
# Report on the West and Central Africa Regional Workshop on Plantain Characterization

Organised by the Centre Africain de Recherches sur Bananiers et Plantains (CARBAP), Njombe, Cameroon, in collaboration with the Global *Musa* Genetic Resources Network (MusaNet), Bioversity International

**11-15 May 2015**

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## 1. Background

The Centre Africain de Recherches sur Bananiers et Plantains (CARBAP), together with the Global Musa Genetic Resources Network (MusaNet), held a workshop to address the need for a standardized characterization and documentation of plantains. This third MusaNet workshop, held in Njombé, Cameroon from 11-15 May 2015, built on the experience from two previous workshops in 2013 at CIRAD in Guadeloupe and in 2014 at the National Research Centre for Banana (NRCB) in India. However the workshop at CARBAP was the first of a more focused, regional scope. In attendance were 12 invited curators of national *Musa* collections across West and Central Africa (WCA), key experts, and staff from CARBAP and Bioversity. The programme and background documents were developed by an Expert Team from CARBAP and Bioversity, led by *Musa* taxonomists Edmond de Langhe and Kodjo Tomekpe. The workshop was financed by the European Union.

The **Aim** of the workshop was:

- To forge a standardized plantain characterization and documentation methodology for West and Central African (WCA) national *Musa* collections.

The **Objectives** of the workshop were to:

- Review and better understand the status and characterization methodology of each of the WCA field collections.
- Have a common understanding and agree on the minimum descriptors used to characterise plantains.
- Share knowledge and experience to promote best practices for the field management of *Musa* germplasm collections.
- Test and validate the mobile device application for gathering data in the field – including data entry and data management.
- Discuss and propose solutions for optimum *Musa* germplasm data management (MGIS).
- Discuss the next steps towards a standardized plantain characterization and documentation methodology.

## 2. Summary of the Workshop Programme

The workshop was divided into the following sessions (see *Annex 1* for the full programme):

- Official inauguration and opening session
- Session 1: Introduction to the Workshop
- Session 2: Description and discussion of the accessions in the field collection (field sessions)
- Session 3: Documentation and sharing of information
- Session 4: Follow-up: Discussion on next steps towards a standardized plantain characterization and documentation methodology
- Session 5: Conclusion and workshop evaluation

This report by the MusaNet Secretariat serves as an official record of the workshop, including the minutes of discussions and links to all presentations (in pdf format). This report and all the presentations are found on the MusaNet website (www.MusaNet.org) under the tab 'Meetings'.

## 3. Opening session – 11 May

The workshop was officially opened on 11 May 2015 with speeches by **CARBAP Director** Dr Michel Ndoumbe Nkeng, the **Representative of the Ministre de la Recherche et l'Innovation,** Mme Nyaka Ngobisa Mandengue and by presentations from the **Innovate Plantain Representative,** Dr. Pierre Michel Loubana (link to presentation) and **MusaNet Coordinator,** Dr. Nicolas Roux (link to presentation).


The workshop delegates and dignitaries at the opening ceremony. The list of all participants is found in Annex 2.

## 4. Session 1 - Introduction to the workshop and curator presentations – 11 May

**Objectives of this session:**

- Clear understanding of the purpose of the workshop, aim and objectives
- Introduction of each participant, their institute and position
- Presentations illustrating each curator's collection, its history, status, strengths and challenges
- Participants' expectations of what will be achieved at (and after) this workshop

Rachel Chase (Bioversity), the workshop facilitator, reviewed the aims and objectives of the workshop and presented the programme for the week (see *Annex 1*).

Each participant introduced themselves by stating their name, position and institute. They were also asked to list their expectations for this workshop, and what their personal objectives were. The expectations were:

- Standardize the methodology for characterization of *Musa*
- Better management of field collections
- Better data management
- Harmonize synonyms

- Identify specific and stable descriptors for plantains
- Establish reference for plantain (e.g. catalogue)
- Establish methodology to help develop catalogues
- Improve plantain classification
- Establish a taskforce specific to diversity and characterization of plantain
- Create identification key for plantain (task force)
- Make available easy characterization tools (e.g. tablet)
- Revise colour chart
- Allow instant identification using photos
- Establish list of the most popular varieties per country

The 12 WCA curators each made a short presentation on the current status of their collections (links to presentations below):

1. Dr. Christophe Cocou Tossou (Benin)
2. Mr. Serge Ruffin Mbila (Congo)
3. Dr. Deless Thiemele (Ivory Coast)
4. Mr. Branly Effa Effa (Gabon)
5. Dr. Beloved Mensah Dzomeku (Ghana)
6. Dr. Sunday Akyniemy (Nigeria)
7. Mrs. Delphine Amah (Nigeria)
8. Mr. Etienne Ziki (Central African Republic)
9. Mrs. Germaine Hermine Vangu (Democratic Rep of Congo)
10. Mr. Kokou Zopouya (Togo)
11. Mr. Lucien Ibobondji (Cameroon)
12. Dr. Joseph Adheka (Democratic Rep of Congo)

A table of names, institutes and email addresses for all participants is found in *Annex 2*.

**Introduction to Plantain Characteristics**

Lucien and Joseph presented an overview of the classification and key characteristics of the subgroup plantains. This included photos of the particularities of the pseudostem, leaves, flowers and fruit. Link to presentation.

**Introduction to the Compound List of Descriptors**

Kodjo presented the Compound List of Descriptors, which was the focus of the field work over the following three days. The list, developed specifically for this workshop, is a compilation of 24 descriptors from the Illustrated Minimum List of Descriptors plus 11 descriptors that were identified as highly discriminating for plantains by Edmond, Kodjo, Lucien and Joseph (the Expert Team of the Organizing Committee). The Compound List was provided in English and French (English only on the mobile device application), both of which are found in *Annex 3*.

**Introduction the Mobile Device and Application**

Max Ruas (Bioversity) presented the mobile device (tablet) and the application that was developed for the workshop. The application contained the Compound List of Descriptors divided into 3 field sessions and for four plantain accessions. He showed the curators how they would record the descriptors into their tablets during the field sessions. Link to presentation.

## 5. Session 2 - Description and discussion of the accessions in the field collection – 12-14 May

The field and discussion sessions were held over three days, consisting of mornings in the field sessions characterising four different plantain accessions and afternoons discussing the descriptors that were scored each morning. All participants used the Compound List of Descriptors on their individual tablets for scoring.

**Objectives of the session:**

- Test the revisions recently undertaken on the Minimum List of Descriptors and the newly developed plantain specific descriptors (both in the Compound List of Descriptors).
- Share experiences on the interpretation of the descriptors and agree on the most appropriate definitions/modifications needed.
- Practical training and knowledge exchange on the descriptors and plantains in general.
- Training of and feedback on using the tablets and the application.

**Field Sessions (mornings 12-14 May)**

During the field sessions, 4 groups of curators rotated among the following four plantain accessions in the field:

Accession 1 – Bend Mossendjo ITC0057 (French plantain type)
Accession 2 – Esang ITC0015 (False horn plantain type)
Accession 3 – Batard ITC1126 (French horn plantain type)
Accession 4 – Ihitisim ITC0121 (True horn plantain type)

The four groups were composed of 2-3 curators, a group leader and an assistant, as below:

| | Group 1 (FR) | Group 2 (EN) | Group 3 (FR) | Group 4 (FR) |
|---|---|---|---|---|
| Curators | Kokou | Beloved | Germaine | William |
| | Deless | Sunday | Christophe | Serge |
| | | Delphine | Branly | Etienne |
| **Leaders** | **Joseph** | **Nicolas** | **Lucien** | **Kodjo** |
| *Assistants* | *Pascal* | *Gerard* | *Guy* | *Silvia* |

*FR= francophone, EN=anglophone*

Each group spent approximately 30 minutes at each accession scoring the Compound List of Descriptors on their tablets. The list is divided into three field sessions:

1. Field Session 1 – 10 descriptors (Vegetative)
2. Field Session 2 – 12 descriptors (Floral)
3. Field Session 3 – 13 descriptors (Fruit)

Curators were asked not to communicate within their groups during the field sessions in order to have the most realistic representation of results. They were also asked to take photos of the descriptors using their tablet while scoring the last accession of each field session.

**Discussion in the meeting room (afternoons 12-14 May)**

1. For each descriptor, the results for the 4 accessions were displayed by projector. These results for all three days are found here for Field Session 1, Field Session 2 and Field Session 3.

2. Photos taken by Joseph Dongmo (CARBAP) of a particular accession and descriptor were also projected next to the graph for visual reference.
3. Led by Kodjo, Lucien and Joseph, the group looked at the visual results (bar graphs) and assessed the different results for each descriptor.
4. The group discussed the possible reasons for the discrepancies (if any) and then moved to the next accession to repeat the process for all 4 accessions.
5. The group concluded if the description/explanation of the descriptor needs to be modified/revised and how this might happen. The experts helped make a final decision and Rachel took notes for the revision (summarised in *Annex 4*). All discussions were also recorded electronically.
6. The process was repeated until the all descriptors were discussed.

**Special programme for Field Session 2 (13 May)**
During Field Session 2, as there was only one accession with an inflorescence for scoring floral descriptors, the programme was amended to allow groups to rotate among the one accession (Bend Mossendjo) and the following 3 stations:

1. Tissue Culture and PIF (macro-propagation method) labs with Dieudonné Ngaha and Paul Ambé (CARBAP)
2. Post-Harvest lab with Gerard Ngoh Newilah (CARBAP)
3. Breeding discussion in the field with Guy Noumbissiée (CARBAP)

**Field management discussions (13 and 14 May)**
Kodjo and Bernard Kegni (CARBAP) conducted an hour long discussion on Field Management in the CARBAP field collection on Day 3. They made various demonstrations and provided advice and recommendations on the different stages of the field collection of regeneration work. Useful interactions were held about the environmental conditions (altitude, precipitation, soil type, choice of planting season, field and soil selection for collection regeneration and others). Discussions focused on the nature and selection of the soil (for example a fallow) before its preparation for planting, the planting device and planting date, density, field layout, holes for planting, drains to prevent water accumulation and promote good drainage and others. Bernard and the group extensively discussed the source of planting material (suckers or/and vitro plantlets, methods of preparation of planting materials (avoid abnormal mother plant and sucker…). Field management practices were discussed with emphasis on mineral and/or organic fertilization, weed control, diseases and pests control (pesticides and/or biological control), trapping of black weevil and watering (particularly on young plants). De-suckering and the choice of successor sucker, pruning and de-leafing to reduce Sigatoka disease pressure has been the subject of intense debate.

Kodjo also presented a talk on Field Management in the meeting room on Day 4, with reference to the Regeneration Guidelines. Link to presentation.

Link to the Regeneration Guidelines

**Indoor demonstration of other plantain descriptors (13 May)**
Kodjo discussed nine additional descriptors (from the 1996 book) that are considered important for plantain but were not included in the Compound List. Link to presentation (including photos)

The nine descriptors are:
6.1.2 Dwarfism
6.2.5 Main underlying colour of the pseudostem
6.2.8 Wax on leaf sheaths
6.3.4a Petiole margins – winged

6.3.22 Pigmentation of outer surface of cigar leaf
6.5.4 Colour of the bract external face
6.5.5 Colour of the bract internal face
6.5.9 Fading of colour on bract base
6.6.2 Compound tepal main colour

## 6. Session 3: Documentation and sharing of information – 15 May

**Objectives of the session:**

- Understanding how to link the tablet to a personal computer for data upload and storage.
- Introduction to the new MGIS interface and its features
- Sharing techniques for taking good photos in the field
- Update of the MusaNet website African collections page
- Introduction to Innovate Plantain network
- Presentation and discussion of 10 varieties for each country

**Data transfer from tablet to computer**

The morning of Day 5 was spent discussing documentation and data management. Max began by discussing the procedure for uploading data from the tablet to a computer. However, due to some bugs in the tablet software, it was not possible for each curator to perform the data transfer. Instead, Max demonstrated the procedure on his computer, and will send instructions (+ video) to all curators following the improvement and release of the application.

**The new MGIS interface**

Max introduced the new MGIS website and discussed its functions/applications (http://www.crop-diversity.org/mgis/). The new interface, launched in January 2015, has many new features; for example it is now possible to access data from molecular studies. There is now an urgent need for more partners to sign the Data Sharing Agreement (DSA) and upload their data, as only collections that have signed the DSA and have uploaded their data will be visible on the new MGIS (via logos). The DSA however does not oblige a collection to share material. Link to presentation.

**MusaNet Website Update**

Nicolas showed participants the MusaNet website collection page for Africa and discussed its importance. He asked that everyone please update the information for their respective collections by sending it to Rachel by email (r.chase@cgiar.org).

**How to take good photos**

Max talked through a presentation made by Lavern Gueco (from UPLB in the Philippines) at a previous MusaNet workshop on how to take good photos of banana plants. The following software are recommended and available free from the internet: Faststone (editing), Easy thumbnails (re-sizing) and Picture Shark (for adding labels). Link to presentation.

Dongmo then presented some of his advice on taking photographs of accessions in the field.

**Innovate Plantain**

Josué Tetang (CARBAP) spoke about the regional banana network for West and Central Africa, Innovate Plantain. He asked all curators to send him a list of the stakeholders of banana research and development in their respective country, in order to optimise the diffusion of innovations on the value chain.

**Top 10 Varieties of *Musa* by Country**

During the week, Nicolas asked all curators to provide a list of the top 10 varieties of *Musa* (most popular according the consumer) in their respective country, including common name, genome group and usage (e.g. cooking, chips). These were compiled into a presentation and discussed one by one, looking for commonalities among countries. The list needs to be further developed with the regional network Innovate Plantain and involvement of key stakeholders (e.g. economists, agronomists). Link to presentation.

## 7. Session 4: Follow-up: Discussion on next steps towards a standardized plantain characterization and documentation methodology – 15 May

**Objectives of the session:**

- To discuss and agree on the next steps after the workshop toward achieving the overall aim and objectives, and participants' expectations

There was an overwhelming consensus by the curators to make a standardized list of descriptors for plantains. Some minor revisions are still needed on the Minimum List of Descriptors for *Musa* and a substantial amount of work is required to fine-tune the Compound List for Plantains. This work will continue with the Expert Team of the Organizing Committee in the months following the workshop, with a goal to revise these two lists as soon as possible. After the modifications, the descriptors should be tested by small group of curators to confirm if they are accurate and adequately capture the diversity of plantains.

During the workshop, problems with the descriptor terminology were identified both in the French and English versions of the Compound List of Descriptors. Often, the translation resulted in some terms that are not botanically appropriate or misunderstood and the lists were therefore not identical. This needs to be carefully examined by the Expert Team. In addition, there is a clear need for better photos (especially for plantains) which would clarify many problems with the interpretation of descriptors as photos are powerful for getting information across in all languages. However, sometimes, diagrams are better than photos.

All comments from the group discussions on the descriptors are summarized in a table in *Annex 4*.

To summarize, the particular activities below were proposed for immediate action following the workshop, with the responsible person in **bold type**:

- **Rachel** to work with the Expert Team (**Kodjo, Lucien and Joseph Adheka**) on revising the Compound List of Descriptors, which will eventually be titled the Plantain Minimum List of Descriptors.
- **Max** to work on the mobile device application with software developers for release of improved version and 'how to' videos for users.
- **All curators** to send by email to Rachel up-to-date information about their respective collection for the MusaNet African Collections Page.

## 8. Session 5: Conclusion and workshop evaluation – 15 May

**Objectives of the session:**

- Review of the workshop Aim and Objectives
- Round table from curators on their overall impressions of the workshop
- Personal, anonymous evaluation of the workshop

Based on a round table discussion on the curators' impressions, the CARBAP workshop achieved the following key outcomes:

- Full participation of the curators from WCA collections
- List of the 10 most popular varieties per country
- Better understanding of how to score *Musa* descriptors
- Agreement on the revision of the Minimum List of Descriptors for Musa and Compound List of Descriptors
- Practical use and feedback on the mobile device (tablet) and application for collecting data in the field
- Understanding of the features of the new MGIS website
- Shared experiences of the practices and constraints in establishing, maintaining and managing a field collection
- Exchange of knowledge on best practice field management and documentation
- Proposals and agreement on the next steps needed following the workshop

The anonymous evaluation forms completed at the end of the workshop showed that the vast majority of participants thought the sessions were very relevant to the workshop objectives and that the time spent on each session was appropriate. Logistical and hosting arrangements were also well received (except for some unfortunate problems with flights) and overall the participants felt that it was an excellent and productive workshop.

## 9. Acknowledgements

The CARBAP workshop in Cameroon was made possible thanks to the financial contribution from the European Union. MusaNet is grateful to the many individuals and their respective organisations for supporting the overall goal of the workshop. Great appreciation goes to CARBAP, especially the director Dr. Michel Ndoumbe Nkeng. Special thanks go to the Organizing Committee (Edmond de Lange, Kodjo Tomekpe, Pierre-Michel Loubana, Guy Noumbissié, Josué Tetang, Gérard Ngoh Newilah, Joseph Adheka, Lucien Ibobondji, Nicolas Roux, Max Ruas, Rachel Chase and Silvia Araujo de Lima) for their efforts over the many months prior to the workshop. Many thanks to the official workshop photographer, Joseph Dongmo. This report was written by Rachel Chase.

**Annex 1. List of participants at the CARBAP workshop**

| No | Last name | First name | Institute | Country | Email |
|---|---|---|---|---|---|
| **1.** | Dr Loubana | Pierre-Michel | CARBAP | Cameroon | loubanapnr@yahoo.fr |
| **2.** | Dr Noumbissié Touko | Guy | CARBAP | Cameroon | guyblaisenoumbissie14@yahoo.fr |
| **3.** | Dr Ngoh Newilah | Gerard | CARBAP | Cameroon | gbngoh@gmail.com |
| **4.** | Mr Noupadja | Pascal | CARBAP | Cameroon | pascalnoupadja@yahoo.fr |
| **5.** | Mr Nguefack | William | CARBAP | Cameroon | willyngue@yahoo.fr |
| **6.** | Mr Ibobondji | Lucien | CARBAP | Cameroon | ibobondji@gmail.com |
| **7.** | Mrs Nkadji | Christine | CARBAP | Cameroon | fagueu@yahoo.fr |
| **8.** | Dr Roux | Nicolas | Bioversity | France | n.roux@cgiar.org |
| **9.** | Mrs Chase | Rachel | Bioversity | France | r.chase@cgiar.org |
| **10.** | Mr Ruas | Max | Bioversity | France | m.ruas@cgiar.org |
| **11.** | Mrs Araujo de Lima | Silvia | Bioversity | France | s.delima@cgiar.org |
| **12.** | Dr Tomekpe | Kodjo | CIRAD | France | kodjo.tomekpe@cirad.fr> |
| **13.** | Dr Adheka Giria | Joseph | UNIKIS | RDC | jadheka@yahoo.fr |
| **14.** | Mrs Vangu | Germaine | INERA | RDC | germainehermine02@gmail.com |
| **15.** | Mrs Amah | Delphine | IITA | Nigeria | D.Amah@cgiar.org |
| **16.** | Dr Akinyemi | Sunday O.S. | NIHORT | Nigeria | sosaking2002@yahoo.com |
| **17.** | Dr Thiemele | Deless | CNRA | Côte d'Ivoire | delessthiemele@yahoo.fr |
| **18.** | Dr Mensah Dzomeku | Beloved | CSIR - CRI | Ghana | bmdzomeku@gmail.com |
| **19.** | Mr Effa Effa | Branly | CENAREST | Gabon | stopisuperstar@yahoo.fr |
| **20.** | Mr Ziki | Etienne | ICRA | RCA | etienne_ziki@yahoo.fr |
| **21.** | Mr Ruffin Mbila | Serge | DGRST-Congo | Congo | groproda@yahoo.fr |
| **22.** | Dr Tossou | Christophe Cocou | INRAB | Benin | chritossou58@gmail.com |
| **23.** | Mr. Zoupoya | Kokou | ITRA | Togo | ekozoupoya@yahoo.fr |

**Annex 2. Programme of the CARBAP workshop**

| DAY 1 | MONDAY 11 MAY 2015 |
|---|---|
| **08:30-10:30** | **OPENING SESSION –** welcome messages and introductions **(20 mins each)**<br>• **CARBAP representative:** Director, Dr Michel Ndoumbe Nkeng (speech)<br>• **Representative of the Ministre de la Recherche et l'Innovation:** Mme Nyaka Ngobisa Mandengue (speech)<br>• **Innovate Plantain representative:** Dr. Pierre Michel Loubana (presentation)<br>• **MusaNet Coordinator:** Dr. Nicolas Roux (presentation of MusaNet)<br>**Introduction to the Workshop (45 mins) -** Rachel Chase<br>**Aim**: To forge a standardized plantain characterization and documentation methodology for West and Central African national *Musa* collections.<br>**Overview of the Objectives of the workshop –** 5 mins<br>• Review and better understand the status and characterisation methodology of each of the WCA field collections.<br>• Have a common understanding and agree on the minimum descriptors used to characterise plantains.<br>• Share knowledge and experience to promote best practices for the field management of *Musa* germplasm collections.<br>• Test and validate the mobile device application for gathering data in the field – including data entry and data management.<br>• Discuss and propose solutions for optimum *Musa* germplasm data management (MGIS).<br>• Discuss the next steps towards a standardized plantain characterization and documentation methodology.<br>**Presentation of Programme –** 10 min<br>**Round table introductions from participants** (30 mins) |
| ***10:30-11:00*** | ***Coffee/tea break + Group photo*** |
| **11:00-13:00** | **SESSION 1: INTRODUCTION TO THE WORKSHOP (cont)**<br>**Round table of curators' expectations of workshop**<br>**Presentations from WCA curators**<br>• Presentation of each partner collection (10 mins each- using pre-prepared guidelines)<br>➢ Benin, Dr. Christophe Cocou Tossou<br>➢ Congo, M. Serge Ruffin Mbila<br>➢ Cote d'Ivoire, Dr. Deless Thiemele<br>➢ Gabon, M. Branly Effa Effa<br>➢ Ghana, Dr. Beloved Mensah Dzomeku<br>➢ Nigeria, Dr. Sunday Akyniemy<br>➢ IITA, Dr. Delphine Amah<br>➢ RCA, M. Etienne Ziki |
| ***13:00-14:30*** | ***Lunch*** |
| **14:30-16:15** | **SESSION 1: INTRODUCTION TO THE WORKSHOP (cont)**<br>**Presentations of WCA curators (cont)** |

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|---|---|
| | ➢ RDC, Mrs. Germaine Hermine Vangu<br>➢ Togo, M. Kokou Zopouya<br>➢ Cameroon, M. Lucien Ibobondji<br>➢ RDC, Dr. Joseph Adheka<br><br>• Introduction to the Compound List of Descriptors (40 mins, Kodjo, Lucien and Joseph) |
| ***16:15-16:30*** | ***Coffee/tea break*** |
| ***16:30-17:30*** | **SESSION 1: INTRODUCTION TO THE WORKSHOP**<br>Presentation on the mobile device (tablet) (Max Ruas). How to use the mobile device in the field (for Days 2-4) and record data. |
| **DAY 2** | **TUESDAY 12 MAY 2015** |
| **08:00-9:00** | **SESSION 2: DESCRIPTION OF THE ACCESSIONS IN THE FIELD COLLECTION – 1st round**<br>**In the meeting room:**<br>**Description of the field exercise for the next 3 days (30 mins) –** Rachel<br>➢ Description of the process<br>➢ Description of the 4 accessions to be scored<br>➢ Explanation of the 4 groups of three curators + lead person + assistant<br>➢ Explanation of the Compound List of Descriptors to be scored in the field over the 3 days – 1) vegetative parts 2) flowers and 3) fruits<br>➢ Photos to be taken at last accession (Day 4)<br>➢ Questions of clarification and agreement<br><br>***8h30 - FIRST ROUND OF FIELD EXERCISE BEGINS (10 descriptors)*** |
| ***9:00-9:30*** | ***Coffee/tea break in field*** |
| ***9:30-12:00*** | ***FIRST ROUND OF THE FIELD EXERCISE – CONTINUED*** |
| ***12:00-14:00*** | ***Lunch*** |
| **14:00-16:00** | **Discussion in the meeting room of the Field Session 1 results with Kodjo Lucien and Joseph** |
| ***16:00-16:30*** | ***Coffee/tea break*** |
| **16:30-17:30** | **Discussion in the meeting room of the Field Session 1 results with Kodjo Lucien and Joseph –** ***continued*** |
| **DAY 3** | **WEDNESDAY 13 MAY 2015** |
| **08:00-08:30** | ***Curators' Presentations (Serge and Christophe)*** |
| **08:30-09:30** | ***Discussion on field management – in the field (Kodjo and Bernard)*** |
| **09:30-10:30** | **Field Session 2 (score one accession and Breeding tour) and Lab Visits (TC and Post-Harvest) – 1st Round** |

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|---|---|
| ***10:30-11:00*** | ***Coffee/tea break*** |
| **11:00-12:00** | **Field Session 2 and Lab Visits – 2nd Round** |
| ***12:00-14:00*** | ***Lunch*** |
| **14:00-15:00** | **Review of Field Session 1 descriptors with results from Lucien and Joseph** |
| **15:00-16:00** | **Discussion in the meeting room of the Field Session 2 results with Kodjo Lucien and Joseph – *see first round process*** |
| ***16:00-16:30*** | ***Coffee/tea break*** |
| **16:30-17:45** | **Discussion in the meeting room of the Field Session 2 results with Kodjo Lucien and Joseph – *continued*** |
| **DAY 4** | **THURSDAY 14 MAY 2015** |
| **9:00-9:45** | **Curators' presentations (Germaine and Sunday)** |
| **9:45-10:30** | **Field Management (in the meeting room) – Kodjo and Bernard** |
| **10:30-11:00** | ***Coffee/tea break at the portique (explanation of bunches by Kodjo)*** |
| **11:00-13:00** | **SESSION 2: DESCRIPTION OF THE ACCESSIONS IN THE FIELD COLLECTION – 3rd round**<br>***THIRD ROUND OF FIELD EXERCISE (13 descriptors)*** |
| ***13:00-14:00*** | ***Lunch*** |
| **14:00-16:00** | **Discussion in the meeting room of the results with Kodjo Lucien and Joseph – *see second round process*** |
| ***16:00-16:30*** | ***Coffee/tea break*** |
| **16:30-17:30** | ***Indoor Demonstration of other plantain descriptors – (Kodjo)*** |
| **DAY 5** | **FRIDAY 15 MAY 2015** |
| **08:00-09:00** | **Visit of the CARBAP collection (Lucien)** |
| **09:00-11:00** | **SESSION 3: DOCUMENTATION AND SHARING OF INFORMATION**<br>• MGIS set up and training (mobile device to computer) – each curator will have his/her own laptop (Max) |
| ***11:00-11:30*** | ***Coffee/tea break*** |
| **11:30-13:00** | **SESSION 3: DOCUMENTATION AND SHARING OF INFORMATION**<br>• MGIS set up and training (Max) – continued<br>• Presentation on how to take good pictures (Dogmo, Kodjo and Josué)<br>• Presentation of new MGIS (Max)<br>• Presentation of Musanet website collections page |
| ***13:00-14:00*** | ***Lunch*** |

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|---|---|
| **14:00-16:00** | **SESSION 4: Follow-up: Discussion on next steps towards a standardized plantain characterization and documentation methodology** |
| ***16:00-16:30*** | ***Coffee/tea break*** |
| **16:30-17:30** | **SESSION 5: CONCLUSION AND EVALUATION**<br>• Review of Aim and Objectives<br>• Round table on personal impressions of the workshop and what we achieved<br>• Evaluation forms |
| **DAY 6** | **SATURDAY 16 MAY 2015** |
| **08:00-17:00** | **FIELD TRIP**<br>**Visit to a small holder plantain farm between Njombé and Bekoko, the Monument of Reunification at Buea and Limbe town. Possible stop at market in Douala.**<br><br>Departure of some travelling participants in the evening from Douala |
| **DAY 7** | **SUNDAY 17 MAY 2015** |
| | Departure of other travelling participants |

**Annex 3. The Compound List of Descriptors used for scoring during the workshop field session (English and French versions).**

# Compound List of Descriptors

## INTRODUCTION

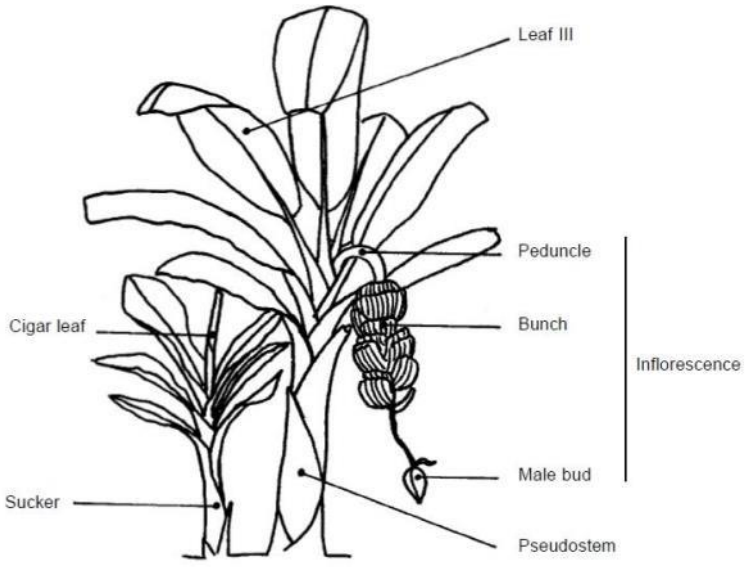
This **Compound List of Descriptors** was developed for the *West and Central African Regional Workshop on Plantain Characterization* at CARBAP, Cameroon in May 2015. It is not intended to be used for any other purpose. It is a compilation of descriptors from the Illustrated Minimum List of Descriptors (in blue type) plus several descriptors that are highly discriminating for plantains (in red type) as identified by the Expert Team of the Organization Committee (Edmond de Langhe, Kodjo Tomekpe, Joseph Adheka and Lucien Ibobondji) of the workshop. NB: The Compound List is divided into three **Field Sessions** that will be conducted during the workshop.

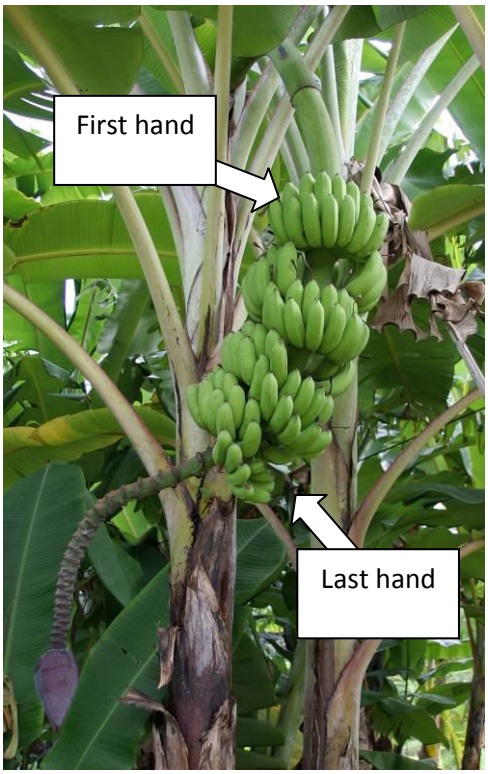
## THE APPROPRIATE DEVELOPMENT STAGE FOR OBSERVATION

The best time to take photos and document the descriptors is when the fruit are green-ripe or yellowing ("harvest time"), and the rachis is at least 45 cm long (15 inches). **All descriptors should be scored at harvest except for descriptors 6.3.4b, 6.3.6, 6.3.7 that should be recorded at shooting time (emergence of the inflorescence) to avoid the desiccation of the petiole margin that often occurs at harvest time.**

For all **colour descriptors**, colour should be determined with the appropriate colour chart and out of direct sunlight. The best time to observe colour descriptors is in the morning when the light is clearer than in the afternoon.
For all **flower descriptors** (6.6.2 - 6.6.13) the material should be fresh as it oxidizes and changes colour rather quickly.
For the **fruit descriptors** (6.7.1 - 6.7.18) observation must be done on several fruits in order to reflect the dominant case.

## THE BANANA PLANT

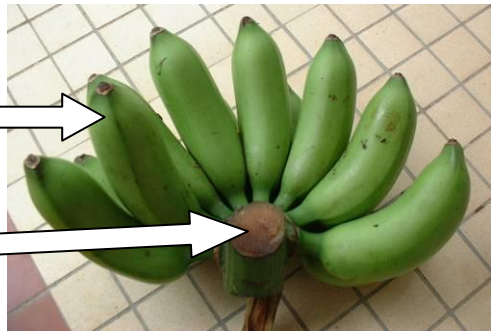



The individual **fruits** also called "fingers" in the **bunch** (photo top-right) are arranged in clusters called "**hands**" along the **rachis** (photo bottom-right)

Fruit

Rachis



# Field Session 1

At the onset of the observation, and for each selected accession, a technician should already have cut the leaf III (at the base of its petiole) under the guidance of the group leader. The petiole should NOT been cut at its mid-length by the observers for the descriptor 6.3.3 since a simple observation of the middle part suffices to see the position of the margins. Cut leaves keep fresh during the morning, so that the same leaf can be described by the next groups.

### 6.2.1b Pseudostem size = number of foliage leaves

Measured by the number of foliage leaves (or their scars). The scars are the dried-up bases of the petioles of past leaves. Along the pseudostem, the leaves are arranged in two spirals. Count the number along one spiral and multiply by 2.

1. <32 = Small
2. 32-38 = Medium
3. >38 = Giant

### 6.2.3 Pseudostem colour

Use colour chart A. Look at the upper part of the pseudostem. Record without removing the external sheaths. The colour of the oldest dry sheaths should not be considered.

1. Cream
2. Yellow
3. Watery green
4. Green yellow
5. Light green
6. Medium green
7. Green
8. Dark green
9. Whitish
10. Orange red
11. Red
12. Pink-purple
13. Purple-brown
14. Red-purple
15. Purple
16. Blue

### 6.2.10 Development of suckers

In relation to the parent plant. Observe on the tallest sucker and record at the harvest time.

1. Taller than parent plant
2. More than 3/4 of the height of the parent plant
3. Between 1/4 and 3/4 of the height of the parent plant
4. Inhibited

### 6.3.1 Blotches at the petiole base

Record the relative surface area coverage by blotches.

1. No pigmentation
2. Sparse blotching (<20%)
3 Moderate blotching (20%-50%)
4. Extensive pigmentation (>50%)

1. 2. 3. 4.

### 6.3.2 Blotches colour (petiole base) – scored on the upper leaf sheath

1. Mahogany (orange-brown like in Pisang Mas)
2. Brown
3. Black-purple
4. Other

### 6.3.3 Petiole canal of the third leaf

The third leaf (Leaf III) is counted from the last leaf produced before bunch emergence. Cut the petiole halfway between the pseudostem and the leaf blade and examine the cross section.

1. Margins spreading
2. Margins erect
3. Margins curved inward
4. Margins overlapping

1. 2. 3. 4.

For descriptors **6.3.4 to 6.3.8** observations on the margins and petiole wings should be made where the petiole and pseudostem meet at shooting.

### 6.3.4b – Petiole margins clasping

Observation should be made at shooting on the neck, where the petiole and pseudostem meet. Margin is the part of the petiole that can be bent outwards/inwards

1. Clasping
2. Not clasping


1.


2.

**6.3.6 Petiole margin colour** (The group leader should demonstrate the difference between the petiole margin and edge)

Use colour chart A and observe out of direct sunlight. Observation should be made at shooting. Record the colour of the margin (general colour is below the rim).

1. Cream
2. Yellow
3. Watery green
4. Green yellow
5. Light green
6. Medium green
7. Green
8. Dark green
9. Whitish
10. Orange red
11. Red
12. Pink-purple
13. Purple-brown
14. Red-purple
15. Purple
16. Blue

**6.3.7 Edge of petiole margin (rim)**

Observation should be made at shooting. Record on the last developed leaf at flowering stage.

1. No contrast between margin and petiole (without a colour line along)
2. Contrast between margin and petiole (with a contrasting colour line along)


1.


2.

**6.3.14 Colour of leaf lower surface**

Use colour chart A. Wax removed.

1. Cream
2. Yellow
3. Watery green
4. Green yellow
5. Light green
6. Medium green
7. Green
8. Dark green
9. Whitish
10. Orange red
11. Red
12. Pink-purple
13. Purple-brown
14. Red-purple
15. Purple
16. Blue

# Field Session 2

Bunch + peduncle and rachis **NOT** to be cut (at Day 3 only)!

Descriptors 6.4.15 – 6.6.13 can only be observed on the French type. The relevant descriptors take quite some time. This means that at every period, 2-3 groups will have some 'free time' for some in situ demonstrations.

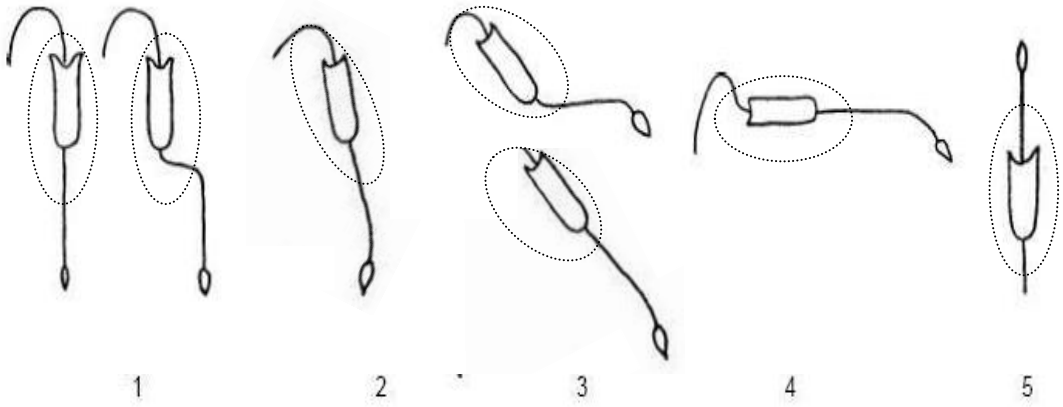
### 6.4.4 Peduncle colour

Easily seen when still attached to the pseudostem. Use colour chart A.

1. Cream
2. Yellow
3. Watery green
4. Green yellow
5. Light green
6. Medium green
7. Green
8. Dark green
9. Whitish
10. Orange red
11. Red
12. Pink-purple
13. Purple-brown
14. Red-purple
15. Purple
16. Blue

### 6.4.6 Bunch position (Angle between the axis of the bunch and the vertical)

1. Hanging vertically
2. Slightly angled
3. Hanging at a 45° angle
4. Horizontal
5. Erect




### 6.4.7 Bunch shape

Score on fully developed plant with no environmental stress.

1. Cylindrical
2. Truncate ( = cone shaped)
3. Asymmetrical
4. Spiral (all fruit are attached to a unique crown coiled around the stalk)
5. Other


1.


2.


3.


4.

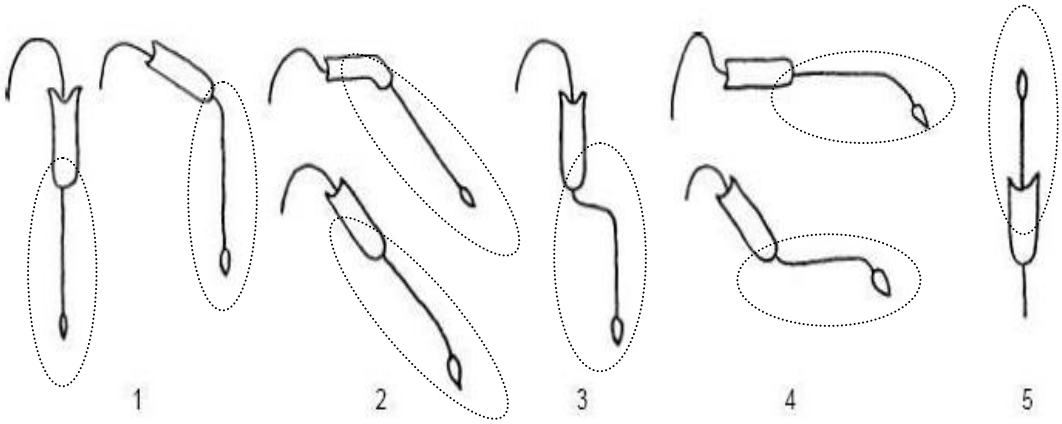
### 6.4.8 Bunch appearance

1. Very Lax (one can easily place a hand horizontally between the hands of fruit)
2. Lax (one can easily place a hand between the hands of fruit)
3. Compact (one can place a finger, but not a hand, between the hands of fruit)
4. Very compact (one cannot place a finger between the hands of fruit)

### 6.4.12 Male rachis position

Observe only the part of the rachis between the last hand and the male bud.

1. Falling vertically
2. At an angle
3. With a curve
4. Horizontal or supra-horizontal
5. Erect
6. Other




### 6.4.13 Male rachis appearance

1. Male bud active at harvest time. The vestiges of neutral/male flowers and the withered bracts cover the whole rachis = French type
2. Male bud exhausted before harvest time. Very few withered bracts or no bracts at all = French-Horn (Batard)
3. Rachis limited to first neutral flowers, with very few withered bracts or no bracts at all and rapidly exhausted male bud = False Horn
4. No male rachis nor flowers = Horn

**For the following descriptors, measure the values w, x, y.**

"w" is the broadest width of the male bud . "x" is the length from the base of the male bud to the point of broadest width 'w'; "y" is the total length of the male bud. As the figure shows, these parameters express the profile of the bud. Do not measure the dimensions along the bud but rather on a projection/outline of the bud (e.g. trace the outline of the bud on paper).

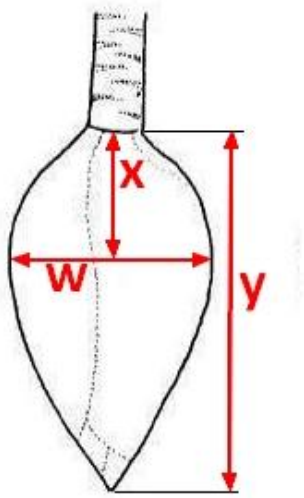



**Figure 2**. Male bud shape dimensions to be used in 6.4.15 and 6.4.17

**NB: For French cut the male bud only now (to avoid rapid deterioration)**

### 6.4.15 Male bud shape– exact ratio values will be worked out after the CARBAP workshop

Calculate the ratio w/y (see figure 2 above).
1. Skinny (w/y ≤ ??)
2. Medium (?? < w/y < ??)
3. Fat (w/y ≥ ??)

### 6.4.17 Male bud shoulder

Calculate the ratio x/y (see figure 2 above).
1. High shouldered (x/y ≤ 0.28)
2. Medium shouldered (0.28 < x/y < 0.30)
3. Low shouldered (x/y ≥ 0.30)

### 6.5.2 Bract apex shape

Refers to the first external unlifted bract. Flatten bracts to determine shape.

1. Pointed
2. Intermediate
3. Obtuse

1. 2. 3.

### 6.6.2 Compound tepal main colour

Look at backside middle of tepal. Use colour chart B and observe out of direct sunlight.

1. White
2. Cream
3. Ivory
4. Yellow
5. Bright yellow
6. Orange
7. Orange red
8. Red
9. Red-purple
10. Pink/pink-purple
11. Brown/Rusty-brown
12. Beige-pink
13. Silvery
14. Light green
15. Green
16. Dark Green

### 6.6.4 Lobe colour (tip of the tepal) of compound tepal

Use colour chart B and observe out of direct sunlight.

1. White
2. Cream
3. Ivory
4. Yellow
5. Bright yellow
6. Orange
7. Orange red
8. Red
9. Red-purple
10. Pink/pink-purple
11. Brown/Rusty-brown
12. Beige-pink
13. Silvery
14. Light green
15. Green
16. Dark Green

### 6.6.13 Anther colour

Observe on the face opposite to the dehiscence split of the anther. Use colour chart B and observe out of direct sunlight.

1. White
2. Cream
3. Ivory
4. Yellow
5. Bright yellow
6. Orange
7. Orange red
8. Red

9. Red-purple
10. Pink/pink-purple
11. Brown/Rusty-brown
12. Beige-pink
13. Silvery
14. Light green
15. Green
16. Dark Green

## Field Session 3

The technician should cut the inflorescence at the "base" of the peduncle, i.e. at (about) the point where the peduncle emerges from the pseudostem.

The group leader should show what the (empty) leaf crown is. If there are two such crowns, measure the length starting from the first crown.

Note that the descriptors will not take much time (the objects are all 'at hand'), except for the numbers 6.4.1, 6.7.3 and 6.7.8.

### 6.4.1 Peduncle length (cm)

Measure from the leaf crown to the first hand of fruit.

1. ≤30 cm
2. 31 – 60 cm
3. ≥61 cm

**6.7.1 Fruit position** Recorded only on the fruits arranged symmetrically around the stalk.

1. Curved towards stalk
2. Parallel to the stalk
3. Curved upward (obliquely, at a 45° angle upward)
4. Perpendicular to the stalk
5. Pendant
6. Other

### 7.10 Number of hands on the whole bunch

Exact value: ____

**Tip**: On a bunch with mostly hands of >10 fingers, a possible ultimate hand with 1-5 (rather smaller) fingers should not be counted.

### 6.7.2 Number of fruits on the mid-hand of the bunch

Count only fully developed fruit. If there is an even number of hands take the upper middle one.

1. ≤12
2. 13-16
3. ≥17

### 6.7.3 Fruit length (cm) at maturity

Measured as the internal arc of the fruit, without pedicel. Record on the inner fruit in the middle of the mid-hand of the bunch. Record the exact value and range.

1. ≤15 cm
2. 16-20 cm
3. 21-25 cm
4. 26-30 cm
5. ≥31 cm

### 6.7.4 Fruit shape (longitudinal curvature)

Observe the inner fruit in the middle of the mid-hand of the bunch. In case of an asymmetric bunch that has straight and curved fruits, please indicate it in the note section and score only the fruit on the upper side of the bunch.

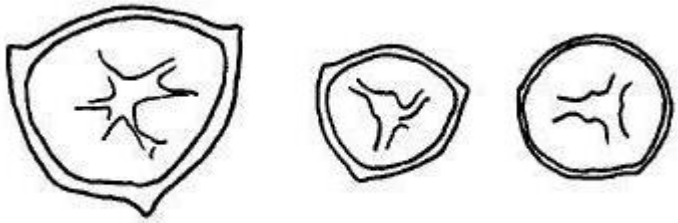
1. Straight (or slightly curved)
2. Straight in the distal part
3. Curved (sharp curve)
4. Curved in slight 'S' shape (double curvature)
5. Other

1. 2. 3. 4.

### 6.7.5 Transverse section of fruit

Observed on mature fruit ('ready to eat' – ripe but not over-ripe, full yellow stage).

1. Pronounced ridges
2. Slightly ridged
3. Rounded
4. Other




### 6.7.6 Fruit apex

1. Pointed
2. Lengthily pointed (like plantain)
3. Blunt-tipped (plateau at tip)
4. Strongly bottle-necked (wider under tip than number 2)
5. Rounded
6. Other


1.


2.


3.


4.


5.

### 6.7.7 Remains of flower relicts at fruit apex

1. Without flower relicts (<20% of the fruits with relicts)
2. Persistent flower relicts (>20% of the fruits with relicts)
3. Only base of the style persists


1.


2.


3.

### 6.7.8 Fruit pedicel length (mm).

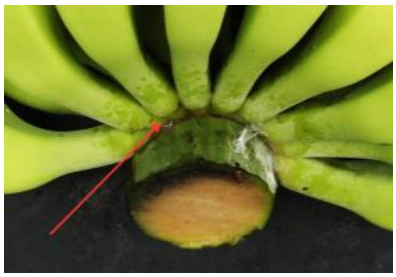
Measure from the scar on the rachis until the beginning of the fruit. Record on the inner fruit in the middle of the mid-hand of the bunch. Tip: use string to measure or trace outline of fruit on paper. Record the exact value and range.

1. ≤10 mm
2. 11 to 20 mm
3 .≥21 mm

### 6.7.11 Fusion of pedicels

Before they join the rachis at the bract scar. Look up from bottom of bunch.

1. No visible sign of fusion
2. Partially fused (up to 50% of the length of the pedicel)
3. Totally fused (more than 50% of the length of the pedicel)


1.


2.


3.

### 6.7.12 Immature fruit peel colour

Use colour chart B. Recorded on the youngest hand of the bunch, before maturity.

1. White
2. Cream
3. Ivory
4. Yellow
5. Bright yellow
6. Orange
7. Orange red
8. Red
9. Red-purple
10. Pink/pink-purple
11. Brown/Rusty-brown
12. Beige-pink
13. Silvery
14. Light green
15. Green
16. Dark Green

### 6.7.18 Pulp colour before maturity

Use colour chart B. Recorded on the youngest hand of the bunch.

1. White
2. Cream
3. Ivory
4. Yellow
5. Bright yellow
6. Orange
7. Orange red
8. Red
9. Red-purple
10. Pink/pink-purple
11. Brown/Rusty-brown
12. Beige-pink
13. Silvery
14. Light green
15. Green
16. Dark Green

**Glossary of terms**

**Anther –** Pollen-bearing portion of stamen.

**Apex –** Bottom tip (of male bract in this case).

**Bract -** a leaf-like structure, usually different in form from the foliage leaves, associated with an inflorescence or flower.

**Bunch –** the descriptive term for all the fruits along the rachis. The individual fruit (also called fingers) are arranged in hands.

**Clasping -** Partly surrounding the stem.

**Distal –** Away from the point of origin or attachment.

**Hand –** Arrangement of the fruit in a bunch, previously clusters of flowers.

**Male bud –**The composite of male flowers and their bracts, in the form of a bud at the end of the growing male rachis.

**Margin –** Border or edge.

**Rachis –** the stem of the entire inflorescence from the first hand to the male bud.

**Sheath –** the part of the leaf clasping or enveloping the pseudostem.

**Pedicel -** the stem which supports one flower or fruit.

**Peduncle -** the stem that supports the inflorescence and attaches it to the pseudostem.

**Petiole -** the stem of a leaf.

**Pseudostem -** a false stem made of the rolled bases of leaves.

**Tepal** - a segment of the outer whorl in a flower that has no differentiation between petals

# Liste Composée des Descripteurs

## INTRODUCTION

Cette **liste composée des descripteurs** a été développé pour l'atelier régional d'Afrique de l'ouest et centrale sur la caractérisation de plantain au CARBAP, Cameroun, en mai 2015. Elle n'est pas destinée à être utilisée pour d'autres sous-groupes de bananes. C'est une compilation de liste minimum de descripteurs (en bleu) et de plusieurs descripteurs qui sont très discriminants pour les plantains (en rouge) identifiés par l'équipe d'experts du Comité d'Organisation de l'atelier. (Edmond de Langhe, Kodjo Tomekpe, Joseph Adheka et Lucian Ibobondji).

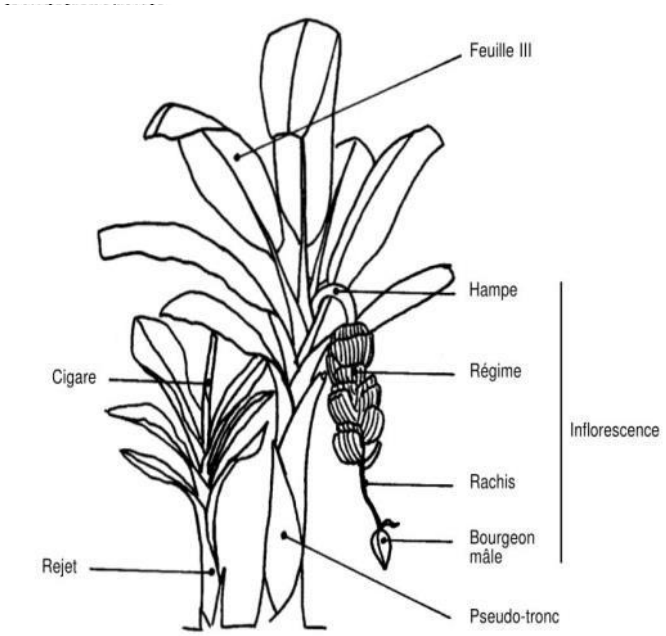
NB: La liste composée est divisée en **trois groupes** correspondant **aux trois sessions** sur le terrain qui seront menées au cours de l'atelier.

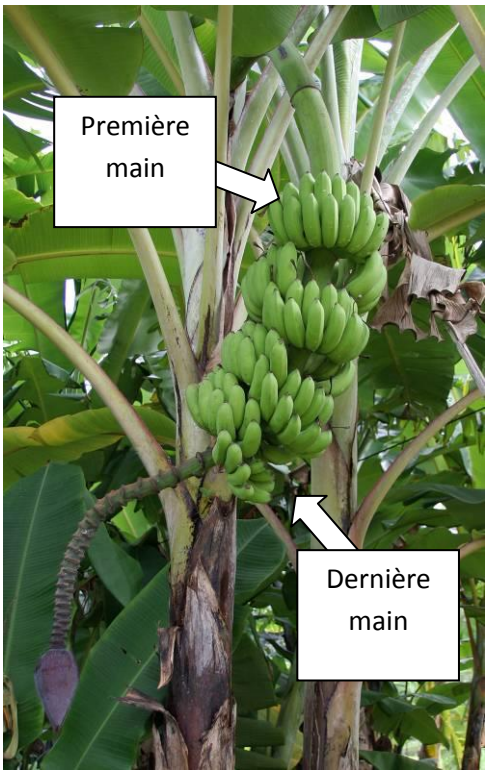
## LE STADE DE DEVELOPPEMENT PROPICE POUR L'OBSERVATION

Le meilleur moment pour prendre des photos et faire les descriptions est lorsqu'un premier fruit mûr apparaît sur le régime sur pied ("stade récolte"). **Tous les descripteurs doivent être observés à la récolte sauf pour les descripteurs 6.3.4b, 6.3.6 and 6.3.7 qui doivent l'être lors de l'émergence de l'inflorescence (''jetée'') et ce afin d'anticiper la dessiccation des marges pétiolaires au stade récolte.**

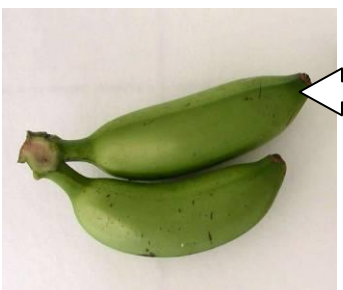
Pour tous les **descripteurs de couleur** – les observations doivent être effectuées avec la charte de couleur correspondante et en évitant un éclairage direct par le soleil. Le meilleur moment pour observer les descripteurs de couleur est le matin lorsque la lumière est moins crue que l'après-midi.
Pour tous les **descripteurs de fleurs** (6.6.2 - 6.6.13) le matériel doit être frais car il s'oxyde et change de couleur rapidement.
Pour tous les **descripteurs de fruits** (6.7.1 - 6.7.18) l'observation doit être faite sur plusieurs fruits afin de refléter le cas dominant.

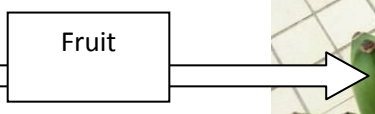
## LE BANANIER

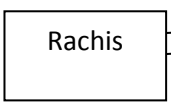


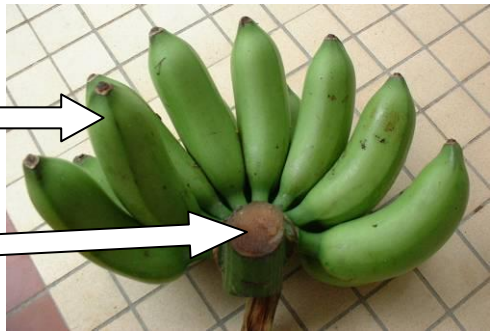




Les **fruits** individuels, appelés également "**doigts**", dans le **régime** (photo en haut à droite) sont arrangés en groupes appelés "**mains**" le long du **rachis** (photo en bas à droite)





**DESCRIPTEURS COMPOSES**

# Session sur le terrain 1

Au début de l'observation, et pour chaque accession sélectionnée, un technicien devra déjà couper la feuille III (à la base de son pétiole) sous la direction du chef de groupe. Le pétiole ne doit PAS être coupé à mi-longueur par les observateurs pour le descripteur 6.3.3 étant donné qu'une simple observation de la partie médiane suffit à voir la position des marges. Garder les feuilles coupées au frais (ombre) durant la matinée, de sorte que la même feuille puisse être décrite par les groupes suivants.

### 6.2.1b Taille de pseudo-tronc = le nombre de feuilles de feuillage

Mesurée par le nombre de feuilles du feuillage (ou leurs cicatrices). Les cicatrices sont les bases desséchées des pétioles des anciennes feuilles. Le long du pseudo-tronc, les feuilles sont disposées en deux spirales. Comptez le nombre de feuilles le long d'une spirale et multiplier par deux.

1. <32 = Petit
2. 32-38 = Moyenne
3. >38 = Géant

### 6.2.3 Couleur du pseudo-tronc

Observer la couleur générale du pseudo-tronc, sans retirer les gaines externes mais sans considérer la couleur des vieilles gaines desséchées. (Charte A).

1. Crème
2. Jaune
3. Vert eau
4. Vert jaune
5. Vert clair
6. Vert moyen
7. Vert
8. Vert sombre
9. Blanchâtre
10. Rouge orangé
11. Rouge
12. Rose-mauve
13. Violacé-brun
14. Rouge-violacé
15. Violet
16. Bleu

### 6.2.10 Développement des rejets

Par rapport au pied mère. Observer le plus grand des rejets au moment de la récolte.

1. Plus grand que le pied mère
2. Dépasse les 3/ 4 de la taille du pied mère
3. Entre 1/ 4 et 3/ 4 de la taille du pied mère
4. Inhibé

### 6.3.1 Macules à la base des pétioles

Noter la surface relative couverte par des taches.

1. Pas de taches
2. Peu de taches (<20%)
3 Taches modérées (20%-50%)
4. Taches étendues (>50%)


1.


2.


3.


4.

### 6.3.2 Couleur des macules (base du pétiole) – sur la gaine de la feuille supérieure

1. Acajou (Brun-orangé comme Pisang Mas)
2. Brun
3. Noir-violacé
4. Autre

### 6.3.3 Canal pétiolaire feuille III

La feuille III est la troisième feuille numérotée à partir de la dernière feuille émise avant floraison (feuille I). Couper le pétiole à mi-distance entre le pseudo-tronc et le limbe foliaire et observer la section.

1. Marges extrorses
2. Marges érigées
3. Marges recourbées vers l'interieur (introrses)
4. Marges se chevauchant


1.


2.


3.


4.

Pour les descripteurs de **6.3.4 à 6.3.8** les marges et les ailes pétiolaires sont observées au niveau de l'insertion du pétiole sur le pseudo-tronc.

### 6.3.4b Marges pétiolaires: jonction avec le pseudo-tronc

1. Enserrant le pseudo-tronc
2. N'enserrant pas le pseudo-tronc


1. 2.

### 6.3.6 Couleur des marges

Observer la couleur générale des marges (ne pas considérer le liseré coloré sur le bord des marges s'il existe) au moment de l'émergence de l'inflorescence (''jetée''). Voir la charte de couleur A et observer sans éclairage direct du soleil.

1. Crème
2. Jaune
3. Vert eau
4. Vert jaune
5. Vert clair
6. Vert moyen
7. Vert
8. Vert sombre
9. Blanchâtre
10. Rouge orangé
11. Rouge
12. Rose-mauve
13. Violacé-brun
14. Rouge-violacé
15. Violet
16. Bleu

### 6.3.7 Bords des marges du pétiole (arrête des marges)

À observer au moment de l'émergence de l'inflorescence (jetée). Effectuer l'observation sur la dernière feuille développée au moment de la floraison.

1. Pas de contraste entre la marge et le pétiole (sans liseré coloré)
2. Contraste entre la marge et le pétiole (avec un liseré coloré)


1. 2.

### 6.3.14 Couleur de la face inférieure du limbe

Voir charte de couleur A. Essuyer la cire.

1. Crème
2. Jaune
3. Vert eau
4. Vert jaune
5. Vert clair
6. Vert moyen
7. Vert
8. Vert sombre
9. Blanchâtre
10. Rouge orangé
11. Rouge
12. Rose-mauve
13. Violacé-brun
14. Rouge-violacé
15. Violet
16. Bleu

# Session sur le terrain 2

Régime + hampe et rachis à ne **PAS** couper (au jour 3 seulement)!

Les descripteurs 6.4.15 - 6.6.13 ne peuvent être observés que sur le type French. Ces descripteurs prennent un certain temps. Cela signifie qu'à chaque période, 2-3 groupes auront un certain «temps libre» pour certaines démonstrations in situ.

### 6.4.4 Couleur de la hampe

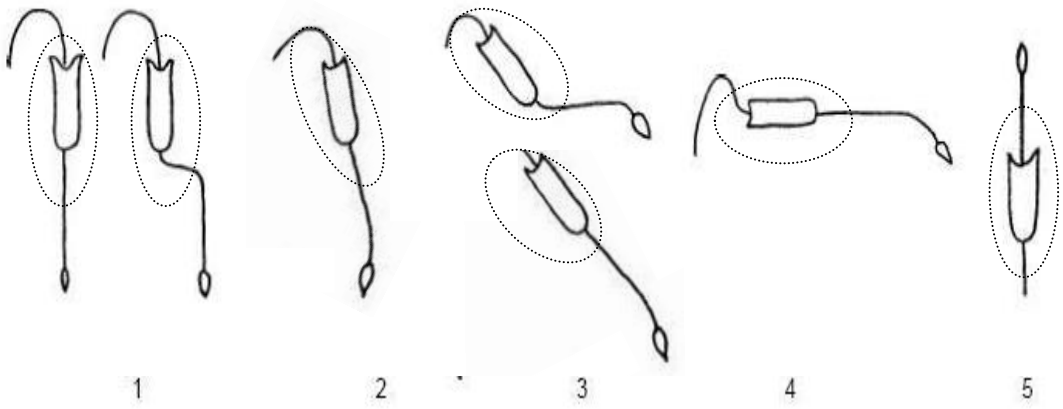
Voir charte de couleur A. Facilement visible lorsqu'elle est encore attachée au pseudo-tronc.

1. Crème
2. Jaune
3. Vert eau
4. Vert jaune
5. Vert clair
6. Vert moyen
7. Vert
8. Vert sombre
9. Blanchâtre
10. Rouge orangé
11. Rouge
12. Rose-mauve
13. Violacé-brun
14. Rouge-violacé
15. Violet
16. Bleu

### 6.4.6 Position du régime

Angle entre la verticale et l'axe général du régime.

1. Pendant verticalement
2. Légèrement oblique
3. Oblique à 45°
4. Horizontal
5. Erigé




### 6.4.7 Forme du régime

Observer sur une plante développée en absence de stress environnemental.

1. Cylindrique
2. Tronconique ( = en forme de cône)
3. Asymétrique
4. Spirale (les fruits sont attachés à l'axe sur un coussinet continu en spirale autour du rachis)
5. Autre

1. 2. 3. 4.

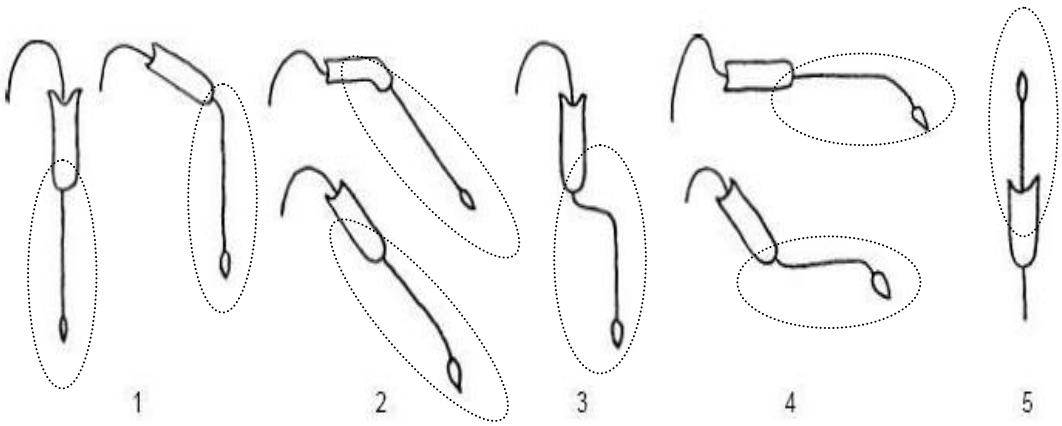
### 6.4.8 Compacité du régime

1. Très lâche (on peut sans difficulté glisser horizontalement la main entre les fruits)
2. Lâche (on peut sans difficulté glisser la main entre les fruits)
3. Compact (on peut glisser un doigt mais pas la main entre les fruits)
4. Très compact (on ne peut pas glisser un doigt entre les fruits)

### 6.4.12 Position du rachis mâle

Observer seulement la partie du rachis entre la dernière main et le bourgeon mâle.

1. Tombant verticalement
2. Oblique
3. Avec une courbure
4. Horizontal ou sub-horizontal
5. Erigé




### 6.4.13 Aspect du rachis male

1. Bourgeon mâle actif au moment de la récolte. Les vestiges de fleurs neutres / hommes et les bractées flétries couvrent l'ensemble du rachis = French type.
2. Bourgeon mâle épuisé avant la récolte. Très peu de bractées flétries ou pas du tout bractées = French-Horn (Batard)
3. Rachis limités à premières fleurs neutres, avec très peu de bractées flétries ou pas du tout bractées et rapidement bourgeon mâle épuisé = False Horn
4. Aucun rachis ni fleurs mâles = Horn
5. Autre

**Pour les descripteurs suivantes, mesurer les valeurs w, x, y.**

"w" est la plus grande largeur du bourgeon mâle. "x" est la longueur entre la base du bourgeon mâle et le point de plus grande largeur 'w'; "y" est la longueur totale du bourgeon mâle. Dans la figure ci-dessous, ces paramètres expriment le profil du bourgeon mâle. Ne pas mesurer les dimensions le long de la courbure du bourgeon mais plutôt sur une silhouette du bourgeon (tracer la silhouette du bourgeon sur une feuille de papier).

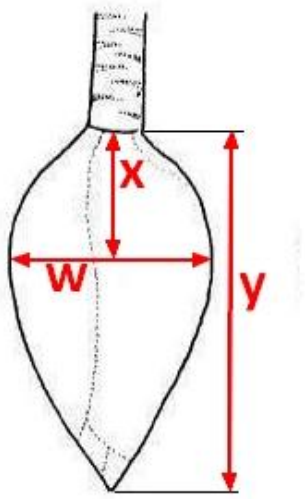



**Figure 2**. Les dimensions du bourgeon mâle utilisées pour les descripteurs 6.4.15 et 6.4.17.

**NB: Pour le French coupé le bourgeon mâle seulement maintenant (pour éviter une détérioration rapide).**

### 6.4.15 Forme du bourgeon mâle – les valeurs exactes seront définies après l'atelier de CARBAP.

Calculer le rapport w/y (voir figure 2).
1. Allongé (w/y ≤ ??)
2. Moyen (?? < w/y < ??)
3. Trapus (w/y ≥ ??)

### 6.4.17 Épaulement du bourgeon mâle

Calculer le rapport x/y (voir figure 2).
1. Fortement épaulée (x/y ≤ 0.28)
2. Moyennement épaulée (0.28 < x/y < 0.30)
3. Peu épaulée (x/y ≥ 0.30)

### 6.5.2 Forme de l'apex de la bractée

Observer la première bractée non ouverte. Aplanir l'extrémité de la bractée pour déterminer la forme.

1. Aigu
2. Intermédiaire
3. Obtus

1. 2. 3.

### 6.6.2 Couleur du périgone

Observer la partie centrale de la face externe du périgone. Voir la **charte de couleur B** et observer sans éclairage direct du soleil.

1. Blanc
2. Crème
3. Ivoire
4. Jaune
5. Jaune vif
6. Orange
7. Rouge-orangé
8. Rouge
9. Rouge-violacé
10. Rose/rose-mauve
11. Brun/rouille-brun
12. Beige-rose
13. Argenté
14. Vert clair
15. Vert
16. Vert sombre

### 6.6.4 Couleur des lobes du périgone

Voir la **charte de couleur B** et observer sans éclairage direct du soleil.

1. Blanc
2. Crème
3. Ivoire
4. Jaune
5. Jaune vif
6. Orange
7. Rouge-orangé
8. Rouge
9. Rouge-violacé
10. Rose/rose-mauve
11. Brun/rouille-brun
12. Beige-rose
13. Argenté
14. Vert clair
15. Vert
16. Vert sombre

### 6.6.13 Couleur des anthères

Observer la couleur de la face opposée à la fente de déhiscence des anthères. Voir la **charte de couleur B** et observer sans éclairage direct du soleil.

1. Blanc
2. Crème

3. Ivoire
4. Jaune
5. Jaune vif
6. Orange
7. Rouge-orangé
8. Rouge
9. Rouge-violacé
10. Rose/rose-mauve
11. Brun/rouille-brun
12. Beige-rose
13. Argenté
14. Vert clair
15. Vert
16. Vert sombre

## Session sur le terrain 3

Le technicien doit couper l'inflorescence à la «base» de la hampe, c'est à dire à (environ) l'endroit où la hampe émerge du pseudo-tronc.

Le chef de groupe doit montrer ce qu'est la couronne (vide) foliaire. S'il existe deux couronnes, mesurer la longueur à partir de la première couronne.

Notez que les descripteurs ne prendront pas beaucoup de temps (les objets sont tous «à portée de main»), sauf pour les numéros 6.4.1, 6.7.3 et 6.7.8.

### 6.4.1 Longueur de la hampe (cm)

Mesurée entre la couronne foliaire et la première main de fruits.

1. ≤30 cm
2. 31 – 60 cm
3. ≥61 cm

### 6.7.1 Position des fruits

Ne répondre que si les fruits sont disposés symétriquement autour du rachis.

1. Courbé vers la tige
2. Parallèlement à la tige
3. Redressés (en oblique, à 45° vers le haut)
4. Perpendiculaires à la hampe
5. Pendants
6. Autre

### 7.10 Nombre de mains sur le régime

Valeur exacte: ____

**Note**: Sur un régime dont la plupart des mains ont plus de 10 fruits, une main finale avec 1 à 5 fruits (voir moins) ne doit pas être comptée.

### 6.7.2 Nombre de fruits de la main médiane du régime

Compter seulement les fruits complètement développés. S'il y a un nombre pair de mains, compter sur la main médiane de plus petit rang.

1. ≤12
2. 13-16
3. ≥17

### 6.7.3 Longueur des fruits (cm) à maturité

Mesurée sur l'arc interne du fruit, sans le pédicelle, sur le fruit interne pris au milieu de la main médiane Enregistrer la valeur exacte et l'intervalle:

1. ≤15 cm
2. 16-20 cm
3. 21-25 cm
4. 26-30 cm
5. ≥31 cm

### 6.7.4 Forme des fruits (courbure)

Observer sur le fruit interne au milieu de la main médiane. Dans le cas d'un régime asymétrique dont certains fruits sont droits et d'autres courbés, indiquez-le dans les notes et observez seulement le fruit de la face supérieure du régime.

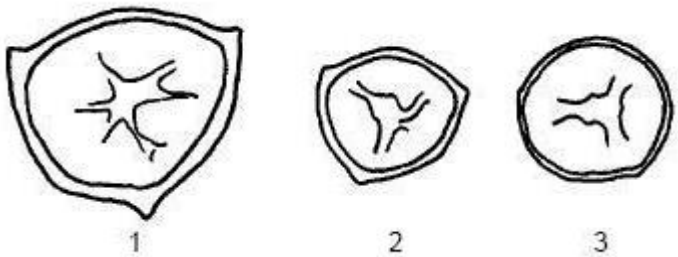
1. Droit (ou courbure très peu marquée)
2. Droit dans la partie distale
3. Courbé (courbure nettement prononcée)
4. Courbé en S (double courbure)
5. Autre

1. 2. 3. 4.

### 6.7.5 Section transversale du fruit

Observer sur fruit mûr (ne pas attendre la maturité dépassée)

1. Arêtes prononcées
2. Arêtes faiblement prononcées
3. Arrondie
4. Autre




### 6.7.6 Apex de fruit

1. Effilé
2. Progressif (e.g. plantain)
3. Tronqué (plateau au bout)
4. En goulot de bouteille (l'apex, étroit, s'élargit brusquement, au contraire de l'option 2)
5. Arrondi


1.

2.

3.

4.

5.

### 6.7.7 Vestiges floraux à l'extrémité du fruit

1. Sans vestiges floraux (<20% de fruits avec vestiges floraux)
2. Vestiges floraux persistants (>20% de fruits avec vestiges floraux)
3. Base du style proéminente


1.

2.

3.

### 6.7.8 Longueur du pédicelle du fruit (mm)

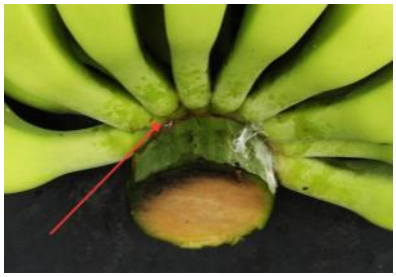
Mesurer à partir de la cicatrice sur le rachis jusqu'à la base de la partie charnue du fruit. Effectuer l'observation sur le fruit intérieur pris au milieu de la main médiane. Notez la valeur exacte et l'intervalle.

1. ≤10 mm
2. 11 to 20 mm
3 ≥21 mm

### 6.7.11 Soudure des pédicelles

Avant la jonction avec le rachis au niveau de la cicatrice de bractée. Observer le régime par en-dessous (pour un régime pendant).

1. Pas de signe visible de fusion
2. Fusion partielle (≤ 50% de longueur du pédicelle)
3. Fusion totale (> 50% de longueur du pédicelle)


1.


2.


3.

### 6.7.12 Couleur de la peau du fruit avant maturité

Observer sur un fruit de la plus jeune main du régime, avant maturité. Voir la **charte de couleur B** et observer sans éclairage direct du soleil.

1. Blanc
2. Crème
3. Ivoire
4. Jaune
5. Jaune vif
6. Orange
7. Rouge-orangé
8. Rouge
9. Rouge-violacé
10. Rose/rose-mauve
11. Brun/rouille-brun
12. Beige-rose
13. Argenté
14. Vert clair
15. Vert
16. Vert sombre

### 6.7.18 Couleur de la pulpe avant maturité

Observer un fruit de la plus jeune main du régime. Voir la **charte de couleur B** et observer sans éclairage direct du soleil.

1. Blanc
2. Crème
3. Ivoire
4. Jaune
5. Jaune vif
6. Orange
7. Rouge-orangé
8. Rouge
9. Rouge-violacé
10. Rose/rose-mauve
11. Brun/rouille-brun
12. Beige-rose
13. Argenté
14. Vert clair
15. Vert
16. Vert sombre

**Glossaire de termes**

**Anthère –** Partie terminale de l'étamine qui renferme le pollen.

**Apex –** Pointe (de la bractée mâle dans ce cas)

**Bourgeon mâle –** L'ensemble des fleurs mâles et leur bractées, en forme de bourgeon à la fin du rachis mâle.

**Bractée -** Une structure de type feuille, habituellement de forme différente d'une feuille du feuillage, associée à une inflorescence ou une fleur

**Distale –** A l'opposé du point d'origine ou d'attache.

**Enserrant -** Entourant partiellement la tige

**Gaine –** Partie de la feuille qui serre ou enroule le pseudotronc

**Hampe -** La tige qui supporte l'inflorescence et qui la relie au pseudotronc

**Main –** Organisation des fruits dans un regime, auparavant grappe de fleurs

**Marge –** Bordure ou tranche

**Pédicelle -** La tige qui supporte une fleur ou un fruit

**Périgone** - pièce florale externe et interne du périanthe, dont on ne peut pas dire s'il s'agit de pétale ou de sépale.

**Pétiole -** pièce foliaire, reliant le limbe à la tige

**Pseudo-tronc -** un faux tronc compose de feuilles enroulées à leur base

**Rachis –** La tige de l'inflorescence entière entre la première main et le bourgeon mâle.

**Régime –** Terme décrivant l'ensemble des fruits le long du rachis. Les fruits individuel (aussi appelés doigts) sont arrangé en mains.

**Annex 4. Notes on descriptor discussion at the CARBAP workshop – Compound List (red type) and Min List (blue type)**

| Desc No | Desc name | Explanation | Definition of terms | Photos | Colour chart | Additional notes |
|---|---|---|---|---|---|---|
| 6.2.1b | Pseudostem size | Best time is during flowering | Pseudostem 'size' is misleading | | | Should be two descriptors: 1) pseudostem height 2) number of foliage leaves |
| 6.2.3 | Pseudostem colour | Need more precise explanation on where to score. 'upper part' or 'general' | FR version does not agree with EN version | | | Need to decide why it is discriminating. |
| 6.2.10 | Development of suckers | Should be measured at harvest time | | | | |
| 6.3.1 | Blotches at petiole base | Look at several plants to get overall idea. | Where to look bottom or top? | | | Is harvest time too late – too dry? Should be flowering time. |
| 6.3.2 | Blotches colour | | | | Should these be added to the colour chart? | Add dark brown? Add drawing from book (Fig 5 on page 24) |
| 6.3.3 | Petiole canal of third leaf | Must be cut correctly. | | | | |
| 6.3.6 | Petiole margin colour | Best time is flowering | | | | Confusion between margin and edge |
| 6.3.7 | Edge of petiole margin | Best time is flowering | | | | Specific to plantains? |
| 6.4.4 | Peduncle colour | Confusion on background colour vs pigmentation and seeing colour from distance | Where on peduncle to score? | | | Perhaps a descriptor on pigmentation presence or absence or colour? |

| Desc No | Desc name | Explanation | Definition of terms | Photos | Colour chart | Additional notes |
|---|---|---|---|---|---|---|
| 6.4.7 | Bunch shape | | | Photo 2 not truncated enough – Lucien has a better one | | The photos should be taken of plantains. |
| 6.4.8 | Bunch appearance | Bunch should still be on the plant | Add 'vertically' for Lax | Add photos /drawing showing hand | | French version is incorrect? |
| 6.4.15 | Male bud shape | | | | | Joseph will work on this? |
| 6.5.2 | Bract apex shape | | | | | The choices are not appropriate for plantain. Add obtuse and split (from book) |
| 6.4.1 | Peduncle length | Where to start measuring? Take lateral side as intermediate, not concave or convex | FR should not be ''couronne'' but ''coussinet'' | | | |
| 6.7.1 | Fruit position | Take the majority of fruits, observed just before cutting | | Add photos | | FR ''tige'' should be rachis |
| 6.7.2 | Number of fruits on the mid-hand of the bunch | | | | | EN version is correct, not FR |
| 6.7.3 | Fruit length | Related to 6.7.2 – middle finger, inner fruit | | | | |
| 6.7.4 | Fruit shape | | | | | Not very discriminating for plantain too variable |

| Desc No | Desc name | Explanation | Definition of terms | Photos | Colour chart | Additional notes |
|---|---|---|---|---|---|---|
| 6.7.5 | Transverse section of fruit | | | | | FR version not as clear as EN version |
| 6.7.6 | Fruit apex | | Remove – like plantain | Add more plantain photos | | |
| 6.7.7 | Remains of flower relicts at fruit apex | | Without should be 0%<br><br>Add minimum <20% | Needs better photos | | |
| 6.7.12 | Immature fruit peel colour | Background colour. Pigmentation is another descriptor | FR needs to say 'avant maturité' of the youngest fruit | | | |
| 6.7.18 | Pulp colour before maturity | Cut a cross-section, not a lateral slice | | | | |

**The feedback from curators on the Mobile Device and Application**

- Useful to be able to take notes on observations
- Useful to add as many accessions and as many plants as needed
- Variety name needs to be on the top when scoring
- French version of descriptors is needed
- Floral descriptors drawing needed
- How can we take several measurements for an average? (eg finger length, multiple plants)
- Is it possible to have more memory for storage of more data?
- Can there be a ratio calculation for the male bud?
- Add limits for measurements to avoid error
- Can there be a demo video sent to curators showing how to upload?
- Should allow for multiple photos