



**AVRDC**

**The World Vegetable Center**

## **Improving Vegetable Production and Consumption in Mali Phase 2**

### **Quarterly Program Performance Report (February 1 – April 30, 2014)**

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## INTRODUCTION

This quarterly program performance report summarizes the progress made to date, identifies specific problems encountered and anticipated solutions, highlights the outcomes of any high-level event, outlines activities for the next reporting period, describes the progress made on gender and environmental compliance and describes some adjustments that were made based on learning experiences in the course of project implementation. The reporting period for this report is from February to April 2014 in compliance with Modification N°02 to Award No. AID-BFS-IO-12-00004 amended in August 2013.

### 1. PROGRESS TO DATE, PER THE AGREED-UPON DELIVERABLES TOWARDS ACHIEVEMENT OF EXPECTED RESULTS

The key activities planned and executed during the current reporting period are as follows:

- On-station testing and evaluation of improved varieties;
- On-station and on-farm seed multiplication of elite AVRDC vegetable varieties recommended for dry and wet season production;
- Conducting cold and dry season experiments with collaborative farmers in the Best Practices Hub(BPH) gardens;
- Strengthening capacity of farmers and private organizations on vegetable production technologies (i.e., vegetable production, seed production and postharvest techniques) in the Sikasso region.

During the reporting period, the progress made in terms of deliverables or expected results include:

#### 1.1 On-station testing and evaluation of improved varieties for generation of new technologies

Performance evaluations of AVRDC – The World Vegetable Center (AVRDC) elite vegetable varieties and new advanced lines/varieties of tomato, pepper, onion and “Roselle” from AVRDC and the private sector have been on-going at the Samanko station since October 2013. The objective of this activity is to identify the best lines/varieties for field testing and evaluation in the Sikasso region. The evaluation of the agronomic performances of 20 local varieties and six introduced onion lines from East-West Seed Company in Thailand in terms of yields, appropriate stage of maturity and time for harvesting, bolting, splitting, pungency and storability is still in progress. The experimental design adopted was the Randomized Complete Block Design (RCBD) with three replications. The planting density was 20 cm between rows and 10 cm between plants in the row. The seeds for the trials were sown in November and transplanted in December 2013. At the time of reporting, harvesting of the different varieties/lines as well as data collection is in progress. Results will be analyzed and presented during the forthcoming reporting period in July 2014.

The trend shows that yield of the 10 F1 hybrid varieties of tomato goes from 6.32 to 27.41 tons/ha (AVTO 1252) against 10.52 tons/ha for the control variety (Xina). The AVTO 1,252 is the best in terms of yield followed by AVTO 1333. The F1 hybrid variety of tomato (AVTO

1252) can be tested in farmers' fields in the rainy season 2014. Regarding the assessment of 17 open varieties of tomato, no variety is superior to the control (Xina) in terms of yield during the rainy season. The yield of the control is 10.57 tones/ha against 7.38 tons/ha for the best variety (AVTO 1283). The assessment of new introductions of tomato for rainy season will continue at the Samanko station.

Prior to embarking on promotion and dissemination activities in the region, the best adapted onion and tomato varieties will be used for multi-location trials in the demonstration sites in Sikasso during the 2014 rainy season.

### **1.2 On-station and on-farm seed multiplication of recommended elite AVRDC vegetable varieties recommended for dry and wet season production**

Activities on seed production are being conducted on-station at Samanko as well as on-farm in the Sikasso region.

In regard to onion seed production, seeds of 78 onion lines/varieties are in seed production for regional and multi-location trials mainly in the Sikasso region. These lines included local purified varieties of onion from West Africa and outperformed varieties developed by AVRDC in Taiwan. At the time of reporting, most of the onion seeds were harvested and are at drying stage before threshing and packaging.

Seeds of three improved varieties and one advanced line of tomato, 15 lines of pepper, one variety of sweet pepper and one variety of "Roselle" were produced and packaged for field testing in the Sikasso region and multilocal trials to be carried out in Mali and West Africa (Table 1).

On-farm activities focused on supervision of seed multiplication of tomato, pepper and egg plant in the four demonstration sites in the Sikasso region. At the time of reporting, 1.5 kg of pepper seed, 2 kg of African eggplant seed and 10 kg of okra seed had been harvested from the demonstration plots.

### **1.3 Cold dry season experiments with collaborative farmers in the BPH gardens**

During the cold dry season in each of the four best practice hubs of the project, a participative experiment including four irrigation systems replicated in two blocks (one covered with grass mulch and the other on bare soil). In each irrigation system in both blocks, two AVRDC improved vegetable varieties and local checks of five species are evaluated. The objectives of this experiment are: (1) to enable farmers to appreciate different irrigation and water conservation methods and; (2) to identify the best varieties of vegetable species in competition.

The experiment can also assist in determining the possible interaction between factors studied, such as varieties, irrigation types, ground cover, on the productivity of vegetables. The observed irrigation systems include: i) traditional as the control using water cans or gourds, ii) drip irrigation system, iii) "Nafasoro pump" spraying water and iv) gravity system.

The five species are: okra, African eggplant, onion, hot pepper and tomato encompassing two improved AVRDC varieties and a check of the farmer of each specie. The varieties of the five vegetable species are as follow:

- (1) Okra: Sasilon, Kooni and the check;
- (2) Onion: FBO5, Jan Iri et Violet de Galmi;
- (3) Hot pepper: Nisondia, Bafarima and the check;
- (4) African eggplant : L10, SOXNA and the check;
- (5) Tomato: Nayéli, AVT01122 and the check.

Except for hot pepper, harvesting has been completed for all of the species so data collection and compilation are in process. Results will be analyzed, discussed and reported in the next reporting period (August 2014).

In addition to these trials implemented in the demonstration sites, 32 other multilocational tests of onion were set up in four sites (Koutiala, Zangasso and Medina Coura in Koutiala district and Kouoro Barrage in Sikasso district). Thirty two farmers were involved in conducting these tests on the basis of one test per farmer. The following improved onion varieties; AVON1319, AVON1321, AVON1310, AVON1320, AVON1323, AVON1073, AVON1307, AVON1324, AVON1053 and AVON1325, were compared to the local landraces. For each test, five improved onion varieties were compared to the local landrace. The objectives of these tests were to identify the most productive varieties adapted to local climatic conditions, being resistant or tolerant to bolting, pests and diseases. The nurseries were set up in November 2013 with transplanting in December 2013. At the time of reporting, harvesting are in progress and data on yields, earliness, bolting and splitting is being collected. Results from the data will be reported during the next reporting period.

#### **1.4 Strengthening capacity of farmers and private companies on vegetable technologies (production, consumption, seed production and postharvest technologies).**

On February 5, 12 farmers (seven women and five men) were trained in vegetable production itineraries in Furala, a satellite village of the hub of Blédougou.

In order to make the seeds of the most preferred varieties (chosen by farmers through a participatory approach) available and affordable to farmers around the project hubs, 22 producers in the four demonstration sites received foundation seed for multiplication: tomato, pepper and African eggplant. From March 20 to 25, 2014, 46 local producers from the four sites, including 22 farmers who had already received foundation seeds, have been trained on grain extraction and seed cleaning. The training was conducted at Molobala, Sokourani, Finkolo and Blédougou involving 46 local producers, out of which 18 women and 28 men.

During the reporting period, AVRDC organized on-station training on vegetable seed production and processing techniques. This training gathered 37 farmers and extension agents including 30 men and seven women. The topics included: Seed legislation, steps in vegetable seed production, actors involved in the seed sector, good practices for vegetable

crop production, seed plot isolation and purification and seed extraction, drying, disinfection, packaging and conservation.

In parallel, training sessions were undertaken in Kadiolo, Bougouni and Yanfolila districts to strengthen capacities of farmers for better vegetable production by increased knowledge of postharvest techniques. Besides these trainings, some FtF indicator data proposed and agreed for this project were collected by field technicians.

AVRDC contracted two seed companies (Union Nationale des Coopératives des Planteurs et Maraichers du Mali and Faso Kaba) for vegetable seed production and processing and provided technical support to them. In this context, a field visit was undertaken from March 26-27, 2014 at Bougouni and Yanfolila to visit some of Faso Kaba's seed production on farm at Toula, Diambala, N'jila, Bounounko. The aim of the visit was to supervise vegetable seed production activities to ensure that seed multiplication rules were strictly adhered to (Figure 1). Faso Kaba Seed Company in turn also contracted 296 seed producers (i.e., 85 men and 211 women). At the time of the visit, 3.415ha were covered with pepper, 2.815with African eggplant, 0.25 ha with Amaranth and 2 ha with okra. The seed expected are estimated at a total of 0.95 tons (Table 2).

## **2. IDENTIFICATION OF SPECIFIC PROBLEMS AND DELAYS AND RECOMMENDATIONS FOR ADJUSTMENTS AND CORRECTIVE ACTION**

The specific problems/challenges during the reporting period and anticipated solutions are as follows:

The most limiting factor to the proper running of the research and training activities in the project hubs remains the issue of water. So, in all of the four hubs, the irrigation water shortage is becoming a big issue limiting the performance of research and training activities. This stems from the fact that the entrepreneur whom Integrated Initiatives for Economic Growth in Mali (IICM), a former USAID project had a contract with, stopped working before reaching the wells' required depth. Faced with that, AVRDC hired local labor (not as specialized) to complete the job in the sites in Molobala and Sokourani. However, the depth of the wells is very depth so the pumping is very difficult or even impossible with the project motor pumps, but the problem could be solved with boreholes. At the same time, in Blédougou and Ganadougou Finkolo, the deepening of the wells is on hold since nobody was found locally to complete the work. To solve the problem, specialized and professional contractors could be solicited to deepen the wells in these two sites before the wet season starts. It is clear that the depth of wells will not be enough to allow for the crops to complete their cycle in Blédougou, Finkolo Ganadougou and Soukorani. IICEM will not succeed to complete the renovation of the well infrastructures as the project is nearing its closure. Due to this, AVRDC has taken to find local diggers to deepen the wells. This will allow to complete cycle of trials.

## **3. OUTCOMES FROM ANY HIGH-LEVEL MEETINGS HELD AND FIELD VISITS**

From February to April 2014, five field visits were organized in the Sikasso region. The aim of these field visits were to show to donors, partners and colleagues from AVRDC headquarters in Taiwan the activities conducted on the ground for a better visibility of the project in the region.

On February 1, 2014, a USAID delegation composed of: Jerry Glover, Eric Witte and David Yangen visited AVRDC activities being implemented at Sokourani and Molobala field sites. Plots with improved varieties and production techniques were shown to the visitors. In particular the maintenance of plots and the level of production of new introduced varieties comparatively to the controls were appreciated. Four improved irrigation systems and two improved soil moisture conservation techniques (utilization of mulch or otherwise) were compared to standard farmer practices. This visit ended at the Molobala site with a demonstration of tomato juice extraction, amaranth leaves drying and conservation of fresh legumes under local conditions by women at the new training center built by AVRDC. The technologies acquired through trainings held by AVRDC have enabled women to extract more tomato juice during the peak tomato production season. The extracted juice can be stored and used for up to six months, when tomato is scarce in the market (lean season).

A regional field day involving direct and indirect collaborators, such as local administrative authorities, government agricultural and health services, partners, NGOs, USAID-Mali and media, was held on March 17, 2014 at Sokourani site (Korro Barrage commune) one of the AVRDC four BHPs (Best Practices Hubs), located between the districts of Sikasso and Koutiala. The Governor of the Sikasso region, flanked by a large delegation composed of local administrative and municipal authorities, representatives of national and regional agricultural research and development services, NGOs, farmers' organization representatives and the national media attended the event. The demonstration garden was visited first. The experimental design consists of a combination of four different types of irrigation in each of which three varieties of five vegetable species are tested. This experimental design allows growers and researchers, through a participative selection process, to see and identify the best practices in terms of irrigation systems, mulching and farmer-preferred vegetable varieties. Also, it brings about interaction between different factors involved such as varieties, types of irrigation and the covering style. The experimentation leading to a farmer learning and technology transfer process were highly appreciated by the visitors. The vegetables in plots were composed of two AVRDC improved onion, okra, African eggplant, tomato and hot pepper varieties respectively – and compared to local landraces.

After the field visit, some women from Sokourani, who have received training by the project, demonstrated two postharvest techniques: tomato juice extraction and conservation of fresh vegetables using double canaries system. Tomato juice can be stored in sterilized bottles over six months while fresh vegetable can be kept for two to three weeks after harvesting.

Finally, to confirm their high interest in the project, three farmers (one woman and two men) testified to the positive impact of the project intervention in their villages (improved vegetable production systems and increased awareness of the importance of consumption of vegetables). Villagers expressed their availability to develop vegetable production and

consumption in their environment because they are convinced that vegetables can increase their wellbeing through the increase of production/consumption and generation of more income.

On March 5, 2014, AVRDC received visitors from Air War College of USA at Samanko. They visited our demonstration garden where improved varieties developed by AVRDC as well as production techniques are set up. They were impressed with the quality of fruits and the management of pesticides (Figure 2).

From March 27-28, 2014, a team from the University of Development Study (UDS) in Tamale in Ghana composed of Dr Yakubu Issaka Balma and Prof. George Nyarko visited two AVRDC demonstrations sites (Sokourani and Molobala) in the Sikasso region. They appreciated the approach of BPHs. This is a site located in a village where the best practices on vegetable production are experimented with. The site serves as a framework for practices and training on vegetables for farmers in the host village and surrounding villages.

From April 20-21, a team from AVRDC headquarters composed of Dr. Peter Hansen (Plant Breeder) and Dr. Jaw-Fen Wang (Plant Pathologist) visited some of the project activities in two BPHs (Sokourani and Molobala) and vegetable seed multiplication sites of an AVRDC contracted seed company in Yanfolila and Bougouni. The purpose of this visit was to review and recommend improvements.

#### **4. PLANNED ACTIVITIES FOR NEXT REPORTING PERIOD (MAY – JULY 2014)**

The key activities planned for next reporting period are as follows:

- Planning, testing and evaluation of improved vegetable varieties' performance during wet season;
- Undertaking of on-station multiplication of recommended elite AVRDC vegetable varieties;
- Planning testing and conducting demonstration and adaptation trials in wet season,
- Strengthening capacity of farmers and private organizations on vegetable production technologies (i.e., vegetable production, seed production and postharvest techniques) in the Sikasso region;
- Continuation of farmer training activities on processing, storage and food preparation of various vegetables and introduction of new technologies in the satellite villages;
- Collecting FtF indicator data in the target sites as well as in the other regions not covered by the project activities;
- Preparing and sending monthly progress reports (May, June and July 2014) and a final technical report in August 2014.

## **5. PROGRESS ON GENDER AND ENVIRONMENTAL COMPLIANCE, INCLUDING BUT NOT LIMITED TO ISSUES ARISING; COORDINATION WITH OTHER USAID PROGRAMS, OR IMPLEMENTING PARTNERS OF OTHER DONORS**

Vegetable production is mainly done by women in Mali, but is usually constrained by factors such as lack of water for irrigation and the poor quality of fencing, etc. AVRDC is assisting women groups in the demonstration sites to lift/reduce gender constraints. Examples of assistance provided include hiring labor for digging the wells and sometimes land preparation. It is hoped that this will induce starter effects.

To protect the environment, AVRDC adopted a number of measures to minimize the use of agrochemicals in vegetable production. One of these measures is encouraging all beneficiaries to use organic fertilizers. The project is using compost in the demonstration sites to incite farmers to adopt the same in their own fields. The bio-pesticides that were applied to fields in Molobala and Sokourani were from local low-input resources. These include bio pesticides such as “neem” extract combined with “kobold” that protects plants in the demonstration site from infestation by pests

During the reporting period, no particular collaborative activity were undertaken with other USAID partners operating in the Sikasso region. We note that two of our partners, notably Integrated Initiatives for Economic Growth in Mali (IICEM) and WINROCK International have closed their activities in the Sikasso region.

## **6. ADJUSTMENTS BASED ON LESSONS LEARNT**

None to report.

Table 1: List of vegetable variety candidates for seed multiplication and quantities of seeds produced in April 2014 at the Samanko station

Crops	Variety	Sowing date	Transplanting Date	Area (m <sup>2</sup> )	Current situation	Quantities of seeds (g)
<b>TOMATO</b>	AVTO1122	November 14 <sup>th</sup> , 2013	December 19 <sup>th</sup> , 2013	400	packed	2 940
	Nayéli	November 14 <sup>th</sup> , 2013	December 20 <sup>th</sup> , 2013	350	packed	1480
	Kénéya	October 25 <sup>th</sup> , 2013	November 11 <sup>th</sup> , 2013	300	packed	3300
	Konica	October 14 <sup>th</sup> , 2013, October 1 <sup>st</sup> , 2013	November 7 <sup>th</sup> , 2013, October 23 <sup>rd</sup> , 2013	200	packed	1230
<b>HOT PEPPER</b>	AVPP0408	August 12 <sup>th</sup> , 2013	October 7 <sup>th</sup> , 2013	10	packed	35
	AVPP0511	“	“	0,9	“	4
	AVPP0514	“	“	4	“	124
	AVPP0901	“	“	5	“	20
	AVPP1112	“	“	5	“	13
	AVPP1114	“	“	5	“	10
	AVPP1238	“	“	5	“	40
	AVPP1602	“	“	7	“	645
	AVPP9813	“	“	1	“	65
	AVPP9905	“	“	5	“	158
	AVPP9912	“	“	5	“	5
	CO5555	“	“	7	“	184
	CO5625	“	“	3	“	150
	AVPP0512	“	“	0.9	“	29
	AVPP0541	“	“	0.9	“	4
<b>Sweet pepper</b>	Wassa	November 25 <sup>th</sup> , 2013	January 8 <sup>th</sup> , 2014	50	Fruiting stage	150 expected
<b>Roselle</b>	Molobala	January 6 <sup>th</sup> , 2014	-	1500	Flowering stage	20 000expected

Table 2: Crops and seed yield expected in Faso Kaba's seed multiplication fields, Yanfolilia, March 2014

	Crops	Total area (ha)	Seed yield expected (kg)
Pepper	3.415	300	
Egg plant	2.815	280	
Amaranth	0.25	150	
Okra	2.0	220	
TOTAL	8.48	950	



Figure 1: A view of a seed multiplication of African eggplant at Bougouni, March 2014



Figure 2: The visitors from War College of USA seen appreciating the good quality of vegetables from AVRDC, Samanko, March 2014