WEST AFRICA AGRICULTURAL PRODUCTIVITY PROGRAMME (WAAPP)
GHANA

ANNUAL (JANUARY-DECEMBER 2010) REPORT

PROJECT COORDINATION UNIT (WAAPP-Ghana)
MINISTRY OF FOOD AND AGRICULTURE
P.O. BOX MB 37 ACCRA, GHANA

JANUARY 2011
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EXECUTIVE SUMMARY

The West Africa Agricultural Productivity Programme (WAAPP) is a two-phase, 10-year Adaptable Programme Loan (APL) of five years duration each, involving three countries: Ghana, Mali and Senegal. The main objective of the 10-year APL is to contribute to agricultural productivity increase in the counties’ priority commodity sub-sectors that are aligned with regional priorities through improved technology generation dissemination and adoption in priority commodities in countries within the sub-region.

Ghana’s priority crops are basically roots and tubers which include cassava, yam, cocoyam and sweet potato.

The project is in its third year of implementation and it is being implemented through four (4) components as follows:

- Enabling conditions for regional cooperation in technology generation and dissemination.
- National Centre of Specialization (NCOS)
- Funding of demand-driven technology generation and adoption.
- Project coordination, management, monitoring and evaluation

WAAPP is in its third year of implementation and within this period, the project in line with its development objective, has made some major achievements. There were a few challenges nevertheless; these challenges did not adversely affect the overall achievements made so far.

The annual report reflects the progress of the project implementation and achievement of WAAPP development objectives to date. The full effect of the resulting outcomes could be measured at the end of the first phase of the project by June 2012.

Draft bio-efficacy protocols for biological evaluation of insecticides for selected humid crops namely; mango, cocoa, oil palm, plantain/banana, vegetables and roots and tubers such as cocoyam, cassava, sweet potato and yam and associated pests and disease combinations have been reviewed and validated. However, there are still on-going bio-efficacy trials of four herbicides, Bellazine, Stomp, Atrazine and Diuron on cassava at two locations in the forest zone.

The Directorate of Agriculture Extension Services (DAES) responsible for dissemination and adoption of developed agricultural research technologies, in collaboration with the CSIR through the Research Extension Farmer Linkage Committees (RELCs) has produced a catalogue of thirty one (31) researchable farmers’ constraints from districts in the ten (10) regions of the country for attention and necessary action by the Competitive Agricultural Research Grant Scheme (CARGS) board. Eight of these constraints were approved for funding by the CARGS board and are currently being implemented by researchers.

In line with project development objectives, four high yielding varieties of cassava which were recently released by the National Center Specialization of the CSIR-CRI have the potential of increasing yield by over 30% over the farmers’ varieties, hence contributing towards alleviating poverty and increasing food security for the country.

In the case of yam, very stable and high yielding Dioscorea alata (D. alata) genotypes with high tolerance to anthracnose disease have been identified and will be further evaluated on-farm in 2011 for release in 2012. Experimental trial to determine a better yield for yam using vine multiplication technique yielded positive and useful results. Preliminary results of the vine technology show that a multiplication ratio of 1:240 as compared to 1:6 in the
traditional method is achievable. Furthermore, five different plant parasitic nematode species, all key pests in yam production were identified in a research project on managing plant parasitic nematodes with botanicals in yam production.

Also, after two years of on-station and on-farm testing, four genotypes of cocoyam have been identified as promising. In September/October 2011, first inspection of cocoyam involving stakeholders and variety release committees would be conducted. In February/March 2012, the four genotypes of cocoyam would be released.

In promoting demand driven technology generation to address key problems facing agricultural productivity in the sub-region, the Competitive Agricultural Research Grant Scheme (CARGS) board in collaboration with the RECLs is currently funding eight (8) research projects that are being implemented by researchers within the NARS in a participatory manner involving all relevant stakeholders along the value chain. All the approved CARGS projects are well established and most of the projects are expected to achieve their objectives by 2012.

Climate change due to global warming has affected the rainfall trend in the country and hence on-farm research trials as well as the fortune of most farmers especially those in the southern part of the country. Appropriate mitigating strategies (such as watering) are however being employed by researchers to come out with appropriate solutions to farmers constraints.

A mid-term review (MTR) of the project was conducted from April 27 to May 7th 2010 to assess the overall progress of the project and address key constraints in order to make the recommendations for enhanced execution of the project. The mid-term review indicated that the project’s aim/objectives still remains valid. The aide memoire concluded that the project is making progress towards achieving the development objectives however there is the need to speed up the disbursement of the project fund and adoption of improved technologies.

The mission recommended that in order to accelerate achievement of the project development objective, the project needs to be restructured to include a sub-component to accelerate adoption and refocusing activities of NCOS on key priority crops, that is focusing about 70% of funding to NCOS on yam and cassava for quick impact.

During the year the total funds received from the World Bank was US$2,423,200.73. The Budget for the year was US$4,407,230.00, and out of it the amount spent stood at US$2,266,241.05, leaving a balance of US$2,140,988.95. The percentage of disbursement is 51% for 2010 and 46% for the total loan.

Notwithstanding all the achievements, some challenges were also encountered in the course of the reporting period. The project had to contend with the vacation of post of the M&E officer but this was quickly resolved with the engagement of three M&E Officers – one each from MoFA, CSIR and NCOS, in order to guard against future occurrence. These newly recruited M&E officers need training to prepare them for this challenging job. There was also the sudden transfer of Project Coordinator, Mr. Joseph Y. Faalong to the Northern Region as the Regional Director of Agriculture. His Deputy, Mrs. Azara Ali-Mamshie was confirmed as the new project coordinator and the responsibilities were officially transferred to her. In addition, there were delays in the release of funds for some project activities due to long and complicated bureaucratic processes within the system, hence it was recommended that efforts should be made to shorten these processes so as to facilitate regular flow of funds to ensure steady progress of work. Coupled to that, the poor retirement of funds also posed problems for smooth release of funds.
**LIST OF ABBREVIATIONS AND ACRONYMS**

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<th>Full Form</th>
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<td>AAP</td>
<td>African Action Plan</td>
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<td>AU</td>
<td>Africa Union</td>
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<td>CAD</td>
<td>Cassava Anthracnose Disease</td>
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<td>CARGS</td>
<td>Competitive Agricultural Research Grants Scheme</td>
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<td>CIP</td>
<td>International Potato Center</td>
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<td>CMD</td>
<td>Cassava Mosaic Disease</td>
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<td>COSMAC</td>
<td>Center of Specialization Management Committee</td>
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<td>CRI</td>
<td>Crops Research Institute</td>
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<td>CSIR</td>
<td>Council for Scientific and Industrial Research</td>
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<td>DAES</td>
<td>Directorate of Agricultural Extension Service</td>
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<td>DUS</td>
<td>Distinctness, Uniformity, Stability</td>
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<td>DCS</td>
<td>Directorate of Crop Services</td>
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<td>ECOWAS</td>
<td>Economic Community of West Africa States</td>
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<td>EMP</td>
<td>Environmental Management Plan</td>
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<td>EPA</td>
<td>Environmental Protection Agency</td>
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<td>FRI</td>
<td>Food Research Institute</td>
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<td>INSTI</td>
<td>Institute of Scientific and Technology Information</td>
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<td>HRD</td>
<td>Human Resource Development</td>
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<tr>
<td>MAS</td>
<td>Marker Assisted Technology</td>
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<tr>
<td>M&amp;E</td>
<td>Monitoring and Evaluation</td>
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<td>MDGs</td>
<td>Millennium Development Goals</td>
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<td>MOFA</td>
<td>Ministry of Food and Agriculture</td>
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<td>MTR</td>
<td>Mid-Term Review</td>
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<td>NARS</td>
<td>National Agricultural Research Systems</td>
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<td>NCOS</td>
<td>National Center of Specialization</td>
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<td>NCRGS</td>
<td>Non-Competitive Research Grant Scheme</td>
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<tr>
<td>Acronym</td>
<td>Description</td>
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<td>NEPAD</td>
<td>New Partnership for Africa’s Development</td>
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<td>NVRC</td>
<td>National Varietal Release Committee</td>
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<td>OFSP</td>
<td>Orange-fleshed Sweet Potato</td>
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<td>PCR</td>
<td>Polymerase Chain Reaction</td>
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<td>PDO</td>
<td>Project Development Objective</td>
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<td>PGGRI</td>
<td>Plant Genetic Resources Research Institute</td>
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<td>PPRSD</td>
<td>Plant Protection and Regulatory Services Directorate</td>
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<td>RELC</td>
<td>Research Extension Linkage Committee</td>
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<td>RTIMP</td>
<td>Root and Tubers improvement and Marketing Program</td>
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<td>SPVDC</td>
<td>Sweet Potato Virus Disease Complex</td>
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<td>SSP-WA</td>
<td>Sweet Potato Support Platform for West Africa</td>
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<td>VCU</td>
<td>Value for Cultivation or Use</td>
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<td>WECARD/CORAF</td>
<td>West and Central African Council for Agricultural Development</td>
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1.0 INTRODUCTION

In pursuit of meeting the Millennium Development Goals (MDGs) the Africa Union’s (AU) New Partnerships for Africa’s Development (NEPAD) has called for three percent annual agricultural total factor productivity growth and six percent growth in agricultural GDP to reach the MDGs by 2015.

In response to this, the World Bank designed the African Action Plan (APP) as a centerpiece of its strategy to help Africa and its regional groups such as ECOWAS reach the MDGs.

ECOWAS in response to the AAP formulated the West Africa Agricultural Productivity Programme (WAAPP) as the implementing instrument for achieving the objectives of increased agricultural productivity and sustainability and to support regional integration.

The WAAPP is a two-phase, 10-year Adaptable Programme of five years duration each, involving three countries (Ghana, Mali and Senegal) and aims to generate and disseminate improved technologies in the countries’ priority areas that are aligned with the region’s top priorities and also to facilitate the spill-over of these improved technologies to the West African region in the spirit of regional cooperation and integration.

The specific country commodities are roots and tubers for Ghana; rice for Mali and drought-tolerant cereals for Senegal for the first phase.

The expected outcomes of the Project are:

(i) strengthened enabling conditions for disseminating technology within participating countries and at the regional level

(ii) strengthened alignment of national priorities with regional priorities within participating countries’ National Agricultural Research Systems (NARS)

(iii) strengthened priority-focused and transparent agricultural research funding mechanisms within participating countries and at the regional level; and

(iv) Established effective project coordination, management and monitoring and evaluation.

The above outcomes will be achieved under the following four main programme components:

1) Enabling Conditions for Regional Cooperation in Technology Generation and Dissemination
2) National Centre of Specialization (NCOS)
3) Funding of Demand-Driven Technology Generation and Adoption
4) Project Coordination, Management, Monitoring and Evaluation.
This annual report presents a summary of results/outputs accomplished by WAAPP through various activities within the year under review (January to December 2010) with some recommendations from lessons learned during the process of project implementation. The report emphasizes the major achievement of the project under the four components for the year 2010. The report informs major stakeholder on whether:

i. Goals and objectives are being achieved;

ii. Design criteria are being followed;

iii. Implementation effects are occurring as predicted;

iv. Emerging or unanticipated issues arising.

Major events that characterized the reporting period include; mid-term review which took place from April 27 to May 7th to assess the overall progress of the project and address key constraints in order to make recommendations for enhanced execution of the project, sod cutting ceremony for the commencement of work on the Bio-technology laboratory and the re-assignment of the National Project Coordinator to a higher position in the Northern Regional Agricultural Directorate. The Deputy Coordinator of the project, Madam Azara Ali -Mamshie was then appointed National Coordinator.

The National Center of Specialization (Crop Research Institute, Kumasi) also released four new cassava varieties within the same period. The Directorate of Agricultural Extension of MOFA and the CSIR jointly reviewed the draft RELC manual, after a series of consultative workshops with all major stakeholders in each of the ten (10) regions of the country. MoFA also prepared a concept paper and the terms of reference for consultancy services for the design and implementation of e-Extension. The Concept Paper and Terms of Reference (TOR) on e-Extension were submitted to the World Bank and subsequently, six (6) Consultants have been selected to come out with their expression of interest to develop a framework and design an operational plan for the e-Extension for MoFA.
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.

The specific objectives of this component for the period under review were:

i. 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.

ii. To encourage the adoption of improved technologies under root and tuber crops

iii. Prepare draft bio-efficacy protocols for crops found in the humid region of ECOWAS

iv. Carry out environmental monitoring of the field activities of WAAPP

v. Establish a registration system/desk for the registration of released and existing crop varieties

vi. Establishing common procedures for the release and registration of crop varieties.

vii. Conduct a study on Intellectual Property Rights

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

The specific objectives for the period under review include:

i. Ensure the full benefits from the spill-over of generated improved technologies among participating countries in the West African region in the spirit of regional cooperation and integration through exchange and visiting scientists programme.

ii. Develop and disseminate appropriate technologies for farmers and other end-users

iii. Develop suitable cassava, yam sweet potato and cocoyam varieties preferred by farmers and other stakeholders

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iv. Develop in-vitro production guidelines for rapid multiplication of clean planting materials and to optimize in-
vitro production processes for the various varieties of local root and tuber crops.

v. Improve farmers’ access to a diversity of high yielding, disease resistant root and tuber clones appropriate
to their needs and other end-users.

vi. Employment of botanical products to control plant parasitic nematodes in yam production to protect the
environment and man”.

vii. Assess the economic importance and environmental implications of technologies being developed.

viii. Create a genetic database that will serve as a source of information for the development of DNA markers
with specific traits for easy germ-plasm characterization improvement.

ix. Provide genomic gene map of selected mandate root crops.

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 (e.g., 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.
3.0 RESULTS/OUTPUTS

The year under review witnessed significant progress towards achieving project outputs under the four components with some very important results and outputs. Below are some significant results and outputs reported under each of the four components.

3.1 COMPONENT ONE: Enabling conditions for regional cooperation in technology generation and dissemination

3.1.1 Results from the Directorate of Agricultural Extension Services

The Directorate of Agriculture Extension Services (DAES) responsible for dissemination and adoption of developed technologies, in collaboration with the CSIR through RELCS has produced a catalogue of thirty one (31) researchable farmers’ constraints from the ten (10) regions of the country which are currently being addressed by researchers through the CARGS. Regional action plans on extension activities have been produced for implementation at the district level in all the regions. The RELCS manual has been reviewed and is in the process of being validated. To improve dissemination of proven technologies to farmer’ and stakeholders through e-Extension, the Directorate has produced concept notes and terms of reference on e-extension and has since submitted it to the World Bank. The Directorate has also engaged the services of six (6) consultants to develop a framework and to design an operational plan for the e-Extension.

Adoption of improved technologies has been enhanced through the establishment of community demonstration sites. As a result, thirty (30) district officers from ten (10) piloted districts have been trained on guidelines for the establishment of field demonstrations on improved cassava varieties. Furthermore, nine (9) community demonstration sites have been established in seven (7) pilot districts in seven (7) districts for the multiplication of improved cassava planting materials. The nine (9) community demonstration sites established in seven (7) pilot districts are located at: (Atwima Kwanwoma, South Dayi, Kwahu South, Agona East, Agona Ahanta, Asutifi and Dangme West) in seven (7) regions for multiplication of improved cassava planting materials. These activities were carried out in collaboration with Directorate of Crop Services DCS. The Directorate of Agriculture Extension Services (DAES) organized (10) regional review/planning sessions in the regions in collaboration with CSIR and other stakeholders in agricultural development in the country.

To ensure achievement of results, DAES conducted effective monitoring in all seven districts. The Directorate also collaborated with the Root and Tuber Improvement and Marketing Programme (RTIMP) to acquire various planting materials for the seven (7) 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.

3.1.2 Results from Directorate of Crop Services Directorate

The National Varietal Release Committee (NVRC), a body responsible for registration and release of genetic materials initiated a process in 2009 to harmonize national procedures for the release of genetic materials. This process is at the final stage.

Country procedures for registration of genetic materials and pesticides were also aligned with that of ECOWAS and a bill to that effect submitted by Cabinet has been passed into law by Parliament. This activity was spearheaded by the Plant Protection and Regulatory Directorate in collaboration with Crop Services Directorate and other...
stakeholders. A manual of protocols for Distinctness, Uniformity, Stability (DUS) and Value for Cultivation or Use (VCU) for Cassava, Yam and Maize has been developed, finalized and validated at a workshop with stakeholders. The committee has also developed a document on DUS and VCU for groundnut, rice, sweet potato, sorghum, and cowpea to be validated in the first quarter of 2011 at a validation workshop. The developed protocols for the above crops have been sent to the Research Institutes and the Universities for their comments. These protocols are based on those proposed by CORAF/WECARD. Data on performance of released plant genetic materials (varieties) were collated, analyzed and documented. Best practices such as use of released improved planting materials and also adoption of Good Agricultural Practices are being disseminated to farmers for adoption in collaboration with DAES. The National Varietal Release Committee (NVRC) developed DUS and VCU protocols for five (5) crops including Sweet Potato, Rice, Sorghum, Cowpea and Groundnut through a series of workshops and meetings.

With regards to technology dissemination, the Directorate of Crop Services (DCS) collaborated with the DAES to build the capacities of District Directors of Agriculture in the establishment of demonstration for improved released varieties. The Directorate developed guidelines for the demonstration/multiplication of Root and Tubers (cassava). Plans are underway for monitoring visits to the multiplication sites. Work has also begun on the collation of data on released and existing varieties, while data on developed technologies that have not been released are also being gathered.

**Environmental Management Plan**

During the 3rd and 4th quarter of the year, the environmental management plan was pursued. Field visits were undertaken by the resource persons to discuss potential environmental impacts with researchers and other stakeholders in Accra, Kumasi and Tamale. Following the field visits a stakeholder workshop was held where a draft environmental management framework was presented to stakeholders and issues from the field were discussed and comments and input collected by the resource persons. Subsequently, a final draft of the environmental management plan of WAAPP has been completed and validated.

**Communication**

With respect to activities on communication, the appointed communications manager attended a sub-regional technical workshop for the implementation of the WAAPP communication strategy in Ouagadougou, Burkina Faso from 14-16 December, 2010. The communication work-plan and budget for 2011 has been prepared for WAAPP-Ghana to be executed in 2011.
3.1.3 Results from the Environmental Protection Agency and the Plant Protection and Regulatory Services Directorate

The Plant Protection and Regulatory Services Directorate (PPRSD) of the Ministry of Food and Agriculture (MOFA) in collaboration with the Environmental Protection Agency (EPA) is implementing a component of the West African Agricultural Productivity Programme (WAAPP) which is to achieve an objective of the establishment of common regulation for the registration of pesticides in West Africa.

The main results achieved were:

i. Draft bio-efficacy protocols for biological evaluation of insecticides for selected humid crops namely; mango, cocoa, oil palm, plantain/banana, vegetables and roots and tubers such as cocoyam, cassava, sweet potato and yam and associated pests and disease combinations have been reviewed and validated. However, there are still on-going bio-efficacy trials of four herbicides, Bellazine, Stomp, Atrazine and Diuron on cassava at two locations in the forest zone.

These results were achieved under the following outputs;

a. Draft specific protocol for biological evaluation of insecticides to control the oil palm leaf miner
b. Draft specific protocol for biological evaluation of insecticides against major pests of vegetable, cocoa, sweet potato (weevils and butterflies), cassava and yam
c. Draft specific protocol for biological evaluation of fungicides to control black sigatoka disease of banana/plantain, mango anthracnose and root rot of cocoyam

In achieving these results all relevant stakeholders were involved in the implementation of planned activities. The services of consultants were not required in these instances.

Following the regional steering committee meeting in October 2010 at Bamako where emphasis was laid on communication, WAAPP-Ghana produced and distributed nationally a thousand copies (1000) of wall calendars, five hundred (500) folders and two thousand (2000) envelopes advertising WAAPP and also to the other WAAPP participating countries. A communication manager and a communication committee have been put in place.

3.2 COMPONENT TWO: National Centre of Specialization (NCOS)

3.2.1 Results from the National Center of Specialization

Research activities at NCOS have intensified across all four mandate root and tuber crops. The projects at the NCOS may be categorized broadly into two groups: those involved with crop improvement and those which deal with other subject areas. The crop improvement projects are well on course.

3.2.2 Results for Cassava

In the case of cassava, four varieties have already been released under WAAPP. The varieties are; CSIR-CRI Ampong, CSIR-CRI Buroni bankye, CSIR-CRI Sika bankye and CSIR-CRI Otuhia. These varieties which have the potential of increasing yield by more than 70% over the control are being promoted and disseminated in various communities.
agro-ecologies for adoption and to increase farmer incomes. Generally, the new varieties are superior to the Afisiafi and Abasafitaa varieties, in terms of yield, dry matter and resistance to diseases and pests. They are also phenotypically distinct in terms of branching habits, stem and petiole colour.

Table 1 shows the Characteristics of the four newly released cassava varieties

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>Proposed Name of Variety</th>
<th>Mean Root Yield</th>
<th>Maturity Period (Months)</th>
<th>Total Dry Matter</th>
<th>Uses</th>
<th>CMD Resistance</th>
<th>Cyanide Level</th>
<th>Fresh Root colour</th>
<th>Petiole colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>AW 1</td>
<td>CSIR-CRI Buroni bankye</td>
<td>59T/ha</td>
<td>12</td>
<td>35.5</td>
<td>Flour, Starch, poundability</td>
<td>resistant</td>
<td>Very low</td>
<td>Deep brown</td>
<td>Purple</td>
</tr>
<tr>
<td>AW 18</td>
<td>CSIR-CRI Ampong</td>
<td>40T/ha</td>
<td>12</td>
<td>32.8</td>
<td>Flour and bakery product</td>
<td>resistant</td>
<td>Very low</td>
<td>Brown</td>
<td>Yellow green</td>
</tr>
<tr>
<td>AW 34</td>
<td>CSIR-CRI Sika bankye</td>
<td>56T/ha</td>
<td>12</td>
<td>25.7</td>
<td>Starch, gari</td>
<td>Tolerant</td>
<td>Very low</td>
<td>Brown</td>
<td>Yellow green</td>
</tr>
<tr>
<td>K 25</td>
<td>CSIR-CRI Otuhia</td>
<td>65T/ha</td>
<td>12</td>
<td>38.6</td>
<td>Starch, flour</td>
<td>Resistant</td>
<td>Very low</td>
<td>Brown</td>
<td>Yellow green</td>
</tr>
</tbody>
</table>
Evaluation of PRE emergence herbicides for weed control in cassava production using the following herbicides: Bellazine (atrazine + cyanazine) @ 1.5l/ha + 1 HW; Bellazine (atrazine + cyanazine) @ 1l/ha + 1 HW; Diuron (Karmex) @ 0.75 g/l + 1 HW; Diuron @ 0.5 g/l + 1 HW; Hand weeding 3 times was done at Fummesua and Wenchi. Preliminary analysis indicated that initial injury symptoms on cassava in Bellazine or Diuron treated plots but by 3 months after treatment most plants had recovered. Frequency of weeding was 2 times for all chemically treated plots and 3 times for the hand weeded only plots. Initial weeding was 3–4 weeks after planting (WAP) for the manually controlled plots while first weeding was delayed to between 6-8 WAP for chemically treated plots. Investigating the Effect of Cassava Variety and Planting distance (Density) on Weed growth it was observed that Canopy closure was earlier on plots planted to Bankyehema (branching) than Agbelifia. The canopy spread of Bankyehema was also wider (implying light interception by weed may be reduced comparatively) than Agbelifia. Spacing did not seem to be affected.

3.2.3 Results for Yam

In the case of yam, very stable and high yielding Dioscorea alata (D. alata) genotypes with high tolerance to anthracnose disease have been identified and will be further evaluated on-farm in 2011 for release in 2012. Experimental trial to determine a better yield for yam using vine multiplication technique yielded positive and useful
results. Preliminary results of the vine technology show that a multiplication ratio of 1:240 as compared to 1:6 in the traditional method is achievable. Furthermore, five different plant parasitic nematode species, all key pests in yam production were identified in a research project on managing plant parasitic nematodes with botanicals in yam production. Two (2) studies were conducted under the yam improvement programme in two (2) communities in each of the three (3) agro-ecologies in the Ashanti for the selection of nine (9) varieties of *D. cayenensis*. These studies were participatory; farmers assessed the materials based on pests and disease tolerance, vine and leaf characteristic. Six (6) farmer filed days involving a total of two hundred farmers were organized. Harvesting of trial farms were also carried out. Two projects on integration of animal manure, chemical fertilizer and preceding system for plant nutrition, disease and pests control under non-staking in yam production and ridging as a mechanical alternative to mounding for yam production have been concluded with positive results.

![Picture: Yam demonstration plot](image)

3.2.1.3 Results for Cocoyam

Also, after two years of on-station and on-farm testing, five prospective cocoyam (*Xanthosoma spp*) accessions for future release have been identified. These are SW 011, SCJ 98/005, ADE 011, AGA 97/162, BD 96/183. In September/October 2011, first inspection of cocoyam involving stakeholders and variety release committees would be conducted.
In February /March 2012, the four genotypes of cocoyam would be released. Activities under the cocoyam improvement programme included:

i. Filed days with farmers during harvesting of trials
ii. Collection of data on commel yield and yield components
iii. Workshop on farmers’ criteria on selecting among the genotypes including local type,
iv. Establishment of four on-farm trials and a demonstration plot

3.2.5 Results for Sweet Potato

For sweet potato, the crossing block to identify suitable genotypes for crop improvement has been established. Demonstration activities to revive interest in the eight varieties of sweet potato released by CSIR-CRI some time
ago (not under WAAPP) are also on-going. Germplasm collections have been characterized and evaluated for
documentation, identification of parental genotypes and development of elite lines based on specific desirable traits
and incorporation of the desired traits into breeding populations have been done. Back-up fields for the
conservation of germplasm characterized in the second half of 2009 have been established at Fumesua and Ejura.
These were planted on 6th May 2010 and 11th May 2010 respectively. Acquisition of more orange-fleshed sweet
potato (OFSP), non-sweet or low sugary sweet potato genotypes from CIP and other regional centres known for
sweet potato (e.g. Asia – especially China, Japan, Indonesia) on supply of germplasm was stepped up in 2010.

Nine sweet potato genotypes and a local check were assessed for resistance/tolerance to the sweet potato virus
disease (SPVD) at Fumesua, Pokuase and Ohawu which are hot spots for the disease.

Picture: Improved sweet potato demonstration plot

Results at Fumesua sweet potato trial farm indicate that three genotypes namely, Naspot 1, Apomden and Jukwa
orange were slightly infected with mean severity ratings of 1.0, 1.0 and 2.3 respectively and mean % infection 2.0,
2.0 and 15.7. 1990-62.1 and Mohc were moderately infected each with mean ratings of 2.7. and mean % infection of
43.7 and 16.7 respectively. The rest were considered as severely infected. At Pokuase, the most promising
lines in terms of tolerance to SPVD were Tanzania (mean % infection of 2.9 and mean severity score of 1.5),
Ukerewe (mean % infection of 1.9 and mean severity score of 1.7) and Naspot 1 (mean % infection of 3.0 and
mean severity score of 1.7). Jukwa Orange and Mohc were moderately infected with mean % infection of 27.4 and
10.8 respectively and mean severity scores of 2.5 and 2.7 respectively. While that at Ohawu, the most promising
lines were Ukerewe (mean % infection of 2.0 and severity score of 2.0), Naspot 1 (mean % infection of 3.9 and
mean severity score of 2.3) and Apomden (mean % infection of 3.9 and mean severity score of 2.3). For the sweet potato programme, there is an ongoing seed multiplication programme. A marketing programme is also being carried to encourage the patronage of sweet potato and its products. More specifically, the programme engaged in such activities as; Maintenance and conservation of local and exotic germplasm, exchange of germplasm within the sub-region, hybridization of parental clones by introgression of desirable genes into adapted germplasm using conventional and Marker Assisted Selection (MAS), Multi-locational (on-station and on-farm) testing of promising genotypes to generate new varieties, Produce and supply healthy planting materials of released varieties to seed industry, establishing of community based, sustainable seed production, distribution systems operating in targeted regions and the training of farmers in rapid seed multiplication and conservation/storage techniques and the testing of adaptability and acceptability of sweet potato varieties through farmer participatory research.

In 2010, nine sweet potato genotypes were assessed for resistance/tolerance to the sweet potato virus disease (SPVD) at Fumesua, Pokuase and Ohawu which are hot spots for the disease. The experimental design was randomized block with three replications. The middle row plants were visually assessed for the presence of the virus at three months after planting. Disease ratings were based on a 1-5 scale where 1 represented apparently no symptoms and 5 very severe symptoms. Plants which scored 20 marks and below were considered tolerant. Percentage infection for each genotype was determined as total plants infected / total number of plants per each plot.

3.2.6 Results from Post-harvest and Socio-economics projects

Projects that involved weed control, plant nutrition, pest and disease control, socioeconomics and post-harvest management of Root and Tuber crops are well established. Due to the huge demand on the budget by research activities it was recommended that some priority (70%) should be placed on cassava and yam research in order to ensure focus. The various commodity groups at the NCOS also presented elaborate plans for the dissemination of improved technologies generated.

3.2.7 Results from Bio-technology

The use of biotechnology techniques to develop and disseminate high and stable yielding, disease and pest resistant root and tuber varieties with improved quality in terms of consumer acceptance, processing and nutritional value though suffered some initial setback due to technical reasons has progressed steadily and is beginning to yield some positive results. Considerable progress has been made in the use of tissue culture to produce clean planting materials for yam, cassava, cocoyam and sweet potato. A biotechnology training workshop to introduce participants to the application of biotechnology tools available for crop improvement was carried out from July 19 to July 23 2010 at the biotechnology laboratories in CSIR-CRI, Kumasi.

Results from Human Resource Planning at NCOS

The visiting scientists and study tours programme whose main purpose was to ensure the full benefits from the spillover of generated improved technologies among participating countries in the West African Sub-region in the spirit of regional cooperation and integration has facilitated the movement of nineteen (19) scientists from the Ministry of Food and Agriculture, CSIR-SARI, CSIR-CRI and CSIR-Head office on the study tour programme to Senegal and

Comment [VMS]: Could you specify the institutes where these 19 scientists came from.
Mail from Ghana. The scientists familiarized themselves with the technologies and research available in those countries, they also interacted with scientists, farmers and stakeholders to look at areas of cooperation in technologies and knowledge exchange as well as identified areas of mutual interest. It is hoped that by end of the first phase of the project 10 Research Scientists from each participating country would have exchanged and shared technology through collaborative efforts of the programme. The exchange programme involves the possibility of researchers engaging in sub-regional trials of elite clones or genetic materials towards evaluation and subsequent release in these countries. This will help spread and disseminate improved technologies developed in the various participating countries within the sub region.

Local/Foreign Courses and Conferences.

In the course of the year, four candidates; three (3) from CSIR-CRI and one (1) from CSIR-Head office were offered fellowship to pursue various MPhil/MSc courses in (Post –harvest technology, Agricultural Economic Agribusiness and Extension and Project Management). Additionally, two research scientists from the NCOS were sponsored to attend various foreign short courses, while four research scientists were also sponsored to attend international conferences: in area of (a.) WAITRO 20th Biennial Congress General Assemble in Dubai, United Arab Emirates; b.) International rice congress, in Hanoi, Vietnam, c.) International Conference on Biological Science and Engineering, Venice, Italy).

3.2.8 Collaboration at NCOS

To achieve expected results, the NCOS adopted a participatory breeding and field evaluation approach. Sensitization of different stakeholders on the attributes of the new varieties was carried out and the establishment of demonstration fields in at least three agro-ecologies in collaboration with MoFA. The Centre is also linking up with RTIMP to multiply and disseminate the new varieties as one of the strategies adopted to achieve results.

3.3 COMPONENT THREE: Funding of Demand-Driven Technology Generation and Adoption

3.3.1 Results of CARGS Projects

All projects have taken off successfully, albeit after initial delays. However, the projects are currently at various stages of implementation. Out of the eight CARGS projects seven are fully established on the field, including one fully developed barn for yam storage. However, one (1) CARGS project (Screening cassava genotypes for effective Management of tuber rots (Polyergus sulphurous) attacking cassava in Greater Accra) had a difficulty at the initial stage of implementation. This problem has since been overcome and researcher is optimistic of achieving results within the stipulated time of the project provided funds are released on time. At time of reporting, preliminary investigation by the researcher had confirmed hotspots of tuber rot in cassava and incidence as well as severity of the disease determined. In addition, farmers’ knowledge, perception and experiences concerning prevalence, spread and control of cassava root rot were also documented.

The CSIR WAAPP coordination unit carried out a series of activities in pursuit of the objectives under component three and the overall project development objectives
In order to obtain fresh problems for scientists to compete for, during the next batch of CARGS projects, the CSIR in collaboration with DAES and other stakeholders in agriculture development organized ten (10) regional review/planning sessions in the country. Thirty (31) Researchable Farmers’ constraints were catalogued from the ten (10) regions and submitted to CARGS Board for necessary action. To this effect concept notes were invited from researchers on how to address these problems. Eighteen (18) concept notes were received of which seven (7) were shortlisted and awaiting approval from CARGS board.

Monitoring visits to assess progress of all research funded projects were conducted by the CSIR. This exercise turned out to be very useful since feedback given scientists aided in the overall progress of projects towards achievement of results.

New researchable problems from farmers from various RELC planning sessions rolled out during the year under review attracted eighteen (18) concept notes from researchers. These were reviewed by a Technical Committee, and seven (7) were recommended for funding. These projects are short term ones and are expected to be completed within the life span of WAAPP.

The CARGS board collaborated with DAES to engage farmers and other stakeholders through a series of workshops (RELC planning sessions) training to ensure that research project under the scheme are demand driven, a key output for adoption of improved developed technologies.

3.3.2 Results of Non-Competitive Research Grant Scheme Projects

A total of 17 Non-Competitive Research Grant Scheme (NCRGS) projects are being funded. Of these, eight (8) are still at the initial stages, while nine are well established on the ground.

Three years into the implementation of the WAAPP, none of the CARGS and the Non-Competitive Research Grant Projects has been completed but based on field observations and on discussions with scientists it was realized that majority of the projects are on schedule with well laid out work plans and budget.

Assessment of the projects also indicated that all projects’ objective still remains valid and the methodologies being used were client-based in most instances with strong collaboration between researchers’ and farmers in a bid to facilitate adoption of improved developed technologies. Project execution rates are encouraging. The field demonstrations were on mainly community-owned plots. This kind of arrangement had its positive and negative effects. In a situation where the group existed as an FBO before the project, a sense of ownership of the project by the members was high. Good examples are Dr. Fening’s Up-scaling of cassava/legume intercropping rotation technology project at Wenchi, and Addiwan, and Mr. Ababio’s fertilizer management on sweet potato project at Jukwa-Krobo.

A three (3) year project on developing value added convenience products from yam for the urban markets in its first year of implementation has developed a technology for developing value-added products from yam at laboratory scale. The developed technology is up-scaled at the pilot-scale and has been validated at a validation workshop with collaborating food industries. The developed products have also been market-tested in conjunction with collaborating food industries.

Results so far from the project indicate that phenols and enzymes (polyphenol oxidase and eroxidise) activities in yams have been associated with bitter after-taste and discoloration in cut yam tissues and there is significant differences in the rate of discoloration of frozen chips (1cm x6cm) cut from sections (head, middle and tail). This
project on developing value-added convenience products from yam for the urban markets by Dr. P-N. T. Johnson & S. Graham-Acuah at the Food Research Institute has undertaken various activities which involved

- Investigating the appropriate pre-treatments required during the processing of yams into convenience forms
- Determining the processing variables for the frozen chips and dried chips and flour,
- Investigating the reconstitution and sensory parameters
- Investigating the appropriate pre-treatments required during processing of yam.

Under the Activity are a number of sub-activities. These are;

i. Determination of the distribution of polyphenol oxidase and peroxygenase in different sections of the yam tuber.
ii. Determination of the effect of antioxidants (ascorbic acid, metabisulphite) treatment on the quality of yam chips.
iii. Determination of the effect of blanching on enzymes (polyphenol oxidase and peroxidase) activities in cut yams.
iv. Determination of the effect of blanching on the textural properties of fried chips.

3.3.3 Results from Project Coordination, Management, Monitoring Evaluation

During the period under review, the Project Coordination Unit in collaboration with CSIR and the World Bank successfully carried out the mid-term review of the project and the aide memoire has been released. Following a recommendation from the mid-term review, a project management committee has been formed to give technical and managerial direction to the project. These committee meetings have been institutionalized to be held monthly. From June 2010, five (5) meetings were held and minutes circulated.

A workshop on the harmonization of the indicators of WAAPP which was organized by WECARD/CORAF in collaboration with the Project Coordination Unit of WAAPP-Ghana was held from 28th-30th June, 2010 at Accra, Ghana. At the end of the workshop, an updated version of the results framework was produced. This workshop was attended by the three new M&E Officers of WAAPP respectively from MOFA, CSIR and CRI. The objective of the workshop was to align the indicators of WAAPP 1A with that of WAAPP 1B. At the end of the workshop, an updated version of the results framework matrix was produced which was a harmonized WAAPP 1A and WAAPP 1 B logical frameworks.

The national steering committee meeting was held from September, 2010 at Noda hotel in Kumasi. A field trip to the National Center of Specialization (Crop Research Institute, Kumasi) was organized for steering committee members to see the work going on at the center. At this meeting the Annual Work Plan and Budget (AWPB) was comprehensively and dispassionately discussed and approved. The meeting also discussed the implementation status of WAAPP, progress towards achieving objectives and challenges bugging progress. It was realized that a trigger under the NCOS relating to visiting scientists was becoming a problem since most scientists were not interested. It was identified that low motivation was to blame for this problem; hence a number of suggestions were made to overcome this hurdle.

The regional steering committee meeting was held from 25-29, October, 2011 in Bamako, Mali. A delegation from Ghana attended the meeting and also mounted an exhibition. Participants also went on a monitoring tour of the Mali
WAAPP project sites to observe progress. Ghana presented the annual work-plan and budget for 2011 as well as its activities on communication. At the end of the meeting recommendation were made for stakeholders to address. The annual work-plan and budget for 2011 was approved.

On 1st December, 2010 during a video conference held at the World Bank office in Accra with Ghana, Mali, Senegal and CORAF an enhanced version of the results framework was presented to the countries. WAAPP Ghana has completed the target values for the project outcome indicators for the period (2010-2012). The procurement processes have been successfully undertaken for the construction of the biotechnology laboratory at the NCOS and a sod-cutting ceremony was held in December, 2011 for commencement of work. Thirty (30) units of Dell Vostro 200 Desktop computers and thirty (30) of Dell latitude E5500 laptop computers were also supplied under a contract for the supply of computers under WAAPP.

The M&E officers took part in a presentation and panel discussion on monitoring and evaluation organized by the Sweet Potato Support Platform for West Africa (SSP-WA) which was held on November 23 at the Institute of Education at the University of Cape Coast, Ghana. After the discussion it was agreed that it is important for M&E to have a baseline study, keep a beneficiary list including addresses and contact details as well as collect gender disaggregated data.

Monitoring field visits were undertaken to WAAPP project sites for direct and participatory observation of physical status of individual project implementation. The M&E team was made up of the WAAPP M&E officers and four independent evaluators recruited by CSIR. The team carried out verification visits between 11th and 28th October, 2010 alongside interviews with lead scientists, collaborators and key stakeholders. Some of the key findings are discussed below:

- All the projects are progressing as stated in the project proposals. The stated objectives are still valid. With the exception of few projects, the methodology as stated in the project proposals are being followed.

- The field demonstrations of some of the non-competitive research projects were on community-owned plots. This kind of arrangement had its positive and negative effects. In a situation where the group existed as an FBO before the project, a sense of ownership of the project by the members was high. Good examples are Dr. Fening’s Up-scaling of cassava/legume intercropping rotation technology project at Wenchi, and Adidwan, and Mr. Ababio’s fertilizer management on sweet potato project at Jukwa-Krobo.

- All projects have taken off successfully, albeit after initial delays. However, the projects are currently at various stages of implementations. Out of the eight CARGS projects seven are fully established on the field. However one CARGS funded project was not yet established due to late release of the second tranche of funds. A total of seventeen (17) Commissioned projects are being funded and out of these, eight (8) are still at the initial stages, while nine are well established on the ground.

- The crop improvement projects at the NCOS are well on course. In the case of cassava, four varieties have already been released under WAAPP. In the case of yam, very stable and high yielding D. Alata genotypes with high tolerance to anthracnose have been identified and will be further evaluated on-farm in 2011 for release in 2012. Four promising genotypes of cocoyam have been identified after two years of on-station and on-farm testing.
4.0 STRATEGIES OF IMPLEMENTATION

In pursuit of the project objective various implementation strategies were adopted to ensure desired results, DAES conducted effective monitoring in all seven 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 Directorate was also in constant collaboration with other implementing agencies to achieve the desired outputs earmarked for the year.

The PPRSD also involved all relevant stakeholders in the implementation of planned activities.

At the NCOS various strategies were employed to yield the requisite results. Key amongst them is the participatory breeding and field evaluation approach. Sensitization of different stakeholders on the attributes of the new varieties was carried out and the establishment of demonstration fields in at least three agro-ecologies in collaboration with MoFA. Linking up with RTIMP to multiply and disseminate the new varieties was one of the strategies adopted to achieve results.

The CARGS board collaborated with DAES to engage farmers and other stakeholders through a series of workshops (RELC planning sessions) training to ensure that research project under the scheme are demand driven, a key output for adoption of improved developed technologies.

The board also adopted a participatory approach (researchers, farmers AEs and other stakeholders) in identifying researchable constraints to agricultural development across the entire country, and to strengthen a transparent funding mechanism for research to address the constraints at national level.

The CSIR embarked upon vigorous M&E of all projects awarded under CARGS and NARS to ensure that projects are established in line with their objectives and are being implemented with a well laid work plan. The M&E system also ensured that project are progressing according to schedule. The services of a team of M&E consultants was solicited to complement the WAAPP M&E officers to conduct an independent assessment of all the research projects under CARGS and NARS.

The Project Coordination Unit has adopted a strategy of holding monthly project management committee meetings to solicit progress on implementation on a monthly basis as well as assigning responsibilities for tasks which have not been performed.

Management has adopted measures for reducing unretired funds held up by the implementing agencies by reducing their outstanding balances from the previous funds released to them and this is yielding results as there is marked improvement in retire of funds.

In order to address the weak M&E system of the project, two (2) additional M&E officers from CSIR and CSIR-CRI have been recruited during the reporting period as a strategy to strengthen the M&E system.
5.0 BUDGET EXECUTION

DISBURSEMENT TO DATE

The disbursement rate currently since the inception of the project is 46% which is made up of actual expenditure and commitments. The disbursement rate based on actual expenditure alone is 35%.

During the year 2010 the total funds received from the World Bank for WAAPP stood as US$2,423,200.73. Out of this figure a total of US$2,266,241.05 has been expended by MOFA and CSIR WAAPP during the year, representing 94% of the total IDA funds received this year 2010. The Budget for the year was US$4,407,230.00, and out of it the amount spent stood at US$2,266,241.05, leaving a balance of US$2,140,988.95. The project has four components and each component has been budgeted separately as below:

Table 2A: BUDGETED FIGURES FOR EACH COMPONENT:

<table>
<thead>
<tr>
<th>COMPONENTS</th>
<th>BUDGET 2010 US$</th>
<th>DISBURSEMENT US$</th>
<th>PERCENTAGE OF DISBURSEMENT (%)</th>
<th>UNDISBURSED AMOUNT / BALANCE US$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Component. 1.</td>
<td>339,000.00</td>
<td>80,566.15</td>
<td>24%</td>
<td>258,433.85</td>
</tr>
<tr>
<td>Component. 2.</td>
<td>2,958,000.00</td>
<td>977,665.50</td>
<td>33%</td>
<td>1,980,334.50</td>
</tr>
<tr>
<td>Component. 3.</td>
<td>804,190.00</td>
<td>1,005,645.17</td>
<td>Over 100%</td>
<td>(201,455.17)</td>
</tr>
<tr>
<td>Component. 4.</td>
<td>306,040.00</td>
<td>202,364.23</td>
<td>66%</td>
<td>103,675.77</td>
</tr>
<tr>
<td>TOTAL US$</td>
<td>4,407,230.00</td>
<td>2,266,241.05</td>
<td>51%</td>
<td>2,140,988.95</td>
</tr>
</tbody>
</table>

Looking at the above Table 2A, all the expenditures under each component are within the Budget, except component 3, which was over spent by US$ 201,455.17 due to the fact that component 3 was under-budgeted.
TABLE 2B: DISBURSEMENT PERFORMANCE BY CATEGORY IN RELATION TO TOTAL LOAN AMOUNT AS AT 31ST DECEMBER, 2010.

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>LOAN AMOUNT (US$)</th>
<th>PREVIOUS DISBURSEMENT (US$)</th>
<th>CURRENT DISBURSEMENT</th>
<th>CUMMULATIVE DISBURSEMENT OF DISBURSEMENT TO DATE (US$)</th>
<th>PERCENTAGE OF DISBURSEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>01. CIVIL WORKS</td>
<td>1,100,000.00</td>
<td>-</td>
<td>-</td>
<td>1,478,966.72</td>
<td>1,478,966.72</td>
</tr>
<tr>
<td>02. RESEARCH GRANTS</td>
<td>4,023,000.00</td>
<td>358,216.98</td>
<td>286,522.32</td>
<td>841,418.02</td>
<td>2,269,487.17</td>
</tr>
<tr>
<td>03. GOODS</td>
<td>2,270,000.00</td>
<td>346,477.90</td>
<td>31,110.88</td>
<td>180,421.49</td>
<td>704,185.13</td>
</tr>
<tr>
<td>04. TRAINING</td>
<td>1,761,000.00</td>
<td>48,825.55</td>
<td>5,031.78</td>
<td>207,687.42</td>
<td>261,544.75</td>
</tr>
<tr>
<td>05. CONSULTING SERVICES</td>
<td>612,000.00</td>
<td>9,809.00</td>
<td>-</td>
<td>19,099.91</td>
<td>74,683.61</td>
</tr>
<tr>
<td>06. OPERATING COSTS</td>
<td>2,834,000.00</td>
<td>1,276,916.55</td>
<td>189,493.49</td>
<td>597,790.54</td>
<td>2,064,200.58</td>
</tr>
<tr>
<td>07. SUPPORT TO CORAF</td>
<td>1,000,000.00</td>
<td>109,563.47</td>
<td>-</td>
<td>-</td>
<td>109,563.47</td>
</tr>
<tr>
<td>08. UNALLOCATED FUND</td>
<td>1,400,000.00</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>15,000,000.00</strong></td>
<td><strong>2,149,809.45</strong></td>
<td><strong>512,158.47</strong></td>
<td><strong>2,546,580.93</strong></td>
<td><strong>6,962,631.43</strong></td>
</tr>
</tbody>
</table>
### Table 2C: Disbursement Performance by Component in Relation to Total Loan Amount As at 31st December, 2010.

<table>
<thead>
<tr>
<th>Expenditure by Components</th>
<th>Loan Amount To Date (US$)</th>
<th>Previous Disbursement (US$)</th>
<th>Current Disbursement Fourth Quarter (US$)</th>
<th>Cumulative Disbursement 1st to 3rd Qtr (US$)</th>
<th>Commitments (US$)</th>
<th>Total Disbursement To Date (US$)</th>
<th>Percentage of Disbursement 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Enabling Conditions for Regional Cooperation in Technology generation and dissemination</td>
<td>1,534,000.00</td>
<td>44,022.69</td>
<td>19,901.95</td>
<td>60,664.20</td>
<td>-</td>
<td>124,588.84</td>
<td>8%</td>
</tr>
<tr>
<td>2. National Centre of Specialization (NCOS)</td>
<td>6,461,000.00</td>
<td>641,345.83</td>
<td>183,108.63</td>
<td>794,556.87</td>
<td>2,546,580.93</td>
<td>4,165,592.26</td>
<td>65%</td>
</tr>
<tr>
<td>3. Funding of Demand-driven Technology Generation and Adoption.</td>
<td>4,887,000.00</td>
<td>981,514.49</td>
<td>248,463.45</td>
<td>757,181.72</td>
<td>-</td>
<td>1,987,159.66</td>
<td>41%</td>
</tr>
<tr>
<td>4. Project Coordination, Management, Monitoring and Evaluation.</td>
<td>1,118,000.00</td>
<td>373,362.97</td>
<td>60,684.44</td>
<td>141,679.79</td>
<td>-</td>
<td>575,727.20</td>
<td>52%</td>
</tr>
<tr>
<td>5. CORAF - Subsidiary Financing</td>
<td>1,000,000.00</td>
<td>109,563.47</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>109,563.47</td>
<td>11%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15,000,000.00</strong></td>
<td><strong>2,149,809.45</strong></td>
<td><strong>512,158.47</strong></td>
<td><strong>1,754,082.58</strong></td>
<td><strong>2,546,580.93</strong></td>
<td><strong>6,962,631.43</strong></td>
<td><strong>46%</strong></td>
</tr>
</tbody>
</table>
From Table 2B, there was no disbursement for civil works for the construction of the bio-technology laboratory as the procurement process was only concluded in December, 2010.
6.0 PROBLEMS ENCOUNTERED

Most of the constraints encountered during the process of project implementation bordered on funds and logistics

- Poor retirement of funds by implementers also hampered the smooth release of funds.
- Lack of irrigation facilities at NCOS for maintaining trials during the dry season and adequate trained staff for some specialist areas is seriously affecting on-station research trial farms. Trials at Ejura and Bodwease could not be established due to unreliable rainfall

The biotechnology research activities were constrained by the lack of:

- Logistics such as appropriate vehicle for sampling materials from field for lab analysis as well as for the transportation of thermo liable chemicals and reagents
- Adequate number of trained technicians
- Constant, unannounced interruptions in electricity supply
- Lack of appropriate microscopes to enhance training of staff in meristem culture techniques

Almost all investigators under the CARGS and Non-Competitive Research Grant Scheme complained that late and inadequate release of funds was hampering progress of work. However, the project accountant has attributed the problem to the inappropriate methods of retirement of tranches of funds given to scientists and therefore encouraged them to follow the appropriate and laid down procedures for the retirement of funds given for research activities.

Some researchers have also complained of the grazing activities of animals that are destroying trial fields, thereby hampering progress of work. Additionally, unfavorable changing weather patterns has also impacted negatively on research work.
7.0 RECOMMENDATIONS

Some of the suggested recommendations identified include:

i. The genotypes Naspot 1,Jukwa orange,Mohc,1990-62.1 and Apomden which showed slight to moderate SPVD infection could be considered for on-farm testing using clean planting materials.

ii. In the case of sustainable sweetpotato production, processing and market information dissemination for poverty reduction and rural stability in West Africa; it was recommended that Ogyefo and Resisto can be reliable parents in generating new varieties through crosses.

iii. With regards to the creation of genomic database of elite local varieties of some root and tuber crops (Yam, sweet potato, cassava and frafra potato) to provide vital information for breeders, there is Need for further evaluation of PGRRI yam varieties collection towards releasing more varieties.

iv. Based on the analysis of Ex-ante Economic on returns to investment on sweet potato research and extension in southern Ghana, the following were recommended;

   a. There is the need to strengthen farmer to farmer extension

   b. Farmers should be encouraged to use improved technologies

v. Provision of irrigation facilities to irrigate conserved germplasm and crossing block, particularly during the dry season.

vi. Business contacts platform developed between farmers and should be sustained to improve productivity along the value chain.

vii. Researchers are advised to use appropriate procedures to retire research fund given them

viii. Adequate time consultation with land owners in acquiring land for field trials.

It is also recommended that implementing agencies should send their returns on time to enable management prepare withdrawal applications for timely replenishment.

In addition a workshop is recommended by the Project Coordination Unit in collaboration with CSIR for the first quarter of 2011 for researchers and other implementers on to sensitize them on the M&E Results framework and reporting format among others.
PRODUCTION STATUS REPORT

Introduction

Procurement management under WAAPP is implemented through the collaboration between the procurement teams from MOFA and CSIR and the team is mandated to undertake all procurements under the programme.

Procurement activities undertaken this year under the programme included the acquisition of computer and office equipment (on-going), laboratory equipment, the bidding process for the construction of National Centre of Specialization (Biotechnology Complex) and consulting services for infrastructure designs and financial audits in line with the Project Appraisal Document (PAD) and the Project Implementation Manual (PIM).

Implementation Progress

<table>
<thead>
<tr>
<th>Activities</th>
<th>Strategy of Implementation</th>
<th>Results/Outputs</th>
<th>Challenges</th>
<th>Implementation Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Goods and Equipment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computer and office equipment and accessories: Thirty (30) units of Dell</td>
<td>Procurement through ICB</td>
<td>Contract signed on July 2009.</td>
<td>Outstanding deliveries: ten (10) units of Dell Latitude E5500 Laptop, thirty (30) units of Dell</td>
<td>Emergency meeting scheduled within first week of 2011.</td>
</tr>
<tr>
<td>Vostro 200 Desktop Computers, forty (40) units of Dell Latitude E5500</td>
<td>procedure</td>
<td>The supplier has delivered thirty (30) units of Dell Vostro 200 Desktop</td>
<td>Latitude E5500 Laptop, thirty (30) units of Dell Latitude E5500 Laptop, thirty (30) units HP</td>
<td></td>
</tr>
<tr>
<td>Laptop</td>
<td></td>
<td>Computers, thirty (30) units of Dell Latitude E5500 Laptop</td>
<td>LaserJet P2055D black and white printers, thirty</td>
<td></td>
</tr>
<tr>
<td>Activities</td>
<td>Strategy of Implementation</td>
<td>Results/Outputs</td>
<td>Challenges</td>
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</tr>
<tr>
<td>------------</td>
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</tr>
<tr>
<td>Computers, thirty (30) units HP LaserJet P2055D black and white printers, thirty (30) units APC 1000VA UPS, four (4) units HP DeskJet 6943 colour printers, twenty-one (21) units HP Scanjet 7650 scanners, twenty-one (21) units Sharp SL 5600 PDAs, Seven (7) units of Canon IR3045 heavy-duty photocopiers, fifteen (150) units Canon IR2016 desktop photocopiers, three (3) units Panasonic UF-790 fax machines and thirty (30) units Rexel V250 paper shredders.</td>
<td>Computers, (30) units APC 1000VA UPS, four (4) units HP DeskJet 6943 colour printers, twenty-one (21) units HP Scanjet 7650 scanners, twenty-one (21) units Sharp SL 5600 PDAs, Seven (7) units of Canon IR3045 heavy-duty photocopiers, fifteen (150) units Canon IR2016 desktop photocopiers, three (3) units Panasonic UF-790 fax machines and thirty (30) units Rexel V250 paper shredders.</td>
<td>Two (2) contracts signed in March 2010 - Wagtech International, UK (Lot 1) and FSE, Belgium (Lot 2)</td>
<td>Letters of credit (LC) has been established for both. LC confirmation is delaying delivery. The World Bank keeps raising issues of established LCs conformity to standards prior to confirmation. So revised LC documents forwarded to the Bank.</td>
<td></td>
</tr>
</tbody>
</table>
### Activities | Strategy of Implementation | Results/Outputs | Challenges | Implementation Status |
--- | --- | --- | --- | --- |
**Civil Works**  
- Construction of Biotechnology Laboratory Complex (National Centre of Specialization)  
  - Pre-qualification of contractors  
  - Procurement through NCB bidding procedure with Pre-qualification  
- Pre-qualification process concluded with the selection of six contractors with Bank’s approval  
- Bidding document with the design and bills of quantities issued to shortlisted contractors.  
- Bid evaluation report and Bank’s approval obtained.  
- The construction is behind schedule due to over-design caused by implementer’s ambitious requests on the facility that called for design review with time implications.  
- The construction work commenced in December 2010 and the implementation is on cause for completion before WAAPP phase one closes.

far three queries have been addressed. A sample from the Bank was therefore requested and provided and discussed with Ghana Office.
<table>
<thead>
<tr>
<th>Activities</th>
<th>Strategy of Implementation</th>
<th>Results/Outputs</th>
<th>Challenges</th>
<th>Implementation Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consulting Services</td>
<td>• External auditing firm</td>
<td>• Three (3) year contract signed in January 2009 for 2008-2010 assignment</td>
<td>• None</td>
<td>• The 3-year audit contract ends after the 2010 financial year. The procurement process for recruiting an external programme auditor is a pipeline activity.</td>
</tr>
<tr>
<td></td>
<td>• Design and Supervision of Construction of Biotechnology Laboratory Complex</td>
<td>• Six months (design) and eighteen months (supervision) contract signed in July 2009</td>
<td>• The selection of the consultant commenced late as the implementing agency took time to agree on the site as well as the facilities within the structure. These were required for the consultant’s terms of reference prior to design and construction of the structure</td>
<td>• The selection of the consultant commenced late as the implementing agency took time to agree on the site as well as the facilities within the structure. These were required for the consultant’s terms</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Detailed designs done</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Construction site handed over to contractor</td>
<td></td>
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<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

ICB – International Competitive Bidding  
MOFA – Ministry of Food and Agriculture