

DISCLAIMER

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Bia agus Mara**
Department of Agriculture,
Food and the Marine

National Technical Protocol for the Official Examination of Distinctness, Uniformity and Stability (DUS) in Sweet Potato *Ipomoea batatas* (L.) Lam. IRELAND

UPOV Code: IPOMO_BAT

Adopted from UPOV TG/258/1

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Signature and Date; _____
Mr. Michael Moloney, Head of Division

Signature and Date; _____
Mr. Gerry Doherty, Technical Manager

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I - SUBJECT OF THE PROTOCOL

1. Scope of the technical protocol

This Technical Protocol applies to all varieties of Sweet Potato *Ipomoea batatas* (L.) Lam. The protocol describes the technical procedures to be followed in order to meet the requirements of Council Regulation 2100/94 on Community Plant Variety Rights. The technical procedures have been agreed by the Examination Office of the Department of Agriculture, Food and the Marine in Ireland and are based on documents agreed by the International Union for the Protection of New Varieties of Plants (UPOV), such as the General Introduction to DUS (UPOV Document TG/1/3 https://www.upov.int/export/sites/upov/publications/en/tg_rom/pdf/tg_1_3.pdf), its associated TGP documents (<https://www.upov.int/tgp/en/>) and the relevant UPOV Test Guideline TG/258/1 dated 24/03/2010 for the conduct of tests for Distinctness, Uniformity and Stability in Sweet Potato *Ipomoea batatas* (L.) Lam.

II - SUBMISSION OF PLANT MATERIAL

1. Informing the applicant

The Community Plant Variety Office (CPVO) is responsible for informing the applicant of

- the closing date for the receipt of plant material;
- the minimum amount and quality of plant material required;
- the Examination Office to which material is to be sent.

A sub-sample of the material submitted for test will be held in the variety collection of the Examination Office as the definitive sample of the candidate variety. The applicant is responsible for ensuring compliance with any customs and plant health requirements.

2. Receipt of documentation and material by the Examination Office

The final dates for receipt of requests, technical questionnaires is the **31st March** in the year of DUS test and the final date or submission period for plant material will be the **20th May** in the year of DUS test.

The Examination Office is responsible for immediately acknowledging the receipt of requests for testing, and technical questionnaires. Immediately after the closing date for the receipt of plant material the Examination Office should inform the CPVO if no plant material has been received. However, if unsatisfactory plant material is submitted the CPVO should be informed as soon as possible.

3. Plant material requirements

The final dates for request for technical examination and sending of Technical Questionnaire as well as the submission date of plant material by the applicant, and quantity and quality of the plant material to be supplied by the applicant are outlined in point 2 above and are published on the CPVO web site (www.cpvo.europa.eu) in S2 Official Gazette.

a) Quality of plant material:

Plant material supplied for DUS Tests must satisfy the minimum quality requirements laid down by the Examination Office.

The material is to be supplied in the form of rooted cuttings or plantlets. Rooted cuttings must be of sound condition and not be visibly unfit for planting by reason of mechanical damage, attack by insect, pest, disease or any other condition which would impair subsequent growth. Plantlets must be visibly healthy, not having undergone any treatment which would affect the expression of the characteristics of the variety.

Rooted cuttings must be delivered in aseptic containers, in the appropriate growth medium. The Examination Office may request an original *in vitro* sample of the candidate variety from the breeder, if the application has been made by an agent or third party representing the candidate variety.

b) Quantity of Plant Material:

The minimum quantity of plant material, to be supplied by the applicant, should be: **20 rooted cuttings**, 15 – 20cm in length, **or 20 plantlets**.

c) Seed Treatment:

The plant material must not have undergone any treatment unless the CPVO and the Examination Office allow or request such treatment. If it has been treated, full details of the treatment must be given.

d) Labelling of sample:

- Species
- File number of the application allocated by the CPVO
- Breeder's reference
- Examination Office reference (if known)
- Name of applicant
- The phrase "On request of the CPVO".

III - CONDUCT OF TESTS

1. Variety collection

A variety collection will be maintained for the purpose of establishing distinctness of the candidate varieties in test. The variety collection will contain both living material and descriptive information. A variety will be included in a variety collection only if plant material is available to make a technical examination.

Pursuant to Article 7 of Council Regulation (EC) No. 2100/94, the basis for a collection should be the following:

- varieties listed or protected at the EU level or at least in one of the EEA Member States;
- varieties protected in other UPOV Member States;
- any other variety in common knowledge.

The variety collection will be held both *in vitro* and *in vivo* to ensure the long term maintenance of each accession. The Examination Offices will replace reference material which has deteriorated or become depleted. Replacement material will only be introduced once appropriate tests confirm conformity with the existing reference material. If any difficulties arise for the replacement of reference material the Examination Offices will inform the CPVO. If authentic plant material of a variety cannot be supplied to the Examination Office the variety will be removed from the variety collection.

2. Material to be examined

Candidate varieties will be directly compared with other candidates for Community plant variety rights tested at the same Examination Office, and with appropriate varieties in the variety collection. When necessary the Examination Office will also include other candidates and varieties. The Examination Office, where necessary or appropriate will make efforts to co-ordinate the work with other offices involved in DUS-testing of Sweet Potato. As Ireland is the only Examination Office currently testing Sweet Potato, this may involve communication with Offices outside the EU. The Examination Office will notify the CPVO of candidate varieties which are likely to present problems in establishing distinctness. In order to solve particular problems the Examination Office may exchange plant material with other offices or organisations that may be of assistance to the Examination Office.

3. Characteristics to be used

The characteristics to be used in DUS tests and preparation of descriptions shall be those referred to in the table of characteristics adopted from UPOV TG/258/1 and set out in **Annex I** of this document. All the characteristics shall be used, providing that observation of a characteristic is not rendered impossible by the expression of any other characteristic, or the expression of a characteristic is prevented by the environmental conditions under which the test is conducted. In the latter case, the CPVO will be informed. In addition, the existence of some other regulation e.g. plant health, may make the observation of the characteristic impossible.

Characteristics shall be recorded on 'Score Sheets' outlined in **Annex II** of this document.

The Administrative Council of the CPVO empowers the President, in accordance with Article 23 of Commission Regulation (EC) No. 874/2009, to insert additional characteristics and their expressions in respect of a variety.

a) Grouping of varieties

The varieties and candidates to be compared will be divided into groups to facilitate the assessment of distinctness. Characteristics which are suitable for grouping purposes are those which are known from experience not to vary, or to vary only slightly, within a variety and which in their various states of expression are fairly evenly distributed throughout the collection. In the case of continuous grouping characteristics overlapping states of expression between adjacent groups is required to reduce the risks of incorrect allocation of candidates to groups. The characteristics that could be used for grouping are the following (UPOV numbering; G for grouping in table of characteristics)

- Plant: growth habit (characteristic 1)
- Stem: anthocyanin coloration of tip (characteristic 6)
- Leaf blade: lobes (characteristic 9)
- Storage root: shape (characteristic 19)

Storage root: main colour of skin (characteristic 22)

Storage root: main colour of flesh (characteristic 24)

4. Trial designs and growing conditions

The minimum duration of tests will normally be one growing cycle for Sweet Potato varieties. Tests will be carried out in polytunnel/glasshouse conditions ensuring normal growth. Candidate varieties for testing will be grown in pots. Plants, pots or parts of plants may be removed for measuring and counting without prejudice to the observations which must be made up to the end of the growing cycle.

a) The test design is as follows:

Each test should be designed to result in a total of at least 15 plants being planted.

Plants will be planted in pots.

Potted plants or parts of plants may be removed for measurement or counting without prejudice to the observations which must be made up to the end of the growing cycle.

Unless otherwise indicated, for the purpose of distinctness, observations shall be made on 10 plants. All other observations should be made on 15 plants or parts taken from each of 15 plants, disregarding any off-type plants.

b) Foliage Test

The foliage test (plant, stem and leaf blade Test) is used following a procedure similar to that described in UPOV TG/258/1 and adopted in this document. Due to climatic conditions in Ireland, all Sweet Potato varieties (both candidate and reference varieties) will be grown in a purpose-built polytunnel or glasshouse.

c) Storage Root Test

The TM of the EO is responsible for selecting a suitable polytunnel, which should have sufficient light, heat and irrigation. The storage root test is used following a procedure similar to that described in UPOV TG/258/1 and adopted in this document.

Further details on trial design and layout can be found in SOP 10A; "Procedures for the selection of varieties in trial, and trial design and organisation"

d) Special tests

In accordance with Article 83(3) of Council Regulation (EC) No. 2100/94 an applicant may claim either in the Technical Questionnaire or during the test that a candidate has a characteristic which would be helpful in establishing distinctness. If such a claim is made and is supported by reliable technical data, a special test may be undertaken by the Examination Office, providing that a technically acceptable test procedure can be devised.

Special tests will be undertaken, with the agreement of the President of CPVO, where distinctness is unlikely to be shown using the characters listed in the protocol.

5. Standards for decisions

a) Distinctness

A candidate variety will be considered to be distinct if it meets the requirements of Article 7 of Council Regulation (EC) No. 2100/94.

Qualitative characteristics:

In the case of characteristics which show discrete discontinuous states of expression, a difference between two varieties is clear if the respective characteristics have expressions which fall into two different states (e.g. UPOV No. 9 Leaf blade lobes: absent [1], three lobes [2], five lobes [3] and seven lobes [4])

Pseudo-Qualitative characteristics:

Characteristics, which show a range of expression that is at least partly continuous, but varies in more than one dimension (e.g. UPOV No. 19 Storage root shape: ovate [1], elliptic [2], obovate [3], oblong [4] and irregular [5]) and cannot be adequately described by just defining two ends of a linear range. In the case of pseudo-qualitative characteristics, a difference between two varieties is clear if the expression of the respective characteristics differs by at least the span of one note?

Quantitative characteristics:

Characteristics, which show a continuous range of expression from one extreme to the other, may be either measured or visually observed. In the case of visually observed characteristics, a difference between two varieties is clear if the expression of the respective characteristics differs by at least the span of one note, taking into account the variability observed within the varieties.

In the case of characteristics assessed by a single observation of a group of plants or parts of plants (VG, MG), a difference between two varieties is clear if the expression of the respective characteristics differs by at least the span of one note, taking into account the variability observed within the varieties.

b) Uniformity

It is of particular importance for users of this Technical Protocol to consult the UPOV-General Introduction prior to making decisions regarding uniformity. However, the following points are provided for elaboration or emphasis in this Technical Protocol:

A candidate will be considered to be sufficiently uniform if the number of off-type plants does not exceed 2 in 60 plants examined (population standard of 1% and acceptance probability of $\geq 95\%$). In a sample size of 15 plants, the maximum number of off-types allowed is 1.

c) Stability

A candidate will be considered to be sufficiently stable when there is no evidence to indicate that it lacks uniformity.

Plant samples of further submissions included in any test must show the same expression of characteristics as the material originally supplied.

IV - REPORTING OF RESULTS

After a recording season the results will be reported to the CPVO in the form of a UPOV model final report. Any problems will be indicated under the headings distinctness, uniformity and stability. Candidates may meet the DUS standards after one growing cycle but in some cases an additional growing cycle may be required.

If it is considered that the candidate complies with the DUS standards, the final report will be accompanied by a variety description in the format recommended by UPOV. If not, the reasons for failure and a summary of the test results will be included with the final report.

The CPVO must receive interim reports and final reports by the date agreed between the CPVO and the Examination Office.

Interim reports and final examination reports shall be signed by the responsible member of the staff of the Examination Office and shall expressly acknowledge the exclusive rights of disposal of CPVO.

V - LIAISON WITH THE APPLICANT

If problems arise during the course of the test the CPVO should be informed so that the information can be passed on to the applicant. Subject to prior permanent agreement, the applicant may be directly informed at the same time as the CPVO particularly if a visit to the trial is advisable.

VI - ENTRY INTO FORCE

The present protocol enters into force on 01/01/2018. Any on-going DUS examination of candidate varieties started before the aforesaid date will not be affected by the approval of the new TP. Technical examinations of candidate varieties are carried out according to the TP in force when the DUS test starts. The starting date of a DUS examination is considered to be the due date for the submission of plant material for the growing periods as from 01.01.2018.

In cases where the CPVO requests to take-over a DUS report for which the technical examination has either been finalized or which is in the process of being carried out at the moment of the request, such report can only be accepted if the technical examination has been carried out according to the Technical Protocol which was in force at the moment when the technical examination started.

Notes on Tables in Annex 1

- All 27 UPOV TG/258/1 characteristics listed in column 1 are to be used in the variety description for CPVO applications.
- All varietal characteristics shall be used, providing that observation of a characteristic is not rendered impossible by the expression of any other characteristics, and providing that the expression of a characteristic is not prevented by the environmental conditions under which the test is conducted.
- Asterisked characteristics (denoted by *) are those included in the Test Guidelines which are important for the international harmonization of variety descriptions and should always be examined for DUS and included in the variety description by all members of the Union, except when the state of expression of a preceding characteristic or regional environmental conditions render this inappropriate.
- QL indicates qualitative characteristics
- PQ indicates a pseudo-qualitative character; i.e. the range of expression is at least partly continuous, but varies in more than one dimension and cannot be adequately described by just defining two ends of a linear range.
- QN indicates a quantitative character; i.e. where the expression covers the full range of variation from one extreme to the other. The expression can be recorded on a one-dimensional, continuous or discrete, linear scale.
- MG: single measurement of a group of plants or parts of plants
- MS: measurement of a number of individual plants or parts of plants
- VG: visual assessment by a single observation of a group of plants or parts of plants
- VS: visual assessment by observation of individual plants or parts of plants

Full details on all aspects of recording these characteristics can be found in SOP 11A; "Procedures for establishing final note/value during observation of characteristics of Sweet Potato".

Annex I

Table 1 Plant: growth habit (G characteristic = 1)

UPOV TG/258/1	Type of observation	Characteristic	State of Expression	Example Variety (IRL option in italics)	Available Number of States
1. (* QN (G)	VG (a)	Plant: growth habit	1 = Upright 3 = Semi-upright 5 = Spreading	Sinchunmi <i>Benikomachi</i> Younmi, <i>Won-MI</i> Yulmi, <i>Burgundy</i> , <i>Benihayato</i>	5 states
2. QN	MS/VG (a) (b)	Stem: length of primary shoots	3 = Short 5 = Medium 7 = Long	Sinchunmi, <i>Norin 2</i> Koganesengan, Younmi, <i>Carolina Ruby</i> <i>Zami</i> , <i>Benihayato</i>	9 states
3. QN	MS/VG (a) (c)	Stem: length of internode	3 = Short 5 = Medium 7 = Long	Younmi, <i>Beniazuma</i> Koganesengan, Yulmi, <i>Burgundy</i> Shinhwangmi <i>Minamiyutaka</i>	9 states
4. QN	MS/VG (a) (c)	Stem: diameter of internode	1 = Very small 3 = Small 5 = Medium 7 = Large 9 = Very large	<i>Zami</i> , <i>Carolina Ruby</i> Sinchunmi, <i>Bonita</i> Koganesengan, Yulmi, <i>Benikomachi</i> Shinyulmi Chinmi	9 states
5. QN	VG (a) (c)	Stem: anthocyanin coloration of internode	1 = Absent or weak 2 = Medium 3 = Strong	Yulmi, <i>Bonita</i> , <i>Benikomachi</i> Singeonmi Hayanmi, <i>Manihi</i>	3 states

Table 2 Stem: anthocyanin coloration of tip (G characteristic = 6)

UPOV TG/258/1	Type of observation	Characteristic	State of Expression	Example Variety (IRL option in <i>italics</i>)	Available Number of States
6. (* (+) QN (G)	VG (a) (b)	Stem: anthocyanin coloration of tip	1 = Absent or weak 2 = Medium 3 = Strong	Yulmi, <i>Bonita</i> , <i>Won-Mi</i> , <i>Marguerite</i> Sinjami Hayanmi, <i>Bellevue</i>	 <i>3 states</i>
7. QN	VG (a) (b)	Stem: anthocyanin coloration of node	1 = Absent or weak 2 = Medium 3 = Strong	Yulmi, <i>Bonita</i> Norin 2 Hayanmi, <i>Bellevue</i> Koganesengan	 <i>3 states</i>
8. (* QN	VG (a) (b)	Stem: pubescence of tip	1 = Absent or sparse 2 = Medium 3 = Dense	Yulmi, <i>Bonita</i> Koganesengan, <i>Carolina Ruby</i> Zami, <i>Won-Mi</i>	 <i>3 states</i>

Ad. 6: Stem: anthocyanin coloration of tip



Tip

Table 3 Leaf blade: lobes (G characteristic = 9)

UPOV TG/258/1	Type of observation	Characteristic	State of Expression	Example Variety (IRL option in <i>italics</i>)	Available Number of States
9. (* (+) QL (G)	MG (a)	MG Leaf blade: lobes	1 = Absent 2 = Three lobes 3 = Five lobes 4 = Seven lobes	Gokokuimo, <i>Won-Mi</i> Benisengan, <i>Bellevue</i> Koganesengan, <i>Sinchunmi, Burgundy</i> Benihayato	4 states
10. (* (+) PQ	VG (a) (d)	<u>VG Only</u> varieties with <u>leaf blade lobes</u> <u>absent</u> : leaf blade: shape	1 = Cordate 2 = Triangular 3 = Reniform 4 = Circular	Gokokuimo, Yulmi, <i>Won-Mi</i> , Beniotome, <i>Benikomachi</i> Koukei 14	4 states
11. (+) QN	VG (a) (d)	<u>VG Only</u> varieties with <u>leaf blade lobes</u> <u>present</u> : leaf blade: depth of lobing	1 = Very shallow 3 = Shallow 5 = Moderate 7 = Deep 9 = Very deep	Benihayato, <i>Sinchunmi</i> Koganesengan, <i>Manihi</i> Tsukumoaka, <i>Tahiti</i>	9 states
12. PQ	VG (a) (d)	Leaf blade: colour (excluding anthocyanin coloration)	1 = Yellow Green 2 = Green 3 = Grey Green	Serolane, Suio, <i>Marguerite</i> Yulmi, <i>Bonita</i> Hayanmi	3 states
13. QN	VG (a) (d)	Leaf blade: anthocyanin coloration of upperside	1 = Absent or weak 2 = Medium 3 = Strong	Yulmi, <i>Bonita</i> Hayanmi <i>Manihi</i>	3 states
14. (+) QN	VG (a) (d)	Leaf blade: extent of anthocyanin coloration on abaxial veins	1= Absent or very small 3 = Small 5 = Medium 7 = Large 9 = Very large	<i>Benikomachi</i> Koukei 14, Yulmi, <i>Bonita</i> Beniaka, Norin 45, <i>Sakura</i> Hayanmi, <i>Benihayato</i> <i>Naeshirazu</i> , Koganesengan, <i>Bellevue, Won-Mi</i>	9 states

UPOV TG/258/1	Type of observation	Characteristic	State of Expression	Example Variety (IRL option in <i>italics</i>)	Available Number of States
15. QN	VG (a) (d)	Leaf blade: intensity of anthocyanin coloration on abaxial veins	1 = Very weak 3 = Weak 5 = Medium 7 = Strong 9 = Very strong	<i>Orleans</i> Norin 45, <i>Norin 2</i> Koganesengan, <i>Bellevue</i> <i>Sakura</i> <i>Manihi</i>	<i>9 states</i>
16. PQ	VG	Young leaf blade: main color on upperside	1 = Yellow green 2 = Light green 3 = Medium green 4 = Dark green 5 = Light purple 6 = Medium purple 7 = Purplish brown 8 = Light brown 9 = Dark brown	<i>Beniwase, Marguerite</i> Koganesengan Norin 2 Kyushu 14 <i>Bellevue</i> Minamiyutaka <i>Manihi</i>	<i>9 states</i>
17. (*) QN	VG (a) (d)	Petiole: anthocyanin coloration	1= Absent or very weak 3 = Weak 5 = Medium 7 = Strong	<i>Yulmi, Benikomachi</i> Norin 45 Hayanmi, <i>Bellevue</i> Koganesengan <i>Manihi</i>	<i>9 states</i>
18. (+) QN	VG/MS (a) (d)	Petiole: length	1 = Very short 3 = Short 5 = Medium 7 = Long 9 = Very long	<i>Sinchunmi, Carolina Ruby</i> <i>Makatea</i> Koganesengan, <i>Yulmi, Manihi,</i> <i>Benikomachi</i> <i>Shinmi</i>	<i>9 states</i>

Ad. 9: Leaf blade: lobes



1
absent



2
three lobes

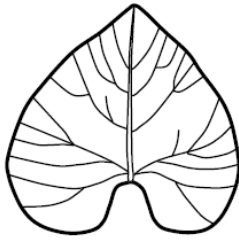


3
five lobes

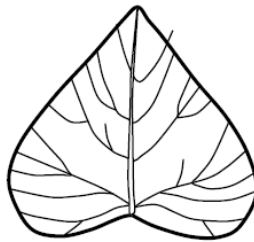


4
seven lobes

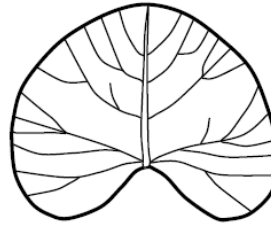
Ad. 10: Only varieties with leaf blade lobes absent: Leaf blade: shape



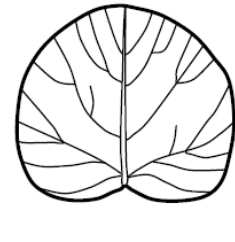
1
cordate



2
triangular



3
reniform



4
circular

Ad. 11: Only varieties with leaf blade lobes present: Leaf blade: depth of lobing



1
very shallow



3
shallow



5
moderate

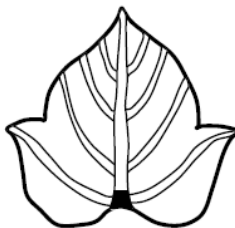


7
deep



9
very deep

Ad. 14: Leaf blade: extent of anthocyanin coloration on abaxial veins



3
small



5
medium



7
large



9
very large

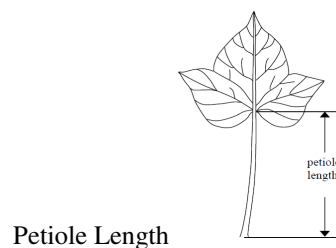







Table 4 Storage root: shape (G characteristic = 19)

UPOV TG/258/1	Type of observation	Characteristic	State of Expression	Example Variety (IRL option in italics)	Available Number of States
19. (* (+ PQ (G)	VG (e)	Storage root: shape	1 = Ovate 2 = Elliptic 3 = Obovate 4 = Oblong 5 = Irregular	Geonmi Serolane, <i>Won-Mi</i> Shinyulmi	5 states
20. QN	MS (e)	Storage root: ratio length/width	3 = Moderately compressed 5 = Medium 7 = Moderately elongated	Norin 2 Geonmi Yulmi	9 states
21. QN	MS/ VG (e)	Storage root: thickness of cortex relative to overall diameter	3 = Thin 5 = Medium 7 = Thick	Yulmi, <i>Makatea</i> <i>Bellevue</i> Shingeonmi, <i>Bonita</i>	9 states

Ad. 19: Storage root: shape

		< position of broadest part >		
		below middle	at middle	above middle
< lateral outline >	rounded	 <p>1 ovate</p>	 <p>2 elliptic</p>	 <p>3 obovate</p>
	oblong	 <p>4 oblong</p>		
	irregular	 <p>5 irregular</p>		

Ad. 21: Storage root: thickness of cortex relative to overall diameter

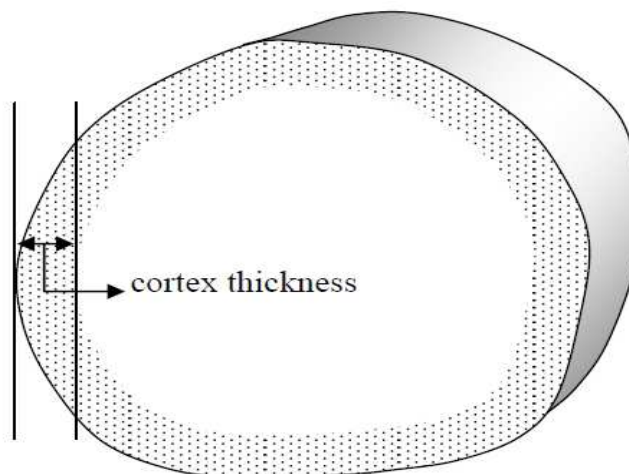


Table 5 Storage root: main colour of skin (G characteristic = 22)

UPOV TG/258/1	Type of observation	Characteristic	State of Expression	Example Variety (IRL option in italics)	Available Number of States
22. (+) PQ (G)	VG (e)	Storage root: main colour of skin	1 = White 2 = Light beige 3 = Yellow 4 = Orange 5 = Brownish orange 6 = Pink 7 = Red 8 = Purple red 9 = Light purple 10 = Medium purple 11 = Brown	Joy White, <i>Bonita</i> , <i>Norin 2</i> Chinmi, Koganesengan Impilo Benihayato, Serolane, <i>Bellevue</i> Khano Yulmi, <i>Makatea</i> Koukei 14, Shinhwangmi, <i>Evangeline</i> , <i>Radiance</i> Beniazuma, Phala Ayamurasaki, Zami, <i>Garnet</i> Happyymi	<i>11 states</i>
23. (* (+) PQ	VG (e)	Storage root: secondary colour of skin	1 = Absent 2 = White 3 = Yellow 4 = Orange 5 = Pink 6 = Red 7 = Purple 8 = Brown	Koganesengan, <i>Bellevue</i> Tamayutaka Koukei 14, <i>Bonita</i> Nakamurasaki Benikomachi Koganesengan	<i>8 states</i>

Table 6 Storage root: main colour of flesh (G characteristic = 24)

UPOV TG/258/1	Type of observation	Characteristic	State of Expression	Example Variety (IRL option in italics)	Available Number of States
24. PQ (G)	VG (e)	Storage root: main colour of flesh	1 = White 2 = Beige 3 = Yellow 4 = Orange 5 = Purple	Hayanmi, <i>Bonita</i> Shirosengan Nakamurasaki Koukei 14, <i>Norin 2</i> Benikomachi, Yulmi Benihayato, <i>Bellevue</i> Hayatoimo, Juhwangmi Ayamurasaki, Borami, <i>Sakura</i>	5 states
25. QN	VG (e)	Storage root: intensity of main color of flesh	1 = Light 2 = Medium 3 = Dark	Borami, Hayatoimo, Yulmi, <i>Makatea</i> Jinhongmi, Shinwangmi, Zami, <i>Radiance</i> Juhwangmi, Shinyulmi, Sinjami, <i>Bellevue, Kaukura</i>	3 states
26. (+) PQ	VG (e)	Storage root: secondary colour of flesh	1 = White 2 = Light beige 3 = Yellow 4 = Orange 5 = Pink 6 = Red 7 = Red- purple 8 = Purple	<i>Sakura</i> Hayatoimo Toka Toka Gold Nakamurasaki, Owairaka Red, <i>Makatea</i>	8 states

UPOV TG/258/1	Type of observation	Characteristic	State of Expression	Example Variety (IRL option in italics)	Available Number of States
27. QN	VG (e)	Storage root: depth of eyes	1 = Shallow 2 = Medium 3 = Deep	Beniaka, <i>Radiance</i> Koukei 14, <i>Georgia Jet</i> Kantou 80	3 states

Ad. 22: Storage root: Main colour of Skin

The main colour is the colour which covers the largest area of skin.

Ad. 23: Storage root: Secondary colour of skin

The secondary colour is the colour with the largest surface area of skin.

Ad. 24: Storage root: Main colour of flesh

The main colour is the colour with the largest surface area of storage root in cross section.

Ad. 26: Storage root: secondary colour of flesh

The secondary colour is the colour with the second largest surface area of storage root in cross section.

Explanations on the Table of Characteristics

Explanations covering several characteristics

Characteristics containing the following key in the second column of the Table of

Characteristics should be examined as indicated below:

(a) Observations should be made after **90 days from planting**.

(b) To be observed on the **main stem**.


(c) Stem internodes and length and diameter of internode should be observed on an internode located in the middle third of the main stem.

(d) Observations to be made on **fully developed leaves** at the middle part of the main stem.

(e) Characteristics should be observed **after harvest**.


Annex II – Score Sheets

Table 1 Plant: growth habit (G characteristic = 1)

UPOV TG/258/1	Type of observation	Characteristic	State of Expression	Example Variety (IRL option in <i>italics</i>)	Score 
1. (* QN (G)	VG (a)	Plant: growth habit	1 = Upright (<75cm)	Sinchunmi <i>Benikomachi</i>	1
			3 = Semi-upright (<150cm)	Younmi <i>Won-Mi</i>	3
			5 = Spreading (150- 250cm)	Yulmi, <i>Burgundy</i> <i>Benihayto</i>	5
2. QN	MS/VG (a) (b)	Stem: length of primary shoots	3 = Short	Sinchunmi <i>Norin 2</i>	3
			5 = Medium	Koganesengan, Younmi <i>Carolina Ruby</i>	5
			7 = Long	Zami <i>Benihayto</i>	7
3. QN	MS/VG (a) (c)	Stem: length of internode	3 = Short	Younmi, <i>Beniazuma</i>	3
			5 = Medium	Koganesengan, Yulmi <i>Burgundy</i>	5
			7 = Long	Shinhwangmi <i>Minamiyutaka</i>	7
4. QN	MS/VG (a) (c)	Stem: diameter of internode	1 = Very small	Zami <i>Carolina Ruby</i>	1
			3 = Small	Sinchunmi <i>Bonita</i>	3
			5 = Medium	Koganesengan, Yulmi <i>Benikomachi</i>	5
			7 = Large	Shinyulmi	7
			9 = Very large	Chinmi	9
5. QN	VG (a) (c)	Stem: anthocyanin coloration of internode	1 = Absent or weak	Yulmi <i>Bonita</i> <i>Benikomachi</i>	1
			2 = Medium	Singeonmi	2
			3 = Strong	Hayanmi <i>Manihi</i>	3


Annex II – Score Sheets








Table 2 Stem: anthocyanin coloration of tip (G characteristic = 6)

UPOV TG/258/1	Type of observation	Characteristic	State of Expression	Example Variety (IRL option in <i>italics</i>)	Score 
6. (* (+) QN (G)	VG (a) (b)	Stem: anthocyanin coloration of tip	1 = Absent or weak	Yulmi, <i>Bonita</i> <i>Won-Mi</i> <i>Marguerite</i>	1
			2 = Medium	Sinjami	2
			3 = Strong	Hayanmi <i>Bellevue</i>	3
7. QN	VG (a) (b)	Stem: anthocyanin coloration of node	1 = Absent or weak	Yulmi <i>Bonita</i>	1
			2 = Medium	Norin 2	2
			3 = Strong	Hayanmi, Koganesengan <i>Bellevue</i>	3
8. (* QN	VG (a) (b)	Stem: pubescence of tip	1 = Absent or sparse	Yulmi <i>Bonita</i>	1
			2 = Medium	Koganesengan <i>Carolina Ruby</i>	2
			3 = Dense	Zami <i>Won-Mi</i>	3


Notes:

Annex II – Score Sheets
Table 3 Leaf blade: lobes (G characteristic = 9)

UPOV TG/258/1	Type of observation	Characteristic	State of Expression	Example Variety (IRL option in <i>italics</i>)	Score 
9. (* (+) QL (G)	MG (a)	MG Leaf blade: lobes	1 = Absent 2 = Three lobes 3 = Five lobes 4 = Seven lobes	Gokokuimo <i>Won-Mi</i> Benisengan <i>Bellevue</i> Koganesengan, Sinchunmi <i>Burgundy</i> Benihayato	1 2 3 4
10. (* (+) PQ	VG (a) (d)	<u>VG Only varieties with leaf blade lobes absent:</u> leaf blade: shape	1 = Cordate 2 = Triangular 3 = Reniform 4 = Circular	Gokokuimo, Yulmi <i>Won-Mi</i> Beniotome <i>Benikomachi</i> Koukei 14	1 2 3 4
11. (+) QN	VG (a) (d)	<u>VG Only varieties with leaf blade lobes present:</u> leaf blade: depth of lobing	1 = Very shallow 3 = Shallow 5 = Moderate 7 = Deep 9 = Very deep	Benihayato, Sinchunmi Koganesengan <i>Manihi</i> Tsukumoaka <i>Tahiti</i>	1 3 5 7 9
12. PQ	VG (a) (d)	Leaf blade: colour (excluding anthocyanin coloration)	1 = Yellow Green 2 = Green 3 = Grey Green	Serolane, Suio <i>Marguerite</i> Yulmi, <i>Bonita</i> Hayanmi	1 2 3
13. QN	VG (a) (d)	Leaf blade: anthocyanin coloration of upperside	1 = Absent or weak 2 = Medium 3 = Strong	Yulmi, <i>Bonita</i> Hayanmi <i>Manihi</i>	1 2 3
14. (+) QN	VG (a) (d)	Leaf blade: extent of anthocyanin coloration on abaxial veins	1 = Absent or very small 3 = Small 5 = Medium 7 = Large 9 = Very large	<i>Benikomachi</i> Koukei 14, Yulmi <i>Bonita</i> Beniaka, Norin 45, <i>Sakura</i> Hayanmi, Naeshirazu <i>Benihayato</i> Koganesengan <i>Bellevue, Won-Mi</i>	1 3 5 7 9


UPOV TG/258/1	Type of observation	Characteristic	State of Expression	Example Variety (IRL option in <i>italics</i>)	Score 
15. QN	VG  	Leaf blade: intensity of anthocyanin coloration on abaxial veins	1 = Very weak 3 = Weak 5 = Medium 7 = Strong 9 = Very strong	<i>Orleans</i> <i>Norin 45, Norin 2</i> <i>Koganesengan, Bellevue</i> <i>Sakura</i> <i>Manihi</i>	1 3 5 7 9
16. PQ	VG	Young leaf blade: main color on upperside	1 = Yellow green 2 = Light green 3 = Medium green 4 = Dark green 5 = Light purple 6 = Medium purple 7 = Purplish brown 8 = Light brown 9 = Dark brown	<i>Beniwase, Marguerite</i> <i>Koganesengan</i> <i>Norin 2</i> <i>Kyushu 14</i> <i>Bellevue</i> <i>Minamiyutaka</i> <i>Manihi</i>	1 2 3 4 5 6 7 8 9
17. (* QN	VG  	Petiole: anthocyanin coloration	1 = Absent or very weak 3 = Weak 5 = Medium 7 = Strong	<i>Yulmi, Benikomachi</i> <i>Norin 45</i> <i>Hayanmi, Bellevue</i> <i>Koganesengan</i> <i>Manihi</i>	1 3 5 7
18. (+ QN	VG/MS  	Petiole: length	1 = Very short 3 = Short 5 = Medium 7 = Long 9 = Very long	<i>Sinchunmi, Carolina Ruby</i> <i>Makatea</i> <i>Koganesengan, Yulmi, Manihi, Benikomachi</i> <i>Shinmi</i>	1 3 5 7 9

Annex II – Score Sheets
Table 4 Storage root: shape (G characteristic = 19)

UPOV TG/258/1	Type of observation	Characteristic	State of Expression	Example Variety (IRL option in <i>italics</i>)	Score 
19. (* (+) PQ (G)	VG (e)	Storage root: shape	1= Ovate		1
			2 = Elliptic	Geonmi	2
			3 = Obovate	Serolane	3
			4 = Oblong	Shinyulmi, <i>Won-Mi</i>	4
			5 = Irregular		5
20. QN	MS (e)	Storage root: ratio length/width	3 = Moderately compressed	Norin 2	1 3
			5 = Medium	Geonmi	5
			7 = Moderately elongated	Yulmi	7
					9
21. QN	MS/ VG (e)	Storage root: thickness of cortex relative to overall diameter	3 = Thin	Yulmi, <i>Makatea</i>	1 3
			5 = Medium	<i>Bellevue</i>	5
			7 = Thick	Shingeonmi <i>Bonita</i>	7
					9


Annex II – Score Sheets

Table 5 Storage root: main colour of skin (G characteristic = 22)

UPOV TG/258/1	Type of observation	Characteristic	State of Expression	Example Variety (IRL option in <i>italics</i>)	Score 
22. (+) PQ (G)	VG (e)	Storage root: main colour of skin	1 = White	Joy White, <i>Bonita</i> <i>Norin 2</i>	1
			2 = Light beige	Chinmi, Koganesengan	2
			3 = Yellow	Impilo	3
			4 = Orange	Benihayato, Serolane, <i>Bellevue</i>	4
			5 = Brownish orange	Khano	5
			6 = Pink	Yulmi, <i>Makatea</i>	6
			7 = Red	Koukei 14, <i>Evangeline</i> Shinhwangmi <i>Radiance</i>	7
			8 = Purple red	Beniazuma, Phala	8
			9 = Light purple		9
			10 = Medium purple	Ayamurasaki, Zami <i>Garnet</i>	10
			11 = Brown	Happymi	11
23. (* (+) PQ	VG (e)	Storage root: secondary colour of skin	1 = Absent	Koganesengan <i>Bellevue</i>	1
			2 = White	Tamayutaka	2
			3 = Yellow		3
			4 = Orange		4
			5 = Pink	Koukei 14, <i>Bonita</i>	5
			6 = Red	Nakamurasaki,	6
			7 = Purple	Benikomachi	7
			8 = Brown	Koganesengan	8

Annex II – Score Sheets

Table 6 Storage root: main colour of flesh (G characteristic = 24)

UPOV TG/258/1	Type of observation	Characteristic	State of Expression	Example Variety (IRL option in <i>italics</i>)	Score 
24. PQ (G)	VG (e)	Storage root: main colour of flesh	1 = White	Hayanmi, <i>Bonita</i> Shirosengan	1
			2 = Beige	Nakamurasaki Koukei 14 <i>Norin 2</i>	2
			3 = Yellow	Benikomachi, Yulmi	3
			4 = Orange	Benihayato, <i>Bellevue</i> Hayatoimo, Juhwangmi	4
			5 = Purple	Ayamurasaki, Borami <i>Sakura</i>	5
25. QN	VG (e)	Storage root: intensity of main color of flesh	1 = Light	Borami, Hayatoimo, Yulmi, <i>Makatea</i>	1
			2 = Medium	Jinhongmi, <i>Radiance</i> Shinwangmi, Zami	2
			3 = Dark	Juhwangmi, <i>Bellevue</i> Shinyulmi, Sinjami <i>Kaukura</i>	3
26. (+) PQ	VG (e)	Storage root: secondary colour of flesh	1 = White	<i>Sakura</i>	1
			2 = Light beige		2
			3 = Yellow	Hayatoimo	3
			4 = Orange	Toka Toka Gold	4
			5 = Pink		5
			6 = Red		6
			7 = Red- purple	Nakamurasaki, Owairaka Red <i>Makatea</i>	7
			8 = Purple		8
27. QN	VG (e)	Storage root: depth of eyes	1 = Shallow	Beniaka, <i>Radiance</i>	1
			2 = Medium	Koukei 14, <i>Georgia Jet</i>	2
			3 = Deep	Kantou 80	3

Explanations on the Table of Characteristics

Explanations covering several characteristics

Characteristics containing the following key in the second column of the Table of

Characteristics should be examined as indicated below:

- (a)** Observations should be made after **90 days from planting**.
- (b)** To be observed on the **main stem**.
- (c)** Stem internodes and length and diameter of internode should be observed on an internode located in the middle third of the main stem.
- (d)** Observations to be made on **fully developed leaves** at the middle part of the main stem.
- (e)** Characteristics should be observed **after harvest**.

ANNEX III

TECHNICAL QUESTIONNAIRE

to be completed in connection with an application for Community Plant Variety Rights

Please answer all questions. A question without any answer will lead to a non-attribution
of an application date. **In cases where a field / question is not applicable, please state so**

1. **Botanical taxon: Name of the genus, species or sub-species to which the variety belongs and common name**

Ipomoea batatas (L.) Lam

SWEET POTATO

2. Applicant(s): Name(s) and address(es), phone and fax number(s), Email address, and where appropriate name and address of the procedural representative

3. Variety denomination

a) Where appropriate proposal for a variety denomination:

b) Provisional designation (breeder's reference):

4. Information on origin, maintenance and reproduction of the variety

4.1 Breeding scheme

Variety resulting from:

4.1.1 Crossing

(a) Controlled cross.....[]
(indicate parent varieties)

(...female parental...) X (... male parent...)

.....

(b) Partially known cross[]
(indicate parent variety(ies))

(...female parental...) X (... male parent...)

.....

(c) Unknown cross.....[]

4.1.2 Mutation
(please state parent variety)

4.1.3 Discovery and development
(please state where and when discovered and how developed)

4.1.4 Other
(please provide details)

4.2 Method of propagation

4.2.1 Seed-propagated varieties

- (a) Self-pollination[]
- (b) Cross-pollination
 - (i) Population []
 - (ii) Synthetic []
- (c) Other []
(please provide details)

4.2.2 Vegetatively propagated varieties

- (a) cuttings []
- (b) *in vitro* propagation []
- (c) other (state method) []

4.2.3 Other []
(please specify)

4.3 Geographical origin of the variety: the region and the country in which the variety was bred or discovered and developed		
5. Characteristics of the variety to be indicated (the number in brackets refers to the corresponding characteristic in the CPVO Protocol; please mark the state of expression which best corresponds).		
Characteristics	Example varieties	Note
5.1 Plant: growth habit (1)		
Upright	Sinchunmi, <i>Benikomachi</i>	1 []
Semi-upright	Younmi, <i>Won-Mi</i>	3 []
Spreading	Yulmi, <i>Burgundy</i> , <i>Benihayato</i>	5 []
5.2 Stem: anthocyanin coloration of tip (6)		
Absent or weak	Yulmi, <i>Bonita</i> , <i>Won-Mi</i>	1 []
Medium	Sinjami	2 []
Strong	Hayanmi, <i>Bellevue</i>	3 []
5.3 Leaf blades: lobes (9)		
Absent	Gokokuimo, <i>Won-Mi</i>	1 []
Three lobes	Benisengan, <i>Bellevue</i>	2 []
Five lobes	Koganesengan, Sinchunmi, <i>Burgundy</i>	3 []
Seven lobes	Benihayato	4 []
5.4 Storage root: shape (19)		
Ovate		1 []
Elliptic		2 []
Obovate	Geonmi	3 []
Oblong	Serolane, <i>Won-Mi</i>	4 []
Irregular	Shinyulmi	5 []

Characteristics	Example varieties	Note
5.5 Storage root: main colour of skin (22)		
White	Joy White, <i>Bonita</i> , <i>Norin 2</i>	1 []
Light Beige	Chinmi, Koganesengan	2 []
Yellow	Impilo	3 []
Orange	Benihayato, Serolane, <i>Bellevue</i>	4 []
Brownish Orange	Khano	5 []
Pink	Yulmi, <i>Makatea</i>	6 []
Red	Koukei 14, Shinhwangmi, <i>Evangeline</i> , <i>Radiance</i>	7 []
Purple Red	Beniazuma, Phala	8 []
Light Purple		9 []
Medium Purple	Ayamurasaki, Zami, <i>Garnet</i>	10 []
Brown	Happymi	11 []
5.6 Storage root: main colour of flesh (24)		
White	Hayanmi, Shirosangan, <i>Bonita</i>	1 []
Beige	Nakamuraski, Koukei 14, <i>Norin 2</i>	2 []
Yellow	Benikomachi, Yulmi	3 []
Orange	Benihayato, Hayatoimo, Juhwangmi, <i>Bellevue</i>	4 []
Purple	Ayamurasaki, Borami, <i>Sakura</i>	5 []

6. Similar varieties and differences from these varieties:

Denomination of similar variety	Characteristic in which the similar variety is different ¹⁾	State of expression of similar variety	State of expression of candidate variety
---------------------------------	--	--	--

¹⁾ In the case of identical states of expressions of both varieties, please indicate the size of the difference

7. Additional information which may help to distinguish the variety

7.1 Resistance to pests and diseases

YES, please specify

NO

7.2 Special conditions for the examination of the variety

YES, please specify

NO

7.3 Other information

7.3.1 Main use

(a) Food / Feed

(b) Ornamental

(c) Pharmaceutical

(d) other

(please provide details)

7.3.2 Other information

YES, please specify

NO

8. GMO-information required

The variety represents a Genetically Modified Organism within the meaning of Article 2(2) of Council Directive 2001/18/EC of 12/03/2001.

YES

NO

If yes, please add a copy of the written attestation of the responsible authorities stating that a technical examination of the variety under Articles 55 and 56 of the Basic Regulation (EC) No. 2100/94 does not pose risks to the environment according to the norms of the above-mentioned Directive.

9. Information on plant material to be examined

9.1 The expression of a characteristic or several characteristics of a variety may be affected by factors, such as pests and disease, chemical treatment (e.g. growth retardants or pesticides), effects of tissue culture, different rootstocks, scions taken from different growth phases of a tree, etc.

9.2 The plant material should not have undergone any treatment which would affect the expression of the characteristics of the variety, unless the competent authorities allow or request such treatment. If the plant material has undergone such treatment, full details of the treatment must be given. In this respect, please indicate below, to the best of your knowledge, if the plant material to be examined has been subjected to:

(a) Microorganisms (e.g. virus, bacteria, phytoplasma) Yes No

(b) Chemical treatment (e.g. growth retardant or pesticide) Yes No

(c) Tissue culture Yes No

(d) Other factors Yes No

Please provide details of where you have indicated "Yes":

10. Possible place of the technical examination

In case the CPVO needs to arrange a technical examination for this candidate variety, there might be more than one examination office entrusted by the CPVO suitable to grow your variety. In this case, the Office will decide on the place of the technical examination but you might wish to express here a preference in respect of an examination office. The available entrusted examination offices for that species can be found in the S2 Gazette under

<https://public.plantvarieties.eu/publication>

I/we hereby declare that to the best of my/our knowledge the information given in this form is complete and correct.

Date

Signature

Name