WEST AFRICA AGRICULTURAL PRODUCTIVITY PROGRAMME (WAAPP) GHANA

ANNUAL REPORT FOR 2011

PROJECT COORDINATION UNIT (WAAPP-GHANA)

MINISTRY OF FOOD AND AGRICULTURE

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ACRONYMS

List of Acronyms

AAP	Africa Action Plan
CARGS	Competitive Agricultural Research Grant Scheme
CRI	Crop Research Institute
International Institute of Tropical AgricultureCSIR	Council for Scientific and Industrial Research
DAES	Directorate of Agricultural Extension Services
ECOWAS	Economic Community of West African States
EPA	Environmental Protection Agency
FRI	Food Research Institute
GPCs	Good Practice Centres
GT	Ghana Telecom
HQCF	High Quality Cassava Flour
IITA	International Institute of Tropical Agriculture
ITA	Institute of Agricultural Technology
IPR	Intellectual Property Rights
KEEA	Komenda-Edina-Eguafo-Abirem
KNUST	Kwame Nkrumah University of Science and Technology
MDGs	Millenium Development Goals
MoFA	Ministry of Food and Agriculture
PGRRI	Plant Genetic Resources Research Institute
PPRSD	Plant Protection Regulatory Services Directorate
RTIMP	Root and Tuber Improvement Marketing Programme
SRI	Soils Research Institute
TOR	Terms of Reference
UCC	University of Cape Coast
UG	

WAAPP	West African Agricultural Productivity Programme
WIAD	Women in Agriculture Directorate

EXECUTIVE SUMMARY

The year under review saw improved programme implementation. The construction of the biotechnology complex began in January and it is now in advanced stage of

completion. The trigger for 10 visiting scientists was finally achieved during the year with the 11 Ghanaian visiting scientists to Mali, Senegal and IITA.

An international root and tuber conference was held in Accra in September and participants came from Africa, South America and Asia. The Directorate of Agricultural Extension Services established 32 demonstration /multiplication sites in the country in their effort at dissemination and adoption.

Technology generation especially from the NCOS progressed satisfactorily. Genetic materials have been exchanged between the Senegal, Mali and Ghana.

A national steering committee and regional steering committee meetings were successfully held and the annual work plan and budgets were approved.

The last quarter of the year experienced activities for the project completion review and the preparation for the Phase 2 of the programme. Ghana has developed its proposal for WAAPP Phase 2 with the assistance of FAO and the World Bank.

Programme execution for the year under review progressed satisfactorily. At the close of the year the disbursement rate was 72% including commitments.

A problem of inadequate newly released cassava planting materials for supply to the implementing districts. Failure to achieve to acquire these planting materials would badly affect the dissemination of these varieties in the programme.

The total disbursement rate as at the end of 2011 is US$ 9,193,991.24 representing 61% of total loan amount of US$ 15,000,000.00. However the actual disbursement plus commitment gives a grand total of US$10,867,219.89 representing **72%** of the overall disbursement.

1.0 INTRODUCTION

The 2011 Annual report seeks to provide information on the implementation of WAAPP to date. It provides a summary of achievements, problems encountered during implementation and the way forward. All implementation arrangements and institutions/agencies were adequately resourced to deliver on all four components of the project. Major events that characterized the reporting period include: the international root and tuber conference, which took place in Accra, the WAAPP 2A preparation mission.

The year 2011 being the preceding year before the end year for phase 1 witnessed increased activity. With regards to funds disbursement, a target of 80% disbursement rate of 80% by end of 2011 was set for all the WAAPP 1 A countries.

2.0 OBJECTIVES

The project objective is to generate and disseminate improved technologies in Ghana's top priority areas that are aligned with the region's top priorities as identified by WECARD/CORAF. The project first phase is to set up a framework in sharing technology, establishing a national center of specialization, fund demand-driven technology generation and adoption and effective management monitoring and evaluation of the project.

Each of the four components of the project has a set of objectives that aims at achieving specific goals.

Component one focuses on creating enabling conditions for Regional Cooperation in technology generation and dissemination (roots and tubers for Ghana). This component aims at strengthening the mechanisms and procedures for the dissemination of technology. To achieve this aim, activities for the realization of the objective of this component were carried out during the period under review. Tremendous efforts are being made to harmonize regional procedures and regulation in the registration and dissemination of technology (genetic materials, pesticides and other crops protection products) to ease cross-border transfer and adoption of technologies.

Component two is to setup a National Centre of Specialization (NCOS). The aim is to strengthen the alignment of national priorities with regional priorities within the participating countries national agricultural research systems (NARS).

The objective is to create a centre of specialization in each participating country, upgrade core infrastructural facilities and equipment at the centre, build the capacity of researchers and support the centre's research and development programme. The CSIR-Crops Research Institute (CSIR-CRI) in Kumasi is the designated National Centre of Specialization (NCOS), and the top priority commodities are the root and tuber crops, specifically, cassava, yam, sweet potato and cocoyam. The NCOS at CRI is well staffed with about 30 research scientists in various specialties

Component three is funding of demand-driven technology generation and adoption. The objective of the component is to create an avenue for the identification and prioritization of constraints to agricultural development, and to strengthen a transparent funding mechanism for research to address the constraints at national level Furthermore, the component will support the transfer of on-the-self agricultural technologies with quick potential impact. This will give market volume and value to produce to earn increased incomes. Cross-sectoral research (eg., sustainable land management) is clearly important, but such research must ultimately focus on the region's top priority commodity sub-sectors, which contribute directly to the region's agricultural growth. Within these parameters, eligible activities will cover all key constraints along the supply chain of these commodity sub-sectors.

The component will also support a competitive agricultural grant system (CARGS) and a limited (non-competitive) core funding with strong buy-in from major stakeholders. The CARGS provides an effective mechanism to involve key stakeholders (particularly producers and agribusinesses) in targeted adaptive research. As indicated earlier, non-competitive research funding is also needed to ensure that no key constraint is overlooked in the competitive process. In such cases, however, it behooves on the researchers to clearly identify the need of such researches to major stakeholders to get their buy-in.

Component four is project coordination, management, monitoring and evaluation. The aim is to establish an effective coordination, management and M&E system at the national and regional levels. The financial management arrangements meets the IDA's requirements and are thus adequate to provide, with reasonable assurance, accurate and timely information on the status of the project required by IDA. This component will also strengthen the participating counties':

- M&E systems to access agricultural productivity and competitiveness in the region's top priority areas and reporting on project activities.
- Financial management and procurement systems
- Development of a national communication strategy.

The specific objectives for the period under review include;

i. Ensure that all reports (technical, financial and procurement) reach MOFA, CORAF/WECARD and the World Bank before the stated deadline.

ii. Roll out some communication activities for WAAPP.

iii. Conduct monitoring visits to the research & development aspects of the project.

iv. Facilitate World Bank missions to the programme.

v.

3.0 RESULTS/OUTPUTS

COMPONENT 1: Enabling Conditions for Regional Cooperation in Technology Generation and
Dissemination

Results from the Directorate of Crop Services (DCS), MOFA

The Directorate of Crops Services (DCS) is the Technical Directorate of the Ministry of Food and Agriculture with the overall mandate for the development of the crops sub-sector. The DCS also has the oversight responsibility for Environment, Land and Water Management within the Food and Agriculture sector.

The Directorate coordinated and implemented the following activities in collaboration with other stakeholders:

- Harmonization of procedures for variety release and registration.
- Cataloguing of available technologies (released improved genetic materials and characterized landraces).
- Establishment of variety registration system for Ghana

Under this component, the National Varietal Release Committee (NVRC) studied and reviewed the existing procedures for the release and registration of genetic materials. The committee further looked at the possible ways of harmonizing these procedures with that of the regional procedures (proposed registration procedures by CORAF).

Documents on General guidelines and procedures for the release and registration of crop varieties and protocols onthe Distinctness, Uniformity, Stability (DUS) and Value for Cultivation and Use (VCU) in two volumes have been prepared.

Results/Outputs

1. A validation workshop was held in July 2011 to validate the information on the procedures for registration (Volume I) and protocols/release procedures (Volume II).The procedures for registration of genetic materials have been signed by the honorable Minister for Food and Agriculture and ready for print.

2. The National Seed Council for cataloguing and registration of newly released and existing genetic materials is n the process of establishment.

Activities

1. Cumulatively, DUS and VCU protocols have been developed for 8 crops including Cassava, Yam, Sweetpotato, Maize, Rice, Sorghum, Groundnut and Cowpea.
   The developed protocols for these crops have been documented and validated in a workshop including researchers, breeders and policy makers from various Ministries, Research Institutes and Universities.

   Evaluation of price quotations for the award of contract to print 1000 copies of the variety release and registration procedures is completed. The manual on the release and registration procedures is expected to be launched in January, 2012.

2. The Directorate in collaboraton with research institutions and universities hasnitiated the collation of data on released and existing genetic materials or varieties. A template for the collection of data has been developed and validated for the collecton of information on the released crop varieties. The template has been has been aligned with the harmonized manual of procedures for the registration of varieties and species in Ghana.

3. Two (2) offices were renovated and equipped withtwo (2) laptops and one (1) desk top computer the cataloguing of genetic materials.

4. One week field inspection was undertaken to breeder fields at Fumesua, Kwadaso and Nobewam to monitor the performance of released varieties. The commodities inspected were the Root and tubers (Cassava, Yam, Sweetpotato and Cocoyam), Vegetables (Pepper, Tomato and Garden eggs), Cereal and Legumes (Rice, Maize and Groundnut).

5. One meeting was held to discuss the status of the seed industry and prepare a strategic document for the multiplication of seed/planting materials. A draft strategic document has been prepared for consideration.

3.1. Results from the Environmental Protection Agency/Plant Protection and Regulatory Services Directorate

The activities of Environmental Protection Agency (EPA) in collaboration with the Plant Protection and Regulatory Services Directorate of MoFA, (PPRSD) under Component 1 objectives were successfully implemented as planned.

Activities

3.1.1 Development and publication of the manual for the registration of pesticides

Four expert meetings were held to review and update the pesticide registration manual as part of efforts to align it with the on-going process to harmonise the registration of pesticide across the sub-region. Participants at the expert meeting were made up of Research Scientist and Pesticides Registration Experts drawn from the EPA, CRI, CSIR, MoFA and the University of Ghana Legon.
A final draft of the manual was presented to the Pesticide Technical Committee which validated and approved the document for publication. The final published manual is attached as Appendix I.

3.1.2 Workshop to train scientist on the application of the harmonised protocols for bio efficacy trials

As part of the harmonization of pesticide regulations in the West Africa sub-region, a number of protocols for bio-efficacy have been developed and harmonised. With support from WAAPP, a two-day workshop was held to introduce and train Research Scientists on the use of the harmonised protocols. Some of the protocols introduced to the Scientists include the following:

1. Specific protocol for biological evaluation of insecticides to control the oil palm leaf miner
2. Specific protocol for biological evaluation of insecticides against major pests of vegetables.
3. Specific protocol for biological evaluation of insecticides against cocoa (*theobroma cacao*) pests.
4. Specific protocol for biological evaluation of fungicides to control black sigatoka disease of banana/plantain
5. Specific protocol for biological evaluation of fungicides to against mango anthracnose.
6. Specific protocol for biological evaluation of insecticides against sweet pot weevils and sweet pot butterflies of sweet potatoes.
7. Specific protocol for biological evaluation of fungicides against the root rots of cocoyam.
8. Specific protocol for biological evaluation of fungicides against fungal diseases (tuber rot, leaf spot and anthracnose) of cassava.
9. Specific protocol for biological evaluation of insecticides against pests and diseases of yam.
10. Specific protocol for biological assessment of agro-chemical inputs against pawpaw pests.
11. Specific protocol for assessing the biological efficacy of fungicides against tomato disease.

It is worth noting that there are other protocols yet to be introduced to the research scientist.

3.1.3 Development of guidelines for the evaluation of bio efficacy trials

The purpose of the guidelines is to establish procedures and criteria for efficacy data evaluation by regulatory officers authorized to carry out assessment of pesticide efficacy reports. It aimed at ensuring standardized procedures for the assessment so as to eliminate the potential for uncertainty and confusion of decision regarding the approval process for trials. They also assist the registrants in their understanding of the review process and the basis for acceptance or rejection of a proposed registration.
Experts meetings were held where a draft guidelines was developed and presented for comments and validation in a workshop attended by the relevant stakeholders including members of the Pesticide Technical Committee. The document was validated and approved for publication. A list of participants and the draft final guideline document is attached as Appendix III.

3.1.4 Development of database to support the pesticide registration scheme.

The process for the development of the database has been initiated and efforts are underway to secure the services of a consultant to prepare framework for this scheme

Results/outcome

The main outcomes of the activities during the period under review are as follows:

- Manual for the registration of pesticides developed and published.
- Research and Scientists trained on the application ofharmonised bio-efficacy trial protocols

Intellectual Property Rights

- Researchers from CSIR were sensitized on IPR and issues pertinent to agricultural and scientific innovations that require protection through workshops.
- An IPR office has been set up at the CSIR Head Office with the assignment of an IPR Specialist from CSIR-IIR to be responsible for all IPR issues from the NARS.
- WAAPP portal has been established lunched and running since 2010 lots of modifications has been done to it in terms of content display. The portal was used to promote the activities of the recently organized R&T conference. The portal is also giving a lot of visibility to Ghana WAAPP both nationally and internationally. The website committee which is responsible editing scientific information for publication on the site has meets regularly to edit information for

posting, editing of the book of abstracts from R&T conference has just been completed and will soon be posted on the site. Also found on the site are WAAPP documents such as the semi and annual reports and many more. This site is also now linked to the CORAF portal. The address to the site is waapp.org.gh

3.1.5. Results from the Directorate of Agricultural Extension Services (DAES)

The Directorate of Agricultural Extension Services (DAES) annual report presents the performance of the Directorate with regard to its mandate of disseminating proven technologies generated WAAPP objectives.

This annual progress report portrays the achievements and the challenges that affected the implementation

Contribution of the Directorate towards WAAPP objectives

3.5.1.1 Established 32 multiplication/demonstrations sites to enhance adoption of improved technologies on root and tuber crops.

3..5.1.2 Collaborated with CSIR-CRI to organise a study tour for farmers and Agricultural Extension Agents and maintained 6 acre plot of land with newly released cassava varieties.

3.5.1.3 Collaborated with Grameen Foundation, Uganda on the impending implementation of e-extension system within the Ministry of Food and Agriculture.

3.5.1.4 Monitored activities in all the 30 Districts with community demonstration/multiplication sites

All the Districts were able to establish the community demonstrations/multiplication sites. The weather was favorable during the major rainy season, thus enhanced plants growth, but became erratic during the minor season.

DAES was also expected to :

- promote e-Extension as an alternative extension delivery methodology by using the mobile phone and internet facility to disseminate information on proven technologies and also improve agricultural information outreach to very remote farmers.
- encourage the adoption of improved technologies under root and tuber crops

Results / Outputs

1. DAES collaborated with Grameen Foundation, Uganda on the impending implementation of e-extension system within the Ministry of Food and Agriculture.

- Six (6) officials from MoFA (5) and Esoko (1) undertook a study tour to Uganda to understudy e-extension being implemented by Grameen Foundation Initiative (Applab Office) in Uganda, from 18th -22nd July, 2011.

- The participants visited Grameen Foundation to understudy e-extension being implemented by them to service farmers and other stakeholders in 10 districts in Uganda. DAES has modified the TOR for the establishment of e-extension within MoFA. The modified version has been sent to the World Bank for no objection.

Adoption of technologies promoted through the establishment of community demonstration sites.

- 31 acres of community demonstration / multiplication sites established in 30 districts in 10 regions. 23 districts have demonstration/multiplication sites established on cassava while 7 districts (Jirapa, Wa West, GaruTempane, Akatsi, Effutu, KassenaNankana and KEEA) established demonstrations on sweet potato.
- 50 District officers from 30 districts trained on guidelines for the establishment of field demonstrations improved cassava and sweet potato varieties in collaboration with Directorate of Crop Services (DCS).
- Collaborated with two districts (Techiman and Krachi East) and CSIR-CRI to establish 2 demonstrations on yam cultivation on ridges. 8,000 yam setts have been planted 2 acres plot of land using **ridges** as against 5,400-5,600 that were planted on **mounds** (farmers' practice). Each District established the community demonstration on an acre plot of land.

DAES collaborated with the CSIR-CRI to ensure effective dissemination of technologies

- Organised study tour for 40 participants (farmers and field officers) to CSIR-CRI and other community demonstration sites to witness best practice on root and tuber technologies. They were selected from 16 districts in the Greater Accra, Central, Western, Eastern and Ashanti regions.

- The Directorate maintained 6 acre plot of land through collaboration with CSIR-CRI with newly released cassava varieties in AtwimaKwanwoma district. Source of planting materials to implementing districts.

Districts implementing WAAPP activities monitored and technically backstopped

- Monitoring visits undertaken by the Directorate to the thirty (30) implementing Districts which established their community demonstration/multiplication to verify work on the fields and in some districts participated in field days.

Activities

- Further to numerous discussions held between officials of the World Bank, Procurement Officer and DAES, the Directorate has modified the former TOR for implementation of e-extension to include the implementation of the programme. DAES is awaiting no objection from the World Bank.

- Cassava varieties such as Bankyehemaa, Techbankye, CapevarsBankye, Nkabom and newly released cassava varieties (for example, CSIR- BroniBankye, CSIR-Ampong, CSIR-Otuhia and CSIR- SikaBankye) are being cultivated in twenty three (23) districts.

- Newly released sweet potato varieties (Faara, Tech Santom, Ogyefo, Apomodin, SantomPona and Okumkom) by CSIR-CRI are being multiplied in 7 (Akatsi, Effutu, KEEA, Jirapa, Wa West, GaruTempane and Kassena-Nankana) districts.

- Field days (3-4 times) had been organised in all the 30 districts to showcase the effects of stubble mulching, fertilizer application, intercropping with cowpea, provision of fire belts and reduction of weeding regimes with some of new cassava varieties.

- Application of chemical fertilizers has enhanced the growth of the plants.

3.6 Strategy of Implementation

The Directorate collaborated with Root and Tuber Improvement Marketing Programme (RTIMP) and CSIR-CRI for the acquisition of various planting materials for the thirty districts.

Farmer groups and individual farmers were used as entry points for the acquisition of land and other activities for the establishment of demonstration sites. The enthusiasm of the farmers has greatly enhanced the establishment of the community demonstration/multiplication sites.

The involvement of processors (cassava) within our collaborators would enhance the adoption of these technologies at the community level.

Collaborators were given planting materials of their choice to help encourage adoption.

3.7 Problems Encountered

- Inadequate newly released cassava planting materials for supply to the implementing districts. Failure to achieve to acquire these planting materials would badly affect the dissemination of these varieties in the programme.
- Issues on climate change such as erratic rainfall hampered plants growth in some of the districts, especially along the coast, Upper East, Upper West and Northern regions.
- Inadequate knowledge in fortifying processed cassava with soya bean for good nutrition and health.
- Mealy bug and white fly infestation experienced at Tema Metro, Dangme West and Dangme East districts.

3.8 Recommendations

- Measures should be put in place to procure newly released cassava planting materials to enhance their adoption by farmers in the country. CSIR-CRI will be relied on for the newly released cassava planting materials.
- The Directorate should collaborate with Women in Agriculture Directorate (WIAD), CSIR-FRI and PPRSD to train farmers on value addition to cassava including fortification with soya bean and control of mealy bugs and whiter flies respectively.
- DAES should liaise with RTIMP to train farmers and processors on their concept in Good Practice Centres (GPCs) in their implementing districts.

3.9 WORKSHOPS

WAAPP Senegal NCS successfully conducted a National WAAPP workshop in Dakar in April 2011.

Five researchers from Ghana (CSIR-CRI, FRI, SRI and SARI) attended this function and participated fully in the design and set up of research trials at Bambey.

2 Laboratory technicians workshops to enhance the report writing skills of technicians was organised in April, 2011 for 51 participants.

3. METASIP workshop to guide researchers on possible research areas of national and regional interest was conducted in 2011 at CSIR-SRI in Kumasi.
4. Two workshops on IPR were organised in April 2011 to educate researchers on intellectual property rights and registration procedures. They were also to sensitize researchers on the importance of IPR especially if developed technologies are to be disseminated across-borders.

Plant Breeders workshop for Breeders within the NARS to identify on-going breeding programs and strategies for release of new technologies as well as IPR issues. A

Plant Breeders Association was formed with Dr. J.M. Aduening as the President of the association.

3.10 STUDY TOURS

Seven (7) Scientists from WAAPP-Mali visited Ghana from 19th -26th June 2011.

Outcome of visit

- The delegation met with WAAPP-Ghana Officials
- Visited NCOS in Kumasi and met with Rice Scientists at CSIR-CRI, Soil scientists at CSIR-SRI, Rice, and Roots and tubers scientists at CSIR-SARI and Food scientists at CSIR-FRI and discussed collaboration in several areas of research. The delegation also visited rice experimental fields at Nobewam near Kumasi.

3.11 VISITING SCIENTIST PROGRAMME (Out)

Twelve researchers from CSIR-SARI, SRI, FRI, PGRRI, CRI, visited WAAPP Senegal, WAAPP Mali and IITA, Nigeria for a period of one month for 10 of them and two months for two researchers from CSIR-SRI.

3.12 VISITING SCIENTIST PROGRAMME (In)

Two Food scientists from WAAPP-Senegal –ITA visited CSIR-FRI in May 2011. At the end of the visit, the visiting scientists recommended the need for strong and sustainable partnership between ITA and CSIR, training of ita researchers in engineering and food processing technologies by CSIR-FRI; assistance to ITA researchers in implementing knowledge acquired through backstopping visits to ITA and assistance in acquisition of prototypes developed by CSIR-FRI and appropriate processing equipment for R&T crops.

3.13 EXCHANGE OF TECHNOLOGIES

- WAAPP Ghana NCOS has sent improved released varieties of maize and cassava (CSIR-Ampong and CSIR-Sikabankye) to Mali for adoption:
- CSIR-SARI has sent to WAAPP Senegal three (3) released Sorghum varieties for evaluation and adoption in Senegal. They are Kapaala, Kadaga and Dolado,

CSIR-SARI has received 30 Sorghum breeding lines and 60 Cowpea breeding lines for evaluation and selection in Ghana.

CSIR-SARI has also received **o**ne striga-resistant Sorghum variety, 16 Sorghum lines from ICRISAT Maliand four sweet Sorghum hybrids with high potential for adoption in Ghana.

3.14 TRAINING

Current status

WAAPP s supporting 17 post-graduate student for M.Sc/M.Phil. programs in various universities (UCC, UG, KNUST, GT University). Two (2) Ph.D programmes are also yet to start.
Beneficiary institutions/organizations are CSIR, MoFA DAES, CSD, PPRSD, UG and UCC**.**

One student since completed an M.PhilProgramme

3.9. Directorate of Agricultural Extension Services (DAES)

Contribution of the Directorate towards WAAPP objectives

3.9.1 Established 32 multiplication/demonstrations sites to enhance adoption of improved technologies on root and tuber crops.

3.9.2 Collaborated with CSIR-CRI to organise a study tour for farmers and Agricultural Extension Agents and maintained 6 acre plot of land with newly released cassava varieties.

3.9.3 Collaborated with Grameen Foundation, Uganda on the impending implementation of e-extension system within the Ministry of Food and Agriculture.

3.9.4 Monitored activities in all the 30 Districts with community demonstration/multiplication sites.

3.10 Main lessons learnt

- Planting materials (cassava) had been given to farmers and primary school for adoption.
- Drudgery of weeding reduced with the use improved cassava planting materials
- Improvement of soil physical structure with the use of land management practices

- Farmers have learnt that 4000 cassava cuttings could be planted per acre
- Marketing of produce in most areas was not a problem as indicated by farmers
- Farmers have witnessed the positive effect of chemical fertilizer application on cassava
- Farmers have learnt that 4,000 yam setts could be planted on an acre of land using **ridges** as against 2,700-2,800 that were planted on **mounds** (farmers' practice)
- Farmers are very willing to adopt the cultivation improved cassava and sweet potato planting materials
- Improved cassava varieties are doing well than the indigenous varieties with regard to tolerance of plant diseases

3.11 Results from Directorate of Agricultural Extension

- DAES collaborated with Grameen Foundation, Uganda on the impending implementation of e-extension system within the Ministry of Food and Agriculture.

- Six (6) officials from MoFA (5) and Esoko (1) undertook a study tour to Uganda to understudy e-extension being implemented by Grameen Foundation Initiative (Applab Office) in Uganda, from 18th -22nd July, 2011.

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- Collaborated with two districts (Techiman and Krachi East) and CSIR-CRI to establish 2 demonstrations on yam cultivation on ridges. 8,000 yam setts have been planted 2 acres plot of land using **ridges** as against 5,400-5,600 that were planted on **mounds** (farmers' practice). Each District established the community demonstration on an acre plot of land.

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- The Directorate maintained 6 acre plot of land through collaboration with CSIR-CRI with newly released cassava varieties in AtwimaKwanwoma district. Source of planting materials to implementing districts.

Districts implementing WAAPP activities monitored and technically backstopped

- Monitoring visits undertaken by the Directorate to the thirty (30) implementing Districts which established their community demonstration/multiplication to verify work on the fields and in some districts participated in field days.

3.12 Activities

- Further to numerous discussions held between officials of the World Bank, Procurement Officer and DAES, the Directorate has modified the former TOR for implementation of e-extension to include the implementation of the programme. DAES is awaiting no objection from the World Bank.

- Cassava varieties such as Bankyehemaa, Techbankye, CapevarsBankye, Nkabom and newly released cassava varieties (for example, CSIR- BroniBankye, CSIR-Ampong, CSIR-Otuhia and CSIR- SikaBankye) are being cultivated in twenty three (23) districts.

- Newly released sweet potato varieties (Faara, Tech Santom, Ogyefo, Apomodin, SantomPona and Okumkom) by CSIR-CRI are being multiplied in 7 (Akatsi, Effutu, KEEA, Jirapa, Wa West, GaruTempane and Kassena-Nankana) districts.

- Field days (3-4 times) had been organised in all the 30 districts to showcase the effects of stubble mulching, fertilizer application, intercropping with cowpea, provision of fire belts and reduction of weeding regimes with some of new cassava varieties.

- Application of chemical fertilizers has enhanced the growth of the plants.

3.13 Strategy of Implementation

The Directorate collaborated with Root and Tuber Improvement Marketing Programme (RTIMP) and CSIR-CRI for the acquisition of various planting materials for the thirty districts.

Farmer groups and individual farmers were used as entry points for the acquisition of land and other activities for the establishment of demonstration sites. The enthusiasm of

the farmers has greatly enhanced the establishment of the community demonstration/multiplication sites.

The involvement of processors (cassava) within our collaborators would enhance the adoption of these technologies at the community level.

Collaborators were given planting materials of their choice to help encourage adoption.

3.14 Results from Demand- driven Technology Generation and Adoption

Under Component 3, the Directorate collaborated with DAES in the successful dissemination of technologies generated by research to farmers and relevant stakeholders for adoption.

Best practices on the establishment of demonstration for improved cassava and sweetpotato varieties were disseminated to 30 districts for adoption in collaboration with DAES.

A Study tour was organized for 40 AEAs/DAOs/RAOs and farmers to breeder fields and community demonstration sites in 15 selected districts (5 regions) for experience sharing and technology adoption.

The Directorate collaborated with DAES to build the capacities of 60 District Directors of Agricure in the establishment of demonstration for improved released varieties.

The Directorate developed guidelines for the demonstration/multiplication of Cassava and Sweetpotato.

A 3-day study tour was organized and undertaken to breeder fields at CRI in Fumesua, and farmer demonstration fields at Kwabre. This activity was organized for 24 AEAs/DAOs/RAOs and 16 farmers to familiarize themselves with new Cassava, Sweetpotato and Cocoyam varieties as well share experiences with other farmers, researchers and adopt new technologies.

3.15 RESULTS FROM NATIONAL CENTER OF SPECIALIZATION (NCOS)

The National Center of Specialization under the theoversite responsibility of the Center of Specialization Management Committee (CoSMAC), continued to implement all approved activities under the various programmes. The current status of research is as indicated in Table 1.

Table 1:Achievements and way forward

Programme	Achievements	Remaining Activities
Cassava	Release of 4 improved high yielding varieties	Multiplication and dissemination of released varieties. Target 5ha
	Assembled 150 exotic lines and 97 landraces	Established characterization field of 18 released varieties 66 exotic lines and 66 landraces
	Produces 4,600F_1 full-sibs from CRI-crossing blocks	PYT for evaluation and traits selection
	Identified 10 elite clones for food and industrial uses	Established pre-release inspection fields by April 2012
	Determined 2 rates of pre-emergence herbicides for weed control under cassava (Bellazine and Diuron)	Participatory on-farm verification and training of farmers on proper use of identified herbicides
	Identified hot spots for cassava pests and diseases in the Forest and Forest-savannah transition zones	Extend survey to cover other ecological zones
Sweet potato	Made crosses and obtained F_1 seeds	Evaluation of seedlings at PYT
	Received elite materials from CIP	CIP materials to be tested on-farm for stability (yield, pests and diseases resistances)
	Supplied released materials to MOFA for multiplication and on-farm activities	Supply more materials to MOFA for multiplication and dissemination
		Set-up inspection plots prior to varietal release in 2012
Yam	Conduct on-farm adaptive	Establish plot Release new

	trials on the Yam viene technology, yam mechanization, evaluation of elite clones of yams towards release.	improved varieties of Yam. Outdoor Yam vne multiplication technology.s for inspection by the NVRC. Develop fact sheets for technologies developed for MoFA DCS and DAES.
Cocoyam	8 elite clones of Xanthosoma yielding between 6 and 8 MT/Ha identified	Demonstration plots are being established 4 locations (AssinFosu, Begoro, Kukuom and Fumesua)
Biotechnology	DNA finger printing for newly released cassava varieties developed Molecular Marker Assisted selection for cassava mosaic disease established Molecular diversity of 115 sweetpotato accessions Finger print 9 released and 21 elite sweetpotato varieties Fingerprint 9 elite cocoyam accessions Established diversity of 50 cocoyam accessions Developed in-vitro micro-propagation guidelines for yam and cocoyam DNA fingerprint of 3 released yam varieties Diversity of 398 cassava and 284 yam collections	Continue for new accessions
Postharvest	Determined biochemical composition of cocoyam Developed recipes for	Determination of Biochemical composition of yam

	cocoyam, sweetpotato and yam Developed new technology for fufu preparation	
Training and Technology Transfer	Conducted trainings on utilization of sweetpotato and cassava (147 farmers and 44 processors)	Multiplication of healthy cassava planting materials Development of extension/ technology transfer materials (e.g. prod. Guides) Development of mass communication packages Capacity building of extension agents to up-scale technologies
Challenges - Cut of approved budget - Equipment Weight scales Oven Computers		

3.16 RESULTS FROM FUNDING OF DEMAND DRIVEN TECHNOLOGY GENERATION AND ADOPTION

Results from CARGS

The Research Extension Farmer Linkage Committees in the various regions despite the limitation of resources were able to conduct some of the activities that were planned for MoFA during the 2010 RELC Planning Sessions in relevant Districts on some existing and newly released varieties of cereals, root and tuber crops, legumes and vegetables. The Technical Review meetings were also limited. However, the Western and Eastern Regions were able to organize the Regional RELC Planning/Review meetings in 2011.

Under the CARGS, 10 on-going projects were supported with adequate funding to ensure successful completion with the dissemination and adoption of relevant technologies developed with the active involvement of stakeholders in 2012. M & E reports indicate good progress in implementation (Appendix.2). Similarly, 21 on-going projects under the Non-Competitive/Commissioned Projects also received adequate funding for implementation and researchers have made considerable progress towards the development of strategies to solve pressing constraints of farmers through adaptive research strategies. (Appendix 3).

CARGS

1. The RELCS and CARGS Manuals were validated by stakeholders in Ghana. However, it became necessary to incorporate some sessions that take account of Sub-Regional needs before the final documents could be published and distributed. Nevertheless these documents guide the operations of the RELCS and the CARGS.
2. The Regional RELCs and CARGS Board are in place and functioning. The CARGS Board met on two occassions in 2011 to review progress of all on-going CARGS and Non-Competitive projects. The Board approved three new projects under the competitive scheme.
3. Designated national RELC Coordnators for MoFA and CSIR are n place and coordinating all activities of the RELC.
4. Constraints identified at the Regonal RELC Plannng Sessions conducted by the eastern and Western region wllbe attended to in 2012.

3.17 Results from Non-Competitive Research Grant Scheme Projects

1. A total of 21 *projects are receiving funding under this scheme and considerable progress has been made in implementation.*

2. The project on development and pilot marketing of convenience frozen foods of yam and sweet potato with private sector participation has shown a lot of promise in adoption in the urban setting.

3. Dissemination through training and adoption of the use of composite flour technology in the bakery industry and school feeding programmes in the Western, Central and Greater Accra Regions has involved the participation of a lot of private bakers as well as domestic matrons and cateresses of several first cycle institutions in these regions. Indications are that substantial savings could be made when a reasonable percentage of wheat flour is substituted wth high quality cassava flour in bread making.
4. In the Central and Volta regions, an NGO, Global Farmers' Wives' Association has trained over 350 women and 1,000 men in good agronomic practices for the production of improved newly released varieties of cassava and also in, integrated cassava-poultry production. In the Central region training in the processing of cassava into cassava products like gari, cassava flour, starch and abgelima has been conducted. The women have also been trained in bread making and other confectioneries using cassava flour and starch.
5. The Mechanical Cassava Harvester (MCH) has been demonstrated in several districts and has generated a lot of interest both at the national and regional levels. A few bottlenecks are still being investigated to ensure the development of a good marketable technology that will drastically reduce drudgery in the harvesting of large scale cassava farms.
6. Simple to construct solar dryers with relatively cheap locally available materials have been designed in various sizes and tested on-station and on-farm for the drying of chips of roots and tubers, vegetables and cereals. Its versatility has generated a lot interest among farmers and domestic users in areas where it has been demonstrated.

3.18 Results from Project Coordination, Management Monitoring and Evaluation

During the period under review, the Project Coordination Unit in collaboration with CSIR and the World Bank successfully carried out an 2 implementation support and review missions in April and September. In December the PCU successfully hosted the WAAPP 2A Preparation mission. WAAPP-Ghana has prepared proposal for the phase 2 of WAAPP.

The PCU successfully conducted eight (8) project management committee meetings and these meeting have helped tremendously in accelerating progress of implementation.

Monitoring and Evaluation

The monitoring and evaluation officers of WAAPP participated in a workshop on Operationalization of the Results Framework for WAAPP1 A and 1B from 28th to 30th June in Thies, Senegal. The outcome of this meeting was an appreciation of data collection tools for WAAPP.

In the third quarter of the year, the M&E officers accompanied the consultants recruited for the preparation of the project completion and review report in the field visits.

Communication Strategy

The PCU facilitated 3 meetings of the communication strategy committee meeting. Much work was done on how to resurrect the television programme on agriculture ”AGRIMAG”. The communication action plan has been reviewed and amended by the committee.

4.0 BUDGET EXECUTION

Disbursement to Date:

The total disbursement rate as at the end of 2011 is US$ 9,193,991.24 representing 61% of total loan amount of US$ 15,000,000.00. However the actual disbursement plus commitment gives a grand total of US$10,867,219.89 representing **72%** of the overall disbursemen.

5.0 Problems Encountered

- Erratic rainfall hampering plants growth in some of the districts, especially along the coast, Upper East, Upper West and Northern regions.
- Inadequate newly released cassava planting materials for supply to the implementing districts.
- Inadequate knowledge in fortifying processed cassava with soya bean.

- Mealy bug and white fly infestation especially at Tema Metro, Dangme West and Dangme East

- Inadequate newly released cassava planting materials for supply to the implementing districts. Failure to achieve to acquire these planting materials would badly affect the dissemination of these varieties in the programme.
- Issues on climate change such as erratic rainfall hampered plants growth in some of the districts, especially along the coast, Upper East, Upper West and Northern regions.
- Inadequate knowledge in fortifying processed cassava with soya bean for good nutrition and health.
- Mealy bug and white fly infestation experienced at Tema Metro, Dangme West and Dangme East districts.

- Mealy bug and white fly infestation especially at Tema Metro, Dangme West and Dangme East.

6.0 Recommendation

- Farmers in the country should put measures in place to procure newly released cassava planting materials to enhance their adoption. CSIR-CRI will be relied on for the newly released cassava planting materials.
- The Directorate should collaborate with Women in Agriculture Directorate (WIAD), FRI and PPRSD to train farmers on value addition to cassava including fortification with soya bean and control of mealy bugs and white flies respectively.
- The CSIR-WAAPP improves on the efficiency of timely release of funds for the directorate's activities
- PCU-WAAPP should expedite action on the procurement of office equipment and logistics (computers and accessories, vehicle etc) to facilitate the work of the Directorate on the project.