Final DCG Impact Evaluation Report

IMPACT EVALUATION OF THE FOOD CROP ESTABLISHMENT PROJECT IN THE SAHELIAN AND SUDANO-SAHELIAN AREAS OF MALI

Submitted by: Aly Djiga, Independent Consultant
December 2015
SUMMARY

1. SUMMARY:

This evaluation which was commissioned by DCG, deals with food crop establishment in the Sahelian and Sudano-Sahelian zones in Mali. Within the context of carrying out action research activities on technologies relative to plant establishments, the Rural Economy Institute and the Drylands Coordination Group conducted Research/Development actions among food crop farmers in the regions of Koulikoro, Segou and Mopti. Certain DCG Mali member NGOs have received funding from NORAD for the implementation of a dissemination phase.

A sample of 8 villages where the four DCG Mali member NGOs that were involved in the project, namely ADRA Mali, ADAF/Gallé, AMAPROS and YAGTU, work was selected for this evaluation. In each village, individual interviews of men and women and semi-structured interviews with farmers’ groups were conducted, followed by field visits.

The goal of this evaluation is to determine the impact of the DCG Mali food crop establishment project in the Sahelian and Sudano-Sahelian zone on former project participants and their communities. The food crop establishment project in the Sahelian and Sudano-Sahelian zones of Mali was launched between 2009 and 2013. For these four NGO’s at the beginning, 294 farmers, including 32 women, participated in the knowledge transfer project. This transfer consisted in conducting tests and demonstrations on the crop establishment technologies in their areas of activity, as follows:

- Sorghum, millet and maize seed priming;
- Groundnut, cowpea and voandzou seed priming;
- Manual placement of fertilizer microdose and millet seed or sorghum seed (proportion 1:1);
- Mechanical placement of fertilizer microdose and millet or sorghum seed (proportion 1:1);

After signing the contract on October 12, 2015, the preparatory work began. Between October 27 and 31, there were meetings in Bamako with officials of member NGOs who had participated in project implementation: ADRA Mali, ADAF/Gallé, and AMAPROS.

From November 1st onwards, there were visits in the villages which had participated in the project. The field visits ended on November 20.

On November 23 through 24, meetings continued with officials of the NGOs AFAD, CARE, the Rural Economy Institute (IER) and the NGO CAEB.

From November 26 to the present, the evaluation report was drafted.

Interviews with former project participants who had participated in the evaluation revealed that all the techniques are still utilized except groundnut seed priming. Soaked groundnut loses the husk on the grain and the two cotyledons come off and the grain does not germinate as a result.
Throughout all the villages visited, the different interviews showed that there is no doubt in the yield increase from 50 to 100% of food crops subsequent to the correct use of seed priming and fertilizer microdose technologies. There is a time gain in the use of mechanized seeders.

All the interviews revealed that these technologies are created in order to help poor farmers become food self-sufficient.

The diffusion of the technologies of food crop establishment has reached national scale in the Sahelian and Sudano-Sahelian zones of Mali, thanks to the joint efforts of NORAGRIC through Jens Aune, DCG Norway and Mali through the researchers of the Rural Economy Institute. Each stakeholder has fully played his role.

The different combinations of mechanical sowing, fertilization and its input mode make up a resilience strategy enabling rapid installation of crops at the beginning of the rainy season, a period which escapes many male and female producers.

In the course of capacity building activities, 2047 male and female producers including extension agents were trained in resilience techniques. The Rural Economy Institute (IER) in conjunction with the Rural Development Service, sponsored radio programs targeting farmers on priming and microdose technologies. These programs were aired every Friday between the months of April and August on the Mali Government Radio and Television Station. In these programs, priming and microdose techniques are explained in local Bamanankan language, using testimonies of farmers who used them. The scaling up of the outcomes of the component was reinforced through participation of DCG member NGOs.

The Government has adapted its strategy of subsidizing fertilizers for millet and sorghum producers based on microdose. Prior to the technologies being proven, the Malian State was subsidizing fertilizer, at 150 kg per hectare to farmers. This year, this strategy has changed with a subsidy of 35 kg of fertilizer per hectare. It was pointed out at Bandiagara that the strategy of providing the Agriculture Service with fertilizer was to grant 10 tons of fertilizer to women’s groups, against 3 tons for men’s groups. The aim of this is to encourage women. Nowadays, more than a dozen projects are being implemented for the large diffusion of food crop establishment technologies in Mali.

The use of these technologies has produced enough impact on communities, notably:

- Increased number of animals in the village: the sale of surplus cereal production has generated income with which heads of households invested in buying cattle, sheep, goats, and pigs.
- Reduced number of departures of youth and particularly girls for out-migration: the chiefs of families who encourage young people to migrate in order to bring back money which would be used to buy cereals to bridge the food gap, this has diminished considerably with food self-sufficiency achieved through the use of seed priming and microdose technologies.
- Increased number of carts, ploughs, seeders in villages: the surplus production is sold and invested in the purchasing of farming equipment.
• Increased number of solar panels and TV sets “TV Canal+”, and this helps farmers be informed about everything that takes place at this moment throughout the world.

According to Mr. Nouhoum Camara, in Charge of Support and Advice for the Agriculture Sector of Baroueli, the food crop establishment technologies are part and parcel of production technical know-how in Mali. Such technologies are taught in schools of agriculture in Mali.

PROJECT RELATED INFORMATION

2. PROJECT NAME:

The object of this evaluation is the food crop establishment project in the Sahelian and Sudano-Sahelian zones of Mali. The project is an outgrowth of farm level research, conducted by Jens B.Aune of NORAGRIC, the researchers of the Rural Economy Institute (IER) and the Drylands Coordination Group in Mali (GCOZA).

3. PROJECT LIFE:

The project had been implemented between 2009 and 2013 with NORAD funding through DCG. It must be remembered that the first trials had been conducted since the year 2004.

4. PARTNERS INVOLVED IN THE INITIAL PROJECT:

Initially, DCG, through its members and the Rural Economy Institute, were involved in project implementation in partnership with farmers in their respective areas of activity. The DCG member NGOs which conducted Research/Development activities with food crop producers are as follows:

• Adventist Development And Relief Agency Mali (ADRA Mali);
• Association for the Development of Production and Training Activities (ADAF/Gallé);
• Malian Association for the Promotion of the Sahel (AMAPROS);
• Association for Women’s Promotion (YAGTU);
• Association of Training and Support to Development (AFAD)

5. INITIAL PROJECT AREAS:

ADRA Mali has implemented the food crop establishment project in 7 villages of the rural commune of Nossombougou, in the district of Kolokani, region of Koulikoro.

ADAF/Gallé started the crop establishment project in 2 villages of the rural communes of Didieni and Ouolodo of the district of Kolokani, region of Koulikoro.
AMAPROS has implemented the project in 10 villages of the region of Segou, in the districts of Bla, San, and Segou.

YAGTU has implemented the project in 4 villages of the Commune of Barassara in the district of Bandiagara, region of Mopti.

AFAD has implemented its project in 1 village of the commune of Niamana in the district of Nara.

The IER has covered all Sahelian and Sudano-Sahelian areas where research activities were conducted.

6. INITIAL PROJECT PARTICIPANTS:

Initially, ADRA Mali had 20 participants, including 4 women.

ADAF/Gallé initially worked with 40 farmers, including 5 women in its project.

200 farmers including 10 women initially participated in the project implemented by AMAPROS.

YAGTU initially worked with 24 farmers, including 12 women in the crop establishment project in its area of activity.

AFAD worked in the village of Madina Kagoro with 10 farmers, one of whom was a woman.

7. DESCRIPTION OF THE INITIAL PROJECT – RATIONALE FOR THE PROJECT AND THE VARIOUS TECHNIQUES TESTED:

The crop establishment project is a Research/Development project, with food crop producers in the Sahelian and Sudano-Sahelian areas of Mali, which consists in diffusing technologies developed to control phenomena hostile to crop establishment and efficient use of fertilizers.

In the Sahelian and Sudano-Sahelian areas, the periods of drought regularly occur at planting time, at the beginning of the rainy season. Such insufficient rainfall and its irregular nature in time and space, amplified by the effects of climate change, do have depressive effects on food crops germination and the growth. In addition, this condition, which promotes the lack of nutrients, reduces rooting, aboveground plant growth and crop economic yield.

After three years of research, there are plans to move on from the results’ dissemination phase with development partners. DCG member NGOs committed themselves by obtaining funds from NORAD for the technology transfer phase.

Such transfer has consisted in conducting tests and demonstrations on the crop establishment technologies in their areas of activity.
The following technologies have been developed:

- Sorghum, millet, and maize seed priming;
- Groundnut, cowpea and voandzou seed priming.
- Manual placement of fertilizer microdose and millet or sorghum seed (proportion 1:1);
- Mechanical placement of fertilizer microdose and millet or sorghum seeds (proportion 1:1);

EVALUATION

8. **THE METHODOLOGY USED FOR THE EVALUATION:**

First, in joint agreement with the DCG Mali coordination, the food crop establishment project was selected for this evaluation and validated by DCG Norway. Likewise, four DCG Mali member NGOs were selected as the focus of this evaluation, namely: ADRA Mali, ADAF/Gallé, AMAPROS, and YAGTU.

The methodology utilized for this evaluation was a literature review of DCG reports, individual interviews with DCG member NGOs which had participated in the project and were selected for this evaluation in Bamako and Bandiagara. Subsequent to these interviews, two villages were selected per NGO for field visits and for interviews with farmers. In each one of these villages, interviews were held with farmers groups and with individual farmers. Group size ranged from 15 to 30 participants. Individual interviews were held with a dozen female and male farmers in every village. Overall, 80 individual interviews were held, and 30% of those were held with women.

For ADRA Mali, the interviews took place in the villages of Npolona and Zambougou of the rural commune of Nossombougou. An interview has held with the Mayor of the rural commune of Nossombougou, Mr. Aboubacar Sène.

Interviews were held with farmers of the village of Djekebougou of the commune of Ouolodo and the village of Farako of the commune of Didiéni for ADAF/Gallé: An interview was conducted with Mr. Soumaïla Diarra a councilor to the Mayor at Didiéni; there was an interview with the Secretary General of the town hall Mr. Dabo Demblé and finally there was an interview with the Sub-Sector Chief of Agriculture at Didieni, Mr. Dramane Sidibé.

Interviews were conducted with farmers of the villages of Ntokosso and Talo of the commune of Fatinè for AMAPROS.

At Baraouli, which is the chief district town of the region of Segou, an interview was conducted with Mr. Nouhoum Camara, in charge of Support and Advice for the Agriculture Sector.

At Bandiagara, an interview was conducted with NGO officials and with farmers of the villages of Ouo-Sarré and Parou of the commune of Barassara for YAGTU.

An interview was conducted with the Agriculture Sector Chief of Bankass, Mr. Boubacar Diakité.

Finally, some interviews were conducted in Bamako with Madame Fadimata Mahamane of CARE International in Mali, Mr. Adama Coulibaly researcher at IER, and Director and Coordinator of Funds Restoration and Agricultural Productivity of the NGO CAEB Mr. Gaoussou Traoré and Mr. Lamine Treta.
9. **DURATION OF THE EVALUATION:**

Since the signing of the contract on October 12, 2015, preparatory works began. From October 27 through 31, there were meetings with member NGO officials who had participated in project implementation: ADRA Mali, ADAF/Gallé, and AMAPROS at Bamako. Beginning on November 1st, there was the visit to villages which had participated in the project and the visit ended on November 20. On November 23 through 24, there were additional meetings with officials of the NGOs AFAD, CARE, the Rural Economy Institute (IER) and the NGO CAEB. From November 26 to-date, there has been the drafting of the evaluation report.

10. **FORMER PROJECT PARTICIPANTS WHO PARTICIPATED IN THE EVALUATION:**

In the course of the interviews held with focus groups in the villages, participants all stated that all former participants had participated in project start up and continue to apply the technologies. There was a count of the number of former participants since project start up and those present in this evaluation. The situation of former participants is presented as follows:

- **Village of Npolona ADRA Mali zone:**
  5 farmers participated in project start up and are still continuing. Of the 5 farmers, 2 participated in the evaluation, and one of these 2 was a woman.

- **Village of Zambougou, ADRA Mali zone:**
  5 farmers participated in project start up and are still continuing. Of the 5 farmers, 1 participated in the evaluation.

- **Village of Djekebougou, ADAF/Gallé zone:**
  20 farmers participated in project start up and are still continuing today. Of the 20 farmers, 4 were present in the evaluation.

- **Village of Farako, ADAF/Gallé zone:**
  20 farmers participated in project start up and are still continuing today. Of the 20 farmers, 5, including 3 women, participated in the evaluation.

- **Village of Ntokosso AMAPROS zone:**
  20 farmers participated in project start up and are still continuing today. Of the 20 farmers, 5, including 2 women, participated in project evaluation.

- **Village of Talo AMAPROS zone:**
  20 farmers participated in project start up and are still continuing. Of the 20 farmers, 5 farmers, including 2 women, participated in project evaluation.

- **Village of Ouo-Sarré, YAGTU zone:**
  6 farmers participated in project start up and are still continuing today. Of the 6 farmers, 4, including 2 women, participated in project evaluation.

- **Village of Parou, YAGTU zone:**
  6 farmers participated in project start up and are still continuing today. Of the 6 farmers, 4, including 2 women, participated in project evaluation.
NB: In the 8 villages where the evaluation was conducted, 72 farmers participated in the project from the beginning. 30 of these 72 farmers who were involved in the project from the startup participated in the evaluation and were members of the focus groups.

11. AREAS VISITED FOR THE EVALUATION:

- In Bamako, interviews were conducted with NGO and Service officials: ADRA Mali, ADAF/Gallé, AMAPROS, AFAD, CARE, C.A.E.B, and the IER.
- The villages of Npolona and Zambougou of the commune of Nossombougou for ADRA Mali: Mr. Adama Konaré’s millet farm at Npolona and Madame Mariam Diarra’s were visited. The town hall of the commune of Nossombougou was visited.
- The village of Djekoubougu of the commune of Ouolodo and the village of Farako of the commune of Didiéni were visited for ADAF/Gallé. Mr. Lamine Konaré’s millet farm at Djekoubougu and Madame Oumou Traoré’s sorghum farm at Farako were visited. Another visit was made to the Didieni Agriculture Sub-Sector Chief and the town hall of the Rural Commune of Didiieni.
- The government services, the Agriculture Sector of Baraouli, were visited in the region of Segou. This service is in charge of farmer training for projects implemented by the NGOs Green Africa and CAEB in the district of Baraoueli.
- The villages of Ntokosso and Talo of the commune of Fatinè for the NGO AMAPROS;
- At Bandiagara, an interview was conducted with two officials of the YAGTU NGO. The villages of Ouo-Sarré and Parou of the commune of Barassara were visited for YAGTU.
- An interview with the Agriculture Service Chief was conducted at Bankass. This is a place where three projects are intervening (two of them are funded by USAID and the other one is implemented by Catholic Relief Service); the monitoring is assured by the Agriculture Sector Chief.

RÉSULTS

12. FORMER PROJECT PARTICIPANTS WHO CONTINUE USING ONE OR MORE TECHNIQUES:

According to interviews with the village focus groups, it was stated by all participants that none of the members who had participated in the start-up of the crop establishment had stopped using project developed technologies. Thus, participants were cited and counted per village:

- Village of Npolona: 5 bridge farmers, including 1 woman;
- Village of Zambougou: 5 bridge farmers;
- Village of Djekoubougu: 5 bridge farmers, including 1 woman;
✓ Village of Farako: 5 bridge farmers, including 1 woman;
✓ Village of Ntokosso: 20 farmers, including 2 women;
✓ Village of Talo: 20 bridge farmers, including 2 women;
✓ Village of Ouo-Sarré: 6 bridge farmers, including 3 women;
✓ Village of Parou: 6 bridge farmers, including 3 women.

NB: The four NGOs; ADRA Mali, ADAF/Gallé, AMAPROS, and YAGTU intervened in a total of 23 villages with 284 participants at the beginning. This evaluation took place in 8 villages. In these 8 villages, 72 farmers participated in project start up. Subsequently to the project, these 72 farmers called bridges, trained each a dozen other bridges who were tasked with training farmers wishing to practice food crop establishment techniques in their villages.

13. THE TECHNIQUES THAT FORMER PARTICIPANTS CONTINUE USING:

In the course of interviews with former project participants who participated in the evaluation, they all stated that the following techniques still continue to be used:

- Sorghum, millet and maize seed priming.
- Cowpea and voandzou seed priming.
- Manual placement of fertilizer microdose and millet or sorghum seeding (proportion 1:1).
- Mechanical placement of the mixture of seeds and fertilizers (proportion 1:1) using an animal traction seeder.

Groundnut seed priming has been dropped, for the lack of adaptation of this technology to groundnut farming. The primed groundnut loses the husk on the grain and the two cotyledons come off and the grain fails to germinate as a result. Having noted the rate of degradation of primed groundnut seeds, farmers excluded this seed from priming technology.

In the villages of Ntokosso and Talo the former participants stated that they did not use mechanized placement of fertilizer microdose for lack of seeders. But, they are planning to buy one this year after the harvest of this agricultural season which turns out to be full of promise.

14. THE TECHNIQUES SELECTED AND USED BY OTHER MEMBERS WITHIN THE COMMUNITY:

ADRA Mali Zone, Rural Commune of Nossombougou:

The millet, sorghum and maize seed priming techniques and the mechanized placement of seeds are used throughout the 22 villages of the Rural Commune of Nossombougou. In all these villages, there is no farmer who is not using these technologies nowadays. This has been stated by the focus group in the villages of Npolona and Zambougou and by the Mayor of the Commune of Nossombougou. The latter reported having covered 10 hectares with maize and soaked the grains prior to sowing them. And he advocates a doubling of the area to 20 hectares next year, in light of the full success of this campaign.
ADAF/Gallé Zone, Rural Commune of Didiéni:

The commune of Didiéni is composed of 40 villages. According to the interviews with focus groups and the Agriculture Sub-Sector Chief of Didiéni, farmers use soaking and placement mechanization in all these villages. According to the Agriculture Sub-Sector Chief of Didiéni, the Government of Mali has subsidized fertilizer on the basis of microdose this year. There is a volume of 35 kilograms subsidized per hectare of food crops against 150 kg/hectare in the previous years. He reports that in the 75 villages and 108 hamlets of the communes of Didiéni and Sagabala which he oversees, 95% of the farmers have a seeder and practice priming and microdose. He reported giving a model of the seeder disk to a traditional smith for replication before the agricultural season, as farmers requested this disk in order to get to do seed placement through mechanization.

AMAPROS Zone:

Focus group farmers of the villages of Ntokosso and Talo reported that they did not know a single village of their commune where seed priming and microdose in manual sowing are not used.
A bridge farmer, Mr. Moussa Tangara received training and has become an expert farmer trainer in soaking and microdose. He was solicited as a consultant by one DCG Mali member NGO, OMADEZA, to go and train about one hundred bridge farmers on seed priming and microdose in their Swedish funded project in the framework of Climate Change. This OMADEZA project intervenes in 16 villages of the district of Bougouni. Mr. Tangara reports receiving from this provision an amount of money with which he was able to use to purchase a motorbike, which he now uses for his travel.

The NGO AMAPROS has sponsored farmer to farmer exchange days among farmers who practiced the techniques of seed priming and microdose in the commune. Radio programs were also aired on the practices and the advantages of the technologies and subsequently to this, about twenty villages of the district of Bla requested that the village trainer train 5 farmers per village on seed priming and microdose in 2013 and 2014.

At Ntokosso, the focus group interviews revealed that the use of seeders is not very frequent in their village, and explaining that they could not afford to use this tool due to lack of funds.
They report that the IER has conducted a demonstration session of mechanical placement of seeds and microdose in the chief town of the commune at Fatinè and placed a sample seeder there. They report that they are convinced about the performance of mechanization and certain farmers have already taken steps to acquire it.

YAGTU Zone:

Officials of the NGO YAGTU report that to-date, the seed priming and microdose techniques are used in all villages of the non-flooded areas of the Region of Mopti. This is justified by the presence of projects funded and implemented by other agencies and institutions for the extension of seed priming and
microdose technologies YAGTU has covered the entire district of Bandiagara with a microdose and seed priming project using Swedish funds.

15. THE CHANGES OBTAINED AS A RESULT OF DCG’S RESEARCH ACTIVITIES:

a). Changes in cereal yields:

ADRA Mali Zone:
About twenty farmers were interviewed, of whom 7 were women in the villages of Npolona and Zambougou. The farmers unanimously responded that for three years in a row, they got a 50 to 100% increased yield for millet and sorghum, subsequent to the use of seed priming and microdose. The focus group of Npolona (24 participants, including 6 women) stated that the production of millet and sorghum farms where seed priming and microdose were applied increased by 50% for the years of low rainfall and 100% for the years of good rainfall. And for this campaign when rainfall has been excellent, production increase will be 100% or more.

ADAF/Gallé Zone:
Surveys show that in the villages of Djekebougou and Farako, with the use of millet and sorghum seed priming technologies, the application of microdose doubled yields for these two crops. They report that this was confirmed for over four years in their villages.

AMAPROS Zone:
According to farmers of the villages of Ntokosso, the yield gain for crops has doubled. Madame Bintou Sogoba, village chief’s spouse, reported that since the use of seed priming and microdose technologies 3 years ago, her family farm, 5 hectares large, produces each year 100 to 120 bags of 100 kilograms each, against 20 to 50 bags in previous harvests.

YAGTU Zone:
According to the survey respondents, the yields of food crop farms have doubled for 3 years now that the seed priming and microdose technologies are used by the entire community of the villages of Ouo-Sarré and Parou.

b). Changes in food security and livelihoods:

ADRA Mali Zone:
Of the twenty farmers interviewed, 19 answered that since effective application of both technologies, seed priming and microdose on millet and sorghum crops, their production, which could not be adequate to feed them even 6 months in a year, would now be adequate for an entire year.
ADAF/Gallé Zone:
Survey farmers all reported that their productions could feed them throughout the year since the use of these technologies. Madame Oumou Traoré, a widow, head of household, who must take care of about twenty people to be fed at Farako, has only one hectare and a half of land where she cultivates sorghum. Prior to the use of these technologies, her production would only be limited to feeding her family for a period of three months. Presently, with the use of seed priming and microdose at a proportion of 1:1, for three years now, her production has been adequate to feed her family throughout the year. Her sorghum farm was visited and even though the harvest for this year has not been completed, the state of the crop is excellent.

AMAPROS Zone:
The persons surveyed all reported that for these past 3 years, their production has been adequate to feed them throughout the year. It was reported, during the focus group interviews, that several families still had a stock of millet or sorghum, coming from the crops of the 2013-2014 campaign.

YAGTU Zone:
The food requirements for the year are met in each family and the surplus production is sold. 5 farmers interviewed out of 10, in the village of Ouo-Sarré, reported that they still held in stock some millet in their granaries from the past year’s agricultural campaign, although they did sell a portion of this either to purchase oxen for some or acquire small ruminants for others.

c). Community level changes:

ADRA Mali Zone:
In both villages, focus groups discussions showed that 50% of the households have over the past three years acquired either a motorbike, or a newly built house with metal sheet roofing, or farm equipment (plough, seeder or cart).

ADAF/Gallé Zone:
The changes that occurred in the community are as follows:
- Construction of new houses with metal sheet roofs;
- Purchasing farming implement: seeds, carts, etc.
- Investment in livestock as a savings strategy: purchasing small ruminants;
- Heads of households which had good harvests following the use of these technologies sold a portion of their production and used the money for their sons’ weddings.

AMAPROS Zone:
The changes brought about by food self-sufficiency are as follows:
- The out-migration of youth has stopped for two years now. Only young men out-migrate in order to make some money for their personal needs: for example purchasing a motorbike, a telephone or building a house with tin roof.
• The surplus production for certain families is sold and invested in their daughters’ marriages, while in the past the girls themselves had to out-migrate to work and make money to buy their wedding trousseaux.

YAGTU Zone:
On the roofs of individual households, one can see a « Canal+ » antenna and solar panels. The farmers interviewed in the focus group discussions drew my attention to these devices, and then reported that this is an impact of the microdose and seed priming technologies.

d) Other changes:

ADRA Mali Zone:
Women responded that they now have time to take care of other income generating activities, such as market gardening, small trade, and raising pigs, sheep and goats. The men say that household conflicts have considerably diminished because of the availability of food for the family throughout the year.

ADAF/Gallé Zone:
Women reported that thanks to the abundant harvests, they could conduct income generating activities which brought them money and that the money was used in supporting their children: clothing, health care, etc.
Thanks to good crops, student parents’ households got to provide schools with the necessary quantities of cereal for the operation of school canteens. School canteens operate and provide each child two meals a day on working days.
With the increase of farm income resulting from these technologies, village communities get to operate their literacy center by regularly paying teachers’ salaries.

AMAPROS Zone:
In the village, every family has its complete agricultural implements: plough, cart, and two to three pairs of plough oxen. The Ntokosso village chief, Mr. Dramane Tangara, also reported that there are no more disputes between members of his village because hunger has disappeared and all women are busy with their gardening activities which bring them good income.

YAGTU Zone:
The women report that with the advent of these technologies, they were able to get land plots which they use on their own behalf. Although these are degraded lands that they were given, they made them fertile by applying restoration and conservation techniques.
16. THE FACTORS WHICH CONTRIBUTED TO CONTINUED USE OF DCG’S TECHNIQUES:

Village OF Npolona:

AT Npolona, farmers responded that the factors which made possible the continued use of project techniques included the fact that they were first to participate in trials since the beginning. Such trials were also conducted in their own farms and they themselves conducted the follow-up. They concluded that they were the real research workers for these technologies.

Village of Zambougou:

Zambougou farmers’ response is that not only were they involved in project implementation, but also that the positive result achieved was the contributing factor for continued use of these technologies.

Village of Djekelbougou:

Djekelbougou farmers attribute the factors of continued use to a good supervision on the part of the NGO and to their desire to find solutions to their problems, which are: the low productivity of their farms and the lack of income to purchase farm inputs.

Village of Farako:

For the Farako farmers, the factors of continued use of technologies are related to their courage and determination in the quest for food security.

Village of Ntokosso:

Ntokosso farmers attribute the factors of continued use of the techniques to the quality of the trainings received from the NGO as well as the bridge farmers’ approach set up by the project. This approach consists in training 5 trainers called bridges, who will subsequently be tasked with training other farmers of the village and other villages.

Village of Talo:

For the Talo farmers, the factors of continued use of the technologies are linked to their will to find solutions to their poverty problems.

Village of Ouo-Sarré:

The continued use of food crop establishment technologies stems from the fact that the trials had been done with their participations and by them in their own farms. They personally observed the results of the trials and were convinced of the relevance of the results.
**Village of Parou:**

The project support is the most important factor that is put forth by Parou farmers. The women of Parou report that without the NGO’s insisting on it, there would be no involvement on their part in this project.

17. **THE REASONS UNDERLYING THE DECISION TO DROP THE TECHNIQUES TESTED BY FORMER PARTICIPANTS:**

Of the 8 villages surveyed, only a single village had a drop-out case reported, subsequent to the failure to apply one of the technologies. In the village of Farako, in ADAF/Gallé zone, Mr. Sidy Coulibaly, the second son of the head of the household, had received the training on soaking and microdose. There are 35 people in their family, including 19 women, 8 men, and 8 children. His family is cultivating 8 hectares of millet and sorghum farms. Since his training three years ago, Sidy has not been able to convince his brothers to use the seed priming and microdose technologies in their farm. His brothers purely and simply opposed the use. The production of 8 hectares never exceeded 300 kilograms. Subsequent to the late coming of the rains in this campaign, Sidy’s brothers all left to go away on out-migration. According to Sidy, his brothers’ refusal is explained by the fact that a younger brother cannot and must not in their tradition introduce an innovation in their farming system.

The groundnut soaking technology was dropped as Farako farmers’ reported. The reason is that the soaked groundnut easily loses the cotyledon coat which comes off and prevents the grain from germinating.

18. **ANY UNFORESEEN CONSEQUENCES OF THE PROJECT:**

The unforeseen consequences caused by the project are summarized as follows:

- **Increase of the number of animals in the village:** the sale of surplus cereal production has provided income that the heads of households invested in the purchasing of cattle, sheep, goats, and pigs.
- **Reduction of the number of young people departing on out-migration, especially girls:** the heads of households who were encouraging youth to migrate in order to bring back money which would be used to purchase cereals and bridge the food gap, this has considerably diminished thanks to the food self-sufficiency achieved through the seed priming and microdose technologies.
- **Increase of the number of carts, ploughs and seeders in the villages:** the surplus production is sold and the income is invested in the purchasing of farm equipment.
- **Increase of the number of solar panels and « TV Canal+ » antennas, and this helps the farmers stay abreast of every event which occurs around the world.**
- **Some men got married to several wives, thanks to the food self-sufficiency.**
• Women in the villages have had more time available to conduct income generating activities such as market gardening and small trade, and have been able to use this income for their own needs instead of it being used in the family diet. Women have been able to purchase marriage trousseaux for their daughters, without the girls themselves having to find them.
• Families were able to celebrate their sons’ weddings with the revenue of the sale of the surplus production.
• DCG member NGOs received project funding from other donors for the diffusion of these technologies.
• Bridge farmers who had participated in the project have become trainers and are paid for the services they provide.
• The Malian Ministry of Rural Development has changed its program of subsidies to farmers for fertilizers to reflect microdose recommendations. The Malian Government was subsidizing farmers with 150 kilograms of fertilizer per hectare for those wishing to produce cereals; with the advent of the microdose technology, the Government has reduced the quantity of fertilizer subsidized to 35 kilograms per hectare.
• Production cost has considerably decreased for the better-off farmers who were investing hundreds of thousands of francs in the purchasing of fertilizers for production.
• Poor farmers get to produce at a lower cost and achieve food self-sufficiency.
• Women have had access to land and produce cereals for their personal needs.
• With the effective functioning of school canteens, made possible by the fact that student parents easily manage to provide the schools with cereal grains, the pupils stay in class to follow courses, as they are given two meals a day at the canteen.
• Children are assured a good diet, thanks to the availability of food throughout the year.
• The farms sown with a seeder are not attacked by birds. The birds have difficulties spotting the seed holes, and this prevents the seeds from being removed.
• A consequence cited in two villages (Ntokosso and Talo) of the 8 villages visited for the evaluation, is that the microdose requires too much family manpower. Only the availability of a seeder can help solve this problem.

GENDER

19. IMPACT OF THE DCG PROJECT ON WOMEN, MEN AND CHILDREN:

Project Impact on women:

• Food security in the family: Less anxiety for women. In case of food insecurity in the family, the woman is the one who does her utmost in order to feed her children.
• Women conduct other income generating activities. They invest such income in their daughters’ weddings.
• With food security in the family, there are fewer conflicts between women in a single household and also between husbands and wives.
• Women work less, at the beginning of the campaign, during the planting season, thanks to the seeders. They have more time now to go and take care of their personal farms.
• Reduction of the woman’s expenses related to the purchasing of groceries for family consumption.
• Women do livestock farming (sheep, goats, pigs and cows) as a way to invest their revenues.

Project Impact on men:

• Peace of mind for men because of food security.
• Construction of new houses with metal sheet roofs instead of straw or wood and adobe.
• Acquisition of farm equipment (ploughs, seeders, and carts), working oxen and cows for the sale of surplus production.
• Less work during the planting season through use of mechanized seeders.
• Equipment of dwellings with solar lighting systems and installation of television sets capturing several channels throughout the world (Canal+).
• Marrying new wives.

Impact of the project on children:

• Young girls are no longer forced to migrate to work in order to have their own marriage trousseau.
• Children are better clad and in good health, because parents now have more financial means, either through mothers’ income generating activities, or through the sale of surplus production by fathers.
• The school enrollment rate is higher because of well functioning school canteens.
• The money obtained from migration by young boys is invested into purchasing motorbikes, telephones, or into getting married.

20. EQUITY IN RELATION TO THE DISTRIBUTION OF PROFITS:

Following the 80 individual interviews on the issue, 30 % answered that men had benefitted more than women from the project. The arguments put forth are that men are in charge of assuring food security. If such food security is assured, a crucial problem for men is solved.
50 % of the persons interviewed answered that the profit is equitable. Their argument is that food security is profitable to men just as it is profitable to women, because in case of food insecurity, even children participate in the quest for solutions.
The other 20 % believe that women have benefitted more for the simple reason that they earn double with the achievement of food security. They have something to feed their families with, and in addition, they conduct income generating activities for themselves.
As far as project implementation is concerned, it was mainly carried out with men because men are the owners of the land where the trial plots were located. Men have been more heavily involved in project implementation, but as far as benefits are concerned, there is equity.

ADOPTION OF RESULTS

21. OTHER INITIATIVES (PROJECTS OR PROGRAMS) WHICH USE ONE OR SEVERAL ASPECTS OF THE PROJECT RESULTS:

In addition to the initial parameters that were established for the project for the dissemination of food crop establishment technologies, several projects and programs have been designed, funded, and implemented by DCG’s members as well as other stakeholders.

RURAL ECONOMY INSTITUTE (IER):

The IER, through its researchers and in collaboration with NORAGRIC, has developed food crop establishment technologies in Mali. Once the technologies were proven, advocacy actions were undertaken by all of the stakeholders involved to ensure a widespread diffusion of these technologies.

a). Production and distribution of technical sheets and posters

About 1050 copies of three technical sheets have been produced and distributed to the technical services (government and non-government) of rural development in Mali and Niger.

Nine posters indicating availability of resilience techniques to climate change have been circulated.

Likewise, radio programs were launched at the ORTM. Over 20 radio broadcasts are available for producers. These programs include messages from producers who have adopted the technologies towards other farmers who might want to adopt the technologies.

b). Stand at the International Agricultural Show of Bamako:

An IER-Noragric-DCG stand at the International Agricultural Show of Bamako in 2014 was visited by the President of the Republic, the Prime Minister, the Minister of Agriculture, and Members of Government. It was pointed out to these eminent visitors that the technologies thus exposed had demonstrated their effect on improving food security in Mali. All these visitors strongly recommended the broad diffusion of these technologies.

c). Session of the Scientific Commission of Agricultural Research in Mali:

In the course of the 20th session in 2014, the scientific commission of the National Committee of Agricultural Research in Mali (CNRA) also recommended diffusion of the food crop establishment
technologies in Sahelian and Sudano-Sahelian zones of Mali and with mechanized and even motorized placement techniques of fertilizer in microdoses.

So agreements between the National Directorate of Agriculture and the Rural Economy Institute were signed in order to launch a capacity building program for extension staff in 5 regions of Mali.

d). Capacity building of male and female producers and extension workers:

The training of male and female producers essentially involved development partners (stakeholders) involved in the scaling up of proven techniques resulting from research activities. This operation reached groups of male and female producers, DRA focal points of the five regions, NGOs and extension workers. Training sessions on the seed priming technique and mechanical placement of fertilizer microdoses were conducted in the regions of Mopti, Segou, and Koulikoro. Other regions, notably Kayes and Sikasso were involved in these sessions.

In the course of these trainings, a total of 2047 direct producers (25% of whom were women) were trained. The strategy is based on the participation of each of the 2047 participants tasked with training in their turn 10 other farmers of the village or the commune.

Thus, the situation of capacity building workshops for producers 2014 is as follows:

<table>
<thead>
<tr>
<th>Regions</th>
<th>Structures/Services</th>
<th>Producers trained*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Koulikoro region</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Koulikoro</td>
<td>Chamber of Agriculture and DRA</td>
<td>101</td>
</tr>
<tr>
<td>Nara</td>
<td>Town Hall PDSEC ASFEM</td>
<td>114</td>
</tr>
<tr>
<td>Banamba</td>
<td>Agriculture Sector</td>
<td>15</td>
</tr>
<tr>
<td>Guéneibé</td>
<td>Town Hall PDSEC</td>
<td>80</td>
</tr>
<tr>
<td>Madina Kakoro</td>
<td>Town Hall- AFAD</td>
<td>50</td>
</tr>
<tr>
<td>Didiéní</td>
<td>ADAF/Gallé</td>
<td>150</td>
</tr>
<tr>
<td>Nossombougou</td>
<td>ADRA-Mali</td>
<td>150</td>
</tr>
<tr>
<td>Dio</td>
<td>Town Hall PDSEC</td>
<td>110</td>
</tr>
<tr>
<td>Koloko</td>
<td>Agric. Sector &amp; Town Hall</td>
<td>150</td>
</tr>
<tr>
<td>Dioıla</td>
<td>SNV</td>
<td>40</td>
</tr>
<tr>
<td>Sassa kawa Global 2000</td>
<td>Head office and branches</td>
<td>60</td>
</tr>
<tr>
<td><strong>Sub total – region</strong></td>
<td></td>
<td>1020</td>
</tr>
<tr>
<td><strong>Region of Segou</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monimpébougou</td>
<td>Agric. Sector &amp; Town Hall</td>
<td>250</td>
</tr>
<tr>
<td>Berthéla – Wolodo</td>
<td>AV</td>
<td>100</td>
</tr>
<tr>
<td>Boidiéwéré and Siakabougou</td>
<td>Agriculture Sector and DRA</td>
<td>30</td>
</tr>
<tr>
<td>Dioro (VM)</td>
<td>Millennium Village</td>
<td>130</td>
</tr>
<tr>
<td>Koulandougou</td>
<td>Town Hall PDSEC – AMAPROS</td>
<td>60</td>
</tr>
<tr>
<td>Niono</td>
<td>SRA</td>
<td>10</td>
</tr>
<tr>
<td>Fani</td>
<td>Town Hall PDSEC – AMAPROS</td>
<td>60</td>
</tr>
<tr>
<td><strong>Sub total</strong></td>
<td></td>
<td>640</td>
</tr>
</tbody>
</table>
e). Support to young researchers and technicians training towards a PhD or a diploma:

For the researchers and students, this work focused on mentoring/supervision of theses work for masters and PhD students. The component participated jointly with the university and the teaching establishments in the practical and theoretical training of students of the agronomic sciences faculties and the FAMA animal medicine faculty of Segou and the IPR/IFRA Katibougou in the field of resilience techniques to climate change (Table 9, and picture 7). These academic stays are attested by the submission of progress reports of theses or activity reports.

The following table presents the situation of student interns in 2014:

<table>
<thead>
<tr>
<th>Name</th>
<th>School</th>
<th>Theme</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lancine Sacko</td>
<td>ISFRA (Doctoral candidate)</td>
<td>Problematic and prospects of monitoring-evaluation of projects/programs of the Rural Development Sector: Case of the Project Adaptation of Agriculture and Stock Breeding to Climate Change (ACC)</td>
<td>5 years</td>
</tr>
<tr>
<td>Siaka Dembélé</td>
<td>University -C.C, Ghana - UDB WASCAL (Doctoral candidate)</td>
<td>Developing Production Technologies For Early Drought Conditions: the case of Sorghum Sorghum bicolor</td>
<td>5 years</td>
</tr>
<tr>
<td>N’Gada Sissoko*</td>
<td>University of Segou Faculty of Agriculture and Economics and Veterinary Medicine (Licence)</td>
<td>Effects of seed priming on the growth and development of millet, sorghum, groundnut and cowpea food crops in potted greenery, Sotuba.</td>
<td>45 days</td>
</tr>
<tr>
<td>Mamoutou Coulibaly</td>
<td>University of Segou Faculty of Agriculture and Economics and Animal Medicine (Licence)</td>
<td>Monitoring-evaluation of the activities of component 01 of the project Adaptation of l’Agriculture and Stock Breeding to Climate Change in farming environment (ACC)</td>
<td>3 months</td>
</tr>
<tr>
<td>Adama Traoré</td>
<td>Engineering Cycle IPR /IFRA - Katibougou</td>
<td>Test of a motorized seeder and study of cotton seed priming fields (maximum duration of soaking)</td>
<td>45 days</td>
</tr>
<tr>
<td>Sidy Dougnon</td>
<td>Engineering Cycle IPR /IFRA - Katibougou</td>
<td>Test of mono- and multi-row seeders on seeding spreading of fertilizer microdoses</td>
<td>45 days</td>
</tr>
<tr>
<td>Fatoumata Traoré*</td>
<td>Engineering Cycle IPR /IFRA -Katibougou</td>
<td>Test of mono- and multi-row seeders on seeding-spreading of fertilizer microdoses</td>
<td>45 days</td>
</tr>
</tbody>
</table>
**AFAD:**

The NGO AFAD received funding from the Australian Government in the amount of FCFA 60 million for its project intended to increase crop yields in 20 villages of two communes of Konobougou in the district of Segou. This project trains 35 farmers as bridge trainers, 10 of whom are women, each of whom will be tasked with training about twenty farmers on seed priming technologies, manual microdose and mechanical microdose.

**AMAPROS:**

In partnership with CARE International in Mali, the NGO AMAPROS has received FCFA 120 million in the framework of the Women and Agriculture project, for the extension of crop establishment technologies in 45 villages and 4 communes of the region of Segou. The intended goal is the adoption by women of technologies over 150 hectares of sown cereal crops.

The NGO AMAPROS has also received funding in the amount of FCFA 165 million from the Mali-Canada Common Development Fund, for a project of promotion of crop establishment technologies for Food Security. The project operates in 20 villages of the communes of Monimpebougou, district of Macina and the commune of Niono Nampalari in the district of Niono. This project is tasked with training 200 farmers, including 40 women in crop establishment technologies and they will in their turn train 800 other farmers.

**ADAF/Gallé:**

The NGO ADAF/Gallé has received two fundings since 2013; one from CONUMUND, a Spanish fund, of 80 million FCFA, and the other, from MISEREOR, a German fund, of FCFA 170 million.

The first is implemented in 15 villages of the commune of Niena, region of Sikasso, and the second in 30 villages of the commune of Ouolodo and in 10 villages and 21 hamlets of the commune of Gomitradougou of the district of Djema. These two projects are aimed at diffusing food crop establishment technologies in order to reduce costs of production and assure food security.
**YAGTU:**

The NGO YAGTU has fully covered the district of Bandiagara which has a total of 139 villages with four projects for a broad diffusion of food crop establishment technologies. The funding received is as follows:

- Rênes/France Decentralized Cooperation, with funding in the amount of FCFA 12 million.
- IPRODB (former GTZ), FCFA 18 million.
- CARE, with funding in the amount of FCFA 200 million.
- Diakonia (Sweden) with funding in the amount of FCFA 30 million.

The populations of the 139 villages are all beneficiaries of these projects. The intended goal is increased cereal and cash crop production for all communities.

**CARE International in Mali:**

Since the passing of food crop establishment technologies to the diffusion phase, CARE Mali has received funds from four sources for scaling up in the regions of Segou and Mopti in the Sahelian zone of Mali. CARE Mali has implemented these four projects in partnership with the following national NGOs in their areas of activity:

- AMAPROS for the districts of Segou and Niono; Region of Segou.
- ASSAFE in the district of Niono; Region of Segou.
- GRAT in the districts of Djenné, Mopti and Tenenkou; Region of Mopti.
- YAGTU in the district of Bandiagara; Region of Mopti.

**a). Project Women’s Hope. 2009-2012**

The goal of the project is to improve income and food security for 12,000 women of 10 communes in the regions of Segou and Mopti, through the practice, by the communities, of the following techniques: microdose, soaking, composting, erosion control, restoring degraded lands, crop associations, food bank and techniques of production of useful trees: Moringa, baobab, gluricida, and acacia Senegal.

**b). Project Good nutrition for children Now:**

This European Union funded Project in the amount of 965,557 Euros had been intended to achieve sustainable improvement of the nutritional situation of children 0 through 5 years of age, and women 15 through 49 years of age in Mopti, notably in the Dogon Plateau area. This project included activities such as training on good nutritional practices and training on new plant establishment and food crop (ECOFARM) technologies, notably seed priming and microdose. The project was implemented by the NGO YAGTU in four communes of Bandiagara.

In terms of outcomes, 76 bridge farmers were trained on the technologies; they in turn, trained 2319 farmers, including 953 women.
c). Project Good Nutrition:

Funded by a private CARE donor in 2010, in the amount of 45 000 $ US, the project Good Nutrition, which was implemented by the NGO YAGTU had been intended to improve knowledge of food security strategies and farming practices in the communes of the district of Bandiagara.

270 other bridges, including 90 women, were trained on the plant and food crop establishment technologies.

d). Project Women and Agriculture (Niéleni):

Funded by the Bill & Melinda Gates Foundation for the period 2011 through 2016, in the amount of 2 400 000 $ US.

The intended goal was: 39 000 femmes, of the impact group, have had equitable access to essential means of production and services required to improve their social and economic status, to improve food and nutritional security of their households and particularly their children under 5 years of age.

The project is implemented in 11 communes of the region of Segou and 12 communes of the region of Mopti. In terms of outcome, 4876 farmers, including 856 women, are trained on food crop and plant establishment technologies. In terms of impact, an 89% yield increase in the FCE farms.

OTHER PROJECTS AND PROGRAMS USING DCG TECHNOLOGIES

NGO Counseling and Support for Basic Education (CAEB):

The officer in charge of land restoration and agricultural productivity for the NGO CAEB, Mr. Lamine Treta, is a former CARE Mali employee. Mr. Treta received his training on crop establishment technologies in the Women and Agriculture project of CARE as Junior Expert: This NGO developed three projects based on the use of seed priming and microdose technologies, which are:

Projet Restauration des Terres et Productivité Agricole dans le cercle de Baraouli:

This project of the NGO CAEB, funded by UNDP through WFP, is implemented in 23 villages of the communes of Boidié and Baraouli. Its goals are: Improved food crop yields per hectare and improved soil fertilization. The project is working with 23 Farming Organizations (OP) whose membership ranges between 10 and 50 per OP.

170 bridge producers, 35 of whom are women, are trained on crop establishment technologies. The 23 OP include a total of 564 producers, including 240 women, who have received training with the bridges.

Project Savings for Change:

It is funded by OXFAM America in the amount of FCFA 21 million. This project is implemented in 10 villages of the commune of Zantièbougou in the district of Bougouni in the Sudano Sahelian zone of Mali.
564 women save money and use the food crop establishment technologies through a dozen or so village Farm Schools and sixty or so individual farm schools.

**Project AMASSA – Green Africa:**

The NGO Green Africa intervenes in three Cooperative Unions in two communes: - The commune of Tingoni, which includes 18 cooperative societies with a total of 600 producers. - The commune of Boidié with 13 Cooperative Societies with 409 members.

The project diffuses microdose, seed priming and mechanized seeding technologies among farmers of these two locations.

**Project International Center for the Fertility of Soils and Agricultural Development:**

The project IFDC, is funded by USAID Mali. A partnership agreement is established between the Regional Directorate of Agriculture of Mopti and the Project. The project covers 52 villages. The activities consist in diffusing the microdose and improved millet and sorghum seeds technologies.

11 Workers of the Agriculture Sector at Bankass are in charge of supervising the 52 villages. Each worker is tasked with having the technology applied on 400 to 630 hectares of millet or sorghum farms.

The target groups are Farmers’ Organizations. Each OP is composed of 100 to 800 members.

**Project Cereal Value Chain:**

This project is funded by USAID Mali and is implemented in partnership with the Regional Directorate of Agriculture of Mopti. Its aim is to conduct sound agricultural practices.

One of the activities is the diffusion of the microdose technology. The project is implemented in 54 villages of the district of Bankass and 58 Farmers’ Organizations including 80 women’s organizations. Each FO has 100 to 275 members.

According to the Bankass Agriculture Sector Chief, Mr. Boubacar Diakité, the Project is intended to apply the microdose on 14,000 Hectares for the production of millet and sorghum in Mali.

**Project Diffusion and Large Scale Dissemination of Techniques/Technologies of improvement of the productivity of millet and sorghum in the Regions of Sikasso and Mopti:**

This project is implemented by the International NGO Catholic Relief Service in partnership with the Regional Directorate of Agriculture of Mopti and 4 districts in the Region including Bankass. This project carries out diffusion of the microdose technology and other agricultural techniques. 11 Agriculture Sector Workers of Bankass are tasked with supervising 55 villages, with a proportion of 5 villages per Agent. Each Agent is in charge of setting up two farm schools (one central and one satellite) in each village supervised. Each central farm school trains 10 farmers 3 of whom are women on the technologies. Each satellite farm-school trains 35 farmers and overall 70 farmers are trained per village.