

## Feed the Future Innovation Lab for Collaborative Research on Sorghum and Millet 2018 West Africa Regional Pearl Millet Convening

September 4-6, 2018

Centre d'Etude Régional pour l'Amélioration de l'Adaptation à la Sécheresse (CERAAS)  
Thiès, Sénégal

### BREAKOUT SESSION PRIORITIZATION REPORT

#### BACKGROUND

Nearly 90 researchers and stakeholders from across the West African pearl millet value chain convened on September 4-6, 2018 in Thiès, Senegal at the Centre d'Etude Régional pour l'Amélioration de l'Adaptation à la Sécheresse (CERAAS). Targeted at many of the major actors in pearl millet from Senegal, Niger, Mali and Burkina Faso, the event was co-hosted by Kansas State University's Feed the Future Innovation Lab for Collaborative Research on Sorghum and Millet (SMIL), CERAAS, and the USDA's NCBA CLUSA's Millet Business Services Project.

The purpose of the convening was to provide a forum for discussion between pearl millet stakeholders (including input suppliers, farmers, processors, etc.) and agricultural researchers focused on of the needs and opportunities for technological innovation. Over three days, the participants presented current pearl millet value chain activities in several West African countries and discussed technological and organizational bottlenecks to improved productivity and profitability of their activities.

On the first day, twenty presentations were made by stakeholders in the West African pearl millet value chain. On the second day, the groups broke out across area-specific topics and worked collaboratively to prioritize the most pressing issues in the West African pearl millet industry. On the third day, the groups presented their findings and observations. This report presents a synthetic view of the major points that were identified during the introductory presentations, the breakout sessions and the final presentations of the third day, organized by area-specific breakout group.

#### OBJECTIVES

The primary objectives of the area-specific breakout sessions were as follows:

- To identify the key needs and constraints as presented by both stakeholders and researchers in Day 1 presentations, and prioritize these according to overall importance
- To identify strategic research priorities that address these key needs and constraints
- To identify key actors and collaborations necessary to the implement the strategic research priorities

#### PARTICIPANTS

Each participant was requested to self-identify their area of expertise/interest by selecting from the following areas:

- Breeding/genetics
- Agronomy/entomology

- Seed systems
- Economics and extension
- Processing/value addition/nutrition

On the day of the area-specific breakout sessions, participants met in separate meeting rooms according to their area of expertise (*seed systems* was combined with the *economics and extension* group for logistical purposes). The *Processing/value addition/nutrition* group was the largest with approximately 28 participants, followed by *Breeding/genetics* with approximately 20 participants, *Agronomy/entomology* with approximately 18 participants and *Seed systems/economics/extension* with approximately 16 participants.

## PROCESS

Each group was co-facilitated by a representative from the Sorghum and Millet Innovation Lab and a representative from a Senegalese partnering institution (CERAAS or ITA), and was recorded by a note taker. The sessions opened with introductions from all participants and a description of the objectives and session format. Participants suggested sub-areas based on their expertise and brief discussion followed to ensure that the groups were in general agreement around the identified sub-areas.

Following the opening session, participants were asked to help identify key needs and constraints under each sub-area. Each participant was given three Post-it notes, on which they were instructed to write the top three needs or constraints that they had heard discussed in the research and stakeholder presentations made the previous day. Participants were then asked to categorize these constraints by placing them on the appropriate sub-area topic sheet around the room.

Once the participants completed this activity, they were divided into small groups and requested to work together to “cluster” the Post-it notes into major needs/constraints, which they then presented back to the full working group. Following the clustering activity, participants were given five colored stickers. They were requested to use those five stickers to choose the needs/constraints that they felt were the most important based on what they heard in the previous days presentations, as well as what they had experienced in their own careers. They were allowed to place multiple stickers on a single constraint should they so choose.

Following the voting exercise, the facilitator reviewed the main needs and constraints identified by priority (based on total number of stickers) and the participants discussed why they felt specific needs/constraints were the highest priority.

Participants then divided back into small groups and were assigned 1 or 2 of the major needs/constraints identified during the clustering process. They were requested to list 3-5 strategic research areas that they felt could help address these major needs/constraints. Each small group presented back to the larger group and discussion was facilitated to identify any research areas that participants felt were missing.

Five colored stickers were again distributed to each participant. As had been done previously, participants were requested to vote on the strategic research areas they felt were the most important based on their knowledge of available resources and opportunities. Once complete, the key research areas as identified by the prioritization process were discussed. Participants were then asked to identify the key organizations and collaborations they felt necessary to address each research area. The listings of these players/collaborators were then presented to the group for discussion.

## RESULTS

Each set of co-facilitators and note taker was requested to compile the results of their breakout session into a report that clearly outlined the major constraints, strategic research areas and key players/collaborators according to their group's area of expertise. Those reports are as follows.

### **BREAKOUT GROUP 1: BREEDING - GENETICS**

*Co-facilitators: Dr. Ndjido Kane (ISRA/CERAAS) and Dr. Bettina Haussmann (SMIL External Advisory Board)*

*Note taker: Dr. Ibrahima Sarr (ISRA)*

The breeding and genetics breakout group consisted of individuals primarily representing research institutions (including ISRA, INRAN, INERA, IER, ICRISAT, IRD, and KSU) as well as a member of the NCBA CLUSA Millet Business Services Project. Working areas included breeding, physiology, molecular biology and genetic diversity.

### **General discussion of participants and pre-established sub areas**

The co-facilitators and participants established three separate sub-areas to help guide the discussion and the prioritization process.

- Sub-area 1. Pearl millet production, transformation and use**
- Sub-area 2. Breeding approach and efficiency**
- Sub-area 3. Institutional issues**

These sub-areas were used to help drive the identification of major constraints or needs within the topic area of breeding/genetics.

### **Major constraints by sub-area**

#### **Sub-area 1. Pearl millet production, transformation and use**

- a. Target traits for better pearl millet productivity:
  - i. Yield, adaptation to different AE zones, downy mildew resistance, drought tolerance, head miner resistance, nutrient-use efficiency/adaptation to low soil fertility, Striga resistance, salinity tolerance, flooding tolerance
- b. Grain and stover quality traits (Approaches/tools for biofortification)
  - i. High FE and ZN and other nutrient content in grains, stover digestibility, low level of anti-nutrients (phytate) and mycotoxins, traits to ease processing
- c. Access to genetic diversity and trait-specific germplasm
- d. Methods to integrate multiple selection targets and possibly farmer participation (dynamic genepool management, multi-step selection, use of selection indices, etc.)
- e. Better collaboration among disciplines and stakeholders, and among breeders in the region

#### **Sub-area 2. Breeding approach and efficiency**

- a. Farmer participatory approaches to overcome adoption difficulties
- b. Clear definition of breeding targets:

- i. Variety type (OPVs/Hybrids), target traits and regions, ideotypes/product concepts - towards a basket of varietal options for a target region
- c. Access to genetic diversity:
  - i. Germplasm collection, conservation, management, & characterization (genetic and phenotypic diversity)
- d. Reliable phenotyping under field-, lab and greenhouse (including high-throughput phenotyping for specific traits like downy mildew resistance)
- e. Integration of molecular breeding tools; identification of/access to diagnostic markers for genomic selection; gene editing
- f. Off-season facilities to speed up breeding program
- g. Better data management and analysis
- h. Crop modeling under different climate scenarios to refine breeding targets
- i. Training in above-mentioned areas

### Sub-area 3. Institutional issues

- a. Infrastructure and equipment:
  - i. Irrigation equipment for offseason nurseries and seed production; conditioning facilities; Downy mildew screening facility, greenhouse or growth chambers screening facilities; farm equipment, gene banks and seed stores, vehicles
- b. Breeding program supplies
- c. Expertise/training in:
  - i. Breeding methodology, plant pathology, genetic resources conservation, regional and international laws on genetic resources, bioinformatics, marker-assisted and genomic selection, ... trans-disciplinary approaches
- d. Institutional data management policy and data management support
- e. Mechanisms for mentoring of young scientists
- f. Mechanisms for better regional collaboration (partially covered by IAVAO)
- g. Longer-term funding

### Key research strategies as follow by the identified constraints

After identifying the three main sub-areas and the associated constraints/needs faced by those in the breeding/genetics point on the pearl millet value chain, the group proceeded to identify a number of “game changers” that they felt could help significantly move forward progress within the region.

### Research priority 1. Farmer participation and specific adaptation to individual contexts

- a. More communication and information/knowledge exchange with farmers
- b. Development of a basket of varieties with specific adaption to particular contexts (exploring G x E x M x S interactions instead of aiming for “one-size-fits-all” varieties)
- c. More on-farm testing and selection (incl. large-N trials to study G x E x M x S interactions)
- d. Network to share and evaluate segregating materials on-station and on-farm

### Research priority 2. Modern tools

- a. Precision phenotyping to better understand mechanisms of drought adaptation and screen for water- and nutrient-use efficiency
- b. Better access to modern selection tools/diagnostic markers

- c. Development of the double haploid technique for fast development of lines

**Research priority 3. Exploring heterosis**

- a. Identification of heterotic groups for use in OPVs & Hybrid breeding
- b. High yielding, high biomass, nutri-rich hybrids for better endowed environments

**Research priority 4. Contribution to better nutrition and easier processing**

- a. Nutritional value of grain and fodder (nutrition-informed breeding, incl. mycotoxins)
- b. Breeding for food processing-related traits

**Major actors as identified by research priorities**

After agreeing on the primary research priorities and their components, the group discussed which players were key in the accomplishment of these priorities and how they would contribute to the process.

KEY PLAYER	POSSIBLE ROLE
<b>Scientists</b> (multi- and trans-disciplinary, national and international specialized centers)	Scientific knowledge and innovation
<b>Farmers organization/cooperatives</b>	Local knowledge and innovation, infrastructure for on-farm testing
<b>Consumers associations</b>	Local knowledge, use-related traits
<b>Development organization/Projects</b>	Infrastructure for on-farm testing and scaling
<b>Private sectors</b> (Processors, Seed companies)	Scaling, market pull
<b>Gene banks</b>	Access to genetic resources
<b>Regional organizations</b>	Regional cooperation
<b>Donors</b>	Long-term funding

**BREAKOUT GROUP 2: AGRONOMY - STRESS MANAGEMENT**

*Co-facilitators: Dr. Daniel Fonckea (ISRA/CERAAS – CIRAD) and Kira Everhart-Valentin (SMIL Management Entity)*

*Note taker: Dr. Bassirou Sine (ISRA/CERAAS)*

The second breakout session on pearl millet research prioritization focused on issues around agronomy and stress management (this was adapted from the initial *agronomy/entomology* description to more broadly cover key constraints and needs in production). Approximately 20 participants took part in this session, and they represented a variety of different points along the value chain, from pest and stress management research through production and processing.

Participants were highly engaged in the discussion and were actively guided through the prioritization process by the session co-facilitators with additional prompting by session rapporteur.



In order to focus discussion as concretely as possible within the established time frame, session facilitators developed **four subareas** to help participants identify key constraints within each areas. Those areas included:

- Sub-area 1.        Stress management**
- Sub-area 2.        Soil health**
- Sub-area 3.        Mechanization**
- Sub-area 4.        Agronomic practices**

The suggested subareas were presented to the participants for feedback, and the group agreed that they provided an appropriate breakdown of the discussion area. Participants were then broken into four small groups and each was assigned a subarea. They were asked to identify the major constraints for pearl millet production and utilization within their subarea. Once complete, each small group presented their lists to the larger group and incorporated any additional feedback offered. The **major constraints** identified were as follows:

**Major constraints by sub-area**

**Sub-area 1.    Stress management**

- a. Drought (*i.e. Irregular precipitation, droughts*)
- b. Disease (*Striga, mildew*)
- c. Insects (*Millet head miners, stem borers, armyworm*)

**Sub-area 2.    Soil health**

- a. Soil degradation and impoverishment
- b. Unavailable land and increasing need for intensification practices
- c. Adapted fertilization (to farming system)
- d. Access to inputs
- e. Salinization of soils and erosion

**Sub-area 3.    Mechanization**

- a. Access, availability of equipment
- b. Production (*i.e. Small-scale mechanization, obsolescence, availability and post-harvest*)
- c. Capacity building of actors (*i.e. Artisans and end users*)
- d. Mechanization adapted to varieties and vice versa (varieties adapted to available mechanization)

**Sub-area 4.    Agronomic practices**

- a. Lack of mastery/low adoption of recommended agronomic practices
- b. Plant population density
- c. Loss of biodiversity (*i.e. Disappearance of trees and shrubs in the parcel*)
- d. Varieties adapted to local agronomic practices (smallholders)
- e. Weed management

Following the compilation process, participants were asked to prioritize the constraints that they felt carried the greatest importance or opportunity by identifying them with a small colored sticker. They were instructed to work across subareas so as not to be bound within the synthetic boundaries created between them. When the sticker totals were tallied, the following for items were identified as the **highest priority constraints**:

**Priority 1. Drought**

**Priority 2. Diseases and insects**

**Priority 3. Soil degradation**

**Priority 4. Access and availability of equipment (mechanization)**

After the highest priority constraints were identified and discussed, the participants were again broken back into small groups and assigned a single high priority constraint. Each was asked to identify key research strategies that could address important aspects of the constraint. Following the exercise, the small groups reported back to the rest of the participants, who were presented with the opportunity to add any key areas that they felt were missing. The suggested research strategies by major constraint were as follows:

**Key research strategies by highest priority constraints**

**Priority 1. Drought**

- a. Innovative management adapted for better water conservation according to field size and local geography/watershed (*i.e. Water harvesting, soil restoration, etc.*)
- b. Integrating climatic data into agronomic practices
- c. Crop modelling

**Priority 2. Diseases and insects**

- a. Natural fungicides against mildew
- b. Striga control (*i.e. Investigation on the effects of organic fertilization and mineral application/research on the effects of association and rotation with wild and cultivated legumes*)
- c. Biological control of insects (*i.e. intercropping, plant-based insecticides, microorganisms of the soil, etc.*)

**Priority 3. Soil degradation**

- a. Quality of organic fertilizers
- b. Dynamic between organic matter and nutrients
- c. Integrated approach to fertility management (*Organic + mineral + practices that include intercropping*)
- d. Integration of trees/agriculture/livestock
- e. Scaling of strong practices and contextualization

**Priority 4. Access and availability of equipment (mechanization)**

- a. Participatory diagnosis of needs and constraints by value chain actors of small-scale mechanization
- b. Improvement/adaptation of small-scale mechanization for millet production
- c. Integrated approach for small-scale mechanization (*i.e. Linkage of actors - artisans, producers, funding hubs, etc.*)
- d. Reinforcement of the dynamic of service hubs (platforms)

After the key research strategies were identified and discussed among the group, participants were again requested to prioritize the strategies that they felt offered the most opportunity or met the greatest needs by marking them with the small colored stickers they were provided. From this ranking process, a total of five **top research priorities** were identified from the key strategies.

**Top research priorities by highest priority constraints**

**Priority 1. Drought**

- a. Innovative management adapted for better water conservation according to field size and local geography/watershed (i.e. Water harvesting, soil restoration, etc.)

**Priority 2. Diseases and insects**

- a. Biological control of insects (i.e. intercropping, plant-based insecticides, microorganisms of the soil, etc.)

**Priority 3. Soil degradation**

- a. Integrated approach to fertility management (Organic + mineral + practices that include intercropping
- b. Integration of trees/agriculture/livestock

**Priority 4. Access and availability of equipment (mechanization)**

- a. Improvement/adaptation of small-scale mechanization for millet production

Following the presentation and discussion of the research priorities established by the participants, the small groups were asked to break out a final time to identify the **major actors** that they felt should be engaged in tackling each of the major research priorities. National research programs and major research institutions were the most commonly identified, but groups also highlighted key NGOs, government sector player and private actors as well.

**Major actors as identified by top research priority**

**Research priority 1.** Innovative management adapted for better water conservation according to field size and local geography/watershed (i.e. Water harvesting, soil restoration, etc.)

<i>Research institutes</i>	INP, ISRA (CNRA, LNRPV, CRA St. Louis), IRD, UCAD (Senegal) 2IE, INERA (Burkina Faso) INRAN (Niger)
<i>Local planning/management</i>	Local communities Direction of management and water resource planning (DGPPE) (Senegal)
<i>Farmers organizations</i>	RESOPP, Poles Multiservices, "CF" producer network, (Senegal) FEPAB (Burkina Faso) MORIBEN, FUMA GASKIYA (Niger)
<i>Extension/dissemination services</i>	ANCAR (Senegal) NGOs

**Research priority 2.** Biological control of insects (i.e. intercropping, plant-based insecticides, microorganisms of the soil, etc.)

<i>Research institutes</i>	ISRA (Senegal) INERA (Burkina Faso) IER (Mali) INRAN and ICRISAT (Niger)
<i>University</i>	University of Maradi (Niger) Virginia Tech (USA)
<i>Farmers organizations</i>	RESOPP, Poles Multiservices (Senegal) MORIBEN, FUMA GASKIYA (Niger) CPR (Burkina Faso)
<i>Extension/dissemination services</i>	ANCAR (Senegal) Direction de l'Agriculture (Burkina Faso) Agents technique de l'Etat (Niger) DPV (all countries)

**Research priority 3.** Integrated approach to fertility management (Organic + mineral + practices that include intercropping); Integration of trees/agriculture/livestock

<i>Research institutes</i>	INRAN (Niger) INERA/GRN-SP (Burkina Faso) ISRA (LNRPV, CNRF, CNRA), Village « climate smart » de Kaffrine (Senegal) IER (Mali) IRD (LMI IESOL), CIRAD (DP ASAP), ICRISAT/CCAFA, ICRAF (J Bayala-Nairobi) (International)
<i>University</i>	University of Maradi, Abdou Moumouni (Niger) University of Ouagadougou, Université de Bobo Dioulasso (Burkina Faso) Université Gaston Berger (SATA), UCAD (AFECA, GEDAH), Observatoire de Niakhar, FENAB (Senegal) University of Wagenigen, Hohenheim, Ohio State (International)
<i>Farmers organizations</i>	MORIBEN, FUMA GASKIYA (Niger)
<i>Extension/dissemination services</i>	CNCR, FONGS, ONG GRET (Senegal) AGRA

**Research priority 4.** Improvement/adaptation of small-scale mechanization for millet production

Research institutes	IRSAT (DMA), Ecoles de formation IUT (Burkina Faso) IUT, INRAN (Niger) IER, IUT (Mali) ISRA, CNRA, IUT (Senegal)
Artisans	CEDERMA, AFMA (Niger) GIE Agritech, RADESS, SISMAR (Senegal)
Farmers organizations/dissemination services	FEPAB, A2N, CRA (Burkina Faso) FUMA GASKIYA, MORIBEN, SAA (Niger) UP de semences (Fatick, Kaolack, Kaffrine), réseaux de producteurs, PM, ANCAR (Senegal)

**BREAKOUT GROUP 3: SEED SYSTEMS - ECONOMICS - EXTENSION**

Co-facilitators: Dr. Aliou Faye (ISRA/CERAAS) and Dr. Timothy J. Dalton (SMIL Management Entity)

Note taker: Mr. Hama Yaye (INRAN)

This working group was presented with a significant challenge. It could have used the working group session to discuss a wide range of issues including input supply constraints, farm economics, extension services, marketing of output, market development and the generation of value-added products. However, because the range of issues was so wide, the group decided to focus on just one issue - constraints to seed supply.

The group consisted of eighteen participants representing the countries of Senegal, Mali, Burkina Faso, and Niger and included specialists in from the donor community, extensions, research, farmer cooperatives, private sector seed supply and development projects.

**Major constraints/needs, as identified per pre-established sub-area**

The group identified five primary areas critical to the development of the seed sector. These areas and sub-areas, in order of importance include:

**Sub-area 1. Diffusion of new innovations, especially seed**

- a. Development of partnerships and consultation between groups
- b. Improved communication
- c. Technical and institutional support for diffusion of new innovations
- d. Sustainable processes of innovation and diffusion

**Sub-area 2. Commercialization of seeds**

- a. Market information, logistics and transportation
- b. Availability and accessibility of seed
- c. Seed treatments and storage

**Sub-area 3. Seed production and multiplication**

- a. Absence of foundation seed for multiplication
- b. Lack of mechanized implements to facilitate all operations of seed production notably those associated with threshing, cleaning, bagging and labeling
- c. Technical and institutional support for seed multiplication

**Sub-area 4. Seed policy**

- a. Regulation and enforcement
- b. Certification and quality assurance

**Sub-area 5. “Professionalization” of participants in the seed sector**

- a. Stakeholder management
- b. Planning
- c. Technical and institutional support

**Key research priorities and strategic partners by constraint**

Each of the five constraint areas detailed specific strategies and who should be included among the potential interested organizations to contribute to innovation and improvement in the area. The three or four most important strategies to overcome the constraints were prioritized while others were grouped together.

**Sub-area 1. Diffusion of new innovations, especially seed**

The group determined that better communication and marketing of new innovations was the most important strategy to pursue to reduce constraints facing the diffusion of new seed. This strategy should be led by farmers' organizations and the private sector to increase the visibility of innovations. Secondly, increased usage of participatory research approaches is required and participatory approaches should be utilized by all interested stakeholders including the state, extension services, research, development programs and the private sector in association with end-users. As an expansion of this concept, the third-most important strategy was to increase dialogue and feedback between end-users and research, development and extension. It was also determined that greater consultation between groups was important as a tool to facilitate information exchange.

**Sub-area 2. Commercialization of seed**

The most important strategy to improve the commercialization of millet seed was to increase the number of locations where seeds are sold. The most important actors in this strategy include farmer organizations, the private sector and NGOs. This was closely followed by the development of contracts for the delivery of seed between seed producers and seed retailers. By nature of this relationship, the private sector, NGOs, and individual producers are the key actors in this strategy. The third most important strategy is related to the monitoring of seed quality, which implicates the state, private sector, and farmer organizations. In addition to these strategies, the group also advocated for reduced involvement and control by state and parastatal organization and devolution to the private sector. In addition, there were several other strategies in this area that are closely related to diffusion of new seeds including increasing the density of the seed distribution network, increased access to financing for seed businesses and improved communication between stakeholders.

### Sub-area 3. Seed production and multiplication

The primary constraint facing seed production was viewed as the need to reinforce human and institutional capacity to multiply seeds and the key actors to reduce this constraint includes research, extension and technical training. Tied in importance with this constraint is weak communication between stakeholders including seed producers and end-users. It was determined that all actors are implicated in improving communication on seed multiplication issues including the state, research, seed producers, farmer organizations and technical services including extension. The third most important constraint was the lack of scale-appropriate post-harvest equipment to facilitate the threshing, cleaning, conditioning and packaging of seeds. It is critical to involve the private sector in the development of machinery to improve seed production.

Numerous additional constraints were discussed in this area including the inability to stock seeds to reduce the degradation of quality, supervision and quality control during all phases of the seed supply chain, strategic planning and marketing of which varieties to multiply, the quantity to produce and where, geographically, are the locations where specific varieties should be marketed. Weak market information systems contribute to the uncertainty and risk associated with seed businesses. There was interest expressed by seed producers in lobbying governments to improve the business climate for seed-producing firms by limiting government activity to monitoring and evaluating quality control, market information gathering and the implementation of the rules and laws governing the sector.

### Sub-area 4. Seed policy

Development of seed policy was viewed as an important element to improve the productivity of the seed sector. Three primary interest groups are critical in this area: the state, private sector and farmer and community organizations. The most important activity to reduce constraints associated with seed policy is the development of a vocal lobbying effort to communicate the needs of seed producers to policymakers. The second most important strategy is for the state to implement those laws and regional agreements that have been approved since many are considered “on the books” but not enforced. This is also the case with regional agreements that have not been implemented at a national level. The third activity is to improve the organizational structure of the policymaking and lobbying environment so that each is more aware of the opportunities for improving the economic environment for the seed sector.

### Sub-area 5. “Professionalization”

The final strategy to improve the functioning of the seed sector is to improve the professional nature of those individuals and firms working in the sector. All individuals in the sector are part of this strategy. One approach to promote a more professional and high-quality product was for individual and firms to specialize in one or two activities along the seed supply chain rather than engaging in all steps. The second requirement is the reinforcement of human and institutional capacity. Tied in the third position is the development of business plans for seed producers, implement manufacturers and farmer organizations to better understand the costs and revenue structures of their activities. This was tied with the development of a platform for consultation among all the actors.

## **BREAKOUT GROUP 4: PROCESSING - VALUE ADDITION – NUTRITION**

*Co-facilitators: Dr. Cheikh Ndiaye (ITA) and Nat Bascom (SMIL Management Entity)*

*Note taker: Moustapha Moussa (INRAN)*

This sub group composed of 18 persons with 8 males (researchers, NGO and USAID representative) and 10 females (mostly processors representing enterprises, GIE/Women associations or NGO, and a representative of USAID Kawalor/NCBA CLUSA).

### **General discussion of participants and pre-established sub areas**

The group indicated that while four sub-area domains as follows were defined, that there are interrelatedness and overlap in multiple domains. The group defined the following four sub-area domains. Smaller working teams were created per domain to work separately to consider key constraints, research strategies, and key actors for each domain. At timed intervals, the smaller teams then reported to the overall group on their progress.

<b>Sub-area 1.</b>	<b>Technologies / Innovations</b>
<b>Sub-area 2.</b>	<b>Adoption / Diffusion</b>
<b>Sub-area 3.</b>	<b>Nutrition / Health</b>
<b>Sub-area 4.</b>	<b>Human and Institutional Capacity Development</b>

### **Major constraints/needs, as identified per pre-established sub-area**

#### **Sub-area 1. Technologies / Innovations**

- Inadequate equipment in both the processing and research areas
- Lack of adequate financing
- Reduced level of operational research that specifically applies to processor research needs
- Lack of adequate training, equipment, “know how” in the area of food safety/hygienic packaging
- Reduced opportunities for training/capacity building of support staff
- Inadequate communication and awareness on existence/availability new innovations

#### **Sub-area 2. Adoption / Diffusion**

- Lack of access to innovative technologies including better plant varieties/seed, adapted/appropriate equipment (including packaging, extrusion, milling and drying technologies), and new products (e.g. enriched/fortified flour formulas)
- Timid promotion of “hub and spoke” food processing innovation system , inadequate linkages/connections among existing centers and operation within the “hub and spoke” network and the overall capacity

#### **Sub-area 3. Nutrition / Health**

- The lack of awareness of nutritionally enriched/fortified foods particularly for infants, children and mothers
- The challenges of transforming a nutrient-rich food into a business strategy
- Lack of training opportunities in nutritional science

#### Sub-area 4. Human and Institutional Capacity Development

- a. Slow recruitment and training of young researchers
- b. Less focus on women and youth targets
- c. Low financing of capacity strengthening program activities
- d. Lack of opportunities to strengthen the capacity of technicians in equipment maintenance
- e. Challenges to get organizational “buy in” and proactive development of capacity strengthening

#### Key research priorities as identified by major constraints/needs

##### Sub-area 1. Technologies / Innovations

- a. A study of the categories / types of processing groups/enterprises including categories: home level/artisanal (1), semi-artisanal/industrial (2), industrial (3) to research levels production (e.g. Food Innovation system), type of processing equipment, constraints being faced, alignment with larger processor groups/associations
- b. Catalog the types of processing equipment and innovations being used across the three categories

##### Sub-area 2. Adoption / Diffusion

- a. Research that has high relevancy and is market demand-driven to address the needs of actors along the value chain
- b. Increased networking and sharing of knowledge/and learning along the value chain actors
- c. Strengthening the research for development linkages between the food innovation centers and sub centers in the “hub and spoke” food innovation system

##### Sub-area 3. Nutrition / Health

- a. Research to address and understand the constraints on the availability of the raw material (e.g. grains, and natural fortificants) in quantity and quality
- b. Micronutrients (e.g. Fe and Zn) concentration and anti-nutritional factors
- c. Technologies increasing the bioavailability/accessibility of micronutrients
- d. Innovative technologies and formulations for fortified food products
- e. Research about formulation techniques for making highly nutritious and cost-effective fortified foods using locally available grains and natural fortificants/ingredients
- f. Research to better understand the factors that attract customers, consumer preferences, food safety and security (e.g. Aflatoxin-free fortified foods), etc.

##### Sub-area 4. Human and Institutional Capacity Development

- a. Training of support staff (e.g. technicians for lab. and equipment maintenance (researchers and operating in local private sector/ women groups/associations)
- b. Technical capacity and training provided by companies for women and youth associations

## Strategic collaborators as identified by key research priorities

### Sub-area 1. Technologies / Innovations

- a. Research institutions (agricultural research institutions and universities), food manufacturing companies, processing equipment manufacturers, development projects, relevant government structures, donors (USAID, USDA, foundations), banking/loan (micro-credit) institutions, processors associations/groups/cooperatives, farmers organizations, and consulting groups/firms (marketing, management, technology, scaling, gender, communication, etc.) and resource persons

### Sub-area 2. Adoption / Diffusion

- a. Research institutions (agricultural research institutions and universities), food manufacturing companies, processing equipment manufacturers, development projects, relevant government structures, donors (USAID, USDA, foundations), banking/loan (micro-credit) institutions, processors associations/groups/cooperatives, farmers organizations, and consulting groups/firms (marketing, management, technology, scaling, gender, communication, etc.) and resource persons

### Sub-area 3. Nutrition / Health

- a. Research institutions (agricultural research institutions and universities), food manufacturing companies, processing equipment manufacturers, development projects, relevant government structures, donors (USAID, USDA, foundations), banking/loan (micro-credit) institutions, processors associations/groups/cooperatives, farmers organizations, and consulting groups/firms (marketing, management, technology, scaling, gender, communication, etc.), resource persons, nutritionists, health centers, economists, sociologists

### Sub-area 4. Human and Institutional Capacity Development

- a. Research institutions (agricultural research institutions and universities), food manufacturing companies, processing equipment manufacturers, development projects, relevant government structures, donors (USAID, USDA, foundations), banking/loan (micro-credit) institutions, processors associations/groups/cooperatives, farmers organizations, and consulting groups/firms (marketing, management, technology, scaling, gender, communication, etc.), resource persons, private sector, technical training schools

## SUMMARY

The West Africa Pearl millet convening was the first large scale regional meeting covering the entire value chain in over fifteen years. The convening brought together the private sector, farmers, farmer cooperatives, research, extension, development programs and government officials in a forum to discuss the constraints and opportunities to improve the functioning of the pearl millet value chain in the West African Sahel. Nearly twenty presentations were given on the first day of the convening in order to stimulate discussion and understanding on the complexity of the value chain.

The convening process identified numerous priority areas for research, development and policy during the second day. Participants in the convening self-selected into areas of expertise to continue debate in smaller groups. The *Processing/value addition/nutrition* group was the largest, followed by *Breeding/genetics*, *Agronomy/entomology* and *Seed*

*systems/economics/extension*. Each of the groups reviewed presentations from the first day and reduced the issues into smaller thematic groupings. These groupings were identified through facilitated discussion and democratic ranking exercises. Each group invested time into ranking the importance of each constraint and identifying strategies and the partnerships required to reduce or eliminate the bottleneck.

Results from these activities were presented in front of the entire plenary for comments, criticism and discussion on the third day. This report has attempted to synthesize the rich discussions that took place and the results from the three day process.