand creation	Variety (including biodiversity)	Health, genetic purity, physiological age, and physical quality		
Policy-makers	Do the policies regarding availability/ supply of seeds include as targets both men and women? Do seed policies promote women's seed sovereignty "that is their ability to access and control seed in ways commensurate with their roles as food providers,	Do the policies of delivering seeds include formal and informal markets (given that women participate mostly in informal markets?)	Do the policies consider the financial capacities of both men and women to acquire seeds? Do the policies consider measures to make seed accessible to both men and women? Do the policies allocate money to	Do messages to improve seeds system target both men and women?	Are there incentives for both men and women to adopt new varieties?		Do policies take into account local informal norms that regulate conservation use and exchange of seed? What are the constraints and opportunities for men and women to register as seed multipliers?	Do policy prescriptions and pronouncements ensure that men and women benefit from seed policies and that neither are harmed?

Stakeholder	Availability/supply	Accessibility			Knowledge and quality		Policy and regulation	Sustainability and resilience
		Delivery channel features	Affordability/profitability	Awareness and demand creation	Variety (including biodiversity)	Health, genetic purity, physiological age, and physical quality		
	producers and preservers of food cultures” (WB, FAO and IFAD 2009).		develop gender-sensitive research?				How can these be addressed?	
National and international researchers	<p>Identify gender division of roles and responsibilities within seed systems.</p> <p>What are the constraints to access to quality seeds for both men and women?</p> <p>How are men and women affected by the availability or lack of availability of seed?</p>	<p>Examine assumptions on delivery mechanisms to ensure that they do not reproduce gender biases.</p> <p>Design delivery channels that assure both men and women the best access to planting material and associated knowledge, as well as promote their ability to be successful as</p>	<p>Identify seed demands of both men and women.</p> <p>What are the constraints for both men and women in affording or profiting from seed systems?</p> <p>Identify the costs and benefits of using quality seeds</p>	<p>Are the messages and their dissemination designed to appeal to both men and women?</p>	<p>Identify how gender roles inform the adoption or rejection of varieties of seeds.</p>	<p>How do gender roles impact the management of seed pests and human health hazards?</p> <p>Identify gender division of roles and responsibilities with respect to access to quality seed.</p> <p>What are the constraints to access to quality seeds for both men and women?</p> <p>How do you promote movement across borders of technologies that respond to both women and men’s needs (mostly</p>	<p>Are results of research used to advocate for policy change?</p>	<p>Do research and interventions take into account the knowledge that men and women have and how they participate in ensuring quality of seed, including their involvement in decision-making, as well as their ability to benefit</p>

Stakeholder	Availability/supply	Accessibility			Knowledge and quality		Policy and regulation	Sustainability and resilience
		Delivery channel features	Affordability/profitability	Awareness and demand creation	Variety (including biodiversity)	Health, genetic purity, physiological age, and physical quality		
		commercial producers of quality planting material.				international research organizations)		from seed systems and marketing?
Traders (local markets)	<p>Are quality and affordable planting materials with farmer-preferred traits available on time?</p> <p>Do women have access to formal and informal seed markets?</p> <p>When do both men and women sell seed (seasons)? Do the men and women have enough to sell?</p>	<p>Are men and women seed traders able to participate competitively in the seed market?</p> <p>Where do both men and women get their seed from?</p> <p>How do both men and women sell seed?</p>	<p>Is available seed affordable for both men and women?</p> <p>What is the profitability of seed for both men and women traders? (collect sex-disaggregated data)</p>	<p>Do both men and women traders have equal access to market information?</p> <p>Do men and women traders have the business skills they need to run successful seed businesses?</p>	<p>Is there market segmentation information regarding what men and women prefer?</p> <p>Are men and women's preferred varieties available on local markets?</p>	<p>Are local traders able to access quality seed from suppliers?</p> <p>Are men and women traders able to identify quality seed for sale?</p>	<p>What are the constraints and opportunities for men and women to register as seed traders? How can these be addressed?</p> <p>What are the potential impacts of market forces on women's bargaining power in the household and how can this be mitigated?</p>	<p>Are both men and women traders able to access quality seed on time and to profit from their seed business?</p>
Specialized seed producers	<p>Is there quality seed for crops considered women's crops?</p>	<p>Design delivery channels that assure both men and women of the best access to planting material and associated knowledge.</p>	<p>Are quality and affordable quality planting materials with user-preferred traits available for both men and women?</p>	<p>How do private companies advertise and create awareness for both men and women?</p>	<p>Do both men and women have knowledge of the advantages and characteristics of quality seed?</p>		<p>Do policy models promote women engagement in seed/planting materials communities</p>	<p>Are men and women farmers engaged in evaluating and testing available quality</p>

Stakeholder	Availability/supply	Accessibility			Knowledge and quality		Policy and regulation	Sustainability and resilience
		Delivery channel features	Affordability/profitability	Awareness and demand creation	Variety (including biodiversity)	Health, genetic purity, physiological age, and physical quality		
				Are men and women able to host demonstration plots for new seed and quality planting material?			of practice and seed growers' associations, and registration of women in seed trackers?	planting materials?
Farmer organizations/groups	Do farmer groups distribute quality planting material in a gender equitable way? How much starter quality seed do farmer organizations and associations need? How do they ensure that women and disadvantaged groups have access to seed?	Do farmer groups take into account the social factors that may restrict men and women from accessing quality seed and develop their delivery channels taking these into account?	Do farmer groups respond to gender-related constraints women and men face in relation to marketing of planting material through groups and their ability to benefit from seed marketing?	Do they promote new or clean varieties targeting both men and women? Do farmer groups and organizations promote both men and women to host demonstration plots and to attend training on seed production and business skills?	Do farmer groups promote on-farm seed management to both men and women? Do women and disadvantaged groups demand different varieties and is this taken into account in group planning?	How do both men and women select, store and condition seed? Do groups target both men and women members with training on seed quality and seed health? Do youth and other disadvantaged groups have access to training and quality seed?	Are farmer organizations involved in policy change debates? What are the constraints and opportunities for men and women to register as seed multipliers? How can these be addressed?	When seed is produced or marketed through groups, do the groups take into account the power relations between men and women within households, communities and markets and address these?
NGOs and national extension	Do extension and NGOs design gender-responsive interventions to ensure that women, youth and other	Examine assumptions on delivery mechanisms to ensure that they do not reproduce gender biases.	Do extension and NGOs target women with training at the same rate as men for them to be able to take	Do extension and NGOs promote varieties among men and women? Do they promote both men and	Do extension and NGOs promote on-farm seed management to both men and women?	How do extension and NGOs train farmers about quality planting material and seed health?	Are NGOs involved in seed policy debates representing the interests of men, women	

Stakeholder	Availability/supply	Accessibility			Knowledge and quality		Policy and regulation	Sustainability and resilience
		Delivery channel features	Affordability/profitability	Awareness and demand creation	Variety (including biodiversity)	Health, genetic purity, physiological age, and physical quality		
	<p>disadvantaged groups have access to seed?</p> <p>Do they understand the constraints to access to quality seeds for both, men and women, and how do they address these in their programming?</p>	<p>Do extension and NGOs involve men and women in seed delivery and production?</p> <p>Do extension and NGO stakeholders use delivery channels that assure both men and women the best access to planting material and associated knowledge, as well as promote their ability to be successful as commercial producers of quality planting material?</p>	<p>advantage of, participate in, and benefit from new commercial systems that may arise because of seed systems' interventions?</p>	<p>women as hosts of demonstration plots?</p> <p>Do they involve both men and women in evaluation of planting material?</p>		<p>Do individual women or groups have access to training and quality seed?</p> <p>What does extension do to ensure women access quality planting material?</p>	<p>and other marginalized farmer groups?</p>	

Stakeholder	Availability/supply	Accessibility			Knowledge and quality		Policy and regulation	Sustainability and resilience
		Delivery channel features	Affordability/profitability	Awareness and demand creation	Variety (including biodiversity)	Health, genetic purity, physiological age, and physical quality		
Seed users	<p>Do men and women farmers have enough seed at the right time?</p> <p>Do women and men have access to enough seed?</p>	<p>Where and how do men and women get seed?</p> <p>What constraints do men and women face when they try to access seed? Are these the same or different?</p>	<p>How much does the seed cost? Is that affordable for both men and women?</p> <p>How much are male and female seed users willing to pay for seed?</p> <p>Do women find available quality seed affordable?</p> <p>Do men find available quality seed affordable?</p>	<p>Do men and women have knowledge about seed quality, how to manage seed and how to access quality seed?</p> <p>What are the different information sources on seed men and women rely on?</p>	<p>What are the local informal norms that regulate conservation, use and exchange of seed by both men and women?</p> <p>Is quality planting material with user preferred varieties available to meet men's and women's needs?</p> <p>What is the cultural significance of the varieties for both men and women?</p>	<p>What are the pest and disease problems from the perspectives of both men and women?</p>	<p>Are men and women able to access quality and affordable seed with the traits that they prefer?</p>	

ANNEX 2: SUGGESTED GENDER-MAINSTREAMED RESEARCH QUESTIONS TO ACCOMPANY THE USER GUIDE

This is based on research questions grouped in the 3 themes and clusters as identified during the development of the multi-stakeholder framework for intervening into RTB seed systems (RTB, n.d.).

Table A2.1: Theme 1 – Farmers’ demand, cost and benefits of quality seed, and value of specialized seed producers

Cluster 1. Seed purchasing	Cluster 2. Awareness/information
<ul style="list-style-type: none"> • Why does farmers’ seed purchasing behavior deviate from seed researchers’ expectations? • What kind of methodologies or instruments do seed researchers use to identify the needs of male and female seed users? • What factors influence farmers’ decisions for buying improved planting materials? • How much are farmers willing to pay for better quality seed? What are the trade-offs? • Does the sex of farmers influence the decision to purchase improved planting materials? • Do men and women have equal economic capacity to buy quality seeds? 	<ul style="list-style-type: none"> • Will increased farmer seed management knowledge and capacity make them more frequent customers of certified seed? • Are farmers aware of the benefits of better quality seed? Are men and women among the targets for information on the benefits of using quality seed? • Is there a difference between the acceptance that men and women have regarding the adoption of good quality seeds? • Do farmers have the capacity to manage and maintain quality seed? • How can we demonstrate the benefits of quality seed for men? • How can we demonstrate the benefits of quality seed for women?
Cluster 3. Opportunity costs	Cluster 4. Markets (moved from theme 3)
<ul style="list-style-type: none"> • What opportunity costs are associated with the use of quality seed? • Are the opportunity costs the same for men and women? • What is the opportunity cost of not using improved seed for men? • What is the opportunity cost of not using improved seed for women? • Will training in seed management enhance the role of women seed managers and be a benefit to them? • Will training in seed management enhance the role of men and women seed managers and be a benefit to them? • How do the services impact both men and women in terms of work load, decision-making and benefit if they have access to training and information? 	<ul style="list-style-type: none"> • What is the effect of duration and subsidy models on business demand? • Do the models of duration and subsidy of companies take into account the differentiated effect on men and women? • How could this impact be identified? • How will quality seed demand and supply be integrated with market information systems so that quality seed is available at the time and locations it is needed? • What is the demand of formal markets for the RTB products offered by women?
Cluster 5. Seed demand for quality seed	Cluster 6. Farmers’ seed preferences

<ul style="list-style-type: none"> • How do we estimate the demand by farmers for quality seed? • What factors determine the demand for quality seeds by women? • What factors determine the demand for quality seeds by men? 	<ul style="list-style-type: none"> • What kind of seeds do women farmers like to have (e.g., seed for producing crops for home consumption or for sale, seed of new varieties)? • What kind of seeds do men farmers like to have (e.g., seed for producing crops for home consumption or for sale, seed of new varieties)?
Cluster 7. Seed flows/sources	Cluster 8. Costs/benefits
<ul style="list-style-type: none"> • What are the existing seed flows? Where do women farmers get seed? • What are the existing seed flows? Where do men farmers get seed? • How, why and where do they source seed? 	<ul style="list-style-type: none"> • What is the importance of seed quality in closing the productivity yield gap for men? • What is the importance of seed quality in closing the productivity yield gap for women? • Are there the differences in the production costs of women compared to men? • How do we identify the tipping point when benefits exceed costs? Context + management?
Cluster 9. Costs/benefits	Cluster 10. Institutional/paradigm change
<ul style="list-style-type: none"> • What are the cost and benefits and/or comparative advantages of using quality seed vs new varieties? • What is role of unhealthy seed (as an income source) in seed health at the community level? 	<ul style="list-style-type: none"> • Who are the main drivers (men, women, individuals, organizations, state institutions) to change the perspectives of institutions from the old paradigm approaches (buy seed) to the new paradigm methods (manage seed health)?
Cluster 11. Market intelligence	Cluster 12. Seed sources/demand
<ul style="list-style-type: none"> • How will we know the level of demand for quality seed by gender and production system to guide farmers' investment in quality seed production? 	<ul style="list-style-type: none"> • What are the advantages and disadvantages of using the seed business model vs the farmer integrated seed producers' model for both men and women?

Table A2.2: Theme 2 – Regulation and policies: what degree of standards enables farmers to get seed of the quality they want/need (and trade-offs between farmer risk and societal risk)?

Cluster 1. Formal regulations favor/hinder access to seed	Cluster 2. Quarantine and cross-border seed movements
<ul style="list-style-type: none"> • What are the current policies on seed quality and how do they influence the uptake of clean seed? • Do current policies on seed quality consider their differential impact on men and women? • What policies have promoted seed quality in countries where seed systems are integrated at the farm level? • How can insurance policies/schemes contribute to make healthy seed available for farmers? • How can we change regulations that are affecting the access of both men and women farmers to improved seed? • What critical knowledge on technology and gender gaps needs to be addressed to enable farmers to adopt quality seed? • How will policies that support markets and value chains for RTBs (e.g. import and infrastructure, policies etc.) promote greater demand for quality seed? • Would official policies create obstacles for quality seed producers? 	<ul style="list-style-type: none"> • Are quarantine procedures appropriate for quality seed producers and consumers? • What policies (education, inspection, surveillance) can effectively reduce informal movement of infected seed across borders?
	Cluster 3. Differentiated effect regulations
	<ul style="list-style-type: none"> • How can regulation protect and benefit small farmer customers, both men and women? • Can seed policies and regulations lead to greater gender equity?
	Cluster 4. Informal quality insurance
	<ul style="list-style-type: none"> • How can farmers’ practices on quality seed production related to health risk be regulated?
	Cluster 5. Standards
	<ul style="list-style-type: none"> • Are seed health regulations based on local pest and disease risk? • What quality standards are appropriate? • What tolerance levels are acceptable according to the context (sanitary, variety management)?
	Cluster 6. Seed production sites
	<ul style="list-style-type: none"> • Can national policies create designated seed production sites?
Cluster 7. Informal access to seed	Cluster 8. Variety regulation
<ul style="list-style-type: none"> • What is the potential of informal forms of seed quality? • Is “truthfully labeled seed” feasible? • Do small-scale farmers need formal regulations to access new varieties and produce quality seed? • What consumer education will ensure seed seller accountability? 	<ul style="list-style-type: none"> • Are variety evaluation methods reflecting farmers’ conditions and needs? • Can registration of varieties across countries within a sub-region facilitate greater effective release? e.g. ECOWAS policy is not implemented. • Can limited exclusive rights on CGIAR germplasm improve adoption/access?

Table A2.3: Theme 3 – Common tools and techniques to improve quality seed multiplication and maintain such quality: what works best, where and when?

Cluster 1.	Cluster 2.
<ul style="list-style-type: none"> • Where in the seed multiplication process are the most appropriate applications of tissue culture or other rapid multiplication technologies to be used? What can be realistically used on the farm? • Which are the criteria and methodology to select a certain technique? 	<ul style="list-style-type: none"> • Which on-farm seed multiplication techniques best maintain or improve seed quality? • Do men and women have equitable access to resources to improve seed quality? • Which seed production techniques are available for farmers (smallholders)/seed producers? • How can men and women participate equitably in seed multiplication? • Where and under what conditions can common tools and techniques work for smallholder farmers? • How can farmer adoption of tools and techniques for seed multiplication be strengthened?
Cluster 3.	
<ul style="list-style-type: none"> • What is the duration of seed health quality on farm? How is re-infestation to be mitigated? • Are there gender-differentiated roles for seed quality management on farms? 	
Cluster 4.	Cluster 5.
<ul style="list-style-type: none"> • How can new techniques and results be communicated and disseminated in a way that is understandable to stakeholders, considering differences in literacy and formal education between men and women? • What seed quality management guidance and training are needed for both male and female farmers? • What guidance and training in seed quality management are necessary for male farmers? • How do we ensure TC planted “after care” is developed/provided? 	<ul style="list-style-type: none"> • Identify common aspects across RTB crops, e.g. macro-propagation chambers for <i>Musa</i> spp. and cassava. • How can commercial techniques be exploited for smallholders? • How do we create/improve public-public relationships in seed multiplication (production)?
Cluster 6.	Cluster 7.
<ul style="list-style-type: none"> • Does gender play a role in the multiplication of good quality planting materials? • How do seed multiplication techniques affect gender? • What are the constraints to and opportunities for men and women to register as seed multipliers? How can these be addressed? • Examine the impact of seed certification on household relations looking at: <ul style="list-style-type: none"> – Who is most likely to be able to register as a seed multiplier between men and women? And how does this affect women’s role and status as managers of planting material? – What are the potential impacts of market forces on women’s bargaining power in the household and how can the impact of market forces be mitigated? 	<ul style="list-style-type: none"> • How do we improve the capacity to maintain seed health along the multiplication chain?

<ul style="list-style-type: none"> – How can insights from gender analysis improve the approaches to scaling up of seed systems through enforcement of seed standards and certification to ensure the quality of the planting material? – How can RTB crop specialists and practitioners develop models for women engagement in seed/planting material communities of practice and seed grower associations, as well as registration of women in seed trackers? 	
Cluster 8.	Cluster 9.
<ul style="list-style-type: none"> • Which seed health diagnostic tools are cost-effective and reliable for the different stakeholders? 	<ul style="list-style-type: none"> • What are the crop/region targeting multiplication ratios for high quality RTB seed? Observed and expected multiplication ratios are often not the same.
Cluster 10.	Cluster 11.
<ul style="list-style-type: none"> • What is the potential to scale up farmer-based tissue culture strategies to improve access to better quality seed? 	

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