



1st SweetGAINS SpeedBreed and Seed Community of Practice (CoP) - East and Central Africa meeting Kigali, Rwanda.

18 - 22 February 2020

Theme: Towards building synergies between modernized sweetpotato breeding and seed systems for successful delivery of improved varieties in Eastern and Central Africa

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<https://www.rtb.cgiar.org/>



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Acronyms

BMGF	Bill & Melinda Gates Foundation
CIP	International Potato Center
CoP	Community of Practice
DVM	Decentralized Vine Multiplier
EGS	Early Generation Seed
EiB	Excellence in Breeding
MEL	Monitoring, Evaluation and Learning
NaCRRRI	National Agricultural Crop Resources Research Institute
NARI	National Agricultural Research Institute
NARO	National Agricultural Resource Organization (Uganda)
NCSU	North Carolina State University
NIR	Near infrared spectroscopy
NGO	Non-governmental organization
OFSP	Orange-fleshed Sweetpotato
RAB	Rwanda Agriculture and Animal Resources Development Board
RTB	Roots, Tubers and Bananas
SoPs	Standard Operating Procedures
SPBase	Sweetpotato Base
SSA	Sub-Saharan Africa
SweetGAINS	Genetic Advances and Innovative Seed Systems for sweetpotato
TARI	Tanzania Agricultural Research Institute
TPEs	Target population of environments
WP	Work Package

Background of Genetic Advances and Innovative Seed Systems for Sweetpotato (SweetGAINS) project

SweetGAINS project is an ambitious three-year investment designed to modernize sweetpotato breeding in Africa. SweetGAINS project is improving breeding operations and methodologies, ensuring integration between breeding outputs and early generation seed availability, and strengthening a joint SpeedBreeders and Seed Community of Practice (CoP) by 2022.

SweetGAINS is using a gender responsive, market-driven approach to sweetpotato breeding and seed systems, which results in improved nutrition and diversified diets for both urban and rural people. At both national and regional levels, the project is further strengthening sweetpotato breeding efforts in Africa to develop nutritious and highly productive varieties. These varieties carry preferred traits for farmers and consumers, replace less productive varieties, and achieve high adoption rates among smallholders. For the smallholder farmer, the program means access to new orange-fleshed sweetpotato (OFSP) and non-OFSP sweetpotato varieties. For urban consumer groups, including schools and hospitals, the program is providing a more reliable and cheaper supply of more nutritious sweetpotato. Moreover, all major sweetpotato producing Sub-Saharan African (SSA) countries are part of the Scaling-up Nutrition movement, and this project aligns with national commitments to delivering more nutritious foods to their populations. The project is incorporating gender responsive research to better target the priorities of women, men, and youth as agricultural consumers, producers, processors and traders in Africa.

Ultimately, the vision of success for SweetGAINS project is to increase access to improved sweetpotato varieties and enhance seed delivery systems through streamlined, gender responsive, well-managed sweetpotato breeding programs across Africa. In doing so, SweetGAINS project is not only meeting the needs of rural and urban consumers for more affordable, healthy food, but also transforming the lives of smallholder farming families by providing improved, high-yield, nutritious sweetpotato varieties.

Executive summary

The SweetGAINS project SpeedBreed and Seed Community of Practice -East and Central Africa meeting was held at Galaxy hotel in Kigali Rwanda from 18th to 22nd February 2020. The theme of the meeting was ***'Towards building synergies between modernized sweetpotato breeding and seed systems for successful delivery of improved varieties in East and Central Africa'***

The meeting was attended by 20 participants (7 female 13 male) from 5 different countries (Kenya, Uganda, Tanzania, Peru and Rwanda). The participants were from different NARIs - SweetGAINS project partners and CIP. The participants included breeders, agronomists, economists, social scientists, communication specialists, and program manager.

The meeting had several training sessions which covered product profiles, electronic data capture and management, biometrics, type of trials, experimental designs and field layout among other topics. The meeting featured presentations and discussions.

The meeting was officially opened by Dr. Charles Bucagu, the Director General, Rwanda Agriculture and Animal Resources Development Board (RAB). In his remarks, he noted that it was great that SweetGAINS project focused on modernizing breeding and the need to have efficient and effective seed systems.

On the last day participants participated in two learning journeys to get first-hand information on seed production activities in Rwanda.

Introduction

Welcome remarks and introductions

Dr. Dorcus Gemenet welcomed participants to the meeting. Participants did a self-introduction and mentioned what they expected from the meeting. She then welcomed Bonny Oloka and Margaret McEwan to give welcome remarks.

Participants' expectations from the meeting:

- To be on the same page regarding modernized breeding
- Refine workplan and learn tools to use in activity implementation
- Exchange ideas during learning journeys
- Challenges and solutions to planned activities
- Have a better and comprehensive understanding of product profiles (what it is, who is involved, and how long it takes to develop, the cost and how it interlinks with the seed system)
- An update on Standard Operating Procedures (SoPs)
- Insight on what the teams in different countries are doing
- Learn from each other and know how to integrate breeding and seed systems
- Capture success stories

Dr. Bonny Oloka, a plant breeder, quantitative genetics and seed systems officer from NARO - Uganda, the coordinator of the CoP, seconded the chair and gave welcome remarks and thanked the team for attending the meeting.

Margaret McEwan, senior scientist and WP4 leader, stated that breeding and seed systems CoP is part of a bigger picture of work within the CGIAR and partners on seed systems. She talked about a toolbox developed by the CGIAR Research Program on Roots, Tubers and Bananas (RTB) cross-crop cluster on access to quality seed and improved varieties. The toolbox contains several tools for intervening on various aspects of RTB seed systems including socioeconomics, seed health (including degeneration) and policy frameworks. The toolbox is related to the Excellence in Breeding stage gate process especially stage 1 and product profiles. Seed traits need to get into the product profiles because the last stage gate has a component on seed delivery. She noted the need to discuss how to include gender responsiveness in product and seed delivery profiles.

WP4 commitments from the inception meeting were also highlighted as a reminder to all.

Official opening

The meeting was officially opened by Dr. Charles Bucagu, the Director General, Rwanda Agriculture and Animal Resources Development Board (RAB). In his remarks, he noted that it was great that the SweetGAINS project focused on modernizing breeding and the need to have efficient and effective seed systems. He welcomed participants to Rwanda and congratulated CIP for the new SweetGAINS project. He was happy that the project will be implemented in Rwanda in partnership with various partners in several countries. He encouraged the participants to have good strategies for seeds systems in Rwanda. He stated that the learning journeys would provide an opportunity for the participants to learn from farmers' experiences.

Remarks by SweetGAINS project leader

[Presentation link](#)

Presenter: Hugo Campos

Hugo Campos, the SweetGAINS project leader mentioned that he was excited with the way the SweetGAINS project had started. Noting that the success of the project depends on the people, he requested participants to be present and committed to the meeting.

He started his presentation by explaining the goal of SweetGAINS project. He mentioned that the project goal is to increase access to improved sweetpotato varieties and enhanced seed delivery systems through streamlined, gender responsive, well-managed sweetpotato breeding programs across Africa. The main countries where seed activities will be implemented are Tanzania with the Tanzania Agricultural Research Institute (TARI) and Uganda with the National Agricultural Resource Organization (NARO). He encouraged the participants to deliver beyond expectations to keep and get more funding. "Sweetpotato is not a major crop for the donors, but if we deliver beyond expectations, we will get more funding," he said. Hugo stated that SweetGAINS is an innovation platform leading the way in statistics and leveraging on other RTB projects to enhance breeding work. For SweetGAINS project, disruptive innovation is required. He also mentioned that the team will be using slack software for its communications.

In a team many needs arise, however, there is need to set priorities right in order to achieve more. Videos were shared to emphasize this. Watch video on [priority](#) and [building a perfect team](#).

Characteristics of a good team



Dr. Hugo also shared the commitments of work packages 2 and 4 developed during the SweetGAINS project inception meeting in Uganda.

Session 1: Sweetpotato Product profiles

Training on product profiles

[Presentation link](#)

Presenter: Hugo Campos

Participants were divided into two groups. They were tasked to discuss about product profiles- what, how, who and when. The groups would then present their work.

Submissions from group 1: Product profile is what describes what you want in the market, make a new leading product to replace the current superior product. It involves identifying niche markets, people, agro-ecologies and target markets. A product profile is done at the start of the project but continuously revised because of the changing markets. Therefore, a market chain analysis is required prior to the drafting of a product profile.

Submissions from group 2: Product profile is understanding what a product is and positioning it for the market. It must include superior qualities to replace what is currently leading in the market. All actors are involved, and the market share determines the leading product to be replaced. It is continuously changing because of the shifting demands. A multi-disciplinary team is involved in designing the product profile in addition to using market survey information.

In detail, Hugo expounded the concept of product profiling after the two groups presented their ideas on the subject. A product profile is the first step towards more predictable breeding programs and more successful breeders. A product profile is a blueprint focused on traits required for market success. This is based on market knowledge and a cross functional (multi-disciplinary) input, is time limited and linked to improved breeding program strategies. It was stressed that plant breeding is too important to be left to breeders only.

He stated that sweetpotato breeding objectives are changing faster because of the increasing demands from the donors because they want success stories. Because of this, not all breeding programs will be funded, only those adapting to the needs and expectations of donors, stakeholders and consumers. This is paramount as the team moves to the one CGIAR system and use of the 4.0 breeding. He mentioned that sweetpotato breeding is currently at 2.8 and the aim is to be at 3.5 at the end of the SweetGAINS project.

This effort will be made possible by implementing genomic selection. Uganda will be the pioneer in Africa and other breeding programs will learn and build on this. Implementation of the EIB recommendations/ guidelines will also contribute to the success.

The metrics driving breeding programs like increased rates of genetic gain, product adoption and clear seed pathways were discussed. The breeding equation was cited as the key to remain successful and relevant. The number of new varieties is not a metric for success and less is more for a well-designed breeding program.

Modern perspectives of breeding programs lie in the understanding of customer needs. These are well captured market driven product profiles, well designed breeding programs and well-designed product testing and delivery.

Hugo also mentioned about the EiB training in Maputo, Mozambique 25-29 May 2020. He encouraged participants to apply for the scholarships and attend the training. The training will focus on how metrics drive breeding programs.

Questions and comments.

Graham Thiele stated that we need to learn from other programs and use tools (e.g. the gender plus tools developed by the gender and breeding initiative) for querying the product profiles.

Benard Yada provided some explanations on the organization of the NARO breeding program: personnel management, sweetpotato varieties, benchmarking varieties for comparison, product profiles to cement what was presented by Hugo. Clarity was provided that Jolien Swanckaert would work to support countries (East and Central Africa) product profiles (developed by NARIs) and work on unique traits.

He also added that a leading variety must have a level of preference and must bring all traits across the value chain. Target Population Environment helps one become efficient in the work.

Kiddo Mtunda raised a concern that NARI have a funding challenge to complete the work. To release a variety, it takes more than 5 years and some funding goes only for three years. Hugo: If during the 3 years we perform beyond expectations be assured we will have more funding.

Kiddo also made a comment that consumers and farmers results should be included in the product profiles.

Kwame Ogero: How many product profiles are we working on? Hugo: We need 4 product profiles, but we can't afford hence we need to decide to have one to 3 starting with the most relevant.

Sam Namanda: If we are replacing NASPOT 8 we need to understand the TPE.

Session 2: Electronic data capture and management.

Use of data before curation

[Presentation link](#)

Presenter: Luka Wanjohi

The presentation focused on the use of Field Book App for sweetpotato breeding, creation of a field layout file in SweetPotatoBase, creation of trait list in SweetPotatoBase, creation of a trait file in SweetPotatoBase, copying field layout and trait files to the tablet with Field Book App, collection of phenotypes from the field, exporting of phenotypes from the Field Book App to a computer, data curation and upload to SweetPotatoBase

Other general data collection issues discussed by the presenter were:

Charging tablets sufficiently before fieldwork. Here breeding teams were asked to invest in tablets with high battery storage capacity of over 4000mA. Cedar tablet was recommended to be acquired for this purpose as its battery has a capacity of up to 8000mA hence can keep power for 8 hours. CEDAR also has user-friendly function keys.

Secondly, breeding teams were advised to get SIM cards for the tablets, back up data in the cloud, use automatic email sharing of files after phenotyping and employ the TeamViewer support when necessary. The breeding teams were advised to adopt some basic apps for quick review of data.

There was a section on the use of barcode labels to improve accuracy of all data management operations. Breeding teams were guided to use barcodes for phenotyping data management, crossing and pedigree data management, NIRS quality assessment data management, germplasm inventory management and genotyping project management and tracking.

Luka urged the participants to ensure that plot name is unique across trials. For example, one could combine the plot name and the clone to form the unique name. There is need to create abbreviations for the names of traits or parameters for curation especially in the statistical software R.

Step 1: Data import

Read the data in R statistical software from the local storage space.

Step 2: Generating summary

Luka indicated that it is important to generate statistical summaries, which help in identifying errors or outliers in the imported dataset. This should be followed by checking the entire datasets.

Margaret inquired if there are validation rules to prevent errors at data collection. **Hugo** added that it is imperative to eliminate paper-based data collection except for exceptional cases. However, one of the presenters indicated that the validation rules minimize errors, but to a limited extent. There are fields which still require entry of zeros for missing data, thus the validation rule may not prevent entry of 01.

There was contention on how to deal with errors at different data collection points especially errors in field and laboratory data. A discussion ensued on when to treat a score zero or missing for parameters affected by different shocks such as disease, drought, and destruction by stray livestock. However, there is need for field data collection protocols for reference by the data collection team.

Jolien urged the participants to remember to add the ontology codes (CO) to data before uploading to the database to ensure a match with ontologies in the Sweetpotato base. Curation is only for checking errors and real values for use in the database. However, special checks between the traits is conducted during data analysis.

Hugo inquired if the partners from Tanzania and Rwanda were proficient in R to support data collection, curation, and analysis in the SweetGAINS project. The partners from Rwanda indicated that they require hands on training in R. The Tanzanian team indicated that they can leverage on the experience from the NextGen project. Jolien mentioned with the support from BTI, curation functions will be integrated in the Sweetpotato base. This will ensure consistency checks which are critical in data collection and management.

Dorcus urged the community of practice to liaise with CIP, Lima team to establish uniform protocols or standards for data collection especially in decisions related to missing data.

Questions

Do the breeding team use electronic gadgets in the breeding process?

Rwanda stated that they use electronic gadgets any time

Uganda. Right from trial design in SweetPotatoBase though trial establishment, data collection (field, laboratory), curation and data export to SweetPotatoBase

Tanzania. Throughout the breeding process

How is data capture and management done in each breeding program?

Rwanda. Not yet fully using electronic data capture and SweetPotatoBase

Uganda. Fully using electronic data capture and SweetPotatoBase, cloud and PC for data storage, management and analysis

Tanzania. Not fully using the electronic data capture and SweetPotatoBase presently. Needs more backstopping

Session 3: Trial design Biometrics

Field layout and experimental design for different types of trials

Presenter: Bert De Boeck

This session was led by Bert De Boeck from CIP-Lima with support from Luka Wanjohi, CIP-Nairobi. The presenter indicated that it is imperative to use the correct experimental designs to avoid experimental noise. The noise is related to differences in farm conditions; soil heterogeneity, irrigation as well as data collection practices like imprecise data collection.

Why experimental design is important?

Appropriate designs help minimize experimental noise; thus, influence of various factors is minimized. To avoid homogeneity bias, confounding treatment effects should be considered for blocking of experimental units. Experimental bias can also be minimized by randomization which ensures difference between observations can be appropriately allocated to the treatments.

Questions and comments

Kiddo Mtunda was concerned with experimental noise resulting from differences in mechanized field preparation.

Jean Ndirigwe also mentioned the effects of noise resulting from differences in terracing between blocks.

Benard Yada raised a concern on how to fit the plants in blocks of different sizes in case of varying terrace levels.

In relation to the issues related to field design, Bert recommended the use of other designs such as ***balanced incomplete block design***. Damian inquired why row by column experimental design is preferred. Hugo indicated the Randomized Complete Block Design (RCBD) is the most reliable design where two replications are enough.

Other approaches to eliminate experimental noise include precise data collection, appropriate analysis (using mixed models as well as integrating spatial correlations) and avoid changing the experimental designs. Bert urged the participants to use digital scales in order to improve data collection. However, this requires substantial investment in equipment for the different work packages under the SweetGAINS project.

Design types

These include RCBD, Alpha design, and resolvable row-column design. Bert explained the application of the designs, differences between the designs as well as the merits and demerits of each design.

Questions

Hugo: Recommend the best design to be used in the implementation of the SweetGAINS project.

Bert: The selection of the most appropriate design depends on the type of field trials; observational trial or preliminary yield trial (PYT). For the observation trial type, the augmented

row-column design is recommended, while for the latter trial type, augmented p-rep design will be appropriate. Resolvable row-column design is recommended for advanced yield trials (AYT).

SPBase and field trials

This involves either designing field trials in SPBase or generating the designs in R and upload the design in SPBase. In either case, there is need to use the naming convention for the experiments and genetic entries. The draft SoPs entails the naming conventions which was discussed in the CoP meeting.

Hugo urged the participants to strategize to reduce the number of traits in the current ontologies since some are redundant.

Other aspects to consider include knowing the field dimensions before designing the experiment. However, this calls for cooperation between the main NARS breeding program and staff of Zonal Agricultural Research and Development Institutes (ZARDIs). This eliminates the extra costs of travel by the technical staff of the lead Public Agricultural Research Institute (PARI) to inspect, and measure fields before experiment design.

The main breeding program can identify a dedicated technician to inspect and measure the field as well as monitor the fields after trial establishment.

Benard Yada urged participants to rethink modernization of trial design and establishment. Although this involves extra costs and de-learning, modernization will improve effectiveness and efficiency in breeding trials establishment and management. Therefore, it is imperative to take advantage of the synergies of the technical staff from the zonal institutes. It is also good practice to use the same design type for all the trials in multi-environment trials (METs). It is good practice to design all trials simultaneously.

Optimal resource allocation for field trials

There is need for trade-off between number of genotypes, replications, locations, and sessions to optimize the limited resources. For optimal field trial design, an R script has been developed to calculate the genetic gains, and this can be downloaded from the Sweetpotato knowledge portal. However, for various NARI breeding components, there is need to analyze the existing historical data. The presenter indicated that the program is easy to execute with different scenarios across the NARI breeding program.

SoP in the breeding process, including tissue sampling and genotyping

Standard Operating Procedures (SoPs) for SweetGAINS project data management

Bert indicated that a first draft was developed by the CIP team, and this will be shared for review by the Community of Practice (CoP). This covers phenotyping, crossing, and NIRS quality assessment data management; germplasm inventory management; and DNA sample management and tracking. The sub-sections on seed systems data management will be incorporated in the SoPs with the support of Luka.

In relation to the earlier discussion on data recording, Bert indicated that missing data should be recorded as missing not as zero which has a meaning during analysis. Under SoP1, there is need to maintain the same naming for genotypes in a breeding program. However, the naming conventions for plot names should be maintained. The data flow schematics for the different SoPs will be adjusted after the general review of the SoPs.

The participants discussed the modalities of using the same naming conventions across all the partner institutions. They agreed to use the same naming conventions going forward, but there is need to cross-check the correct naming for historical data to remove multiple names of the same genotypes. The codes of origin should be maintained across the different countries to preserve the names of officially released varieties.

General discussion on biometrics and SoPs in sweetpotato breeding

Under the SoP3, the NIRS analysis should be completed within 60 days. The participants were concerned with the breakdown of the dry freezer in Uganda. The partners are currently optimizing the use of wet samples in the NIRS analysis to remain within the stipulated time (60 days) in the SPBase.

The SoP4 flow will involve registration of the accessions using the names in SPBase. This will prevent early registration challenges due to variation in naming before and after cleaning the process.

Under SoP5, labelling of extracted DNA has been supported by the Coordinator App. However, efforts to label the plates of extracted DNA before shipping proved futile due to too many characters in the naming which requires large labels.

Margaret inquired on the best way to synchronize the cleanup of elite clones, and varieties. The participants agreed to integrate the process in the stage gate workflow.

Session 4: Updates on seed systems and breeding work in various countries

Updates on seed systems and breeding activities in Uganda, Tanzania, Rwanda and Ethiopia

Presenters:

Benard Yada - Uganda,

Jean Ndirigwe - Rwanda

Kiddo Mtunda – Tanzania

Margaret explained the expectation for the updates on seed systems and breeding work in Uganda, Tanzania and Rwanda. The session was a gallery walk with a 5-minute presentation from each country. This was followed by a 10 minutes silent feedback with participants writing on sticky notes what they thought stood out from the presentations, and key challenges.

Participants were then divided into 2 groups to identify and discuss 3 issues:

- Highlights
- Challenges
- Take home messages

Group 1	Group 2
Highlights/successes: <ul style="list-style-type: none">•Demand for quality seed is available in all countries•All countries have candidate materials for future release•Human resource and infrastructure capacity are available in all countries	Highlights/successes: <ul style="list-style-type: none">•Good infrastructural capacity i.e. screen houses•At least 2 breeders per country•All have new varieties in recent releases
Challenges: <ul style="list-style-type: none">•Limited funding for breeding processes in all countries•More investment is needed in business plans•Unbalanced number of technicians and scientists	Challenges: <ul style="list-style-type: none">•Low technician: breeder ratio•Breeding pipeline not continuous due to few sources of funds•Low EGS production and sales
Take-home message: <ul style="list-style-type: none">•Successful breeding and seed systems requires financial and infrastructural support	Take-home message: <ul style="list-style-type: none">•Promote sweetpotato to be more important in each country

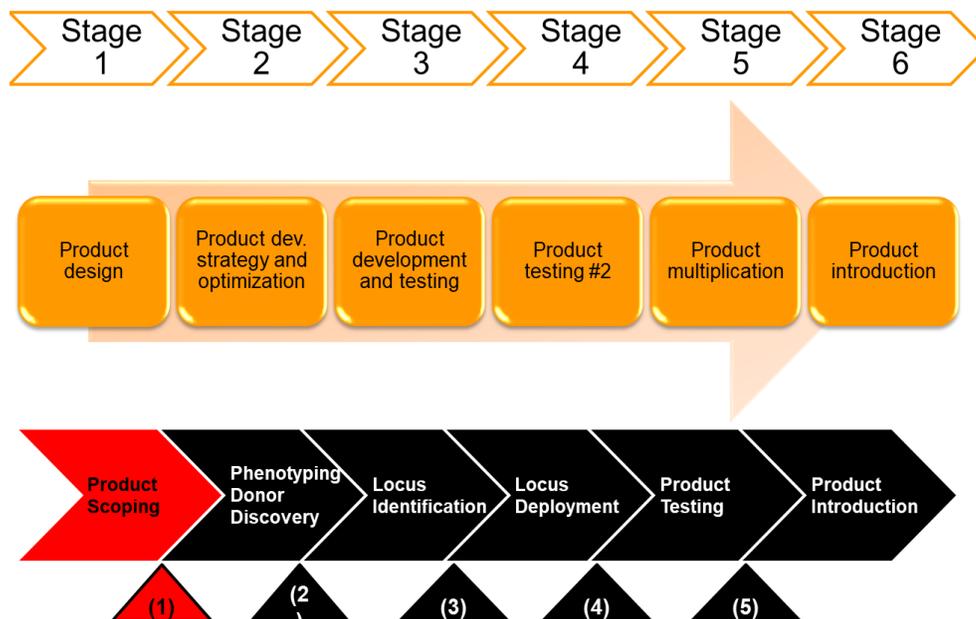
Stage and Gate Trait Discovery and Deployment Process.

[Presentation link](#)

Presenter: Dr. Dorcus Gemenet

Dr. Gemenet explained to the participants about the stage gate process. She went ahead to also explain about how trait discovery works.

How does it work for trait discovery?



Questions and comments

Margaret: Who participates in the decision making in the trait discovery pipeline? What is the relationship between the stage gate process of EiB and the trait discovery pipeline? Dorcus: here, the product is the trait and not the variety. However, the two are linked.

Kwame: How do the two processes interlink, the trait discovery and the product design? Dorcus: The product design is related to the product profile. The trait discovery is where you identify the donor of a particular trait and continue through all the stages through locus identification, locus deployment, product testing and product introduction.

Hugo explained about product advancement process, run on a stage/gates system to stimulate discussion. This process needs Breeders, Seed Scientists, gender specialists, plant pathologist, etc.

Trait discovery and deployment process. Both are managed in a stage gate system, with input from people with various expertise. However, this process should not be left to breeders alone as was the case previously.

General discussion

Margaret: We need to agree when materials will go for cleanup and the number of lines. We also need to discuss which advanced trials need to go to commercial producers for multiplication.

Robert: Some countries have registration prior to on-farm. Others have it after on-farm trials and it is done after DUS.

Margaret: Is it possible for countries to estimate how many clones they will send for clean up so that the planning and cleaning process can be done sooner? Each clone costs USD 1,800 to clean up.

Hugo: Do we need to make new crosses and create new genetic variation every single year? At the end of SweetGAINS, we will be assessed by our ability to increase genetic gain, and our ability to provide clean seed to farmers.

Margaret: Under SweetGAINS, we are meant to put advanced materials to commercial seed producers. How practical is that? Benard: it depends on the level of advancement the materials are at. It is feasible at on-farm trials. Kiddo: It depends on availability of land available with commercial seed producers. There must be a distance to separate these materials from other trials of their own.

Kwame: At the end of the on-farm trial, you need to have enough quantities of the material. When does this seed production start? Doreen: the materials must be clean prior to seed production. Benard: one critical group that must be brought in the loop when conducting our trials is the Variety Release Committee.

Kiddo: We should also consider involving processors in on-farm trials to test materials in the pipeline and help in selecting processing-type varieties.

Introducing Slack app.

Presenter: Luka Wanjohi

Luka introduced Slack, the new software that SweetGAINS project team will be using for communication. Slack is a meeting space for the whole team. It is a great place to coordinate and collaborate, and a fun place to get to know each other, even when you cannot be in the same room at the same time. It is a tool that you can use on your computer and your phone to stay in touch with your team and keep everyone up to date with the important news and goings-on. Slack also allows sharing of documents and can be integrated with other applications like the outlook and one drive.

Questions and comments

Dorcus: Is this Slack free or Slack standard? Luka: this is Slack free.

Kwame: There are various sharing apps and software, why this again? Luka: this one is tailored for SweetGAINS project members from different organizations. Hugo: this is not only about CIP, but about the entire community involved with SweetGAINS project. We are deploying this because it will create value.

Bert: What if the free version does not have all the functionalities required? Luka: the paid plan is discounted and has various advantages.

Photography tips

Ahead of the learning journey, participants were guided on how to take good photos when they are in the field. One needs to invest in a good camera. Always ensure the lens are clean. When shooting, focus on the subject and avoid zooming much as this distorts the quality of the image. Make sure the photos are shot in raw format to easily use them on any software. Participants were also advised not to share photos pasted into Word, rather, share the photos in raw format.

Session 5: Seed systems learning journeys

Each group came up with a set of questions to ask the farmer or the group. - [link](#)

Group 1



Group 1 members and KOTEMU group pose for a photo

Visit to KOTEMU GROUP

Blog link: [Market segmentation and sustaining sweetpotato seed businesses](#)

About KOTEMU group

KOTEMU group is among the seed producers supported by previous sweetpotato seed systems interventions in Rwanda. The well-organized group was established in 2008 and is a member of Urugaga Imbaraga. Urugaga Imbaraga is a national farmer organization that works to improve the socio-economic conditions of an estimated 27,300 farmers located in 25 out of 30 districts across the country. KOTEMU group began sweetpotato seed multiplication after learning that it was a profitable venture and currently multiplies about 10 tonnes of sweetpotato vines per year.

Questions and answers

What volume of vines do you multiply? What motivated you to do vine multiplication?

The group multiplies about 10 tons of sweetpotato vines per year. They started sweetpotato vine multiplication after learning that it was a profitable venture.

Where do you source your starter material and how often do you obtain new planting material?

They obtain starter material from RAB and maintain in net tunnels. This is harvested and planted on a plot that is next to the net tunnels for bulking. From here the material is planted on another group plot or members' fields. They replenish planting material after every three years. RAB gives them the planting material for free. They do not sell from net tunnels but from open nurseries.

What class of seed are you producing and what is the selling price?

The group produces quality declared seed and one kilogram of planting material is sold at RWF 125. However, sometimes NGOs buy at RWF 400 per kg.

Method of multiplication

The group maintains the mother stock of clean planting material in net tunnels. This is harvested and planted in open fields using rapid multiplication technique whereby the plants are established at 20 cm x 10 cm spacing. Sometimes the third multiplication is done on ridges using conventional multiplication (80 cm x 30 cm spacing).

Which varieties are you multiplying and how do you decide which varieties- any input from the market?

Varieties planted included Kabode, Mafuta, Vitaa, Gihinga Mukhungu, Terimbere. In addition, the group was evaluating Kakamega 7, Cecilia, Mafuta, New Kawogo and Esther.

Which is the most preferred variety and why? Is it the same that is preferred for roots?

Kabode is the most preferred variety because it is high-yielding, orange-fleshed and has acceptable dry matter content. When choosing a new variety, the group considers;

- Root yield
- Vine yield – length of vines and thickness
- Taste and skin color of the storage roots. They like sweet varieties that have a red skin. The group also likes orange-fleshed varieties.

How reliable is the vine market and does this depend on sell of roots?

The market is not reliable now. There was a reliable market in the previous two years and the group could sell a kilogram of planting material at RWF 400. The price now is RWF 125 per kg. The market for vines does not depend on performance of root markets. Selling of vines is more lucrative compared to selling roots. The group uses rapid multiplication therefore reducing the chance of producing roots.

Who buys the largest share of your sweetpotato vines and what brings in more money between vines and roots?

The leading buyers of quality vines produced by the group are NGOs such as World Vision. They mostly buy orange-fleshed varieties which they then distribute for free. Individual smallholder farmers do not pay for planting material. In their culture, you do not sell planting material to a neighbor. Neighbors can exchange seed of one crop with that of another crop.

How are you planning to set up a sustainable business that is not project-dependent?

The group produces as ordered. They scale down when there is less demand.

What traits would you like to see in new varieties, and would you like to host trials for promising lines?

- The group prefers varieties that last longer i.e. do not degenerate (kuzara) quickly. It was mentioned that some varieties succumb to viruses within a year.
- The variety must be well adapted to their location. For instance, Ukerewe, a Tanzanian variety, starts to rot if not harvested in time something they do not like.
- Good shape
- Red skin
- Oblong
- Good vine vigor; able to withstand dry periods
- Roots that go deeper into the soil
- Good processing ability
- Orange-fleshed
- Sweet
- Early maturing

The group does not like piecemeal harvesting because they prefer harvesting everything at once so that they can sell. The group is willing to host variety trials.

What challenges are you facing as vine multipliers?

- Unpredictable weather
- Shortage of land

Group reflections and highlights

KOTEMU farmers group understand the sweetpotato crop. They can identify the problems facing them as a group and with the crop. During the visit their plots were well labelled and no weeds. They also have very good knowledge on markets, adaptability and traits of the different sweetpotato varieties. The farmer group is also aware of the need to change seed after 3 years.

Lessons Learnt

- Distributed seed to people who also became sources of planting material
- More of business approach- they don't want piecemeal harvesting
- Have an issue with damage of roots during transport
- Challenge of very small plots

- The group demonstrated good use of technology e.g. net tunnels
- Mostly a women's group- good to involve women

KOTEMU farmers group recommendations

- Breed sweetpotato that is oblong, red smooth skin, orange, HDM, should not break during transportation, sweet, early maturing
- Implement a national seed tracking system
- Technology and marketing should go hand in hand

Topic for CoP discussion

How to enhance marketing among farmer groups to reduce dependence on NGOs.

Group 2



Group 2 members: R-L- Hugo Campos, Jean Ndirigwe, Margaret McEwan, Bonny Oloka, Doreen Chelangat, Bert De Boeck, Kiddo Mtunda, Robert Mwangi, Seraphine Uzamushaka and Jeanne Mukasine (holding the baby)

Blog link: [Understanding farmer needs for new sweetpotato varieties](#)

Visit to Jeanne Mukasine (sweetpotato vine multiplier and seller)

The group had a set of questions to ask Jeanne. See below.

Have you always been here, or you bought this place? How much land do you cultivate per season?

She has always lived on that land. It was given to her by her father in-law and she bought the rest with money from her sales. She has a total of 3 ha and she cultivates all of it. Seventy per cent of the land is under sweetpotato cultivation whereas the other 30% is used for other crops like pineapple, sugarcane, etc.

Do you hire people, who are they, what is their gender composition?

She hires mostly women who are from her neighborhood. Her husband also helps in the garden

Which varieties do you grow, what is the most preferred?

She grows Kabode (NASPOT 10 O) and Vita (NASPOT 9 O). CIP provided her with 7 varieties but over the years she zeroed down to the two varieties which were the most preferred.

What is the source of your planting material, do you pay for it?

Planting material is got from RAB at no cost. However, if it was sold, she would buy it willingly if it's cut from screenhouses or net tunnels.

Where is your market? What are your sales, gross earnings from the sale of roots and vines?

She has a signpost at the main road with her contact information and location. People come to her home to buy and she sells from there. She also sells to NGO's and the government alongside local farmers in her region. To NGO's, she charges Rwandan francs 250/kg of vine weight, 150/kg to local farmers, 100/kg to her neighbors, and 200/kg in the market. Her annual sales of vines are about USD 3,000.

What other crops do you grow?

Pineapple, Sugarcane and Amaranthus.

How have you benefitted from growing sweetpotato?

She built a house, has educated her son, has bought a few livestock from where she gets manure for her for her fields.

What does sweetpotato mean to you?

Sweetpotato is both an income generating and food security crop for her and the entire family.

Group reflections and highlights

The group noted that Jeanne had knowledge on sweetpotato production. She also understands that sweetpotato has many nutritional benefits. She understands the varieties and the market demands. Out of 7 varieties provided to her, she has only 2 (Vita and Kabode) that are in high demand. She has also diversified her income from roots and vine sales. She is also willing to conduct on-farm trials for the different varieties.

Lessons learnt

- Work closer together with the NARS to see the design
- Share field plan and provide support in analyzing farm trials
- Provide more training on R and management of sweetpotato database
- Build capacity for seed production
- Developing product profiles could not have been more timely. The farmer can't wait to replace Kabode with a better variety
- Piecemeal harvesting is practiced very widely and should not be ignored by breeders
- Making of silage should be promoted. Some farmers disregard excess unsold vines

Topic for CoP discussion

- What could be other alternative businesses that can supplement vine businesses?
- How can we come up with a more standard design of demo / on-farm plots?
- How many varieties should be promoted through DVMs?
- What should be the replacement period for existing varieties?
- Which seed systems model is most appropriate?

Session 6: Panel discussions on harnessing product profile information for marketing and demand creation in sweetpotato seed systems.

Panelist:

Kirimi Sindi -CIP-Rwanda

Doreen Chelangat- NARO-Uganda

Tim Byrne - [AbacusBio](#)

Tim Byrne made a presentation on crafting products according to supply chain priorities. In his presentation he emphasized the need to understand the market- what are we selling and to whom? He talked about 1000 Minds approach of valuing varieties based on performance of traits. The approach includes an online survey capturing demographics, farmer-trait preferences, choice patterns, and farmer typologies etc. The presentation also touched on the impact of product profiles on seed systems. Information on product profiles will enable us to understand what defines a good variety.

Kirimi Sindi:

Harvesting practices will change from manual to mechanical. There is need to develop varieties that are hardy, that do not wear easily during harvesting and transportation. Other important variety traits to include are good processing quality, early maturing, disease resistance and drought tolerance among others.

Doreen Chelangat:

A product profile is a blue-print document containing traits preferred by end users. Diverse stakeholders are involved in its development. Sweetpotato product profiling rose from the pressure on breeders to develop varieties that respond to market needs. This is a precursor to effective demand. It should be noted that product profiles will keep on changing to respond to emerging preferences.

Questions and answers:

How do you see the paradigm shift towards stronger linkages between breeding and seed systems?

Initially the burden was on breeders and was mainly donor-driven but now the focus will be on farmers. Increased demand of newly released varieties will create a pull on the seed system.

Is doing economic traits survey adequate to understand the market for sweetpotato seed?

The survey can generate useful information however adoption is dependent on several other things including functioning seed systems. A lot more needs to be done to increase adoption.

What capacities are required to harness product profile information in market and demand creation?

There is need to enhance capacities in supply chain management. Rating of traits is important, but we should also remember that some traits are negatively correlated.

Have you managed to include economic weight on some traits? Which ones carry more weight?

The survey has just been completed and data analysis has not been done.

Information on preferences can help in seed marketing when properly packaged. How can this be done keeping in mind different audiences and communication channels?

Looking at the broader picture how do you link the product profile to adoption? There are some non-monetary values attached to varieties. How do you ensure these are not left out?

The survey tool is using both monetary and non-monetary values. In addition, it should be noted that marketing is important in product adoption. Product profiling is grading. A multi-functional team approach that includes information packaging, marketing, agronomy and communication is needed in order to boost adoption.

When is the 1000 Minds report going to be ready?

September 2020 but a draft can be shared by May 2020.

Can information collected from a specific district be extrapolated nationally?

Every region is unique hence this will not be a copy-pasting exercise.

Are there plans to train scientists on product profiling?

Yes, but there is need to work out the modalities.

How do you get a balanced product profile keeping in mind the diverse end users and the need to limit the number of products?

Ranking of traits is done and the idea is to replace the lead variety in the market. Most needs of both consumers and seed multipliers are in line.

Concluding remarks

There is no 'one size fits all' profile. For the very first-time variety development will begin with market needs. There will be difficult decisions on which market segment to focus on and this will require us to be more strategic than ever. Product profiling is part of a package of tools for fast-tracking adoption of new varieties.

Way forward

TOPIC	ACTION POINT	RESPONSIBLE	TIMELINE
PRODUCT PROFILES <i>(Developing product profiles for UG, TZ, RW & ET. RW, TZ & ET lagging)</i>	Decision required on West Nile product profiles	Benard and Srinilias with Julius	Mid-March
	Define seed traits to include in product profiles- few is better (4 – 6)	Kiddo, Sam and Doreen	End of March
ONTOLOGY	Include seed traits	Kiddo and Sam	End of March
	Rationalize the ontology- all traits	Bert and Jolien- team to include Doreen, a social scientist, an agronomist	Next CoP
ELECTRONIC DATA CAPTURE	Capture the needs of different NARS partners – training, number of trials, gadgets (tablets, electronic scales, labels, label printers etc.)	Luka	Beginning of April
	Review work plans and budgets – WP 2	Luka and Bert: Consult Maria and Hugo	2 nd week of April
SOPs FOR BREEDING DATA MANAGEMENT & CONVENTION	Review SOP document	Bert and Luka: Team: - (Damien – RAB; Doreen-NARO; Kiddo – TARI; Fekadu – SARI)	End of April
	Training to ensure compliance to SOPs	Bert and Luka	By Sep2020
SOPs FOR SEED SYSTEMS	SOPs for quality seed production	Kwame and Sam	End of June
	SOPs for data management	Luka and Srinilias	End of July
LEARNING JOURNEYS- BLOGS	Group 1	Kwame	March 15 th
	Group 2	Hugo	Feb 28th
LEARNING JOURNEYS- ONLINE DISCUSSIONS	2 nd Online discussion to start in April	Doreen	April

Meeting evaluation and wrap up of CoP meeting

[Presentation link](#)

Presenter: Hugo Campos

The meeting evaluation was shared to all participants. Dr. Campos thanked the participants for their participation and wished them safe travels back home. He reminded them of the commitments made during the meeting.

Annexes
Meeting agenda



SweetGAINS SpeedBreed and Seed CoP - East and Central Africa
18th -21st February 2020
Galaxy Hotel, Kigali, Rwanda

Theme: Towards building synergies between modernized sweetpotato breeding and seed systems for successful delivery of improved varieties in East and Central Africa

Coordinators: **Dr. Bonny Oloka** (boloka@naro.go.ug) and **Kwame Ogero** (k.ogero@cgiar.org)

February 18, Tuesday	ARRIVAL	
February 19, Wednesday		
08:00 – 08:30	REGISTRATION	
		<i>Chair: Dorcus Gemenet</i> <i>Rapporteur: Doreen Chelang'at</i>
08:30 – 08:45	Welcome remarks and introductions	Bonny Oloka & Margaret McEwan,
08:45 – 09:15	Remarks by SweetGAINS PI	Hugo Campos
09:15 -13:00	SESSION 1: Sweetpotato Product Profiles	Supporting team: Hugo Campos, Dorcus Gemenet, Benard Yada, Doreen Chelangat, Jolien Swanckaert
09:15 – 10:15	Training on Product Profiles	Hugo Campos
10:15 – 10:35	Official Opening	RAB Representative, CIP Rwanda
10:35 – 11:00	PHOTO AND HEALTH BREAK	
11:00 – 12:30	Training on Product Profiles continued	Hugo Campos
12:30 – 13:30	Feedback and practice session	Hugo Campos
13:30 – 14:30	LUNCH BREAK	
14:30 – 18:00 Hrs	SESSION 2: Electronic Data Capture and Management <i>Chair: Bert De Boeck</i> <i>Rapporteur: Fekadu Gurmu</i>	Supporting team: Luka Wanjohi, Doreen Chelangat, Jolien Swanckaert
14:30 – 16:30	Use of FieldBook App. Data collection exercise and Barcode label printing	Luka Wanjohi, Doreen Chelangat, Jolien Swanckaert

16:30 – 16:45	HEALTH BREAK	
16:45 – 18:00	Use of SPBase for data management.	Doreen Chelangat, Jolien Swanckaert
February 20, Thursday		
08:00 – 08:30	REGISTRATION	
		<i>Chair: Benard Yada</i> <i>Rapporteur: Jolien Swanckaert</i>
08:30 - 09:30	Stage and Gate Trait Discovery and Deployment Strategy	Dorcus Gemenet
09:30 – 13:00	SESSION 3: Trial design Biometrics	Supporting team: Bert De Boeck, Dorcus Gemenet
09:30 – 11:00	Field layout and experimental design for different types of trials.	Bert De Boeck
11:00 – 11:15	HEALTH BREAK	
11:15 – 12:30	SoPs in the breeding process, including tissue sampling and genotyping	Bert De Boeck, Dorcus Gemenet
12:30 – 13:00	General discussion on biometrics and SoPs in sweetpotato breeding	Dorcus Gemenet, Bert De Boeck
13:00 – 13:45	LUNCH	
	<i>Chair: Jean Ndirigwe</i> <i>Rapporteur: Bonny Oloka</i>	
13:45 – 18:00	SESSION 4: A) Updates on seed systems and breeding work in various countries B) Quality management and program optimization	Supporting team: NARI partners, Bert De Boeck, Dorcus Gemenet
13:45 – 14:45	Updates on seed systems and breeding activities in Uganda, Tanzania, Rwanda and Ethiopia	NARI partners
14:45 – 15:45	Workflows and data management	Luka Wanjohi
15:45 – 16:00	HEALTH BREAK	
16:00 – 17:30	Quality control and quality assurance	Bert De Boeck, Dorcus Gemenet
17:30 – 18:00	Preparation for seed systems learning journeys	Margaret McEwan, Faith Njunge
19:00 – 21:00	GROUP DINNER	
February 21, Friday		
08:00 – 15:40	SESSION 5: Seed Systems Learning Journeys	Supporting team: Jean Ndirigwe, Kirimi Sindi, Margaret McEwan. Rapporteur: Each group to appoint on Thursday

06:30 – 07:15	Breakfast	
08:00 -12:00	Departure	
09:00 – 12:30	Learning Journey field visits	CIP Rwanda and Faith Njunge
13:00 – 14:00	Lunch at the hotel	
14:00 – 15:00	Group reflections and write up on learning journeys	
15:00 – 15:40	Plenary: Group feedback on learning journeys and brainstorming on topics for CoP online discussions	Moderator: Kirimi Sindi
15:40 – 16:00	HEALTH BREAK	
16:00 – 17:15	SESSION 6: Panel discussion on harnessing product profile information in marketing and demand creation along the seed systems value-chain	Moderator: Srinivasulu Rajendran Panelists: Kirimi Sindi, Doreen Chelang'at and Tim Byrne
17:15 – 17:30	Evaluation and wrap up of CoP meeting	Hugo Campos
February 22, Saturday - Departure		

Participants list

No.	Title	First Name	Last Name	Position	Institution	Country
1	Dr.	Benard	Yada	Sweet potato Breeder	NaCRRI-NARO	Uganda
2	Ms	Bernice	Wairimu	Program Specialist	International Potato Center	Kenya
3	Mr.	Bert	De Boeck	Lead, Biostatistics and Data management	International Potato Center	Peru
4	Dr.	Bonny	Oloka	Research Officer; Plant Breeding, Quantitative Genetics and Seed Systems	NaCRRI-NARO	Uganda
5	Mr.	Damien	Shumbusho	Breeder	Rwanda Agricultural Board	Rwanda
6	Dr.	Dorcus	Gemenet	Quantitative Geneticist	International Potato Center	Kenya
7	Ms.	Doreen	Chelangat	RA - Breeding	NaCRRI-NARO	Uganda
8	Ms.	Faith	Njunge	Communication officer	International Potato Center	Kenya
9	Dr.	Hugo	Campos	Director of research	International Potato Center	Peru
10	Dr.	Jean	Ndirigwe	Breeder	Rwanda Agricultural Board	Rwanda
11	Dr.	Jolien	Swanckaert	Plant Breeder Associate	International Potato Center	Uganda
12	Dr	Kiddo	Mtunda	Director for Research and Innovation	TARI	Tanzania
13	Dr.	Kirimi	Sindi	Economist	International Potato Center	Rwanda
14	Mr.	Kwame	Ogero	Seed systems agronomist	International Potato Center	Tanzania
15	Mr.	Luka	Wanjohi	Data Manager	International Potato Center	Kenya
16	Ms.	Margaret	McEwan	Seed Systems, CIP	International Potato Center	Kenya
17	Dr.	Robert	Mwanga	Sweetpotato Breeder	International Potato Center	Uganda
18	Dr.	Sam	Namanda	Senior Research Associate	International Potato Center	Uganda
19	Mr.	Stephen	Angudubo	Agricultural and Applied Economist	NaCRRI-NARO	Uganda

Meeting evaluation

Introduction

The 2020 SweetGAINS SpeedBreed and Seed Community of Practice (CoP) participants were requested to evaluate various components of the annual meeting namely: Presentations during the technical meeting sessions, panel session, field trip, meeting organization and recommendations for improvement in the future. 11 participants responded to the evaluation call out of a total number of 20 participants. All responses were submitted electronically.

Participation by age, gender and organization

The age of the participants at the meeting ranged from 32 - 61 years (fig. 1). Male participants continued to dominate the meeting with their participation standing at 81.2% (fig. 2). The majority of the respondents, 64%, came from the International Potato Center (CIP). The reminder came from National Agricultural Research (NARs) organizations.

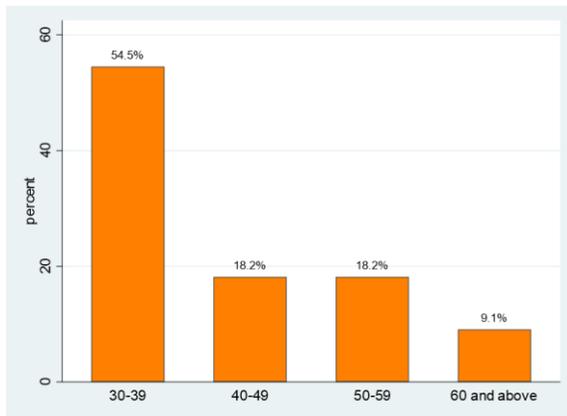


Figure 1 Participants age distribution

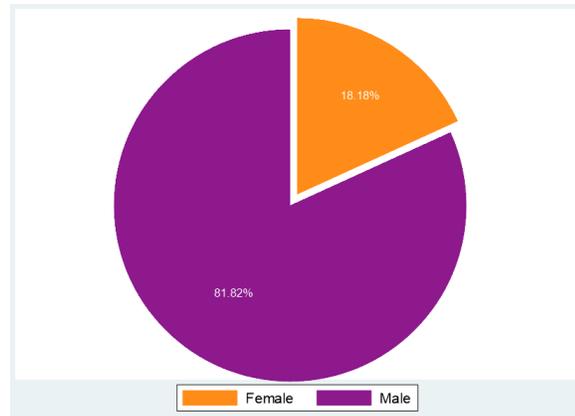


Figure 2 Participants by gender

Technical meeting content

Majority of the respondents felt that the meeting had met their expectations (fig. 4) and the quality of the presentations was good (fig. 5).



Figure 3 Rating on whether meeting matched expectations



Figure 4 Quality of presentations in terms of content

The sessions on sweetpotato product profiles and electronic data management received the highest ratings overall. All sessions got a quality rating of at least being alright. Below are the quality ratings of each of the sessions. (fig. 5)

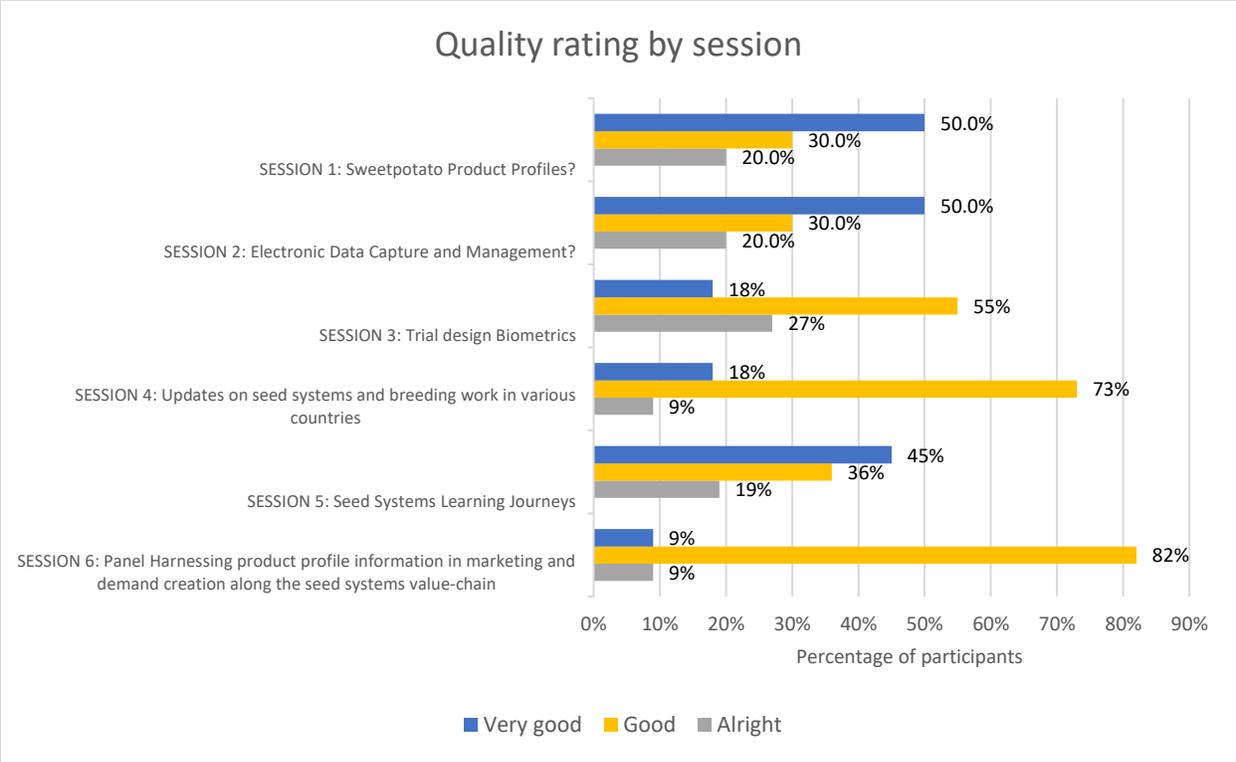


Figure 5 Quality rating by Session

All respondents were generally satisfied with the quality of the field trip. One participant however noted the need to avoid repetitive field trips in future meetings. Below is the complete quality rating for the field trip.



Figure 6 Field Trips

Respondents were further asked to list their three most useful parts of the meeting. The product profiles training featured prominently with the highest number of mentions. Below is a breakdown of the most mentioned parts:

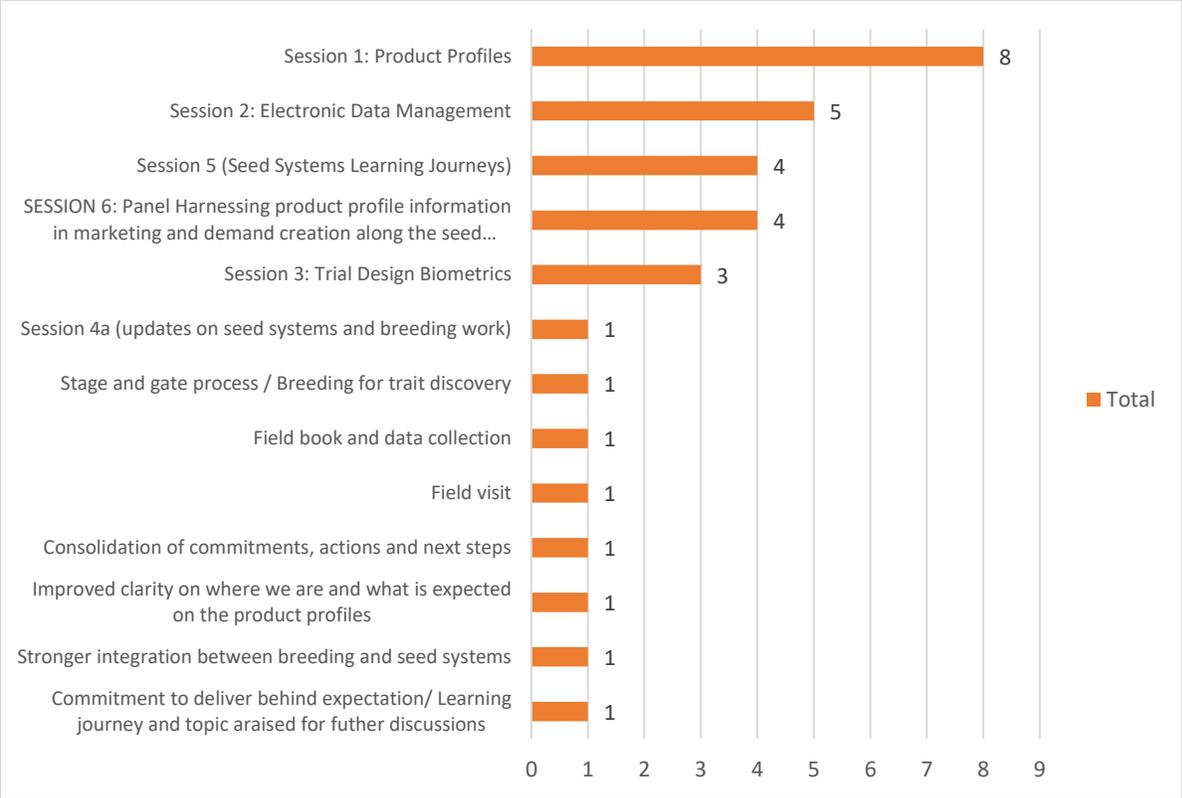


Figure 7 Most useful parts

Meeting organization (logistics and communication)

All respondents were generally happy with the meeting organization. The choice of the hotel however was mentioned as one area needing improvement in the future, as well as internet connectivity within the hotel. Below is a chart (fig. 8) showing how the respondents perceived the logistical organization of the meeting.



Figure 8 Organization and Logistics

Suggestions for future improvement

Finally, respondents were requested to list suggestions for improvement for future CoP meetings. Some of the issues raised included improvement in time management to allow participants more time for hands-on exercises, deeper training in areas such as product profiles and statistical analysis, better design of the learning journeys to avoid visiting the same sites. Below is the complete list of proposed suggestions for future meetings.

- Better hotel choice for next meeting. The internet has been a big issue in this meeting.
- Cluster agenda items for a day by category
- Deepen training on product profile and data management
- Enhance topic discussion through the CoP and sharing regular updates on implementation of SGs project to keep our commitments on track. Complete development of the product profiles for different countries.
- Learning journey was repetitive
- Less time for training on statistics. E.g. R-software
- More on seed systems
- More time for learning and sharing experiences on breeding and seed systems from different countries
- Organize one-way trips
- Put in action all commitments, let us improve our communication and implement the DISC recommendations
- Reduce the program crowding by extending the number of days
- SOPs for quality seed production
- We need more time for hands on exercises regarding electronic data management