SUMMARY REPORT

WEST AFRICA AGRICULTURAL PRODUCTIVITY PROGRAMME (WAAPP), NATIONAL CENTER OF SPECIALIZATION (NCoS)
ROOT AND TUBER CROPS

REGIONAL CONFERENCE, 2016

Theme: “Research in root and tuber crops value chain: The hope for food security in the ECOWAS sub region”

MAY 1 – 7, 2016
CSIR-CROPS RESEARCH INSTITUTE, FUMESUA-KUMASI, GHANA
NATIONAL CENTER OF SPECIALIZATION (NCoS) ROOT AND TUBER CROPS REGIONAL CONFERENCE, 2016
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Report Prepared by:
Dr. Regina Sagoe
Dr. Kinsley Osei
Mr. Felix Frimpong

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Dr. Stella Ama Ennin, Director of CSIR-CRI
Dr. M B Mochiah
Dr. J N Berchie
Dr. J N L Lamptey
Dr. Adelaide Agyeman
Mr. I S Baning
Dr. Grace Bolfrey Arku
Mrs. Lawrenicia D. Acheampong
Mrs. Mavis Akom
Ms. Linda Agyeman
Mr. Kwadwo Adofu
Mr. Eric O Danquah
Ms Alimatu O Sadia
Mr Albert Aubun
Mr Atta Aidoo Snr.
Mr Jonas Osei Adu
Mrs Joyce Larbi Siaw
ABSTRACT

The West Africa Agricultural Productivity Program, National Centre of Specialization (NCoS) in Ghana, CSIR-Crops Research Institute organized a regional conference to create a platform to strengthen National and Regional multidisciplinary networks and for identification, planning and implementation of common research problems and solutions on root and tuber value chain development in the different countries in the sub region. The 5 day conference had the theme: “Research in root and tuber crops value chain: The hope for food security in the ECOWAS sub region”. The opening session presents highlights and overview of WAAPP Ghana activities, achievements of the NCoS and partner/allied institutions in Ghana. Key note papers that address the private sector involvement, value addition, integrating research and extension delivery and innovative technology in sustainable research and development for food security were presented. This was followed by 4 Technical sessions (oral and poster presentations) in the mornings which, centred on a particular commodity and a working group discussion in the afternoon of each day was accomplished. Each days technical session was preceded by an identified eminent scientist who presented papers in a commodity crops area of interest to the NCoS (Cassava, yam, sweetpotato and cocoyam) on the sub theme: “Towards sustainable productivity: Root and Tuber Crops value chain research and development”. Discussions on paper presented for the day were moderated by a key discussant who directed and set the tone for the working groups in the identification of national and regional priorities for conceptual note development for the commodity of the day. Common problems within the sub region were identified and conceptual notes of interest developed. The conference brought together research scientists, from the following WAAPP countries - Burkina Faso, Côte d'Ivoire, Gambia, Guinea, Mali, Senegal and Togo. And representatives from partner institutions of Ghana NCoS - CSIR- Soil Research Institute, Food Research Institute, Plant Genetic Resources Research Institute, Animal Research Institute, Savannah Agricultural Research Institute, local Universities (UG-Legon, UDS-Tamale,UCEW-Mampong) and some Directorates from the Ministry of Food and Agriculture, Ghana. Prominent personalities, producers, traders, processors, NGOs, Provost of Colleges of Agriculture in local universities and Scientists from International Institutions and Donor Agencies were present to share ideas and knowledge on the workshop themes and the way forward. The conference saw a magnificent turnout of 160 participants disaggregated as follows: Foreigners, 16 made up of; Nigeria-4, Mali-3, Cote d'Ivoire-3, Burkina Faso-2, Senegal-2, Sierra Leone-1 and Togo-1. Ghana had 144 representation out of which Farmers were 3, Processors-2, Trader-1 and 12 Media personnel.
In all there were 73 papers (Oral presentations-56 and Poster presentations-17) further disaggregated as follows; Opening Keynote addresses-4, Commodity Keynote addresses-4, sub-theme Keynote addresses-4, Cassava: Oral-11, Poster-3, Yam: Oral-13, Poster-6, Cocoyam: Oral-10, Poster-4 and Sweet potato: Oral-10, Poster 4. The workshop ended with the initiation of research networking groups and new conceptual notes drafted for fine tuning and soliciting for funds.

SECTION 1 – INTRODUCTION
This section presents background to the organisation of the Regional workshop, objectives, conference approach, date and venue, participants and expected results.

1.1 Background

The West Africa Agricultural Productivity Program (WAAPP) initiated by the Economic Community of West African States (ECOWAS) member countries is part of the implementation of the agricultural sector of the Millennium Development Goals (MDGs) and aims to support regional cooperation in agriculture in West Africa in accordance with the action plans for managers in the agricultural policy of ECOWAS and NEPAD. It receives financial support from the World Bank and sub-regional coordination of the program is provided by the West and Central African Council for Agricultural Research and Development in Africa (WECARD/CORAF).

The program which started as WAAPP-1A in 2008 and continued as WAAPP-2A in 2013 aims to contribute to sustainable increases in agricultural productivity in national and regional priority sectors that are more likely to increase the agricultural growth rate for the participating countries and provide support to regional integration as an instrument to promoting shared growth. These supports have a developmental goal to intensify generation, dissemination and adoption of improved technologies in the agricultural priority commodities of the participating countries. Reaching this objective implies the strengthening of regional cooperation in the generation of technologies; scaling up dissemination and developing collaborative mechanisms.

To achieve this, the National Centre of Specialization (NCoS) in Ghana, CSIR-Crops Research Institute organized a regional conference to create a platform to strengthen National and Regional multi-disciplinary networks that will identify, plan and implement common research
problems and solutions on root and tuber value chain development in the different countries in West Africa.

1.2. Objectives of the workshop

The main objective of the workshop was to share knowledge on root and tuber crops value chain research and development activities in the sub region, and establish effective networking groups in the development of concept notes that addresses regional common issues. Specifically this workshop or conference was to create a platform for identification of common regional agricultural research problems and develop conceptual notes for further development.

1.3 Results

At the end of the workshop, the following results were achieved:

- Initiation of research networking groups (fig 1a and 1b)

- A register of technologies generated / implemented by WAAPP NCOS, were showcased for adoption by other WAAPP countries

- New conceptual notes were drafted for fine tuning and soliciting for funds (fig. 1a)

Figure 1a: Scientist interaction during group’s concept notes development

Figure 1b: Cross section of farmers and scientist during open forum and group work
1.4. Workshop approach

The 7 day conference (travel days inclusive) had a plenary (fig 1c) and working group (fig 1d) sessions that allowed for discussions and consensus building. Mode of communication was bilingual (French and English) with the assistance of a bilingual simultaneous translators (fig 1e). The operational mode of the workshop was based on the following:

- Day 1: Arrival

- Day 2: An opening session, which focused on oral presentations that highlights an overview of WAAPP Ghana activities, achievements of the NCoS and partner/allied institutions in Ghana. The afternoon session presented key note papers that address the private sector involvement, value addition, integrating research and extension delivery and innovative technology in sustainable research and development.

- Day 3 - 6: Four (4) Technical sessions (oral and poster presentations) which focussed on a particular commodity in the mornings and a working group discussion in the afternoon of each day was successfully accomplished. Each days technical session was preceded by an identified eminent scientist who presented papers in a commodity crops area of interest (Cassava, yam, sweetpotato and cocoyam) on the sub theme: “Towards sustainable productivity: Root and Tuber Crops value chain research and development”

- These discussions were moderated by a key discussant who set the tone for the working groups in the identification of national and regional priorities for conceptual note development for the commodity of the day. The working groups identified common problems within the sub region and develop conceptual notes of interest.

- Day 7: Closing and departure.
Figure 1c: cross section of personalities during the plenary session

Figure 1d: working group session
1.5. Date and Place

The conference took place at the CSIR-Crops Research Institute, Fumesua-Kumasi, Ghana from 1 – 7 May 2016. Participants arrived on the 1st of May and departed on the 7th of May 2016.

1.6. The Participants

The conference brought together research scientists, from the following WAAPP countries - Burkina Faso, Côte d'Ivoire, Liberia, Mali, Senegal and Togo. There were representatives from partner institutions of Ghana NCoS - CSIR- Soil Research Institute, Food Research Institute, Plant Genetic Resources Research Institute, Animal Research Institute, Savannah Agricultural Research Institute, local Universities (UG-Legon, UDS-Tamale, UCC- Cape Coast, KNUST-Kumasi, UCEW-Mampong and some Directorates from the Ministry of Food and Agriculture, Ghana. Representations from WAAPP, Ghana-Program Management Committees were present (fig 1f). Prominent personalities, processors, traders, producers, provost of Colleges of Agriculture in local universities and Scientists from International Institutions, Donor Agencies and Local Universities were present to share ideas and knowledge on the workshop themes and the way forward. A minimum of 160 participants were in attendance every day and a program for the 5-days conference attached as an appendix 1.
SECTION 2
This section presents the opening session and the first technical sessions. Presenting summaries of dignitaries and keynote speakers for the main theme: “Research in root and tuber crops value chain: The hope for food security in the ECOWAS sub region” under various thematic areas and summaries of the opening session.

2.1 Opening session
2.1.1 Dignitaries present at the Opening Session

The conference started at 10am with a prayer by Dr J.N. L. Lamptey, a Principal Research Scientist of the CSIR-Crops Research Institute. Some of the dignitaries present during the opening were as follows: Deputy Minister for Ashanti Region- Hon. Andy Osei-Okrah, Deputy Minister for Food and Agriculture - Dr. Alhassan Yakubu, the Director General of CSIR- Dr. Victor Agyeman, Deputy Director General – Dr (Mrs) RoseEmma Entsua Mensah, Director, CSIR-CRI-Dr. Stella Ama Ennin, CORAF Program Manager responsible for Root and Tuber NCoS– Prof. Abdourahamane Sangare, WAAPP Technical specialist representing the Ghana
National Coordinator - Dr. Alphonses Belane and Chiefs and Elders of Parkoso, Fumesua and Okyerekrom (communities around WAAPP-NCoS).

2.1.2 Chairs Opening Remarks

The Director General of the CSIR, Dr Victor Agyeman who chaired the opening session observed that WAAPP since its inception has contributed immensely to increases in agricultural productivity in terms of national and regional priority sectors with the potential to ensure food security. He further reminded participants that global consumption of root and tuber crops is estimated at 112 kg/capita/year; a figure which compares favourably with the main stable grain crops. In his concluding remark, the DG was happy that the conference would create a forum for all stakeholders to share knowledge, identify common problems and solutions and develop regional concept notes for funding.

2.1.3 Welcome Address

The Director of CSIR-CRI, Dr Stella Ama Ennin (fig 2a) in welcoming participants to the CRI campus, reminded researchers that while deliberating on constraints and opportunities along the root and tuber value chain in the West African sub-region, focus should not be lost on future plans to end poverty, end hunger, achieve food security and improved nutrition and promote sustainable agriculture in the sub-region. The Director ended on the opportunity the conference offers participants on defining the research and development agenda for root and tuber crops in the ECOWAS sub-region.
2.1.4 Statement from the Regional Minster of Ashanti Region

The Deputy Ashanti Regional Minister, Hon. Andy Osei Okrah alluded to the fact that agriculture is a major driver of economic growth. It was his wish that agriculture productivity increased by at least 70% to meet projected food demands for the next 20-30 years.

2.1.5 Highlights of WAAPP achievements in Ghana

Delivering his presentation on highlights of WAAPP-Ghana, Dr Alphones Belane enumerated the 4 components under the programme. He stressed the numerous impacts WAAPP has made across the whole country. Achievements made so far included but not limited to; certification of planting materials and registration of agro-input dealers, vaccine production to control the New Castle Disease, procurement of incubators and electric generators for farmers in Northern Ghana, and soft drink production from Apomuden sweet potato roots for school children. He however numerated certain challenges that have militated against the smooth running of WAAPP activities. These included; erratic rainfall which affected crop performance, low guinea fowl eggs hatchability due to cost of energy to power incubators, high keet mortality and cassava root rot of CRI-Ampong and Sika Bankye.
2.1.6 Overview of WAAPP–Research activities

Prof. Paa Nii Johnson who represented the Deputy Director General after a brief introduction to the start of WAAPP, Ghana elaborated on the significant impact WAAPP activities have had on the agricultural sub sector. He cited impacts have been made through the Research and Extension Linkage Committees, the National Centres of Specialization and the NCoS Scientific Management Committee - COSMAC. Activities of some Allied CSIR institutions, Animal Research Institute’s feed conservation unit for goats and Food Research Institute’s distribution of cassava milling machines to recognized companies and provision of backstopping function to cassava processing groups were highlighted in his presentation.

2.1.7 Overview of WAAPP in the West African sub-region

Prof. Abdourahamane Sangare (fig 2b) traced the history of the formation of WAAPP. He suggested that for the program to succeed there was the need for substantial increase in research to upscale dissemination of technologies. He ended with the 3-pronged CORAF coordination on Regional capacity building, capacity strengthening of NARS and Partnership development.

Figure 2b: Prof. Abdourahamane Sangare from CORAF in a shot
2.1.8 Key note Address

*In delivering the Key note address, the Hon. Deputy Minister for Food and Agriculture, Dr. Alhassan Yakubu* (fig 2c) reiterated the uniqueness of WAAPP. He advised the need for strengthening national and regional networks for the success of the programme. He was particularly happy that root and tuber crops, especially cassava has risen from a rural crop to an industrial one. In ending, he pointed to the hope in the root and tuber crops and the need for full exploitation by researchers in the sub-region.

![Figure 2c: Hon. Deputy Minister for Food and Agriculture, Dr. Alhassan Yakubu](image)

**2.2. First Technical session**

This session was chaired by Prof. G. Dowuona, the COSMAC Chair and presents the key note papers on the theme and an opening presentation on the achievements of WAAPP, NCoS towards becoming a Regional Centre of Excellence.

**2.2.1 Towards a Regional Centre of Excellence: Achievements of WAAPP NCoS**

*The first presentation was by the NCoS Coordinator, Dr Regina Sagoe* (fig 2d), *who in her presentation on “Towards a Regional Centre of Excellence: Achievements of WAAPP NCoS”, touched on the technologies that have been demonstrated in three ECOWAS countries.* On key outcomes, emphasis was placed on improved cassava planting materials availability to farmers in the country, six (6) taro lines in advanced stages of evaluation with possible releases in 2017. Two sweet potato lines also at advanced stages of evaluation with possible releases in...
2017. Five promising lines of yam (D. alata, D. cayenensis and D. rotundata) evaluated with farmers with possible releases in 2017 and improvement of the seed yam system through vine and mini-sett technologies and germplasm documentation, multiplication, conservation and exchange. Concluding, the coordinator lamented limited funding which necessitates assistance from commissioned projects such as CORAF/WECARD.

Figure 2d: NCoS Coordinator, Dr Regina Sagoe during her presentation

2.2.2 Marketing and commercialization: Involving the private sector in R & T value chain development

This topic was presented by Nana Kwadwo Adentwi. He stressed the need for researchers to make available yam varieties and their qualities to guide end-users and processors. Researchers should also generate interest amongst consumers and to encourage increased demand. Again, they should add value to the produce, support product diversification and publicize new uses. Developing access mechanism into new markets and creating and financing new distribution channels and export systems were highlighted for sustained productivity along the value chain.
2.2.3 Developing root and tuber crops for value addition – The way forward

This was delivered by Prof. Ibok Oduro of KNUST (fig 2e). She urged stakeholders to begin with the end in mind using the chess game as an illustration. She described root and tuber crops as very important in providing food for millions of people, though some are neglected. She gave the production of Irish potatoes, cassava, sweet potatoes, yam, taro and other aroids stressing the peculiar limitations to their increased utilization. Prof. Oduro went on to define value addition and how to add value (fig 2f) emphasizing the integration of end users preferences and capacity building among others. Concluding, she appealed to all stakeholders to put on their value addition lens and caps to make the best out of root and tuber crops.

Figure 2e: Prof. Ibok Oduro of KNUST in shot

Figure 2f: Exhibits of value added products by CSIR-FRI, JOSMA & others
2.2.4. Towards integrated agricultural research and extension delivery for R & T development.

The session was chaired by Professor Paa Nii Johnson, with the penultimate presentation of the day being delivered by Dr Stella Ama Ennin on the topic “Towards integrated agricultural research and extension delivery for R & T development. She emphasized that IAR4D should focus on Innovation Platform as a tool for creating and sharing new or existing knowledge and learning for economic impact. She stated that the linear system where researchers handed over information to extension officers for onward delivery to farmers was not sustainable. She further advocated for the involvement of all the key stakeholders in the development of technologies emphasizing that IPs could be created at the national and the community levels for effectiveness and sustainability. She used two main case studies to drive home her point: The DFAT-CORAF/WECARD–CSIRO Crop- small ruminant integration and the WAAPP Ghana IAR4D. She highlighted changes in markets, capacity of rural actors, and R4D system, policy and livelihoods as outcomes and called for flexibility in expectations and respect for development partners’ guidelines.

2.2.5 Technology and Innovation in Root and Tuber Crops Value Chain.

The last presentation for the day was given by Prof. Richard Akromah, the Provost of College of Agriculture and Natural Resources, KNUST. His topic was “Technology and innovation in root and tuber crop value chain. He called for sustainable productivity, technology and innovations infusion in R & T production, which was premised on the fact that root and tuber production is the main stay for majority of people in Sub-Saharan Africa with the potential to reduce poverty and improve incomes. He further stressed that root and tuber crops produce more calories than other crops, have broad agro-ecological adaptation and are less influenced by market shocks.

Some of the current improved technologies and innovations were improved planting material, use of ridges as alternative to mounding in R & T crops, use of mini-sett and vine technology in yam production, integrated pests and diseases management and row planting. He concluded with the following suggestions; Breeding for market demand candidate varieties, exploring market avenues for the root and tubers and continued funding for the root and tubers.

The day ended at 5 pm with a prayer by Dr Charles Tortoe, CSIR-Food Research Institute.
SECTION 3
The section presents proceedings for the second day of the conference which highlighted research and developmental activities on Cassava in the sub region. This was preceded by a keynote paper on the crop cassava.

3.0 Keynote paper: Cassava value chain research and development in the sub region

Daily proceedings were preceded by a recap of the previous day’s proceedings by the Rapporteur General at 8:30am. The morning session was chaired by Prof. Isaac K. Asante of the UG, Legon. The first presentation for the day was the Keynote paper: Cassava value chain research and development in the sub region by Dr A. G. O. Dixon, IITA, Ibadan - Nigeria.

He started with the importance of cassava stressing the great potential of the crop to drive rural industrial development, raise rural incomes, and contribute to food security. He mentioned that cassava productivity and yields in Africa is the lowest in the world. However, the crop has diverse end uses and huge and untapped market opportunities. Challenges confronting production include: Low yields, fragmented small-holder farms, high labour costs, weak access to markets and limited access to finance. Efforts made to address the challenges include: Cassava research and development in Africa, development of cassava value chains in Africa and Presidential initiatives on the crop in Nigeria and Ghana. Dr Dixon finally suggested short and long term actions to make cassava production profitable.

3.1 Cassava Technical Session 1

Summaries of presentations made under this technical session are as follows:

3.1.1 Vegetative growth and monitoring of diseases and pests of cassava hybrids presented by Dr. N’zue Boni of CNRA, Cote D’Ivoire.

After introducing the importance of cassava, he listed some constraints of production as; low yielding varieties, irregularity of rains, high soil pressures and poor pro-vitamin content of white varieties. A total of 30,452 stands were used in the research work. Results indicated that out of the 13,456 hybrids harvested, only 1,126 representing 8% were selected on the basis of pests and diseases tolerance.
3.1.2 Agro morphological characteristics of 44 accessions of cassava cultivated in Cote d'Ivoire was presented by Dr. Konan Djaha.

The objective of this study was to investigate the phenotypic variability of the accessions and their structure on the basis of 26 variables selected amongst the descriptors of IITA materials. Forty-four (44) cassava accessions collected in the main production areas of La Cote d’Ivoire were cultivated at the Nangui Abrogoua University and evaluated on agro-morphological traits. Qualitative and quantitative variables were used to classify the accessions. Descriptive analysis showed significant phenotypic differences among accessions for all characters studied. A principal component analysis confirmed the morphological variability in the region of 63 to 84%. The hierarchical cluster analysis helped structure the accessions into 3.

3.1.3 Growth, development and yield of cassava progenies as affected by nutrient status of mother plants – Dr. J. N. Berchie, CSIR-Crops Research, Ghana.

Cassava yields are significantly low; generally below the potential yields of 30-40 t/ha. The major contributory factors are low soil fertility and poor quality of the planting material. The study investigated the effect of fertilizer application of the mother plant on the growth, development and yield of progenies from these plants. Cassava variety- Debor was used involving 4 fertilizer treatments. NPK was applied one month after planting and Muriate of potash three months after planting. Cassava yields for all the fertilizer treated plots were significantly higher than the control plot with yield difference ranging between 68% and 278% in the first year. Commercial cassava planting material producers could boost the quality of the planting material through fertilizing the mother plant.

3.1.4 Dr Edmond Koffi of CNRA presented “Enzymatic polymorphism of genetic diversity in cassava accessions in Cote d’Ivoire”

He observed that the high rate of adoption of improved cassava varieties has resulted in the neglect of local landraces and the eventual loss of genetic material. The study evaluated the diversity and genetic relationships between cassava accessions using enzymatic markers. A total of 327 accessions were used and enzymatic characterisation was performed using the following descriptors; Acid phosphatase (PAC), Esterase (EST), Malate dehydrogenase (MDH) and Phospho glucose isomerase (PGI). Five heterozygous alleles were revealed with two from the unique PGI. Among polymorphic alleles evidenced, those from PGI, PAC and
MDH expressed a dimeric state with two loci. High yielding genotypes were recommended to farmers nationwide.

3.1.5 Evaluation of released cassava varieties for delayed postharvest physiological deterioration – Dr Ruth Prempeh of CSIR-CRI, Ghana.

The study investigated the rate of postharvest physiological deterioration (PPD) in 8 cassava varieties including 2 checks (Ampong and Debor). Cassava roots were harvested 10 months after planting and evaluated for their reaction to PPD at 3 and 7 days after harvest (DAH) using the Booth’s method. Statistical analysis showed no differences among varieties at 3 DAH. However, significant differences (P<0.05) were observed at 7DAH. Postharvest Physiological Deterioration at 7DAH ranged from 19.3% in Lamesese variety to 41.4% in the check - Debor. All the varieties were better than the check -Ampong. Significant differences also existed in the evaluation periods (3 and 7DAH) for both variety and time. Consequently, the varieties Lamesese and AGRA bankye had excellent delayed PPD at 7DAH and therefore, could be promoted and used for improving other farmer preferred varieties.

3.1.6 Dr Adjabeng Danquah - “Additive main effect and multiplicative interaction analysis and estimation of genetic components of growth and yield of cassava in two ecologies in Ghana”.

Twenty cassava genotypes were evaluated for 2 years on yield stability using the additive main effect and multiplicative interaction (AMMI) analysis. AMMI stability value was used to rank genotypes based on yield. Results indicated highly significant effect of genotype, environment and genotype by environment interaction for all traits studied. The AMMI analysis of variance indicated that genotype accounted for 51% of the total variation for height at branching whilst environment and interaction accounted for 33% and 15% respectively. Storage root yield and dry matter were influenced by their genotypic variances more than the interactions indicating that remarkable genetic improvement can be made with selection.

3.1.7 In vitro conservation of cassava genetic resources in Ghana was presented by Asomani Antwi Naomi of CSIR-PGRRI, Ghana.

To prevent the erosion of genetic diversity in cassava, in vitro conservation activities were carried out on cassava genetic resources at the PGRRI, Bunso. The successful implementation of the agenda would ensure the maintenance of diversity for crop improvement. The resources collection consists of accessions acquired from collection missions across the country, from
other countries and some released varieties. The in vitro collection is maintained by periodic culturing of nodal explants excised from old plantlets of each accession at six months intervals. Presently, a total of 241 accessions are kept as tissue culture plantlets under slow growth conditions in the in vitro gene bank.

3.1.8 A preliminary investigation into cassava root rot disease in the Brong Ahafo Region of Ghana was delivered by Dr Susanna Akrofi of CSIR-PGRRRI, Bunso-Ghana.

This study was to determine the type of cassava root rot disease; the incidence of the disease and the cultural practices that favour the spread and persistence of the disease in the Brong Ahafo region. Multi-stage random sampling technique was used to identify and interview 35 farmers from the Forest, Humid Savanna and Transition zones of the Brong Ahafo region on their production practices and cassava varieties grown. Findings established inappropriate farm management practices as causes for increased cassava dry root rot disease occurrence, spread and persistence. These findings will facilitate the design of appropriate management strategies for cassava dry root rot disease.

3.1.9 Performance of an improved manual cassava harvesting tool as influenced by planting orientation and cassava variety was delivered by Mr Shadrack Amponsah of CSIR-CRI.

This study done at CSIR-Crops Research Institute, Kumasi-Ghana, evaluated the efficiency of an improved manual cassava harvesting tool under three different planting orientations for four cassava varieties in terms of field capacity, level of drudgery and root tuber damage. Force requirement in uprooting the different cassava varieties was also determined. Field capacity of improved manual harvesting tool ranged from 49.9-156 man-h/ha, root tuber breakage from 4.32-19.55% and harvesting energy consumption ranging from 470.34-773.72 W across cassava varieties and planting orientations were established. Nkabom cassava variety was the easiest to uproot irrespective of the planting orientation whereas Sikabankye variety offered the best in terms of root tuber damage and drudgery. Again, it was faster harvesting vertically planted cassava though cassava planted slanted offered the least root tuber breakage and drudgery, regardless of cassava variety. Further research to identify the relationship between uprooting force requirement and some cassava agronomic parameters was recommended.
3.1.10 Growth Performance of Grasscutters (Thryonomys swinderianus) in Captivity Fed on Pelleted Forage and Cassava Tubers with the Peel in Ghana by J.M. Siedu.

This poster presented the growth performance and quality of the meat of grasscutters in captivity fed on two pelleted diets made of Elephant grass (*Pennisetum purpurenum*), *Gliricidia* leaves and cassava with the peel with urea as ration 1 and with soy bean meal as ration 2. Their growth and meat quality was compared with those fed on only elephant grass as control. Findings suggested the 2 formulated test rations together with other commercial ingredient as complete diets should be feed to the animals for sustainable production in Ghana and countries south of the sub-Saharan region.

3.1.11 Improving the multiplication rate of tissue culture acclimatized cassava planting materials under screen house conditions by David Appiah Kubi.

This poster presentation (fig 3) established the fact that access to clean to clean planting materials for vegetative propagated crops like cassava is essential to sustain productivity. Experiment conducted under screen house conditions using four released farmers’ preferred varieties of cassava namely *Broni Bankye, Sika Bankye, Ampong and Otuhia* in Ghana were described and a simple method that can be adopted to scale up the tissue culture numbers in generating cleaned cassava planting materials for field establishment identified.
SECTION 4
This section presents technical sessions on yam on day 4 activities of the conference. The morning session was chaired by Dr. Charles Tortoe of the CSIR-Food Research Institute, Accra, Ghana.

4.0 Keynote paper: “Yam Value Chain R4D in West Africa: Past, Present and Future” was delivered by Dr. Norbert Maroya, General Manager of YIIFSWA, IITA, Ibadan.

Yam a very important crop in the lives of many Africans but scarcity, cost and poor quality of seed militate against production. Dr N. Maroya (fig 4a) elaborated on the main features of yam value chain in the past. He was worried about the exclusion of yam from all national, regional, and international initiatives. The objectives of the YIIFSWA project were highlighted and yam value chain analysis in Ghana and Nigeria elucidated. The necessity for a formal seed system in Ghana and Nigeria was emphasised and significant breakthroughs by the YIIFSWA project were mentioned. Finally he advocated for innovative thinking along the yam value chain.
4.1 Yam Technical presentations

4.1.1 Producing yam for export: The influence of seed sett size and planting density on tuber size by Eric Owusu-Danquah, CSIR-Crops Research Institute, Ghana.

The effect of planting density and sett sizes on the tuber yield and tuber sizes of Dente and Pona was evaluated at two locations for two years. It was observed that planting density had significant influence on tuber sizes and yield of yam. The current sett size of 350g used by farmers can be reduced to about half the size. Planting distance of (1.2m X 0.4m) on ridges is more profitable and sizes fit the GSA specifications. He called for further demonstrations and validation on farmers’ fields.

4.1.2 Seed yam production at Bunso in the Eastern region of Ghana - Samuel Kwasi Owusu, CSIR-Plant Genetic Resource Research Institute, Ghana.

Unavailability of quality seed yam has been a major constraint to yam production. Seed yam production is an economically viable venture. However, to produce quality seed yam, the producer should start with healthy planting material, carefully treated against pests and diseases. Also, the market should be well studied to know which varieties to produce and when. For sustainability, he advocates the drafting of the unemployed youth into the seed yam production system after giving them sufficient training.
4.1.3 Improved agronomic practices for sustainable yam production: The on-farm experience was shared by Eric Owusu Danquah of CRI.

Shifting cultivation is not a sustainable system because land is limiting. Improved agronomic practices particularly soil nutrition could support profitable sedentary yam production. Yam could be produced sustainably on continuously cropped fields with pragmatic farm management practices. Promotion of mechanization would support expansion of holdings while reducing drudgery at the same time.

4.1.4 Increasing farmers’ access to conserved yam genetic resources in Ghana -Dr Lawrence Aboagye of CSIR-Plant Genetic Resource Research Institute, Ghana

The maintenance of genetic diversity is pre-requisite for attaining food sufficiency status. Currently, most if not all the germplasm in farmers’ hands have lost their genetic potential due to biotic and abiotic factors. Therefore, increasing farmers’ access to conserved yam genetic resources is a step in the right direction. Organization of farmer field schools and field days, establishment of demonstration plots in communities as learning centres, building the capacities of both farmers and breeders for sustainable conservation and use of yam genetic resources could result in high yam productivity.

4.1.5 Seed yam generation: A low cost but efficient techniques” was delivered by Dr Emmanuel Otoo, (fig 4b) CSIR-Crops Research Institute, Ghana

Yam production is often constrained by either unavailability of quality seed yam or high cost of seed yam. The traditional means of producing seed yam has significantly low multiplication ratio compared with cereals. Effective and efficient techniques for increasing the multiplication ratio of seed yam have been developed. Unfortunately, the most efficient ones such as bioreactor and pressurized aeroponics are expensive and unfriendly to farmers as at now. Techniques which farmers could exploit to advantage with regard to cost efficiency and complexity are enhanced milking, miniset, non-pressurized aeroponics, vine multiplication and techniques in that order of importance.
4.1.6 Management of root-knot nematodes with Trichoderma virides - Mrs Zipporah Appiah-Kubi of CSIR-CRI, Ghana.

The experiment was conducted using three isolates of the fungus Trichoderma virides on three varieties of yam; Afebetua, Dente and Pona. Findings established all 3 fungus isolates were effective in managing root-knot nematode, Meloidogyne spp. In all cases soil populations of the pest were reduced by more than 50%.

4.1.7 Influence of fertilizer application on postharvest storage of white yam tubers, - Atta Aidoo, CSIR-CRI, Kumasi-Ghana

This study was conducted to establish claims that fertilizer application has effect on the shelf life of two white yam cultivars, Serwa and TDr95/19177. Healthy- looking white yam tubers were randomly selected from a fertilizer application trial in Ejura-Sekyeredumasi district and storage rot experiment set-up at CSIR-CRI (Kumasi, Ghana). Major fungi identified were: Lasiodiplodia theobromae, Fusarium oxysporum, Penicillium sp., Rhizopus sp., Aspergillus flavus with about 54% of rotten tubers being the dry rot type. Varietal differences and tuber sizes were key factors identified as having effect on storage rots. Other studies on Pona and Dente to evaluate fertilizer application on shelf life is underway.

4.1.8 Value addition characteristics of water yam varieties marketed in the Ashanti region of Ghana: Evelyn Adu-Kwarteng, CSIR-CRI, Kumasi-Ghana

A rapid assessment of major markets in the Ashanti Region was undertaken to ascertain the types of water yam (D. alata) varieties available. Profiling of product sensory attributes for fried crispy chips were done and findings presented. Results indicate immense potential of the
D. alata varieties for profitable value addition due to low market price of the raw material and high acceptability of shelf-stable finished products. The potentials of various other innovative products developed from the D. alata varieties are discussed.

4.1.9 Prospects for expansion in utilization and trade and Gender diversity in soil fertility management for yam production in Ghana: The case of Ejura Sekyedumasi district, by Jonas Osei-Adu, CSIR-CRI, Kumasi, Ghana

This presentation establishes the fact that understanding gender diversity in soil fertility management is crucial in mainstreaming gender into the dissemination and adoption of effective soil fertility management options. Gender diversity analysis was done using data generated from 100 yam farmers in the Ejura-Sekyeredumase district of Ghana. This study presents facts that supports male dominance in soil fertility management activities. The role of women in decision making was limiting but had a strong voice (81%) in deciding on how to spend the money from the farm.

4.1.10 Growth and yield of tissue culture generated seed yams (Dioscorea rotundata Poir) on the field – presented as a poster by Mavis Akom, CSIR-CRI, Ghana

This presentation suggested the use of tissue culture to rapidly produce disease-free and high quality seed yam in large quantities. This study was conducted in Ghana to access the growth and yield of seed yams generated from tissue culture on the field. Findings suggested that tissue culture generated seed yams can perform adequately on the field with the appropriate agronomic practices and is a useful means to ensure reliable source of clean seed yam for enhanced yam production.

4.1.11 Maximizing Natures Gain: The Yam-Legume Cropping System in Ghana - Felix Frimpong; CSIR-CRI, Ghana

The presentation suggests the quest for improved management strategies that can result in better use of available resources (e.g. selecting the appropriate crop and cropping system to match the total amount and pattern of seasonal rainfall for high yields). It evaluates the impact of yam-legume cropping systems (intercropping or not) and seedbed management (ridges or mounds) practices on maximizing productivity. The results indicate significant ($P<0.05$)
interactions between seed bed and cropping system and tuber yields increases over sole cropping. Thus emphasizing intercropping as a major cropping system option for maximizing productivity.

4.1.12 Comparative crop water assessment in a yam/legume cropping system using the CROPWAT 8.0 model – Patricia Oteng Darko; CSIR-CRI, Ghana

This paper examined the water use in a cereal-legume cropping system using one each of an agronomic and mechanical solution: intercropping and seed bed management and a CROPWAT 8.0 model. Findings suggested insufficiency of rains for the sole yam treatments; employing a 0% yield reduction and an 80% effective rainfall where total evapotranspiration values will exceed total effective rainfall of the season for the treatments. Total evapotranspiration for the yam-legume (groundnut and cowpea) intercrops were 5% and 12% respectively, lower than the sole yam suggesting that intercrops utilizes soil moisture more effectively than their corresponding sole crops.


The presentation presents aeroponics as a system perceived to be a highly technical innovation, far out of reach to the ordinary farmer. It however argues for the use of gravity fed aeroponics presenting an evaluation of this system for propagating seed yams from vine cuttings. It describes the basic advantage of this system and its non-dependency on electrical power, pumps or timers and its ability for continuous production.

4.1.14 In vitro performance of some selected varieties of yam – Agnes Aboagye; CSIR-CRI, Ghana

This study evaluated the in-vitro performance of two released (CRI-Pona, Mankrong Pona) and four land races (Dente, Pona, Labariko, Matches). Results obtained showed that the improved varieties have a greater performance than the landraces. Various varieties performed differently on the same growth conditions and this could probably be due to differences in their genetic make-up.
4.1.15 Genotyping of released and elite yam varieties using Simple Sequence Repeats (SSRs) – Agnes Bosompem; CSIR-CRI, Ghana

This presentation focused on genotyping released and elite yam varieties for traceability and future referencing using a set of SSR (Simple Sequence Repeats) markers. Sixteen microsatellites SSR markers were used to screen the three released varieties (CRI-Pona, CRI-Kukrupa, and Mankrong Pona) and seven elite lines (Labreko, Muchumudu, Pona, Labako, Kpuno and Kperingo Dente) which were collected from the tissue culture laboratory of CSIR-CRI. Validation of the selected set of primers was done to justify the need to develop primers for genotypes endemic to West African Sub-region. Yam fingerprint information available to monitor the integrity of the released varieties. Analysis with DARWIN revealed three clusters where CRI Pona, CRI-Kukrupa, Dente and Labreko were grouped in one cluster. Mankrong Pona and Muchumudu was also grouped together. Similarly matrix generated confirmed the clustering. This set of data has been documented for use in the sub region.

4.1.16 Advances in Yam Improvement: Relevance, Approaches and Strategies – Felix Frimpong

This paper presents yam as a highly economic crop for small holder farmers summarizing various technologies, innovations, strategies and tools scientifically proven to increase yield levels to at least 40% over the current yield of 11t/ha. These interventions include but not exclusive to; Integrated soil fertility management (achieving water use efficiency through intercropping, crop rotation etc.), multiple propagation of seed yam (in-vitro micro propagation-1:200, vine technology- 1:240, mini-sett technique-1:30, aeroponics-1:250, hydroponics-1:200, temporary immersion bioreactors systems, photoautotrophic culture). Others include the use of mechanized ridging (35-50% yield increase per unit area), seed treatment, minimum staking options (use of trellis for D. rotundata, no stakes for D. alata), seed sett sizes (150g-200g), integrated pest management (reducing early pests and diseases attack through combined practices, weeding at least 3 times in a season) and postharvest storage mechanism (practices that promote ventilation and tuber protection). The presentation highlights the potential of research to boost yam production and food security.
SECTION 5
This section presents the key paper on cocoyam value chain in the sub region, technical oral and poster presentations delivered on day 5 of the conference. Its morning session was chaired by Dr. Emmanuel Otoo, Deputy Director, CSIR-CRI, Kumasi, Ghana. A total of 11 papers were presented as oral and 4 as poster (fig 5) in the morning. The afternoon saw participants developing concept notes for cocoyam value chain in the sub region.

![Figure 5: Cocoyam poster session](image)

5.0 Cocoyam Value Chain Research and Development in the ECOWAS Sub-Region - Dr Joseph Onyeka of NRCRI, Umudike, Nigeria.
Highlights of his presentation advanced the fact that both Tannia and Taro are collectively called cocoyam. Nutritional and pharmaceutical properties of the crop were outlined. China’s production was stated as increasing whilst, production in the ECOWAS sub-region was decreasing partly due to the Taro leaf blight. Dr Onyeka described the cocoyam value chain as a simple one. Challenges to cocoyam production included; Lack of improved varieties, pests and diseases problems, low yielding cultivars, increasing labour and production cost and lack of information on market access. Dr Onyeka’s good news to the Conference was the identification of a variety resistant to leaf blight. He finally challenged scientists to find solutions to the various production and development constraints so far identified.
5.1 Technical Presentations on Cocoyam

5.1.1 Progress of Taro (Colocasia esculenta) improvement in Ghana - Samuel Kwasi Owusu, CSIR-PGRRI, Ghana

This paper presents findings from a study initiated to broaden the genetic base of taro through collection, characterization and hybridization for desired characteristics. A total of 126 germplasm has been collected comprising 76 local and 50 exotic materials for improvement. Out of a total of 280 crosses made, 32 representing 11% were successful.

5.1.2 Preliminary studies on the development of Simple Sequence Repeats (SSRs) markers for cocoyam” - Dr Marian Quain, CSIR-CRI, Ghana

The objective was to develop SSR markers which could be utilised for characterisation of assembled cocoyam germplasm. Ten cocoyam lines based on three prominent cormel flesh colours (purple, white and cream) were assembled from PGRRI. SSR markers were developed from genomic DNA extraction. The developed primers have strong potential for cocoyam diversity studies and their applications in the sub-region.

5.1.3 On-farm evaluation and farmer participatory varietal selection of taro (Colocasia esculenta) in Ghana was delivered by Dr. Lawrence Aboagye, CSIR- PGRRI, Ghana.

The objective of the study was to characterize introduced and local accessions under field conditions at Nobewam in the Ashanti region in 2011. At the peak vegetative stage and at harvest, the accessions were assessed with farmers based on their agro-morphological characteristics, yields and organoleptic properties. Across locations traits evaluated were: Plant height, number of leaves, plant spread, number of suckers, percent infection by taro leaf blight (TLB) and corm yield per plant. Significant differences were observed among the accessions in the traits evaluated. The selection and incorporation of desirable agro-morphological traits, yield and tolerance to TLB in a participatory manner would lead to the development of taro varieties with acceptable characteristics to users.
5.1.4 Enhancing germplasm for resistance to Phytophthora leaf blight disease in taro - Dr Daniel Nyadenu KNUST, Ghana

The presentation highlighted results from the evaluation of local and introduced germplasm of taro for resistance to Phytophthora leaf blight disease in Ghana. Thirty-four (34) accessions of taro were conserved at KNUST. Four isolates of Phytophthora colocasiae were used for the study. Two weeks old culture of active growing isolates of the fungus were inoculated to leaves of the 34 accessions and incubated for 5 days. Results indicated that accessions of taro vary significantly in resistance to the fungus. Also, significant differences (P<0.05) were observed among isolates of Phytophthora colocasiae for infection of taro leaf.

5.1.5 Sustainable soil and crop management strategies for increased cocoyam production in Ghana” was presented by Kennedy Agyemang, CSIR-CRI, Ghana.

This study evaluated the effect of different levels of poultry manure and mineral fertilizer on growth and yield of a released cocoyam variety – Gye me di and the best time for harvesting a released early maturing cocoyam variety - Ma ye yie. Increases of about 23.5 % in cormel yields was observed with an increase in NPK rates and harvesting at 12 months after planting produced the highest cormel yields across locations.

5.1.6 Review of information on genetic resources activities of some root and tuber crops in Ghana – Paul Osei Kofi, CSIR-PGRRI, Ghana

Genetic resources information on acquisition, characterization, evaluation, documentation and distribution of six root and tuber crops under conservation at the Council for Scientific and Industrial Research-Plant Genetic Resources Research Institute (PGRRI), Bunso, were reviewed as a genetic resources support component for effective management of the germplasm for crop improvement. The six root and tuber crops were yam, cocoyam, taro, sweetpotato, frafra potato and cassava. The implications of the information on effective conservation and use of these information for crop improvement of these root and tuber crops were discussed.
5.1.7 Variations in the pathogenicity of Phytophthora colocasiae isolates associated with taro leaf blight – Joseph Adomako, CSIR-CRI, Ghana

Fifteen isolates of Phytophthora colocasiae Racib, collected from naturally infected taro, Colocasia esculenta (L.) Schott, fields from the Ashanti region of Ghana were assessed for their differences in pathogenicity based on various aggressive components such as infection efficiency (IE), incubation period (IP), lesion size (LS), latent period (LP) and sporulation capacity (SC) after their inoculation onto detached leaflets of taro. Significant differences ($P<0.05$) were observed among the isolates based on the aggressiveness components (IE, IP, LS, LP and SC) studied except infection efficiency. Findings indicates diversity based on the aggressiveness potentials as measured by the epidemiological components. The isolates were then classified as weak, moderate or highly aggressive.

5.1.8 Supply chain analysis of cocoyam in Ghana - Dr Patricia Acheampong, CSIR-CRI, Ghana.

This paper presents challenges, barriers and opportunities and the way forward to develop and expand production and marketing of cocoyam in Ghana. Results revealed demand for cocoyam was all year round but production of the crop was dwindling. Farm sizes were small varying from 0.2ha to 0.5ha. Cocoyam productivity remained low, with yields averaging 6tons/ha and lower in farmers’ fields. Positive margins were recouped by all the actors along the cocoyam supply chain with farmers enjoying the most net margins in all the regions. The analysis also revealed the existence of both horizontal and vertical linkages among chain level members and along the value chain. These relationships could be strengthened to improve the following constraints: storage system, transportation system, use of market information, increased use of improved technologies, increased marketing skills, and product development.

5.1.9 Effect of fertilizer application and plant density on yield and growth of taro – Kennedy Agyeman; CSIR-CRI, Ghana.

The presentation highlighted the effect of spacing, inorganic and organic fertilizers on taro established at Fumesua, Mankranso and Bekwai of Ghana on crop productivity. The results showed significant differences among the different fertilizers rate and plant density for most of the growth and yield parameters. Number of tubers/plant, tuber weight/plant and tuber yield/ha were significantly influenced by fertilizer application.
Increasing plant density increase disease severity, with a mean infection levels being influence by locations. Infestations were generally higher at Mankranso (96.5) than in Bekwai (82.6) with mean severity scores of 2.6 and 2.8 respectively. Total tuber yield decreased at higher plant density (40,000 plants/ha). Spacing had a highly significant effect on marketable and unmarketable tuber yields per hectare. The need to evaluate interaction between spacing and fertilizer impact on marketable yield is recommended.

5.1.10 In vitro Production of Clean Planting Material: Setting the Time Lines – Dr Marian Dorcas Quain; CSIR-CRI, Ghana

The presentation highlights the use of meristem and thermo-therapy systems where applicable to produce clean planting materials of sweetpotato, cassava and yam. It uses molecular and ELISA assay based methods to index clean cultures, and certify the germplasm as clean. This paper reports the detailed time lines in the production of clean planting material using tissue culture techniques. It takes up to 12, 18, and 24 months to generate clean planting materials of Cassava, Sweetpotato, and Yam respectively. Similar systems are being investigated for Taro and cocoyam and preliminary results indicate it take up to 6 months to generate clean planting material. These information is very paramount for a sustainable pre-based seed production of planting material of root and tuber crops.

5.1.11 Developing Low Technology for Rapid Multiplication of Taro (Colocassia esculenta (L) Schott) Planting Material – Dr. Regina Sagoe, CSIR-CRI, Ghana

This paper presents the preliminary observations on the development of a workable system to make quality and healthy planting materials available to farmers and researchers. It describes a protocol developed for the rapid multiplication of taro and establishes the fact that some parts of the crop taro will sprout spontaneously and grow well in certain growth media. A multiplication ratio of 6 to 10 per corm has been established. Sprout counts from the river sand (1237) were higher than that from the sawdust (1170). Seedlings from these growth chambers were healthy looking. And these seedlings when established in the field were able to withstand an attack by the Taro leaf blight disease (incidence-82%, severity-2.6), recording yields ranging from 7.5 to 12.3t/ha when compared with yields from a mix of locals (5.5 – 7t/ha).

It concludes by supporting the notion that nutritional predisposition of the planting material influence low or high yield. Supplementary nutrients will have to be applied to plantlets to boast its growth at the nursery stage.
5.1.12 On-Farm Evaluation of Five Taro Lines towards Increased Food Security in Ghana – Dr. Ernest Baafi, CSIR-CRI, Ghana

This paper highlights the need for improved taro cultivars that are tolerant to the taro leaf blight to avert the negative impact TLB disease has had on the taro industry in Ghana. Five introduced taro lines (CE/IND 12, BL/SM 158, BL/SM 151, BL/SM 115 and BL/SM 16) from international network of edible aroids (INEA) which were evaluated at Bipoa and Abrakaso in the forest zone of Ghana alongside farmer’s variety were described. Results indicates a significant genotypic differences and genotype x location interaction for the traits. Corm yield ranged from 2.25 t/ha to 5.86 t/ha. All the lines had significantly higher corm yield than the local variety except CE/IND 12 which performed poorly. Corm length ranged from 13.67 cm to 16.61cm. Corm diameter ranged from 10.81cm to 15.20cm. Harvest index ranged from 0.45 to 0.69. Corm dry matter content was significantly higher for the local variety than all the lines. However, three of the lines (BL/SM 151, BL/SM 115 and BL/SM 16) had relatively higher dry matter content. These lines will meet the food needs of farmers and consumers and therefore, needs to be selected for further testing in multilocalional trials for subsequent release to farmers.
SECTION 6
This section presents summaries of proceedings on day 6 of the conference which opened with a key paper on sweetpotato and was chaired by Dr. Haruna Braimah. There were eleven (11) technical presentation in the morning after which discussions on the presentations were done (fig 6).

Figure 6: cross section of participants during sweetpotato plenary session

6.0 Sweetpotato Value Chain Research and Development in the West African Sub-Region – Prof Harrision Dapaah, UCEW- Mampong, Ghana

His presentation highlighted the four distinct agro-ecologies characterizing the sub-region as Sahel with 150-500mm annual rainfall; Savanna with 500-1000mm annual rainfall; Forest with 1200-1500mm annual rainfall and Coastal Savanna with 500-800mm annual rainfall. The potential of sweetpotato to serve as a source of income, food security crop, feed and for the alleviation malnutrition was stressed. And further alluded to the fact that the full potential of sweetpotato has not been realized due to the perception that the crop is basically for home consumption. It is estimated that less than 20% of the crop is traded in both rural and urban markets and the sweetness of the crop compared with other root and tuber crops seem to affect the level of consumption. He gave an indication of inadequate Research and Production attention in Sub-region; thus a limited knowledge on current production status and extent of...
regional, country and local market for the crop. Three potential value chain worth developing in the sub-region for the different types of Sweetpotato producers/actors were described as: Fresh root value chain; processed root value chain and Animal feed value chain (both vines and root). The following were presented as potential interventions for the development and improvement of the three value chain systems: Breeding or selection of high yielding varieties tolerant to biotic and abiotic stresses with characteristics acceptable to the market; Integrated crop management; strong seed system to provide adequate quantities of quality planting materials; adopting best crop production technologies; organizing farmers to connect to the market (creating market linkages) and developing a better crop-livestock management system. And concludes with 5 possible models that can drive the sweetpotato value chain. These are direct linkages of producer groups with urban markets; proactive market creations and creation of sweetpotato trader group; developing local processing enterprises; direct linkages of producer groups within institutional markets (schools, hospitals), building trust between farmers and other market chain actors and stimulate innovation and product development to add more value.

6.1.1 Evaluation of Six Sweetpotato Genotypes for Enhanced Food Security in Ghana – Kwadwo Adofo, CSIR-Crops Research Institute, Ghana

This paper presented the need to develop new and adapted varieties (high yielding, tolerant to pests and diseases, high nutritive value, preferred by farmers, consumers and agro-industrialists) as a result of changing environmental conditions (erratic rainfall, drought, low soil fertility) which adversely affects the crop’s optimum performance. It evaluates the agronomic performance of six advanced sweetpotato clones across the Coastal Savannah and Forest-Transition agro-ecological zones of Ghana. Five sweetpotato genotypes (three introductions & two hybrids) have been identified as potential candidates for varietal release proposal and concludes by suggesting a significant genotype by environment interaction for storage root yield, vine yield, virus disease score, weevil damage rating and percent dry matter content.
6.1.2 The sweetpotato support platform for West Africa: Complementary efforts by the International Potato Center to strengthen sweetpotato breeding in West Africa – Dr Edward Carey, CIP, Ghana

This paper introduces sweetpotato as a nutrient and energy dense root crop and describes the SPHI program as a multi partner 10 year effort that has reposition in the food economies of households in the sub Saharan Africa. It describes other project interventions in West Africa and presents target areas of importance in Ghana. The presentation further highlights the accelerated breeding program under SASHA, the rapid proximate analysis for minerals and sugars and beta carotene, the regional virus indexing program, seed system involving farmers and capacity building.

6.1.3 Structure of sweetpotato diversity in West Africa as explained partly by climatic conditions – Kodjo Glato, ¹University of Lomé, Togo

The presentation focused on the evaluation of sweet potato diversity in West Africa by sampling from the region extending from the coastal area of Togo to the northern Sahelian region of Senegal representing a range of climatic conditions. Using 12 microsatellite markers, 132 varieties evaluated along this gradient were described and using phenotypic data from field trials genetic diversity in West Africa was found to be 18% lower than in America. Genetic diversity in West Africa is structured in five groups, with some groups found in very specific climatic area, e.g. under a tropical humid climate, or under a Sahelian climate. We also observed genetic groups with occurrence in a wider range of climates. The genetic groups observed were also associated with morphological differentiation, mainly the shape of the leaves and the color of the stem or root. This particular structure of diversity along a climatic gradient can be used to propose conservation strategies as well as to recommend specific varieties to be grown in current and future climate conditions. This knowledge will help adapt agriculture to ongoing climate variation in West Africa.

6.1.4 Evaluation of Resistance of Sweetpotato Varieties to Cylas puncticollis Boheman (Coleoptera: Apionidae) Weevil in Burkina Faso - Souleymane Koussoubé; Ouaga I University Professor Joseph Ki-Zerbo, Ouagadougou, Burkina Faso

The presentation described thirteen sweet potato variety field susceptibility to the Cylas puncticollis Boh weevil in Burkina Faso. The susceptibility and performance of some improved varieties like BF77*Tainung-10, Caromex, T1B40060, Tiebele-2, Jewel, which
were not significantly different from those of the local varieties: BF18, BF59 and BF51 were established. The laboratory screening showed that Caromex and TIB40060 varieties are the most preferred by weevils. The orange-fleshed varieties JEWEL, TIB-440060, BF59×CIP-4 reaction was not significantly different to the more tolerant check local varieties BF59 and BF18. These improved orange-fleshed varieties could however be included in the breeding program for resistance to sweetpotato weevil.

6.1.5 Effect of Sowing Depths on Cylas spp Infestation on Some Sweetpotato Varieties - Boamah E. D, CSIR- Plant Genetic Resources Research Institute, Bunso-Ghana

The presentation highlights the effect of sowing depths on Cylas infestation of four sweetpotato varieties Sauti, TIS 8266, TIS 84/0320 and TIS 3017. The population levels of Cylas spp investigated on the sweetpotato varieties after planting increased from 2nd, 3rd to the 4th month and significant increases in incidence of weevil with time on the four sweetpotato varieties were established. The level of tuber infestation of the four sweetpotato varieties by Cylas spp decreased with increasing depth of planting. This may explain why sweetpotato varieties with long tuber stalk had the least incidence of Cylas spp. The results also indicated that the sweetpotato variety which had the highest number of leaves and branches, as well as the thickest vine had the highest incidence of vine infestation at 5% significant level. The varying levels of soluble sugar and percent dry matter of the 4 varieties used were also established.

6.1.6 Effect of Compost Mounds and Chemical Fertilizer on Yield of Sweet Potato Patterson Osei Bonsu, CSIR-Crops Research Institute, Ghana.

The presentation highlights the use of compost mounds to maintain soil fertility and sustain sweetpotato yields by farmers in Papua New Guinea. It then evaluates the effects of compost mounds formed from groundnut residues and chemical fertilizer on yield of sweetpotato in Ghana. The treatments evaluated were i) major season maize followed by minor season sweet potato, with no residue incorporated nor chemical fertilizer (maize with no fertilizer); ii). major season maize followed by minor season sweet potato, with residue incorporated in mounds plus chemical fertilizer (maize with fertilizer); iii) major season groundnut followed by minor season sweet potato with residue incorporated nor chemical fertilizer (groundnut with no fertilizer) and iv) major season groundnut followed by minor season sweet potato with residue incorporated plus chemical fertilizer (groundnut plus fertilizer). Findings indicated low incidence of weed incidence at land preparation in the minor season on the plots previously
planted to groundnuts compared with the maize plots. Incorporation of residues in mounds did not affect sweetpotato yields but chemical fertilizer significantly improved yields.

6.1.7 Analysis of the Main Marketing Constraints for Frafra Potato and their Income Implications for Smallholder Farmers - NANEMA Kiswendsida Romaric, Laboratory BIOSCIENCES/University Ouaga I Pr Joseph KI-ZERBO, Burkina Faso

This presentation emphasises the importance of consumption of Frafra potato in Burkina Faso, Ouagadougou. It presents previous research activities that have revealed that profits made from marketing of Frafra potato is decreasing compared to that of other tuber crops (yams, sweetpotato). A survey conducted in 2015 in the main markets of Ouagadougou to identify the main marketing constraints for frafra potato; identified the following as major constraints: The rapid tuber deterioration and the lack of improved methods for conservation, the small size of frafra potato tubers and the short period of tubers availability on the markets. While the variety with black skin color is the preferred variety. It concludes by suggesting a future breeding program that aims at increasing tuber size.

6.1.8 Genotyping of released and elite Sweetpotato varieties using Simple Sequence Repeats (SSRs) and Expressed Sequence Tags (ESTs) - Allotey L.A, CSIR- Crops Research Institute

The poster stressed the importance of Sweet potato (Ipomoea batatas) as the seventh most important crop in the world. And goes further to describe a DNA Amplification Fingerprinting (DAF) approach employed to develop individual-specific profiles and analyze genetic relationships among 20 germplasm collected. Two sets of microsatellites -Simple Sequence Repeats (SSRs) and Expressed Sequence Tags (ESTs) were used in this study. Screening methodology were described and findings presented as follows: Data generated revealed different clustering for the two sets of markers used. ESTs markers clustered the released varieties together with the elite line Jewel. However the SSR markers clustered Jewel together with two other elite lines in one group. No duplicates were identified in the collection. The two marker systems used clustered the varieties differently, therefore depending on the research objective; the appropriate marker system should be used.
6.1.9 Physicochemical and Functional Properties of Flour from Twelve Varieties of Ghanaian Sweetpotatoes - Charles Tortoe, CSIR-Food Research Institute, Accra, Ghana

The study evaluates the physicochemical and functional properties of flours developed from 12 varieties of sweet potatoes. Results indicate flours have good water solubility and binding indices of importance as flours and easy-to-cook properties as their pasting temperature was between 79 and 84 °C whereas peak viscosity and setback ratios varied from 75 – 304 RVU and 1.38-1.66, respectively. Interestingly, the 12 varieties of Ghanaian sweetpotatoes possess good physicochemical and functional properties that make them applicable in wide array dietary and industrial purposes.

6.1.10 Baseline study on cassava and sweetpotato industries in Mali - Daouda Dembélé, IER, Mali

This presentation describes how WAAPP, Ghana have provided the opportunity for Mali to develop a study on cassava and sweetpotato crops in 2011-2013. The discussions focus the development of the production of these two crops in Mali. The following activity focus are discussed: (i) a diagnostic study of the market and from farms in Sikasso, Segou, Koulikoro, Mopti and Kayes region; (ii) the establishment of cassava and potato collections; (iii) the establishment in the Sikasso region, evaluation trial of Malian landraces and varieties from the Ghana National Centre of Specialization. Cassava collection was implemented during the 2011-2012 campaign with 4 varieties from Ghana which are Sika, Doku, Bankyejema and Ampong and 5 varieties from Mali which are Loulouni I Loulouni II, Louloun III and Farako. The planting material used for sweetpotato consisted mainly of local landraces collected from some farmers in the Sikasso region. The results of the diagnostic study show that at the farmer’s level, the two crops are weakly intensified with the use of agricultural equipment and traditional farming techniques. The best cassava yields were obtained with Doku duade varieties (68 t/ha) and Ampong (61 t/ha). Yields from Mali varieties ranged between 30 and 46 t/ha. For sweetpotatoes, Bilasso had the best performance with 18 t/ha. The results of such diagnostic study helped to define recommendations for research and development in Mali.
6.1.11 Adoption Potential of Improved Sweetpotato Varieties in Ghana - Amengor Eyram Natson, CSIR-Crops Research Institute, Kumasi-Ghana

The study employed qualitative approach (Participatory Rural Appraisal) involving 126 farmers randomly selected from a purposive pool of sweetpotato farmers from four major sweetpotato growing areas (Akatsi, Komenda, Ohawu and Asempanaye). Males (59.6%) dominated in sweetpotato production across location and a youth representation of 40% of the total sampled size which is a good indication for sweetpotato production. Sweetpotato production was found to be more pronounced in the minor season (August-September) on an average farmsize of 1.5acres (0.6ha) using local and improved varieties (Sauti, Santompona, Faara and Apomuden). Major pest that affected the crops were Sweetpotato weevil (50% yield loss), Grasshoppers (30% yield loss) and Caterpillar (20% yield loss). Pesticides (Acetelic 50EC) was extensively used in pest control. Farmers perceived that, excessive use of pesticides had a negative effect on the sweetpotato yield and quality. Mean yield per hectare was 3.3tons (3000kg). Market price and gross margin profits were presented and varietal preference were location specific. Optimum adoption of a new variety requires the consideration of location variety choices, training on good agricultural practices, education on the traits of the new variety and proper marketing techniques.

SECTION 7
This section presents the guidelines for the development of Regional Research and Development concept notes in the various group discussions and further outlines the draft concepts developed under the various root and tuber commodities. Project titles were identified and networks developed around countries who have similar constraints in the sub region.

7.0 Group session – Root and Tuber Crops value chain concept notes development

Conference participants reconvened in the afternoon as syndicate groups to further discussed the papers presented for the day and then developed some regional concept notes in the four thematic areas on all root and tuber crops value chain.

The 4 Key Areas for sustainable development which formed the thematic basis for the groupings under each commodity were as follows: Technology and innovations that increase productivity; Value Addition technologies and innovation in processing and packaging; Integrated Agricultural Research and Extension Delivery services and Marketing and Commercialization systems that involves the private sector.
Membership of each group cut across the various multi-disciplines in science research, development officers, policy officers, processors, producers both small and large scale and marketing officers. Each group identified a moderator and a rapporteur and after some discussions listed and prioritized technologies available and issues relating to constraints and interventions along the commodity value chain. Criteria for evaluation were agreed upon by each group which was graded on a scale of 1-3 (low to high).

In the development of concept notes, which was based on prioritized bottlenecks and interventions on themes, the various groups established interested countries and personnel with contact addresses (network) for further proposal development. Final outcomes were presented at a plenary in the following format with the top ranking giving orientations for the development of Concept notes: Project tentative title; Areas for sustainable development; Project Objectives; Expected Results; Indicative activities per Result Areas; Target beneficiaries; Participating countries/Institutions.

7.1 Cassava value chain development

Developing concepts under the identified title resulted in the listing of technologies or issues mitigating increased productivity along the cassava value chain as presented during the technical sessions of the conference. These were then prioritized and objectives developed based on titles identified during discussions.

7.1.1 Technology and Innovation

Issues related to cassava production technology and innovation development were as follows: Availability and adoption of improved cassava varieties; seed system and distribution; good agronomic practice; fertilizers; mechanization and supplemental irrigation, which has become necessary as a result of climate change. These were discussed within the syndicate group and evaluated on a scale of 1 to 10 for relevance, scalability, capability, strength and potential to resolve the issue at stake and the existence of an enabling environment to implement technologies related to these issues. The 3 top prioritized issues as presented in the table 7.1.1 below defined the development of the objective.
### Table 7.1.1 Prioritization of issues related to sustainable cassava production

<table>
<thead>
<tr>
<th>Technology/Issues</th>
<th>Relevance</th>
<th>Scalability</th>
<th>Capability Strength Potential</th>
<th>Enabling environment</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved varieties</td>
<td>7</td>
<td>3</td>
<td>7</td>
<td>6</td>
<td>23</td>
</tr>
<tr>
<td>Seed systems distribution</td>
<td>7</td>
<td>6</td>
<td>6</td>
<td>7</td>
<td>26</td>
</tr>
<tr>
<td>Good agronomic practices</td>
<td>7</td>
<td>5</td>
<td>5</td>
<td>6</td>
<td>23</td>
</tr>
<tr>
<td>Fertilizer</td>
<td>7</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>16</td>
</tr>
<tr>
<td>Mechanization</td>
<td>7</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>18</td>
</tr>
<tr>
<td>Supplemental Irrigation</td>
<td>7</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>16</td>
</tr>
</tbody>
</table>

**Project Tentative Title:** Closing the Cassava Yield Gap in the West African Sub-region

**Objectives:**

1. To improve cassava seed systems.
2. To increase adoption of improved cassava varieties.
3. To promote good agronomic practices in cassava cultivation.

**Expected Results:**

1. Cassava seed supply system improved.
2. Adoption of improved cassava varieties increased.
3. Good agronomic practices adopted in cassava cultivation.

**Key Activities for expected results are as follows:**

**To improve cassava seed systems**

1. Cleaning and multiplication of potential seed materials
2. Promotion of ‘2 – 3 node cuttings’ as planting materials
3. Promotion of pre-sprouted cuttings for planting
4. Organize training programs to enhance the capacity of seed multipliers and stakeholders in seed certification.

**To increase adoption of improved cassava varieties**

1. Create awareness on available improved varieties – using mass and print media, farmer field days, demonstration plots,
2. Distribution of improved varieties to farmers targeting their different end uses.
To promote good agronomic practices

1. Awareness creation on good agronomic practices through establishment of demonstration plot, mass and print media.
2. Monitoring of farmer groups on good agronomic practices adoption.

Target beneficiaries are research institutions, universities, farmers, seed producers and dealers, processors and business men. Participating countries will be cassava growing countries in the West African sub-region.

7.1.2 Technology and innovation for Cassava Value addition

Issues related to cassava production technology and innovation development were as follows: Availability and adoption of improved cassava varieties; seed system and distribution; good agronomic practice; fertilizers; mechanization and supplemental irrigation, which has become necessary as a result of climate change. These were discussed within the syndicate group and evaluated on a scale of 1 to 10 for relevance, scalability, capability, strength and potential to resolve the issue at stake and the existence of an enabling environment to implement technologies related to these issues. The 3 top prioritized issues as presented in the table 7.1.1 below defined the development of the objective.

Table 7.1.1 Prioritization of issues related to sustainable cassava production

<table>
<thead>
<tr>
<th>Technology/Iissues</th>
<th>Relevance</th>
<th>Scalability</th>
<th>Capability Potential</th>
<th>Enabling environment</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved varieties</td>
<td>7</td>
<td>3</td>
<td>7</td>
<td>6</td>
<td>23</td>
</tr>
<tr>
<td>Seed systems distribution</td>
<td>7</td>
<td>6</td>
<td>6</td>
<td>7</td>
<td>26</td>
</tr>
<tr>
<td>Good agronomic practices</td>
<td>7</td>
<td>5</td>
<td>5</td>
<td>6</td>
<td>23</td>
</tr>
<tr>
<td>Fertilizer</td>
<td>7</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>16</td>
</tr>
<tr>
<td>Mechanization</td>
<td>7</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>18</td>
</tr>
<tr>
<td>Supplemental Irrigation</td>
<td>7</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>16</td>
</tr>
</tbody>
</table>

Project Tentative Title: Closing the Cassava Yield Gap in the West African Sub-region

Objectives:

4. To improve cassava seed systems.
5. To increase adoption of improved cassava varieties.
6. To promote good agronomic practices in cassava cultivation.

**Expected Results:**

4. Cassava seed supply system improved.
5. Adoption of improved cassava varieties increased.
6. Good agronomic practices adopted in cassava cultivation.

**Key Activities for expected results are as follows:**

**To improve cassava seed systems**

5. Cleaning and multiplication of potential seed materials
6. Promotion of ‘2 – 3 node cuttings’ as planting materials
7. Promotion of pre-sprouted cuttings for planting
8. Organize training programs to enhance the capacity of seed multipliers and stakeholders in seed certification.

**To increase adoption of improved cassava varieties**

3. Create awareness on available improved varieties – using mass and print media, farmer field days, demonstration plots,
4. Distribution of improved varieties to farmers targeting their different end uses.

**To promote good agronomic practices**

3. Awareness creation on good agronomic practices through establishment of demonstration plot, mass and print media.
4. Monitoring of farmer groups on good agronomic practices adoption.

Target beneficiaries are Research Institutions, Universities, Farmers, seed producers and dealers, processors and business men. Participating countries will be cassava growing countries in the West African sub-region.
7.1.2 Technology and innovation for Cassava Value addition

This group evaluated issues related to technologies and innovations in processing and packaging. Technologies identified for further evaluation included gari and cassava dough as food, starch for ethanol, glucose and sugar and cassava as animal feed and packaging of cassava products developed. These were prioritise based on relevance, scalability, capability, strength and potential and the existence of enabling environment. Gari as food, animal feed and starch for ethanol and glucose production were the top 3 priorities identified

Project Title: Processing cassava as food and feed for improved livelihood in the Sub-region

Objective: Improve livelihood through increased consumption of cassava products as food and feed

Outcomes /Results

1. Increased sub regional integration
2. Reduced environmental pollution
3. Increased consumption of cassava produce as food and feed
4. Additional income from cassava by-products

Indicative activities per result are

1. Increased production of cassava products:
2. Transfer of technology:
3. Collaboration between participating countries: identifying strength of partners in the development and dissemination of products
4. Developing technologies that reduce environmental pollution: conversion of by-products into useful products
5. Development of cassava by-products

Target beneficiaries: Producers (crop and animal farmers), Processors, Consumers

Participating countries: ECOWAS sub region and other interested parties
7.1.3 Integrated Agricultural Research and Extension Delivery

**Project Title:** Generation and dissemination of new technologies in cassava production system

**Areas for sustainable development:**

1. Development and dissemination of New improved varieties
2. Healthy planting materials availability
3. Agronomic practices and post-harvest technologies.

**Expected results:**

- Increased farmers’ yield per unit area
- Sustainable supply of planting materials
- Reduced spread of diseases among cassava field.

**Indicative activities per result area**

1. Participatory evaluation on new varieties with farmers to enhance adoption
2. Germplasm collection and maintenance,
3. Establishment of community level planting material multiplication centres of healthy planting materials,
4. Training of trainers in improved agronomic and postharvest practices,
5. Training in good cultural practices for pests and diseases management
6. Strengthening phytosanitary inspection and regulation of planting material multipliers.

**Beneficiaries:** Farmers, agro input dealers, Researchers and financial institutions.

**Participating countries and institutions:** ECOWAS member countries, Ghana; CSIR-PGRRRI, FRI, SARI and CRI.

7.1.4 Marketing and Commercialization - involving the private sector

Issues of relevant to cassava marketing and commercialisation included the following: Market information, Promotion, Packaging/branding, Standardization of weights, Storage and policy backing for some of these issues. These were discussed and prioritised for relevance, scalability, capability, strength and potential of research team and the existence of enabling environment on a scale of 1-3 (Table 7.1.4). Top of these issues were availability of market information, promotion, packaging /Branding and standardisation of weights for produce.
Table 7.1.4: Prioritisation of issues for sustained marketing and commercialisation

<table>
<thead>
<tr>
<th>Issues</th>
<th>Relevance</th>
<th>Scalability</th>
<th>Capability strength potential</th>
<th>Enabling environment</th>
<th>Ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Market Information</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>2. Promotion</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>3. Parking/Branding</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>4. Standardization</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>5. Storage, knowledge, logistics</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>6. Policy</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>6</td>
</tr>
</tbody>
</table>

**Project Title:** Promoting Cassava Commercializing In West Africa

**Areas for sustainable development include the** Private sector empowerment; youth empowerment through capacity building in production and processing techniques and investment in new technologies and engagement of FBOs in market information dissemination.

**Project objectives**

- create enabling policy environment for marketing of cassava
- link producers to industrial consumers
- create sustainable jobs in agriculture

**Expected Results**

- Rural poverty reduction
- Job creation along the value chain
- Provision of sustainable marketing of cassava products
- Increased contribution to GDP

**Target Beneficiaries are** the Youth in agriculture and Women farmers and processors.
7.2 Yam Value Chain development

7.2.1 Technology and Innovation

Factors resulting in low yam yields were identified and listed as follows: Prevalence of pests and diseases; climate change and low soil fertility issues; drudgery in land preparation and unavailability of quality seeds. For sustainable seed systems the following technologies were identified as available and could be promoted: miniset; aeroponics; vine technology; bioreactor; hydroponics; tissue culture; enhanced milking and gravity feeding techniques could be used for production of seeds at various stages of seed system development.

Table 7.2.1: Prioritization of issues for sustainable yam production

<table>
<thead>
<tr>
<th>ISSUES</th>
<th>Relevance</th>
<th>Scalability</th>
<th>Capacity, Potential, Strength</th>
<th>Enabling environment</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seed System</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>Good agronomical practices</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Disease and Pest management</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Use of Improved varieties</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>Integrated soil fertility management</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Mechanization</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Irrigation</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>5</td>
</tr>
</tbody>
</table>

Technologies or innovations in yam agronomic practices for increased productivity were available in the following areas: mechanical ridging, mineral fertilizer application, organic fertilizer, staking options, cropping systems, weed management, integrated soil fertility management, pests and diseases, use of tolerant and resistant varieties, cleaning/ virus indexing using Tissue culture and biological control. The group them listed issues and scored their importance on a scale of 1 to 3 and as shown on the Table 7.2.1.

The top 4 issues were seed system, good agronomic practices, disease and pest management and use of improved varieties in the farming system. These informed the development of a project title.
**Tentative Project Title:** Enhancing yam productivity through integrated crop management system

**Objectives:**

1. To improve seed yam availability.
2. To promote use of improved yam varieties.
3. To promote good agricultural practices in yam production.
4. To improve yam disease and pest management strategies.

**Expected Results**

1. Sustainable formal yam system established
2. Improved yam varieties adopted by farmer
3. Good agronomical practices adopted by farmers
4. Pest and disease incidence minimized

**Indicative Activities per Result Areas**

1. To improve seed yam availability, the following activities were suggested:
   - Promote yam miniset and enhanced milking technologies for quality farmer saved seeds and commercial seed growers.
   - Promote use of vine cutting technology for production of pre-basic and basic seeds at the farmer’s level.
   - Implement tissue culture techniques in cleaning, multiplication and maintenance of improved and farmer preferred yam varieties.
   - Promote use of aeroponics and bioreactors for pre-basic and basic yam seed production on commercial scale.

2. To promote use of improved yam varieties, the following were suggested:
   - Create awareness on available improved varieties – using mass and print media, farmer field days, demonstration plots,
   - Distribute seeds of improved varieties to farmers.

3. To promote good agronomic practices in yam production, the following were suggested:
   - Promote mechanized ridging to reduce drudgery in field preparation.
   - Promote integrated soil fertility management.
   - Promote sustainable soil water conservation.
   - Promote sustainable yam cropping systems.
4. To improve yam disease and pest management, the following key activities were suggested:

- Promotion of resistant and tolerant yam varieties.
- Cleaning of infested planting materials using virus indexing, thermotherapy and meristem culture techniques.
- Promote integrated pest management strategies as the preferred option.

**Target Beneficiaries were as follows:** Seed producers, farmers, aggregators, consumers, exporters, processors, transporters, marketers.

The following were identified as participating countries: The yam belt of the West African Sub-region which includes Ghana, Nigeria, Cote d’Ivoire, Togo, Benin, Burkina Faso, Guinea, and Cameroon.

### 7.2.2 Technology and innovations for Value Addition

This referred to technologies and innovation related to yam value addition at processing level of the value chain. The following were listed as available: Yam Fries, flour, starch and vacuum packed yam / Ampesi / yam balls. Issues related to the promotion and acceptance of these value addition technologies were identified as lack of awareness of technologies and products, financial challenges in the up scaling of these innovative product, inadequate quality raw material base, lack of suitable equipment and technical know-how and difficulty in changing food habits. The 3 top technologies which were of relevance in the food system, scalable in terms of dissemination but processors have less capability and a fair enabling environment for promotion are yam fries, yam flour and the vacuum packed yam products for the urban markets.

Issues of high importance that received attention were lack of awareness that such product development exist, financial challenge or investment opportunities and difficulty in changing eating habits of consumers. These informed the identification of a project that promotes value addition technologies that reduce post-harvest loses and increase income in the sub region.

**Tentative Project Title:** Value addition to yam for economic growth in the sub region

**Objective:** To reduce postharvest loses through the development and promotion of value addition yam products.
This will improve shelf life and enhance the livelihoods of actors in the value chain through the creation of jobs and promotion of new products.

**Indicative activities** under results are as follows:

1. Reduce postharvest loses
   - Developing processing techniques to increase shelf life
   - Marketing

2. Creation of employment
   - Development of new products/ different formulations
   - Promotion of new products

Targeted beneficiaries are Farmers, Processers, Traders and Exporters.

### 7.2.3 Integrated Agricultural Research and Extension Delivery

**Issues of** importance identified under this thematic area are presented on the table below showing its level of relevance; scalability; capacity, potential and strength of actors and enabling environment for sustainable increased productivity.

#### Table 7.2.3 Prioritization of Technologies for research and extension delivery

<table>
<thead>
<tr>
<th>Technologies /issues</th>
<th>Relevance</th>
<th>Scalability</th>
<th>Capability/Strength potential</th>
<th>Enabling environment*</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yam storage</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Seed yam system</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Sustainable funding</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Soil and water management</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>7</td>
</tr>
</tbody>
</table>
Issues for sustainable development

1. Use of stakeholder platforms for validation of existing seed yam generation and dissemination technologies
2. Innovative funding opportunities
3. Storage technologies
4. Capacity building of stakeholders in quality seed yam production and dissemination
5. Gender mainstreaming (women empowerment)

Project Title: Enhancing quality seed yam production and dissemination in West Africa

Project objectives:

- To validate existing seed yam generation technologies
- To develop a sustainable funding mechanism for seed yam development
- To develop sustainable seed yam storage technologies
- To build capacity of stakeholders in producing and multiplying quality seed yam.

Expected results:

1. Enhanced Income through increased productivity
2. Ensure food and nutritional security in the West African Sub Region,
3. Sustainable funding for seed yam production
4. Capacity of major stakeholders in yam seed system enhanced (Academics, Scientists Extension officers and farmers)

Indicative activities:

- Formation of community and national innovation platforms in the West Africa Sub Region
- On farm demonstrations on seed yam technologies
- Training value chain actors of the seed yam system

7.2.4 Marketing and Commercialization - involving the private sector

Issues of importance identified under this thematic area are presented on the table below showing its level of relevance; scalability; capacity, potential and strength of actors and enabling environment for sustainable increased productivity.
Table 7.2.4 Prioritization of Issues for sustainable research and development

<table>
<thead>
<tr>
<th>Issues</th>
<th>Relevance</th>
<th>Scalability</th>
<th>Capability</th>
<th>Enabling environment</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seasonal Glut</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Promotion</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Packaging/branding</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Fresh Storage</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>8</td>
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<tr>
<td>Standardization</td>
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<td>1</td>
<td>1</td>
<td>6</td>
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<tr>
<td>Transportation</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Market Structures</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>

Areas identified for sustainable development:

1. Building private sector capacity
2. Increase in value chain actors
3. Youth/ women empowerment
4. Investment in new technologies

Project Title: Strengthening yam markets in West Africa.

Objectives:

To advocate for enabling policy environment,

To develop sustainable yam market in West Africa

Expected output:

Increased food security, enhanced job creation and income of value chain actors

7.3 Cocoyam Value Chain

7.3.1 Technology and innovation for increase productivity

Issues of importance identified under this thematic area are presented on the table below showing its level of relevance; scalability; capacity, potential and strength of actors and enabling environment for sustainable increased productivity.
Table 7.3.1 Prioritization of issues for sustainable cocoyam development

<table>
<thead>
<tr>
<th>ISSUES</th>
<th>Relevance</th>
<th>Scalability</th>
<th>Capacity, Potential, Strength</th>
<th>Enabling environment</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved cocoyam varieties</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Limited Quality declared planting materials</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Labour / high production cost</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Narrow genetic base</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Access to planting materials</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Pests and diseases</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>10</td>
</tr>
</tbody>
</table>

**Tentative Project Title:** Up-scaling the production of cocoyam for enhanced food security in West Africa.

**Objectives:**

- To promote improved cocoyam varieties
- To mass generate and distribute large quantities of Quality declared planting materials
- To manage cocoyam pests and diseases.

**Expected Results**

1. Increased use of improved varieties
2. Increased availability and use of cleaned planting materials.
3. Disease and pest incidence reduced.

**Indicative Activities per Result Areas**

1. To disseminate improved cocoyam varieties
   - Promote cocoyam minisett technology for quality farmer saved seeds and commercial seed growers.
   - Implement tissue culture techniques in cleaning, multiplication and maintenance of improved and farmer preferred cocoyam varieties.
   - Identify and Promote Quality declared planting materials

2. To improve cocoyam disease and pest management strategies.
   - Promotion of resistant and tolerant cocoyam varieties.
   - Cleaning of infested planting materials using virus indexing, thermotherapy and meristem culture techniques.
- Promote Integrated crop and pest management strategies

**Target Beneficiaries** are Seed producers, farmers, aggregators, consumers, exporters, processors, transporters, marketers. Participating countries are the West African Sub-region which includes Ghana, Nigeria, Cote d’ivoire, Togo, Benin, Burkina Faso, Guinea, Cameroon, and Mali

**7.3.2 Technology and innovations for cocoyam processing and packaging (value addition)**

Technologies and innovations and Issues that prevents sustainable productivity under this thematic area were scored for its importance on a scale of 1 to 3 for relevance, scalability, capacity/strength/potential of actors and enabling environment for implementation.

The top 3 products available are cocoyam flour, leaves as vegetable and chips for product development. Issues that prevents the sustainable development and utilization of such products are lack of awareness of such products, financial challenge and inadequate raw materials. Areas for sustainable development are Processing and marketing.

**Tentative Project Title:** Value addition to cocoyam for enhanced economic growth in the ECOWAS sub-region

**Objectives:**

To address nutritional challenges in the Sub-region, increase the demand for cocoyam, creation of employment, diversification of food forms and revamping the export market.

**Expected Results:**

- Contribute to addressing the nutritional challenges of the Sub- region,
- Increased demand for cocoyam,
- Reduction in unemployment,
- Reduction in rural-urban migration,
- Cocoyam export revamped

**Targeted Beneficiaries:** Farmers, Processors, Traders, Exporters, Consumers
Participating countries: ECOWAS sub-region and beyond

7.3.3: Integrated Agricultural Research and Extension Delivery

Issues of importance identified under this thematic area are presented on the table 7.3.3 below showing its level of relevance; scalability; capacity, potential and strength of actors and enabling environment for sustainable increased productivity.

Table 7.3.3 Prioritization of Issues

<table>
<thead>
<tr>
<th>Issues</th>
<th>Relevance</th>
<th>Scalability</th>
<th>Capability/Strength</th>
<th>Enabling environment</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taro leaf blight (TLB)</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Limited germplasm collection</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Drought</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>7</td>
</tr>
<tr>
<td>Lack of critical human resources</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>6</td>
</tr>
</tbody>
</table>

Project Title: Enhancing cocoyam production through improved germplasm development and dissemination.

Areas of sustainable development:

1. Breeding for TLB resistant varieties
2. Germplasm collection and characterization across ECOWAS,
3. Conduct on farm demonstrations,
4. Training of trainers
5. Exchange visit and capability building.

Project Objectives:

- Enhanced productivity and production of Cocoyam
- Contributing to Food Security and Nutrition

Expected results:

Capacity of actors along the value chain enhanced for increased productivity,
Quality and sufficient planting materials made available at farmer level,
TLB resistant varieties made available to farmers,
Taro and Cocoyam germplasm conserved.
Indicative activities per results areas:

- Breeding for Taro Leaf Blight resistance
- Conduct baseline survey
- Germplasm collection
- Characterization and evaluation

Target beneficiaries: All stakeholders in the value chain.

Participating countries: ECOWAS sub-region and beyond

7.3.4: Marketing and Commercialization - involving the private sector

Issues of importance identified under this thematic area are presented on the table 7.3.4 below showing its level of relevance; scalability; capacity, potential and strength of actors and enabling environment for sustainable increased productivity.

Table 7.3.4 Prioritization of Issues for sustainable development

<table>
<thead>
<tr>
<th>ISSUES</th>
<th>RELEVANCE</th>
<th>SCALABILITY</th>
<th>CAPABILITY</th>
<th>ENABLING ENVIRONMENT</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seasonal Glut</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Market Information</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Standardization</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Storage</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Funding</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>8</td>
</tr>
</tbody>
</table>

Areas for sustainable development: Seasonal shortage, Standardization and policy, Sustainable funding, Promotion, Branding and packaging

Project Title: Public-private partnership in sustainable marketing of cocoyam

Objectives:

To identify and link funding sources,
To create linkage between government and private sector (input-output markets),

Build capacities of value chain actors

**Expected Results:**

- Increased industry competitiveness
- Increased incomes of value chain actors
- Increased Job creation

**Indicative activities per Result Areas:**

1. Market intelligence studies
2. Scaling out of developed products,
3. Capacity building in branding,
4. Product development and packaging,
5. Advocacy,
6. Lobbying,
7. Development of a model agribusiness (funding)

**Target Beneficiaries:** All actors along the value chain

**Participating countries:** ECOWAS sub-region and beyond

### 7.4 Sweetpotato value chain

#### 7.4.1 Technology and innovation for production

Issues of importance identified under this thematic area are presented on the table 7.4.1 below showing its level of relevance; scalability; capacity, potential and strength of actors and enabling environment for sustainable increased productivity.
Table 7.4.1 Prioritization of issues for sustainable sweetpotato development

<table>
<thead>
<tr>
<th>ISSUES</th>
<th>Relevance</th>
<th>Scalability</th>
<th>Capacity, Potential, Strength</th>
<th>Enabling environment</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweet potato weevil resistant varieties</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Integrated soil management</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Integrated crop and pest management</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Adequate quality declared planting materials</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Improved varieties</td>
<td>3</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Integrated crop-livestock system</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>8</td>
</tr>
</tbody>
</table>

Tentative Project Title:
Upscaling the production of sweet potato for enhanced food security in West Africa

Objectives:
1. To produce and distribute quality planting materials
2. To upscale integrated crop and pest management practices

Expected Results:
Timely availability of quality planting materials

Indicative Activities per Result Areas
1. To produce and distribute quality planting materials
   - Promote quality planting materials farmer.
   - Implement tissue culture techniques in cleaning, multiplication and maintenance of improved and farmer preferred varieties.
2. To improve cocoyam disease and pest management strategies.
   - Promotion of resistant and tolerant varieties.
• Cleaning of infested planting materials using virus indexing, thermotherapy and meristem culture techniques.
• Promote Integrated crop and pest management strategies

**Target Beneficiaries:** Seed producers, farmers, aggregators, consumers, exporters, processors, transporters, marketers.

**Participating countries:** The West African Sub-region: Ghana, Nigeria, Cote d’ivoire, Togo, Benin, Burkina Faso, Guinea, Cameroon, Mali.

### 7.4.2 Technology and innovations for value addition

Three key products identified for promotion were potato flour, puree and composite gari. Issues of importance identified under this thematic area are presented on the table 7.4.2 below showing its level (scale of 1-3) of relevance; scalability; capacity, potential and strength of actors and enabling environment for sustainable increased productivity.

<table>
<thead>
<tr>
<th>ISSUES</th>
<th>RELEVANCE</th>
<th>SCALABILITY</th>
<th>CAPACITY/POTENTIAL/STRENGTH</th>
<th>ENABLING ENVIRONMENT</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awareness/Promotion</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Financial</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Inadequate raw materials</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>Lack of processing centres</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>6</td>
</tr>
</tbody>
</table>

**Project Title:** Exploiting the potential of sweetpotato for improved livelihood in the sub – region

**Objective:**
1. To address nutritional challenges in the Sub – region (especially Vit. A deficiency)
2. Increase the income of actors along the value chain by diversification of sweetpotato food forms
3. Increase production through the promotion of Sweetpotato as a food and industrial crop

**Expected Results:**
• Increased production and utilization of S.P
• Improved nutrition
- Incomes of actors improved
- More employment for the youth
- Diversify food forms

Areas for sustainable development include increased production of raw materials, processing centres and market availability.

**Indicative activities:**
- Establishing more processing centers
- Developing different Sweetpotato food forms,
- Promoting and creating awareness on health benefits of these new products
- Setting up incubation centers for capacity development
- Improve community based good practice center

**Target Beneficiaries:** Farmers, Researchers, Consumers, Exporters, Processors, Traders/Marketers.

**Participating countries:** The West African Sub-region: Ghana, Nigeria, Cote d’ivoire, Togo, Benin, Burkina Faso, Guinea, Cameroon, Mali.

### 7.4.3 Integrated Agricultural Research and Extension Delivery

Issues of importance identified under this thematic area are presented on the table 7.4.3 below showing its level of relevance; scalability; capacity, potential and strength of actors and enabling environment for sustainable increased productivity.

<table>
<thead>
<tr>
<th>Issues</th>
<th>Relevance</th>
<th>Scalability</th>
<th>Capability/Strength</th>
<th>Enabling Environment</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pest and diseases</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Soil management</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Storage</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Market</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Availability of planting materials</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>8</td>
</tr>
</tbody>
</table>

**Areas for sustainable development:**
- Availability of quality plant material
- Integrated crop and soil management
- Capacity building on innovative products
- Demonstration
- Storage (post harvest management and value addition)
- Gender main streaming
- Development of Technology transfer material on good agronomic practices
- Establishment of commodity and policy innovation platform

**Project title:** Enhancing sweetpotato value chain through innovations

**Objective:** Develop sweetpotato value chain for improve livelihood

**Expected results:**

- Enhanced food security, nutrition income and livelihood
- Enhanced knowledge and capacity of stakeholders across sweetpotato value chain
- Developed strong and viable linkages among value chain actors
- Efficient and sustainable market system developed

**Indicative activities per results areas:**

- Developing affordable tissue culture systems across the sub-region,
- Provision of equipment and infrastructure along the value chain
- Capacity building through training
- Establishment of demonstration, field days, open days
- Promote Integrated crop, soil, pest and disease management)

**Target beneficiaries:** all stakeholders in the value chain

**Participating countries:** Ghana, Mali, Cote d’Ivoire, Burkina Faso, Togo, Sierra Leone, Liberia, Senegal
7.4.4: Marketing and Commercialization - involving the private sector

Issues of importance identified under this thematic area are presented on the table 7.4.4 below showing its level of relevance; scalability; capacity, potential and strength of actors and enabling environment for sustainable increased productivity.

<table>
<thead>
<tr>
<th>ISSUES</th>
<th>Relevance</th>
<th>scalability</th>
<th>capacity</th>
<th>Enabling environment</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inadequate market information</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Lack of weighing Standards-produce</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Poor storage</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>Financial support</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>7</td>
</tr>
</tbody>
</table>

Project Title: Commercialization of sweet potato: the involvement of the private sector

Objectives:

- To determine the factors that drives the sweet potato market
- To create awareness and promote the consumption of sweetpotato products
- Build capacities of value chain actors for enhanced productivity

Expected Results:

- Marketing drivers identified
- Capacity of value chain actors enhanced
- Enhanced livelihood of sweetpotato value chain actors

Indicative activities:

- Market intelligence studies
- Facilitate market linkages among Sweetpotato actors
- Create platform for knowledge sharing among actors
- Development of a model agribusiness (funding)
Project beneficiaries: all actors along the value chain

Participating Countries: Ghana, Nigeria, Togo, Senegal, Mali, Burkina Faso, Benin, Cote D’Ivoire, and Cameroun.

7.5 Conclusion

This forum created a platform to identify issues of common relevance and interest to the sub-region in the first instance but did not allow the completion of an elaborate concept note. The meeting took note of contributing members present and addresses. These initial contributors will be contacted for further clarification and development of the concept notes.

8.0 Evaluation of conference

The closing session was chaired by the Director of CSIR-Crops Research Institute and closing remarks or statements were delivered on behalf of CORAF by Prof Abdouharamane Sangare who encouraged us to fine tune the draft regional concept notes developed. Other Root and Tuber project leaders under CGAIR centres present also pledged their support to organize future platforms towards the development of the commodities. Major issues cutting across all thematic areas of the crops during our deliberation and stressed by the Honourable Guest Speaker was sustainable funding for Research and Development for both the public and private sector especially towards out scaling of technologies and innovations for increased production and productivity.

A post evaluation forms were distributed to conference participants to evaluate the conference which was categorized under three main themes: Presentations (oral, poster, exhibition and content); Logistics (accommodation, transport and meals); Time management, general impression and suggestions for further improvement were the other areas evaluated. A total of 132 evaluation forms were received out of about 200 forms distributed. Table 8 below shows how participants perceived the various presentations.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Excellent</th>
<th>Very Good</th>
<th>Somewhat Good</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral Presentation</td>
<td>12(9%)</td>
<td>96 (73%)</td>
<td>24(18%)</td>
<td>132 (100%)</td>
</tr>
<tr>
<td>Poster Presentation</td>
<td>18(14%)</td>
<td>54 (41%)</td>
<td>54 (41%)</td>
<td>132 (100%)</td>
</tr>
<tr>
<td>Exhibition</td>
<td>6(4%)</td>
<td>54 (41%)</td>
<td>72(55%)</td>
<td>132 (100%)</td>
</tr>
<tr>
<td>Content of presentations</td>
<td>30(23%)</td>
<td>60 (45%)</td>
<td>42(32%)</td>
<td>132 (100%)</td>
</tr>
</tbody>
</table>

Conference participants generally evaluated the meeting proceedings as very good to excellent but would want to see more participation from other West African countries.