



Animal &
Plant Health
Agency

United Kingdom Variety Lists / Plant Breeder's Rights Technical Protocol for Official Examination of Distinctness, Uniformity and Stability (DUS)

Runner Bean

Phaseolus coccineus L.

December 2022

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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 and maintenance of reference stocks of varieties of Runner bean entered for Variety List (VL) Trials and/or Plant Breeders' Rights (PBR).

2 Scope

2.1 These procedures apply to all varieties of Runner Bean (*Phaseolus coccineus* L.). 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 Plant Variety Rights Office for the UK, Animal and Plant Health Agency (APHA); only Variety Lists 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, 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: 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 or the Test Centre.

3.4 The procedures are administered by:

Plant Variety Rights Office for the UK

Animal and Plant Health Agency (APHA)

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 co-ordinated and carried out by the:

Vegetable DUS Test Centre

SASA

Roddinglaw Road

Edinburgh

Tel No 0131-244 8890

EH12 9FJ

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. 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 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/9/5	Guidelines for the conduct of tests for Distinctness, Uniformity and Stability, Runner Bean (<i>Phaseolus coccineus</i> L.) published 09.04.2003.
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/8/4	Trial Design and Techniques Used in the Examination of Distinctness, Uniformity and Stability. 01.11.2019
UPOV TGP/9/2	Examining Distinctness. 29.10.2015.
UPOV TGP/10/2	Examining Uniformity. 01.11.2019.
GB and NI Variety Lists	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 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 Variety Listing or for Plant Breeders' Rights is stated on the GOV website (<https://www.gov.uk/national-lists-of-agricultural-and-vegetable-crops>).

4.2 The procedures for the submission of Variety Listing and 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 in the Seed Gazette. 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 certification requirements for Basic Seed as laid down in the seed marketing legislation of the 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 First Test Cycle

500 or 5,000 seeds

7.2 Second Test Cycle

4,500 seeds if 500 seeds were provided in year 1

No seed if 5,000 seeds were provided in year 1

Where a second sample has been provided, it will be authenticated against the original submission. An additional charge will be applied.

7.3 Shortfall in Seed Quantities

Where insufficient seed is available in the first instance a 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, inside and outside the bag, with the following information:

- Applicant
- AFP number (if known)
- Breeder's Reference number or name
- Type of Seed (Bulk or Selected, DUS only)
- Quantity of seed and thousand seed weight
- In the case of hybrids, 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 Runner bean.

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 *leguminous* crop in the previous five years but may be less where it has been determined the risk is negligible.

5.2 Field husbandry should follow best practice for all operations and particularly as regards cultivation, drilling, transplanting, fertiliser 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 Technical Questionnaire the candidate variety may be grown in plots and compared with varieties which are in the same classification for the following grouping characters:

UPOV characteristics that could be used for group:

Plant: growth type (characteristic 2)

Flower: colour of standard (characteristic 12)

Flower: colour of wing (characteristic 13)

Pod: suture strings (characteristic 17)

Seed: main colour (characteristic 28)

Varieties with seeds with more than one colour only: Seed: predominant secondary colour (characteristic 29)

Varieties with seeds with more than one colour only: Seed distribution of predominant secondary colour (characteristic 30)

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 D 5.2 approval by the NLSC must be sought. See Section F for further information on addition characters.

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

Climbing (supported)

Number of replications	2
Number of rows per plot	2
Spacing between plot rows	0.75m
Spacing between plots	1.3m

Plot length	3m
Number of plants per replicate	at least 30
Number of plants per variety	at least 60
Plant spacing	0.20m (approx.)

Dwarf

Number of replications	2
Number of rows per plot	2
Spacing between plot rows	0.60m
Spacing between plots	0.70m
Plot length	3m
Number of plants per replicate	at least 30
Number of plants per variety	at least 60
Plant spacing	0.20m (approx.)

Groups are randomised and varieties are randomised within groups.

5.7 Seed is sown in the field or polythene tunnel between late May and early June according to a plan produced by the Test Centre. Varieties are coded by the Test Centre.

5.8 Any candidates with distinctness problems in the first test cycle of test may be grown side by side with their close controls in the second or third test cycles.

5.9 Recordings are taken on each trial from approximately 10-12 weeks after sowing until harvest maturity stage. Characters recorded are listed 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 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 D 5.2, are recorded on all candidates and their controls. The data for measured characters are analysed and, together with those from the first recorded cycles, 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 cycles of test is necessary, characters, as indicated in Section D 5.2, are recorded on all candidates and their 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 must 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 test. All such notifications must be copied to APHA.

7.2 In the case of distinctness problems, if confidentiality considerations allow, the applicant should be informed which variety is not distinct 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, method of observation and standards required for DUS assessment.

3 Responsibilities

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

4 Organisation

4.1 The minimum duration of tests to assess characteristics is normally two independent growing cycles. Shorter durations 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

5.1 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

V 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

5.2 Runner Bean Characteristics Routinely Recorded in DUS Tests

UPOV TG/9/5 2003	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 Standard applied
*01 QL VG	N/A	Plant: anthocyanin coloration of hypocotyl	DUS plot	At least 60 plants in total from 2 replicates	Visual observation or visual score	1=absent 9=present	Clear visual difference or 1 state	Visual Assessment
*02G QL VG	N/A	Plant: growth type	DUS plot	At least 60 plants in total from 2 replicates	Visual observation or visual score	1=dwarf 2=climbing	Clear visual difference or 1 state	Visual Assessment
03 QN VG	N/A	<u>Dwarf bean varieties only:</u> Plant: height	DUS plot	At least 60 plants in total from 2 replicates	Visual observation or visual score	3=short 5=medium 7=tall	Clear visual difference or 2 states	Visual Assessment
04 QN VG	N/A	<u>Climbing bean varieties only:</u> Plant: start of climbing (80% of plants)	DUS plot	At least 60 plants in total from 2 replicates	Visual observation or visual score	3=early 5=medium 7=late	Clear visual difference or 2 states	Visual Assessment
05 QN VG	N/A	<u>Climbing bean varieties only</u> Plant: speed of climbing	DUS plot	At least 60 plants in total from 2 replicates	Visual observation or visual score	3= slow 5=medium 7=rapid	Clear visual difference or 2 states	Visual Assessment
06 QN VG	N/A	Leaf: ground colour	DUS plot	At least 60 plants in total from 2 replicates	Visual observation or visual score	1=yellow green 2=green	Clear visual difference or 1 state	Visual Assessment
*07 QN VG	N/A	<u>Varieties with green colour only:</u> intensity of colour	DUS plot	At least 60 plants in total from 2 replicates	Visual observation or visual score	3=light 5=medium 7=dark	Clear visual difference or 2 states	Visual Assessment

UPOV TG/9/5 2003	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 Standard applied
*08 QN VG	N/A	Leaf: blistering	DUS plot	At least 60 plants in total from 2 replicates	Visual observation or visual score	3=weak 5=medium 7=strong	Clear visual difference or 2 states	Visual Assessment
09 QN VG	N/A	Terminal leaflet: size	DUS plot	At least 60 plants in total from 2 replicates	Visual observation or visual score	3=small 5=medium 7=large	Clear visual difference or 2 states	Visual Assessment
10 PQ VG	N/A	Terminal leaflet: shape	DUS plot	At least 60 plants in total from 2 replicates	Visual observation or visual score	1=triangular 2=triangular to circular 3=circular 4=circular to quadrangular 5=quadrangular	Clear visual difference or 2 states	Visual Assessment
11 QN VG	N/A	Terminal leaflet: apex	DUS plot	At least 60 plants in total from 2 replicates	Visual observation or visual score	3=short acuminate 5=medium acuminate 7=long acuminate	Clear visual difference or 2 states	Visual Assessment
*12G PQ VG	N/A	Flower: colour of standard	DUS plot	At least 60 plants in total from 2 replicates	Visual observation or visual score	1=white 2=pink 3=red	Clear visual difference or 1 state	Visual Assessment
*13G PQ VG	N/A	Flower: colour of wing	DUS plot	At least 60 plants in total from 2 replicates	Visual observation or visual score	1=white 2=pink 3=red	Clear visual difference or 1 state	Visual Assessment
*14 QN VG/MS	N/A	Pod: length (including beak)	DUS plot or single plants	At least 60 plants in total from 2 replicates or 30 plants in total from 2 replicates	Visual observation or visual score or measurement of single plants	1=very short 3=short 5=medium 7=long 9=very long	Clear visual difference or 2 states or COYD @ 5%	Visual Assessment or for measured samples COYU @ 0.1%

UPOV TG/9/5 2003	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 Standard applied
15 QN VG/MS	N/A	Pod: maximum median width	DUS plot or single plants	At least 60 plants in total from 2 replicates or 30 plants in total from 2 replicates	Visual observation or visual score or measurement of single plants	3=narrow 5=medium 7=broad	Clear visual difference or 2 states or COYD @ 5%	Visual assessment or for measured samples COYU @ 0.1%
16 QN VG	N/A	Pod: intensity of green colour	DUS plot	At least 60 plants in total from 2 replicates	Visual observation or visual score	1=very light 3=light 5=medium 7=dark 9=very dark	Clear visual difference or 2 states	Visual Assessment
*17G QL VG	N/A	Pod: suture strings	DUS plot	At least 60 plants in total from 2 replicates	Visual observation or visual score	1=absent 9=present	Clear visual difference or 1 state	Visual Assessment
18 QN VG	N/A	Pod: degree of curvature	DUS plot	At least 60 plants in total from 2 replicates	Visual observation or visual score	1=absent or very slight 3=slight 5=medium 7=strong 9=very strong	Clear visual difference or 2 states	Visual Assessment
19 PQ VG	N/A	Pod: shape of curvature	DUS plot	At least 60 plants in total from 2 replicates	Visual observation or visual score	1=concave 2=s-shaped 3=convex	Clear visual difference or 2 states	Visual Assessment
20 QN VG	N/A	Pod: shape of distal part (excluding beak)	DUS plot	At least 60 plants in total from 2 replicates	Visual observation or visual score	1=pointed 2=pointed to truncate 3=truncate	Clear visual difference or 2 states	Visual Assessment

UPOV TG/9/5 2003	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 Standard applied
21 QN VG	N/A	Pod: length of beak	DUS plot	At least 60 plants in total from 2 replicates	Visual observation or visual score	3=short 5=medium 7=long	Clear visual difference or 2 states	Visual Assessment
22 QN VG	N/A	Pod: curvature of beak	DUS plot	At least 60 plants in total from 2 replicates	Visual observation or visual score	1=absent or very weak 3=weak 5=medium 7=strong 9=very strong	Clear visual difference or 2 states	Visual Assessment
23 QN VG	N/A	Pod: constrictions (at harvest maturity)	DUS plot	At least 60 plants in total from 2 replicates	Visual observation or visual score	1=absent or very weak 3=weak 5=medium 7=strong 9=very strong	Clear visual difference or 2 states	Visual Assessment
*24 QN MG	N/A	Seed: weight	DUS plot	Seeds harvested from 60 plants in total from 2 replicates	Visual observation or visual score	1=very low 3=low 5=medium 7=high 9=very high	Clear visual difference or 2 states	Visual Assessment
25 PQ VG	N/A	Seed: shape of median longitudinal section	DUS plot	Seeds harvested from 60 plants in total from 2 replicates	Visual observation or visual score	1=narrow elliptic 2=elliptic 3=broad elliptic 4=kidney-shaped	Clear visual difference or 2 states	Visual Assessment
26 PQ VG	N/A	Seed: shape of median cross-section	DUS plot	Seeds harvested from 60 plants in total from 2 replicates	Visual observation or visual score	1=narrow elliptic 2=elliptic 3=circular	Clear visual difference or 2 states	Visual Assessment
*27 QL VG	N/A	Seed: number of colours	DUS plot	Seeds harvested from 60 plants in total from 2 replicates	Visual observation or visual score	1=one 2=two	Clear visual difference or 1 state	Visual Assessment

UPOV TG/9/5 2003	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 Standard applied
*28G PQ VG	N/A	Seed: main colour	DUS plot	Seeds harvested from 60 plants in total from 2 replicates	Visual observation or visual score	1=white 2=light tan 3=pinkish purple 4=violet 5=black	Clear visual difference or 1 state	Visual Assessment
*29G QL VG	N/A	<u>Varieties with seeds with more than one colour only:</u> Seed: predominant secondary colour	DUS plot	Seeds harvested from 60 plants in total from 2 replicates	Visual observation or visual score	1=brown 2=black	Clear visual difference or 1 state	Visual Assessment
*30G QL VG	N/A	<u>Varieties with seeds with more than one colour only:</u> Seed: distribution of predominant secondary colour	DUS plot	Seeds harvested from 60 plants in total from 2 replicates	Visual observation or visual score	1=spotted 2=mottled	Clear visual difference or 1 state	Visual Assessment
31 QN VG	N/A	<u>Varieties with seed: main colour white only:</u> Seed: veining	DUS plot	Seeds harvested from 60 plants in total from 2 replicates	Visual observation or visual score	3=weak 5=medium 7=strong	Clear visual difference or 2 states	Visual Assessment
32 QL VG	N/A	Seed: colour of hilar ring	DUS plot	Seeds harvested from 60 plants in total from 2 replicates	Visual observation or visual score	1=same colour as seed 2=different colour to seed	Clear visual difference or 1 state	Visual Assessment
*33 QN MG	N/A	Time of flowering (50% of the plants with at least one flower)	DUS plot	At least 60 plants in total from 2 replicates	Visual observation or visual score	3=early 5=medium 7=late	Clear visual difference or 2 states	Visual Assessment

5.3 Previously Approved 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/9/5 2003	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 Standard applied
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

5.4 New Additional DUS Characteristics

Applicants can suggest new additional characters on the Technical Questionnaire for testing DUS or after notification by the DUS Test Centre of distinctness problems. For procedures see Section F.

Section E - Reference Seed Stock Maintenance

1 Purpose

1.1. This section sets out the procedures for the reference seed stock maintenance and VCU seed stock authentication (if applicable).

2 Scope

2.1 These procedures apply to all reference collection varieties.

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 certification 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 that 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 ($P=0.05$) differences in the first recording cycles, or no significant ($P=0.05$) differences over two recording cycles years 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 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 and the Variety Lists reviewed.

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

5.1 When a new variety enters into common knowledge such that 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.

5.2 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 Variety 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 authentication of replacement seed (See E4).

6 Release of Reference Samples for Authorised Purposes

6.1 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.

6.2 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 Runner bean entered for Variety Listing and/or Plant Breeders Rights trials.

2 Scope

2.1 These procedures apply to applications where new additional DUS characteristics which have not been previously approved by the NLSC are requested for use for 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 must include 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.
- 5.2 The NLSC may commission a test or trial to further investigate a proposal. The applicant will be advised by APHA of arrangements and costs.
- 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 distinctness, uniformity and stability of varieties of Runner bean.

2 Scope

2.1 These procedures apply to all varieties of Runner bean (*Phaseolus coccineus* L.) entered for Variety Listing and Plant Breeders' Rights tests and those being tested for Foreign Authorities.

3 Responsibilities

3.1 The Test Centre is responsible for applying the criteria for DUS, set out in this procedure.

3.2 The Test Centre is responsible for producing the DUS reports in accordance with these procedures and for ensuring that they are in accordance with UPOV Protocols.

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 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 TG1/3 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 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.
- 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 years of test 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.
- 5.9 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.
- 5.10 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 glasshouse or field are identified and marked for exclusion from recording.

6.4 The number of off-types in grouping characteristics should not exceed the level indicated in UPOV TGP/8/1 for a population standard of 2% and a 95% acceptance probability. In a population of 60, 3 off-types are allowed.

6.5 Where the number of off-types in the first test cycle exceeds 1 but is less than 3, 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.

6.6 After the variants have been excluded, the characteristics listed in Section D 5 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:

6.7 Uniformity of continuous variation (quantitative characters) 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:

6.8 Provided a variety meets the off-type standard, it can be considered sufficiently uniform after two test cycles if, for all measured characters necessary for distinctness, the Combined over Years Uniformity (COYU) analysis is not significantly greater than that of the reference varieties at the 0.1% ($P=0.001$) (see document TGP/8/1) significance level. In all cases an examination of data from individual test cycles is carried out to investigate the uniformity problem indicated by the COYU result. Decisions on whether any outlier plants (off-types) identified by data analysis should be excluded from the calculation of variety means and standard deviations, should be taken by the Test Centre.

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 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 comprises the following at the time when the application for the candidate is made:

1.1.1 All other candidate varieties already in DUS test in the UK or entering testing at the same time as the candidate.

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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The Animal and Plant Health Agency (APHA) is an executive agency of the Department for Environment, Food & Rural Affairs, and also works on behalf of the Scottish Government and Welsh Government.