

Updating knowledge on demands for grain and stalk quality of sorghum varieties in Burkina Faso

Technical Report

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Executive summary

This study aimed to update the knowledge on sorghum utilization in urban and rural areas of Burkina Faso, to understand what are the recent trends and evolution of this demand and to identify better the grain and fodder quality traits preferred or requested by the different stakeholders of the major sorghum value chains existing in this country. This study was conducted in three phases: 1) a preliminary analysis of sorghum demands among the main cereals processors and end-users, 2) a sharing workshop between scientists and current sorghum users and 3) socio-economic surveys among sorghum producers, households, key local processors and traders in three province of the country. This study also proposed a conceptual framework for identifying the different key breeding goals related to quality aspects such as those to generate sorghum varieties with higher added value.

The preliminary diagnostic confirms that maize has become the main cereal used for the preparation of the national thick porridge *tô* and the other typical cereal-based dishes (couscous) at the detriment of sorghum and millet. In town, rice consumption is still progressing. But in parallel urban households ask for more diversification for semi-finished food products or products ready to use. Regarding current sorghum utilizations in Ouagadougou, there is very little new. The production of the local beer *dolo* remains by far the largest market for sorghum in Burkina Faso. In urban areas, its consumption remains important and stable, for cultural reasons but most of all because of low price. In Ouagadougou there are several types of *dolo*, each related to a region and exhibiting a specific quality. Besides this use for local beer production, the main other uses of sorghum identified in urban areas are the elaboration of *granulated flour* for couscous, *degué* and thin porridges, pop-sorghum and fine flour for infant food. The local poultry industry and the manufacturers of animal feed preferably use maize and soybean and seem uninterested in sorghum (in terms of quality and price). At the opposite the use of sorghum straw as feedstock for ruminants has increased during the last ten years and has become very important in rural areas.

A sharing workshop held with the sorghum users and a large set of qualitative and quantitative socio-economic surveys among sorghum producers and the stakeholders of the main sorghum value chains provided relevant information concerning the current state in the use of sorghum in three provinces of the country, the existing value chains and networks of stakeholders, as well as the criteria of grain quality preferred or requested by each user group. One main result of this study is the need of improved red-grain sorghum varieties with adequate grain quality for the elaboration of malt and *granulated flour* for thin porridge and *degué*.

I. Grant Profile

1. **Grant title:** **Updating knowledge on demands for grain and stalk quality of sorghum varieties in Burkina Faso**

2. **Duration:** 2014-2015 (12 months)

3. **Objective:** The Program's objective is to update the knowledge on sorghum demands in urban and rural areas of Burkina Faso and to identify better what are the grain and fodder quality traits preferred by the sorghum users. This study was conducted in three phases: 1) preliminary analysis of sorghum demands among cereals users, 2) sharing workshop between scientists and sorghum users and 3) socio-economic surveys among sorghum producers, households, key local processors and traders in three province of the country. This study also proposed a conceptual framework for identifying the different key breeding goals related to quality aspects such as those to generate varieties with higher added value.

4. **Outputs:**

- Enhancement of the knowledgebase on the cropping systems, production constraints and utilization of sorghum in two main sorghum production area of Burkina Faso
- Enhancement of the knowledgebase on the specific grain quality traits preferred or requested by the key sorghum users, to be used by sorghum breeders, food scientists and agro-enterprises of different sizes
- List of sorghum processors and other stakeholders present in three provinces of Burkina Faso.

5. **Budget received from the CRP Dryland Cereals** US\$ 40,000

6. **Contributions of CIRAD** US\$ 41,867

7. **Total project cost** US\$ 81,867

8. **Project Executing Agency** CIRAD, Montpellier France

II. Grant Partners

Category	Partner
Research	CIRAD IRSAT INSS ICRISAT Mali
NGO	Aprossa-Afrique Verte
Processors organization	FIAB
Farmer Organizations	UGCPA-BM AMSP

- CIRAD – Centre de Coopération Internationale en Recherche Agronomique pour le Développement-France
- IRSAT – Institut de Recherche en Sciences Appliquées et Technologies-BFA
- INSS – Institut des Sciences des Sociétés_BFA
- ICRISAT-Mali – International Crops Research Institute for the Semi-Arid Tropics Mali
- UGCBA-BM – Union des Groupements pour la Commercialisation des Produits Agricoles de la Boucle du Mouhoun-BFA
- AMSP – Association Minim Sông Pânga-BFA
- FIAB – Fédération des Industries Agro-alimentaires du Burkina Faso-BFA

III. Preliminary diagnostic of sorghum utilization in Burkina Faso

So far, in Burkina Faso and in most of the West African countries, excepting Nigeria, sorghum breeding programs almost exclusively focused on developing varieties adapted to the preferences and needs of consumers of the rural areas, particularly for the preparation of *tô* (thick porridge) and incidentally *dolo* (local opaque beer).

The objective of this preliminary diagnostic carried out by Dr. Gilles Trouche (CIRAD, UMR AGAP) and Dr. Thierry Ferré (CIRAD, UMR INNOVATION) was to identify the main trends of development of food products and markets in urban areas as well as to identify the current main sorghum users in Ouagadougou and nearby areas, for both human and animal consumption. It also aimed to identify the institutions and the programs that support the development of local cereal sector.

In Ouagadougou, our qualitative interviews with several experts and economic operators confirm that maize has become the main cereal used for the preparation of *tô* porridge and other typical cereal-based dishes (couscous) at the detriment of sorghum. This finding is also true for the secondary cities as Kaya and Dedougou. In town, rice consumption is still progressing but in parallel we observe a trend of diversification to supply semi-finished food products or products ready to use. Thus *attiéké* (cassava couscous) has become ubiquitous in popular restaurants and street food and more recently diverse soybean-based products (skewers, cheese, spaghetti, *soumbala*, yoghurt etc.) also appeared in urban consumption. Very recently the “*tô attaché*” or “*Kafa*” (maize porridge portions put in a plastic bag and ready to eat with a sauce) is also widespread in street food. Traditional cereals (i.e. millet, sorghum and fonio) are transformed by many small units. A Network for Cereals Processors of Burkina Faso (RTCF) supported by NGOs such as APROSSA-Afrique Verte, includes 65 very small enterprises (VSE) located in the major cities of Burkina Faso. These VSEs prepare and sell several types of flour, semolina, granules, *degué* or couscous, mostly elaborated with pearl millet, sold in grocery stores and small supermarkets.

Regarding sorghum utilizations, apart from its incorporation in infant foods (e.g. Nutrifaso program supported by GRET) there is very little new. According to some processors, pop-sorghum is now widespread and actually we found it easily in a local market. Production of the local beer *dolo* remains by far the largest market for sorghum in urban areas. According to the *dolotières*¹ met during this study, its consumption remains important and stable in town including with the younger generation, for cultural reasons but most of all because of its very low price. In Ouagadougou there are several types of *dolo* as the *dolo dagara*, *dolo mossi*, *dolo*

¹ Women preparing the *dolo* beer

samo, each related to a region and exhibiting a specific quality. For example the dolo *dagara*², prepared with white grain sorghum, exhibits a lighter color and a sweeter taste compared with the *dolo mossi*, principally elaborated with red grain sorghum. However, the *mossi dolotières* mentioned an evolution of the consumers' demand, urban consumers asking for a *dolo* with brighter color, sweeter taste and probably also with less alcohol. This trend was confirmed by Dr. Boniface Bougouma, food scientist at IRSAT. Dolo-takeaway is also a growing trend.

One of the very important features of the production of *dolo* in urban area is the increasing difficulty to achieve the traditional malting process because of lack of space for drying the germinated sorghum grains. This constraint progressively induces a segmentation of *dolo* production chain in two distinct segments, on the one hand that of *malteuses*³ and secondly that of *dolotières*. Today, the *malteuses* are located in rural areas of sorghum production, or in periphery of the secondary cities. The *malteuses* of certain regions, primarily those of the Central East Region, acquired a high reputation for the quality of the sorghum malt. As we observed at Kaya, the biggest *dolotières* move to buy their stock in these regions and have established over time trusting relationships with these women groups.

Consumption of unfermented *dolo* also called *ranoodo* seems to increase. The UMAO company, a SME located at Ouagadougou, sells a stabilized *ranoodo* packaged in recycled glass bottles.

The local poultry industry and the manufacturers of animal feed preferably use maize and soybean and seem uninterested in sorghum (in terms of quality and price). At the opposite the use of sorghum straw as feedstock for ruminants has increased during the last ten years and has become very important in rural areas.

For more information, a full report of this first part of the study is available (in French).

² Population living in southern Burkina Faso and northeastern Ghana

³ Women producing the sorghum malt

IV. Exchange workshop

This exchange workshop brought together researchers from several institutions (INERA, IRSAT, ICRISAT and CIRAD), representatives of farmer organizations, representatives of NGOs supporting food and nutrition programs and cereals processors in order to make a full inventory on current uses of sorghum in urban and peri-urban areas in Burkina Faso and to identify potential new uses on which researchers would work in the coming years. This workshop was held in Ouagadougou from 10 to 12 February 2015 and was attended by 27 participants representing 20 institutions or small local enterprises.

The main objectives of this workshop were therefore:

- 1) share experiences between research, NGOs, farmer organizations and associations of cereals processors;
- 2) inventory current and potential uses for sorghum in Burkina Faso, particularly in urban areas, as well as their constraints and needs for improvement;
- 3) identify actions to be conducted to bring a better value to sorghum in benefits of the different stakeholders of the sorghum value chain;

4) define the objectives and target people for the additional socio-economic surveys to be carried out for this project in order to supplement the information acquired during the workshop, and more specifically define the grain quality traits or attributes that matches better the different sorghum-based products.

The workshop allowed identifying about 15 intermediate or final products elaborated from sorghum grains which are marketed in Ouagadougou and other secondary cities of Burkina Faso (see Annex 4). It confirmed that the greatest sorghum users, based on the processed volumes, are the brewers-dolotières for the production of the local beer *dolo* and malted beverage *ranoodoo*. The second main value chain of sorghum in urban areas, although the quantities processed are considerably smaller, is the elaboration by very small enterprises of coarse flours and aggregates/granules, usable to prepare thin porridge, *degué* and *couscous*, with a diversity of modes and period of consumption, places where it is sold ... The main innovations regarding sorghum processing and consumption in urban areas concern infant food, *zoom-koom* and to a lesser extend sorghum *kafa*, currently very marginal compared to maize *kafa*, but it could find a more prominent place among street food options because of a certain lassitude of urban consumers with respect to maize and their demand for more diversification in food products.

This workshop also permits to define collectively a methodological framework for defining a breeding program aiming at the creation of sorghum varieties with grain quality traits meeting the needs of sorghum processors and consumers of urban areas.

The participants identified the following questions and concerns to consider before implementing such a program:

- Where and how work the supply chains of sorghum for the *malteuses*, brewers and other important sorghum processors?
- How to assess more precisely (compared to focus groups and individual interviews) what are the most suitable grain traits/attributes for the different utilizations?
- What is the finality of this kind of breeding program? Improving the farmers' incomes (but only for those who can market a part of their production i.e. rich farmers?) or improving the incomes of small processors (mainly women) or reducing the costs of the target food product at the benefits of poor consumers?
- Will the innovations provided in all the value chain (varieties, cultural practices and processing techniques) benefits to low-resources households of urban or rural areas?
- Do we need to conduct an ex-ante evaluation in order to evaluate the effects of these programs on each stakeholder?
- Which public policy to support this action e.g. for promoting the use and the consumption of sorghum?

Finally the workshop participants agreed about the objectives, the survey methodology, the target regions and the list of stakeholders that will be interviewed for the socio-economic survey aiming to complement our knowledge regarding sorghum utilizations and the stakeholders involved.

Four provinces were selected because of their importance in sorghum production and/or consumption: Kouritenga (Centre-East), Sanmatenga (Centre-North), Mouhoun (West) and Kadiogo (Centre).

The stakeholders of sorghum value chains selected for these surveys were the following:

- A. Farmers
- B. Consumers
- C. Grain traders using sorghum
- D. Stakeholders of the three major value chains identified during the workshop

1. Local beer-dolo

- *Malteuses*
- *Brewers-dolotières*

2. Granulated flour (*grumeaux*) for the preparation of thin porridges (*bouillies*), *dégué* and *couscous*

- Small processing enterprises
- Households
- Street restaurateurs

3. Flours

Infant flour : Small and medium processors working in this activity sector

V. Socio-economic surveys

1. Objectives

The general objectives of these surveys are:

- Identify the characteristics appropriate sorghum grains for the main purpose, according to the knowledge and expertise of the different actors,
- Check that these features are shared and / or understood between researchers from different disciplines and with the other stakeholders of the sorghum value chain.

The specific objectives are:

- Determine the quality criteria of the preferred sorghum grain or wanted by each category of actors,
- Confirm and complete the list of current and potential uses of sorghum,
- Describe the transformation processes used in each value chain
- Identify the most popular varieties for each use.

2. Indicators to be documented

The survey will collect information from key sorghum players sectors to learn about sorghum grain quality standards and the various uses of sorghum. It will provide answers mainly to the following questions:

- What are the relevant/ important grain quality characteristics for the different stakeholders, depending on the region and type of environment?
- What are the varieties used by the different stakeholder groups according to their primary use and the region?
- What are the main uses of sorghum grain by area and category of actors?
- What are the supply and marketing channels for the different categories of sorghum processors?

3. Methodology

3.1 Survey team

Field data collection work of this study were performed by a team of four members, under the supervision of Dr. Laurencia Ouattara-Songre (IRSAT) who has been designated as a national

coordinator of this study during the exchange workshop held in February 2015 in Ouagadougou.

3.2 Regions and sites of the survey

The surveys have been conducted in rural and urban areas in three provinces of Burkina Faso (among the four selected during the exchange workshop, due to budget limitations). These three provinces are showed in the following administrative map of Burkina Faso.

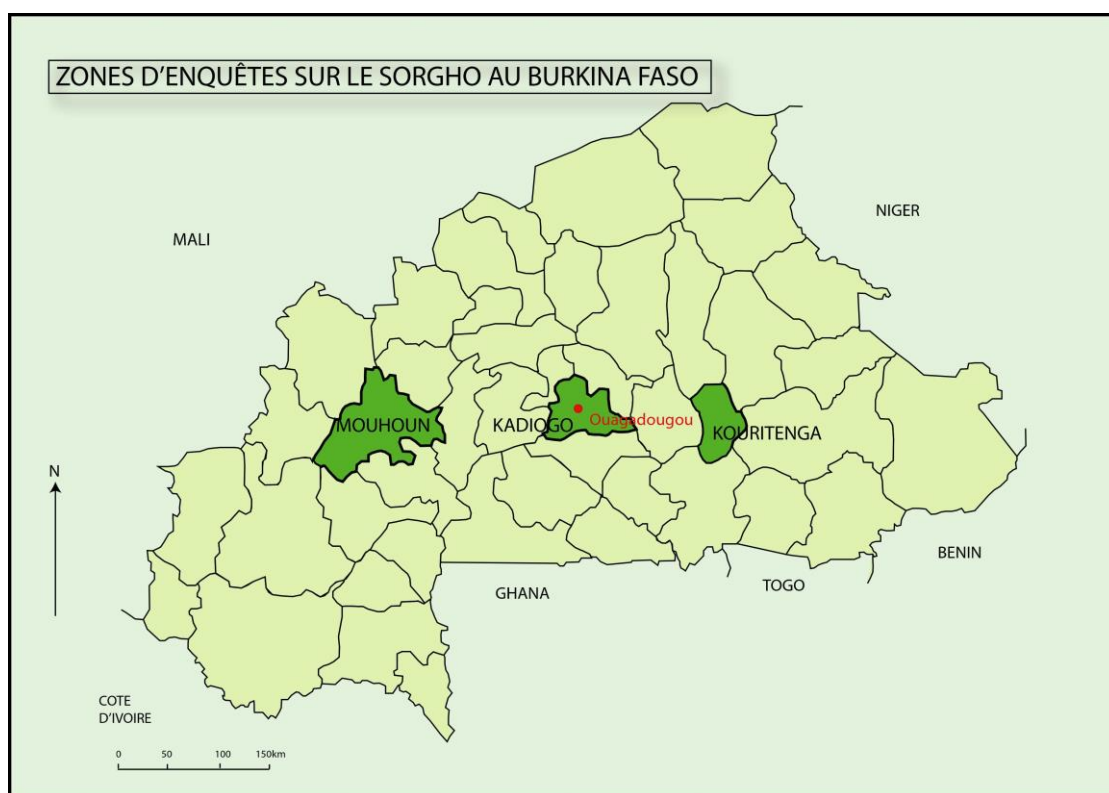


Fig. 1: Provinces of the socio-economic surveys conducted in the study

3.3 Sampling strategy

The sample size has been set according to the type of survey to be carried out. For quantitative surveys using a semi-structured questionnaire, the sample size was 35 individuals per category of stakeholder (producers, malteuses, brewers-dolotières, and households) for each province. For qualitative surveys, the sample size ranged from 8 to 16 per province for traders and from 5 to 20 per province for processors (Table 1).

In each province, a sample of each category of stakeholders was selected randomly in the localities chosen for the study. For processors of Ouagadougou, the selection was made from a list of cereal processors, available for Burkina Faso.

Table 1: Sampling plan of sorghum producers and users interviewed in this study

Province	Locality	Area	Farmers	Malteuses	Brewers/ dolotières	Households and small food producers	Traders	Processors	Total/site
Kadiogo	Zone 1- Ouaga	Urban	0	9	9	0	16	12	46
	Pissy-Ouaga	Urban	0	10	9	0			19
	Sondogo-	Peri- urban	0	9	7	0			16
	Taptenga	Peri- urban	0	7	10	0			17
	Total Kadiogo		0	35	35	0	16	12	98
Mouhoun	Dédougou	Urban	15	15	15	15	8	0	68
	Wétina	Rural	10	10	10	10	0	0	40
	Soukuy	Rural	10	10	10	10	0	0	40
	Total Mouhoun		35	35	35	35	8	0	148
Kouritenga	Koupèla	Urban	15	15	15	15	8	5	73
	Ademtenga	Rural	10	10	10	10	0	0	40
	Songretenga	Rural	10	10	10	10	0	0	40
	Total Kouritenga		35	35	35	35	8	5	153
	Total		70	105	105	70	32	17	399

4. Main results

The detailed results of this study are presented in the survey report “Perception de la qualité des grains de sorgho au Burkina Faso” written in French.

These surveys and interviews with the different sorghum users carried out in three provinces of Burkina Faso, provided the expected information regarding the current state in the use of sorghum, the new developments, the existing value chains and networks, the criteria for grain quality preferred by each user group and the expectations of some of them to get new varieties that meet these criteria.

The main results and lessons learned from this study are:

- Sorghum is less processed and less sold in comparison with maize and millet,
- there are important differences between the provinces in the use of sorghum as well as the preferences for types of grain,

- red grain sorghum varieties are more processed and sold than white grain varieties which remain produced mainly for self-consumption,
- 40% of the sorghum traded is intended to *dolo* production, this sector being by far the more structured with a network of stakeholders that this study help to identify and better describe,
- in Kouritenga and Mouhoun provinces, women producing the sorghum malt (*malteuses*) are the main buyers of sorghum,
- Producers use to request early sorghum varieties to adapt to climate change,
- high and homogeneous germination, red color and grain hardness are the major determinants of quality for sorghum grains, according to the *malteuses*,
- Grain types preferred by brewers-*dolotières* vary greatly by region, even if red and heavy kernels and red, heavy and hard kernels are generally those that are the most preferred,
- Women using sorghum for making granulated flour requested new varieties with red and hard grain, giving high dehulling yield, which is not the case of existing red grain varieties that are too soft to be decorticated without too many losses; in our opinion, this request should be a priority breeding goal for sorghum improvement in Burkina Faso,
- Households of the province Kouritenga prepare a great variety of dishes and drinks from sorghum; this local knowledge should probably be better documented and shared, especially with street restaurateurs in major urban centers of the country to bring more diversity in the use of sorghum.

VI. Conclusion

In addition to all the quantitative and qualitative information and data collected on the current utilizations of sorghum in Burkina Faso, and the different stakeholders involved and their networks, one of the main output of this study was the identification of some key components of grain quality required by the stakeholders of the major sorghum value chains existing in this country. In particular, this study contributed to identify the need of new red-grain sorghum varieties with specific grain quality for the value chains malt/local beer and grumeaux/thin porridges.

VII. Acknowledgments

We thank all the institutional partners who facilitated this study as well as all the farmers, households, traders, and sorghum processors interviewed during the socio-economic surveys for their support and their available.

Annex 1: Institution and people met during the preliminary diagnostic on changes in sorghum utilization in Burkina Faso, December 2014

INSTITUTION	NAME	PROFESSIONAL ACTIVITY
IRSAT	Boniface Bougouna Ignace Medah Charlotte Konkobo Laurencia Ouattara	Food scientist Sociologist Sociologist Food scientist
INERA	Hamidou Traore Grégoire Palé	Deputy Director in charge of research programs Technician in the national sorghum breeding program
GRET	Mme Claire Kaboré Soumaré Mamadou	Project manager for the Nutrifaso project Responsible of food programs
OXFAM	Daniel Blais	Director
APROSSA-Afrique verte	Philippe Ki	Programs Coordinator
FIAB	Mme Simone Zoundi	President of FIAB
Réseau des transformatrices de céréales du Faso (RCTF)	Mme Guielbeogo Asseta Mme Tameni Berthe	Manager of SPBN Manager of “Etablissement La Douceur “
FASO RIIBO	Mme Minoungou Inés	Company manager
Association des dolotières du Kadiogo	Mme Guilma	<i>Dolotièr</i> e member of the association
Association des dolotières de Kaya	Mmes Kaboré, Kinda Pauline et Ouedraogo Bernadette	Dolotières members of the association
CNPA	Martial Sawadogo	Director
Maison De l'Aviculture (MDA)	Séni Zida Ouedraogo Narcisse	President Technician
Groupe Velegda	Mme Mamounata Velegda	Manager
Association des commerçants de céréales de Kaya	Sawadogo Boureima et Sawadogo Soumaïla	Grain traders
Confédération Paysanne du Faso (CPF)	Issoufou Porgo	Livestock expert, programs coordinator
AMSP	Ouedraogo Abdoulaye	Technician
CIRAD	Arlène Alpha	Economist, specialist of public policy

Annex 2: Program of the workshop held in Ouagadougou, 10-12 February 2015

DATE	SESSION	PARTICIPANTS	OBJECTIVE
10 February: 8 h 30 - 17 h 30	Inventory of sorghum value chains existing in Burkina Faso: exchanges between scientists and organizations supporting farmers and cereals processors	Researchers + OP and NGO representatives working on food safety / food nutritional quality	Sharing information on research programs and actions of the sorghum industry development, results... Identify research questions and ideas aimed at making innovations on the sector
11 February: 8 h 30 - 12 h	Sessions by sectors (30-45 minutes per sector) <ul style="list-style-type: none"> - Malt beverages (fermented and unfermented) - Infant flours - New products - Animal feed (fodder + by-products) 	Researchers and key players in each sector	Identify constraints, difficulties and expectations of users of sorghum to improve current products Bringing ideas on the new criteria of search quality vs uses and potential markets
11 February: 14 h 00 - 17 h 30	Reflection on a methodological framework "better integrate the quality aspects in breeding programs.	Researchers all disciplines + OP + others?	Propose a methodological framework to better integrate the objectives and quality criteria required by the various users of sorghum in breeding programs
12 February: 8 h 30 - 12 h 30	Developing a plan of action for the short and medium term	All stakeholders	Discuss and validate an agenda of activities (additional questions, bibliography,...) to conduct after the workshop

Annex 3: Participants of the Ouagadougou workshop, 10 to 12 February 2015

Full name	Institution	Location
Laurencia OUATTARA	IRSAT	Ouagadougou
Ignace MEDAH	IRSAT	Ouagadougou
Charlotte KONKOBO YAMEOGO	IRSAT	Ouagadougou
Boniface BOUGOUMA	IRSAT	Ouagadougou
Baloua NEBIE	ICRISAT	Bamako-Mali
Jonas Miédomé KAM	INSS/CNRST	Ouagadougou
Gisèle KAZONI	APROSSA_AFRIQUE VERTE	Ouagadougou
Abdoulaye OUEDRAOGO	AMSP Kaya	Kaya
Adama SIDIBE	UGCPA-BM	Dédougou
Mme GUIELBEOGO TASSEMBEDO Asseta	Entreprise SPBN +RCTF	Ouagadougou
Mme TAMINI G. Berthe	Entreprise « La Douceur + RCTF	Ouagadougou
Mme KABORE Clarisse	Entreprise UTC	Ouagadougou
Mme TRAORE Assetou	Entreprise Tout Super + RTCF	Ouagadougou
Mme KABORE Madeleine	Association dolotières Kaya	Kaya
Mme GUIGMA Maria	Association dolotières Ouaga	Ouagadougou
Mme MINOUNGOU Inés	Faso Riibo	Ouagadougou
Mme YAO PODA Berthine	Transformatrice Koudougou	Koudougou
Mme MEDA Béatrice	Malteuse et Dolotièrè Pogbé Tiéta	Ouagadougou
Mme Zoundi Simone	FIAB	Ouagadougou
Joachim OUEDRAOGO	FIAB	Ouagadougou
Myriam ADAM	CIRAD/ICRISAT/INERA	Bobo-dioulasso
Samssonna BIEGO	CTRAPA	Ouagadougou
Sandrine DURY	CIRAD	Montpellier-France
Thierry FERRE	CIRAD	Montpellier-France
Rachel BEZNER KERR	CORNELL UNIVERSITY	Ithaca-USA
Gilles TROUCHE	CIRAD	Montpellier-France

Annex: Summary of session 2 of the exchange workshop "current uses of sorghum in urban areas of Burkina Faso», 10-12 February 2015

Product	Enterprise	Preferred grain quality	Information for relationship type grain and quality of the product	Steps and method of manufacture of the product	Places of sale and/or consumption	Customers
Fermented tô <i>Kafa</i> (Picture 1)	Mrs. Yao Poda Berthine	White color, Hard and light grain	Hard grain gives less loss to hulling	Hulling mill and then washing and soaking Rest overnight and then grind into wet the next day New soaking then 1 night's rest Preparation of the tô the 3 RD day (?) by using the fermented flour and the supernatant: recipe of the fermented, + light and digestible to than to ordinary	Prepared on orders for traditional ceremonies (baptisms, weddings...) Sales in "kiosks"	All age groups
Dègue - Red Sorghum	Tout Super- Mrs. Traoré Assetou	Red color, Soft and floury grain, Preferred origin: Tenkodogo and Garango	Farinaceous grains cannot be husked: too many losses	Grain washing and sorting to remove impurities Not decortication The mill grinding flour then separation / sound	Prepared on orders for Lent period	All age groups
Boiled-fast Red Sorghum: granulated flour (Picture 2)	UTC – Mrs. Kaboré Clarisse	Dark red color, big size Origin: purchased with grain traders, unknown origin	Farinaceous grains: flour thinner, easier to roll to lumps (but more difficult than the mil)	Not decortication Grinding at the mill Humidification and hand roll	Small supermarket Buyers of Benin	Housewives with a certain buying power.
Porridge-fast Red Sorghum	Street food	Red color	Not documented	Not documented	Sale in the street: porridge ready to use, usually without milk Rather the night in Ouaga and Bobo morning (conso ++ to Bobo)	All? Consumed to fight anemia problems
Sorghum for the TB flour	CTRAPA	White color, hard		Decortication by humid way		

“Stabilized” dolo and ranoodo (Picture 3)	UMEAO-Ouagadougou	dark red color if available preference for the Framida improved variety which has soft and very floury grains with testa		<p><u>Optimize the malting:</u> alternate soaking and aeration phases; use of a cemented and tiled tub for germination: easier, quicker and more homogeneous germination, better hygiene→ healthier malts with higher amylase contents</p> <p><u>Optimize the brewing:</u> improved gas cooking stoves + reduction of water intake</p> <p><u>Improve the conservation and quality the Dolo:</u> conservation in plastic barrels with valves allows a stabilization for 3 to 5 days, instead of some hours (no contamination by lactic bacteria) and gives a higher quality (more alcohol, sparkling effect)</p>		
<i>dolo mossi</i>	Mrs. Guigma Maria-Ouagadougou: only brewer	Red grains mixed with white grains Malt bought with malteuses of Koba-Niagdamare villages	Preference for sorghum mixture to give a lighter dolo	Described in the December 2014 report	Direct sales in her own <i>cabaret</i> . Sale or consignment to young women who distribute the dolo in the districts	Any age Majority of men but also women. Young people prefer a stronger <i>dolo</i>
<i>Dolo mossi</i>	Mrs. Kaboré-Kaya: grain trader + brewer	Red grain or mixture of red + white grain, several sources of malt but she prefers the malt produced in Bittou (bond of trust with these <i>malteuses</i>)	White sorghum gives a stronger and sweeter dolo Bittou malt gives a sweet dolo	Described in the December 2014 report	Direct sales in her <i>cabaret</i>	Idem
<i>Dolo dagara</i>	Mrs. Meda Béatrice-	Mixture of white and red kernels (2 tines of	Dagara dolo is lighter and sweeter	Malting in 4 days Brewing phase not described	Direct sales in her <i>cabaret</i>	Young and old with slightly

	Ouagadougou: <i>malteuse</i> and brewer	light red grain + 1 tine of white grain) Grain purchased with traders in the Pô city Requested grain quality: - Not damaged by insects - Well-filled (not affected by drought) - Avoid unsuitable grain texture: e.g. white chalky grains		Each brewer must adapt to the demand of customers: traditional recipes must evolve to satisfy the customers.		different preferences: young people want a stronger, older prefer a dolo more fermented and not sweet
Infant flour (Picture 4)	Faso Riibo-Ms. Mandy Inés	White sorghum (15% in formulation of the flour Natavie	Non-pigmented white grain sorghum that provides a fine light flour (same quality as requested for the tô) NB: a recent test using the Kapelga tan variety has been entirely satisfactory	Washes of grains (3 times) Sun-drying (4 days) Sieving (remove small seeds and debris) No decortication Roasting Mixture of cereals and pulses according to established proportion then grind	80% of the sales to institutional customers (WFP, NGOs...) 20% in the supermarkets of Ouagadougou	Populations benefiting from food aid (refugees...) and middle class.
Infant flour	Street <i>restaurateurs</i> supported by the Nutrifaso project	White sorghum in the flour <i>biduungzom</i> (=flour of children): 4 formulas according to seasonal prices, 1 formula with sorghum	Not documented		Kiosk and mobile sales in the working-class districts	Very poor households
Sorghum syrup (Picture 5)	ICRISAT Mali	Sweet stems, different varieties with white vitreous or semi-vitreous grain sorghum		Press craft to crush the stems and extract the sweet juice Gas cooktop to concentrate juice for making syrup Development of a solar furnace	Novel product promoted by ICRISAT Mali, no sales in BFA	

Other products:

- sorghum pancakes *masa*
- Zoom-koom of red or white sorghum sorghum: changing a little from millet zoom-koom, more attractive for price
- Consumed sorghum "wesla", with milk couscous
- Pop-sorghum (Picture 6): found some retail sellers in the Sankariare market, product packed in bags of 300 grams, bought by the students out of classes

Niger: high demand for couscous and dégué of sorghum because sorghum has a the reputation to be better for diabetic people



Picture 1: Kafa or “tô attaché” made with sorghum



Picture 2: Grunulated flour of red sorghum



Picture 3: Improved dolo-ram and ranoodo



Picture 4: Infant flour Natavie



Picture 5: sorghum syrup



Picture 6: pop-sorghum



Picture 7: Group of sorghum processors who participated to the Ouagadougou exchange workshop, February 2015