



Animal &
Plant Health
Agency

United Kingdom National List / Plant Breeders' Rights Technical Protocol for the Official Examination of Distinctness, Uniformity, and Stability (DUS)

Potato

(*Solanum tuberosum* L.)

February 2020

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Section A - General Information

1 Purpose

- 1.1 This Protocol sets out the procedures for conducting tests and assessments in relation to official examinations of DUS, maintenance of reference stocks and verification of VCU submissions of varieties of potato entered for National List (NL) Trials and Plant Breeders' Rights (PBR).

2 Scope

- 2.1 These procedures apply to all varieties of potato. Special procedures and responsibilities for Genetically Modified (GM) varieties are set out in Sections A5 and A6.
- 2.2 Only National List candidates, Plant Breeders' Rights candidates, candidates for other EU Authorities and the reference varieties may be incorporated in the DUS tests, except where specified in this protocol or authorised by APHA Varieties and Seeds.

3 Responsibilities

- 3.1 The growing tests and assessments in this protocol are conducted under the responsibility of the Secretary of State for Environment, Food and Rural Affairs, Scottish Ministers, Welsh Ministers and the Northern Ireland Assembly (the National Authorities).
- 3.2 They are supervised, on behalf of the National Authorities, by officials of the Testing Authorities, that is, the Animal and Plant Health Agency (APHA), SASA, the Department of Agriculture, Environment and Rural Affairs (DAERA) and the Welsh Ministers.
- 3.3 This protocol is authorised by the Plant Variety and Seeds Committee (PVSC). It cannot be amended without their approval. Requests and suggestions for amendment of the protocol should be put in writing to APHA Varieties and Seeds, either directly or via the Test Centre.
- 3.4 The procedures are administered by:

Varieties and Seeds
The Animal and Plant Health Agency
Eastbrook
Shaftesbury Road
Cambridge
CB2 8DR

Tel No 02080 265993
Fax No 02084 152504

- 3.5 Test Centre

The DUS growing tests and assessments in this protocol are co-ordinated and carried out by the:

Variety Testing Unit
SASA
Roddinglaw Road
EDINBURGH

EH12 9FJ

Tel. No 0131 244 8938

Fax. No 0131 244 8940

The Test Centre is responsible for providing the appropriate facilities.

4 Non Compliance with the Protocol

- 4.1 Where the protocol uses the word “must” for any action, then failure to carry out this action will result in non-compliance. Where non-compliance occurs or there are concerns regarding the validity of any data or tests, this must be reported to APHA. Where this protocol uses the word “should” for any action this is the method to be followed, unless there are clear reasons not to do so which can be justified by the Test Centre as technically sound.

5 Responsibility for GM Releases

- 5.1 GM Release Consent Holders are responsible for GM releases. All parties involved in DUS work operating under a GM Release Consent must adhere to the instructions of the Release Consent Holder where necessary, to comply with the relevant consent conditions. Where DUS protocol non-compliance occurs, this must be reported to the consent holder and the Test Centre who will notify APHA.

6 Procedures for GM Varieties

- 6.1 Applicants intending to enter GM candidates must consult APHA, well in advance of their application, about specific requirements under GM regulations.
- 6.2 The Test Centre must ensure that no test or trial sites are planted with GM candidates and/or varieties until APHA has given the specific clearances.

7 Associated Documents

List of documents associated with this protocol

Reference	Title
Potatoes VCU Protocol	United Kingdom National List Trials: Protocol and Procedures for Examining the Value for Cultivation and Use (VCU) of Potatoes
UPOV TG/1/3	General Introduction to the Examination of Distinctness, Uniformity and Stability and the development of Harmonised Descriptions of New Varieties of Plants. 9.4.2002
CPVO TP/23/3	CPVO Technical Protocol for Distinctness, Uniformity and Stability Tests – Potato (<i>Solanum tuberosum</i> L.) 15.3.2017
UPOV TG/23/6	Guidelines for the Conduct of Tests for Distinctness, Uniformity and Stability, Potato. 31.3.2004
UPOV TGP/8/2	Trial Design and Techniques Used in the Examination of Distinctness, Uniformity and Stability. 16.10.2014
UPOV TGP/9/2	Examining Distinctness. 11.4.2008
UPOV TGP/10/1	Examining Uniformity. 30.10.2008
Commission Directive	Commission Directive of 2003/90/EC as amended setting out implementing measures for the purposes of Article 7 of Council Directive 2002/53/EC (13 June 2002) as regards the characteristics to be covered as a minimum by the examination and the minimum conditions for examining certain varieties of agricultural plant species.
Council Regulation EC No 2100/94	Council Regulation 2100/94/EC of 27 July 1994 on Community Plant Variety Rights.

Section B – Application Requirements

1 Purpose

- 1.1 The purpose of this section is to identify the specific requirements for National List and Plant Breeders' Rights applications.

2 Scope

- 2.1 These procedures apply to all applications.

3 Responsibilities

- 3.1 The applicants are responsible for ensuring that these procedures are complied with.

4 Receipt of Applications

- 4.1 The latest date for receipt of applications for acceptance of a variety onto the National List or for Plant Breeders' Rights, which is set administratively by APHA, is 15 December. Applications received after this date may be considered for inclusion in the current year's tests and trials on a case by case basis.
- 4.2 The procedures for the submission of National List and Plant Breeders' Rights applications, technical questionnaires and for payment of administration fees are set out on the APHA pages of the Gov.UK website at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/714974/pbr-fees.pdf
- 4.3 Applicants should notify APHA of special DUS characteristics which may require additional examinations. These claims should, in addition, be noted in the TQ accompanying the application.

5 Receipt of Seed

- 5.1 The latest date for receipt of seed is 15 January and is set administratively by APHA. Acceptance of seed after this date will be determined by APHA in consultation with the Test Centre. Instructions for the delivery of seed will be made available to applicants by APHA.

6 Seed Quality Requirements

- 6.1 The seed must satisfy the quality requirements for basic category seed potatoes as laid down in The Seed Potatoes (Scotland) Regulations 2000 and The Seed Potatoes (Scotland) Amendment Regulations 2005.
- 6.2 Seed tubers must be derived, in the UK, from seed crops which satisfy the conditions for Approved Stock as set out by SASA (Potato Branch, SASA, Roddinglaw Road, Edinburgh EH12 9FJ), Defra and WG (Plant Health Division, Foss House, Kings Pool, 1-2 Peasholme Green, York YO1 7PX), and DAERA (Plant Health and Crop Certification, Room 1019, Dundonald House, Belfast BT4 3SP). Seed tubers from elsewhere in the European Union (EU) must have satisfied equivalent conditions.

- 6.3 Seed tubers must be size graded 30mm x 50mm, be in sound condition, be substantially free from soil and not be visibly unfit for planting by reason of mechanical damage, attack by pest, disease or any other condition which would impair subsequent growth.
- 6.4 Seed tubers must not have been chemically treated and must be delivered in new sacks or other new containers.

7 Seed Quantity

- 7.1 The number of tubers required for DUS testing each year is a minimum of 120 tubers. If a variety is submitted for PBR and NL testing, the number of tubers required is 600 each year. In the event of deterioration of seed prior to planting, replacement tubers may be acceptable provided that they are from the same stock, and will, in the opinion of the Test Centre, not affect the assessments.

8 Requirements for Seed Tubers, including Provisions for GM Varieties

- 8.1 Seed tubers derived in the UK must be from field-grown seed crops which satisfy the conditions for Approved Stock as set out by the Potato Branch, SASA (Roddinglaw Road, Edinburgh EH12 9FJ), APHA (Eastbrook, Shaftesbury Road, Cambridge, CB2 8DR) and DAERA (Farm Policy Branch, Room 910, Dundonald House, Belfast BT4 3SP). Each package or container holding the seed tubers submitted for trials should be accompanied by an EU plant passport and be sealed by part of the plant passport/label.
- 8.2 Seed tubers submitted for trials from seed stocks grown in the European Union should be accompanied by an EU plant passport. Each package or container holding the seed tubers submitted for trials should be sealed by part of the plant passport/label.
- 8.3 Applicants wishing to submit seed tubers which have been propagated within the EU and which do not meet the requirements for the issue of a plant passport may apply for temporary authorisation under Regulation 20 of the Plant Health (Official Controls and Miscellaneous Provisions) (Scotland) Regulations 2019, or the equivalent legislation in England, Wales and Northern Ireland. Any authorisation granted will be subject to conditions and a copy must accompany the seed tubers.
- 8.4 Applicants wishing to submit seed tubers which have been produced outside the EU must initially apply for a licence under the Plant Health (Official Controls and Miscellaneous Provisions) (Scotland) Regulations 2019, or the equivalent legislation in England, Wales and Northern Ireland to bring a restricted number of tubers through quarantine. Only the produce of these tubers further multiplied in the EU and meeting the requirements in 8.1, 8.2 or 8.3 will be eligible for tests and trials.
- 8.5 All packages of GM material must be clearly labelled as “GMO” or “Genetically Modified Organism”.

Section C – Growing Test Procedures

1 Purpose

- 1.1 The purpose of this section is to provide details of the procedures used in the growing tests for DUS analysis.

2 Scope

- 2.1 These procedures apply to all varieties of potato.

3 Responsibilities

- 3.1 The Test Centre is responsible for conducting these procedures.
- 3.2 The Test Centre will be responsible for ensuring that material supplied to them is not used for any purpose other than the conduct of these procedures, the release of reference samples for authorised purposes. (See Section E7) or the production of seed potato nuclear stock, if authorised by the breeder or agent.

4 Reference Varieties

- 4.1 The principles governing the selection of reference varieties are set out in Appendix 1.
- 4.2 Seed of reference varieties will be supplied by the Test Centre.

5 Design of Tests

- 5.1 Tests are normally conducted over 2 years but a third year test may be conducted if further evidence is required.

5.2 Sprout Test

Sprout characteristics are assessed following a procedure similar to that described by A Howing, R. Suk & B. Ros (1986. *Acta Horticulturae* 182: 359-363). In February or early March, tubers are mounted, rose end uppermost, on pins under a very low light intensity (small incandescent light bulbs, approx.. 6 volt, 0.05 amp). There are a minimum of 5 replications for each variety. After c 12 weeks incubation at 20°C, the characteristics 1 to 11 listed in Section D 5.1 and as described in Appendix 2 are recorded in comparison with the example varieties.

5.3 Growing Test

- 5.3.1 The Test Centre is responsible for selecting a suitable site which should be on ground that has normally not had a potato crop in the previous five years but the interval may be less where the risk is negligible.
- 5.3.2 Field husbandry should follow best local practice for all operations and particularly as regards cultivation, drilling, fertiliser and spray application, use of irrigation, and control of pests and diseases.
- 5.3.3 Test varieties will be planted in plots, each containing a minimum of 40 plants. There will be 2 replications of which one may also be used for VCU purposes. In this latter replication, the varieties will be planted according to VCU maturity group i.e. first early or

second early and maincrop. In the other replication, varieties will be planted according to 5 DUS maturity groups: very early, early, medium, late and very late. Varieties will be randomised within each maturity replication.

- 5.3.4 Seed tubers should be spaced 25 to 35 cm apart for very early varieties and 30 to 40 cm apart for all other maturity groups.
- 5.3.5 The candidate varieties may be grown in a single row plots for comparison with very similar varieties, particularly if these are identified.

6 Records and Recording

- 6.1 All records and plot data should be in a form determined and validated by the Test Centre.
- 6.2 Characters, recording details and instructions are given in Section D. Any variant and abnormal plants or plants resulting from an adverse reaction to husbandry practice are recorded but excluded from the sample. Diseased plants will also be excluded.
- 6.3 In the first recording year, characters, as indicated in Section D 5.1, are assessed on all candidate varieties and the data analysed to determine the most similar reference varieties. (For details see Section G).
- 6.4 In the second recording year, characters, as indicated in Section D 5.1, are assessed on all candidate varieties and the data analysed and, together with those from the first year, used to determine the distinctness of a candidate variety. (For details see Section G). Uniformity and stability are determined visually over 2 years.
- 6.5 If the Test Centre notices unusual or novel characters in a candidate variety, a note and a photographic record may be made at any time.

7 Communications with the Applicant

- 7.1 The Test Centre will notify the applicant or his agent of any DUS problems at the earliest practical opportunity through interim (1 year) reports. All such notifications must be copied to APHA.
- 7.2 If considerations of confidentiality allow, the applicant should be informed which variety is similar to his own and be invited to submit any information which may help to distinguish them.
- 7.3 If DUS problems arise, applicants will be invited to visit the DUS tests by arrangement so that the material can be examined and discussions held with the Test Centre.
- 7.4 After each recording season, the results may, if necessary, be summarised and reported to the applicant and APHA by the Test Centre.

Section D – Summary of DUS Characteristics to be Assessed, Method of Assessment and Standards Applied

1 Purpose

- 1.1 The purpose of this section is to summarise the characteristics to be assessed.

2 Scope

- 2.1 This section summarises characteristics, states of expression, method of observation and standards required for DUS assessment.

3 Responsibilities

- 3.1 The Test Centre is responsible for co-ordinating the procedures in this summary.

4 Organisation

- 4.1 The minimum duration of tests to assess characteristics should normally be two growing periods. Shorter periods may be applied for assessment of additional characteristics. Additional growing periods may be approved by the UK National List and Seeds Committee.

5 DUS Characteristics to be Assessed

5.1 Routine Characteristics

The following table summarises the DUS characteristics to be routinely examined. Notes and instructions on recording the characteristics are provided at Appendix 2 and referenced in Tables as follows: a) = Sprouts, b) = Plant Foliage, c) = Buds / Inflorescences / Flowers, and d) = Plant at Haulm Senescence, e) = Tuber after Harvest.

All characteristics, other than 31 (Plant: time of maturity), are recorded by visual assessment by a single observation of a group of plants or parts of plants (VG). Character 31 is recorded by measurement of a group of plants or plant parts (MG).

For each characteristic, a state of expression other than those listed can be recorded where it is clear that the characteristic is on a continuous scale. For example, character 1 gives 3 example states but states between these examples and at either end are possible and should be recorded.

Note: *denotes a characteristic which must be examined according to Commission Directive 2003/90/EC, the CPVO protocol and/or UPOV Guidelines.

G denotes a UPOV grouping characteristic.

QN indicates a qualitative character i.e. the range of variation is continuously expressed in one dimension. States of expression are primarily for descriptive purposes and not for distinctness.

PQ indicates a pseudo-qualitative character i.e. the range of variation is at least partly continuous, but is expressed in more than one dimension.

A. Sprouts

DUS characteristics to be routinely examined for sprouts

CPVO TP/23/3	UPOV TG/23/6	Character	Optimal Stage for Assessment	State of Expression	Example Varieties (UK options in italics)	Available number of states
1*	1	Lightsprout: size	After 12 weeks incubation	3=Small 5=Medium 7=Large	Laura, <i>Golden Wonder</i> Diamant, Victoria Gloria, Solist	9 states
2*	2*	Lightsprout: shape of base	After 12 weeks incubation	1=Spherical 2=Ovoid 3=Conical 4=Broad cylindrical. 5=Narrow cylindrical.	Albatros, <i>Alpha</i> Laura, Marabel, <i>Cara</i> Bintje, Solist Diamant, Innovator Valfi, <i>Spunta</i>	5 states
3*	3*	Lightsprout: anthocyanin colouration of base	After 12 weeks incubation	1=Absent or very weak 3=Weak 5=Medium 7=Strong 9=Very strong	Estima Sante, Solist <i>Dunbar Standard</i> Arielle, <i>Desiree</i> Abbot, Granola, Victoria, <i>Kerr's Pink</i> Avano, <i>Red Duke of York, Montana</i>	9 states
4* G	4* G	Lightsprout: proportion of blue in anthocyanin colouration of base	After 12 weeks incubation	1=Absent or low 2=Medium 3=High	Arielle, Desiree, Solist, Victoria Abbot, Pamina Avano, <i>Record</i>	9 states
5*	5*	Lightsprout: pubescence of base	After 12 weeks incubation	1=Absent or very weak 3=Weak 5=Medium 7=Strong 9=Very strong	Valfi, <i>Sante</i> Goldmarie, <i>Pentland Dell</i> Albatros, Laura, <i>Maris Piper</i> Abbot Oxania, <i>Dunluce</i>	9 states
6*	6	Lightsprout: size of tip in relation to base	After 12 weeks incubation	3= Small 5=Medium 7=Large	Laura, <i>Estima</i> Albatros, King Edward, Ukama Abbot, Ernstestolz, <i>Dunbar Standard</i>	9 states
7*	7	Lightsprout: habit of tip	After 10 weeks incubation	1=Closed 3=Intermediate 5=Open	Laura, <i>Estima</i> Arielle, Rita, <i>Catriona</i> Diamant, Solist, <i>Arran Pilot</i>	5 states
8*	8	Lightsprout: anthocyanin colouration of tip	After 12 weeks incubation	1=Absent or very weak 3=Weak 5=Medium 7=Strong 9=Very strong	Estima, Innovator Solist Laura, Spunta Agria, <i>Montana</i> Valfi, <i>Red Duke of York</i>	9 states
9*	9	Lightsprout: pubescence of tip	After 12 weeks incubation	1=Absent or very weak 3=Weak 5=Medium 7=Strong 9=Very Strong	Goldmarie, <i>Maris Piper</i> Laura, Valfi Albatros Abbot, Camilla	9 states
10*	10*	Lightsprout: number of root tips	After 12 weeks incubation	3=Few 5=Medium 7=Many	Estima, Solist, <i>Craigs Royal</i> Arielle, Bintje, <i>Catriona</i> Innovator, <i>Maris Piper</i>	9 states
11*	11	Lightsprout: length of lateral shoots	After 12 weeks incubation	3=Short 5=Medium 7=Long	Laura, Producent, <i>King Edward</i> Estima, Princess, <i>Kerr's Pink</i> Spunta	9 states

B. Plant at Flower Bud Stage

DUS characteristics to be routinely examined for plant at flower bud

CPVO TP/23/3	UPOV TG/23/6	Character	Optimal Stage for Assessment	State of Expression	Example varieties (UK options in <i>italics</i>)	Available number of states
12*	12	Plant: foliage structure	Flower Bud	1=Stem Type 2=Intermediate 3=Leaf Type	Agria, <i>Estima</i> , <i>Pentland Dell</i> <i>Premiere</i> , <i>Desiree</i> <i>Kennebec</i> , <i>Shannon</i>	3 states
13*	13*	Plant: growth habit	Flower Bud	3=Upright 5=Semi-upright 7=Spreading	<i>Victoria</i> , <i>Dunbar Standard</i> <i>Desiree</i> , <i>Secura</i> , <i>King Edward</i> <i>Solist</i> , <i>Arran Banner</i>	9 states
14*	14*	Stem: anthocyanin colouration	Flower Bud	1=Absent or very weak 3=Weak 5=Medium 7=Strong 9=Very strong	<i>Estima</i> <i>Atlantic</i> , <i>Victoria</i> , <i>Pentland Crown</i> <i>Laura</i> , <i>Saturna</i> , <i>Bintje</i> <i>Desiree</i> , <i>Pentland Dell</i> <i>Valfi</i> , <i>Arran Victory</i>	9 states
15*	15	Leaf: outline size	Flower Bud	3=Small 5=Medium 7=Large	<i>Kingston</i> <i>Laura</i> , <i>Majestic</i> <i>Kennebec</i> , <i>Merlin</i>	9 states
16*	16	Leaf: openness	Flower Bud	1=Closed 3=Intermediate 5=Open	<i>Albatros</i> , <i>Likaria</i> , <i>Record</i> <i>Premiere</i> , <i>Solist</i> , <i>Majestic</i> <i>Goldmarie</i> , <i>Arran Consul</i>	5 states
17*	17	Leaf: presence of secondary leaflets	Flower Bud	3=Weak 5=Medium 7=Strong	<i>Solara</i> , <i>Goldmarie</i> , <i>Desiree</i> <i>Solist</i> , <i>Majestic</i> <i>Hercules</i> , <i>Victoria</i> , <i>Cara</i>	9 states
18*	18	Leaf: green colour	Flower Bud	3=Light- 5=Medium 7=Dark	<i>Solist</i> , <i>Estima</i> <i>Ulme</i> , <i>Victoria</i> , <i>Maris Piper</i> <i>Spunta</i> , <i>Sierra</i>	9 states
19*	19	Leaf: anthocyanin colouration on midrib of upper side	Flower Bud	1=Absent or very weak 3=Weak 5=Medium 7=Strong 9=Very strong	<i>Solist</i> , <i>Estima</i> <i>Avano</i> , <i>Russet Burbank</i> , <i>Majestic</i> <i>Laura</i> , <i>Kerr's Pink</i> <i>Romanze</i> , <i>Desiree</i> <i>Bildstar</i> , <i>Roseval</i> , <i>Arran Victory</i>	9 states
20*	21	Second pair of lateral leaflets: width in relation to length	Flower Bud	3=Narrow 5=Medium 7=Broad	<i>Innovator</i> , <i>Russet Burbank</i> , <i>Arran Consul</i> <i>Desiree</i> , <i>Majestic</i> <i>Romano</i>	9 states
21*	22	Terminal and lateral leaflets: frequency of coalescence	Flower Bud	1=absent or very low 3=Medium 5=Very high	<i>Courage</i> <i>Goldmarie</i> , <i>Ulster Prince</i> <i>Cardinia</i> , <i>Alex</i>	5 states
22*	27*	Flower bud: anthocyanin colouration	Flower Bud	1=Absent or very weak 3=Weak 5=Medium 7=Strong 9=Very Strong	<i>Solist</i> , <i>Estima</i> <i>Isle of Jura</i> , <i>Panda</i> <i>Victoria</i> , <i>Maris Piper</i> <i>Osprey</i> <i>Valfi</i> , <i>British Queen</i> , <i>Argos</i>	9 states

C. Buds / Inflorescences / Flowers

DUS characteristics to be routinely examined at buds / inflorescences / flowers

CPVO TP/23/3	UPOV TG/23/6	Character	Optimal Stage for Assessment	State of Expression	Example Varieties (UK options in <i>italics</i>)	Available number of states
23*	29*	Plant: frequency of inflorescences	Flowering	1=Absent or very low 3=Low 5=Medium 7=High 9=Very high	King Edward, Rosalind (<1) Arielle, <i>Estima</i> (1-5) Laura, Rita, <i>Home Guard</i> (5-15) Agria, Innovator, <i>Kerr's Pink</i> (15-30) Sibu, <i>Maris Piper</i> (>30) a % Plants in Flower b Infls/Plant) c Flowers/Infl. No/Plant = $\frac{a \times b \times c}{100}$	9 states
24*	30*	Inflorescence: size	Flowering	3=Small 5=Medium 7=Large	Accent, Estima, Solist Rubesse, <i>Desiree</i> Innovator, <i>Pentland Ivory</i>	9 states
25*	31	Inflorescence: anthocyanin colouration on peduncle	Flowering	1=Absent or very weak 3=Weak 5=Medium 7=Strong 9=Very strong	Estima, Solist, Victoria, <i>Pentland Ivory</i> Saturna, <i>Dunbar Standard</i> <i>Desiree</i> , <i>Maris Piper</i> Blau St Geller	9 states
26*	32	Flower corolla: size	Flowering	1=Very Small 3=Small 5=Medium 7=Large 9=Very Large	<i>Rhona</i> Avano, Sommergold, <i>Pentland Javelin</i> Laura, <i>Arran Comet</i> Innovator Rioja, Roseval	9 states
27* G	33* G	Flower corolla: intensity of anthocyanin colouration on inner side	Flowering	1=Absent or very weak 3=Weak 5=Medium 7=Strong 9=Very Strong	Solist, <i>Pentland Dell</i> Laura, Pirol, Secura, <i>Desiree</i> Osprey, Quadriga, <i>Up to Date</i> Courage, Valfi Ramona, <i>Mayan Gold</i> , <i>Trixie</i>	9 states
28* G	34* G	Flower corolla: proportion of blue in anthocyanin colouration on inner side	Flowering	1=Absent or low 2=Medium 3=High	Laura, Osprey, <i>Maris Piper</i> Courage, Secura Pirol, Quadriga, Valfi	3 states
29*	35*	Flower corolla: extent of anthocyanin colouration on inner side	Flowering	1=absent or very small 3=Small 5=Medium 7=Large 9=Very large	Laura, <i>Ulster Concord</i> Pirol, <i>Maris Piper</i> Panda, <i>Arran Comet</i> Courage	9 states
30*	28	Plant: height	Flowering	1=Very short 2=Short 3=Medium 4=Tall 5=Very tall	Mimi <i>Duke of York</i> Arielle, Leyla, <i>Desiree</i> <i>Maris Piper</i> Panda, <i>Pomeroy</i>	5 states

D. Plant at Haulm Senescence

DUS characteristics to be routinely examined at the plant at haulm senescence

CPVO TP/23/3	UPOV TG/23/6	Character	Optimal Stage for Assessment	State of Expression	Example Varieties (UK options in italics)	Available number of states
31* G	36* G	Plant: time of maturity	Foliage ripening	1=Very early 3=Early 5=Medium 7=Late 9=Very late	Christa, Solist, <i>Duke of York</i> Cilena, Courage, <i>Estima</i> Laura, Nicola, <i>Desiree</i> Avano, <i>Pentland Crown</i> Producent, Kuras, <i>Cara</i>	9 states

E. Tuber after Harvest

DUS characteristics to be routinely examined at the tuber after harvest

CPVO TP/23/3	UPOV TG/23/6	Character	Optimal Stage for Assessment	State of Expression	Example Varieties (UK options in italics)	Available number of states
32*	37*	Tuber: shape	After harvest	1=Round 2=Short-oval 3=Oval 4= Long-oval 5=Long 6=Very long	Kuras, <i>Kerr's Pink</i> Courage, <i>Record</i> Diamant, Rubesse, <i>Estima</i> Linda, Innovator, <i>Pentland Dell</i> Spunta, <i>Golden Wonder</i> , <i>Ratte</i> Pompadour, <i>Pink Fir Apple</i>	6 states
33*	38*	Tuber: depth of eyes	After harvest	1=Very shallow 3=Shallow 5=Medium 7= Deep 9=Very deep	Nadine Agria, Innovator, <i>Pentland Crown</i> Courage, Erntestolz, <i>Kerr's Pink</i> Elles, Kuras, <i>Epicure</i> <i>Joshua</i>	9 states
34* G	39* G	Tuber: colour of skin	After harvest	1=Light beige 2=Yellow 3=Reddish brown 4=Light red 5=Medium red 6=Dark red 7=Red parti-coloured 8=Blue 9=Blue parti-coloured	Nadine Solist SF Balu, <i>Ivory Russet</i> Rosalind, <i>Kerr's Pink</i> Laura Romanze, <i>Darkred Chieftain</i> <i>Cara</i> , <i>King Edward</i> Valfi, <i>Edzell Blue</i> Catriona, Kestrel	9 states
35		Tuber: smoothness of skin	After harvest	1=Smooth 2=Medium 3=Rough	SF Balu, <i>Pentland Ivory</i> Solist, <i>Record</i> Ivory Russet, <i>Golden Wonder</i>	3 states
36*	40*	Tuber: colour of base of eye	After harvest	1=White 2=Yellow 3=Red 3=Blue	Nadine Agria, Solist Quarta, Romanze, <i>Cara</i> Purple Majesty, <i>Catriona</i>	4 states
37*	41*	Tuber: colour of flesh	After harvest	1=White 2=Cream 3=Light Yellow 4=Medium yellow 5=Deep yellow 6=Red 7=Red parti-coloured 8=Blue 9=Blue parti-coloured	Kuras, Russet Burbank Desiree, <i>Estima</i> Diamant, Solist Bildstar, Quarta Princess, Laura, <i>Saturna</i> Red Emmalie, <i>Salad Red</i> Early Rose Purple Majesty Herd Laddie	9 states

6 Other Characteristics Recorded

The following table summarises other characteristics which have been approved by the NLSC and may be recorded and stored on SASA's variety database. Information obtained from these characteristics will not be included in the DUS decision or report.

Other NLSC approved characteristics

CPVO TP/23/3	UPOV TG/23/6	UK	Character	Optimal Stage for Assessment	State of Expression	UK Example varieties	Available number of states
	23	22 QN	Leaflet: waviness of margin	Flower Bud	1=Absent or very weak 3=Weak 5=Medium 7=Strong 9=Very strong	Umatilla Russet Grata Marabel, <i>Home Guard</i> Aiko Sava, <i>Riviera, Waregem</i>	9 states
	24	23 QN	Leaflet: depth of veins	Flower Bud	3=Shallow 5=Medium 7=Deep	Pirol, <i>Home, Guard</i> Premiere Bernadette, <i>Red Pontiac</i>	9 states
		33 QN	Flower corolla: pigment on rear (White Flowers)	Flowering	1=Absent 9=Present	<i>Estima</i> <i>Majestic</i>	2 states

6.1 UK Additional DUS Characteristics

There are other additional characteristics which have been used by the UK in the past, but which are not accepted by the CPVO. It might be possible to use these characters in decisions for NL and UK PBR but, without detailed discussion and eventual acceptance by the CPVO, any DUS reports using these characters will not be accepted for EU Plant Breeders Rights. For further information, please contact APHA Tel. No.01223 342396. A fee may be charged for examination of these characteristics as advised by APHA. Applicants can suggest new additional characters on the Technical Questionnaire for testing DUS or after notification by the DUS Test Centre of distinctness problems. (For procedures see Section F).

Section E – Reference Seed Stock Maintenance and VCU Seed Stock Authentication Procedures

1 Purpose

- 1.1. This section sets out the procedures for reference seed stock maintenance and VCU seed stock authentication.

2 Scope

- 2.1 These procedures apply to all reference collection varieties and VCU seed submissions where the VCU seed has not been taken from the same bulk as the seed used for the DUS test.

3 Responsibilities

- 3.1 The Test Centre is responsible for conducting these procedures.

4 Procedures for Reference Seed Stock Maintenance

- 4.1 The seed sample submitted by the applicant for testing is considered to be the definitive stock of the variety. Subject to meeting the required health quality standards (see B 6), a few tubers will be transferred to the SASA reference potato variety collections and maintained annually as part of a living collection, except if the candidate variety is not accepted for National Listing.
- 4.2 Tubers may also be produced from microplants derived from the submitted seed sample which have been tested to comply with the requirements of Plant Health Directive 2000/29/EC. This material will then be incorporated into SASA's Reserve Virus Tested Potato Collection and will be used to renew varieties in the main reference collection, as appropriate.

5 Procedures for VCU Seed Stock Authentication

- 5.1 Evidence will be requested from the breeder of the relationship between the VCU seed sample and the definitive DUS seed sample. Sprouts, plants and tubers will be compared visually with the definitive stock over the recording season, if necessary.
- 5.2 If the new seed sample cannot be visually distinguished from the reference stock, it will be accepted as representing the variety.
- 5.3 If the VCU seed sample can be distinguished visually from the definitive stock in the authentication plots, then it will not be accepted as representing the candidate variety.

6 Procedures for the Inclusion of New Common Knowledge Varieties into the Reference Collection

- 6.1 When a new variety enters into common knowledge such that it must be included in the reference collection for comparative purposes, a request will be sent by the Test Centre to the Testing Authority which has added this variety to its National List for the supply of at least 4 tubers. A UPOV description may also be requested from the Testing Authority.

7 Release of Reference Samples for Authorised Purposes

- 7.1 A maximum of 5 tubers of seed of reference samples can be supplied by the Test Centre, on request, to UK, EU and UPOV DUS Testing Authorities and UK, EU and UNECE Seed Certification Agencies, provided the recipient is notified in writing that this material, or any material derived from it, must not be supplied to a Third party or used for any other purpose than as a reference for official DUS testing or seed certification. Varieties which are in the public domain can be supplied subject to a germplasm acquisition agreement.
- 7.2 Provision of reference samples, other than in 7.1, to any other parties must be authorised by APHA.

Section F – Procedures for Assessment of New additional DUS Characteristics

1 Purpose

- 1.1 This Section sets out the procedures for assessment of new additional DUS characters for varieties of potato entered for National List trials and PBR.

2 Scope

- 2.1 These procedures apply to applications where new additional DUS characteristics which have not been approved by the NLSC are requested for use for determinations of DUS.

3 Responsibilities

- 3.1 The Test Centre is responsible for liaising with the applicant to produce a proposed procedure for the conduct of new tests. This procedure must ensure that Distinctness, Uniformity and Stability will be assessed.
- 3.2 All new additional characteristics must be authorised by the National List and Seeds Committee.

4 Reference Varieties

- 4.1 The reference varieties will include only those varieties from which the candidate variety is not distinct, as well as other appropriate varieties for control purposes.
- 4.2 Seed of reference varieties will be supplied by the Test Centre.

5 Procedures

- 5.1 Details of the proposed special test or assessments will be submitted to the NLSC to consider the feasibility of setting up a test acceptable to the UK Authorities. The applicant will be advised by APHA of arrangements and costs.
- 5.2 The NLSC will consider the results of the commissioned test or trial when reaching its recommendation on the granting of Plant Breeders' Rights and/or National Listing.
- 5.3 Where the test for a character is approved by the NLSC it should be subsequently listed in Section D5.1.

Section G – Procedures for DUS Decisions

1 Purpose

- 1.1 This section sets out the procedures for assessing DUS decisions on varieties of potato.

2 Scope

- 2.1 These procedures apply to all varieties of potato entered for National List and Plant Breeders' Rights tests and those being tested for Foreign Authorities.

3 Responsibilities

- 3.1 The Test Centre is responsible for applying the criteria for DUS, set out in this procedure.
- 3.2 The Test Centre is responsible for producing the DUS reports in accordance with these procedures and for ensuring that they are in accordance with the UPOV Guidelines.

4 Reference Varieties

- 4.1 Appendix 1 sets out which varieties are considered as reference varieties for these procedures.

5 Distinctness

- 5.1 In accordance with associated document UPOV TG1/3, varieties can be considered distinct where they have a different expression in a grouping character from varieties in the reference collection identified as being similar. For PQ characters, the difference must be clear i.e. at least 1 state and, for QN characters, the difference must be visually clear or consistent.
- 5.2 Where varieties are grown in close proximity under the same conditions, and a direct comparison can be made, distinctness may be determined on the basis of visual observation. In these circumstances, the basis for distinctness will be clearly recorded.

6 Uniformity

- 6.1 Uniformity is assessed visually for all characteristics used to establish Distinctness.
- 6.2 Any variants identified by visual assessment are marked and counted, and their proportions calculated. Variants are defined as plants which are clearly not of the variety. Care is taken to ensure that the plants which are counted are not the result of any non-genetic factors such as environment, pest or disease or husbandry.
- 6.3 After the variants and abnormal plants have been excluded, the characters listed in Section D are used to assess the uniformity of the remaining plants.
- 6.4 Uniformity is assessed in both years of the two year test period and in further years for those characteristics being assessed for distinctness.
- 6.5 For characters which are not measured, the uniformity standard is tabulated in UPOV TC/34/5. The total number of variants in the two test years is calculated to give the value "k" and the total number of plants in the two test years gives the value "n". Where a third

year of uniformity data is required, the same principle, i.e. that of adding the numbers of variants and the total numbers of plants examined, is applied.

7 Stability

- 7.1 A variety is considered sufficiently stable when there is no evidence to indicate that it lacks uniformity or fails to conform to the essential characteristics of its description in different submissions or in different tests.

8 DUS Report and Variety Description

- 8.1 Upon completion of the DUS examination, the DUS Summary report will be submitted to APHA by the specified date. This report will specify all non-routine characteristics for establishing distinctness.
- 8.2 The final DUS report, including the full variety description, will be submitted to APHA by the specified date. The characteristics to be used in the description are identified in Section D.

Appendix 1 - Reference Collection Varieties

1 National Listing

- 1.1 The DUS reference collection, for NL purposes, for any given category of plant variety comprises the following at the time when the application for the candidate is made:
 - 1.1.1 All other candidate varieties already in DUS test in the UK, or entering testing at the same time as the candidate, including those being tested for other Member States.
 - 1.1.2 All varieties on the UK National List and varieties on the EU Common Catalogue whose seed is known to be certified or marketed in the UK.
 - 1.1.3 Varieties nominated by the authorities concerned where tests are done for other Member States.
 - 1.1.4 Any varieties nominated by the applicant as being comparable i.e. known to be similar.
 - 1.1.5 Any other varieties considered to be comparable i.e. known to be similar by the appropriate Test Centre or DUS Centre Group.

2 Plant Breeders' Rights

- 2.1 The DUS reference collection, for PBR purposes, for any given category of plant variety comprises the following at the time when the application for the candidate is made:
 - 2.1.1 All other candidate varieties already in DUS tests in the UK, or entering DUS testing at the same time as the candidate, including those being tested for other Member States or the Community Plant Variety office (CPVO).
 - 2.1.2 Varieties protected in the UK, EU or in a UPOV Member State, which are known to be similar to the candidate variety.
 - 2.1.3 Other available comparable varieties in common knowledge.

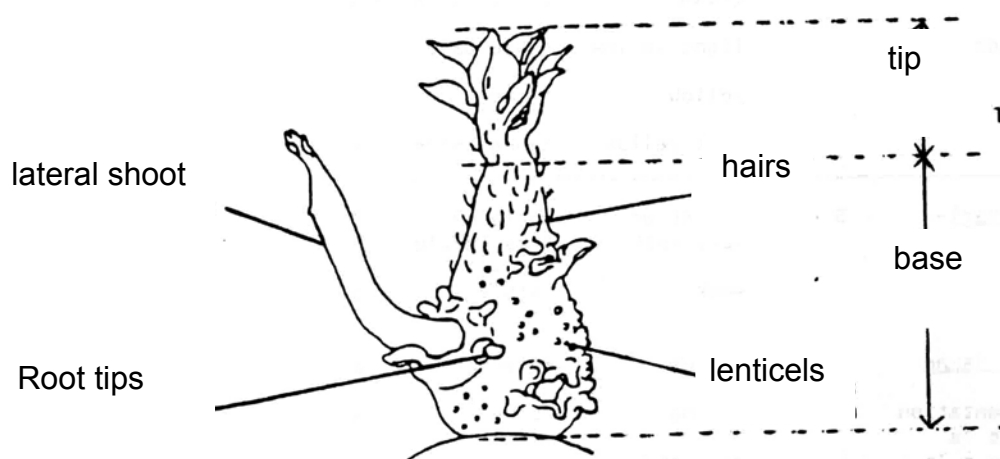
Appendix 2 – Potato Variety Description

(CPVO Protocol – reference TP/023/3)

Notes and Instructions

A) Sprouts

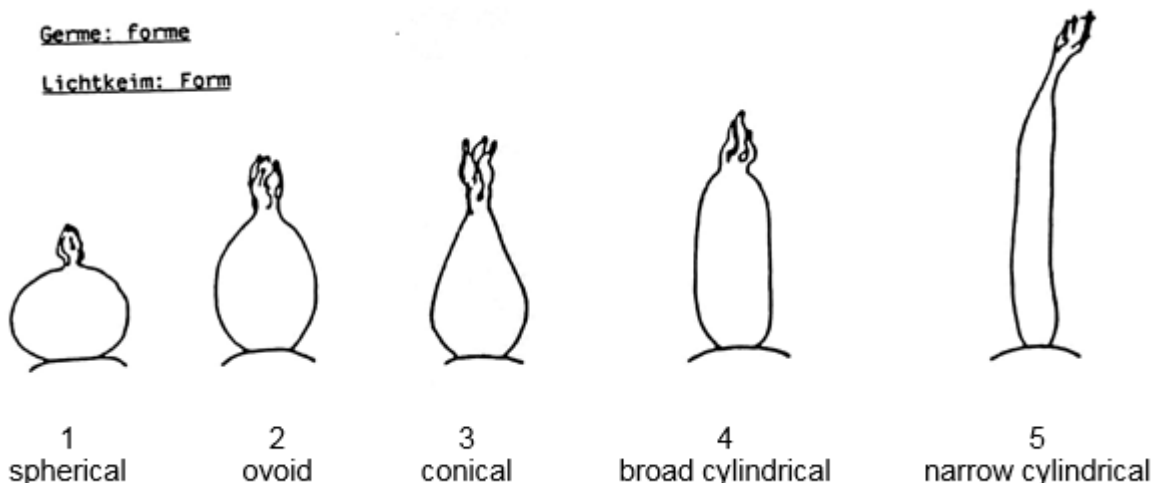
Characters 1 - 11 – Light sprout



Sprout characters should be noted on at least 5 tubers sprouted for 12 weeks at 20°C under diffuse artificial lighting in a light sprout cabinet (see Houwing A, Suk R and Ros B (1986), *Acta Horticulturae* **182**).

The spectrum of the light source is the most determining factor for the expression of characteristics of lightsprouts. A good expression of characteristics is obtained with lightsprouts growing in a cabinet at room temperature under exclusion of day light and under continuous light of small incandescent bulbs (6V AC/0.05 A, 7-10 per square meter, 20-30cm above the tubers).

Character 2: Shape of base



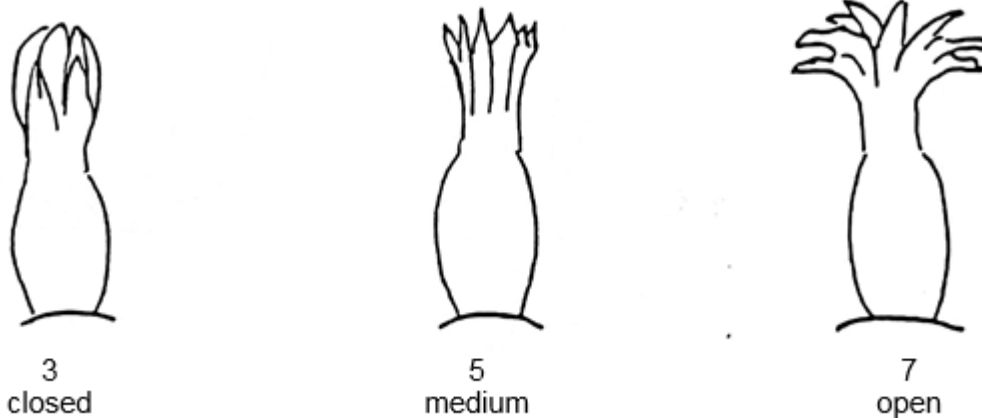
Character 3: intensity of anthocyanin colouration of base.

If lightsprout appears green, then record as “absent”

Character 4: proportion of blue in anthocyanin colouration of base

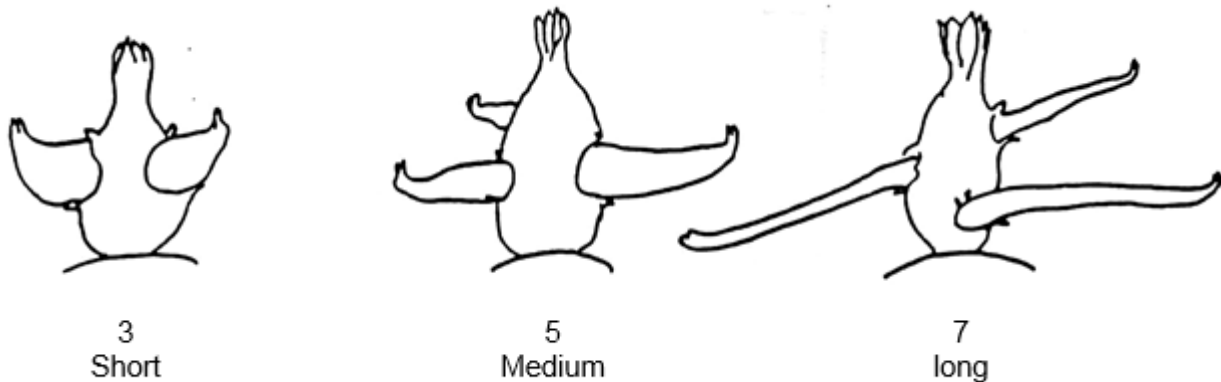
The colour results from a red and blue component. If the proportion of blue is low, the anthocyanin appears red violet. If the proportion of blue is high, the anthocyanin appears blue violet.

Character 7: habit of tip



This characteristic should be observed after about 10 weeks to obtain a good differentiation in the collection.

Character 11: length of lateral shoots



B) Plant Foliage

Characters 12 – 22

These records on foliage should be made when flower buds are clearly fully developed on the plants and just before the first flowers are fully opened throughout the plot.

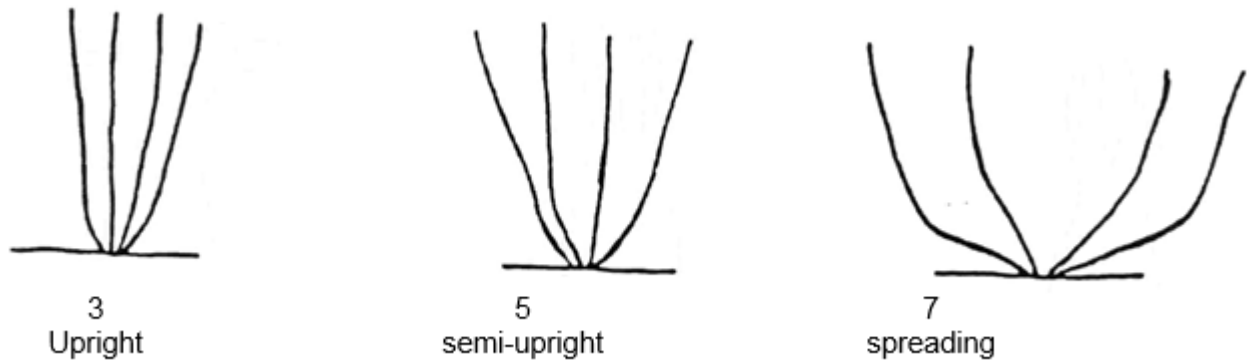
Character 12: foliage structure

Stem-type: foliage open, stems clearly visible

Intermediate: foliage half open, stems partly visible

Leaf-type: foliage closed, stems not or hardly visible

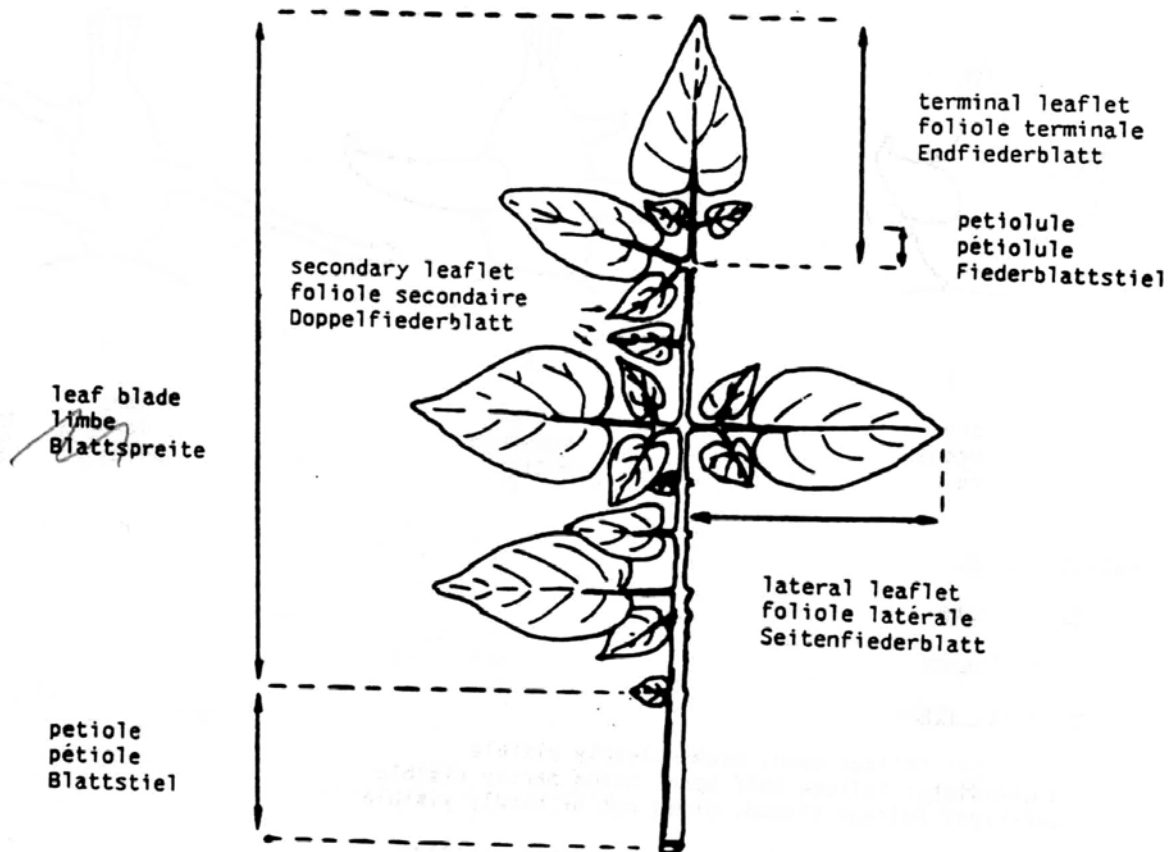
Character 13: Growth habit



Character 14: Stem: anthocyanin colouration

Intensity should be observed on the lower three quarter of the stems.

Characters 15 - 22: Leaf



Leaves and leaflets selected for detailed description should be fully formed and expanded and are those normally inserted about half way up the stem.

Character 16: Openness



3
Closed

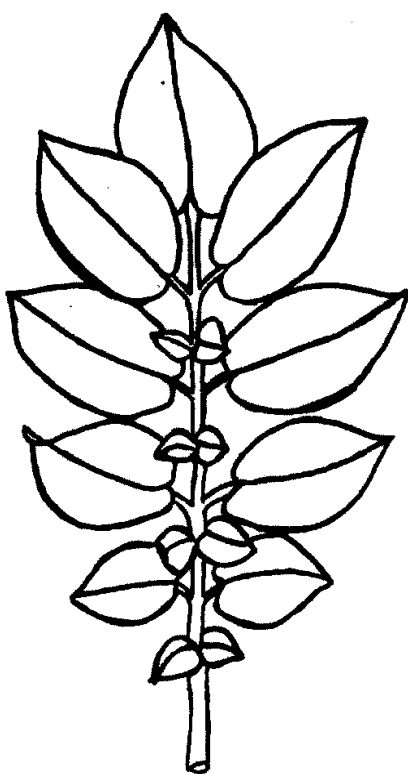


5
medium

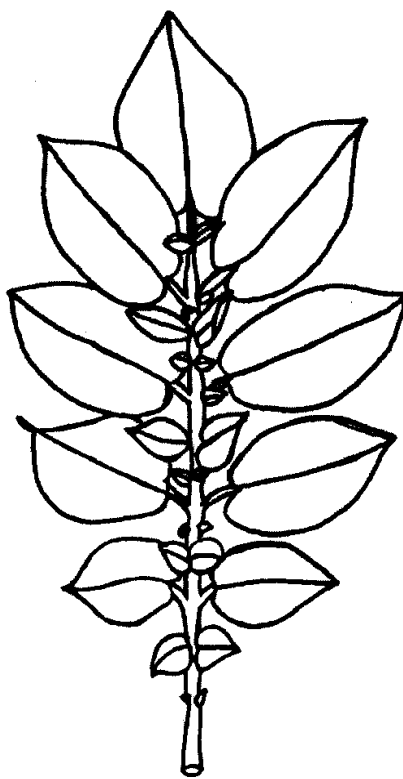


7
open

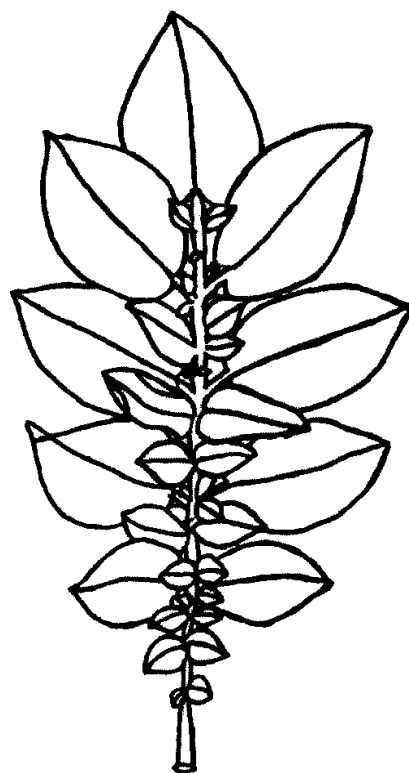
Character 17: presence of secondary leaflets



3
weak



5
medium

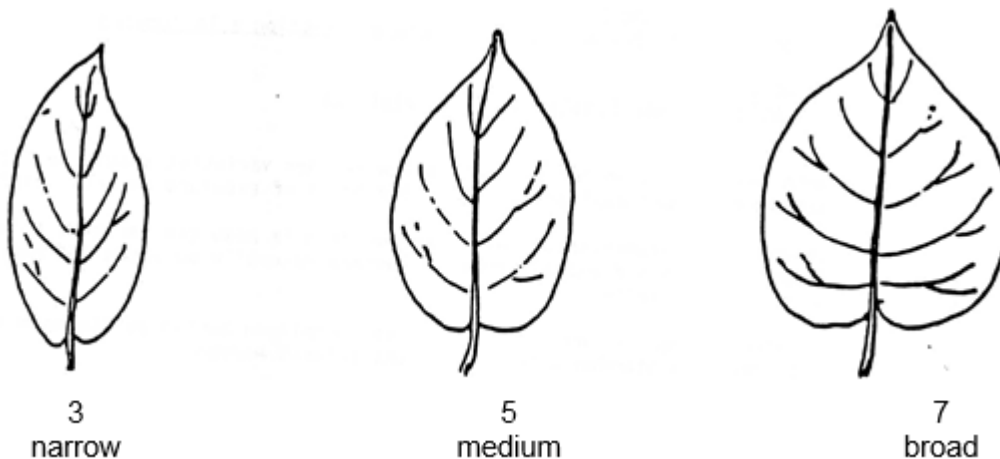


7
strong

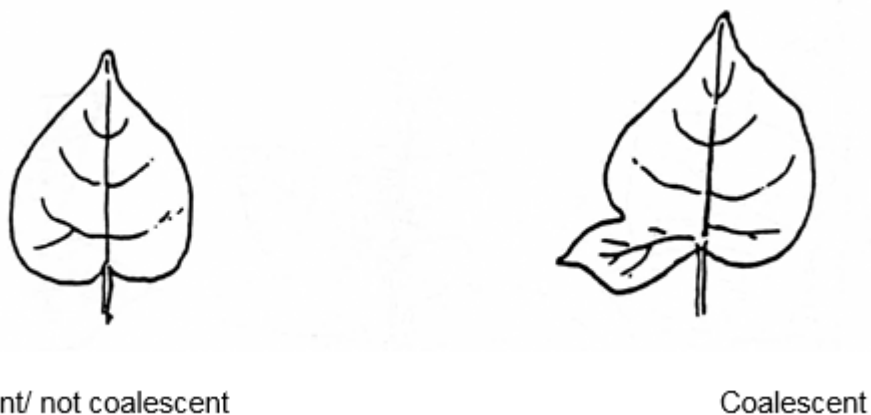
Character 19: Leaf anthocyanin colouration

The intensity of the anthocyanin colouration should be observed. The extension and the distribution should not be considered.

Character 20: Second pair of lateral leaflets: width in relation to length



Character 21: Terminal and lateral leaflets: frequency of coalescence

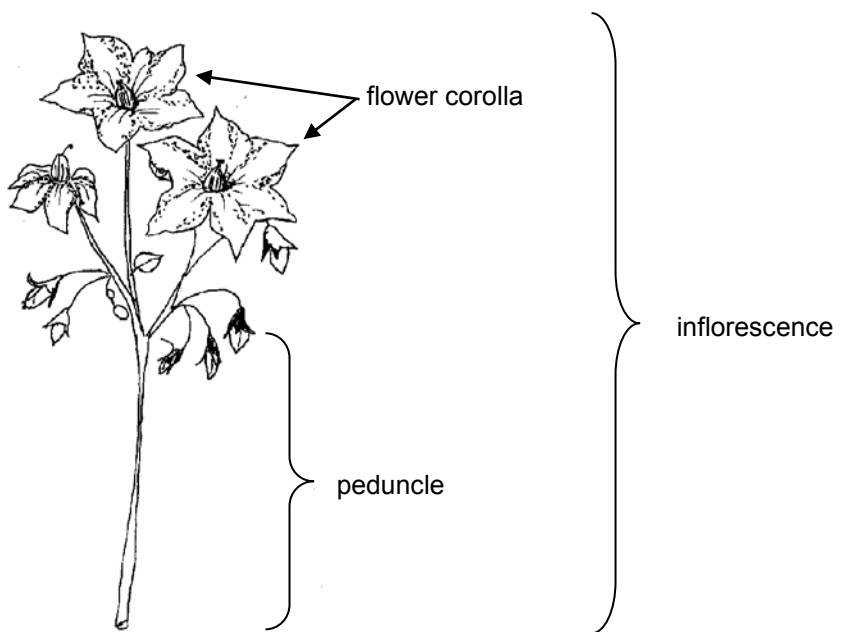


Character 22: Flower bud anthocyanin colouration

The observations should be made on fully developed buds before the corolla is visible.

C) Buds / Inflorescence / Flowers

Characters 23 - 30



Character 23: Frequency of inflorescences

The frequency of inflorescences may be determined by dividing the product of the percentage plants in flower, the number of inflorescences per plant and the number of flowers per inflorescence by one hundred.

Characters 25, 27: Anthocyanin colouration

The intensity of the anthocyanin colouration should be observed. The extension and the distribution should not be considered.

At least one and if possible two later observations should be made to confirm flower descriptions.

D) Plant at Haulm Senescence

Character 31: Plant: time of maturity

The time of maturity is reached when 80% of the leaves are dead.

E) Tuber after Harvest

Characters 32 – 37

Character 32: Shape

- 1 round
- 2 short-oval
- 3 oval
- 4 oval-long
- 5 long-oval
- 6 very long

Characters 34 and 36: Colour of skin and base of eye

Colour of skin and base of eye on tubers described as parti-coloured (i.e. the skin is incompletely pigmented), the distribution and intensity of pigmentation will be recorded. It is, however, recognised that expression of this characteristic may be variable and such a description will acknowledge that a proportion of the tubers may not be parti-coloured.

Character 37: Colour of flesh

Flesh colour should be determined by cutting at least 10 freshly lifted, ungreened ware tubers and comparing the flesh colour with those of the example varieties.



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