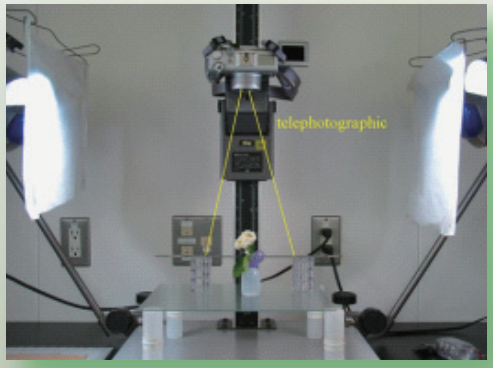
東アジア植物品種保護フォーラム
The East Asia Plant Variety Protection Forum

5 January 2011
The East Asia Plant Variety Protection Forum

Manual for Taking Photographs for DUS Testing



Contents

1. Purpose of taking photographs during DUS tests

Photographs that are taken during DUS tests provide important information about characteristics, growth conditions, and corroboration of DUS. For that reason, it is necessary to take clear photographs that are easy to understand, and easy to compare.

(1) Why are photographs important for DUS tests?

Photographs that are taken during DUS tests are attached to DUS test reports to provide a better understanding of the growth conditions and characteristics. By attaching appropriate photographs to reports, you can help to improve the quality of both the reports and the examinations.

(2) Use of photographs

1) DUS test report

Photographs that are attached to DUS test reports must explain about characteristics in variety descriptions.

2) Accumulation of photographic data on varieties

Photographs that are attached to DUS test reports must be arranged so that they can be viewed by test and by variety so that it will be easy to use them as materials in future examinations.

3) Selection of comparing varieties

The arranged photographic data described in 2) above can be used to select comparing varieties for candidate varieties that will be applied in the future.

4) Other purposes

Photographs can also be used as materials for writing manuals for DUS test, as corroboration for responding to official objections, and so on.

2. Basic items for taking photographs

(1) Types of digital cameras

There are basically two types of digital cameras that can take sharp pictures: digital single-lens reflex cameras, and easy-to-use compact cameras. The biggest difference between the two is whether or not the lens needs to be changed to match the purpose of the photo. There are also differences in the performance of the lenses, image sensors, and aspect ratio of the images. In DUS tests, the most suitable camera is selected based on the conditions of the photographic environment.

1) Single-lens reflex camera

The lens can be changed to match the photographic conditions, and detailed settings can be made to take sharper pictures. However, the camera is relatively large and is not as portable as a compact camera.

2) Compact cameras

Although it is not possible to change lenses or make detailed settings, compact cameras are very portable. Compared with single lens reflex cameras, the CCDD, CMOS, etc., are small so the images are not as clear, but recently somewhat larger models, and high-performance models which can make detailed settings, have come onto the market.

Photographs that are attached to DUS test reports should not be trimmed or have an altered aspect ratio.

(2) Camera functions, basic operation, and photographic techniques

The photographer must have an understanding of the functions and operation of the camera, make the most optimal settings for the photographic environment, and take photos that are appropriate for a DUS test report.

1) Number of pixels and compression ratio

The number of pixels and compression ratio must be determined based on the method(s) of using the photographic data (printouts, entering into databases, viewing on personal computers, etc.), but these conditions are determined by the testing authorities. In Japan, the number of pixels is usually about 1600×1200, and the compression ratio is set at “Fine.” These criteria have been determined based on considerations such as printing the output to a report, checking the images on a personal computer, and uploading the images into a database, among other things.

2) ISO speed

High ISO speed has the advantage of enabling photographs to be taken in dark places, but it also produces a lot of “noise.” Therefore, the minimum setting for ISO speed is usually used for DUS photography. However, if sufficient shutter speed cannot be obtained for dark places, then the ISO speed should be raised to a point where the photo can be taken without noise being generated.

3) Photo mode

The photo mode for pictures that are taken for DUS tests should not be set on AUTO. Instead, it should

either be set to P (program) mode (which enables detailed settings such as white balance to be made), or A (aperture priority) mode.

P mode: Photos are taken with a suitable shutter speed and aperture that are automatically determined based on lighting (brightness).

A mode: Photos are taken with a fixed aperture and a shutter speed that is determined based on lighting (brightness).

- Taking photographs with A (aperture priority) mode

Taking photographs by setting a smaller aperture size in A mode (increasing the F number) can result in a deeper depth of field, and the range of field also deepens, but because the lighting is insufficient, the shutter speed is slow, and there is a risk of blurring a picture with hand movements. When using a smaller aperture size, the camera is mounted on a tripod or stand, but if it is a high-performance camera, the ISO speed and the shutter speed can be increased while keeping noise to a minimum. It should be noted that the maximum and minimum values of aperture depend on the camera's lens.

F: 2.0 Visually focused on the flowers

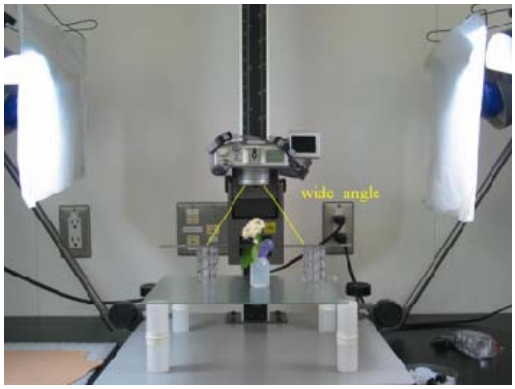
F: 8.0 Visually focused from the flowers to the background

4) Macro mode

In DUS tests, there are many times to photograph small objects such as the part of flowers. Macro mode is used to photograph small objects. While the photographic distance of Macro mode depends on the type (lens) of camera, a general rule of thumb is to use Macro mode to photograph objects when the distance between the object and camera is less than 50 cm.

· Distortion

When you approach an object by the wide angle side of a camera, the peripheral areas of the photo will become distorted. To prevent such distortion, you should take photos by a telephoto side.



· The ruler appears bent because the photo was taken by a wide angle side too close to the object.

· By a telephoto side, the ruler appears straight.

5) Zoom

Only use optical zoom. Digital zoom acts by using software to stretch the original image, which ruins the picture quality, so you should not use digital zoom.

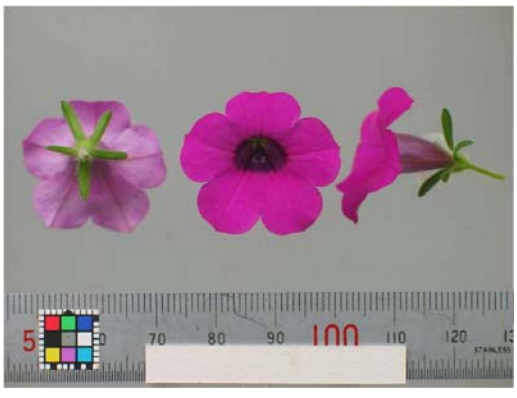
6) Type of light meter and exposure compensation

With nearly all digital cameras, if you press the shutter halfway, you will get a condition of AF/AE (auto focus/auto exposure) lock. In the original settings of nearly all digital cameras, the exposure is fixed based on the average amount of light in the entire screen. In DUS tests, flowers are photographed from above, so if the focus is on the flower, the amount of light will differ depending on the flower color, which can cause discrepancies in the exposure. For example, the overall picture might be too dark (underexposure), or too bright (overexposure). In such cases, you should change the type of light meter for each photographed object, use a more suitable amount of light, and adjust the exposure so that it is more appropriate. Please note that the smaller the lens brightness (F number) of your camera is, the greater the range of applications will be.

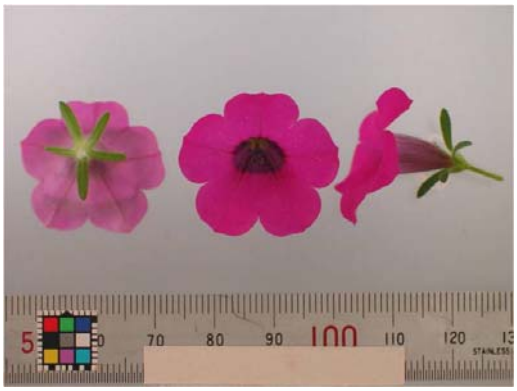
7) White balance

When taking photos for DUS tests, it is especially important to adjust the white balance. If you set to match the color temperature of the light source when you are shooting, you probably will not be able to reproduce the color of your object. Therefore, in DUS tests, every time that the color temperature of the light sources in the photograph location changes (outdoors in sunlight, outdoors in cloudy weather, in the shade, indoors, under fluorescent lighting, etc.), you should adjust the white balance accordingly. White balance is adjusted with either a special 18% gray card or pure white paper. If you use commercially-sold pure white paper to adjust the white balance, you should use the same type of paper.

If the white balance is not properly adjusted, it could adversely affect the colors of your entire photograph.



Suitable



Not suitable

8) Using a flash

It is better to take photos in an environment where you don’t need to use a flash. But if you have to use a flash, pay attention to shadows and reflections. In DUS test reports, you must clearly note, where applicable, that a flash was used to take a photo.

(3) Basic photography methods

1) Preventing shaking

In order to prevent your hands from shaking, mount the camera on a tripod or copy stand whenever possible. If no tripod or copy stand is available, keep your upper arms tight so that your hands do not shake. It is effective to lean against a building, etc., for added support. If the shutter speed is slower than 1/100, fix the camera in place to take photos.

2) Photographic objects

The objects you photograph should be healthy examples of the variety in question that exhibit typical characteristics. Basically, when you photograph a candidate object, there is little risk of contradiction between the photo and the test results. However, because it is difficult to take photos while conducting a test, it is normal to select new individual objects to photograph. Even if they are of the same variety, individuals will display a range of characteristics, so you should avoid individuals on the extreme ends and choose individuals that well exhibit the characteristics of the candidate variety.

3) Composition

A. Consistency of composition

By maintaining consistency of composition, photos used in DUS tests can be easily used to variety comparisons well into the future. For that reason, a composition of each plant variety should be decided when necessary. Consideration should be made so that changes in composition will not make comparisons difficult.

B. Captions

You must attach a caption to all photos used in DUS test reports. Please note that the terminology of plants used in the captions should be taken from the names of the characteristics used in test guidelines.

C. Date of photos

When attaching photos to a DUS test report, always note the dates (day, month, year) that they were taken. If the date is shown in the photo, you should be aware of the location of the printing when designing a layout.

D. Labeling variety names

A label showing variety name should be incorporated into the photo. The size of the name label should be in balance with the size of the photographed object.

E. Balance of photographed objects

The height and width of photos should be decided after considering the shape and size of the photographed object. It is best to make the object as large as possible without cutting off parts of it in the photo.

F. Scale

When changing the length of the scale, you should consider the balance with the size of the photographed object. If there is no scale, use a tape measure.

G. Using the CASMATCH color adjustment chart

If you can obtain a CASMATCH color adjustment chart, we recommend that you use it in your photos. In Japan, CASMATCH is incorporated into a composition that includes characteristics related to color. By incorporating CASMATCH, it is possible to adjust the color to a constant level with software, even for different photographed objects and lighting conditions. In regular DUS tests, the suitability of the color quality of photo is judged based on the CASMATCH. It should be noted that CASMATCH is used mainly in the medical profession to observe changes in the condition of diseased areas and the progress of treatment, with software that corrects the color to a constant level.

H. Background

The background should be plain, preferably a light blue or light gray in color, either paper or cloth. If there is no background for photographic use, you can use the wall of a building or concrete surface if they are plain. If you take photos with the same composition, the background color should conform with it.

I. Miscellaneous

In order to photograph unstable objects in a still condition, you should prepare pushpins, clips, tweezers, etc., beforehand.

4) Photographic environment

It would be best to prepare a constant photographic environment. For example, if there are dedicated photographic facilities, you can use a copy stand that has special fluorescent lighting for taking photos. Because the facility has a camera, lighting equipment, etc., it would be easier and more consistent to use heavier equipment. Lighting is by photographic fluorescent light. If you always have such a copy stand prepared, then you will be able to take photos in a constant environment.

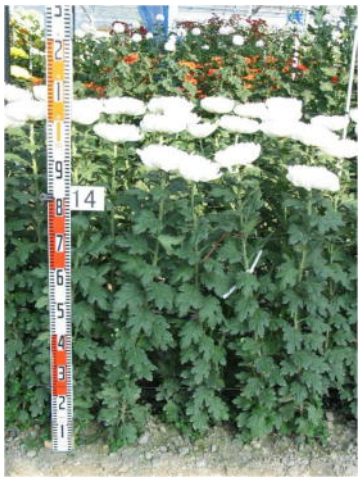
A. Points to bear in mind when taking photos indoors

- The position and angle of the lighting should be adjusted, and pay attention to shadows and reflected light. It is a good idea to lay some non-reflective paper on the background.

B. Points to bear in mind when taking photos outdoors

- When taking photos outdoors, you should avoid direct sunlight, pay attention to shadows and reflected light, and develop a technique such as selecting bright shade and timing of thin cloud cover.
- Even if you use a tripod, you should be aware that the object you are photographing can move in the wind.

· Direct sunlight



· Bright shade

3. Photographic techniques (practical guide)

(1) Photographs that explain about characteristics and growth conditions

Photographs should be taken of each variety in order explain about characteristics and growth conditions. It is desirable for the photos to cover as many characteristics as possible, but if there are too many photos with various compositions, it will require a corresponding amount of labor to take the photos and manage the data afterward. Therefore, you must use fewer photos and take photos that will explain as many characteristics as possible.

Example of a carnation

Test plot
- Growing conditions

Plant growth habit
- Plant height, number of lateral branches, and degree of leaf rolling

Leaf
- Leaf length, width, shape, color, and wax

Flower
- Flower color, diameter, type, side view

Flower parts
- Flower petal color, pattern, petal length, petal width, buds, calyces, ovaries, pistils

(2) Photos to explain about DUS

In order to explain about DUS, when necessary you should photograph candidate and comparing varieties and candidate types and off types together.

1) Distinctness

If there is distinctness, when necessary you should take photos to show characteristics for which distinctness is recognizable.

Candidate **Comparing V.**

Candidate **Comparing V.**

- Case in which the flowers of the candidate and comparing varieties are nearly identical, but distinctness is seen in the color of the pistil.

2) No distinctness

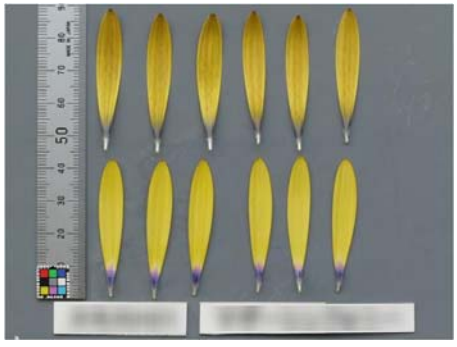
If there is no distinctness, then the application for plant variety protection is generally rejected, so you will need photos that explain that the characteristics of the candidate and comparing variety are no distinctness. In the case of an item that will be rejected, you will have to have photographic proof that can be used to respond to a formal objection, complaint, etc.

Candidate **Comparing V.**

Candidate **Comparing V.**

[1]

Candidate **Comparing V.**



Candidate **Comparing V.**

- Case in which the characteristics of the candidate variety and comparing variety are no distinctness.

[1] **Comparing V.; Comparing Variety**

3) If there is no uniformity

If there is no uniformity, then the application for plant variety protection is usually rejected, so you will have to have photos that identify conditions for the occurrence of off types, as well as of the off types themselves. To identify off types, you will need photos of them lined up with candidate type and off type. In the case of an item that will be rejected, you will have to have photographic proof that can be used to respond to a formal objection, complaint, etc.

・ Photos taken to confirm the occurrence of off types in a test plot

L: Candidate type
R: Off type

Top: Candidate type;
Bottom: Off type

Top: Candidate type;
Bottom: Off type

・ Photos taken of candidate types and off types together

(3) Important points in taking photographs

1) Characteristics expressed in the photos must be matched with characteristics described in the Variety Description.

One type of problem that occurs with photos in DUS test reports is discrepancies between characteristics described in the Variety Description, and those expressed in the photos. For example, characteristic No. 1, “Plant height,” is noted as 80 cm in the Variety Description on the left side, but it exceeds 100 cm in the photo. In this case, there is some question about whether there was a problem with selecting the photographed object, or a problem with the measurement values. The photos must not contradict the described characteristics.

TC/26/6
Annex I, page
UPOV VARIETY DESCRIPTION

1. Reference number of reporting authority .....
2. Reference number of requesting authority (bilateral agreements only) .....
3. Breeder’s reference .....
4. Applicant (name and address) .....

5. Botanical name of taxon .....
6. Common name of taxon .....
7. Variety denomination .....
8. Date and document number of UPOV Test Guidelines .....
9. Date and/or document number of national test guidelines .....
10. Testing authority .....
11. Testing station(s) and place(s) .....
12. Period of testing .....
13. Date and place of issue of document .....

UPOV No.	National No.	Characteristics	States of Expression	Note	Remarks
1.	1	plant: height	tall	7	80cm
2.	2	number of inflorescences	few	3	2.4

Reference number of reporting authority .....
15. Characteristics Included in the UPOV Test Guidelines or National Test Guidelines

Name of Variety: ……

2) Camera characteristics

Even if the white balance is appropriate, it does not mean that the original flower color can be expressed properly. Since color expression can differ depending on the camera type, you must be aware of the camera's ability to express color when selecting a camera type. You must check photos immediately after they are taken, and if they do not express the original color, then you must take corrective action such as readjusting the white balance, etc.

Camera 1: Not the original colors
(too much redness)

Camera 2: Original colors
(an orange hue)

- Example of white balance being appropriate but color expression by different cameras differs.

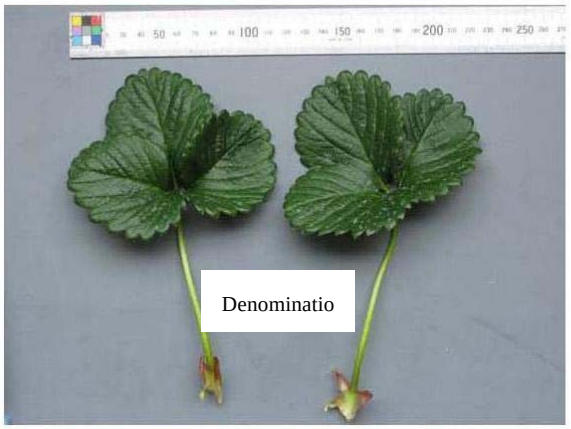
4. List of compositions by species

(1) Typical compositions

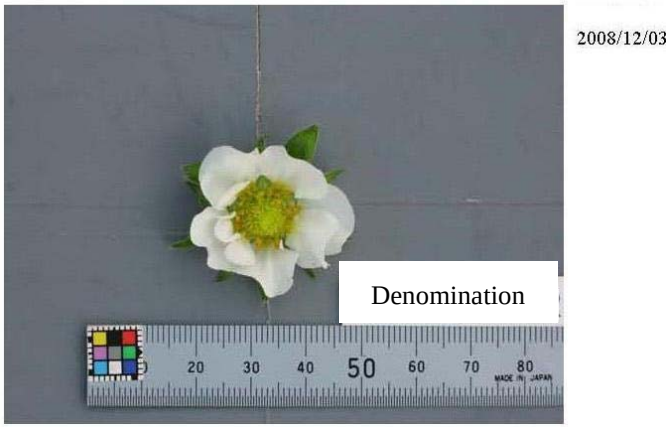
Strawberry (the dates refers to the dates the photos were taken)

Test plot

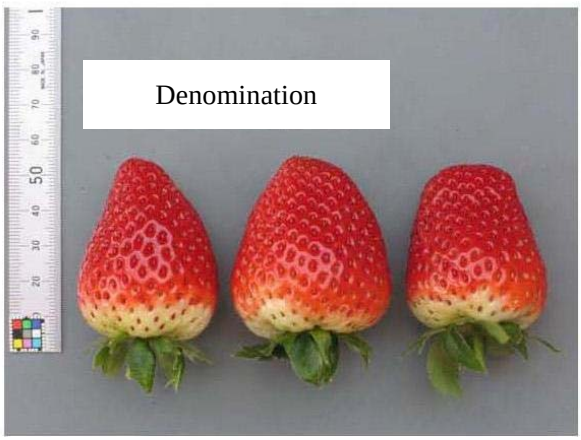
Growth habit



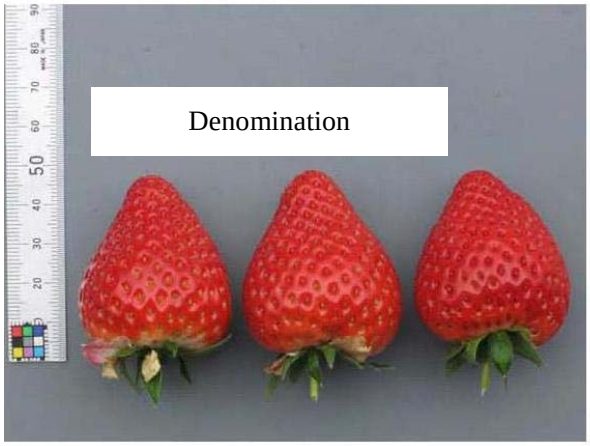
Leaf



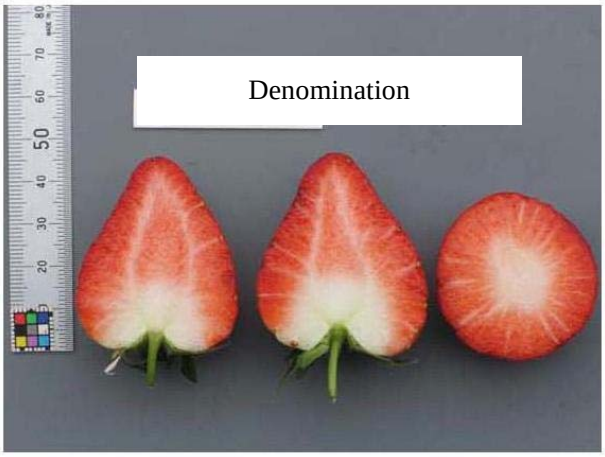
Flower



First fruit



Second fruit



2009/01/21

Cross sections of fruit

Potato (the dates refer to the dates the photos were taken)

2009/07/08

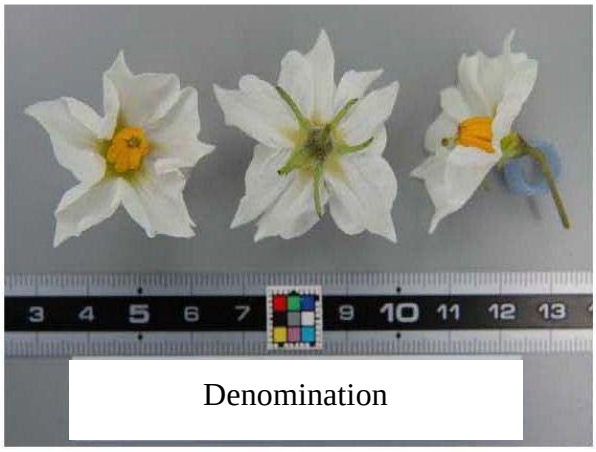
Test plot

2009/07/08

Growth habit

2009/07/08

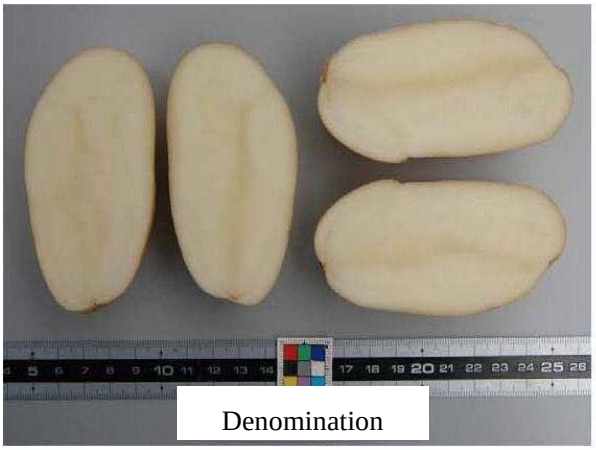
Leaf



2009/07/08

Flower

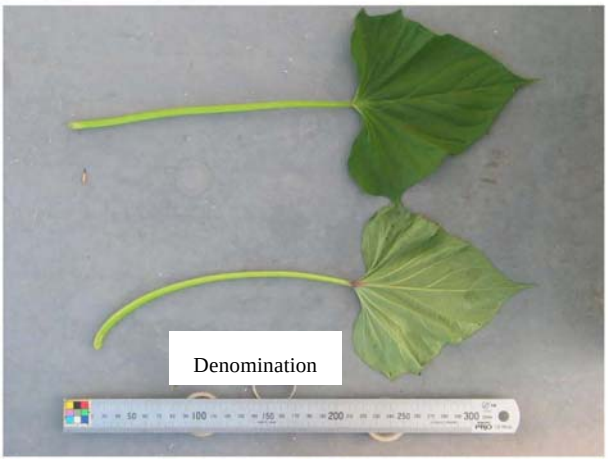
Tubers



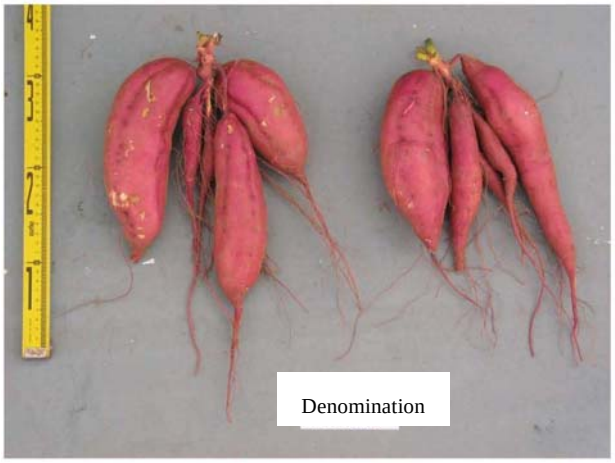
Cross section of tube

Sweet potato (the dates refer to the dates the photos were taken)

Test plot

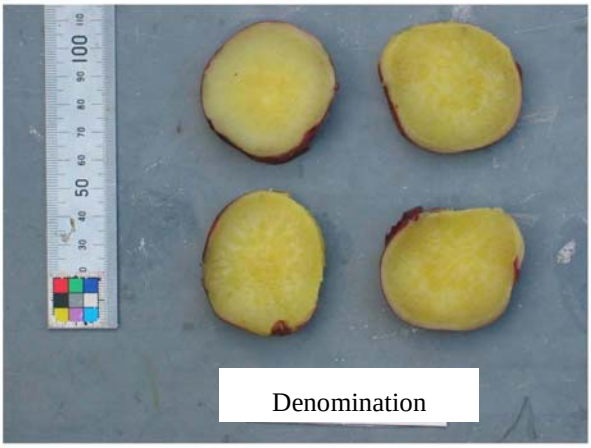


Leaf



Condition of tubers

Shape and color of tubers

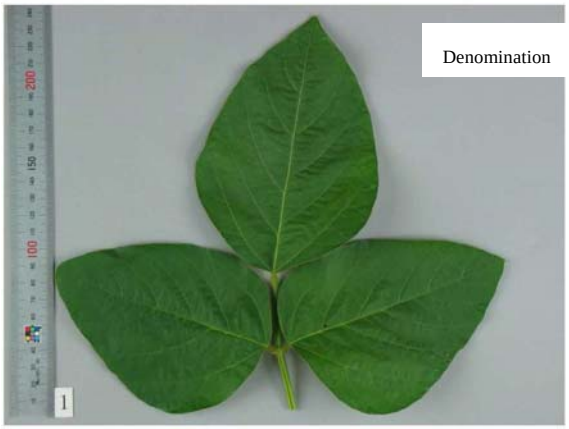


Color of steamed potato

Soybean (the dates refer to the dates the photos were taken)

Test plot (harvesting of young pod)

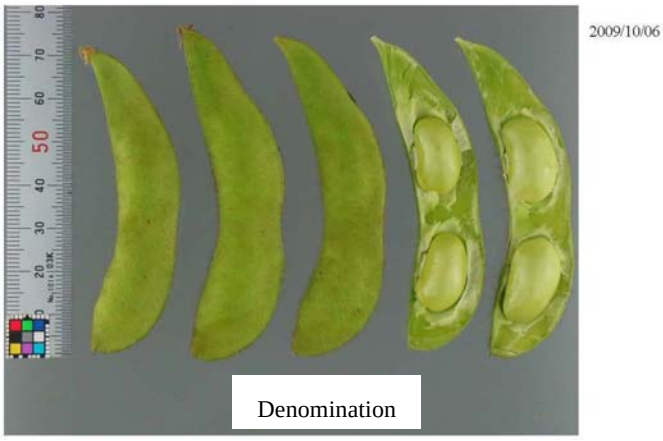
Growth habit (harvesting of young pod)



Leaf

Flower

Harvested stem (young pod)

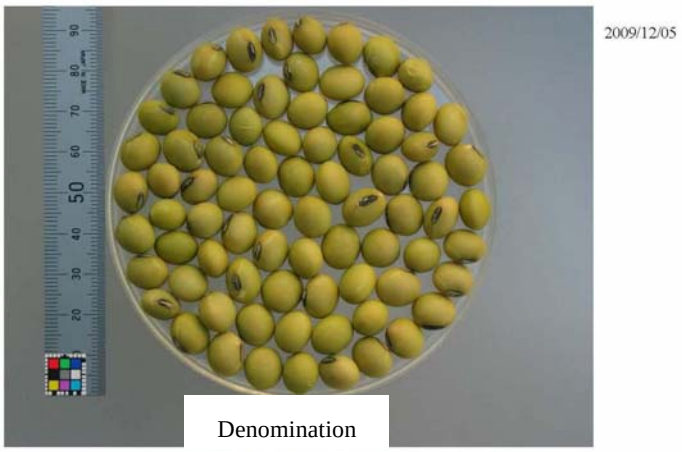


Pod (harvesting of young pod)

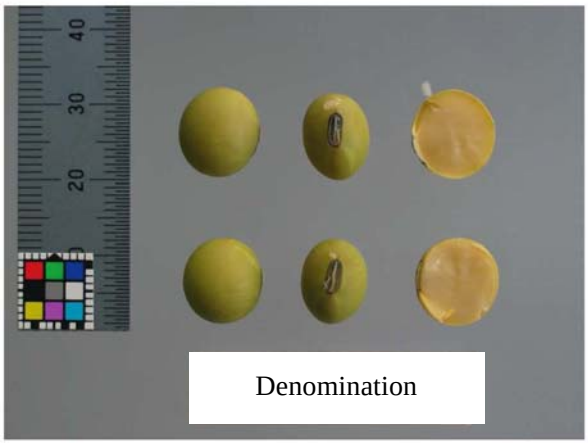
Test plot (harvesting time of seed)

Harvested stem (harvesting time of seed)

State of pod (harvesting time of seed)



Seed



Seed (enlarged)

Lettuce (the dates refer to the dates the photos were taken)

Growth habit (side view)

Growth habit (upper view)

State of globular lettuce

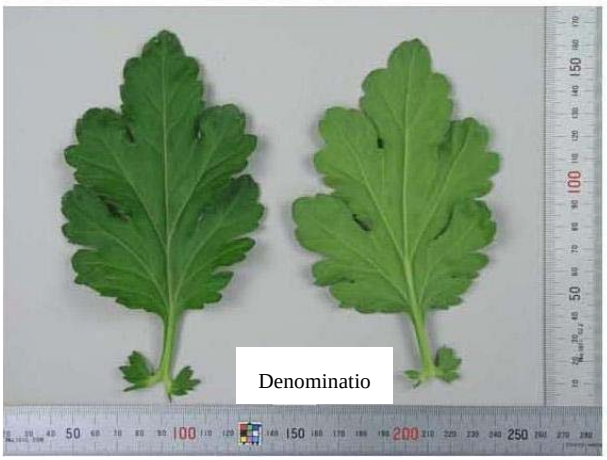
Leaf

Seed

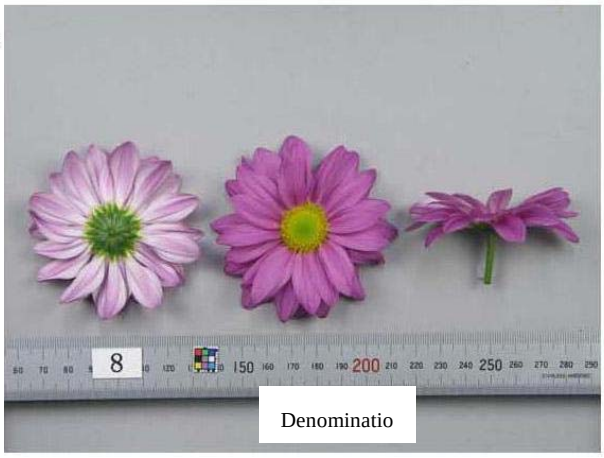
Chrysanthemum (the dates refer to the dates the photos were taken)

Test plot

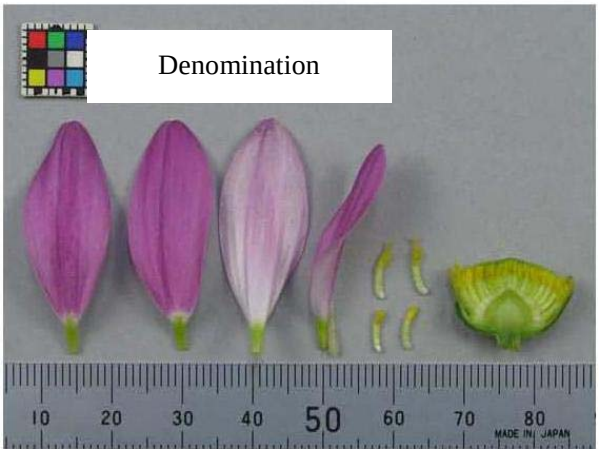
Growth habit



Leaf



Flower



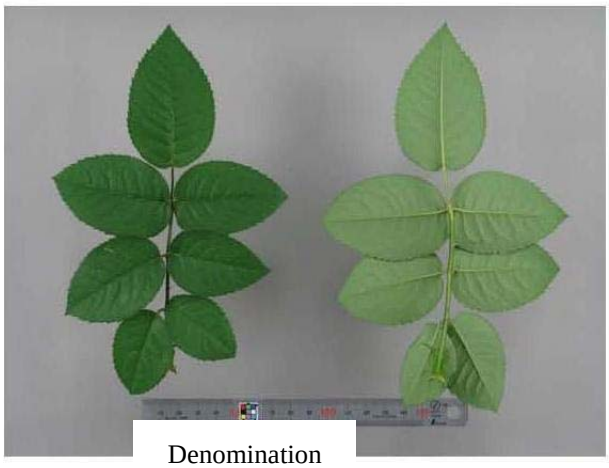
Flower petal

Rose (the dates refer to the dates the photos were taken)

Test plot

Shoot

Stem (central part)



Leaf

2010/0

Flowering stem

2010/01/02

Flower

2010/01/02

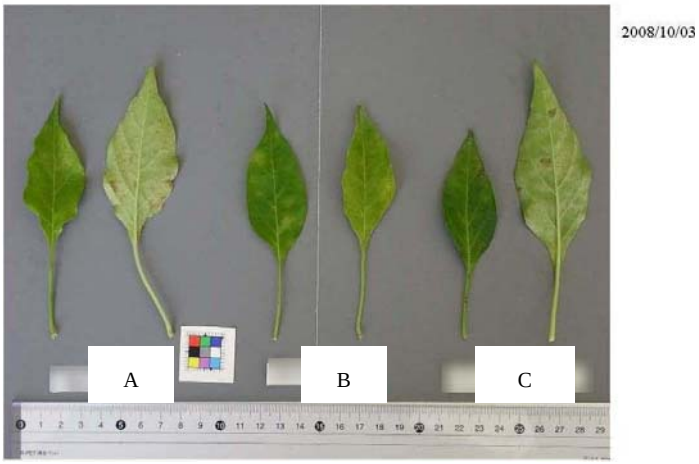
Flower petal

(2) Compositions showing the distinctness

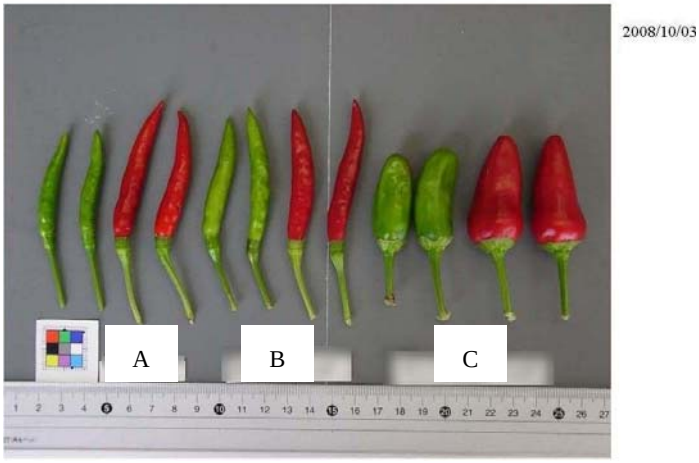
Capsicum (the dates refer to the dates the photos were taken)

Comparison of growth habits

Comparison of bearing



Comparison of leaves

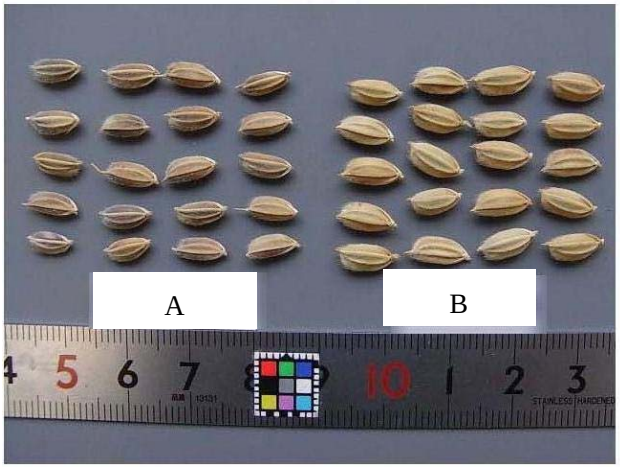


Comparison of fruits

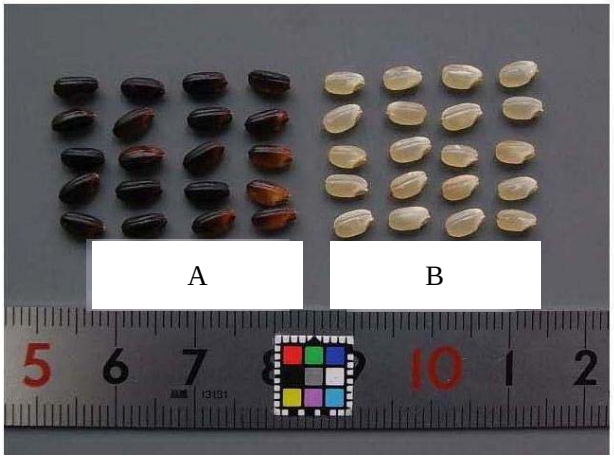
Rice plant (the dates refer to the dates the photos were taken)

Comparison of growth habits

Comparison of panicles



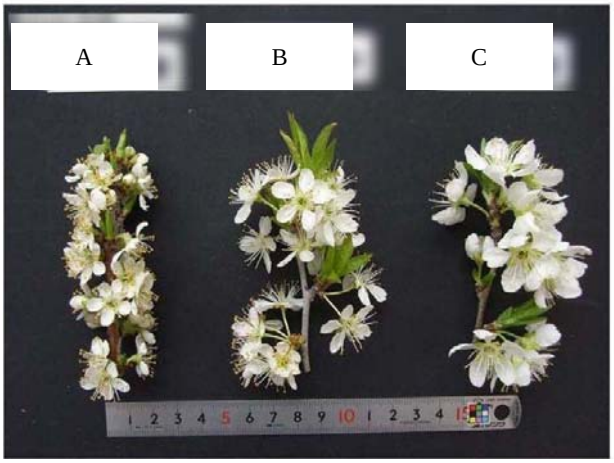
Comparison of grain



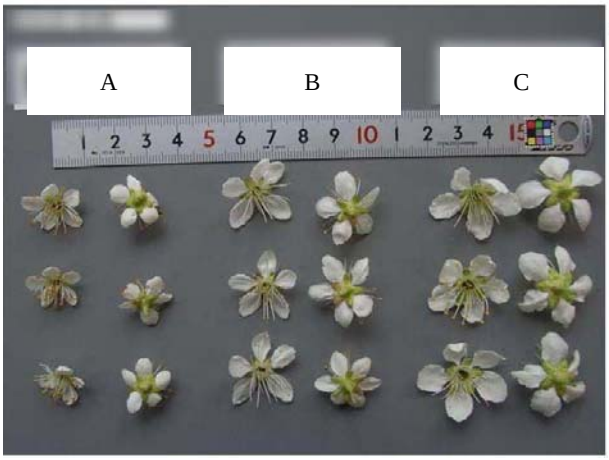
Comparison of decorticated grain

Plum (the dates refer to the dates the photos were taken)

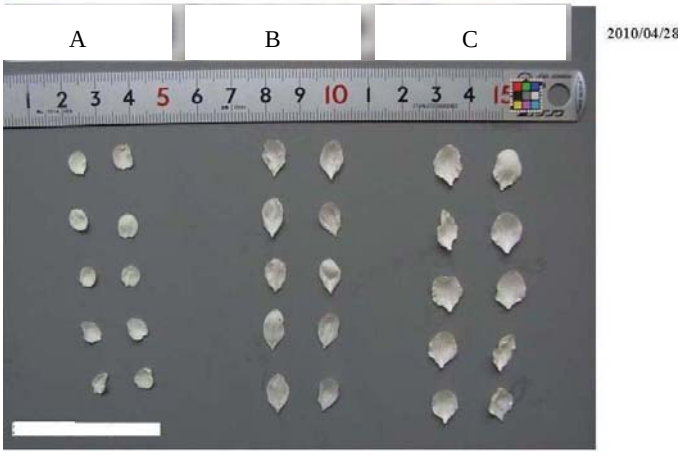
Comparison of branches



Comparison of inflorescence



Comparison of flowers



Comparison of flower petals

農林水産省
生産局　知的財産課　種苗審査室
〒100－8950 東京都千代田区霞が関１－２－１

MAFF
Ministry of Agriculture, Forestry and Fisheries

Plant Variety Protection Office, Intellectual Property Division,
Agricultural Production Bureau
1-2-1,Kasumigaseki,Chiyoda-ku,Tokyo 100－8950,Japan