



PROTOCOL FOR TESTS ON DISTINCTNESS, UNIFORMITY AND STABILITY

Phleum nodosum L.
Phleum pratense L.

TIMOTHY

UPOV Code: PHLEU_BER; PHLEU_PRA

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1. SUBJECT OF THE PROTOCOL AND REPORTING

1.1 Scope of the technical protocol

This Technical Protocol applies to all varieties of *Phleum nodosum* L. and *Phleum pratense* L.

The protocol describes the technical procedures to be followed in order to meet the requirements of Council Regulation 2100/94 on Community Plant Variety Rights. The technical procedures have been agreed by the Administrative Council and are based on documents agreed by the International Union for the Protection of New Varieties of Plants (UPOV), such as the General Introduction to DUS (UPOV Document TG/1/3 http://www.upov.int/export/sites/upov/resource/en/tg_1_3.pdf), its associated TGP documents (<http://www.upov.int/tgp/en/>) and the relevant UPOV Test Guideline TG/34/7 dated 17/12/2020 (https://www.upov.int/test_guidelines/en/fulltext_tgdocs.jsp?lang_code=EN&q=timothy) for the conduct of tests for Distinctness, Uniformity and Stability.

1.2 Entry into Force

The present protocol enters into force on **01.01.2022**. Any ongoing DUS examination of candidate varieties started before the aforesaid date will not be affected by the approval of the Technical Protocol. Technical examinations of candidate varieties are carried out according to the TP in force when the DUS test starts. The starting date of a DUS examination is considered to be the due date for submitting of plant material for the first test period.

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

1.3 Reporting between Examination Office and CPVO and Liaison with Applicant

1.3.1 Reporting between Examination Office and CPVO

The Examination Office shall deliver to the CPVO a preliminary report ("the preliminary report") no later than two weeks after the date of the request for technical examination by the CPVO.

The Examination Office shall also deliver to the CPVO a report relating to each growing period ("the interim report") and, when the Examination Office considers the results of the technical examination to be adequate to evaluate the variety or the CPVO so requests, a report relating to the examination ("the final report").

The final report shall state the opinion of the Examination Office on the distinctness, uniformity and stability of the variety. Where it considers those criteria to be satisfied, or where the CPVO so requests, a description of the variety shall be added to the report.

If a report is negative the Examination Office shall set out the detailed reasons for its findings.

The interim and the final reports shall be delivered to the CPVO as soon as possible and no later than on the deadlines as laid down in the designation agreement.

1.3.2 Informing on problems in the DUS test

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

1.3.3 Sample keeping in case of problems

If the technical examination has resulted in a negative report, the CPVO shall inform the Examination Office as soon as possible in case that a representative sample of any relevant testing material shall be kept.

2. MATERIAL REQUIRED

2.1 Plant material requirements

Information with respect to the agreed closing dates and submission requirements of plant material for the technical examination of varieties can be found on <https://public.plantvarieties.eu/publication> in the special issue S2/S3 of the Official Gazette of the Office. General requirements on submission of samples are also to be found following the same link.

2.2 Informing the applicant of plant material requirements

The CPVO informs the applicant that

- he is responsible for ensuring compliance with any customs and plant health requirements.
- the plant material supplied should be visibly healthy, not lacking in vigor, nor affected by any important pest or disease.
- the plant material should not have undergone any treatment which would affect the expression of the characteristics of the variety, unless the competent authorities allow or request such treatment. If it has been treated, full details of the treatment must be given.

2.3 Informing about problems on the submission of material

The Examination Office shall report to the CPVO immediately in cases where the test material of the candidate variety has not arrived in time or in cases where the material submitted does not fulfil the conditions laid down in the request for material issued by the CPVO.

In cases where the examination office encounters difficulties to obtain plant material of reference varieties the CPVO should be informed.

3. METHOD OF EXAMINATION

3.1 Number of growing cycles

3.1.1 The minimum duration of tests should normally be two independent growing cycles.

3.1.2 The two independent growing cycles should be in the form of two separate plantings.
The testing of a variety may be concluded when the competent authority can determine with certainty the outcome of the test.

3.2 Testing Place

Tests are normally conducted at one place. In the case of tests conducted at more than one place, guidance is provided in TGP/9 "Examining Distinctness" http://www.upov.int/edocs/tgpdocs/en/tgp_9.pdf.

3.3 Conditions for Conducting the Examination

The tests should be carried out under conditions ensuring satisfactory growth for the expression of the relevant characteristics of the variety and for the conduct of the examination.

The optimum stage of development for the assessment of each characteristic is indicated by a number in the third column of the Table of Characteristics. The stages of development denoted by each number are described in Chapter 8.3.

The recommended type of plot in which to observe the characteristic is indicated by the following key in the second column of the Table of Characteristics:

- A: spaced plants
- B: row plot

3.4 Test design

3.4.1 Spaced plants: Each test should be designed to result in a total of at least 60 plants, which should be divided between at least 2 replicates.

Row plots: Each test should be designed to result in a total of at least 200 plants, which should be divided between at least 2 replicates.

In addition, the test may include 8 meters of row plot which should be divided between at least 2 replicates. The density of the seed should be such that around 200 plants/meter can be expected.

3.4.2 The design of the tests should be such that plants or parts of plants may be removed for measurement or counting without prejudice to the observations which must be made up to the end of the growing cycle.

3.5 Special tests for additional characteristics

In accordance with Article 23 of Implementing Rules N° 874/2009 an applicant may claim either in the Technical Questionnaire or during the test that a candidate has a characteristic which would be helpful in establishing distinctness. If such a claim is made and is supported by reliable technical data, a special test may be undertaken providing that a technically acceptable test procedure can be devised.

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

3.6 Constitution and maintenance of a variety collection

The process for the constitution and the maintenance of a variety collection can be summarized as follows:

Step 1: Making an inventory of the varieties of common knowledge

Step 2: Establishing a collection ("variety collection") of varieties of common knowledge which are relevant for the examination of distinctness of candidate varieties

Step 3: Selecting the varieties from the variety collection which need to be included in the growing trial or other tests for the examination of distinctness of a particular candidate variety.

3.6.1 Forms of variety collection

The variety collection shall comprise variety descriptions and living plant material, thus a living reference collection. The variety description shall be produced by the EO unless special cooperation exists between EOs and the CPVO. The descriptive and pictorial information produced by the EO shall be held and maintained in a form of a database.

3.6.2 Living Plant Material

The EO shall collect and maintain living plant material of varieties of the species concerned in the variety collection.

3.6.3 Range of the variety collection

The living variety collection shall cover at least those varieties that are suitable to climatic conditions of a respective EO.

3.6.4 Making an inventory of varieties of common knowledge for inclusion in the variety collection

The inventory shall include varieties protected under National PBR (UPOV contracting parties) and Community PBR, varieties registered in the Common Catalogue, the OECD list, the Conservation variety list and varieties in trade or in commercial registers for those species not covered by a National or the Common Catalogue.

3.6.5 Maintenance and renewal/update of a living variety collection

The EO shall maintain seeds in conditions which will ensure germination and viability, periodical checks, and renewal as required. For the renewal of existing living material the identity of replacement living plant material shall be verified by conducting side-by-side plot comparisons between the material in the collection and the new material.

4. ASSESSMENT OF DISTINCTNESS, UNIFORMITY AND STABILITY

The prescribed procedure is to assess distinctness, uniformity and stability in a growing trial.

4.1 Distinctness

4.1.1 General recommendations

It is of particular importance for users of this Technical Protocol to consult the UPOV-General Introduction to DUS (link in chapter 1 of this document) and TGP 9 'Examining Distinctness' (http://www.upov.int/edocs/tgpdocs/en/tgp_9.pdf) prior to making decisions regarding distinctness. However, the following points are provided for elaboration or emphasis in this Technical Protocol.

4.1.2 Consistent differences

The differences observed between varieties may be so clear that more than one growing cycle is not necessary. In addition, in some circumstances, the influence of the environment is not such that more than a single growing cycle is required to provide assurance that the differences observed between varieties are sufficiently consistent. One means of ensuring that a difference in a characteristic, observed in a growing trial, is sufficiently consistent is to examine the characteristic in at least two independent growing cycles.

4.1.3 Clear differences

Determining whether a difference between two varieties is clear depends on many factors, and should consider, in particular, the type of expression of the characteristic being examined, i.e. whether it is expressed in a qualitative, quantitative, or pseudo-qualitative manner. Therefore, it is important that users of these Technical Protocols are familiar with the recommendations contained in the UPOV-General Introduction to DUS prior to making decisions regarding distinctness.

If distinctness is assessed using the 2 x 1% criterion, the difference between two varieties is clear if the respective characteristics are significantly different in the same direction at the 1% level in at least two out of three years. The tests in each year are based on Student's two-tailed t-test of the differences between variety means with standard errors estimated using the residual mean square from the analysis of the variety x replicate plot means.

If distinctness is assessed by the combined over years distinctness analysis (COYD) the difference between two varieties is clear if the respective characteristics are different at the 1% significance level or less ($p < 0.01$) in a test over either two or three years.

If the conditions for the application of the COYD analyses are not fulfilled, distinctness should be assessed using the 2x1% method.

If the significance level or statistical methods prescribed are not appropriate the method used should be clearly described.

4.1.4 Number of plants/parts of plants to be examined

Unless otherwise indicated, for the purposes of distinctness, all observations on single plants should be made on 60 plants or parts taken from each of 60 plants and any other observations made on all plants in the test, disregarding any off-type plants.

In the case of observations of parts taken from single plants, the number of parts to be taken from each of the plants should be 1.

4.1.5 Method of observation

The recommended method of observing the characteristic for the purposes of distinctness is indicated by the following key in the third column of the Table of Characteristics (see document TGP/9 "Examining Distinctness", Section 4 "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

Type of observation: visual (V) or measurement (M)

"Visual" observation (V) is an observation made on the basis of the expert's judgment. For the purposes of this document, "visual" observation refers to the sensory observations of the experts and, therefore, also includes smell, taste and touch. Visual observation includes observations where the expert uses reference points (e.g. diagrams, example varieties, side-by-side comparison) or non-linear charts (e.g. colour charts). Measurement (M) is an objective observation against a calibrated, linear scale e.g. using a ruler, weighing scales, colorimeter, dates, counts, etc.

Type of record: for a group of plants (G) or for single, individual plants (S)

For the purposes of distinctness, observations may be recorded as a single record for a group of plants or parts of plants (G), or may be recorded as records for a number of single, individual plants or parts of plants (S). In most cases, "G" provides a single record per variety and it is not possible or necessary to apply statistical methods in a plant-by-plant analysis for the assessment of distinctness.

In cases where more than one method of observing the characteristic is indicated in the Table of Characteristics (e.g. VG/MG), guidance on selecting an appropriate method is provided in document TGP/9, Section 4.2.

4.2 **Uniformity**

- 4.2.1 It is of particular importance for users of this Technical Protocol to consult the UPOV-General Introduction to DUS (link in chapter 1 of this document) and TGP 10 'Examining Uniformity' (http://www.upov.int/edocs/tgpdocs/en/tgp_10.pdf) prior to making decisions regarding uniformity. However, the following points are provided for elaboration or emphasis in this Technical Protocol:

- 4.2.2 This Technical Protocol has been developed for the examination of cross-pollinated varieties. For varieties with other types of propagation the recommendations in the UPOV-General Introduction to DUS and document TGP/13 "Guidance for new types and species", Section 4.5 "Testing Uniformity" should be followed.

The assessment of uniformity should be according to the recommendations for cross-pollinated varieties in the UPOV-General Introduction to DUS.

If uniformity is assessed by the combined over years uniformity method (COYU) the candidate variety is sufficiently uniform in the respective characteristic if the relative tolerance limit in relation to comparable varieties does not exceed the 1% significance level or less ($p < 0.01$) in a test over two consecutive cycles.

If uniformity is assessed by the combined over years uniformity method (COYU) the candidate variety is sufficiently uniform in the respective characteristic if the relative tolerance limit in relation to comparable varieties does not exceed the 0.1% significance level or less ($p < 0.001$) in a test over three consecutive cycles.

If uniformity is assessed by the relative variance method the candidate variety is sufficiently uniform in the respective characteristic if the variance does not exceed the average variance of comparable varieties in at least two out of three years. The threshold of F (at $P = 0.01$) for a sample size of 60 is 1.47.

4.3 Stability

It is of particular importance for users of this Technical Protocol to consult the UPOV-General Introduction to DUS (link in chapter 1 of this document) and TGP 11 'Examining Stability' (http://www.upov.int/edocs/tgpdocs/en/tgp_11.pdf)

In practice, it is not usual to perform tests of stability that produce results as certain as those of the testing of distinctness and uniformity. However, experience has demonstrated that, for many types of variety, when a variety has been shown to be uniform, it can also be considered to be stable.

Where appropriate, or in cases of doubt, stability may be further examined by testing a new seed stock to ensure that it exhibits the same characteristics as those shown by the initial material supplied.

5. GROUPING OF VARIETIES AND ORGANISATION OF THE GROWING TRIAL

- 5.1 The selection of varieties of common knowledge to be grown in the trial with the candidate varieties and the way in which these varieties are divided into groups to facilitate the assessment of distinctness are aided by the use of grouping characteristics.
- 5.2 Grouping characteristics are those in which the documented states of expression, even where produced at different locations, can be used, either individually or in combination with other such characteristics: (a) to select varieties of common knowledge that can be excluded from the growing trial used for examination of distinctness; and (b) to organise the growing trial so that similar varieties are grouped together.
- 5.3 The following have been agreed as useful grouping characteristics:
- a) Plant: time of inflorescence emergence after vernalization (characteristic 9)
 - b) Stem: length (characteristic 13)
- 5.4 If other characteristics than those from the Technical Protocol are used for the selection of varieties to be included into the growing trial, the EO shall inform the CPVO and seek the prior consent of the CPVO before using these characteristics.
- 5.5 Guidance for the use of grouping characteristics, in the process of examining distinctness, is provided through the UPOV-General Introduction to DUS and document TGP/9 "Examining Distinctness".

6. INTRODUCTION TO THE TABLE OF CHARACTERISTICS

6.1 Characteristics to be used

The characteristics to be used in DUS tests and preparation of descriptions shall be those referred to in the table of characteristics. All the characteristics shall be used, providing that observation of a characteristic is not rendered impossible by the expression of any other characteristic, or the expression of a characteristic is prevented by the environmental conditions under which the test is conducted or by specific legislation on plant health. In the latter case, the CPVO should be informed.

The Administrative Council empowers the President, in accordance with Article 23 of Commission Regulation N°874/2009, to insert additional characteristics and their expressions in respect of a variety.

6.2. States of expression and corresponding notes

States of expression are given for each characteristic to define the characteristic and to harmonize descriptions. Each state of expression is allocated a corresponding numerical note for ease of recording of data and for the production and exchange of the description. All relevant states of expression are presented in the characteristic.

Further explanation of the presentation of states of expression and notes is provided in UPOV document TGP/7 "Development of Test Guidelines".

6.3 Example Varieties

Where appropriate, example varieties are provided to clarify the states of expression of each characteristic.

6.4 Legend

For column 'CPVO N°':

G	Grouping characteristic	- see Chapter 5
QL	Qualitative characteristic	
QN	Quantitative characteristic	
PQ	Pseudo-qualitative characteristic	
(+)	Explanations for individual characteristics	- see Chapter 8.2

For column 'UPOV N°':

The numbering of the characteristics is provided as a reference to the UPOV guideline.

(*) UPOV Asterisked characteristic - Characteristics that are important for the international harmonization of variety descriptions.

For column 'Stage, method':

A, B - see Chapter 3.3

If more than one type of plot is indicated for a specific characteristic, the examination office has to choose the most appropriate plot type under its conditions. The characteristic should not be assessed twice.

MG, MS, VG, VS		- see Chapter 4.1.5
(a)-(b)	Explanations covering several Characteristics	- see Chapter 8.1
DC10-DC68	Explanations on growth stages	- see Chapter 8.3

P.p. *Phleum pratense*

P.n. *Phleum nodosum*

7. TABLE OF CHARACTERISTICS

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
1.	1.	VG B	Leaf: intensity of green colour <u>without</u> vernalization		
QN		20-29	very light		1
			very light to light		2
			light		3
			light to medium		4
			medium	Presto (P.p.)	5
			medium to dark		6
			dark	Teno (P.n.)	7
			dark to very dark		8
			very dark		9
2.	2.	VG B/ VS A	Plant: growth habit <u>without</u> vernalization		
QN		20-29	erect		1
		(a)	erect to semi-erect		2
			semi-erect	Aturo (P.p.)	3
			semi-erect to intermediate		4
			intermediate	Dolina (P.p.)	5
			intermediate to semi-prostrate		6
			semi-prostrate	Alma (P.p.)	7
			semi-prostrate to prostrate		8
			prostrate		9

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
3.	3.	MG B/ VG B	Plant: natural height <u>without</u> vernalization		
QN		20-29	very short	Latima (P.n.)	1
			very short to short		2
			short		3
			short to medium		4
			medium	Barpenta (P.p.); Vega (P.p.)	5
			medium to tall		6
			tall	Rubato (P.p.)	7
			tall to very tall		8
			very tall		9
4. (+)	4.	MS A/ VG B	Plant: time of inflorescence emergence <u>without</u> vernalization		
QN			very early	Vähäsöyrinki (P.p.)	1
			very early to early		2
			early	Rhonia (P.p.); Saga (P.p.)	3
			early to medium		4
			medium	Rasant (P.p.); Teicis (P.p.)	5
			medium to late		6
			late	Rubato (P.p.)	7
			late to very late		8
			very late		9

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
5.	5.	VG B/ VS A	Leaf: intensity of green colour <u>after</u> vernalization		
QN		20-39	very light		1
			very light to light		2
			light		3
			light to medium		4
			medium	Aturo (P.p.)	5
			medium to dark		6
			dark	Latima (P.n.)	7
			dark to very dark		8
			very dark		9
6.	6.	VG B/ VS A	Plant: growth habit <u>after</u> vernalization		
QN		20-39	erect		1
		(a)	erect to semi-erect		2
			semi-erect	Phlewiola (P.p.)	3
			semi-erect to intermediate		4
			intermediate	Presto (P.p.), Teno (P.n.)	5
			intermediate to semi-prostrate		6
			semi-prostrate		7
			semi-prostrate to prostrate		8
			prostrate	Latima (P.n.)	9

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
7.	7.	MS A/ VG B	Plant: natural height <u>after</u> vernalization		
QN	(*)	20-39	very short	Latima (P.n.)	1
			very short to short		2
			short	Vähäsöyrinki (P.p.)	3
			short to medium		4
			medium	Barmidi (P.p.)	5
			medium to tall		6
			tall	Prometheus (P.p.), Rasant (P.p.)	7
			tall to very tall		8
			very tall		9
8.	8.	VG B	Leaf: width		
QN		20-39	very narrow		1
			very narrow to narrow		2
			narrow	Teno (P.n.)	3
			narrow to medium		4
			medium	Dolina (P.p.)	5
			medium to broad		6
			broad	Varis (P.p.)	7
			broad to very broad		8
			very broad		9

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
9. (+)	9. (*)	MS A	Plant: time of inflorescence emergence <u>after</u> vernalization		
QN			very early	Tiller (P.p.)	1
			very early to early		2
			early	Phlewiola (P.p.); Teno (P.n.)	3
			early to medium		4
			medium	Vähäsöyrinki (P.p.)	5
			medium to late		6
			late	Adrienne (P.p.)	7
			late to very late		8
G			very late	Aberystwyth S48 (P.p.)	9
10.	10. (*)	MS A	Flag leaf: length		
QN		50-56	very short	Teno (P.n.)	1
		(b)	very short to short		2
			short		3
			short to medium		4
			medium	Grindstad (P.p.)	5
			medium to long		6
			long	Erecta (P.p.)	7
			long to very long		8
			very long		9

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
11.	11.	MS A	Flag leaf: width		
QN	(*)	50-56	very narrow		1
	(b)		very narrow to narrow		2
			narrow		3
			narrow to medium		4
			medium	Tiller (P.p.)	5
			medium to broad		6
			broad	KIS Muri (P.p.)	7
			broad to very broad		8
			very broad		9
12.	12.	MS A	Flag leaf: length/width ratio		
QN		50-56	very low		1
	(b)		very low to low		2
			low	Teno (P.n.)	3
			low to medium		4
			medium	Saga (P.p.)	5
			medium to high		6
			high	Dolina (P.p.)	7
			high to very high		8
			very high		9

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
13. (+)	13. (*)	MS A	Stem: length		
QN		60-68	very short		1
			very short to short		2
			short		3
			short to medium		4
			medium	Vähäsöyrinki (P.p.)	5
			medium to long		6
			long	Dolina (P.p.)	7
			long to very long		8
G			very long		9
14.	14. (*)	MS A	Stem: length of upper internode		
QN		60-68	very short		1
			very short to short		2
			short	Latima (P.n.)	3
			short to medium		4
			medium	Aturo (P.p.)	5
			medium to long		6
			long	Aurora (P.p.)	7
			long to very long		8
			very long		9

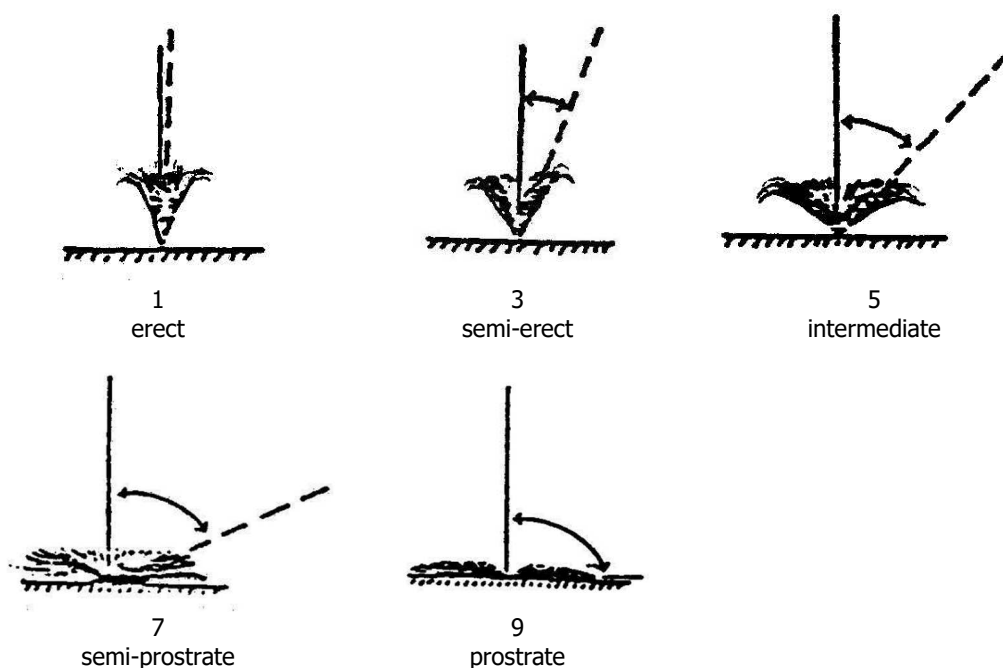
CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
15.	15.	MS A	Inflorescence: length		
QN	(*)	60-68	very short		1
			very short to short		2
			short	Teno (P.n.)	3
			short to medium		4
			medium	Phlewiola (P.p.)	5
			medium to long		6
			long	Aurora (P.p.)	7
			long to very long		8
			very long		9
16.	16.	VG B	Plant: tendency to form inflorescence in aftermath		
QN			very weak	Vega (P.p.)	1
			very weak to weak		2
			weak	Anjo (P.p.), Tryggve (P.p.)	3
			weak to medium		4
			medium	Rubato (P.p.)	5
			medium to strong		6
			strong	Timola (P.p.)	7
			strong to very strong		8
			very strong		9

8. EXPLANATIONS ON THE TABLE OF CHARACTERISTICS

8.1 Explanations covering several characteristics

Characteristics containing the following key in the third column of the Table of Characteristics should be examined as indicated below:

- a) The growth habit should be assessed visually from the attitude of the leaves of the plant as a whole. The angle formed by the imaginary line through the region of greatest leaf density and the vertical should be used.



- b) The flag leaf is the first true leaf at the top of the stem which is visible at the time of inflorescence emergence and has a sheath enclosing the stem.

In some cases, a small bract-like leaf which has a very short sheath, ligule and blade develops at the base of the inflorescence. This leaf is not visible at the time of inflorescence emergence but only when the inflorescence fully emerged. It generally does not have a normal sheath clasping the stem. This bract-like leaf is not to be considered as a flag leaf

8.2 Explanations for individual characteristics

Ad. 4: Plant: time of inflorescence emergence without vernalization

1st observation: - when approximately 20% of the plants of the earliest heading variety have emerged
- Date 1 for plants with emerged inflorescences

2nd observation: - 1-2 weeks after first observation (weather dependent)
- Date 2 for plants with emerged inflorescences

3rd observation: - 1-2 weeks after second observation (weather dependent)
- Date 3 for plants with emerged inflorescences

Date 4 for those other plants which have not emerged in any one of the three observations.

From this data a mean date per variety is calculated.

Ad. 9: Plant: time of inflorescence emergence without vernalization

The date of inflorescence emergence of each single plant should be assessed at least twice a week. A single plant is considered to have headed when the tip of three inflorescences can be seen protruding from the flag leaf sheath. From the single plant data, a mean date per plot and a mean date per variety is calculated.

Ad. 13: Stem: length

Observations should be made on the longest stem and include the inflorescence.

8.3 Explanations on growth stages

All characteristics should be recorded at the appropriate time for the plant concerned. Growth stages of grasses are indicated by decimal codes which are derived from the decimal code for the growth stages of cereals (Zadoks, et al., 1974). This decimal code is in close conformity with the BBCH code (Meier, 1997).

Seedling growth (seedling: one shoot)

DC 10	First leaf through coleoptile
DC 15	Five leaves unfolded
DC 19	Nine or more leaves unfolded

Tillering

DC 20	Main shoot only (beginning of tillering)
DC 23	Main shoot and 3 tillers
DC 25	Main shoot and 5 tillers
DC 29	Main shoot and 9 or more tillers

Stem elongation

DC 30	Pseudo-stem erection (formed by sheaths of leaves)
DC 31	First node detectable (early stem extension across all stems)
DC 35	Fifth node detectable (50% extension across all stems)
DC 39	Flag leaf ligula/collar just visible (pre-boot stage)

Booting

DC 41	Flag leaf sheath extending (little enlargement of the inflorescence, early boot-stage)
DC 45	Boots swollen (late-boot stage)
DC 47	First leaf sheath opening
DC 49	First awns visible (in awned forms only)

Inflorescence emergence (mostly non-synchronous)

DC 50	First spikelet of inflorescence just visible
DC 52	25% of the inflorescence emerged (across all stems)
DC 54	50% of the inflorescence emerged (across all stems)
DC 56	75% of the inflorescence emerged (across all stems)
DC 58	Emergence of inflorescence completed

Anthesis (mostly non-synchronous)

DC 60	Beginning of anthesis
DC 64	Anthesis half-way
DC 68	Anthesis complete

9. LITERATURE

Meier, U., 1997: Growth stages of mono- and dicotyledonous plants. BBCH-Monograph Blackwell Science. Berlin, Vienna

ZADOKS, J. C., CHANG, T. T. and KONZAK, C. F., 1974. A decimal code for the growth stages of cereals. Weed Research, 14: 415–421.

10. TECHNICAL QUESTIONNAIRE

The Technical Questionnaire is available on the [CPVO website](#) under the following reference:
CPVO-TQ/034/1 – *Phleum nodosum* L., *Phleum pratense* L. - timothy

Link to e-TQ:

<https://applyfor.plantvarieties.eu/mypvr.oa/#!/en/oa/show/questionnaire/TQ/12921/en>