



**AVRDC**

**The World Vegetable Center**

**Improving Vegetable Production and Consumption in Mali  
(Mali Production)  
Phase 2**

**Quarterly Program Performance Report  
(November 1, 2013 – January 31, 2014)**

Submitted by AVRDC – The World Vegetable Center  
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Annelie Öberg (LL.M.)  
Grants & Partnership Development  
Tel: +886-6-583-7801 ext. 130  
Email: [annelie.oberg@worldveg.org](mailto:annelie.oberg@worldveg.org)

## **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, plans the 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. This reporting period is from November 2013 to January 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:

- Continuation of on-station testing and evaluation of improved varieties,
- Continuation of on-station and on-farm multiplication of elite AVRDC vegetable varieties recommended for dry and wet season production,
- Setting-up of demonstration and adaptation trials in cold 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,

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 elite vegetable varieties and new introductions 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 purified varieties and 6 introduced onion lines in terms of yields, appropriate stage of maturity and time for harvesting, pungency and storability is still in progress. The experimental design adopted was the Randomized Completely Bloc Design (RCBD) with three replications. The density of planting 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. Data collection on the plants is in progress.

In addition, mother bulbs of 64 lines/varieties are being produced for regional and multi-locational trials mainly in the Sikasso region.

Eleven onion varieties were evaluated for their adaptability for growing and bulbing during the 2013 wet season. The objective of this evaluation was to identify onion varieties which can be recommended for hot and rainy season production in Mali and West Africa and to choose the best lines to be included into the onion breeding scheme. The trial was harvested in October 2013. Analysis of the results undertaken in November 2013, revealed that there are significant differences ( $p < 0.05$ ) between the total yield of the different varieties. The "Prema 178" variety had the highest yield with 18 t/ha followed directly by "EWAU3553"

and “EW001” respectively with 16.7 t/ha and 13.3 t/ha. The lowest yield were observed on “Jan Iri” and “Violet Galmi” varieties with 1.0 t/ha and 1.2 t/ha respectively. The variety “Charlotte” is the best performing in terms of capacity to produce fresh leaves (13 fresh leaves at harvest against 6 for “Jan Iri”) which are highly sought by consumers during the lean onion production season.

For tomato, two series of trials involving 17 improved varieties and one control experiment for Trial 1 and 10 tomato hybrids F1 varieties and one check for Trial 2 were set up in July – August 2013 at the Samanko station. The objectives of these evaluations were to identify adapted varieties for both hot and rainy seasons and to include the best lines into the tomato breeding scheme. At the time of reporting, data analysis and seed processing were in progress.

Before 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 next vegetable season.

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

Activities on seed production are being conducted on-station as well as on-farm in the Sikasso region. On-station, seeds of 78 onion lines/varieties including local purified varieties and, introduced out performed varieties are in production for regional and multi-locational trials mainly in the Sikasso region. At the time of reporting, seed multiplication process for onion was in progress. Seed of 10 tomato lines for fresh season, 16 tomato lines adapted for wet season production and 13 pepper lines were harvested, dried, packed and stored at the Samanko station (Table 1). Likewise, seed of 4 improved and released varieties of tomato are being processed (Table 2). The actual quantities of seed production will be shared in the next reporting period in May 2014.

On-farm activities are focused on providing technical support to at least 2 seed companies (Union Nationale des Coopératives des Planteurset Maraichers du Mali and Faso Kaba) for vegetable seed production and processing. Seed production from designated plots located mainly in Bougouni district was in progress at the time of reporting.

## **1.3 Demonstration trials conducted in farmers’ fields in Sikasso**

In the 2013 wet season, demonstration plots comparing 1 or 2 AVRDC improved varieties to the local control as well as large production plots (0.25-0.5 ha) were set up in farmers’ fields in the hubs and the satellite villages. The vegetables are tomato, African eggplants, hot pepper, okra and Roselle and the tests were implanted in the Best Practice Hubs and satellite villages with farmers. The purpose of such demonstration plots was to afford farmers the opportunity to experience and choose the best varieties for rainy season production. However, the production in large plots aims to convince farmers of the possibility of success in vegetable production during the rainy season and implement nutrition and postharvest practice training sessions. In the hubs and satellite villages, 101 demonstration trials and 108 varietal trials were set up in 20 villages. The preliminary results showed that AVRDC improved varieties were early maturing in comparison with local

landraces. Also, the frequency of harvest was higher for improved varieties than for the landraces. Statistical analysis carried out showed that AVRDC improved varieties were early maturing in comparison with local landraces.

In addition to these trials implemented in the demonstration sites, 32 other multi-locational tests of onion were set up in 4 sites (Koutiala, Zangasso and Medina Coura in Koutiala district and Kouoro Barrage in Sikasso district). 32 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 variety. The objective of these tests was 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 taken place in December 2013. The trials are still in progress. Progress of the trials will be reported in the next reporting period. The best varieties in terms of yield and early maturity indicators will be chosen through participatory varietal selection approaches and promoted in the beneficiary communities.

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

From November 5 to 6, 2013, 12 agents (5 women and 7 men) of a Malian private seed company (Faso Kaba) received training from AVRDC in seed production techniques at the Samanko research station (Photo 1). A week later, from November 12 to 13, 2013, 13 agents (4 women and 9 men) from additional Malian seed companies (Mali Semence, Nakoshi, Baddar seed, UNCPM and Sahel Veto) were also trained in the same techniques by AVRDC in the same location.

In order to promote improved vegetable production in the hubs and satellite villages, AVRDC is initiating the setting-up of a local seed production network around the target location. As of December 2013, 22 farmers, including 20 male and 2 female, had undergone vegetable seed production training of trainers (TOT) in all of the four sites. The training aimed at improving the TOTs' capacity in (1) nursery techniques, types, disinfection, seedling care, etc; (2) registration process to seed production and (3) postharvest management and seed storage.

The training of 25 farmers (21 male and 4 female) from the four project experiment sites occurred from November 27 to 28, 2013 in Sokourani. The objective of the training was for farmers to become more familiar with the irrigation system maintenance, water management and carry-out minor repairs on the system.

## **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:

Poor installation of the fence and availability of water: Despite efforts by IICEM to renovate

the fence at Blédougou, the current state of the fence does not allow for safe operation of demonstration tests for the cold season, it therefore needs to be repaired. The fence is either not correctly fixed in places or fell down in places so stray animals caused damage to the plants in vegetation. In addition, 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 these infrastructures as the project is nearing closure. Facing this situation, AVRDC has taken urgent measures for the deepening of wells. This will allow completing the trials cycle.

### **3 Outcomes of any high-level meetings held and field visits**

From January 31 to February 1 2014, a USAID delegation composed of Jerry Glover, Eric Witte and David Yanggen visited AVRDC activities at Sokourani and Molobala sites (Photo 2). The AVRDC staff outlined the experimental design that was implemented in the demonstration sites to the visitors. It 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 to investigate and identify, through a participative selection process, best agricultural practices in terms of irrigation systems, mulching and farmer-preferred vegetable varieties. Also, it can bring about interaction between the study factors. The irrigation systems are: i) a traditional one, as the control, using water cans or gourds, ii) drip irrigation system, iii) sprinkler irrigation using “Nafasoro pump and iv) gravity system. AVRDC improved vegetable species and varieties are tested and evaluated compared with farmers’ landraces in each irrigation system. Five vegetables (okra, African eggplant, onion, hot pepper and tomato) encompassing two improved AVRDC varieties and a control of each are tested. In the demonstration site, visitors got a look at all of the four irrigation systems and how the plants are growing according in each system.

This visit ended in Molobala site with the demonstration of tomato juice extraction, amaranth leaves’ processing and conservation of fresh legumes using traditional methods by women in the training center newly built by AVRDC. These techniques being acquired through training held by AVRDC enable women to extract more tomato juice during peak tomato production and keep using this juice for at least six months when tomato is scarce in the market.

### **4 Planned activities for the next reporting period (February – April 2014)**

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

- Continuation of on-station testing and evaluation of improved varieties,
- Continuing of on-station multiplication of recommended elite AVRDC vegetable varieties,
- Conducting demonstration and adaptation trials in cold and wet season,
- Supporting seed entrepreneurs in the targeted sites in terms of provision of foundation seed production, certified seed production and processing and reinforcement of linkages with the basic seed unit of the Institute of Rural Economy (IER) in Mali.
- 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,
- Evaluating the level of adoption of new technologies' transferred to farmers,
- Organization of a regional field day in Sikasso.

## **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 bad state of the fence, etc. AVRDC is assisting women groups in the demonstration sites to lift/reduce gender constraints. Some of the assistance provided include hiring labor for digging the wells and sometimes land preparation. This intervention could induce starter effects and allow them to produce nutritious vegetable.

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 of the beneficiaries to use organic fertilizers. The project is using compost in the demonstration site to incite farmers to do 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 "neem" extract combined with kobo oil that protects plants in the demonstration site from infestation by pests. Other sanitary measures consisting of weeding and cleaning around the garden were applied, notably in Finkolo, so far making the chemical treatment not necessary. Few sprayings of "attakan c", cypermethrin based, and animidaclorprid component (allowed by US regulations) were done on tomato plants to get rid of some insects' infestation. In addition, all the nurseries underwent solarization system to sterilize the seed beds.

During the reporting period, no particular collaborative activity has been undertaken with other USAID partners operating in the Sikasso region. We note that 2 of our partners, notably Integrated Initiatives for Economic Growth in Mali (IICEM) and WINROCK International have definitively closed their activities in the Sikasso region.

Table 1: Seeds of vegetable varieties produced and quantities of seed stored at the Samanko station, January 2014

Crops and purpose	Variety	Quantity Seed Stored (g)
Tomato lines for fresh season	AVTO1080	7,4
	AVTO0922	5,3
	AVTO1122	85
	AVTO1130	13
	AVTO1229	0,22
	AVTO1260	7,6
	AVTO1242	7,8
	AVTO1010	1
	AVTO1008	1,7
	AVTO1219	7,1
Tomato lines adapted for wet season	AVTO0301	16
	AVTO1008	43
	AVTO1283	33
	AVTO1284	5
	AVTO1303	7
	AVTO1286	4
	AVTO1319	19
	AVTO1306	15
	AVTO1287	6
	AVTO1308	13
	AVTO1320	6
	AVTO1321	10
	AVTO1290	23
	AVTO1219	7
AVTO1314	2	
AVTO1318	23	
Pepper	AVPP0408	39
	AVPP0511	40
	AVPP0514	70,5
	AVPP0901	7,5
	AVPP1112	10,5
	AVPP1114	15
	AVPP1238	44,5
	AVPP1602	614
	AVPP9813	65
	AVPP9905	124,5

	AVPP9912	12,5
	CO5555	579
	CO5625	120

Table 2: Vegetable seed production in progress at Samanko, January 2014.

Crops and purpose	Variety	Seed Quantity Expected (g)
Tomato lines under seed production	Kénéya	4 000
	AVTO1122	4 000
	Nayéli	4 000
	Konica	1 500



Photo 1: Demonstration of tomato seed treatment during the seed production training in November 2013 at the Samanko station



Photo 2: USAID team at the training centre of AVRDC at Molobala, February 1, 2014. From left to right: Zangha Dembele representing local administration, Dr. Abdou Tenkouano, regional director for WCA, Dr. Jerry Glover and Mr. Eric Witte of USAID-Washington