



PARI ANNUAL RESEARCH AND PLANNING MEETING 2016 REPORT

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By

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Executive summary

The Program of Accompanying Research for Agricultural Innovation (PARI) is a research program within the “One World – No Hunger” initiative of the Government of Germany whose objective is to foster the scaling of agricultural innovation in Africa and India, through research activities that inform the direction of investments for innovation. The program is currently being implemented in 12 African countries in addition to India and Germany.

National and international partners of PARI gathered together in Nairobi, Kenya, between 8th and 9th of December 2016, to review research outcomes achieved in 2016, harmonise activities of project partners as a way of delivering PARI objectives while defining and planning collaborative research activities for 2017. The annual review and planning meeting drew 70 participants from the following inter-continental organizations:

Africa

- Forum for Agricultural Research in Africa (FARA)
- African Growth and Development Policy Modelling Consortium (AGRODEP) under the auspices of the International Food Policy Research Institute (IFPRI), and National Agricultural Research Services (NARS) from the following African countries:
 - **Benin**-National Agricultural Research Institute of Benin (INRAB)
 - **Burkina-Faso**-Institute de L’Environment et de Recherches Agricoles (INERA)
 - **Cameroon**- Institut de Recherche Agricole pour le Développement (IRAD)
 - **Ethiopia**-Ethiopian Development Research Institute (EDRI)
 - **Ghana**- Council for Scientific and Industrial Research (CSIR)
 - **Kenya**- Kenya Agricultural and Livestock Research Organization (KALRO)
 - **Malawi**- Department of Agricultural Research Services (DARS)
 - **Mali**-Institut d’Economie Rurale (IER)
 - **Nigeria**-Agricultural Research Council of Nigeria (ARCN)

- **Togo**- Institut Togolaise de Recherche Agronomique (ITRA)
- **Tunisia**- Institut National de Recherche Agronomique de Tunis (INRAT), and
- **Zambia**- Zambia Agriculture Research Institute (ZARI)

USA

International Food Policy Research Institute (IFPRI)

Asia

Indian Council for Research on International Economic Relations (ICRIER)

Europe

- Center for Development Research (ZEF), University of Bonn
- Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)
- Imperial College London
- TUM School of Life Sciences Weihenstephan, Technical University Munich
- Institute of Crop Science and Resource Conservation (INRES), University of Bonn
- University of Hohenheim (UHOH)

The meeting started with a plenary session, where presentations and discussions were held followed by roundtables and panel discussions pitched around achievements of the program over the last two years. Partners focused on leveraging the results achieved in 2015 and 2016 to promote agricultural development within the context of the Africa vision for agriculture by way of implementing the Malabo declaration and G7 commitment to African agriculture.

Participants at the meeting unanimously agreed on the need for increased collaboration among PARI partners to allow for channelling effective and harmonized methodologies and approaches for research and documentation of agricultural innovation and technologies that stimulate investment in developing and scaling agricultural innovations across Africa.

A key segment of the meeting was presentation on Farmers' Innovation Contest, one of the core activities of PARI. The contest aims at identifying, documenting, and consolidating original research and innovation ideas from farmers to broaden agricultural innovation potentials in Africa and the world. Following a review of 2016 phase of this contest activity, actions were set in motion to implement the contest in 2017 and 2018 across six (6) West-African PARI countries (Benin, Burkina-Faso, Cameroon, Mali, Nigeria, and Togo).

Lessons drawn from success stories on innovation and mutual commitments of agricultural development stakeholders symbolized by the volumes of data on innovation, innovation platforms, digital maps and state-of-the art tools for data handling in agricultural production, generated over the last two years encapsulate the positive transformation of African agriculture propelled by PARI.

In addition, partners socially interacted with each other, and one of the highlights of such interaction was the send forth of two of African partners of PARI.

Introduction

Between 8th and 9th of December 2016, national and international partners of the PARI programme, gathered in Nairobi, Kenya, to review research outcomes achieved in 2016, harmonise activities of project partners as a way of delivering PARI objectives while defining and planning collaborative research activities for 2017. This report summarises the key highlights of the meeting as well as discussions, findings and recommendations for successful implementation of PARI programme.

Objectives of the Meeting

The meeting specifically set out to achieve the following objectives:

1. Review the research outcomes achieved in 2016
2. Harmonise activities of project partners to deliver the PARI objectives
3. Define collaborative research activities for 2017 around the key PARI themes

Programme of the meeting

The program of the meeting was designed in the following order:

- Opening remarks
- Overview of 2016 PARI research activities and most critical research issues for 2017
- PARI research themes: Progress and Outlook
 - o Innovation Platforms
 - o Mechanisation and post-harvest technologies
 - o Nutrition
 - o Information market place (posters and computers)
 - o Farmers Innovation Contests
- Opportunities for Indian-African Learning and Exchange
- Parallel roundtables on innovation-related research themes
- Modelling and mapping agricultural potential in the PARI countries

- Panel discussion on “A vision for African Agriculture: Charting a way towards implementing the Malabo Declaration and the G7 commitment
- Closing remarks

Opening remarks

The opening remarks were delivered in different speeches by Dr Eluid Kireger, the Director General of KALRO, represented by the Deputy-Director, Dr. Makini Felister; Dr Yemi Akinbamijo, the Executive Director of FARA; and Prof. Joachim von Braun, Director of Centre for Development Research (ZEF) as follows:

1. Speech by KALRO Deputy-Director General (Dr. Felister Makini), representing the Director General, Dr. Eluid Kireger



Dr. Stefan Schmitz, Commissioner, Special unit “One World, No Hunger”, BMZ

Prof. Dr. Joachim von Braun, Executive Director of ZEF

Dr. Yemi Akinbamijo, Executive Director of FARA

Representatives from International Universities and other organizations

Representatives from PARI African participating countries

Representatives from Kenya

All other invited Distinguished Guests

Ladies and Gentlemen,

Let me first take this opportunity to welcome all of you to Kenya, Karibuni sana!

Indeed, it gives me great pleasure to be with you this morning in the Programme for Accompanying Research in Innovations (PARI) Annual Research and Planning Meeting 2016. This event brings together researchers and other partners implementing PARI project from various organizations and countries.

Ladies and gentlemen

Like the rest of Sub-Saharan Africa, agriculture is the mainstay of Kenya’s economy and its importance cannot be overemphasized.

Over 26% of Kenya's GDP, 60% of export earnings, and over 80% of Kenya's workforce depend on agriculture. While the crops sub-sector contributes 60% of the agricultural GDP, the livestock and fisheries sub-sectors contribute the remaining 40%. However, in the face of growing population and environmental challenges, delivery approaches have failed in creating the desired impact for the country to meet its requirements for food security and economic growth. This is because research outputs did not attain the intended results and benefits that targeted farmers and other value chain actors. Majority of the population therefore continue to suffer from persistent food and drought related crises, infestations of insect pests and foliar diseases, with the threat of climate change remaining a nightmare.

Focus currently is therefore on more progressive forms of partnership approaches based on innovation systems where an innovation system is defined as a network of organizations, enterprises and individuals focused on bringing new products, processes, and forms of organizations into economic use, together with the institutions and policies that affect their behaviour and performance as described by the World Bank Investment Sourcebook Series on Agricultural Innovation Systems. This means promoting agricultural innovations requires new actors, processes and technologies to convey new knowledge.

This has resulted in a major shift from centrally managed government controlled extension systems to diversified, pluralistic systems of extension with multiple actors. The shift introduced the involvement of various partners/actors to enhance the development and utilization of agricultural innovations for desired impact. The Kenya Agricultural and Livestock Research organization also realized that as a research organization working singly, technologies and innovations will continue to remain on the shelves without benefitting the targeted end users for desired impact. KALRO therefore adopted the innovation systems approach.

Ladies and gentlemen

KALRO is the premier research organization that was established in 2014 through an Act of Parliament after the merger of four former institutes: These include Kenya Agricultural Research Institute (KARI), Kenya Sugar Research Foundation (KESREF), Tea Research Foundation of Kenya (TRFK) and the Coffee Research Foundation (CRF). It comprises 16 institutes and 47 research centres spread across the country and has a staff complement of 3,400 including 600 research scientists.

The mandate of KALRO is to promote, streamline, coordinate and regulate all aspects of research in agriculture and livestock development, and promote the application of the research findings and technologies.

Ladies and gentlemen,

It is gratifying for KALRO to be involved in the Programme for Accompanying Research in Innovations (PARI) project that has enabled us to partner with many of you including FARA and the German Government represented by ZEF thus creating capacity for better understanding of innovation systems and its application.

This is because innovation in agriculture and development is a way to address the challenges of feeding an increasingly populous and resource constrained Africa that essentially entails the result of an interactive process between many actors to borrow FARA's words.

We have indeed enjoyed a good working relationship with FARA and ZEF during the implementation of PARI project in the past two years.

Ladies and Gentlemen,

Now allow me to highlight some of the activities we have undertaken in this research collaboration and partnership.

In 2015, KALRO undertook three studies: An inventory of innovations in Kenya, whereby over 40 innovations initiated by various actors were documented. In addition, a scoping study on innovation platforms; and investments on agricultural innovations were undertaken.

In 2016, with further support from FARA and ZEF, KALRO implemented six interrelated activities. These include;

- Farmers' innovation contests in Bungoma, Kakamega and Siaya Counties
- Study on agricultural mechanization in Kenya focusing on the status, challenges, determinants and prospects;
- In-depth analysis of the impacts of selected successful innovation platforms;
- Stakeholder workshops on formation of overarching innovation platforms at county level;
- A study on the sweet potato value chain; and

- Compilation of a database of selected innovations in Kenya.

Through these studies, useful information has been generated that will inform concerned stakeholders to make informed decisions with respect to agricultural policies and income generation initiatives.

Ladies and gentlemen,

Returning to today's event, let me reiterate that this is an important day for the agricultural research fraternity, in particular for the African Continent, as it builds on previous initiatives that identify innovation as a key driver in socio-economic development. Through this workshop, pertinent research findings will be shared and appropriate strategies and action plans formulated in an effort to contribute to "one world, no hunger". Mine is to wish you fruitful discussion during the two-day meeting.

Finally, let me take this opportunity to express KALRO's gratitude for the support it has received from FARA and ZEF and to all of you for gracing this occasion.

Thank you and God bless you.

2. Speech by Dr. Yemi Akinbamiyo, Executive Director of FARA



Good morning distinguished ladies and gentlemen. I want to welcome you to this all-important meeting. It is the 2nd in a row of annual research and planning meeting of the PARI project. The first run was in Bonn Germany, in November 2015 and its outcomes are laudable.

The objective of PARI project is commendable and it aligns very well with the interest of Africa and the desired future for its agriculture. This desired future for Africa agriculture is well captured in the different continental frameworks especially the "Sustaining CAADP Momentum" that relies on the Africa leaders' political will as expressed in the Malabo Declaration of 2014.

Since 2014, concerted efforts have been channelled into the actualization of the declaration and transforming it into actions beyond words and documents. The centres of these actions are the national agricultural research system partners and the policy instruments. Getting the nations to play a proactive role requires research that generates knowledge to inform appropriate direction of investment for innovation around different commodities and issues.

The PARI project has come at an opportune time to aid knowledge generation as well as contribute knowledge to the action of its sister development project, the Green Innovation Centres in 12 Africa countries.

Distinguished ladies and gentlemen, If Africa will consistent generate the knowledge and technologies needed to meet the changing needs of its agricultural sector, the role of science cannot be over emphasized. Science for Africa Agriculture still requires lots of investment; but more importantly a lasting framework to ensure its development and contribution to national growth.

FARA with its stakeholders across the globe has developed the Science Agenda for Africa Agriculture (S3A) to achieve this laudable objective. The implementation of the S3A is in the pipeline and it hoped that this will midwife the lasting contributions of science to agricultural growth on the continent.

As it relates to the immediate need for innovation on the continent, the obvious challenges of our generation require proactive action. Obviously, “Africa can no longer wait for slow paced change; it rather needs to create the environment for a quick positive change in its agriculture” in other to avert failure and backwardness. The glaring trends of youth unemployment versus ageing farming population; growth of the middle class; changing dietary patterns, health awareness; upsurge in ICT, poor competitiveness of commodities produced in Africa and many other issues pose challenges and opportunities for Africa to step-up its game and maximize opportunities for agricultural growth.

I am excited that this meeting has gathered brilliant minds and leaders of thought, to provide update on what we have done with our unique research partnership in the last two years and plan together to achieve greater feat in 2017. All eyes are on us to deliver tangible outputs with implications on development outcomes and impact.

The agricultural research and development outlook in Africa is very bright for 2017 with the take-off the AfDB supported Technology for Africa Agricultural Transformation (TAAT) program. TAAT aims to bring the existing technologies in Africa to scale and foster mega impact along the selected value chain. About 35 countries in Africa have shown interest in this program and it is expected to kick off in the first quarter of 2017.

In addition to TAAT, the Africa Agricultural Research program (AARP) is also being developed under the leadership of FARA and its constituents as the core research program to backstop the TAAT value chains and priority intervention areas. The operational thoughts behind AARP is the devolution of research responsibilities to national systems to provide knowledge and technology support to agricultural growth in our fast-changing world. The proposal of AARP is being developed and I will solicit the active participation of our national and international partners in this effort to birth a change.

I will also like to inform you of the evolving structural change in the operation of the regional and sub-regional bodies in Africa agriculture. There is the conception of the Science for Agricultural Consortium (S4AC) that will foster more effective “Pulling and Delivering together” by FARA, the SROs, AFASS and other regional bodies. This is promising to be very strategic move to grow agricultural research and development in Africa through partnership.

I will like to close by reiterating the goal of the PARI projects “to promote and support the SCALING of proven innovations in the Agri-food sector in collaboration with relevant actors”. This is much needed now and should be achieved.

I therefore want to welcome you all to this important meeting and particularly our intercontinental partners from Germany, India and Africa that have travel from different corner of Africa to Nairobi. I want to appreciate the magnanimity of the leadership of Kenya Agricultural and Livestock Research Institute (KALRO) for hosting this meeting. Please do enjoy the hospitality of the good people of Kenya.

On this note, I want to wish you a very fruitful deliberation.

Asante Sana.

3. Remarks by Prof. Joachim von Braun, Director of Centre for Development Research (ZEF)



The opening remarks from Professor von Braun consisted of a short PowerPoint presentation in which he highlighted critical areas in the need of agricultural innovations. Emphasizing on the conditions needed for agricultural innovations, transformation, and food security across PARI countries, Prof. von Braun commended the choice of the proposed research for development themes focusing on Mechanisation, ICT 4 Agriculture and food, seed sectors, vocational training

for youth, crop insurance, farmer organisations, solar energy in food and agriculture, and job creation in food system. As a pre-condition for positive agricultural transformation in Africa, Prof. von Braun identified effective engagement of politicians, policymakers and all other stakeholders as key. To conclude, he outlined PARI priority areas of action for 2017 as: 1) Scaling up (across cases and countries); 2) Integrating (among micro-and macro insights); and, 3) More policy communication (advice, briefs for action and piloting, with policy-makers and GIZ innovation centres). He also informed participants that approval has been granted by the German Government to continue to fund PARI until 2019.

Presentations and issues discussed

In total, 20 presentations that addressed different PARI research themes were made.

Overview of 2016 PARI research activities & most critical research issues for 2017



An overview of 2016 PARI research activities and highlight of critical research issues for 2017 was presented by Dr. Oluwole Fatunbi (on left in the picture) and Dr. Heike Baumüller. Building on the main objective of PARI, which seeks to contribute to sustainable agricultural growth and food security in Africa through 1) future oriented impact analyses 2) identification and scaling of promising innovations, and 3) engagement of food and agriculture policy makers, the presenters engaged participants on the core mandates of the program. Given that PARI principles hinge on aligning actions that generate knowledge for national, regional and international agriculture and inform food policies and frameworks across the continent, strategic partnerships among research and development partners that promote investment and opportunities for growth were highlighted. Taking each PARI objective on its own, the presenters discussed the achievements of the PARI programme in 2015 and 2016 and projected activity plans for 2017 in accordance with each research and development partner organisation. Taken together, the research themes for 2017 will focus on innovation platforms, technology scaling/impact assessment, mechanization, crops of Green Innovation Centres, livestock, postharvest, soil/plan health, food system and climate change.

Next, a series of presentation followed.

1st series of presentations

Synthesis of African Countries Research on Innovation



The session started with a presentation of a preliminary report on meta-analyses based on country reports, outlining the entire innovation and technologies, innovation platforms and investments in Africa spanning a period of 20 years. The report represented a synthesis of harmonized research findings from 12 countries prepared by Dr. Ir. Augustin Kouevi (on left in the picture) and Dr. Abdulrazak Ibrahim. Several technologies have been developed based on different agricultural domains such as crops (cereals, grains, roots and tubers), livestock (cattle, dairy, small ruminants, and poultry), and cross-cutting domains. Examining the drivers for technological innovations, low productivity, concerns for overcoming vulnerability, value addition and marketing were found to be at the forefront. An average of 35 innovation platforms (IP) has been recorded per PARI country over the last 15 years. These IPs tended to focus on the promotion of improved crop varieties, farming practices, livestock and agri-food processing and marketing. Successes were recorded in the IPs as evidenced by increased linkages among stakeholders, improved access to information, infrastructure, inputs, production systems, processing, storage, conservation technologies as well as capacities for marketing. Challenges identified within the IPs relate to sustainability of funding, mutual commitment of stakeholders to the success of the IPs and problem solving capacities of stakeholders, underscoring the need for capacity building. Notable in the findings of the harmonized research report is clearly low investment in agricultural research and development across all the PARI countries, where funding allocated in that respect does not meet the required minimum standards with the resulting effect of poor performance in agricultural growths and economies. In all, the studies recommended increasing investments in agricultural research and development and consolidation of existing innovation platforms, while developing new ones.

PARI Thematic Presentations

Each of the PARI countries presented brief reports on selected thematic areas within the PARI program.

Assessment of innovation platforms in Ghana



A report on research related to innovation platforms (IP) in Ghana was presented by Dr. Richards Ampadu-Ameyaw and Dr. Rose Omari of STEPRI/CSIR. Reporting on how IPs are gaining momentum in the country and the successes and limitations recorded, they identified access to markets for smallholder farmers as the main challenge in the platforms. As an example, the presenters showed how, in 2016, Ghana (STEPRI/CSIR) initiated a study on the promotion of rice value chain through the establishment of multi-stakeholders' innovation platforms in the Volta region. By the end of 2016, two such IPs had been initiated. One of the emerging issues in the region is that men who used to engage in cocoa farming are now competing with women in the rice value chain. Access to land, poor soil quality, poor and inadequate seeds, land preparation and development, quality production of rice (white and brown), financing, high cost of transport, marketing and poor pricing were reported as the main challenges currently faced by the rice IP stakeholders. The CSIR partners demonstrated resolve to further work closely with all stakeholders in the IPs and foster upscaling by introducing further innovative measures like labelling. In 2017, CSIR plans to continue with 2016 activities, mechanization and land preparation and development.

Assessment of innovation platforms in Mali



Mali's report, presented by Mr. Alpha Oumar Kergna (on left in the picture) and Dr. Daouda Dembele of IER, outlined research findings from the country. They reported that IPs in Mali were mainly project driven and funded, and essentially revolved around the need for farmers and producers to gain more access to inputs. They classified the IPs under five categories, namely; i) producers platforms, ii) fragmented platforms, composed of stakeholders working in proxy to reach the goals of each category, iii) cooperative platforms, in which stakeholders temporarily collaborate upon invitation by project leaders, iv) coordinated platforms in which stakeholders collaborate more closely, and v) collaborative platforms in which all stakeholder groups collaborate with each other. This last category represents an ideal IP, however, it is rare in the country. The presenters concluded on the note that small scale platforms perform better than large scale platforms because they allow for faster flow of information and are easier to manage.

Assessment of innovation platforms in Togo



The PARI partners from ITRA in Togo, Mr. Alpha Todje, Bonfoh Bédibètè, Zoupoya Kokou, and Gbakenou Koffi presented a report on the efforts currently underway to revitalize rice, soybean and tomato value chains through activities of existing innovation platforms. . Analysing the performance and potentials of the IP through managers, they demonstrated that most of them are dependent on external technical and financial supports.

Assessment of innovation platforms in Tunisia



In their presentation, Mr. Salah Benyoussef (on right in the picture) and Dr. Mohamed Ben Hamouda of INRAT from Tunisia, recalled the work plans for 2015 and 2016, and reported on activities implemented, results recorded and way forward. They also presented INRAT's work plan for 2017. PARI work plan for 2016 targeted the establishment of IPs through community development plans and learning alliances for agricultural value chain assessing the gaps induced by non-use of quality seeds of durum wheat. Stakeholders meetings, rapid value chain analysis and SWOT analysis were conducted and led to the identification and mapping of sheep meat value chain as the relevant commodity around which an IP could be set up. In 2017, Tunisia PARI team plans to continue with unfinished activities of 2016, analyse the value chain of dairy sub-sector in Sidi Bouzid in conjunction with "Milk cooling" project funded by GIZ, and to support the creation of an information system unit.

Issues raised and discussed on the 1st series of presentations

The following are some of the salient points and questions raised during the first series of presentations:

- How many innovations are successful in PARI countries, what were the levels of the successes recorded, how do they operate?
- Which technologies have been adopted and which ones were not, and why?
- Need to consistently document in-depth 10 to 15 innovations, instead of superficially gathering information on hundreds of innovations.

- What strategies may be employed to secure women's rice farms in Ghana?
- How can innovation platforms perform more effectively?
- What makes IPs work and how can they be capitalised and built upon?
- What role does research in seedlings play in Ghana and Togo IPs?
- Who owns PARI: BMZ, FARA, or member countries? Countries should prepare to sustain projects beyond the financial support currently being received and that FARA should link up with countries to negotiate the continuation of projects.
- Rice produced by innovation platforms should be branded before sale in Ghana.
- There is a need to foster learning on IPs among member countries

2nd series of presentations: Mechanization and post-harvest technologies

In the second series of presentation, the following topics were covered.

Research by the University of Hohenheim on agricultural mechanization in Africa



This study reported on agricultural mechanization in Ghana, Zambia, Kenya and Germany, while drawing lessons from the US. The study was presented by Mr. Thomas Daum from the University of Hohenheim. Having duly identified labour shortage and concern for sustainable intensification as major reasons justifying the necessity to engage in research on and promote mechanization in Africa, he highlighted the research themes studied in the five countries. In Ghana, it became apparent that governance of agricultural mechanization has been neglected. He highlighted the need for broader governance reforms to address the entire agricultural innovation system, rather than focusing only on machinery. Furthermore, building on experiences from the US and Germany, Mr. Daum suggested that stakeholders from both private and public sectors as well as farmers should all be involved in the quest for lasting solutions to mechanization problems in Africa. Building on an example from Zambia, where a project on participatory smartphone applications was developed, valuable information and records of best farming practices may be generated to assist farmers in improving nutrition, empower women farmers and promote constraint managing skills. In conclusion, mechanization has a great potential to enhance the activities of smallholder farmers if they are adequately equipped with the right technical know-how and management skills.

Research on mechanization in Cameroon



The Cameroonian team, Dr. Noe Woin, Dr. Nembangia Justin Okolle (on left in the picture) and Dr. Ngome Francis from IRAD, presented the country's 2016 research findings on the use of small agriculture machines.

These machines are used for food processing, production, storage and conservation and are operated mainly by men. Machines designed to improve productivity in processing and conservation were more widely adopted than the other technologies. However, the adoptions levels were generally low. The cost effectiveness and performance of locally-made seed extraction machines were found to be high in terms of quality of seed extraction compared to manual seed extraction methods. This was even more obvious in the cases of pepper and egg plant seeds. A comparative analysis of beans storage and conservation performance of four technologies comprising of transparent plastic containers with a tight fitted lid (PC), reused metallic containers with well-fitting lids (MC), waterproof plastic bags made with polyethylene based material and appropriately sealed (PB) and commonly used woven polypropylene bags (Control) was conducted. The PC was found to be the best for weevils control in beans. In addition, plastic jugs were also found to be highly efficient for controlling weevils in maize. Constraints were recorded in potato processing as symbolized by lack of competence for peeling, poor drying and storage system. To scale innovations, the PARI team from Cameroon suggested the involvement of public institutions (advisory services, research institutes, etc.) and non-governmental institutions (NGOs and research institutes, etc.). Further recommendations include organizing workshops, seminars, farmer field schools, and demonstrations to train stakeholders, and sensitization of stakeholders. The presentation ended with a list of top ten innovation priorities for Cameroon and fourteen activities planned for 2017.

Research on mechanization in Nigeria



The ARCN team from Nigeria, represented by Prof. Dayo Phillip (on right in the picture) presented their research activities implemented in 2016 in Nigeria. Centred on cowpea – livestock integration and cowpea post-harvest management, the report showed data on cultivation and utilization of dual purpose cowpea; a variety identified for its high quality in terms of grain and fodder yield, these serving effectively as staple crop and as animal feed. A system of mechanized

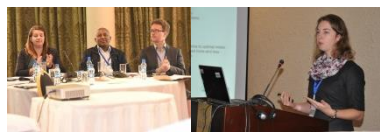
cowpea residue management has been introduced to address the farmers and pastoralists' conflicts, which guarantees sufficient cowpea yield to farmers. Here, the PARI team also focused on the mechanization of cowpea threshing and the use of PICS bags for effective postharvest management of cowpea, particularly in Northern Nigeria.

Main issues raised and discussed on mechanization

The following issues arose from the discussion on mechanization:

- Solutions to smallholders are necessary.
- Facilitators are needed for the promotion of mechanisation of smallholder farms.
- Many of the storage and conservation technologies presented have been in existence for decades. This indicates stagnation of the continent. Lessons from India on the success stories of mechanisation are handy.
- Classical research model still in use in Cameroon. Innovative action research approach recommends to involve all key stakeholders.
- Mechanisation would cost more than manual approach. Do we factor time used?
- Prof. Van Braun distinguishes three types of mechanisation in Africa:
 - o Endogenous mechanisation: example of precision agriculture in Mali.
 - o Imported machinery: service component and reliable servicing can be issues.
 - o High technologies for precision agriculture
- All these types of mechanisation can be source of opportunities for smallholder farmers: there is a need to study how it will look to each country.
- Is mechanisation in Africa about tropicalisation of machines?
- Need to know the status of mechanisation in each specific country.
- Need to know success stories and trajectories of mechanisation in Africa.
- What would be hindering the growing of mechanisation service providers?
- How to make sure that mechanisation takes off and works for the whole African agricultural systems?

3rd series of presentation: Progress and Outlook on nutrition



In this series of presentations, progress and outlook on nutrition took the centre stage.

As part of the attempt to overcome the apparent nutrition problems in Africa, TUM and other partner organisations from Germany and Africa (FARA, INRAB, and CRC) are undertaking research activities in Benin and Kenya around personalized nutrition. Specifically, tablet computers are used to collect nutritional data. This information is complemented by dried blood spots (DBS) analyses and food frequency questionnaires. Based on these data, nutrition advice can be provided via the tablets, taking into account current food intake, phenotype and regional. A second research area includes farm diversification and nutrition in Ethiopia, Malawi, Tanzania and Nigeria. Preliminary findings suggest that farm diversification contributes to diet diversification in food secure households. However, food insecure households hardly diversify their farm production and hence have less diversified diets.

Main issues raised and discussed

- Has there been ethical clearance from authorities?
- Why limit food security to calories?
- Are there rooms from other countries to join the experiments and studies?
- Influence of seasons in nutrition!

Information Marketplace: Poster presentations and demonstrations of research outputs

A major event during the meeting was Poster presentations and demonstrations of research outputs in which participants displayed posters on research activities and findings. In addition, participants could try out the ICT tools developed under PARI, including an online innovation database, an innovation platform monitor and the e-atlas. During the time devoted for this marketplace, the workshop participants visited and discussed the posters and websites.



Presentation of posters



Presentation of publications and machines



Websites and database shows

4th series of presentations: Farmer Innovation Contests in Ethiopia, Kenya, Malawi and Zambia



Dr. Justice Tambo from ZEF presented the methodology, criteria, processes, and general results of the farmers' innovation contests organized in Ethiopia, Kenya, Malawi and Zambia in 2016. In all, 621 applications have been received, 321 of which were rejected and 300 accepted and evaluated. While the process is still going on in Ethiopia, winners have already been identified in the other three countries. In total, 36 awards will be distributed to the 36 (9 per country) best farmer innovators. Information on some of the selected innovations was presented to the participants, by representatives from the four countries.

Main issues raised and discussed

- How to deal with intellectual property rights?
- How do farmers submit proposals?
- Innovation should not introduce other problems, e.g. use of manure for maize conservation seems not much ethical and hygienic.
- What exactly is original in farmer innovation contest?

- What is the science behind the process of innovation contest?
- It is complex to say what is innovation and what is not so. There is need to share information about what is perceived as innovation.
- Copy left is the intellectual property right approach used in innovation contest.

5th series of presentation: PARI research in India and linkage with African priorities



The fourth series of presentations featured the PARI program in India with Professor Ashok Gulati from ICIER. Following a historical perspective, in which he highlighted the evolutionary milestones of Indian agricultural production, spanning a period of five decades, he identified key areas within which India and Africa can partner under the auspices of PARI in the 2017 work plan . PARI activities in India address rural energy, precision farming, onion, tomato, and grape value chains as well as agri-linkage between India-Africa. Prof. Gulati reported that to reach agricultural revolution goals, India imported and promoted the use of necessary machineries. Emerging from the status of net importer to net exporter of agricultural products, India owes its success to innovative and bold approaches. In what started as green revolution, India evolved to adopt and upscale solar power technologies to revamp its agricultural sector. The next great milestone, tagged gene revolution, saw the country embracing agricultural biotechnology to become a leader in the production of genetically modified cotton. These were achieved with low land holdings involving small farmers. Since the India – Africa summit, which first took place in 2008, and was subsequently repeated in 2011 and 2015, areas of mutual interest between the two regions continue to emerge especially in the agricultural sector. The PARI meeting offered a critical opportunity to gear actions toward cultivating a robust Indian – African partnership in agricultural development in 2017 within the PARI framework.

Panel discussion on opportunities for Indian-African learning and exchange



Dr. Yemi posited that while India is one super continent with a single government where the whole country may be directed towards a single direction, the African continent comprises of several countries that may be likened to 40 goats herding in different directions. As such

implementing a uniform policy across the countries is a herculean task. He further stated that there is need to advertise for science to be put at the heart of African agriculture development.

Prof. von Braun highlighted the importance of demonstrating economic benefits in the promotion of mechanization.

Issues raised and discussed

- GMO can also carry risks that need to be born in mind.
- How is India bringing solar energy to rural areas?
- What is the land tenure policy in India?
- Sustainability of Bt cotton in India.
- How did India get policy makers to revolutionise agriculture?
- New insurance policy in India.

Answers to issues

Prof. Gulati

- Crises can trigger improvements, citing as example the war between India and Pakistan in 1965.
- Difficult times lead to powerful decisions.
- India did land reform when there was no mechanisation in place.

Prof. von Braun

- Interaction research – policy-making is essential.
- Africa should replicate Indian approach but better.
- Private sector should be in PARI network and meetings.
- Scientists should not be cold/free of emotion in front of social problems.

Parallel Roundtables on Innovation-related Research Themes

The PARI meeting participants discussed around four themes in different groups of interest. These were: 1) mechanisation and vocational training; 2) scaling innovations; and 3) Nutrition and 4) climate change.

Roundtable conclusions

Three groups of participants reflected on the roundtable themes, especially around four major questions, viz., 1) what are the research gaps within the scope of PARI? 2) What research is PARI conducting on each theme; 3) Plans for the Future; and, 4) Options for collaboration.

Mechanisation and vocational education and training

- Research gaps



- o Status assessment

- Mechanization across the value chains

- Indigenous technologies

- Current status of mechanization, obstacles to society, mechanization needs

- Opportunities for mechanization in post-harvest sector.

- o Scaling strategies

- Models for sharing technologies especially for small size farms

- Success stories of mechanization in and out of Africa

- Economics of mechanization

- o Cross-cutting reforms

- Reform needs for mechanization across the entire agriculture and food security

- How do stakeholders define mechanization?

- Supporting services, e.g. spare-parts, repairs, installation

- How to use the time that is free up by the use of technologies?

- Policy and institutional reform needs

- Skills development

- Skills needs assessment

- Development of curriculum to feed in vocational schools
- Train extension workers and NGOs in relevant skills.

Scaling of innovations

- What are we scaling/what have we done regarding scaling?



- ZEF/IFPRI – Modelling innovations reported per country.
 - Hohenheim/TUM: Introduction and adaptation of innovations.
 - ZEF/FARA/NARS: Identification of bottom-up innovations that farmers have started adopting.
 - GIZ: Green Innovation Centre (GIC)
 - FARA/NARS: IP characterisation.
- Research gaps to fill within the scope of PARI
 - Need to develop descriptor of a scalable innovation.
 - Need of detail characterisation of innovations (economic evaluation, institution, etc.). Quality characteristics are needed for scaling.
 - Contact industries that can reproduce and promote the technologies (linkage with private sector).
 - Identify relevant partners that can help scale innovations.
 - Identify markets.
 - Understanding policy environment (conducive policy environment needed).
 - Develop well researched and robust scaling strategies.
 - Can we truly have standardized strategies?

- Document successful scaling experiences.
 - Think of context specific strategies.
 - Think of building on the innovation (top down and bottom up) database of PARI to develop the strategies, recommendation domains.
- Need to develop communication strategies to accompany scaling strategies.
- Should we target scaling of whole value chain or aspects concerned with innovations in value chains.
- Experiences of green innovation centres of GIZ in scaling.
- Options for collaboration in 2017
 - Active linkage with GIZ's Green Innovation Centres (GICs)
 - Indicators + time lines to be thought of.
 - FARA, ZEF, NARS, Hohenheim, and TUM to conduct scientific validation of identified farmers/bottom-up innovations (=> repackaging) => Participatory development of innovations
 - ZEF/NARS/FARA to develop capacity on scaling strategies
 - FARA and NARS to research and develop communication strategies to accompany scaling.
 - Innovation contest contributes also to changing mindset of scientists on potentials of farmers (scientists to know that innovation can come from all sources/directions).

Nutrition

- What are the research gaps within the scope of PARI?



- Evaluation of nutrition and health outcomes of past and ongoing nutritional/agricultural programmes using innovative methods

- Development of innovation methods and tools to measure food consumption and nutritional status.
 - Developing innovative methods to assess drivers of food choice.
 - Development of innovative communication tools for behavioural impact and healthy lifestyle change.
 - Integrating food safety and health care into PARI projects.
 - Evaluation of nutritional impact of PARI agricultural innovations with a particular focus on gender, youth and children.
 - Studies on the linkage between soil health and micronutrient content of foods and overall impact of micronutrient status.
 - Strengthening knowledge of PARI countries in personalized nutrition.
 - Assessment of policies supporting food security and dietary diversity simultaneously?
 - Assessment of linkage of mechanisation with time saving.
- What research is PARI conducting?
- Assessment of linkage of mechanisation with time saving and the eventual impact on nutritional status of women and children in Zambia
 - Personalised nutrition study in Kenya and Benin.
- Plans for the Future
- Evaluation of nutrition and health outcomes of past and ongoing nutritional/agricultural programmes using innovative methods.
 - Development of innovation methods and tools to measure food consumption and nutritional status.
 - Developing innovation methods to assess drivers of food choice.

- Development of innovative communication tools for behavioural impact and healthy lifestyle change.
 - Integrating food safety and health care into PARI projects.
 - Evaluation of nutritional impact of PARI agricultural innovations with a particular focus on gender, youth and children.
 - Studies on the linkage between soil health and micronutrient content of foods and overall impact of micronutrient status
 - Strengthening knowledge of PARI countries in personalized nutrition is successful in African countries.
 - Assessment of policies supporting food security and dietary diversity simultaneously.
 - Assessment of linkage of mechanisation with time saving and the eventual impact on nutritional status of women and children.
- Options for collaboration
- PARI should work with existing initiatives such as WASH (water, sanitation and hygiene), Partnerships for Aflatoxin Control in Africa (PACA), Scaling up Nutrition (SUN).

Climate change

- What research gaps within the scope of PARI?



- Climate change was not clearly prioritized in PARI
- What research is PARI conducting or planning to conduct in this area?
- Develop a comprehensive environmental data base at PARI country level from existing data
 - Carryout an inventory of climate change research done/Conservation Agriculture
 - Identify the gaps

- Identified gaps will inform
 - o Planning of intensive research areas
 - o Collaborative research options.

Issues raised and discussed on the roundtable conclusions

Mechanisation and vocational education and training

- Think of developing a curriculum at the end of PARI programme
- How can farmer field school (FFS) feed into vocational training?
- Need to reinforce capacities of a critical mass with the help of our institutions. For instance, on what is meant by innovation, if innovation were to be stimulated.
- The need for systemic approach to the development of vocational training.
- The need for farmers to systematically learn about all agricultural value chains through vocational training.

Green Innovation Centres (GIC) and India may develop agricultural service delivery for agricultural mechanisation and intensification.

Scaling of innovations

- Need to document successful and brilliant failure experiences.

Nutrition

- Aflatoxin/food safety
- There are 30 African countries involved in a UN nutrition scaling experience.
- On climate aspect, WASCAL and CIRCOF experiences may be valued.

Ways forward/ cross-cutting issues

- Who can be the best partners for the next PARI phase? There is a need to be systematic in terms of political linkage and communication.
- Learning from partners/ stakeholders
- Need for policy reform
- Combine technological innovation & political reforms and adapt them to national level

- Balance between: local level needed issues and generating for scaling up
- Call for assessment.

6th series of presentation: Modelling and mapping agricultural potential in the PARI countries

AGRODEP/IFPRI activities on economic modelling



This presentation by David Laborde and Fousseini Traore highlighted the role of AGRODEP/IFPRI in PARI, and the place of economic modelling in the components of AGRODEP within PARI activities. Dr. Laborde gave a review of AGRODEP and introduced the economic modelling activities implemented by AGRODEP. These activities consisted mainly of adapting the MIRAGRODEP Global CGE model to PARI context and countries, and training some AGRODEP members for the implementation of the model in PARI countries. The model has already been adapted and applied in Ghana on maize and cassava. There are plans to apply the model in Nigeria and Kenya by 2017. Challenges faced by AGRODEP for the economic modelling in PARI relate to availability of data, consistency between AGRODEP activity components and data in those countries.

IFPRI research on targeting investments in agricultural innovation using typologies of micro-regions



Mr. Eduardo Maruyama from IFPRI started his presentation with the objectives and logic behind the mapping of agricultural typologies in PARI. According to him, knowing exactly agricultural efficiency gaps to fill may allow determining where and how to invest. To implement this typology in Burkina Faso, Ethiopia, Ghana, Kenya, Malawi, Nigeria, and Zambia, the IFPRI team built an agro-ecological, household, accessibility and poverty database. The results of this typology will be accessible on the PARI e-atlas under construction. The remaining countries where the typology will be implemented soon are Togo, Benin, Cameroon, Mali, and Tunisia.

AGROPEP/IFPRI research on the eAtlas



Here, Dr. Mohamed Abd Salam El Vilaly of AGRODEP/IFPRI presented the e-Atlas, a GIS-based mapping tool designed to help policy analysts and policy-makers access and use high quality and highly disaggregated data on various

agriculture related aspects. This online material can be assessed by everyone from anywhere.

Main issues raised and discussed on the modelling section

- Where do farmers come in all the modelling?
- E-atlas is useful for all practitioners.
- Crop modelling: what is unique?
- Type of irrigations used and types of crops to model in Malawi?
- What are agricultural factors. There seems to be confusion about definition of agriculture.
- There is need to look at other useful agro-data.
- Agro-potentials should be extended to regions instead of trapping ourselves inside countries.
- FARA to help access data on regions.

Panel discussion: A Vision for African Agriculture: Charting a way towards implementing the Malabo Declaration and the G7 commitment



This panel discussion was led by Professor Joachim von Braun of ZEF, Dr. Ousmane Badiane of IFPRI/AGRODEP and Dr. Yemi Akinbamijo from FARA. The discussion was facilitated by Jeff Koinange, a Kenyan media publicist.

Following introduction, Mr Koinange sought for comments from Prof. von Braun, who posited that African food security, agriculture and innovation are key issues of concern for German government. He stated that in the 2017 G20 summit to be chaired by Germany, these themes will prominently feature in the discussions along with the German initiative of “One World, No Hunger”. German government wishes to make a difference in collaboration with African leaders through PARI programme, conferences, policy-makers, private sector, civil society, etc. The core business is green revolution in Africa through access to quality seeds, fertilisers, irrigation, and mechanisation for farmers.

Taking over the discussion, Dr Yemi Akinbamijo stressed the fact that Africa has not attained its agricultural potentials in spite of the demonstration of good will since Maputo. Besides



the Maputo and Malabo declarations, the African Union took some political interdependent resolutions on food security, peace, and prosperity setting a 2063 target. Given the important role of food in ensuring peace, agriculture is not only important, but crucial life line that will release millions of Africans from poverty. The mission therefore is to contribute to release millions of our population out of poverty with the help of agriculture.

Chipping in, Dr. Badiane recalled that the meeting was taking place in a critical period of development of Africa. These last 15 – 20 years represent the longest period of sustained economic growth Africa has ever experienced. Exports have more than tripled and more countries consistently grow economically these days, meaning that something is changing in Africa. However, looking around, there is a long way to go in terms of reducing poverty and hunger and eliminating malnutrition. It would appear that the real reason is not about how well or fully the continent started. In the 1960s, Africa started with strong trajectories, but with little concern for the development of Africa in terms of economic growth and the future of the continent. In the 1970s and 1980s, poor policies, poor technologies and economy management led to the poverty of a full generation of people. These led also to large pool of poor people and large pool of low performances that the growth of the last 15-20 years could not help reversing. PARI meeting represents an important opportunity to ensure that the successes of these last 15-20 years are maintained, sustained and broadened to more people and more countries. Clearly, technical innovation is at the heart of this process. He urged FARA, ZEF, National Research Centres and other stakeholders present to bring the best techniques and try to stimulate the design, implementation and evaluation of programmes that will allow African countries to have the best of options to unlock potentials that will continue this process and improve the livelihoods of African populations.

Responding to the moderator's question on how Africans can maintain the momentum of these last 15 – 20 years, Dr. Badiane showed how 1980s and 1990s represented depressing with little success, yet the continent came out of it. However, to maintain the current tempo, individual governments need to look at what works well in their own countries

and in neighbouring countries over these last fifteen years, learn and decide on how to do better.

Regarding the different declarations, which in many cases serve as rhetoric with limited actions, Dr. Yemi recalled that the main difference between the Malabo and Maputo declarations is about the time (2003 – 2014, 11 years) that separates them. It seems that after the African leaders gave the green light, committees and programs have been delivering papers, policies, and processes that may have helped somewhere and somehow. However, it is very clear that declarations are not enough, especially given the threat of hunger. There is therefore the need for more concrete actions and initiatives from PARI, AGRA, FARA, AfDB, etc., have been converging in favour of impacting concretely African agriculture. This clearly represents an important moment in the African trajectory.

Responding to a question raised on what may prevent Germany from continuing allocating resources to African agriculture, as a priority, Prof. von Braun reminded all that, policy makers do what the public tells them to do, especially in participatory governance. German government after consulting with 19 other institutions developed a new financial model of cooperation with Africa. Africa remains among the top vigorous priorities of the current government in Germany. Certainly, renewed business relationships, from which both sides will benefit from investments is desirable. Agriculture is also prioritised in the German agenda to address underemployment and unemployment of young people. Improved agricultural productivity is expected to contribute to the creation of new jobs. Policy, technology, and organisational changes are keys to agricultural transformation in Africa that can build on examples of India, China, Brazil, etc. Policy change is central and cannot occur without words. These initiatives come down to Leadership at different levels, not only at the top. They also entail learning from other countries on agricultural development, reducing hunger, building capacities, vocational training of farmers, etc.

Citing Ethiopia as an African example of a successful country, Dr. Yemi demonstrated how the country has shown rapid social transformations notably because of a serious and purposeful leadership that empowered people.

In order to make agriculture look “attractive” to the majority of Africans who are young, several efforts need to be made. Dr. Badiane posited that African scenarios have been changing quite rapidly. Out of the ten fastest growing economies in the world, 7 are from Africa. In addition to Ethiopia, countries like Ghana and Rwanda have performed quite well. After Maputo and Malabo declarations, African countries have doubled the annual outlays for agriculture over the last 10-15 years. According to the agriculture status report, African countries are spending more in agriculture with the resulting reduction in poverty and increased growth. On youth in agriculture, the continent has relied for too long on the god given talent of men and women who practice farming. There is need to shift away from the idea of training everyone except farmers. A key strategy towards making agriculture attractive to the youth is to modernise it in such a way that it appeals to their naturally curious instinct and the quest for new things. Once youth have access to resources and acquire skills they effectively make productive life from farming and will always go to agriculture.

What this means is that the cycle will be broken if conditions are not created for continuity in the practice of agriculture by youth? Prof. von Braun further highlighted the role of smartphone in the transformation of agriculture, by providing practitioners with necessary farming information. Therefore, only young women and men with high farming aspirations will play the game of innovation in agriculture. Ultimately, good leadership, governance and participation are needed, to make sure youth engage in agriculture.

In order to effectively achieve the 2063 vision, Dr. Akinbamiyo emphatically stated that Africa needs to build on examples from Brazil, China, and India.

Other issues raised and discussed

- Roles of subsidies on the marketing of products
- Quality diagnoses matter
- Everything can wait, except agriculture.
- Something is going wrong with our agriculture
- Need for strong institutions

- Let us not cry for the youth, let them move forward. We can fight for keeping youth in rural areas. Let us bring jobs to rural areas for them.
- The future of agriculture in Africa depends on the model chosen. We cannot dig a whole to fill another whole. Biological and mechanical advantages are to look at.
- How to model commitment of agriculture decision makers?
- How to involve the youth in post-harvest and marketing.
- Bio-economy strategy: fishery, agriculture, etc. Africa should find its way.
- Political will and major policy change are keys for agricultural development.
- A lot of frameworks developed. There is need for finding ways to put the frameworks into action.
- IPs and innovation centres should continue benefitting from investments.
- We need to make sure that inputs reach farmers.
- We need to anticipate
- African countries need to talk together and act together for success.
- Commitment is key.
- We need to learn from experiences and move forward, change wrong routes.
- Coherence is needed.
- Tsunami is needed for agricultural revolution in Africa.
- Collective will and actions are also needed.

Main conclusion from the panel discussion

We need to build necessary conditions for the effective transformation of African agriculture.

Conclusions and ways forward

PARI represents an important effort to promote investment in agricultural innovation to ensure food security and sustainable agricultural development in Africa. However, the success of the program requires continuous support from policy makers, strategic entry points into regional and national institutional framework and the needed technical conditions. Key among these

conditions include the ability to learn from success and failure experiences, mutual commitment among stakeholders in agricultural development as a means of effectively and positively transforming African agriculture.

Appendices

Copies of presentations

Photos

Publications

List of Participants