

Guidelines for the minimum set of photos of accessions submitted for field verification

Developed by the Taxonomy Advisory Group (TAG)

Purpose and technical advice

The purpose of this list is to assist you in taking the most appropriate photos to illustrate the field verification work and eventually, seek the opinion of the Taxonomy Advisory Group regarding the identification of uncertain accessions. You can post the set on the TAG forum: <http://tag.inibap.org/>. The guidelines are compatible with the requirements of MGIS in order to be able to download them directly into the database.

This is a suggested minimum set of photos that can be completed with more photos, if necessary. Sometimes, the development stage of the plant will not allow you to take the full set at the same time. In that case, photograph the characters that you think are most likely to help in the identification. The schemas in this document can help you identify the character. We would appreciate if you could fill out the form at the end of this document (one form per accession).

For the field verification exercise, also take photos of the somaclonal variants, if there are any. Send us the photos regardless of the age of the plant. Sometime the abnormalities are obvious when the plant is young, but sometimes they appear at a later stage, even during the second cycle.

Technical information about the camera used should be given with the photos (see Angela Kepler's guidelines). A "macro" position is advisable to take good close-up photos.

Photos have to come with at least the following information when they are submitted to Bioversity:

- The filename has to include the photo number (1 to 15), the ITC code, the cultivar's name and the part of the plant photographed.
e.g. "8_ ITC0177_ Makara_ Bract and flowers_ "
- Captions including the location, accession name, accession code, crop cycle and author also has to be provided in an Excel or Word file.

Bring with you the booklet "**Descriptors for bananas, *Musa spp.***" and its colour chart. For all photos where colour is important (such as photo 7, 8, 10, 13, 14), include the *Musa* colour chart in the photo for comparison purposes. Also bring with you the addendum for East African Highland Bananas if you have to photograph EAHB accessions.

Botanical explanations of the terms used

6.2 Pseudostem/suckers (See Fig. 4)

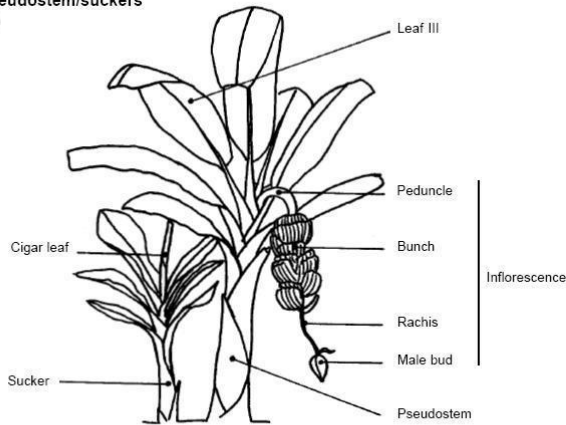


Fig. 4 Pseudostem/suckers (adapted from Champion, 1963)

6.3 Petiole/midrib/leaf

Recorded on the third, fully unfolded leaf counting down from the top of the plant. (See Fig. 5)

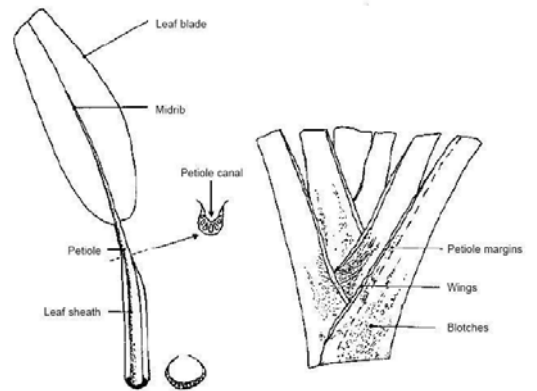


Fig. 5 Petiole/midrib/leaf (from Champion 1963 (left), De Langhe 1961 (right))

The appropriate development stage for observation

You will notice that, between the bunch and the male bud, the nodes are arranged on the rachis along three intertwined long spirals (a node is the scar made by a fallen bract).

Choose one of the spirals and count the number of nodes/scar along it. If there are 20 of them, the plant is at the right development stage for photos and description.

On average, bracts fall off at the rate of one a day. Since there are always three spirals, multiplying the number of nodes/scar in a spiral by three gives the time elapsed since flowering. Twenty nodes mean that the plant flowered 60 days before. This is the point after which rapid change no longer occurs.



continue counting up to 20.

The photo shows the first 10 nodes/scar of the first spiral, which continues on the back of the rachis. The spiral has to have at least 20 nodes/scar to be at the right development stage for photos and description.







<p>Photo 1 – Label Photograph the label bearing the name of the accession. If there is no official label, make one with a sheet of paper on which you note the accession name, the accession code, the collection, date.</p>	 
<p>Photo 2 - Entire plant</p> <ul style="list-style-type: none"> • Photograph the entire plant with its bunch. Add an object (ideally a ruler or a stick of known size) or ask someone to stand beside it to have an idea of the scale. Feel free to make complementary photos under a few other angles if you think it is necessary. The bunch has to be visible. • Cigar leaf (see first schema for location on the plant): note the colour of the outer surface using the colour chart A 	 
<p>Photo 3 - Pseudostem underlayers. Remove the dried outer sheaths to uncover the coloured under layers. Select a typical patch ~0.5 m X 20 cm.</p>	

Photo 5 – Neck

- Vegetative part to be observed on a tall sucker (ideally at the stage of 20 emerged leaves)
- Photograph the zone where the leaf sheaths separate (i.e. the 'neck' of the pseudostem').
- Choose the best angle to show the canal type and the leaf bases
- Make a **close up on the petiole base** in order to see the colour line on the petiole margin, the petiole wings and the blotches at the petiole basis.



6.3 - Leaf Petiol Canal

★ **6.3.3 Petiole canal leaf III**

Leaf III is the third leaf counted from the last leaf (leaf I) produced before bunch emergence. Cut the petiole half way between the pseudostem and the leaf blade and examine the cross section. (See Figs. 4 and 6)

- 1 Open with margins spreading
- 2 Wide with erect margins
- 3 Straight with erect margins
- 4 Margins curved inward
- 5 Margins overlapping

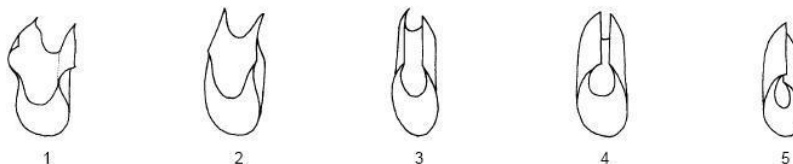


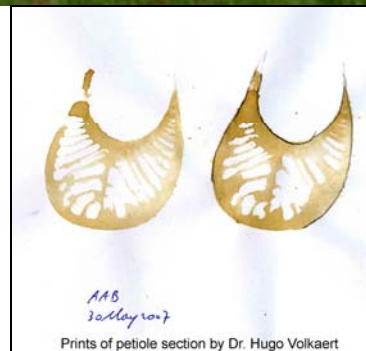
Fig. 6 Petiole canal leaf III

Photo 6 – leaf petiol section

Cut a leaf, preferably the 3rd one. Cut the petiole a third of the way down from the blade (or halfway down if the petiole is long). The cut should be done with a sharp knife to make it a straight one. Photograph the petiole section to show if the leaf canal is opened or closed.

Make an imprint of the cross-section (you can cut off the leaf blade to make it easier). Press the surface of the cross-section on a sheet of white paper. Some sap will flow out and make an imprint on the paper. After a short time (15 to 45 seconds are usually sufficient) that imprint will turn brown, at which point it can be scanned. If you cannot scan it, photograph it.

If there is a lot of sap, one can take a set of imprints which have been left to dry for different lengths of time. If there is very little sap, press longer against the paper. If needed, use a pencil to highlight the petiole wings.



6.4, 6.5, 6.6 - Male bud, Bracts and Flowers

6.6 Male flower

(See Fig. 14). Descriptors 6.6.1 to 6.6.25 refer to the flowers at the axil of the first external bract unlifted. At least 10 flowers should be observed

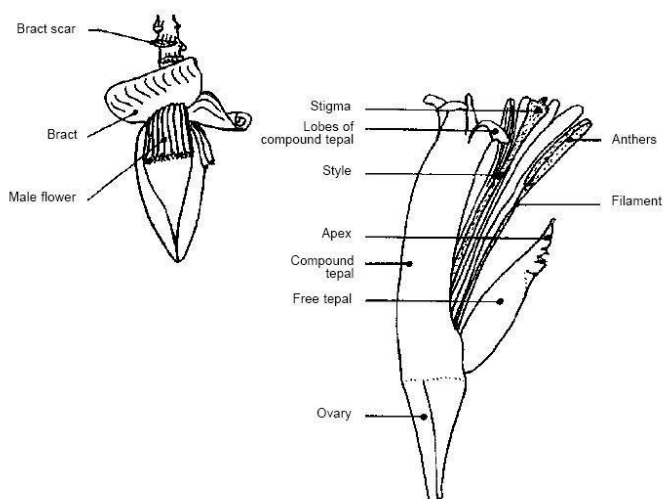


Fig. 14 Male bud and flower (adapted from Champion 1967)

6.4 - Male bud

★ **6.4.15 Male bud shape**

Note the general shape of the male bud at harvest. (See Fig. 9)

- 2 Lanceolate
- 3 Intermediate
- 4 Ovoid
- 5 Rounded
- 6 Oblong
- 7 Cordate (heart shaped)

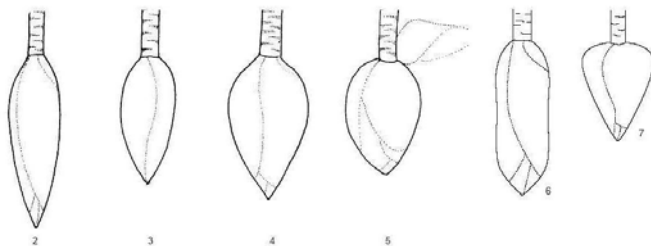


Fig. 9 Male bud shape

(1 Like a top This value was removed because it is not appropriate)

★ **6.5.12 Bract behaviour before falling**

(See Fig. 13)

- 1 Revolute (rolling)
- 2 Not revolute (not rolling)

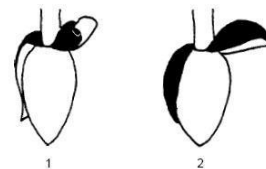


Fig. 13 Bract behaviour before falling

Photo 7: Male bud

Make sure to show: (close-up if needed)

- rolled bracts
- a row of male flowers
- arrangement of the bracts (take an extra photo if overlap is not very obvious)
- tiny yellow tip (look carefully if present)
- Please note, the male bud size in the descriptors form attached: descriptor 6.4.16 Measure the length of the male bud, the largest width (L/W), and the position of the largest width (I/L) to give the bulging. Indicate the results in the Notes.

Technical advice: Cut the bud and take the picture in a lightly shaded environment (light shade of a tree, or better, a 25% shade screen). **Add the colour chart A** next to the bud. If you photograph the bud while it is still on the plant, it shouldn't be in the shade or in bright light. Try to have a green background. If possible, place a reverberating plate underneath it to reflect the light. If the plant is tall, it is best to use a ladder to get near the bud; if you photograph it from the ground, the shape will be distorted. Alternatively, stand a little distant from the plant and photograph it using a telescopic lens



<p>6.5 - Bract</p> <p>Photo 8: Bract internal colour & flowers</p> <ul style="list-style-type: none"> • Do not use the older, outermost rolled bract. • Remove the bract, not yet rolled or detached, together with underlying flowers to show the inside colour (use the colour chart A as well). If possible, leave the flowers in their place. <p><u>Technical advice:</u> Take the picture in the light shade (light shade of a tree, or better, a 25% shade screen). Add the colour chart A on the photo to show the bract internal colour.</p>	
<p>Photo 9: Bract shape Flatten the apex of the bract.</p> <p>★ 6.5.2 Bract apex shape (4.2.12) Flatten the apex of the bract to observe its shape. (See Fig. 11)</p> <ol style="list-style-type: none"> 1 Pointed 2 Slightly pointed 3 Intermediate 4 Obtuse 5 Obtuse and split <p>Fig. 11 Bract apex shape</p>	
<p>6.6 – Male Flowers</p> <p>Photo 10: One flower with colour of the anthers.</p> <ul style="list-style-type: none"> • These must be completely fresh, but if only fallen flowers are available, take a photo anyway! Best on a plain background but black is very tricky. Beware of the sunshine and the camera flash, which can wash out the colours. • Remove a flower (from the centre of a row, not the ends). Make sure it has a typical amount of colour (especially important in those with pink & pink-purple streaks). • Lift the flowers slightly: Open one flower in order to see the colour of the anthers. <p><u>Technical advice:</u> Take the picture in a lightly shaded environment (light shade of a tree, or better, a 25% shade screen). Put a dark background: black or grey. If you have nothing else, put the flower in one bract.</p> <p><u>Note:</u> for <i>Musa acuminata</i>, the colour changes at the base of the flower - For ABB, flowers show a reddish colour in various degrees.</p>	<p>Add the colour B chart on the photo</p>

6.4 – Bunch and male bud

- ★ 6.4.12 Rachis position
(See Fig. 8)
- 1 Falling vertically
 - 2 At an angle
 - 3 With a curve
 - 4 Horizontal
 - 5 Erect

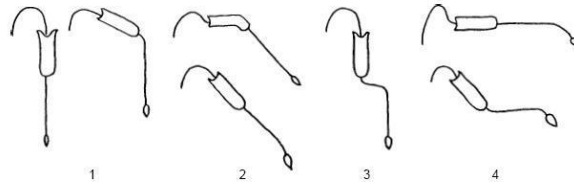


Fig. 8 Rachis position (adapted from De Langhe 1961)

Photo 11: Bunch

- To see the bunch orientation and the full rachis
- Photograph the entire bunch from top of peduncle to the tip of the male bud (including full rachis and retained bracts if present). Include the rachis tip even if the male bud is completely exhausted.
- Fully green-ripe (or with a few yellow fruit) best shows fruit and bunch characters.
- Note number of hands, number of fingers on the 2nd hand, and approximate number of fruits per bunch.



Photo 12: Bunch close-up.

Close-up of bunch, showing typical orientation of hands, best including top hand (which may be skewed). This photo will also show fruit tips from different angles, retained floral relicts, scar size, ridging, etc.



Photo 13 : Peduncle close-up , showing:

- Unusual colours. If peduncle is not plain green, photograph with fill-in flash or reflected light. Note colour(s) in the form.
- Degree of hairiness. If peduncle is not glabrous (shiny) green, take an extra photo, capturing the hairiness. Photograph from a ladder looking down on the peduncle if possible. Fine rain or mist is the best weather..



6.7- Fruits

- ★ 6.7.4 Fruit shape (longitudinal curvature) (4.2.7)
(See Fig. 19)
- 1 Straight (or slightly curved)
 - 2 Straight in the distal part
 - 3 Curved (sharp curve)
 - 4 Curved in 'S' shape (double curvature)
 - 5 Other (specify in descriptor Notes, 6.8)

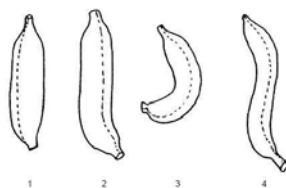


Fig. 19 Fruit shape (longitudinal curvature) (adapted from Dodds and Simmonds 1948)

- ★ 6.7.6 Fruit apex
Observed at the distal end of the fruit. (See Fig. 21) (4.2.8)
- 1 Pointed
 - 2 Lengthily pointed
 - 3 Blunt-tipped
 - 4 Bottle-necked
 - 5 Rounded

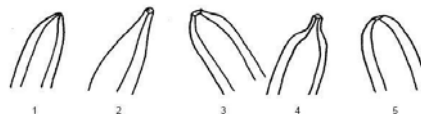


Fig. 21 Fruit apex (adapted from Champion 1967)

- 6.7.7 Remains of flower relicts at fruit apex
Observed at the distal end of the fruit. (See Fig. 22) (4.2.8)
- 1 Without any floral relicts
 - 2 Persistent style
 - 3 Base of the style prominent



Fig. 22 Remains of flower relicts at fruit apex

Photo 14: One Hand

- Remove a hand, preferably the third one, in order to see how it is attached. -Photograph it from above, showing pedicels, crown and apex. Preferably put it on a dark background (black or grey)
- Observe the hand located just after the one you have just removed. If possible, photograph it while it is still attached.
- Show how the pedicels are attached to the rachis (long, short, inexistent, etc). The pedicels and the apex should be on the same row of fruits.
- Note if pedicels are fused. If fruits are extremely curved, take two photos from different angles.
- Add the colour chart B on your photo

Note: several cultivars of ABB group have fused pedicels

**Photo 15: Fruits**

- When the fruits are really curved take **two pictures**. Do not forget to take several fruits (around 5) on the same picture in order to see the apex variation within a hand.
- Cut them to include full-length pedicels. Lay one fruit sideways, and then beside it another half-fruit sliced lengthwise, then a transverse section of the 3rd fruit 1 cm or less thick.
- This photo will show ripe fruit colour, skin thickness, degree of ridging, flesh colours, degree of seed development, and core type. If the flesh is an unusual colour, take another photograph with a familiar banana for contrast. Choose your backgrounds carefully according to the pulp colour. Beware of sunshine and camera flash washing out the colour of the flesh.
- Add the colour chart B on your photo



If seeds are present, please take a photo with the fruit opened

Photo 16 (optional): Extra photo of a character that is very specific to the variety

Please, indicate the result of your field observation regarding the accession status:

Results: 1. True to type (TTT) 2. True to Sub-group (TTS) 3. Genetic Deviation (GD) 4. Mislabelling (ML)
(please circle your choice)

Fill in the hereunder field form with any complementary observation or character that cannot be seen on the photos (e.g. measurements) and precise the colours observed with charts. This form will facilitate data entry in MGIS.

Collection: _____

Curator/Observer: _____

Accession name: _____

Botanical classification: _____

ITC number: _____ Accession code: _____

Origin: _____

Planting date: ___/___/___ Photos date: ___/___/___

Original accession in the collection: YES NO

Number of plants: _____ Cycle number: _____

Number of empty nodes (6.4.2): _____

Location in the collection: _____

Description recorded in MGIS: YES NO

If another value should be recorded, note "N" and specify in Notes.

6.1 PLANT GENERAL APPEARANCE

For the following descriptors use Colour Chart A

6.2.1 Pseudostem height [m]

- 1 <2 m
- 2 2.1 to 2.9 m
- 3 ≥3 m

6.2 PSEUDOSTEM/SUCKERS

6.2.6 Pigmentation of the underlying pseudostem

- 1 Pink-purple
- 2 Red
- 3 Purple

6.3 PETIOLE/MIDRIB/LEAF

6.3.1 Blotches at the petiole base

- 1 Sparse blotching
- 2 Small blotches
- 3 Large blotches
- 4 Extensive pigmentation
- 5 Without pigmentation

6.3.3 Petiole canal leaf III

- 1 Open with margins spreading
- 2 Wide with erect margins
- 3 Straight with erect margins
- 4 Margins curved inward
- 5 Margins overlapping

6.3.4 Petiole margins

- 1 Winged and undulating
- 2 Winged and not clasping the pseudostem
- 3 Winged and clasping the pseudostem
- 4 Not winged and clasping the pseudostem
- 5 Not winged and not clasping the pseudostem

6.3.6 Petiole margin colour

- 1 Green
- 2 Pink/purple to red
- 3 Purple to blue

6.3.7 Edge of petiole margin

- 1 Colourless (without a colour line along)
- 2 With a colour line along

6.6.4 Inflorescence / male bud

6.4.6 Bunch position

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

6.4.7 Bunch shape

- 1 Cylindrical
- 2 Truncated cone shape
- 3 Asymmetric - Bunch axis is nearly straight
- 4 With a curve in the bunch axis
- 5 Spiral

6.4.12 Rachis position

- 1 Falling vertically
- 2 At an angle
- 3 With a curve
- 4 Horizontal
- 5 Erect

6.4.13 Rachis appearance

- 1 Bare
- 2 Neutral flowers
- 3 Male flowers/bracts above the male bud
- 4 Neutral/male flowers and presence of withered bracts

6.4.15 Male bud shape

- 1 Like a top
- 2 Lanceolate
- 3 Intermediate
- 4 Ovoid
- 5 Rounded

6.4.16 Male bud size [cm]

Length and maximum diameter of male bud at harvest

- 1. < or equal to 20 cm
- 2. 21 to 30 cm
- 3. > or equal to 31 cm

6.5 BRACT

6.5.1 Bract base shape

- 1 Small shoulder
- 2 Medium
- 3 Large shoulder

6.5.2 Bract apex shape

- 1 Pointed
- 2 Slightly pointed
- 3 Intermediate
- 4 Obtuse
- 5 Obtuse and split

6.5.3 Bract imbrication

- 1 Old bracts overlap at apex of bud
- 2 Young bracts slightly overlap
- 3 Young bracts greatly overlap

6.5.5 Colour of the bract internal face

- 1 Whitish
- 2 Yellow or green
- 3 Orange red
- 4 Red
- 5 Purple
- 6 Purple brown
- 7 Pink-purple

6.5.12 Bract behavior before falling

- 1 Revolute (*rolling*)
- 2 Not revolute (*not rolling*)

6.6 MALE FLOWER

For the following descriptors use Chart B when needed

6.6.2 Compound tepal basic colour

- 1 White
- 2 Cream
- 3 Yellow
- 4 Orange
- 5 Pink/pink-purple

6.6.4 Lobe colour of compound tepal

- | | |
|----------|----------|
| 1 Cream | 3 Orange |
| 2 Yellow | 4 Green |

6.6.13 Anther colour

- | | |
|----------|---------------------------|
| 1 White | 5 Brown/rusty brown |
| 2 Cream | 6 Pink/pink-purple |
| 3 Yellow | 7 Black (anthers aborted) |
| 4 Grey | |

6.6.24 Dominant colour of male flower

- 1 White
- 2 Cream
- 3 Yellow
- 4 Pink
- 5 Red-purple

6.7 FRUIT

7.10 Number of hands: | _____ |

6.7.2 Number of fruits on second hand

- 1 ≤ 12
- 2 13-16
- 3 ≥ 17

6.7.3 Fruit length [cm]

- 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)

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

6.7.6 Fruit apex

- 1 Pointed
- 2 Lengthily pointed
- 3 Blunt-tipped
- 4 Bottle-necked
- 5 Rounded

6.7.7 Remains of flower relicts at fruit apex

- 1 Without any floral relicts
- 2 Persistent style
- 3 Base of the style prominent

6.7.8 Fruit pedicel length [mm]

- 1 10 mm
- 2 11 to 20 mm
- 3 21 mm

6.7.11 Fusion of pedicels

- 1 Very partially or no visible sign of fusion
- 2 Partially fused
- 3 Totally fused

Notes: