



Animal &
Plant Health
Agency

Great Britain and Northern Ireland Variety Lists / UK Plant Breeders' Rights Technical Protocol for Official Examination of Distinctness, Uniformity and Stability (DUS)

Turnip Rape

Brassica rapa L. subsp. campestris (L.) A. R. Clapham

November 2024

Changes

- Updated title from United Kingdom to Great Britain and Northern Ireland
- Updated Plant Breeders' Rights to UK Plant Breeders' Rights
- Updated species latin name to *Brassica rapa L. subsp. campestris (L.) A. R. Clapham*
- Updated relevant dates in document to 2024
- Section A
 - Section 3.1
 - Added “the” to Scottish and Welsh Ministers
 - Section 3.5
 - Removed Fax No
 - Section 4
 - Updated language
 - Section 7.1
 - Updated UPOV TGP from 8/4 to 8/5 and updated date.
- Section B
 - Section 4.1
 - Updated link to <https://www.gov.uk/national-lists-of-agricultural-and-vegetable-crops>
 - Section 5.1
 - Updated Seed Gazette to Gov website
 - Updated language to add “in the absence of exceptional circumstances”
- Section C
 - Section 2.1
 - Updated latin name to match title
 - Section 5.3
 - Added minimum duration of tests information
 - Section 5.5
 - Removed “and CPVO”
 - Section 6.3
 - Updated language

- Section 6.5
 - Updated language
- Section 7.2
 - Updated language
- Section 7.4
 - Updated language
- Section D
 - Section 4
 - Updated language
 - Section 5
 - Added “C Special Test” to type of observation of characteristics to cover character 1 and 2
 - Section 5.2
 - Updated characteristics
 - Section 5.3
 - Updated characteristics
- Section E
 - Section 6.1
 - Added language
 - Section 6.2
 - Updated language
- Section F
 - Section 3.2
 - Updated language
- Section G
 - Section 2.1
 - Updated latin name of species as per title
 - Section 6.9
 - Updated Scoring table

- Section 8.1
 - Updated language
- Section 8.2
 - Updated language

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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 where appropriate verification of Value for Cultivation and Use (VCU) submissions of Turnip Rape entered for Variety Listing (VL) Trials and/or Plant Breeders' Rights (PBR).

2 Scope

2.1 These procedures apply to all varieties of Turnip Rape. Special procedures and responsibilities for Genetically Modified (GM) varieties are set out in Sections A5 and A6.

2.2 Except where specified in this protocol or authorised by the Animal and Plant Health Agency (APHA), Plant Varieties and Seeds, only Variety List candidates, Plant Breeders' Rights candidates, candidates for Foreign Authorities and the reference varieties may be incorporated in the DUS tests.

3 Responsibilities

3.1 The growing tests and assessments in this protocol are carried out under the responsibility of the Secretary of State for Environment, Food and Rural Affairs, the Scottish Ministers, the Welsh Ministers and the Minister for Agriculture, Environment and Rural Affairs in Northern Ireland (the National Authorities).

3.2 They are supervised, on behalf of the National Authorities, by officials of the Testing Authorities, that is APHA, the Scottish Government (SG), the Department of Agriculture, Environment and Rural Affairs (DAERA) and the Welsh Government (WG).

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 Plant Varieties and Seeds, either directly or via the Test Centre.

3.4 The procedures are administered by:

Plant Variety Rights Office for the UK
Animal and Plant Health Agency
Eastbrook
Shaftesbury Road
Cambridge
CB2 8DR

Email: pvs.helpdesk@apha.gov.uk

3.5 Test Centre

The DUS growing tests and assessments in this protocol are coordinated and carried out by the:

Vegetable DUS Test Centre

SASA

Roddinglaw Road

Edinburgh Tel No 0131-244 8890

EH12 9FJ Email vegvarietytesting
 @sasa.gov.scot

3.6 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.

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

7.1 The following documents are associated with this protocol:

Reference	Title
UPOV TG/185/3	Guidelines for the Conduct of Tests for Distinctness, Uniformity and Stability, Turnip Rape (<i>Brassica rapa</i> L. var. <i>silvestris</i> (Lam.) Briggs.). 17.04.2002.
Turnip Rape VCU Procedures	United Kingdom Variety List Trials: Protocol and Procedures for Examining the Value for Cultivation and Use (VCU) of Turnip Rape.
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. 19.04.2002.
UPOV TGP/8/5	Trial Design and Techniques Used in the Examination of Distinctness, Uniformity and Stability. 28.10.2022.
UPOV TGP/9/2	Examining Distinctness. 29.10.2015.
UPOV TGP/10/2	Examining Uniformity. 01.11.2019.
GB and NI National List	The Seeds (National Lists of Varieties) Regulations 2001 (as amended); and The Seeds (Variety Lists) Regulations (Northern Ireland) 2020.
Plant Varieties Act 1997	Plant Breeders' Rights Regulations 1998 and Plant Varieties Act 1997
Plant Breeders' Rights 2019	The Plant Breeders' Rights (Amendment etc.) (EU Exit) Regulations 2019 as amended by The Animal Health, Invasive Alien Species, Plant Breeders' Rights and Seeds (Amendment etc.) (EU Exit) Regulations 2019 and The Plant Breeders' Rights (Amendment) (EU Exit) Regulations 2020

Section B - Application Requirements

1 Purpose

1.1 The purpose of this section is to identify the specific requirements for Variety Listing and/or Plant Breeders' Rights applications, as appropriate.

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 Variety Listing and/or for Plant Breeders' Rights, which is set administratively by APHA, is stated on the GOV website at <https://www.gov.uk/national-lists-of-agricultural-and-vegetable-crops>. Applications received after these dates 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 Variety Listing and/or Plant Breeders' Rights applications, Technical Questionnaires (TQ) and for payment of administration fees can be obtained from APHA PVS at the address shown in Section A or on the GOV website at <https://www.gov.uk/national-lists-of-agricultural-and-vegetable-crops>

4.3 Applicants should note in the TQ, submitted with the application, any additional characteristics which may require examinations that are listed in the DUS characteristics section D, 5.2 or 5.3 (an additional fee may be required).

5 Receipt of Seed

5.1 The latest date for receipt of seed is stated on the GOV website and is set administratively by APHA. In the absence of exceptional circumstances, seed submissions received after this date will be refused. Instructions for the delivery of seed will be made available to applicants by APHA (<https://www.gov.uk/national-lists-of-agricultural-and-vegetable-crops>).

6 Seed Quality Requirements

6.1 The seed must satisfy the quality requirements for Basic Seed as laid down in seed marketing legislation of the Devolved Administrations.

The seed must not be chemically treated. Seed treatment, where appropriate, will be undertaken by the Test Centre. The chemicals applied and rates of application will be determined by the Test Centre.

7 Seed Quantity

7.1 1st Test cycle

Hybrid and Open-pollinated material	300g
Parent lines	100g or 25g
Parent maintainer lines	30g

The DUS and VCU seed of hybrids and open-pollinated varieties must be supplied as one lot. Applicants should refer to the VCU Turnip Rape protocol for VCU seed requirements - [VCU protocols and procedures for testing agricultural crops - GOV.UK \(www.gov.uk\)](#).

7.2 2nd Test cycle

If 25g of seed of parent lines were provided in 1st test cycle

Parent lines	100g
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Where a second sample has been provided, it will be authenticated against the original

submission. An additional charge will be applied.

7.3 A sample of 25g will be drawn from the 2nd test cycle Turnip Rape VCU submission for authentication against the original submission. Applicants should refer to the VCU Turnip Rape protocol for VCU seed requirements.

7.4 Shortfall in Seed Quantities

Where insufficient seed is available in the first instance, further stock must be supplied in the following year which will be authenticated against the original submission. An additional charge may be applied. This must be agreed in advance with APHA and the test centre.

8 Labelling Requirements, Including Provisions for GM Varieties

8.1 Applicants **must** clearly label their seed with the following information:

- Applicant
- AFP number (if known)
- Breeder's Reference number or name
- Type of Seed (Combined submission of DUS and VCU)
- Quantity of seed
- Whether it is a parental line

8.2 All packages of GM material must be labelled clearly 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 Turnip Rape (*Brassica rapa L. subsp. campestris (L.) A. R. Clapham*).

3 Responsibilities

3.1 The Test Centre is responsible for conducting these procedures.

3.2 The Test Centre will be responsible for ensuring that no material supplied to them is used for any other purpose than the conduct of these procedures or the release of reference samples for authorised purposes (See Section E7).

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 The DUS Test Centre is responsible for selecting a suitable site which should be on ground that has normally not had a Cruciferous crop in the previous five years but may be less where the risk is negligible.

5.2 Field husbandry should follow best local practice for all operations and particularly as regards cultivation, drilling, fertiliser, transplanting and spray application, use of irrigation, and control of pests and diseases.

5.3 The minimum duration of tests should normally be two independent growing cycles. The National List and Seeds Committee (NLSC) must be informed on any proposed changes to the number of cycles.

5.4 From information given in the TQ the candidate may be grown in plots and compared with varieties which are in the same classification for the following characters:

UPOV characteristics that are recommended for grouping:

Ploidy (characteristic 2)

Leaf: type (characteristic 8)

Time of flowering (50% of plants with at least one open flower) (characteristic 16)

Additional UK grouping characters

Flower: color of petal

Plant: tendency to form inflorescences in year of sowing

Seed: frequency of seeds with yellow coloration

5.5 Varieties known to be clearly different from the candidate on any other discontinuous or continuous characteristic may be excluded from the trial. If this exclusion is based on a characteristic which is not listed in Section D5.1, approval by the NLSC must be sought. See Section F for further information on additional characters.

5.6 The tests are carried out using a grouped design, with a plot of each candidate variety present in each replicate as follows:

	Spring Turnip Rape	Winter Turnip Rape
Number of replications	4	4
Number of rows per plot	3	3
Spacing between plot rows	0.35 m	0.45 m
Plot length	10m	10m
Number of seeds sown per replicate	ca 1000	ca 1000
Number of plants grown per replicate	300	200
Hence, number of plants grown per variety	1200	800
Plant spacing (thinned to)	0.10 m	0.15 m

Groups are randomised and varieties are randomised within groups.

5.7 Seed is sown by direct drilling in the field between mid-April and late May (Spring Turnip Rape) and between early August and September (Fodder and Winter Turnip Rape) according to a

plan produced by the Test Centre. Plants are thinned to a stand to achieve the plant number per plot as indicated in C 5.6). Varieties are coded by the Test Centre.

5.8 Any candidate with distinctness problems in the first test cycle may be grown side by side with its close controls in the second or third test cycle.

5.9 Recordings are taken on each trial from approximately 4 weeks after sowing for Spring Turnip Rape or 6 weeks after sowing for Fodder or Winter Turnip Rape. Characters recorded are those set out in Section D.

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 analysis.

6.3 In the first recording year, characters, as indicated in Section D 5.2, are recorded on all candidates and their close controls. The data for measured characters are analysed and used to assess distinctness and uniformity of the candidate. (For details see Section G).

6.4 In the second recording cycle, characters, as indicated in Section D 5.2, are recorded on all candidates and their close controls. The data for measured characters are analysed and, together with those from the first recording cycle, used to assess distinctness and uniformity of the candidate. (For details see Section G).

6.5 If a third test cycle is necessary, characters, as indicated in Section D 5.2, are recorded on all candidates and their close controls. The data for measured characters are analysed and, together with those from the first and second test cycles, are used to assess distinctness and uniformity of the candidate. (For details see Section G).

6.6 If the Test Centre notices unusual or novel characters in a candidate, a note may be made of these at any time and a photographic record made.

7. Communication with the Applicant

7.1 The Test Centre will notify the applicant or the agent of any DUS problems at the earliest practical opportunity as they arise during the growing season. All such notifications must be copied to APHA.

7.2 In the case of distinctiveness problems, if confidentiality considerations allow, the applicant should be informed which variety their candidate is not yet distinct from 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 (if appropriate) and discussions held with the Test Centre.

7.4 After each test cycle the results are 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, methods of observation and standards required for DUS assessment.

3. Responsibilities

3.1 The Test Centre is responsible for coordinating the procedures in this summary of characteristics.

4. Organisation

4.1 The minimum duration of tests to assess characteristics is normally two independent growing cycles. Shorter periods may be applied for assessment of additional characteristics. Proposed changes to the number of growing cycles must be approved by the NLSC.

5. DUS Characteristics to be Assessed

Routine Characteristics

The following table summarises the DUS characteristics to be routinely examined.

Note:

* a characteristic which must be examined according to UPOV Guidelines.

G a grouping characteristic

Type of observation of characteristics:

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

C Special test

5.2 Turnip Rape Characteristics Routinely Recorded in DUS Tests

UPOV TG/185/3	UK	Character	Material examined	Number of plants or sample size for assessment	Method of assessment and recording	States of expression	D Method and Minimum distance required	U Method and Standards Applied
1 C	94	Seed: erucic acid	Seed	20g	% by mass of methyl esters in accordance with ISO standard in document 5508 paragraph 6.2.2.1	1 = absent 9 = present	Less than 2% is interpreted as absent 1 state	If there is evidence of a mixture, Uniformity will be assessed on a sample of single plants. Off-type Standard
2*G C	95G	Ploidy	Young plants	2 replicates of 5 plants	By flowcytometer	2 = diploid 4 = tetraploid	1 state	If there is evidence of a mixture, Uniformity will be assessed on a sample of single plants. Off-type Standard
3 MS	02	Cotyledon: length	Glasshouse plot	40 plants in total: 20 plants per replicate	Measurement of a sample of single plants	3 = short 5 = medium 7 = long	Clear visual difference or COYD @5%	Visual Assessment or for measured samples COYU@0.1%
4 MS	03	Cotyledon: width	Glasshouse plot	40 plants in total: 20 plants per replicate.	Measurement of a sample of single plants	3 = narrow 5 = medium 7 = broad	Clear visual difference or COYD @5%	Visual Assessment or for measured samples COYU@0.1%

UPOV TG/185/3	UK	Character	Material examined	Number of plants or sample size for assessment	Method of assessment and recording	States of expression	D Method and Minimum distance required	U Method and Standards Applied
5 VG	29	Leaf: attitude	DUS plot	At least 300 plants in total from 4 replicates	Visual assessment of a group of plants: observation or relative score	1 = erect 3 = semi-erect 5 = horizontal	Clear visual difference or 2 states	Visual Assessment
6 VG	23	Leaf: reflexion of top	DUS plot	At least 300 plants in total from 4 replicates	Visual assessment of a group of plants: observation or relative score	3 = weak 5 = medium 7 = strong	Clear visual difference or 2 states	Visual Assessment
7* VG	20	Leaf: intensity of green colour	DUS plot	At least 300 plants in total from 4 replicates	Visual assessment of a group of plants: observation or relative score	3 =light 5 = medium 7 = dark	Clear visual difference or 2 states	Visual Assessment
8*G VS	9	Leaf: type	DUS plot	At least 300 plants in total from 4 replicates	Visual assessment of a group of plants	1 = entire 2 = lobed	Clear visual difference or 1 state	If there is evidence of a mixture, Uniformity will be assessed on a sample of single plants. Off-type Standard

UPOV TG/185/3	UK	Character	Material examined	Number of plants or sample size for assessment	Method of assessment and recording	States of expression	D Method and Minimum distance required	U Method and Standards Applied
9 MS	16	For Varieties with lobed leaves only: Leaf: number of lobes	DUS plot	60 plants in total: 15 plants per replicate	Count on a sample of single plants	3 = few 5 = medium 7 = many	Clear visual difference or COYD @5%	Visual Assessment or for measured samples COYU@0.1%
10 VS	21	Leaf: undulation of margin	DUS plot	At least 300 plants in total from 4 replicates	Visual assessment of a group of plants: observation or relative score	3 = weak 5 = medium 7 = strong	Clear visual difference or 2 states	Visual Assessment
11 VS	52	Leaf: dentation of margin	DUS plot	At least 300 plants in total from 4 replicates	Visual assessment of a group of plants: observation or relative score	3 = weak 5 = medium 7 = strong	Clear visual difference or 2 states	Visual Assessment
12* MS	11	Leaf: length (blade and petiole)	DUS plot	60 plants in total: 15 plants per replicate	Measurement of a sample of single plants	3 = short 5 = medium 7 = long	Clear visual difference or COYD @5%	Visual Assessment or for measured samples COYU@0.1%

UPOV TG/185/3	UK	Character	Material examined	Number of plants or sample size for assessment	Method of assessment and recording	States of expression	D Method and Minimum distance required	U Method and Standards Applied
13 MS	17	Leaf: width (widest point)	DUS plot	60 plants in total: 15 plants per replicate	Measurement of a sample of single plants	3 = narrow 5 = medium 7 = broad	Clear visual difference or COYD @5%	Visual Assessment or for measured samples COYU@0.1%
14* VG	38G	Tendency to form inflorescences in year of sowing; winter types in spring sown trials	DUS plot	At least 300 plants in total from 4 replicates	Visual assessment of a group of plants: observation or relative score	3 = weak 5 = medium 7 = strong	Clear visual difference or 2 states	Visual Assessment
15 VG	40G	Tendency to form inflorescences in year of sowing: spring types in late summer sown trials	DUS plot	At least 300 plants in total from 4 replicates	Visual assessment of a group of plants: observation or relative score	3 = weak 5 = medium 7 = strong	Clear visual difference or 2 states	Visual Assessment
16*G MG	1	Time of flowering (50% of plants with at least one flower open)	DUS plot	At least 300 plants in total from 4 replicates	Dating for a group of plants:	1 = very early 3 = early 5 = medium 7 = late 9 = very late	Clear visual difference or COYD @5%	Visual Assessment or for measured samples COYU@0.1%

UPOV TG/185/3	UK	Character	Material examined	Number of plants or sample size for assessment	Method of assessment and recording	States of expression	D Method and Minimum distance required	U Method and Standards Applied
17* VG	42G	Flower: colour of petal	DUS plot	At least 300 plants in total from 4 replicates	Visual assessment of a group of plants	1 = lemon yellow 2 = orange yellow	Clear visual difference or 1 state	If there is evidence of a mixture, Uniformity will be assessed on a sample of single plants. Off-type Standard
18 MS	43	Flower: length of petal	DUS plot	60 plants in total: 15 plants per replicate.	Measurement of a sample of single plants	3 = short 5 = medium 7 = long	Clear visual difference or COYD @5%	Visual Assessment or for measured samples COYU@0.1%
19 MS	44	Flower: width of petal	DUS plot	60 plants in total: 15 plants per replicate.	Measurement of a sample of single plants	3 = narrow 5 = medium 7 = broad	Clear visual difference or COYD @5%	Visual Assessment or for measured samples COYU@0.1%
20* VS	45	Flower: production of pollen	DUS plot	At least 300 plants in total from 4 replicates	Visual assessment of a group of plants	1 = absent 9 = present	Clear visual difference or 1 state	If there is evidence of a mixture, Uniformity will be assessed on a sample of single plants. Off-type Standard

UPOV TG/185/3	UK	Character	Material examined	Number of plants or sample size for assessment	Method of assessment and recording	States of expression	D Method and Minimum distance required	U Method and Standards Applied
21* MS	70	Plant: total length including side branches	DUS plot	60 plants in total: 15 plants per replicate	Measurement of a sample of single plants	3 = short 5 = medium 7 = long	Clear visual difference or COYD @5%	Visual Assessment or for measured samples COYU@0.1%
22 MS	72	Siliqua: length (between pedicel and beak)	DUS plot	60 plants in total: 15 plants per replicate.	Measurement of a sample of single plants	3 = short 5 = medium 7 = long	Clear visual difference or COYD @5%	Visual Assessment or for measured samples COYU@0.1%
23 MS	80	Siliqua: width (widest point)	DUS plot	60 plants in total: 15 plants per replicate.	Measurement of a sample of single plants	3 = narrow 5 = medium 7 = broad	Clear visual difference or COYD @5%	Visual Assessment or for measured samples COYU@0.1%
24* MS	73	Siliqua: length of beak	DUS plot	60 plants in total: 15 plants per replicate.	Measurement of a sample of single plants	3 = short 5 = medium 7 = long	Clear visual difference or COYD @5%	Visual Assessment or for measured samples COYU@0.1%

UPOV TG/185/3	UK	Character	Material examined	Number of plants or sample size for assessment	Method of assessment and recording	States of expression	D Method and Minimum distance required	U Method and Standards Applied
25 MS	71	Siliqua: length of pedicel	DUS plot	60 plants in total: 15 plants per replicate.	Measurement of a sample of single plants	3 = short 5 = medium 7 = long	Clear visual difference or COYD @5%	Visual Assessment or for measured samples COYU@0.1%
26 VS	91G	Seed: frequency of seeds with yellow coloration present	Submitted seed sample	500 seeds divided down from the total sample and split into 2 parts	Visual assessment of a bulked seed sample	1 = nil or very low 3 = low 5 = medium 7 = high 9 = very high	2 state difference	n/a

5.3 Previously Approved Additional Characteristics Not Routinely Recorded in DUS Tests

The following table summarises the additional characteristics which have been approved by the NLSC and can be examined at the request of the applicant where necessary to establish Distinctness. A fee may be charged for examination of these characteristics as advised by APHA, Plant Varieties and Seeds.

UPOV TG/185/3	UK	Character	Material examined	Number of plants or sample size for assessment	Method of assessment and recording	States of expression	D Method and Minimum distance required	U Method and Standards Applied
N/A	61 QN	Leaf: incision of lamina base (varieties with entire leaves only)	DUS plot	At least 300 plants in total from 4 replicates	Visual assessment of a group of plants	1 = very weak 3 = weak 5 = medium 7 = strong 9 = very strong	Clear or visual difference or COYD @5%	Visual Assessment or for measured samples COYU@0.1%
N/A	12	Leaf: length of terminal lobe (varieties with lobed leaves only)	DUS plot	60 plants in total: 15 plants per replicate	Measurement of a sample of single plants	3 = short 5 = medium 7 = long	Clear or visual difference or COYD @5%	Visual Assessment or for measured samples COYU@0.1%

UPOV TG/185/3	UK	Character	Material examined	Number of plants or sample size for assessment	Method of assessment and recording	States of expression	D Method and Minimum distance required	U Method and Standards Applied
N/A	13	Leaf: width of terminal lobe (varieties with lobed leaves only)	DUS plot	60 plants in total: 15 plants per replicate	Measurement of a sample of single plants	3 = narrow 5 = medium 7 = broad	Clear or visual difference or COYD @5%	Visual Assessment or for measured samples COYU@0.1%
N/A	74 QN	Flowering stem: height at first flower	DUS plot	60 plants in total: 15 plants per replicate.	Measurement of a sample of single plants	3 = short 5 = medium 7 = tall	Clear or visual difference or COYD @5%	Visual Assessment or for measured samples COYU@0.1%
N/A	77D QN	Flowering stem: anthocyanin coloration of basal part	DUS plot	At least 300 plants in total from 4 replicates	Visual assessment of a group of plants	1 = absent or very weak 3 = weak 5 = medium 7 = strong 9 = very strong	Clear or visual difference or 2 states	Visual Assessment

5.4 New Additional DUS Characteristics

New Additional DUS Characteristics: Applicants can suggest new additional characters on the TQ 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 for VCU seed stock authentication (if applicable).

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 with the successful or pending application is considered to be the definitive stock of the variety. Subject to meeting the required quality standards, a small portion of the seed is sown for observation and measurement. The remainder is stored under controlled and monitored storage conditions as part of the official reference collection.

4.2 If, during the normal tests, there is any evidence that a seed stock is deteriorating in storage, or that stocks have low quantity, a request will be made to the maintainer asking for a replacement stock of the variety. This replacement stock must be authenticated by comparing plots established from the replacement seed with those of the definitive seed, over a maximum of two recording cycles.

4.3 If the replacement seed sample cannot be visually distinguished from the definitive reference stock, it will be accepted as representing the variety. If there are visual differences, the new sample will be recorded, and will be accepted as representing the variety if there are no significant ($P=0.02$) differences in the first recording cycle, or no significant ($P=0.02$) differences over two recording cycles in a COYD analysis (see associated document UPOV TGP/8/1 for details). It may then be accepted as definitive and substituted for the existing definitive stock in the

reference collection. These procedures may be modified where, in the opinion of the technical officer, differences are the result of environmental or cultural factors.

4.4 A replacement sample or an additional replacement sample will be considered sufficiently uniform after one recording cycle, if the level of off-types is the same or less than the number at 1% population standard and 95% acceptance probability, and the standard deviations of the measured characters are not significantly greater at the 0.1% ($P=0.001$) significance level than that of the mean standard deviations of the control varieties. Over 2 years the additional replacement sample will be considered sufficiently uniform if the Combined Over Years Uniformity (COYU) is not significantly greater at the 0.1% ($P=0.001$) significance level than that of the reference varieties. These procedures may be modified where, in the opinion of the technical officer, differences are the result of environmental or cultural factors.

4.5 In the event of the replacement sample not meeting the required acceptance standards, an additional replacement sample is requested. Plots will be established from any additional replacement seed sample and compared over a maximum of two recording cycles. If the additional replacement sample does not meet the acceptance criteria set out in 4.3, the variety will be deleted from the reference collection.

5 Procedures for VCU Seed Stock Authentication

5.1 Evidence will be requested from the applicant of the relationship between the VCU seed sample and the definitive DUS seed sample. Plots will be established from any VCU seed sample to be authenticated and compared visually with the definitive stock over the recording season.

5.2 The plots must be examined from establishment through flowering to maturity.

5.3 If the VCU seed sample cannot be visually distinguished from the reference stock it will be accepted as representing the variety.

5.4 If the VCU seed sample is visually clearly different from the definitive stock in the authentication plots, then it will not be accepted as representing the candidate variety. This procedure may be modified where, in the opinion of the technical officer, differences are the result of environmental or cultural factors.

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

6.1 When a new variety enters into common knowledge, it must be included in the reference collection if seed is available. A request for seed will be sent by the Test Centre to the maintainer of the variety and an official description will be requested from the Testing Authority which registered the variety. If an official description is provided, seed received will be assumed to be

definitive if the seed conforms to the official description to an acceptable standard. Small differences in the expression of quantitative characters are likely to be the result of recording in a different environment and will be considered as conforming to the description. If no official description is available, seed will be assumed to be definitive.

6.2 If the seed does not conform to the official description to an acceptable standard, the sample shall not be accepted as definitive. A replacement sample will be requested and the relevant Testing Authority informed. The standards for this validation will be as for VCU seed stock authentication of replacement seed (see E5).

7 Release of Reference Samples for Authorised Purposes

7.1 Seed of reference samples can be supplied by the Test Centre, on request, to UK and UPOV DUS Testing Authorities and UK and OECD 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.

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 Characters

1 Purpose

1.1 This section sets out the procedures for assessment of new additional DUS characters for varieties of Turnip Rape entered for Variety Listing and/or Plant Breeders' Rights (PBR) trials.

2 Scope

2.1 These procedures apply to applications where additional DUS characteristics which have not been previously approved by the NLSC are requested for use in the examination 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 requirements will be met.

3.2 All new additional characteristics must be authorised by the NLSC in consultation with the PVSC.

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 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 Variety Listing.

5.3 Where the test for a character is approved by the NLSC it should be subsequently listed in Section D 5.2 or 5.3 as appropriate.

Section G - Procedures for DUS Decisions

1 Purpose

1.1 This section sets out the standards used to assess distinctiveness, uniformity and stability of varieties of Turnip Rape.

2 Scope

2.1 These procedures apply to all varieties of Turnip Rape (*Brassica rapa L. subsp. campestris (L.) A. R. Clapham*) entered for Variety Listing and/or 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 UPOV guidelines.

4 Reference Varieties

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

5 Distinctness

5.1 Distinctness is normally assessed in two independent test cycles, but a candidate variety could be considered distinct after one test cycle if there are no other similar varieties. A third independent test cycle may be undertaken if distinctness is not established after two test cycles.

5.2 In accordance with associated document UPOV TG/1/3 varieties can be considered distinct where they have a different expression in a grouping character.

- 5.3 The distinctness standard applied for qualitative characters is a difference of one state unless otherwise indicated in Section D. For pseudo-qualitative characters the distinctness standard is a difference of 1, 2 or 3 states depending on the characteristic.
- 5.4 If a candidate is clearly different in a visually observed quantitative character, it is considered to be distinct without the need for a repeated observation.
- 5.5 Where varieties are grown in close proximity under the same conditions, and a direct comparison can be made, a candidate is considered to be distinct if a clear visual difference is observed in a quantitative character.
- 5.6 Where varieties are not grown in close proximity, a candidate is considered to be distinct if a difference of at least two states (see table in section D 5.2) is recorded in a visually observed quantitative character in at least 2 growing cycles.
- 5.7 The standard for measured or counted quantitative characters is, at least, a 5% ($P=0.05$) significant difference in one character over two or three growing cycles in a Combined Over Years Distinctness (COYD) analysis. Please see associated document UPOV TGP/8/1 for details.
- 5.8 Where COYD cannot be applied, alternative methods should be considered.
- 5.8.1 When the number of varieties grown does not provide sufficient degrees of freedom for use of the standard COYD analysis, alternative methods should be adopted. If there is sufficient historical data (at least 5 years and sufficient degrees of freedom) then the long-term LSD is applied. This LSD is calculated using up to 10 years of the most recent data. If there is insufficient historical data, the 2 x 1% method should be used.
- 5.8.2 Where the candidate has a full complement of data for two test cycles, but there is only data for control varieties for one test cycle, the use of FITC (Fitted Constant program in DUST) may be applied. This situation may arise due to the loss of plant material within plots in any one year or where suitable control varieties were not grown in both test cycles. The standard applied for Distinctness in such cases is $P=0.01$.

6 Uniformity

- 6.1 Uniformity is assessed for all characteristics used to establish Distinctness.

Uniformity based on the assessment of 'Off-types'

- 6.2 The assessment of 'Off-types' is undertaken in both test cycles and the total number of 'off-types' combined should not exceed the number allowed using the population standards.

6.3 Off-type plants in the field and glasshouse are identified and marked for exclusion from recording.

6.4 For cross-pollinated varieties relative uniformity standards are applied; the total number of off-type plants recorded in the test should not exceed that of similar varieties.

6.5 The total number of off-type plants recorded in the test for parental lines, should not exceed the number indicated in TGP/8/1 using a population standard of 2% and a 95% acceptance probability. In a population of 1200 spring turnip rape plants, 32 off-types are allowed. Alternatively, in a population of 800 winter turnip rape plants, 23 off-types are allowed.

6.6 Where the number of off-types in spring turnip rape in the first test cycle exceeds 32 but is less than 51 or exceeds 23 but is less than 43 for winter turnip rape, the applicant may submit a new seed sample (Resubmission) in the second test cycle with the aim of meeting the off-type standard. Distinctness will be assessed on data from the original seed submitted in the first test cycle and on data from the resubmitted seed in the second test cycle. The resubmitted seed will be authenticated against the original seed in side-by-side plots.

6.7 In addition, for the assessment of uniformity on visually observed characteristics of hybrid varieties should not exceed the numbers indicated in UPOV TGP/8/1 for a 10% population standard and a 95% acceptance probability.

6.8 After the variants have been excluded, the characteristics listed in Section D5 are used to assess the uniformity of the remaining plants according to the methods described.

Uniformity based on the assessment of general variation where no measurements are recorded:

6.9 Uniformity of continuous variation is assessed visually according to the following scale:

Score	Description
1-5	unacceptable (1 is worst)
6-9	acceptable (9 is best)

A candidate with a visual uniformity score of 6 or more is satisfactory.

Uniformity based on the assessment of general variation where measurements are recorded:

6.10 Provided a variety meets the off-type standard, it can be considered sufficiently uniform after two, or three, test cycles if, for all measured characters necessary for distinctness, the combined over years uniformity (COYU) is not significantly greater than that of the reference varieties at the 0.1% ($P=0.001$) significance level. In all cases an examination of data from individual years is carried out to investigate the COYU result should this reveal potential uniformity problems.

6.11 Provided a variety meets the off-type standard, it can be considered sufficiently uniform after three years of tests when, for all measured characters required for distinctness, the combined over years uniformity (COYU) is not significantly greater than that of the reference varieties at the 0.1% ($P=0.001$) significance level. In all cases an examination of the data from individual years is carried out to investigate the COYU result should this reveal potential uniformity problems.

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 and will be discussed at the relevant DUS Test Centre Meeting. This report will specify all non-routine characteristics used for establishing distinctness.

8.2 The final DUS report, including the full variety description for positive reports, will be submitted to APHA. The characteristics to be used in the description are identified in

Section D.

Appendix 1 – Reference Collection Varieties

1 Variety Listing and Plant Breeders Rights

1.1 The DUS reference collection, for any given category of plant variety comprise 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.

1.1.2 All varieties with UK PBR.

1.1.3 All varieties on the OECD variety list that are listed by countries with comparable climatic conditions to the UK.

1.1.4 All varieties protected under National PBR (UPOV contracting parties) with comparable climatic conditions to the UK.

1.1.5 Any varieties nominated by the applicant as being comparable i.e., known to be similar.

1.1.6 Any other varieties considered to be comparable i.e., known to be similar by the appropriate Test Centre or DUS Centre Group.

1.1.7 Other available comparable varieties in common knowledge.



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