



A man from Ségou region holding fonio. Credits: Bioversity International/G. Meldrum



RESEARCH PROGRAM ON
**Climate Change,
Agriculture and
Food Security**



RESEARCH
PROGRAM ON
**Agriculture for
Nutrition
and Health**

Proceedings of the stakeholder workshop

Fonio in Mali: Challenges and opportunities for value chain development

Bamako, Mali, 21 March 2018

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Contributors

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Proceedings

Prepared by Harouna Coulibaly with contribution from Amadou Sidibe, Charlie Mbosso, Yara Koreissi, Aminata Gnana Diarra, Gaia Lochetti, Gennifer Meldrum, and Stefano Padulosi.

Organization of the meeting

Led by Amadou Sidibe and Charlie Mbosso with support from Harouna Coulibaly, Yara Koreissi, Brahim Dembele, Stefano Padulosi, Gennifer Meldrum, Aminata Gnana Diarra, Gaia Lochetti, Issa Wattara and Issa Togo. We are grateful to the NGO ASEM for its support in organizing the participation and facilitation of farmers during the meeting.

Project coordinators

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Amadou Sidibe (Project Coordinator in Mali, IER)

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Introduction

Increasingly arid conditions and a delayed start to the rainy season are challenging agricultural production in Mali and exacerbating existing issues with chronic food insecurity and malnutrition. Fonio (*Digitaria exilis*) is a native, underutilized crop, well adapted to the arid conditions of the Sahel. It has a very short growth cycle and can produce on poor soils. At the same time, it produces a seed of high nutritional quality with a taste that is well appreciated by consumers. For these reasons, fonio can help secure food production in the face of climate change. This traditional crop has received little attention in relation to research and development efforts, mainly focused on rice and on a narrow basket of other cereals mainly introduced from outside Africa.

Given the strategic importance of fonio, Bioversity International and the Institute of Rural Economy (IER) have been working since 2015 on the IFAD-EU project "*Linking agrobiodiversity value chains, climate adaptation and nutrition: Empowering the poor to manage risks*", aimed at promoting the use of this species in the regions of Sikasso and Ségou. As part of this project, a study of the fonio value chain was conducted to understand the key constraints for commercialization. Interviews with producers, traders and consumers were conducted to understand their different perspectives. A number of important results have been achieved through this study and other project activities.

On March 21, 2018, a workshop was held in Bamako to share the salient results of the value chain assessment in San and Tominian area. The event was also an opportunity for mutual learning among the main institutions working on fonio in Mali—technical services, NGOs, producers, processors and consumers. During the day, focus group discussions were held with stakeholders to identify needs, challenges and opportunities for improving the value chain of fonio, a highly nutritious but neglected crop.

There are many constraints to improving the use of fonio, but with a little attention this crop can play a key role not only in diversifying farming systems for better nutrition and resilience, but also as a source of rural households' income. The holistic value chain approach applied in the project involves interdisciplinary and inter-sectoral initiatives in each segment of the value chain, including the improvement of seed quality, cultivation and processing, as well as increasing consumer demand through specific marketing and awareness-raising activities. The results of the meeting, which are shared in this report, guided the last year of the project's implementation in terms of identifying specific interventions to strengthen the production, processing, and marketing activities of fonio in Mali.

Programme

21st March 2018

8.30-8.45	Arrival and registration of participants (URG / IER)
8.45-9.10	Opening ceremony, welcome and presentations of participants (Amadou Sidibe/IER/URG, Harouna Yossi/CRRA/IER)
9.10-9.25	The importance of research on fonio and presentation of the overall project (Stefano Padulosi/Bioversity International)
9.25-9.40	Project highlights on fonio (Amadou Sidibe/IER)
9.40-10.10	Results of the fonio value chain study in Sikasso and Ségou Regions (Charlie Mbosso/Bioversity International)
10.10-10.15	Introduction to discussion topics of the day and set up of working groups (Gennifer Meldrum/Bioversity international)
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10.15-10.30	<i>Coffee break</i>
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10.30-11.15	Discussion topic #1: Attracting greater demand from consumers in Mali in rural and urban markets
11.15-12.00	Discussion topic #2: Improving value chain organization and collective marketing for fonio and the role of women
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12.00-13.30	<i>Lunch</i>
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13.30-14.15	Discussion topic # 3: Overcoming production and harvesting constraints for fonio
14.15-15.00	Discussion topic # 4: Improving the fonio seed system
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15.00-15.15	<i>Coffee break</i>
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15.15-16.00	Plenary discussion on group work
15.15-16.00	Closing remarks and takeaway messages

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Opening ceremony

Harouna Yossi and Amadou Sidibe, Institut d'Economie Rurale

Dr. Harouna Yossi, Director of the Regional Centre for Agronomic Research, on behalf of the Sotuba staff and on his own behalf welcomed the participants to the national workshop for the restitution of results of the fonio value chain study. Participating to this workshop is an honour, and it shows the interest of the organizers and the project team in the development of rural Mali in general, and of the conservation and sustainable use of biodiversity to cope with the adverse effects of climate change in particular. He concluded by expressing his sincere thanks to the participants and wished the workshop every success.

Mr. Amadou Sidibe, National Coordinator, presented the activities of the day and in his speech he mentioned the manifestations of climate change and climate variability in Mali. They mainly result in late rainfall that is irregular, insufficient, and poorly distributed in space and time. It also refers to heavy torrential rains causing flooding destroying homes and crops. All these events disrupt the normal development of crops, thus causing a reduction in production. In addition, the coordinator recalled the adverse effects of climate change that the project proposes to address through the linkage between agro-biodiversity, adaptation to changing climates, improved nutrition and capacity building of poor farmers for risk management.

Finally, Mr. Sidibe has focused on the value chains studies of the project's target species (fonio, Bambara groundnut and vegetables) and he ended his remarks thanking all the participants.

This ceremony ended with the presentation of each participant and ultimately with a group photo.



Workshop participants. Credits: Bioversity International/G.Lochetti

Context and overall presentation of the project

Stefano Padulosi, Bioversity International

Stefano Padulosi began his speech with the presentation of Bioversity International, based in Rome, Italy with a vision on agricultural biodiversity that feeds people and sustains the planet. Bioversity International's mission is to provide scientific evidence, management practices and policy options for using and safeguarding agricultural and tree biodiversity to achieve sustainable global food and nutrition security.

The project for which this workshop was organized is titled "*Linking Agrobiodiversity Value Chains, Climate Adaptation and Nutrition: Empowering the Poor to Manage Risk*". The activities are carried out in Guatemala, Mali and India for a period of three years (2015-2018) with the IER as the main partner in Mali. The main objective of the project is to build the capacity of farmers and other value chain actors, including indigenous communities, to manage the risks associated with climate change, poor nutritional status and economic marginalization.

The main expected results are among others:

- **Cultivation:** improvement of crops, methods, approaches and tools to deal with climate change;
- **Market:** enhanced market access for stress-tolerant and nutritious crops;
- **Conservation and utilization:** capacity building of farmers and other value chain actors in the conservation and sustainable use of agricultural biodiversity;
- **Nutrition:** evidence of the role of agrobiodiversity in nutrition, income and climate change adaptation, with recommendations for policies to support its improved use.

The target crops for the project in Mali are fonio, Bambara groundnut and jute mallow (*Corchorus sp.*), which are neglected and underutilized crops in the country.

These crops have several advantages, especially in the face of climate change, such as marginal soil production and the need for fewer external inputs. Many of these native and neglected species also have nutritional benefits, such as a more favourable nutrient profile, rich in trace elements and nutraceutical properties. All these species can contribute to income generation for producers and processors, providing a unique opportunity. There is also an importance for the empowerment of indigenous peoples and women, and, finally, these species also represent a valorisation of traditional foods and cultures.

There are also several constraints, such as the low incentive to produce and sell because of high transaction costs, poor coordination and lack of transparency among value chain actors, the poor availability and quality of quality seeds, the low level of yields and finally the perception of these crops being food for the poor.



*Stefano Padulosi, Harouna Yossi, Amadou Sidibe, Charlie Mboosso, Gennifer Meldrum.
Credits: Bioversity International/G.Lochetti*



Stefano Padulosi presents the project. Credits: Bioversity International/G.Lochetti

The value chain of Fonio in Mali

Charlie Mbosso, Bioversity International

The presentation of the themes on the fonio value chain was chaired by Fodé Keita, Representative of the National Directorate of Agriculture, and was translated into Bamanakian by Aminata Berthé, researcher IER.

This session focused on the salient results of fonio production, processing, marketing and consumption, in short, its value chain.

Introduction and definition of key concepts

- **Supply and demand:** the supply of a good is the quantity of a product offered for sale by the sellers for a given price. Demand is the quantity of a product requested by buyers for a given price.
- **Value chain and market chain:** the products pass from the producer to the consumer through different levels. Some products have short chains while others are much more complex. When a part of the chain is weak, the whole chain is weak. The value chain is the set of activities that bring a product or a service through the different phases of production, processing, marketing; or a strategic network between a numbers of independent businesses, where network members engage in extensive collaboration.

Fonio production

Fonio is one of the oldest cereals in West Africa, one that is very tasty and nutritious. It has high organoleptic and nutritional qualities (essential amino acids, methionine and cysteine, which are deficient in rice, wheat, maize and sorghum) and contributes greatly to the food security of rural communities. It is a crop adapted to the conditions of the semi-arid and sub-humid regions of West Africa and constitutes an important source of income.

According to FAO, fonio production in 2006 reached 365 000 t for a harvested area of 475 000 ha. The average yield is close to 770 kg / ha, but it can sometimes reach more than 1 t / ha in Guinea, a country that alone provides more than 60% of global production. The yield may be less than 500 kg / ha in some northern areas of Burkina Faso or Mali (Cruz et Al., 2011).

The total production of fonio in Mali in 2015 was of 20,294 tonnes (0.25% of national cereal production (Ministry of Agriculture 2016)). Ségou was the region with the highest production (52% of the national fonio harvest), followed by Mopti, Koulikoro and Kayes (40% of the production), and finally Sikasso Region (8% fonio). Variability of production since 1961 was between 20,000 and 60,000 tons per year (FAOSTAT).

Despite all these qualities, fonio remains a minor culture whose constraints and opportunities are not well documented.

Highlights on the fonio value chain

Production and Transformation

The production and milling of fonio is dominated by men but the transformation is done by women. Paddy fonio and whitened fonio have two main distribution channels:

Producers → Consumers

Producers → Intermediaries → Consumers

The distribution channels of the processed fonio products are varied:

Fonio washed and dried:

Processors → Consumers

Processors → Intermediaries → Consumers

Fonio pre-cooked and *djouka*:

Processors → Consumers

Processors → Intermediaries → Consumers

Processors → Intermediaries → Exportation → Consumers



Transformed fonio products in markets in Bamako. Credit IER/Youssoufa Mohamadou



Women processors in Bamako with their transformed fonio products. Credit IER/Youssoufa Mohamadou

The survey took place in 14 markets in Sikasso (Kignan, Koutiala, Sikasso, Kouoro, Kimparana), Segou (San, Yasso, Yangasso) and Bamako (Wolofobougou, Niarela, Dibida, Fadjiguila, Magnambougou, Niamakoro). Here, retailers, semi-wholesalers and wholesalers sold whitened fonio in market stalls.

In four of the markets where the survey took place in Sikasso (Koutiala, Kignan) and Ségou (San, Tominian), retailers, semi-wholesalers and wholesalers sold washed-dried fonio, precooked fonio and *djouka* at market counters or on plates.

The variable costs of fonio production are high in Sikasso because of the labour force, whereas the costs that are incurred in Ségou are because of the use of the maximum amount of material required for the production activity.

The production of fonio is significantly more profitable at an interest rate of 15% in Sikasso where the average net income is 10 552 FCFA, compared to Ségou. Fonio is economically profitable in Sikasso.

The analysis shows that by investing 1 FCFA in the production of fonio, the producers would earn on average 1.15 FCFA in Sikasso.

Indirect stakeholders are agencies, structures providing support, such as services, financial support or capacity building to direct stakeholders in the fonio sector. Bioversity International through the IFAD-EC project, IER through the URG program, local NGOs (ASEM, Helvetas, CAAD, AMEDD, AMASSA Green Africa), declared institutions (OMA, agricultural sector), banking institutions (BNDA) and transporters.

Export countries are: Senegal, Burkina Faso, France, United States, and Canada.

Fonio consumption

Fonio is consumed throughout the whole year and especially during festive periods (Ramadan, Tabaski, Christmas, and Easter), all the adults surveyed and their children enjoy its taste. The most popular fonio recipes are: *djouka*, *foyo* and *tô*, mentioned respectively by 25%, 22% and 22% of the consumers interviewed. *Djouka* is the most popular and appreciated recipe among the consumers. *Foyo* and *Tô* are also preferred by some. Most consumers prefer varieties with coarse grains, more often with a white seed but sometimes with a black one as well.

Consumers' constraints

Half of the consumers surveyed are interested in buying more fonio. It is recommended for the elderly or suffering from diabetes.

Many consumers are not interested in buying more fonio because the amount consumed is already sufficient or because they do not like the food enough. 75% of fonio paddy traders and 91% of bleached fonio traders confirmed that they would not sell much more if they increase the quantity on offer due to lack of customers.

On the other hand, for processed fonio products, almost all traders say that consumers would buy a lot more if they increase the quantity on offer. The price of fonio *djouka* is not very affordable for consumers (989 FCFA / kg), which is why it is consumed mostly during the holidays.

Common constraints for the value chain actors

At the village level the volume of fonio produced is very low and it is grown on small plots. It is necessary to test the system of warranty to have a maximum quantity of the available product at the village level, villages while allowing the producer to solve his personal problems at the same time, regardless of the sales period.

There are many losses in the production of fonio due to the delay of harvest and overlapping with other farm work. The lack or absence of mills for fonio dehulling in the villages decreases the economic gain for producers.

Fonio has a very unstable market (bad price) at the level of the villages. To strengthen marketing it is necessary to organize in groups and associations, to establish a fixed price for purchase before the production.

Conclusions

Considering the many qualities of fonio (availability, nutritional value, and profitability), this crop offers great opportunities in terms of food security, sustainability, income diversification, food diversification and product development. If fonio will be adopted and its cultivation improved, it can make an important contribution to food and nutrition security and to poverty reduction in Mali and other parts of Africa.



Charlie Mbosso presents the value chain analysis. Credits: Bioversity International/G.Lochetti

Discussion groups and synthesis of results

After Ms Charlie Mbosso's presentation, working groups were organized to reflect on the improvement of the fonio value chain. The participants were divided into two groups to better answer the questions asked.

These questions of reflection revolved around the following four points:

- 1) How to attract greater consumer demand in rural and urban markets in Mali?
- 2) How to improve the organization of the value chain, the marketing of fonio and the role of women in it?
- 3) How to overcome production and harvesting constraints for fonio?
- 4) How to improve the seed system of fonio in Mali?



Group work during the workshop. Credit: Bioversity International/G.Lochetti

1) How to attract greater consumer demand in rural and urban markets in Mali?

- Advertising on television and radio on the nutritional and cultural importance of fonio;
- Raise awareness on fonio cultivation;
- Subsidize fonio cultivation;
- Improve threshing and other processing techniques;
- Raise awareness through various media on the important value of fonio for nutrition, health and climate change resilience;
- Improve the quality of transformed fonio products;
- Market research (4P);
- Regular information about stocks and prices in production areas;
- Post-harvest equipment (adapted machinery) to reduce losses, and lighten the drudgery of tasks;
- Increase production;
- Reduce the prices.

2) How to improve the organization of the value chain, the marketing of fonio and the role of women in it?

- Organize producers into cooperatives to facilitate access to finance;
- Increase product diversification by leveraging on the fundamental importance of women in processing, marketing and quality;
- Establish a platform to improve the exchange network among the actors of the value chain;
- Organize trainings and exchange visits;
- Labelling processed products;
- Mechanize the production and processing of fonio;
- Improve varieties;
- Establish traceability of fonio;
- Diversify fonio products;
- Organize at the base of different groups (producers, traders, transporters, processors and consumers);
- Establish a platform (AOPP);
- Follow the technical production itinerary (soil, good quality of seeds, crop rotation, harvesting technique, mechanization);
- Strengthen the capacity of the actors;
- Organization of markets and fairs.

3) How to overcome production and harvesting constraints for fonio?

- Mechanize the harvesting and threshing or to organize the harvest in working group, as the harvest is the most important constraint;
- Use selected and improved seeds that are resilient to climate change;
- Improve access to good quality seeds (creation of fonio seed sale stores, train seed growers etc.)
- Improve equipment and materials (ploughing tractors, threshing machines, mowers, and access to credit);
- Continue research on fonio production, and popularize the results of research;
- Training on new technologies.

4) How to improve the seed system of fonio in Mali?

- Train and increase the number of farmers that produce seeds;
- Organize seed fairs;
- Increase the number of seed and gene banks;
- Subsidize seeds;
- Held diversity fairs;
- Create partnerships with national seed service to improve the seed system;

- Create new varieties according to the consumer's choice (seed size, white colour, etc.). In addition, breeders must take into account variety tolerance to stress and have good quality that can increase women's income (IER);
- Organize the producers of seeds into unions or organizations;
- Strengthen the capacities of seed producers.

Final discussion

After the four topics were discussed, the two groups met and the facilitators shared the answers of each group. It was a moment of collective reflection on the problems and constraints of the fonio value chain. Following the presentations, both groups were given the opportunity to ask questions to better understand the perspective of different actors in the value chain and their responses to each other. These included, among others:

Question: You discussed the role of the woman only at the processing / consumption level while women also participate greatly in weeding, harvesting and winnowing. Why?

Answer: This is an oversight, the role of the woman is indeed central in the activities mentioned.

Question: Why do you consider the use of a drill for fonio sowing when the majority of it is sown by broad casting? Also why did you not speak about breeding or varietal selection among your suggested interventions?

Answer: Given the difficulty of the fonio production activities, the use of the drill will allow for a linear sowing that will be favourable to mechanization of the harvests. Agronomic research (IER) should carry out activities in this direction and on varietal selection.

Conclusions

Throughout the day, stakeholders were very interested in presentations, participated in group discussions and appreciated the lunch. In fact, during lunch, fonio-based dishes were served to the participants to highlight the potential this crop can have in daily meals. The nutritionist described and pointed out the good nutritional value of fonio and everyone was interested in the dishes. Training activities on these recipes will be organized during the last year of the project with women from the Ségou region.

This workshop was a good opportunity for the different value chain actors to meet and share their experiences and perception on the constraints of they face in the production, processing, marketing and consumption of fonio. They were challenged to find solutions to the problems of the fonio value chain in Mali.

After a few words of thanks from the Bioversity International team, the closing of the workshop was done by National Coordinator Amadou Sidibe. He thanked the partners (Bioversity International, researchers, producers, NGOs, technical services) for the successful implementation of the project activities. While wishing a good return to everyone, he declared closed the workshop on consultation on the Bambara groundnut project "*Linking value chains of agrobiodiversity, climate adaptation and nutrition: giving to the poor ways to manage risks*".

Agricultural biodiversity is an essential foundation for rural households around the world, and specifically for the poor and the marginalized. Diversity options allow farmers to respond to different situations and contexts. When these are accompanied with enhanced capabilities to address risks along the value chain, these options may be more effective in building resilience for the social welfare system and can improve food and nutrition security. Community resilience is linked to the use of adapted and more resilient crops; their effective use can generate income, thus leading to an increased household food security. Several neglected and underutilized species, such as fonio, Bambara groundnut and millets, are known to be stress tolerant and hold a great potential to contribute to the resilience, nutrition and food security of communities. This is why it is important to support their production and integrate these crops into strong and sustainable value chains.



Bioversity International is a member of the CGIAR Consortium. CGIAR is a global research partnership for a food-secure future.



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