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Transfer of Sorghum, Millet Production, Processing and Marketing Technologies in Mali

**Quarterly Report
January 1, – March 31, 2012
USAID/EGAT/AG/ATGO/Mali
Cooperative Agreement # 688-A-00-007-00043-00**

Submitted to the USAID Mission, Mali

by

Management Entity

**Sorghum, Millet and Other Grains Collaborative Research Support Program
(INTSORMIL CRSP)**

Leader with Associates Award: EPP-A-00-06-00016-00



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Production-Marketing



Décrue sorghum



Processing



Training

1. Acronyms and abbreviations

ACRONYM	DESCRIPTION
AMEDD	Association Malienne d'Eveil au Developpement
BNDA	Banque Nationale de développement Agricole Mali
CONFIGES	NGO/ Gao
CRRA	Centre regional de Recherche Agronomique
DRA	Division de la Recherche Agronomique
FCFA	Franc CFA
Ha	Hectare
IER	Institut d'Economie Rurale
IICEM	Integrated Initiatives for Economic Growth In Mali
LTA	Laboratoire d'Tecnologie Alimentaire (IER)
MOU	Memorandum of Understanding
MT	Metric tonne
NGO	Non Governmental Organization
RCGOP	NGO/ Tomboctou
SAA	Sasakawa Foundation
WFP	World Food Program
WTAMU	West Texas A&M University

2. Introduction

The goal of this project is to raise farmers' incomes in a sustainable way. Experience indicates that increasing input use for sorghum and millet in West Africa depends upon the simultaneous adoption of the inputs for higher productivity (Improved cultivars, inorganic fertilizers, pest management tactics and credit), the introduction of improved agronomic practices ((Higher plant populations, increased use of organic fertilizers and the introduction of water conservation/harvesting techniques) and improved marketing to respond to the price collapse problems and to improve grain quality to increase demand from food processors (and for farmers to receive a premium price for quality). Improved product marketing insures that farmers will earn enough money to pay for the increased inputs, especially improved seeds and inorganic fertilizer. Without these higher input levels the soil fertility cycle of declining yields, low farm incomes and minimal input purchase will not be broken.

The principal constraint to the introduction of the new cultivars, inorganic fertilizer and associated technologies is the low profitability of the higher input use systems. Many national and international scientists have produced a backlog of good technologies. The missing components are the research and extension to increase the profitability of these intensive production systems by 1) moderating or eliminating price collapses with better marketing strategies and 2) improving farmer access to and increasing the efficiency of the principal input markets.

This project is designed to move sorghum and millet production technologies onto farmers' fields, link farmers' organizations with food and feed processors and to commercialize processing technologies so as to enhance markets. To achieve this we improve the supply chain from the farm level to the consumer. The project emphasis in the north is on the development and transfer of *décrué* sorghum and millet technology while in the south the transfer of rain fed sorghum and millet technology to the farm level.

Objectives:

- **Facilitate adoption of production and marketing technologies to improve the incomes of sorghum and millet producers**
- **Facilitate the development of markets for the use of millet and sorghum as a food for humans and as a feed for poultry**
- **Develop stronger farmers' groups and enhance their marketing power**
- **Extend mechanized food processing technologies to entrepreneurs and processor groups**
- **Introduce improved agronomic practices into *décrué* farming systems in northern Mali.**

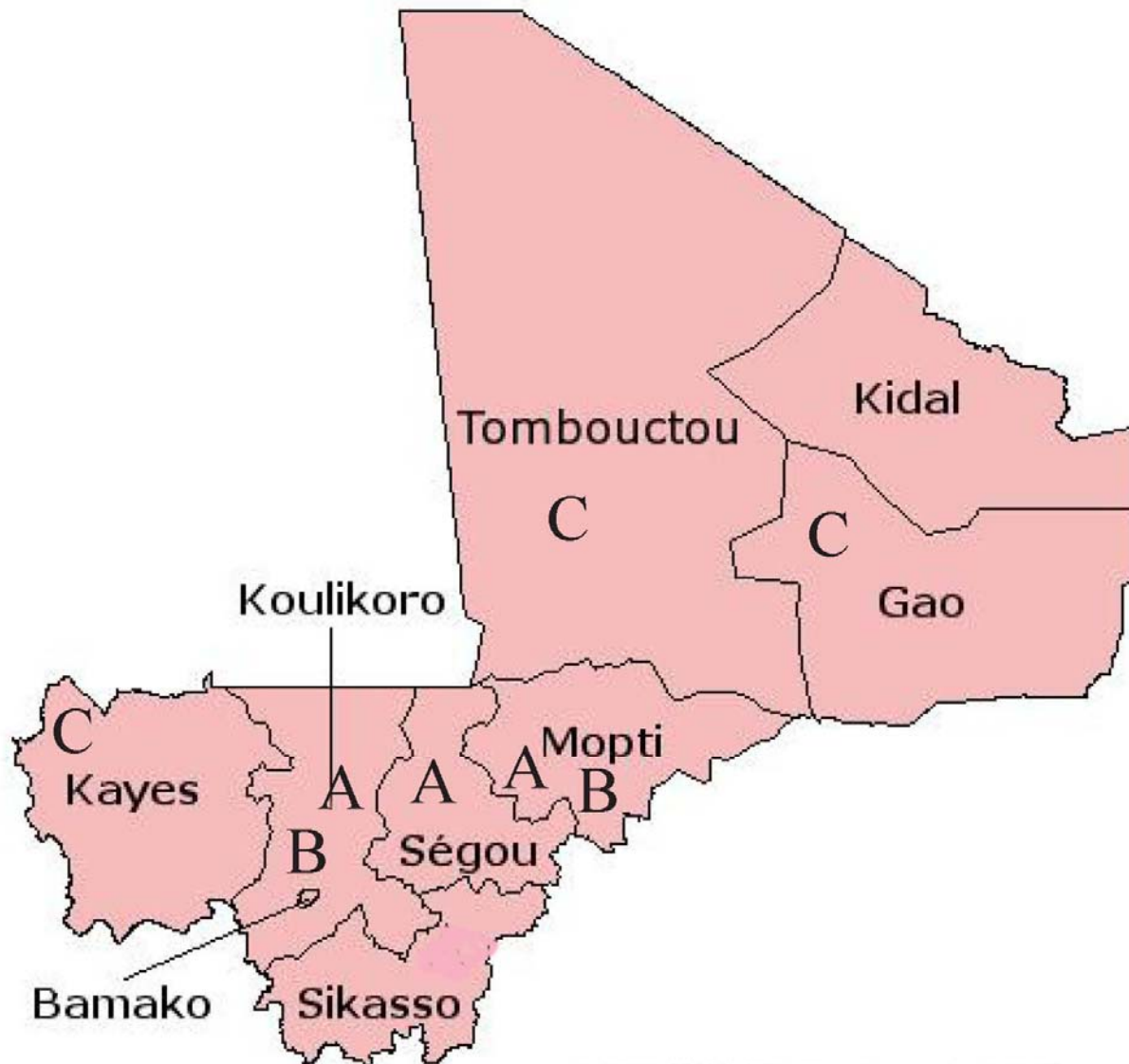
Implementing Partners:

Africare**	NGO
AMEDD**	Association Malienne d'Eveil au Developpement
BNDA**	Banque Nationale de développement Agricole Mali
CONFIGES**	NGO/Gao
CRRA**	Centre regional de Recherche Agronomique
DRA**	Division de la Recherche Agronomique
IER*	Institut d'Economie Rurale
KSU*	Kansas State University
IICEM**	Integrated Initiatives for Economic Growth In Mali
LTA**	Laboratoire d'Technologie Alimentaire (IER)
Purdue*	Purdue University
RCGOP**	NGO/ Tomboctou
SAA**	Sasakawa Foundation
WTAMU**	West Texas A&M University

*Prime partner

**Sub-prime partner

Geographic areas of coverage:



INTSORMIL Projects in Mali

A = Production and Marketing

B = Food Processing

C = Décrue Sorghum

3. Executive summary of achievements

Ten movies depicting the **Transfer of Sorghum, Millet Production, Processing and Marketing Technologies in Mali** project have been produced and about 10 more are in various phases of production. These can be seen on INTSORMIL's **YouTube** channel at: <http://www.youtube.com/user/INTSORMIL>

In the first quarter of 2012, the processing project focused on workplan activities to complete the project this year. The goal of this project is to create models for making sorghum and millet processors more competitive by processing high quality, consistent products and in higher volume through mechanization. We are engaged in two major activities and continued these in this quarter, prior to the March 21 government disruption: 1) scaling up of processing activities of our partner entrepreneurs in the Mopti/Gao area, and 2) in Bamako at IER/LTA in Sotuba, increasing activities of the Incubation Centre that was formally launched in fall 2011. An additional activity, reported at our briefing at the USAID office in late January, was a study done by Fatima Cisse, MS student at Purdue University under the training component of the project, that shows traditional sorghum and millet thin and thick porridges, and millet couscous provide a substantially slower digestion and delivery of energy to the body (as measured by gastric emptying rate) than non-traditional foods typically consumed by urban dwellers (rice, boiled potatoes, pasta). We think that this information could be useful in a promotion campaign stressing the health benefit of sorghum and millet to expand markets in Bamako and other urban areas. This work has been submitted for publication in a nutrition/food science journal.

In January, consultant M. Diouf traveled to Mopti and Gao to work with our processor partners for problem solving, assessment of current status, further communication on objectives in the final phase of the project, and to collect quantitative data from each unit on amounts and types of products processed in 2011, the first commercial start-up phase of the project. A summary of this data can be found in the indicators section below. B. Hamaker met in late January with M. Diouf, Y. Kouressi, IICEM partners, and USAID Mission officials.

All the *décrué* sorghum research activities were conducted by IER. With the situation in Mali this quarter, we were asked to suspend the research and extension activities during the critical period. Thus, no research activities were conducted. However, we have been discussing with the NGO (AMEDD) to see if these activities can be continued through their collaboration. We will be working with AMEDD to extend the acreage of *décrué* sorghum. However, most of the *décrué* research is in the politically unstable regions, and planting season is fast approaching. Thus, we are in the process of initiating the work with AMEDD and we will be reporting on this collaboration in the next quarterly report.

All trainees are making good progress in their studies. Mr. Bandiougou Diawara defended his MS research thesis and currently is working on corrections suggested by the graduate committee. A no cost extension has been granted to June, 2013 to allow all of the trainees to complete their degree programs prior to returning to IER.

4. Project component description and intermediate results

Following FtF priorities the current focus of the **Production-Marketing Project** is on Koutiala and Mopti. We are continuing our farm level work beginning new farmers' associations and strengthening present farmers' associations working with us. So in February and March we spent 8 and 9 days respectively in the field visiting farmers' associations with our IER, AMEDD, and DRA collaborators. A basic component of our marketing strategy is getting high prices by selling later after the harvest price collapse especially in adverse rainfall years. There was a late season drought in 2011 but our farmers did better than local farmers. The big issue for the 2011 crop season was the high cereal prices in both regions. So we spent time in the villages going over marketing strategies especially urging the farmers' associations, once they are assured of funds to purchase inputs in 2012, to set aside grain and wait for even higher prices. In Mopti all our farmers' associations sold their millet for over 200 CFA/kg. The reimbursements in kind required fewer bags since prices were 80 to 100 CFA/kg higher than in normal years.

The **Food Processing Project** consists of two major components, 1) The mechanization of processors in the Mopti/Gao region, and 2) setting up of an Incubation Centre in Bamako (IER/LTA Sotuba). We have a system to document the activities of the food processors in each unit to follow amount and types of products produced. During this period, processors were starting up their operations and while output may seem modest (3 to 4 metric tons in each unit), the data shows positive trends. Diversity of products, many of which require an expertise and precision beyond their training, shows an identification of markets by the entrepreneur partners. Grains have been obtained mostly through the INTSORMIL production-marketing project farmers and IICEM project farmers. Work was conducted in the Incubation Centre to produce high quality sorghum flours that can be used by Bamako bakeries. Through this project conducted in collaboration with IICEM grain was identified and decortications and milling conditions were determined to process excellent quality flour. Work on the new mechanized couscous/degué agglomerated processing line progressed well.

The **training component** includes both long term and short term training. We have five long-term academic students from Mali studying the US and as of June 2011, all are enrolled in their respective Master's graduate programs. Their graduate school admission dates varied from January 2010 to June 2011, due to English language skill performance. Three short term trainings were proposed in the areas of plant breeding, crop and soil science and agricultural economics. Two short term trainings, plant breeding at Purdue and crop and soil sciences at Kansas State, have been completed. The proposed agricultural economics short-term training is no longer planned since the identified candidate is no longer interested.

5. Achievements during reporting period

Management Entity: E. A. Heinrichs and Tony Michaelsen

December 6-14, 2011 E. A. Heinrichs and Tony Michaelsen of the ME and Vara Prasad, Kansas State University, Leader of the Décrue Sorghum Project visited the décrue area in northern Mali and documented, on film, the décrue sorghum production practices. This movie, and several others produced with the assistance of IER, have been placed on the INTSORMIL YouTube Channel.

INTSORMIL's Channel:
<http://www.youtube.com/user/INTSORMIL>

The following is a list of movies completed as of this date on the Mali Project. Another 10 or so are under production.

IER: Collaboration Produces Improved Sorghum

<http://www.youtube.com/watch?v=OnGEFNiY-SE&feature=plcp>

IER / INTSORMIL: Collaboration

<http://www.youtube.com/watch?v=WxDZIMsXgJE&feature=plcp>

IER: Institutional and Human Capacity Building at IER

<http://www.youtube.com/watch?v=kTXDGVPyNyU&feature=plcp>

IER: Production and Marketing Project in Mali

<http://www.youtube.com/watch?v=fgbE43Zomh0&feature=plcp>

IER: Breeding Food Grain Quality Sorghum and Pearl Millet

<http://www.youtube.com/watch?v=zPDeLkdXTBA&feature=plcp>

IER: Delican: a sorghum based biscuit made in Mali

<http://www.youtube.com/watch?v=dDTi3nRzEdk&feature=plcp>

IER: Transforming Sorghum and Millet Grain into Flour in Mali

<http://www.youtube.com/watch?v=BuZqdWYnjXY&feature=plcp>

IER: Scientists in the Battle Against Hunger

<http://www.youtube.com/watch?v=JY6n9IUHtQY&feature=plcp>

Décrue Story

<http://www.youtube.com/watch?v=y6aY4JqLMA0&feature=plcp>

**Décrué Story: Mali, West Africa
(In Progress)**

Production – Marketing: John Sanders, Purdue University and Botorou Ouendeba

We arranged with AMEDD in Koutiala that they would expand the area in new technologies by 500 ha. They now have the funds for this expansion. Presently, there is substantial variation in the numbers in the various villages. This is not a problem but we did push again on the issue of getting more women involved and of limiting men to one ha/farmer.

There are now four tons of excellent Grinkan seed produced by local seed producer associations and on two experiment stations in storage being held by AMEDD for the 2012 season. So with good or normal weather we expect a very big effect from Grinkan in 2012 in the northern cotton zone (Koutiala) where the rainfall variability makes sorghum rather than maize the second crop following cotton in the rotation. With Grinkan the yields and prices are high enough that it has been called the “cotton of Garasso.”

Similarly, in Mopti with DRA we will be expanding the area in new technology by 280 ha. This is an expansion of the present farmers’ organizations that are doing well following the agronomic and marketing recommendations and are reimbursing the farmers’ associations for the input credits thereby creating a revolving fund for this purpose. Six of the seven farmers’ associations that were helped in constructing their storage facilities had finished them. The farmers’ contributions were the materials and the labor. We assisted with cement for the floor, also the windows, door and roof. Farmers were very happy with the prices and proud of their storage facilities. With higher yields, village storage and evolving farmers’ associations the farmers felt much more confidence in their marketing ability and anxious for program expansion.

Food Processing: Bruce Hamaker and Fatima Cissé, Purdue; Yara Koreissi, IER/LTA; Mamadou Diouff, Consultant

Background of the planned activities for the reporting period

The overarching goal of the processing project is to expand markets for sorghum and millet farmers in Mali through creation of working models to increase the competitiveness of small and medium-scale food processors. This is addressed through two activities: 1) mechanization of processors in the Mopti/Gao region, and 2) setting up of an Incubation Centre in Bamako (IER/LTA Sotuba) to introduce and improve technologies for urban processors and to work with them to strengthen their enterprises. Another activity of the project relates to the training component and work by MS student F. Cisse on potential health attributes of sorghum and millet, and the traditional foods made from them, that might be used for promotional activities to encourage urban consumers to purchase more of these grains. M. Diouf, consultant from Dakar, and B. Hamaker, project PI, traveled to Mali in January; and B. Hamaker attempted to travel in March (the coup d’etat occurred while on a flight to Bamako and the flight returned to Paris). B. Hamaker, Y. Kouressi, and M. Diouf briefed K. Hanna and J. Lycos at the USAID mission in late January.

Component 1 –Mopti/Gao region entrepreneur partners

In January, consultant M. Diouf and part of the team from IER/LTA Sotuba traveled to Mopti and Gao to work with and assess entrepreneur partner projects. All units, except the one in Bandiagara (Mme. Seyo), have been processing millet and sorghum products since spring 2011. Our food technologist stationed in Severe has set up a documentation system in each unit to follow amount and types of products produced. See the Section 7 below for tabular accounting of products made in four processing units from March to November 2011. During this period, processors were starting up their operations and while output may seem modest (3 to 4 metric tons in each unit), the data shows positive trends. Diversity of products, many of which require an expertise and precision beyond their training, shows an identification of markets by the entrepreneur partners. Grains have been obtained mostly through the INTSORMIL production-marketing project farmers and IICEM project farmers. In the January trip, six processing units were functioning relatively well. We had promotion activities and a training workshop for increasing efficiency and productivity planned for mid- to late spring 2012, prior to the disruption of the project. We have heard that processing activities in Sevaré have largely continued since the coup. In Gao, Mme. Haidara and family have moved to Segou, and though Mme. Maiga remains, it is not clear whether or not the processing unit is active.

Component 2 - IER/LTA Incubation Centre

In the quarter, work was conducted in the Incubation Centre to produce high quality sorghum flours that can be used by Bamako bakeries. This project is coordinated with IICEM. Grain was identified and decortications and milling conditions were determined to process excellent quality flour. Samples were shown at USAID and IICEM meetings in late January. Work progressed also on the new mechanized couscous/degué agglomerated processing line. On some equipment pieces work was performed to solve technical difficulties.

Training (F. Cisse) research on extended energy attribute of traditional Malian sorghum and millet foods
 MS student at Purdue, F. Cisse, completed data analysis of a study she conducted in Bamako in the summer of 2011. Using a non-invasive ¹³C-breath analyzer technique to measure gastric emptying rate, she studied how traditional sorghum and millet foods (sorghum and millet thin and thick porridges, and millet couscous) provide energy after consumption compared to non-traditional “imported” foods (rice, boiled potato, and pasta). As seen in the figure below, the sorghum and millet thick porridges and millet couscous have substantially longer emptying rate from the stomach than the rice, potato, and pasta foods. This shows these sorghum and millet foods provide energy for a much longer time period than the popular imported foods eaten in urban centers. We suggest that this information could be used in a promotion campaign to consume more sorghum and millet in the cities; another strategy to expand markets for sorghum and millet farmers.

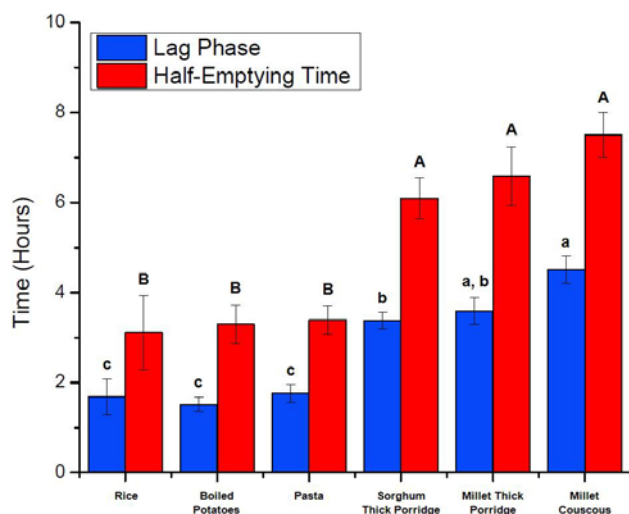


Figure 1. Gastric emptying differences in a study conducted in Bamako with volunteers consuming traditional sorghum and millet foods compared to non-traditional “imported” foods. Data shows that sorghum and millet foods have substantially slower gastric emptying and longer energy delivery to the body than imported foods.

Training: Jess Lowenberg-DeBoer, Purdue University

Long term training

Fatimata Cisse (Purdue Food Science) has successfully completed her coursework and is working on her research. She is analyzing her data and preparing another needed experiment. She will need to extend her training program to September 2012 to complete her MS degree. However, Bruce Hamaker, her major professor, would like to change Ms. Cisse’s training to a PhD program. He is in process of submitting needed documents to the Food Science Graduate Committee regarding this bypass from a master’s to a doctorate program. He has discussed this with Jess Lowenberg-DeBoer, the ME, the Mission and IER and received verbal agreement – but is now pursuing formal approval letters. If approved, the additional costs to complete her PhD training will be supported by other funds (INTSORMIL and Gates), and would require her program to be extended to June 2014.

Bandiougou Diawara and Sory Diallo continued their Master’s coursework and research in Agronomy at Kansas State. Mr. Diawara defended his thesis on May 14th and will make the required revisions and finish up by June 30, 2012, at which time he will return to work at IER in Mali. We will report details of his research in the next report. Mr. Diallo completed his coursework and research experiments this last quarter, and is doing some quality trait analyses on grain and has started to write up his thesis. He is currently conducting data analyses and scheduling his defense

Aly Ahamadou and Mamadou Dembele, accepted June 1, 2011 into the West Texas A&M’s Graduate School, continue their coursework and research. Their major professor, Dr. Lal Almas, reports - Both students are in MS non-thesis option in agricultural business and economics area. Both were enrolled in 9 credit hours of graduate level in spring 2012. They have successfully completed those 9 hours that will count towards their degree. Each has one A and two Bs in spring 2012 courses. The minimum requirement is to pass a course with B. Their progress is satisfactory towards completion of their program.

6. Indicators and milestones

Food Processing

Food Processing Indicator data table with actual milestones achieved by food processing entrepreneurs (2011-2012).

UNIT OF MRS CISSÉ SIRA DIAKITÉ IN SÉVARÉ			
SUMMARY OF THE QUANTITIES OF MANUFACTURED FINAL PRODUCTS; period - FROM March 2011 to November 2011			
General Total: 1.409 kg distributed as follows:			
Products from Millet	Quantity (in kg)	Products from Sorghum	Quantity (in kg)
Dehulled Grain of Millet	933,5	Dehulled Grain of Sorghum	100
Bran and others by products	ND	Gritz of Sorghum	53
Basi mugu (precooked couscous)	35,5	Torrefied gritz of Sorghum	12
Mugu Fara de Mil	45	Flour of sorghum resulting from gritz manufact.	55
Cream	68,5	Bran and others by products	ND
Thiakri	25,5	Couscous with vegetables	32
Zoom kom	8	Tô mugu (60% Sorgho/40% Millet)	23
		Diouka	30
TOTAL	1.116	TOTAL	293

Quantities of raw materials used by the unit during the period:

- Millet: 2.552 kg (2,552tonnes)
- Sorghum: 500 kg (0,5 ton)
- Total.....: 3.052 kg (3,052 tons)

UNIT OF: MRS GARIKO RAMATOULAYE GARIKO IN SÉVARÉ			
SUMMARY OF THE QUANTITIES OF FINAL PRODUCTS MANUFACTURED:			
PERIOD : MARCH 2011 TO JANUARY 2012 : 4.585,25 KG DISTRIBUTED AS FOLLOWS			
Products from Millet	Quantity (in kg)	Product: from Sorghum	Quantity (in kg)
Grain of Dehulled grain of millet	2.347,275	Dehulled grain of Sorghum	535,4 0
Gritz of Millet	78,000	Gritz of Sorghum	56,85
Bran Its and others by products	378,725	Bran Its and others by products	164,6 0
Basi mugu (precooked couscous) of Millet	199,3 00	Basi mugu (precooked couscous) of Sorghum	-
Mugu Fara de Mil	491,5 00	Mugu Fara de Sorgho	32,85
Dégué mugu (flour) of Millet	358,45 0	Dégué mugu (flour) of Sorghum	-
Tô mugu of Millet	80,000	Tô mugu of Sorghum	60,00
TOTAL	3.933,25 0	TOTAL	849,70

Quantities of Raw materials used by the unit during the period:

- Millet: 3.452 kg (3,452 tons) to check
- Sorghum:..... 800 kg (0,8 ton)
- Total:..... 4.252 kg (4,252 tons)

Unit of Mrs Diallo Assétou Traoré In Sévaré					
Recapitulation of the quantities of manufactured final products					
Period : March to November 2011					
Products from Millet	Quantity (kg)	Observations	Product from Sorghum	Quantity (kg)	Observations
Dehulled Grain of Millet	1 636,5	(to be checked)	Dehulled Grain of Sorghum	1 078,4	
Basi mugu (precooked couscous) of Millet	50,0		Cracks of Sorghum	20,0	
Mugu Fara de Mil	30,0		Flour of Sorghum	40,0	
Dégué mugu (flour) of Millet	210,0		Diouka de Sorgho	9,5	
Ben Dégué	15,0		-	-	
Tjanon	5,0		-	-	
Acassa ball	20,0		-	-	
Flour of Millet	40,0		-	-	
TOTAL	2 006,5		TOTAL	1 147,9	

Unit of Mrs Haïdara Nanamoye Guindo In Gao			
RECAPITULATION OF THE QUANTITIES OF MANUFACTURED FINAL PRODUCTS			
Period: from Mars to November 2011: 3 752,6 kg distributed as follows			
Product from Millet	Quantité (kg)	Product from Sorghum	Quantity (kg)
Dehulled Grain of Millet	2 109,4	Dehulled Grain of Sorghum	505,0
Gritz of Millet (resulting from dehusking)	105,0	-	-
Bran and others by products	-	-	-
Basi mugu (couscous précuit) of Millet	46,0	-	-
Dégué mugu (flour) of Millet	176,2	-	-
Tô mugu of Millet	445,0	-	-
Couscous of Millet to groundnuts	233,0	-	-
Moni crou of Millet	86,0	-	-
Acassa ball	47,0	-	-
TOTAL	3 247,6	TOTAL	505,0

Production-Marketing

New areas: 500 ha in Koutiala with present funding. 750 ha if we can go ahead with what we have discussed with them and additional funding. This depends upon the US government lifting the freezing of funds spent there. Similarly in Mopti 280 ha with present funding and 500 ha if the block on Mali funding is lifted before planting time.

Farmers' associations: In Koutiala this would be 8-10 new farmers associations for men with present funding and 12-14 if we can go ahead again in Mali. In Mopti no new farmers associations with the 280 ha at present and three new ones if we can go ahead with another 220 ha.

Number of farmers: For Koutiala the same as the number of ha for the first approximation as we don't have the number of women involved in Koutiala at this time. In Mopti the land is divided between 50 ha for men and 10 ha for women in each village with the women generally cultivating $\frac{1}{4}$ ha. In Mopti 240 ha for men¹ and 30 for women. So there will be 240 men and 120 women. For both Koutiala and Mopti for the second grant which is going to the INTSORMIL office in May but will not be sent out unless the freeze is lifted, we would attempt to follow the 50-10 rule.

7. Gender related achievements

The **Production-Marketing Project** always attempts to organize in the village with 50 ha for men and 10 ha for women. We also recommend two different farmers' associations by gender in the village but with collaboration on the storage and marketing between the two. We are in a scaling up process now so our collaborating agencies often make program modifications. But we continue in our village meetings to emphasize that the men need to give the women access to good land, manure, and carts as these are the three principal requests from women in the village meetings. The women generally follow the program recommendations better than the men including higher reimbursement rates. We also attempt to get some competition on yields between the genders. The women are allocated land (or not) each year and depend upon the men for land preparation and access to manure and carts. But we point out to the men that continuation of the program on their larger areas depends upon the women doing well.

Our seven **Food Processing** entrepreneurs in Mopti/Severé, Gao and Bandiagara are women and they employ workers (both women and men) to run the processing facilities. As the project has developed, it has become apparent that some of the women were in particularly difficult situations and becoming part of the project is viewed as a significant opportunity for them. With the possible exception of one partner, the women participating in the project have expressed and have demonstrated their commitment to the success of the project. Yara Koréissi Dembélé is the lead scientist from IER for the processing project.

¹In one of the villages we did not expand the area for men last year and just expanded the area for women. The men finally reimbursed so we are expanding their area again.

8. Synergic activities

Production-Marketing

The entire program is synergistic. The Production-Marketing program started and is firmly rooted on defining the technologies with the national agricultural research organization (IER) and identifying the priority production regions with the national agricultural extension agency (DRA)

We continue to interact with IICEM on their scaling up. They are the main USAID-Mali financed entity engaged in scaling up of our technologies. Their marketing recommendations are different from ours so income comparisons between farmers and farmers' associations in our project and that of IICEM would be very interesting. But the important thing for us is to help them get good seed and facilitate their training efforts with our "fiche technique."² In this quarter we made available to AIID (an IICEM affiliate) four tons of excellent quality Grinkan seed for their activities in the Koutiala region. This is in addition to our four tons of Grinkan.

Our principal collaborator on research is IER but INTSORMIL scientists have also been involved previously in entomology and poultry nutrition. Diallo and Niaba Teme from IER accompanied us on the two trips respectively in this quarter.

In Koutiala we work closely with AMEDD, especially the director, Bougouna Sogoba, and his field technician, Boire. In March we were also engaging the regional DRA (national extension service) to provide farmer training and monitoring. But this will be put on hold with the present situation in Mali.

In Mopti we work with the regional DRA for training, monitoring and coordination. We visited the villages involved there including the three new villages, which are in the process of building their storage facilities.

Food Processing

In January, a meeting was held with B. Hamaker, Y. Kouressi, and M. Diouf with IICEM at their office to discuss proceeding with the planned project to supply high quality sorghum flours to SOADF, the baking school, and further the five largest bakeries in Bamako. The same joint group from INTSORMIL and IICEM visited Mme. Deme and her group to discuss training and use of the mechanized couscous/degue agglomerated product unit at the IER/LTA Incubation Centre.

Décrue sorghum

No research activities were conducted this quarter. However, we are currently working with NGO – AMEDD to continue the research activities in the décrue region. Details will be provided in the next quarterly report.

² In previous years Niaba Teme from our project worked directly for them in training.

9. Other important activities

There is increasing collaboration between the three principal activities of the broader INTSORMIL Project. With the food processing sector, Production-Marketing continues to advise them about the increasing availability of clean seed from our farmers' associations and the need of our farmers' associations for a price premium for quality. We also hold joint workshops of processors and farmers' associations to help build these commercial networks.

With the *décrué* sorghum program, now that they have identified some technologies that function well on the *décrué*, Production-Marketing will be collaborating with them to get the technology out following the integrated extension approach that Production-Marketing has been introducing.

The Production-Marketing program is also tied to the overall INTSORMIL program from which we draw scientific help. We have already mentioned the entomological help. We also have had visits combined with short courses for intensive chicken producers by Joe Hancock, animal nutrition scientist specializing in poultry at KSU. As we get yields of sorghum up we can compete with corn in the rations especially for intensive poultry. Non-tannin sorghum have 95 to 97% of the feeding efficiency of maize so with prices at 95% or less of maize producers should substitute sorghum for maize in the ration. Chicken producers or feed mixers need the mixing machine to do this and the awareness of the substitutability between rations. Joe Hancock provides the necessary technical information and has been supporting our program in this way for several years. The intensive poultry sector is growing rapidly. With good yields of Grinkan in 2012 we will be again competing with maize with respect to price as was the case in 2008. So we will need to follow up our workshops and advise chicken producers about relative prices at that time.

10. Problems, challenges and solutions

1. Mali has had difficult weather for cereal production for the last two seasons. So prices were especially high in the spring of 2012 for millet and sorghum. The Mopti farmers benefitted from that and are happy with the project and wanting to expand. With the help of the DRA it was easy to find three new villages and to get them started on constructing their storage facilities. In six of the seven villages in which we work in Mopti the farmers' associations have finished their storage buildings. They are nicely painted and with signs so it is clear that the association and the farmers are proud of them.

In Koutiala there are 8 tons of good Grinkan seed available for AMEDD and AIID (IICEM) so we expect a very good year there. Farmer training by IER and AMEDD is presently going on before planting. An issue for

concern in Koutiala is the management input that will be applied by the various organizations in the absence of our visits. So this year could be a good test of our ability to create sustainable programs.

2. Adjusting our academic training program plan to accommodate different students' English capacities has been a challenge. Our request for a No Cost Extension to complete the students was granted – and we anticipate all Master's students will be finished by June 2013 or earlier.

3. Changing Fatimata Cisse from a MS program to a PhD program requires many sequential approvals. We are hopeful final approvals will be obtained early in June to extend her DS 2019.

4. We feel that good progress was made during this quarter in both scaling up production in the Mopti/Gao processing units and demonstration of the usefulness of the Incubation Centre facilities to facilitate high quality composite flour use in Bamako bakeries and to mechanize urban processors. Curtailing of project activities due to the recent government disruption has reduced, though not stopped activities. In Sevaré, processors are largely still active. Hopefully, the project will be reactivated to complete this year's work plan and to document the usefulness of both models to disseminate processing technologies in an effective way to local entrepreneurs.

5. The travel ban for U.S. PIs to the Tombouctou area makes it difficult to manage the Décrue Sorghum project.

13. Activities planned for next reporting period

Production-Marketing

- We are preparing the two additional grants to NGOs for Koutiala and Mopti in the case we can still initiate these activities before the planting season. However, we are rapidly running out of time to be able to get it into the field to buy inputs before planting time.

Food Processing

Planned activities for next reporting period (if project is active)

- Incubation Centre activities
 - IICEM-IER/LTA/INTSORMIL Baker's Project
 - Provide sufficient volume of high quality sorghum flour for baking trials
 - Extend agglomeration technologies to 1-2 entrepreneurs
 - Problem w/ the steamers; might be gas line
 - Optimize water content
 - Work towards efficiency of process

- 2 CIRAD-type agglomerators delivered and placed each at CRRRA Mopti and the other at LTA.
 - 2 steamers placed each at LTA and Mopti/Severe
 - 1 drier placed at Mopti/Severe
- One workshop/Exhibition on agglomerated products at Incubation Centre
 - Originally planned for late May
 - 3 days training and ½ day exhibition
- Mopti/Gao Project
 - M. Diouf suggested he could provide more involvement to increase processing and marketing activity of the units
 - One workshop on sourcing and marketing which is planned to follow the above workshop at the Incubation Centre
 - Promotion activities
 - Invite television and radio personnel to workshops
 - Make fliers
 - Have exposition at the end of workshop

Décrué Sorghum

For the next quarter we plan to continue our activities with help of the NGO AMEDD. The details are still being worked out and will be reported next quarter.

Training

- Fatimata Cisse will hopefully move to the PhD program in Food Science and will conduct a new experiment here in the US for her research.
- Aly Ahamadou and Mamadou Dembele will take 6 hours during the summer 2012, and plan to attend the annual meetings of Agricultural and Applied Economics Association in August 2012 in Seattle, Washington as part of their professional development and networking.
- Bandiougou Diawara will complete his MS degree and return to work at IER in June.
- Sory Diallo is continuing his research and summarizing data for his thesis.

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