Annex 2. Guidelines for producing coconut photos

The procedure for producing good quality coconut photos is as difficult as a complex laboratory protocol. During the development of this catalogue, illustrated guidelines were conceived and sent to participating members, which described the procedures for making standardized photos requested for figures.

The main elements of these guidelines are given below, some of which appear to be deceptively basic.

Resources needed

1. Harvest hook
2. Bamboo metre scale
3. Digital camera with 300mm zoom lens and medium intensity electronic flash capable of taking the following quality: 8.7 x 13.9 cm (1029 x 1643 pixels) in the CYMK mode (Cyan, Magenta, Yellow and Black). Its resolution is 300 pixels per inch or 118.1 pixels per cm.
4. 12m aluminium ladder and/or trained coconut climber
5. Manual saw
6. Nut drying rack (thick piece of wood with nails)
7. Two workers for sawing, and hanging fruit
8. Mixture of water and lemon juice (copra cleaning fluid)
9. Scissors

Copra photo platform: A plywood sheet of 1.5 m x 1.8 m, with thickness of 20 to 30 mm covered with grey-blue fabric. Hammer 12 large nails (about 10 cm long) into the back of the plywood sheet (at distances as shown) to hold the fruits as indicated in Figure 3 (see following pages). A 20-cm scale and a tag with the international name of the variety are added to the lower part.

10. De-husked nut photo platform: Another plywood sheet (0.5 m x 1 m x 10 to 20 mm), covered with grey-blue fabric, pieces of plastic tubes (10 to 15 cm in diameter and 2 to 5 cm long) may be used to hold the coconuts. A 10-cm scale is added to the lower part (see Figure 4).

11. Coconut eye cleaning-brush (toothbrush)

12. Light-reflector: Two in situ white painted walls, forming a reflective corner; or 2 white-painted 1 m x 1 m plywood sheets; or 2 large white umbrellas.

13. Photo-editing software

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Any available clean grey-blue fabric can fit, as the pictures will be further digitally processed.
Guidelines for producing the whole palm photo

Figure 1 illustrates the technique for taking a good photo of a coconut palm.

1. Select an appropriate, representative true-to-type palm, ideally 10 to 12 years of age, and if possible bearing more than 60 fruits, such as the palm presented in photos 1 and 2. It is preferable to portray healthy and productive coconut palms, as the idea of photographing an “average palm” is inappropriate: the same palm may bear a quite variable number of fruits according to seasons and years.

2. Remove the old, dry leaves and weeds around the palm. By using a harvest hook, or by climbing to the palm crown, cut also two to three leaves (as close to the stem as possible), in the direction of the photographer, so the bunches and fruits are clearly visible from the ground.

3. Avoid taking the photograph in the middle of the day, when the light reduces image quality, as shown in photo 3. Wait for a clear, sunny day, and go to the site at 7 am or 5 pm, according to the side of the palm that was prepared (see step 2) for being photographed. At these times of day, a golden, flat light should come from behind the photographer allowing for sharp photos, with bunches well illuminated and a blue sky as background, such as on photo 4.

4. The base of the stem and the ends of the leaves must be visible in the photo, in order to have a complete view of the palm. There is no scale in this photo. Ideally a 1m scale (such as a bamboo cane), should be visible, or an informal scale such as a person.

5. Making such a photo will require 1 to 2 hours, including the time spent to select and clean the palm.

6. The final output is a photo of 8.7 x 13.9 cm (1029 x 1643 pixels) in the CYMK mode (Cyan, Magenta, Yellow and Black). Its resolution is 300 pixels per inch or 118.1 pixels per cm.
Figure 1. Making a good coconut palm photo.
Guidelines for producing inflorescence and bunch photos

Figure 2 illustrates the technique for making inflorescence and bunch photos.

1. As inflorescence and bunch photos need to be made in situ, climbing the palm may often be required.

   - For palms less than 12-years old, it is possible to make some of the photos from the ground or even standing on the roof of an (old) car, as shown in photo 1.

   - For taller palms, researchers and technicians generally use aluminium ladders to reach an altitude up to 12 m. If ladders are not available a coconut climber can be trained as follows:
     a. Climb the selected palm
     b. Clean it by cutting two leaves and a few leaflets from the other leaves.
     c. Climb down.
     d. Climb the closest neighbouring palm, well oriented to take the photo.
     e. Use a good camera with a minimum of 300 mm zoom lens, as generally a distance of 8 to 10 m separates the palms

2. Photos of bunches and inflorescences are ideally made during light cloudy days, avoiding the period from 11 am to 3 pm when the light is hard and vertically orientated. Otherwise the photos will not be good, such as those presented in photos 2a, b and 3a, b. In these photos, the palms were not cleaned and the light was too hard and bright.

3. The best light for these photographs is generally obtained during the changeover from direct sunlight to cloud shadow. Additional electronic flash of medium intensity may be used.

4. Take four to five photos for each topic to ensure good results and select the best photo (4a, b).

5. Making such a photo will require about 1 hour, including the time spent to select and clean the palm.

6. The final output for bunch and inflorescence illustrations are photos, in portrait format of 1000 x 667 pixels in the CYMK mode (Cyan, Magenta, Yellow and Black). At 118.1 pixels per cm, or 300 pixels per inch, it gives a printed size of 8.5 x 5.6 cm.

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2 These workers are best fitted for such a task because their normal job consists in climbing the coconut palms to harvest the fruits.
Figure 2. Making good inflorescence and bunch photos.
Guidelines for producing the 12-fruit photos

Figure 3 provides an illustrated guideline for making a photo of 12 fruits.

1. Harvest 9 immature fruits (3 samples of each small, medium and large nuts) on nine different palms. All fruits must be free of disease lesions and insect damage.

2. Select 3 immature fruits among the 9 harvested to portray colour, size and shape variability that may exist within the variety.

3. From the same 9 different coconut palms also harvest 21 mature fruits (7 each of small, medium and large nuts), each with a brown-grey epidermis and free water inside. All fruits must be free of disease lesions and insect damage.

4. Select 3 mature fruits among the 21 harvested to portray the colour, size and shape variability that may exist within the variety.

5. Split the remaining fruits, half longitudinally, the other half equatorially, using a manual saw, one worker sawing and another worker, if available, hanging the coconut fruit on a thick piece of wood with nails.

6. Wash the split nuts with a mix of water and lemon juice for the meat to remain white while drying. Remove any loose fibres that go over the husk with a pair of scissors.

7. Mount the fruits on the pre-prepared copra photo platform (see ‘Resource needed’ section 10) on the nails as shown on figure 3.

8. Add to the lower part of the platform a 20-cm scale and a tag with the international name of the variety.

9. The final output is a photo of 8.7 x 13.9 cm (1029 x 1643 pixels) in the CYMK mode. Its resolution is 300 pixels per inch or 118.1 pixels per cm. The 20-cm scale presented close to the fruits counts 200 pixels and is 1.69 cm long in the photo.

10. Making such a photo will require two to three hours of work. A team of three people can make ten of these photos in one (hard) working day.

11. Use photo editing software to optimize the final presentation. If the initial image is of good quality, the subsequent work is easier. However, even if the photo is only of medium quality, photo processing software is now so powerful that it is possible, although time-consuming, to achieve an acceptable-quality final product.

Partners often send photos of different size, which have to be converted in order to conform to the same specifications. The first step of the conversion process will be to measure the number of pixels within the 20-cm scale presented in the photo. In the final photo, the 20-cm scale must count 200 pixels and should be 1.69 cm long (see 9 above).

So, imagine you receive a dense, digital fruit photo of 1500 x 2500 pixels, with the 20-cm scale counting 280 pixels instead of the required 200 pixels.

- This photo will be resized with a 200/280 = 1.4 quotient.
- It will become a temporary photo of 1071 x 1786 pixels.
- The 12 resized fruits from this temporary photo will be digitally isolated, extracted from the background and transferred to another file with the standard size of 1029 x 1643 pixels and appropriate background colour and 20-cm scale. The background colour is a standard colour referenced: Pantone 644 CVC. This colour is equivalent to: Red 163 Green 180 and Blue 207 in the RGB mode, and Cyan 39%, Yellow 9%, Magenta 22%, and Black 0% in the CYMK mode.
- The processing of a 12-fruit photo will take at least 20 minutes using Photoshop software.
Figure 3. Illustrated guideline for making a photo of 12 fruits.
Guidelines for producing the photos of three de-husked nut

1. For making the photos of 3 de-husked nuts, 15 to 20 fully mature fruits need to be de-husked. The fruits need to be fully mature to avoid unpleasant whitish aspect from dry immature coconuts.

2. Allow a 1-2 day interval between de-husking and taking the photographs, to ensure a homogeneous russet colour.

3. Select three nuts from the lot, one each of large, medium and small.

4. Dry-clean the “coconut eyes” (fungus-blackened germination holes), with a brush (e.g. toothbrush).

5. Place a pre-prepared nut photo-platform (see ‘Resources needed’ section 11) on the ground,

6. Mount the three coconuts on the pieces of plastic tubing, horizontally aligning the top (germination holes) of the three coconuts. This ensures that the three coconuts are at the same distance from the camera to enable taking a perfectly sharp photo. A 10-cm scale is added to the bottom.

7. Take the photo from the top.

8. Avoid direct sunlight and any unidirectional lightning. Ideally, find a corner between two white walls, which act as reflectors, or two white-painted 1 m x 1 m plywood sheets, or two white umbrellas.

9. Previous observations record great variability in shape and disposition of the three “eyes” among and between the coconut varieties.

10. The final output is a photo of 10.16 x 6.77 cm (1200 x 800 pixels) in the CYMK mode. Its resolution is 300 pixels per inch or 118.1 pixels per cm. The 20-cm scale presented close to the fruits counts 400 pixels and is 3.36 cm long in the photo. So, compared to the other fruits from the 12 fruits photo, the de-husked nuts coconuts are represented with a two-fold larger scale.

11. Figure 4 gives examples of various good and bad photos for the three de-husked coconuts:
   - 1 and 2: good single coconut photos
   - 3 and 4: the coconuts are too young and not dry
   - 5: the coconut remains too young (it remains whitish when dry)
   - 6: the coconut eyes are not brushed (whitish)
   - 7: the coconut eyes are not brushed (black fungus)
   - 8: the coconut eyes are not well centred
   - 9: removing of husk fibres by scraping is excessive
   - 10: bad hard direct sunlight (excess shadow)
   - 11: light is too directional (excess shadow)
   - 12: an example of a bad photo: two coconuts are of the same size, eyes and mouth are not well oriented, scale is missing and the smaller coconut is blurred
   - 13: a good 3 coconuts photo.
Figure 4. Making good photos of de-husked nuts.
Guidelines for standardization of the coconut fruit colours

The budget devoted to the catalogue project did not allow to buy a good digital camera and to use it in all the partner countries. As the files used and processing done was highly variable from Côte d’Ivoire through India to the Cook Islands, the quality was extremely variable, with strong dominant colours most often encountered.

Generally, the shades of coconut fruits are in the range of yellow, orange, green and brown. While making and receiving new fruit photos, different colours of immature fruits were progressively found. Each time a new colour was found; a coloured fruit was digitally picked and added to the new “standard for coconut fruit colours” which is presented in Figure 5. The fruit No. 11 was photographed in Santo Island, Vanuatu; while fruit No. 10 was photographed in Côte d’Ivoire; fruit No. 21 was in Tonga Islands, etc.

Colour perception is subjective — i.e. everyone sees colour somewhat differently. Colour is not an object; it is a property of light, of a particular portion of the visible spectrum that is reflected by the object. The light in the surroundings of an object also affects how human eye perceives it. This “standard of coconut fruit colour” helps to recognize the colour easily and to associate it with a variety.

For instance, the paler yellow colour (No. 11) refers to the Samoa Yellow Dwarf, while Malayan Yellow Dwarf (No. 10) has a more intense and greenish yellow colour. The incorrectly named Cameroon Red Dwarf (No. 9) is paler orange in colour, soft like that of apricot. Malayan Red Dwarf (No. 8) has a bright orange colour, although the colour of Tahiti (No. 7) or Vanuatu Red Dwarf is more intense and reddish. Brazil Green Dwarf (No. 12) is deeper green, while Sri Lanka Green Dwarf (No. 13) is greyish green; the Pilipog Green Dwarf (No. 14) is yellowish green. Other colours, mostly intermediate between green and brown, are more frequent and can be found in a range of coconut varieties.

Some technical problems of colour adjustment have emerged. The initial digital standard was conceived under the RGB mode, i.e. red, green and blue colours of light mixed in the additive process for full-colour creation. To allow the standard to be printed, we have to move it from RGB to the CMYK mode. Changing the colour mode from RGB to CYMK generally provokes a slight fading of colours that has to be corrected later.

Therefore, once the standard is established, for each new variety photographed, the researcher-in-charge indicates the number of the standard colour closest to this variety. Then subjectively selected colour from the film can be re-created by using digital photo processing software.

As described above, the production of good usable quality images, a composite of six photos for each variety is indeed laborious and technically demanding. The whole process, when done carefully, from the negative film to the ready-to-print digitized variety figure takes between three and four hours of photo processing work.
Figure 5. Standardized coconut fruit colours.
Guidelines for producing the “free” picture to the top right

The “free” picture is presented on the top right of each variety figure. This picture provides any additional illustration (photo, map, figure or drawing) related to the coconut variety, such as special traits not visible in other pictures (e.g. pink colour inside the husk, detail of inflorescence, or aspect of the young palm) or any special use or ethno-botanical information about the variety.

The final output is the same size as the bunch and inflorescence photos, i.e. photos in portrait format of 1000 x 667 pixels in the CYMK mode. At 118.1 pixels per cm, or 300 pixels per inch, it gives a printed size of 8.5 x 5.6 cm. In this design, it is presented within an oval shape. Making such a picture will require a variable time depending on the chosen subject.

Challenges and opportunities for guidelines

Although the project work turned out to be more difficult than initially expected, significant progress has been made in the cataloguing of coconut varieties. Protocols are now well defined and difficulties are less likely to be underestimated than in the past years. More than 150 coconut varieties have already been described from conserved germplasm and farmers’ varieties.

The standards defined for the catalogues were presented during three successive years to the COGENT Steering Committee, and unanimously accepted by its members. However, maintaining the high standard set remains a challenge. The most challenging point is about photos. Initially, the difficulty of making the standardized photos was greatly underestimated. Most of the coconut breeders do not have the capacity to produce the required high quality photos without receiving an appropriate training. Moreover, even if they are trained, it is time-consuming and physically demanding, requiring climbing the coconut and staying for long periods in the field, enduring discomforts such as mosquitoes. Even professional photographers hired for the purpose sometimes refused to do the work.

The standard of quality initially defined is very high and difficult to achieve, especially in a project involving more than 20 countries scattered across the globe. Nevertheless, investment in such quality is worthwhile in the context of communications regarding the coconut palm and its products, and regarding the lack of knowledge about coconut genetic resources at global level. Some examples of varietal descriptions were also published in the COGENT bulletin (Bourdeix 1999, Bourdeix et al. 2000, Konan et al. 2000, Bourdeix et al. 2002).

References for the guideline section

