

**UNITED KINGDOM NATIONAL LIST/ PLANT BREEDERS RIGHTS TECHNICAL PROTOCOL FOR THE
OFFICIAL EXAMINATION OF DISTINCTNESS, UNIFORMITY AND STABILITY (DUS)**

TURNIP RAPE

(Brassica rapa L. var. silvestris (Lam.) Briggs.)

SECTION A - GENERAL INFORMATION	1
1. PURPOSE.....	1
2. SCOPE	1
3. RESPONSIBILITIES	1
4. NON COMPLIANCE WITH THE PROTOCOL	2
5. RESPONSIBILITY FOR GM RELEASES	2
6. PROCEDURES FOR GM VARIETIES	2
7. ASSOCIATED DOCUMENTS	2
SECTION B - APPLICATION REQUIREMENTS.....	3
1. PURPOSE.....	3
2. SCOPE	3
3. RESPONSIBILITIES	3
4. RECEIPT OF APPLICATIONS.....	3
5. RECEIPT OF SEED	3
6. SEED QUALITY REQUIREMENTS.....	3
7. SEED QUANTITY	4
8. LABELLING REQUIREMENTS, INCLUDING PROVISIONS FOR GM VARIETIES	4
SECTION C – GROWING TEST PROCEDURES.....	5
1. PURPOSE.....	5
2. SCOPE	5
3. RESPONSIBILITIES	5
4. REFERENCE VARIETIES.....	5
5. DESIGN OF TESTS	5
6. RECORDS AND RECORDING	6
7. COMMUNICATIONS WITH THE APPLICANT	6
SECTION D - SUMMARY OF DUS CHARACTERISTICS TO BE ASSESSED, METHOD OF ASSESSMENT AND STANDARDS APPLIED.....	8
1. PURPOSE.....	8
2. SCOPE	8
3. RESPONSIBILITIES	8
4. ORGANISATION.....	8
5. DUS CHARACTERISTICS TO BE ASSESSED	8
SECTION E - REFERENCE SEED STOCK MAINTENANCE AND VCU SEED STOCK AUTHENTICATION PROCEDURES.....	17
1. PURPOSE.....	15
2. SCOPE	15
3. RESPONSIBILITIES	15
4. PROCEDURES FOR REFERENCE SEED STOCK MAINTENANCE	15
5. PROCEDURES FOR VCU SEED STOCK AUTHENTICATION	15
6. PROCEDURES FOR THE INCLUSION OF NEW COMMON KNOWLEDGE VARIETIES INTO THE REFERENCE COLLECTION	16
7. RELEASE OF REFERENCE SAMPLES FOR AUTHORISED PURPOSES	16

SECTION F - PROCEDURES FOR ASSESSMENT OF NEW ADDITIONAL DUS CHARACTERS	17
1. PURPOSE.....	17
2. SCOPE	17
3. RESPONSIBILITIES	17
4. REFERENCE VARIETIES.....	17
5. PROCEDURES.....	17
SECTION G - PROCEDURES FOR DUS DECISIONS	18
1. PURPOSE.....	18
2. SCOPE	18
3. RESPONSIBILITIES	18
4. REFERENCE VARIETIES.....	18
5. DISTINCTNESS.....	18
6. UNIFORMITY	19
7. STABILITY	20
8. DUS REPORT AND VARIETY DESCRIPTION	20
APPENDIX 1.....	21
1. NATIONAL LISTING	21
2. PLANT BREEDERS RIGHTS.....	21

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 National List (NL) and Plant Breeders' Rights (PBR) tests.

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 National 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, Scottish Ministers, Welsh Ministers and the Minister for Agriculture and Rural Development 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 the Animal and Plant Health Agency (APHA), the Scottish Government Agriculture and Rural Development Division (SGARD), the Department of Agriculture and Rural Development for Northern Ireland (DARDNI) 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 Varieties and Seeds
Animal and Plant Health Agency
Eastbrook
Shaftesbury Road
Cambridge
CB2 8DR

Tel No 0300 060 0497
Fax No 0300 060 2115

3.5 TEST CENTRE

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

Vegetable DUS Test Centre
Science and Advice for Scottish Agriculture (SASA)
Roddinglaw Road
Edinburgh
EH12 9FJ

Tel No 0131-244 8853
Fax No 0131-244 8940

- 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, Plant Varieties and Seeds. 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, Plant Varieties and Seeds.

6 PROCEDURES FOR GM VARIETIES

- 6.1 Applicants intending to enter GM candidates must consult APHA, Plant Varieties and Seeds, 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, Plant Varieties and Seeds 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	United Kingdom National 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/8/1	Trial Design and Techniques Used in the Examination of Distinctness, Uniformity and Stability. 21.10.2010.
UPOV TGP/9/1	Examining Distinctness. 11.04.2008.
UPOV TGP/10/1	Examining Uniformity. 30.10.2008.
Commission Directives	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. [Turnip Rape]
Council Regulation (EC) No. 2100/94	Council Regulation (EC) No. 2100/94 of 27 th July 1994 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, Plant Varieties and Seeds is 15th January for Spring Turnip Rape or 1st July for Winter Turnip Rape. 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 National List and Plant Breeders' Rights applications, technical questionnaires (TQ) and for payment of administration fees are set out on the GOV website at <https://www.gov.uk/national-lists-of-agricultural-and-vegetable-crops>.
- 4.3 Applicants should notify APHA, Plant Varieties and Seeds, 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 15th February for Spring Turnip Rape or 31st July for Winter Turnip Rape, and is set administratively by APHA, Plant Varieties and Seeds. Seed submissions received after this date will normally be refused. Instructions for the delivery of seed will be made available to applicants by APHA, Plant Varieties and Seeds.

6 SEED QUALITY REQUIREMENTS

- 6.1 The seed must satisfy the quality requirements for Basic Seed as laid down in Schedule 2 of the Seed Marketing Regulations 2011 and equivalent regulations made by Devolved Administrations.
- 6.2 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.

7.2 2nd Test cycle

If 25g of seed of parent lines were provided in 1 st test cycle	
Parent lines	100g

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.

8 LABELLING REQUIREMENTS, INCLUDING PROVISIONS FOR GM VARIETIES

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

- Applicant
- 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 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 Turnip Rape.

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 DUS 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 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

- 5.4 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 and CPVO must be sought. See Section F for further information on additional characters.

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

	Spring Rape	Turnip	Winter Rape	Turnip
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.

- 5.6 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 5.5). Varieties are coded by the Test Centre.
- 5.7 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.
- 5.8 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 noted but excluded from the sample.
- 6.3 In the first recording year, characters, as indicated in Section D5.1, are recorded on all candidates and their close controls. The data for measured characters are analysed and used to determine the most similar reference varieties and assess uniformity of the candidate. (For details see Section G).
- 6.4 In the second recording cycle, characters, as indicated in Section D5.1, 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 determine the most similar reference varieties and assess uniformity of the candidate. (For details see Section G).
- 6.5 If a third test cycle is necessary, characters, as indicated in Section D5.1, 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 determine the most similar reference varieties and assess the 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 his agent of any DUS problems at the earliest practical opportunity. All such notifications must be copied to APHA, Plant Varieties and Seeds. In the case of tests for foreign DUS authorities, notifications must be copied to the test authority

and to APHA, Plant Varieties and Seeds. In the case of European applications notifications must be copied to CPVO and APHA, Plant Varieties and Seeds.

- 7.2 If confidentiality considerations 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 are summarised and reported by the Test Centre to the applicant, APHA, Plant Varieties and Seeds, who will inform the applicant, foreign test authorities or the CPVO as appropriate.

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 co-ordinating the procedures in this summary.

4. ORGANISATION

The minimum duration of tests to assess characteristics is normally two independent growing cycles. Shorter periods may be applied for assessment of additional characteristics. Additional growing cycles may be approved by the UK National List and Seeds Committee (NLSC)

5. DUS CHARACTERISTICS TO BE ASSESSED

5.1 Routine Characteristics

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

Legend:

Key to abbreviations used with character number

Types of expression of characteristics:

QL – Qualitative characteristic

QN – Quantitative characteristic

PQ – Pseudo-qualitative characteristic

Types 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

G denotes a grouping characteristic.

D denotes a characteristic used in the variety description.

Note: CPVO character numbers will be included in the table when a Turnip Rape protocol is agreed by the Administrative Council.

TURNIP RAPE CHARACTERISTICS ROUTINELY RECORDED IN DUS TESTS

Character Number			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
CPVO	UPOV TG/185/3	UK							
	1 C		Seed: erucic acid	Seed	?	?	1 = absent 9 = present	1 state	If there is evidence of a mixture, Uniformity will be assessed on a sample of single plants. Off-type Standard
	2*G	95D G QL	Ploidy	Glasshouse plot	2 replicates of 5 plants	Visual assessment of a group of plants: observation or relative score	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	02D QN	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 or Consistent visual difference or COYD @5% for both 2 and 3 year tests	Off-type Standard and Uniformity Score>5 or COYU@0.1% for both 2 and 3 year tests
	4	03D QN	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 or Consistent visual difference or COYD @5% for both 2 and 3 year tests	Off-type Standard and Uniformity Score>5 or COYU@0.1% for both 2 and 3 year tests
	5	29D QN	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 or Consistent visual difference or COYD @5% for both 2 and 3 year tests	Off-type Standard and Uniformity Score>5 or COYU@0.1% for both 2 and 3 year tests

SECTION D

CPVO	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
	6	23D QN	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 or Consistent visual difference or COYD @5% for both 2 and 3 year tests	Off-type Standard and Uniformity Score>5 or COYU@0.1% for both 2 and 3 year tests
	7*	20D QN	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 or Consistent visual difference or COYD @5% for both 2 and 3 year tests	Off-type Standard and Uniformity Score>5 or COYU@0.1% for both 2 and 3 year tests
	8*G	9D G QL	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 1 state	If there is evidence of a mixture, Uniformity will be assessed on a sample of single plants. Off-type Standard
	9	16D QN	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 or Consistent visual difference or COYD @5% for both 2 and 3 year tests	Off-type Standard and Uniformity Score>5 or COYU@0.1% for both 2 and 3 year tests
	10	21D QN	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 or Consistent visual difference or COYD @5% for both 2 and 3 year tests	Off-type Standard and Uniformity Score>5 or COYU@0.1% for both 2 and 3 year tests
	11	52D QN	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 or Consistent visual difference or COYD @5% for both 2 and 3 year tests	Off-type Standard and Uniformity Score>5 or COYU@0.1% for both 2 and 3 year tests

SECTION D

CPVO	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
	12*	11D QN	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 or Consistent visual difference or COYD @5% for both 2 and 3 year tests	Off-type Standard and Uniformity Score>5 or COYU@0.1% for both 2 and 3 year tests
	13	17D QN	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 or Consistent visual difference or COYD @5% for both 2 and 3 year tests	Off-type Standard and Uniformity Score>5 or COYU@0.1% for both 2 and 3 year tests
	14*	38D QN	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 or Consistent visual difference or COYD @5% for both 2 and 3 year tests	Off-type Standard and Uniformity Score>5 or COYU@0.1% for both 2 and 3 year tests
	15	40D QN	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 or Consistent visual difference or COYD @5% for both 2 and 3 year tests	Off-type Standard and Uniformity Score>5 or COYU@0.1% for both 2 and 3 year tests
	16*G	1D QN	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 or Consistent visual difference or COYD @5% for both 2 and 3 year tests	Off-type Standard and Uniformity Score>5 or COYU@0.1% for both 2 and 3 year tests
	17*	42D QL	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 1 state	If there is evidence of a mixture, Uniformity will be assessed on a sample of single plants. Off-type Standard

SECTION D

CPVO	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
	18	43D QN	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 or Consistent visual difference or COYD @5% for both 2 and 3 year tests	Off-type Standard and Uniformity Score>5 or COYU@0.1% for both 2 and 3 year tests
	19	44D QN	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 or Consistent visual difference or COYD @5% for both 2 and 3 year tests	Off-type Standard and Uniformity Score>5 or COYU@0.1% for both 2 and 3 year tests
	20	45D QL	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 1 state	If there is evidence of a mixture, Uniformity will be assessed on a sample of single plants. Off-type Standard
	21*	70D QN	Plant: total length including side branches	DUS plot	At least 300 plants in total from 4 replicates	Measurement of a group of plants	3 = short 5 = medium 7 = long	Clear or Consistent visual difference or COYD @5% for both 2 and 3 year tests	Off-type Standard and Uniformity Score>5 or COYU@0.1% for both 2 and 3 year tests
	22	72D QN	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 or Consistent visual difference or COYD @5% for both 2 and 3 year tests	Off-type Standard and Uniformity Score>5 or COYU@0.1% for both 2 and 3 year tests
	23	80D QN	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 or Consistent visual difference or COYD @5% for both 2 and 3 year tests	Off-type Standard and Uniformity Score>5 or COYU@0.1% for both 2 and 3 year tests

CPVO	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
	24*	73D QN	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 or Consistent visual difference or COYD @5% for both 2 and 3 year tests	Off-type Standard and Uniformity Score>5 or COYU@0.1% for both 2 and 3 year tests
	25	71D QN	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 or Consistent visual difference or COYD @5% for both 2 and 3 year tests	Off-type Standard and Uniformity Score>5 or COYU@0.1% for both 2 and 3 year tests
	26	91D QN	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

5.2 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.

Character Number			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
CPVO	UPOV TG/185/3	UK							
	01 Special Test	QN	Seed: erucic acid	Submitted seed	100g	% 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	n/a

CPVO	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
		61D 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 Consistent visual difference or COYD @5% for both 2 and 3 year tests	Off-type Standard and Uniformity Score>5 or COYU@0.1% for both 2 and 3 year tests
		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 Consistent visual difference or COYD @5% for both 2 and 3 year tests	Off-type Standard and Uniformity Score>5 or COYU@0.1% for both 2 and 3 year tests
		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 Consistent visual difference or COYD @5% for both 2 and 3 year tests	Off-type Standard and Uniformity Score>5 or COYU@0.1% for both 2 and 3 year tests
		74D 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 Consistent visual difference or COYD @5% for both 2 and 3 year tests	Off-type Standard and Uniformity Score>5 or COYU@0.1% for both 2 and 3 year tests
		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 Consistent visual difference or COYD @5% for both 2 and 3 year tests	Off-type Standard and Uniformity Score>5 or COYU@0.1% for both 2 and 3 year tests

5.3 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 the authentication of reference seed and for the stock authentication of VCU seed.

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. 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, a request for definitive seed will be sent to the Testing Authority that added the variety to its National List or granted Plant Breeders' Rights. This seed will then be used to validate the sample of seed from the maintainer. 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, EU and UPOV DUS Testing Authorities and UK, EU 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 the NLSC.

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 National List and Plant Breeders' Rights (PBR) tests.

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 in testing.

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 NLSC and the CPVO.

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, Plant Varieties and Seeds 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 or 5.2 as appropriate.

SECTION G - PROCEDURES FOR DUS DECISIONS**1 PURPOSE**

1.1 This section sets out the procedures for assessing DUS decisions on varieties of Turnip Rape.

2 SCOPE

2.1 These procedures apply to all varieties of Turnip Rape entered for UK National List and Plant Breeders' Rights tests and those being tested for the CPVO or other 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 CPVO Protocols.

4 REFERENCE VARIETIES

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

5 DISTINCTNESS

5.1.1 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 5.1) 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 the first test cycle.
- 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	1-5	unacceptable (1 is worst)
Score	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.
- 6.6 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, Plant Varieties and seeds by the specified date. This report will specify all non-routine characteristics used for establishing distinctness.
- 8.2 The final DUS report, including the full variety description, will be submitted to APHA, Plant Varieties and Seeds 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.
- 1.2 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.
- 1.3 All varieties on the UK National List and varieties on the EC Common Catalogue.
- 1.4 Varieties nominated by the authorities concerned where tests are done for other Member States.
- 1.5 Any varieties nominated by the applicant as being comparable i.e. known to be similar.
- 1.6 Any other varieties considered to be comparable i.e. known to be similar by the appropriate DUS Test Centre.

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.
- 2.2 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).
- 2.3 Varieties protected in the UK, EC or in a UPOV Member State, which are known to be similar to the candidate variety.
- 2.4 Other available comparable varieties in common knowledge.