E

TG/19/11(proj.1)
ORIGINAL: English
DATE: 2016-06-03

INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

Geneva

DRAFT

BARLEY

UPOV Code(s):

HORDE_VUL

Hordeum vulgare L.

GUIDELINES

FOR THE CONDUCT OF TESTS

FOR DISTINCTNESS, UNIFORMITY AND STABILITY

prepared by experts from Germany

to be considered by the

Technical Working Party for Agricultural Crops
at its forty-fifth session, to be held in Mexico City, Mexico,
from 2016-07-11 to 2016-07-15

Disclaimer: this document does not represent UPOV policies or guidance

Alternative names:*

Botanical name	*English*	*French*	*German*	*Spanish*
Hordeum vulgare L.	Barley	Orge	Gerste	Cebada

The purpose of these guidelines ("Test Guidelines") is to elaborate the principles contained in the General Introduction (document TG/1/3), and its associated TGP documents, into detailed practical guidance for the harmonized examination of distinctness, uniformity and stability (DUS) and, in particular, to identify appropriate characteristics for the examination of DUS and production of harmonized variety descriptions.

ASSOCIATED DOCUMENTS

These Test Guidelines should be read in conjunction with the General Introduction and its associated TGP documents.

* These names were correct at the time of the introduction of these Test Guidelines but may be revised or updated. [Readers are advised to consult the UPOV Code, which can be found on the UPOV Website (www.upov.int), for the latest information.]

TABLE OF CONTENTS PAGE

1. Subject of these Test Guidelines

These Test Guidelines apply to all varieties of *Hordeum vulgare* L..

2. Material Required

2.1 The competent authorities decide on the quantity and quality of the plant material required for testing the variety and when and where it is to be delivered. Applicants submitting material from a State other than that in which the testing takes place must ensure that all customs formalities and phytosanitary requirements are complied with.

2.2 The material is to be supplied in the form of seed and ears (if requested).

2.3 The minimum quantity of plant material, to be supplied by the applicant, should be:

Seed: 3 kg
Ears: 120

The seed should meet the minimum requirements for germination, species and analytical purity, health and moisture content, specified by the competent authority. In cases where the seed is to be stored, the germination capacity should be as high as possible and should, be stated by the applicant.

The ears should be well developed and should contain a sufficient number of viable seeds to establish a satisfactory row of plants for observation.

2.4 The plant material supplied should be visibly healthy, not lacking in vigor, nor affected by any important pest or disease.

2.5 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.

3. Method of Examination

3.1 Number of Growing Cycles

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

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”.

3.3 Conditions for Conducting the Examination

3.3.1 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.

3.3.2 The optimum stage of development for the assessment of each characteristic is indicated by a number in the second column of the Table of Characteristics. The stages of development denoted by each number are described in Chapter 8.

3.4 Test Design

3.4.1 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.

3.4.2 ***The following paragraph should become 3.4.1:***
Each test should be designed to result in a total of at least 2000 plants, which should be divided between at least 2 replicates. The assessment of the characteristic “Seasonal type” should be carried out on at least 300 plants. If tests on ear rows are conducted, at least 100 ear rows should be observed.

3.5 Additional Tests

Additional tests, for examining relevant characteristics, may be established.

4. Assessment of Distinctness, Uniformity and Stability

4.1 Distinctness

4.1.1 General Recommendations

It is of particular importance for users of these Test Guidelines to consult the General Introduction prior to making decisions regarding distinctness. However, the following points are provided for elaboration or emphasis in these Test Guidelines.

To assess distinctness of hybrids, the parent lines and the formula may be used according to the following recommendations:

(i) description of parent lines according to the Test Guidelines;

(ii) check of the originality of the parent lines in comparison with the variety collection, based on the characteristics in Chapter 7, in order to identify similar parent lines;

(iii) check of the originality of the hybrid formula in relation to the hybrids in the variety collection, taking into account the most similar lines; and

(iv) assessment of the distinctness at the hybrid level for varieties with a similar formula.

Further guidance is provided in documents TGP/9 "Examining Distinctness" and TGP/8 "Trial Design and Techniques Used in the Examination of Distinctness, Uniformity and Stability".

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 Test Guidelines are familiar with the recommendations contained in the General Introduction prior to making decisions regarding distinctness.

4.1.4 Number of plants or parts of plants to be Examined

Unless otherwise indicated, for the purposes of distinctness, all observations on single plants should be made on 10 plants or parts of plants taken from each of 10 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 second 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. color 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 these Test Guidelines to consult the General Introduction prior to making decisions regarding uniformity. However, the following points are provided for elaboration or emphasis in these Test Guidelines:

4.2.2 The assessment of uniformity for hybrid varieties depends on the type of hybrid and should be according to the recommendations for hybrid varieties in the General Introduction.

4.2.3 Where the assessment of a hybrid variety involves the parent lines, the uniformity of the hybrid variety should, in addition to an examination of the hybrid variety itself, also be assessed by examination of the uniformity of its parent lines.

4.2.4 The recommended sample size for the assessment of uniformity is indicated by the following key in the table of characteristics:

A: sample size of 100 plants/parts of plants
B: sample size of 2000 plants

4.2.5 For the assessment of uniformity in a sample of 2000 plants, the following standards should be applied
For self-pollinated varieties a population standard of 0.1% and an acceptance probability of at least 95% should be applied. In the case of a sample size of 2000 plants, 5 off-types are allowed.
For male sterile lines a population standard of 0.2% and an acceptance probability of at least 95% should be applied. In the case of a sample size of 2000 plants, 8 off-types are allowed.
For male sterile single cross hybrids used as parent in a 3-way-hybrid a population standard of 0.5% and an acceptance probability of at least 95% should be applied. In the case of a sample size of 2000 plants, 15 off-types are allowed.

4.2.6 For the assessment of uniformity in a sample of 100 ear-rows, plants or parts of plants, a population standard of 1% and an acceptance probability of at least 95% should be applied. In the case of a sample size of 100 ear-rows, plants or parts of plants, 3 off-types are allowed. An ear-row is considered to be an off-type ear-row if there is more than 1 off-type plant within that ear-row.

4.2.7 For "A" characteristics, with the exception of characteristic 1, the assessment of uniformity can be done in 2 steps. In a first step, 20 plants are observed. If no off-types are observed, the variety is considered to be uniform. If more than 3 off-types are observed, the variety is considered not to be uniform. If 1 to 3 off-types are observed, an additional sample of 80 plants or parts of plants must be observed.

4.2.8 For the assessment of uniformity of hybrid varieties, a population standard of 10% and an acceptance probability of at least 95% should be applied. In case of characteristics indicated by B, the sample size for the assessment of uniformity may be reduced to 200 plants. In case of a sample size of 200 plants, 27 off-types are allowed. In case of a sample size of 100 ear rows, plants or parts of plants, 15 off-types are allowed.

4.3 Stability

4.3.1 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.

4.3.2 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.

4.3.3 Where appropriate, or in cases of doubt, the stability of a hybrid variety may, in addition to an examination of the hybrid variety itself, also be assessed by examination of the uniformity and stability of its parent lines.

5. Grouping of Varieties and Organization 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 organize the growing trial so that similar varieties are grouped together.

5.3 The following have been agreed as useful grouping characteristics:

(a) Lowest leaves: hairiness of leaf sheath (characteristic 3)
(b) Ear: number of rows (characteristic 13)
(c) Ear: development of sterile spikelets (characteristic 14)
(d) Grain: rachilla hair type (characteristic 23)
(e) Grain: type (characteristic 25)
(f) Grain: hairiness of ventral furrow (characteristic 26)
(g) Seasonal type (characteristic 28)

5.4 Guidance for the use of grouping characteristics, in the process of examining distinctness, is provided through the General Introduction and document TGP/9 “Examining Distinctness”.

6. Introduction to the Table of Characteristics

6.1 Categories of Characteristics

6.1.1 Standard Test Guidelines Characteristics

Standard Test Guidelines characteristics are those which are approved by UPOV for examination of DUS and from which members of the Union can select those suitable for their particular circumstances.

6.1.2 Asterisked Characteristics

Asterisked characteristics (denoted by *) are those included in the Test Guidelines which are important for the international harmonization of variety descriptions and should always be examined for DUS and included in the variety description by all members of the Union, except when the state of expression of a preceding characteristic or regional environmental conditions render this inappropriate.

6.2 States of Expression and Corresponding Notes

6.2.1 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.

6.2.2 In the case of qualitative and pseudo-qualitative characteristics (see Chapter 6.3), all relevant states of expression are presented in the characteristic. However, in the case of quantitative characteristics with 5 or more states, an abbreviated scale may be used to minimize the size of the Table of Characteristics. For example, in the case of a quantitative characteristic with 9 states, the presentation of states of expression in the Test Guidelines may be abbreviated as follows:

State	*Note*
small	3
medium	5
large	7

However, it should be noted that all of the following 9 states of expression exist to describe varieties and should be used as appropriate:

State	*Note*
very small	1
very small to small	2
small	3
small to medium	4
medium	5
medium to large	6
large	7
large to very large	8
very large	9

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

6.3 Types of Expression

An explanation of the types of expression of characteristics (qualitative, quantitative and pseudo-qualitative) is provided in the General Introduction.

6.4 Example Varieties

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

The varieties are indicated as follows:
(S) - spring barley
(W) - winter barley.

6.5 Legend

		English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
1	**2**	**3**	**4**	**5**	**6**	**7**			
		Name of characteristics in English		**Nom du caractère en français**		**Name des Merkmals auf Deutsch**	**Nombre del carácter en español**		
		states of expression		types d'expression		Ausprägungsstufen	tipos de expresión		

1 Characteristic number

2 (*) Asterisked characteristic – see Chapter 6.1.2

3 Type of expression
QL Qualitative characteristic – see Chapter 6.3
QN Quantitative characteristic – see Chapter 6.3
PQ Pseudo-qualitative characteristic – see Chapter 6.3

4 Method of observation (and type of plot, if applicable)
MG, MS, VG, VS – see Chapter 4.1.5

5 (+) See Explanations on the Table of Characteristics in Chapter 8.1

6 Not applicable

7 Growth stage key See Explanations on the Table of Characteristics in Chapter 8

A, B – see Chapter 4.2.4

(***Remark for TWA**: Explanation for cell/column 4 will be improved for the next draft because standard reference to "type of plot" is not appropriate.)*

7. Table of Characteristics/Tableau des caractères/Merkmalstabelle/Tabla de caracteres

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
1.		**PQ VG|A**	**(+)**	**00**			
		Kernel: color of aleurone layer					
		whitish				(S) Grace, (W) California	1
		weakly coloured				(S) Henley, (W) SY Leoo	2
		strongly coloured				(S) ---, (W) Saffron	3
2.	**(*)**	**QN VG|B**	**(+)**	**25-29**			
		Plant: growth habit					
		erect				(S) ---, (W) ---	1
		semi-erect				(S) Pirona, (W) ---	3
		intermediate				(S) Grace, (W) California	5
		semi-prostate				(S) Quench, (W) KWS Joy	7
		prostate				(S) ---, (W) ---	9
3.	**(*)**	**QL VG|A**		**25-29**			
		Lowest leaves: hairiness of leaf sheath					
		absent				(S) Grace, (W) California	1
		present				(S) ---, (W) Henriette	9
4.	**(*)**	**QN VG|B**		**45-49**			
		Flag leaf: intensity of anthocyanin coloration of auricles					
		absent or very weak				(S) ---, (W) California	1
		weak				(S) Pirona, (W) ---	3
		medium				(S) Conchita, (W) SY Leoo	5
		strong				(S) Grace, (W) Semper	7
		very strong				(S) ---, (W) Meseta	9

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
5.		**QN VG|B**	**(+)**	**49-51**			
		Flag leaf: attitude					
		erect				(S) ---, (W) Hobbit	1
		semi-erect				(S) Natasia, (W) California	3
		horizontal				(S) Quench, (W) Saffron	5
		semi-drooping				(S) Arcadia, (W) Matros	7
		drooping				(S) ---, (W) Augusta	9
6.	**(*)**	**QN MG|B**	**(+)**				
		Time of ear emergence					
		very early				(S) ---, (W) ---	1
		early				(S) Lilly, (W) Meseta	3
		medium				(S) Natasia, (W) California	5
		late				(S) ---, (W) Saffron	7
		very late				(S) ---, (W) ---	9
7.		**QN VG|B**		**50-60**			
		Flag leaf: glaucosity of sheath					
		absent or very weak				(S) ---, (W) ---	1
		weak				(S) ---, (W) Barbara	3
		medium				(S) Pirona, (W) Saffron	5
		strong				(S) Grace, (W) California	7
		very strong				(S) ---, (W) Henriette	9
8.	**(*)**	**QN VG|B**		**60-65**			
		Awns: intensity of anthocyanin coloration of tips					
		absent or very weak				(S) ---, (W) California	1
		weak				(S) Pirona, (W) Lomerit	3
		medium				(S) Ebson, (W) Marielle	5
		strong				(S) Grace, (W) Semper	7
		very strong				(S) Wilma, (W) Semper	9

		English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
9.	**(*)**	**QN**	**VG|B**			**65-75**			
		Ear: glaucosity							
		absent or very weak						(S) Sunshine, (W) Henriette	1
		weak						(S) Michelle, (W) Matros	3
		medium						(S) Arcadia, (W) Semper	5
		strong						(S) Natasia, (W) KWS Meridian	7
		very strong						(S) ---, (W) ---	9
10.		**QN**	**VG|B**	**(+)**		**70**			
		Ear: attitude							
		erect						(S) ---, (W) ---	1
		semi-erect						(S) Quench, (W) KWS Meridian	3
		horizontal						(S) Grace, (W) Saffron	5
		semi-recurved						(S) Ingmar, (W) Augusta	7
		recurved						(S) ---, (W) ---	9
11.		**QN**	**VG|B**			**80-85**			
		Grain: anthocyanin coloration of nerves of lemma							
		absent or very weak						(S) ---, (W) California	1
		weak						(S) Chamonix, (W) Hobbit	3
		medium						(S) Quench, (W) Marielle	5
		strong						(S) Grace, (W) Atenon	7
		very strong						(S) ---, (W) Matros	9
12.	**(*)**	**QN**	**MG|B**	**(+)**		**80-92**			
		Plant: length							
		very short						(S) ---, (W) ---	1
		short						(S) Frontier, (W) Findora	3
		medium						(S) Quench, (W) Henriette	5
		long						(S) Pirona, (W) Semper	7
		very long						(S) ---, (W) ---	9

		English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
13.	**(*)**	**QL**	**VG|B**			**80-92**			
		Ear: number of rows							
		two						(S) Grace, (W) California	1
		more than two						(S) Olsok, (W) Henriette	2
14.	**(*)**	**QL**	**VG|B**			**80-92**			
		Ear: development of sterile spikelets							
		non or rudimentary						(S) Grace, (W) California	1
		full						(S) Quench, (W) Casanova	2
15.	**(*)**	**QN**	**VG|B**	**(+)**		**80-92**			
		Sterile spikelet: attitude							
		parallel						(S) Pirona, (W) California	1
		parallel to divergent						(S) Henley, (W) KWS Joy	2
		divergent						(S) Quench, (W) Casanova	3
16.	**(*)**	**PQ**	**VG|B**	**(+)**		**80-92**			
		Ear: shape							
		clearly tapering						(S) KWS Irina, (W) California	1
		slightly tapering						(S) Arcadia, (W) Hobbit	2
		parallel						(S) Natasia, (W) Semper	3
		slightly fusiform						(S) ---, (W) ---	4
		clearly fusiform						(S) ---, (W) ---	5
17.	**(*)**	**QN**	**VG|B**			**80-92**			
		Ear: density							
		very lax						(S) ---, (W) ---	1
		lax						(S) Ingmar, (W) Casanova	3
		medium						(S) Quench, (W) KWS Meridian	5
		dense						(S) Belgravia, (W) Findora	7
		very dense						(S) Mercada, (W) ---	9

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
18.		**QN MS|B/VG|B**	**(+)**	**80-92**			
		Ear: length					
		very short				(S) ---, (W) ---	1
		short				(S) Mercada, (W) Champagne	3
		medium				(S) Quench, (W) Findora	5
		long				(S) Ingmar, (W) California	7
		very long				(S) ---, (W) ---	9
19.	**(*)**	**QN MS|B/VG|B**	**(+)**	**80-92**			
		Awn: length compared to ear					
		very short				(S) ---, (W) ---	1
		short				(S) ---, (W) ---	3
		medium				(S) Grace, (W) California	5
		long				(S) Natasia, (W) Henriette	7
		very long				(S) ---, (W) ---	9
20.		**QN MS|A/VG|A**		**92**			
		Rachis: length of first segment					
		very short				(S) ---, (W) ---	1
		short				(S) Quench, (W) SY Leoo	3
		medium				(S) Natasia, (W) KWS Meridian	5
		long				(S) Belgravia, (W) California	7
		very long				(S) ---, (W) ---	9
21.		**QN VG|A**	**(+)**	**92**			
		Rachis: curvature of first segment					
		absent or very weak				(S) ---, (W) ---	1
		weak				(S) KWS Alcina, (W) Henriette	3
		medium				(S) Henley, (W) California	5
		strong				(S) Ingmar, (W) KWS Joy	7
		very strong				(S) ---, (W) ---	9

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
22.	**(*)**	**QN VG|A**	**(+)**	**92**			
		Median spikelet: length of glume and its awn relative to grain					
		shorter				(S) ---, (W) ---	1
		equal				(S) Quench, (W) California	2
		slightly longer				(S) ---, (W) Cierzo	3
		much longer				(S) ---, (W) Champagne	4
23.	**(*)**	**QL VG|A**	**(+)**	**80-92**			
		Grain: rachilla hair type					
		short				(S) Quench, (W) KWS Joy	1
		long				(S) Grace, (W) California	2
24.		**QN VG|A**	**(+)**	**80-92**			
		Grain: spiculation of inner lateral nerves of dorsal side of lemma					
		absent or very weak				(S) Grace, (W) California	1
		weak				(S) Chamonix, (W) KWS Joy	3
		medium				(S) Henley, (W) Champagne	5
		strong				(S) ---, (W) Semper	7
		very strong				(S) ---, (W) ---	9
25.	**(*)**	**QL VG|A**		**92**			
		Grain: type					
		non-husked				(S) Pirona, (W) ---	1
		husked				(S) Grace, (W) Henriette	9
26.	**(*)**	**QL VG|A**	**(+)**	**92**			
		Grain: hairiness of ventral furrow					
		absent				(S) Grace, (W) Henriette	1
		present				(S) ---, (W) Saffron	9

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
27.	**QL** **VG|A**	**(+)**	**92**				
		Grain: disposition of lodicules					
		frontal				(S) Mercada, (W) ---	1
		clasping				(S) Grace, (W) Henriette	2
28.	**(*)** **PQ** **VG**	**(+)**					
		Seasonal type					
		winter type				(S) ---, (W) Henriette	1
		alternative type				(S) ---, (W) ---	2
		spring type				(S) Grace, (W) Cierzo	3
29.	**QN** **VG**						
		NEW (proposal KR): Flag leaf: length					
		short					1
		medium					2
		long					3
30.	**QN** **VG**						
		NEW (proposal KR): Flag leaf: width					
		narrow					1
		medium					2
		broad					3
31.	**QL** **VG**						
		NEW (proposal KR): Awn: type					
		absent					1
		hood					2
		straigt					3
32.	**QL** **VG**						
		NEW (proposal KR): Awn: spiculation					
		absent					1
		present					2

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
33.	**QN** **VG**					
	NEW (proposal KR): Grain: length of rachilla					
	short					1
	medium					2
	long					3
34.	**PQ** **VG**					
	NEW (proposal KR): Grain: color of lemma					
	absent					1
	weakly colored					2
	strongly colored					3
	black					4

8. Explanations on the Table of Characteristics

8.1 Explanations for individual characteristics

Ad. 1: Kernel: color of aleurone layer

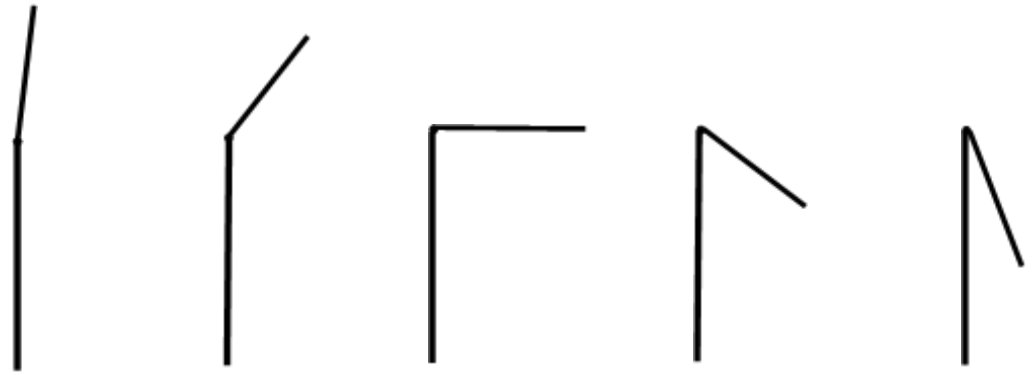
The colour of the aleurone layer should be assessed visually after the kernel is soaked in water over night. If necessary, a magnifying glass may be used.
Any alternative method may be used if it gives the same results.

Ad. 2: Plant: growth habit

The growth habit should be assessed visually from the attitude of the leaves and tillers. The angle formed by the outer leaves and the tillers with an imaginary vertical axis should be used.

1	3	5	7	9
erect	semi-erect	intermediate	semi-prostate	prostate

Ad. 5: Flag leaf: attitude



1	3	5	7	9
erect	semi-erect	horizontal	semi-drooping	drooping

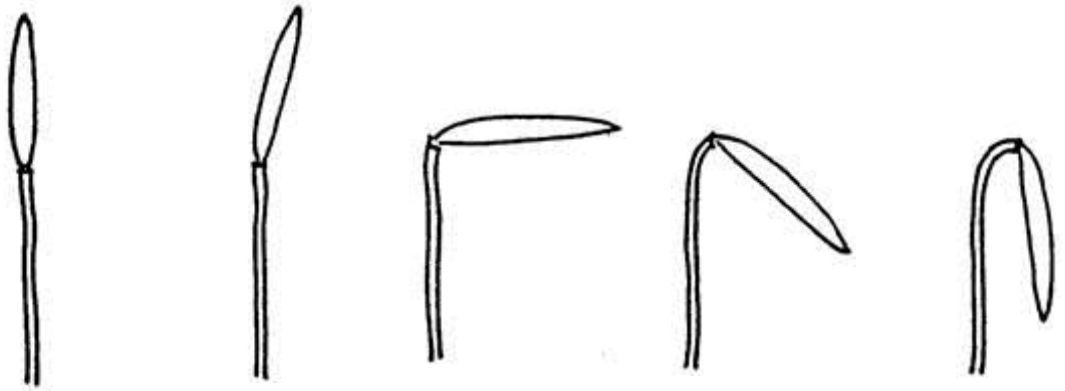
Flag leaf attitude is sensitive to the stage of plant development. Therefore, observation at the appropriate stage (stage 49–51 of the Zadoks decimal code) is of particular importance.

Flag leaf attitude relates to the angle between the main axis (stem) and the flag leaf blade. The expression of the majority of plants should be recorded without considering individual plants which may express a different attitude.

Ad. 6: Time of ear emergence

Time of ear emergence is reached when the first spikelet is visible on 50% of ears.

Ad. 10: Ear: attitude



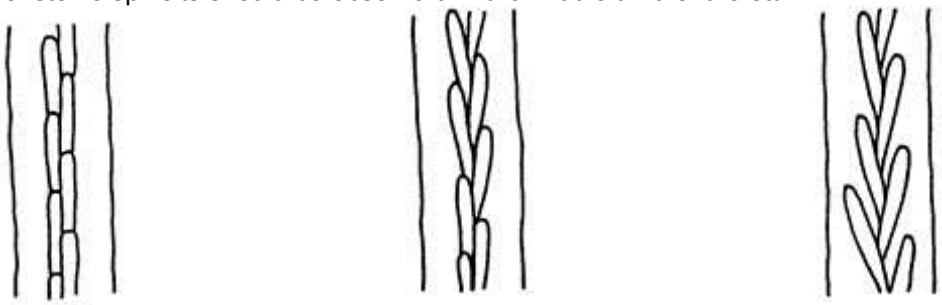
1	3	5	7	9
erect	semi-erect	horizontal	semi-recurved	recurved

Ad. 12: Plant: length

Plant length includes stem, ear and awns.

Ad. 15: Sterile spikelet: attitude

The attitude of sterile spikelts should be observerd in the middle third of the ear.



1	2	3
parallel	parallel to divergent	divergent

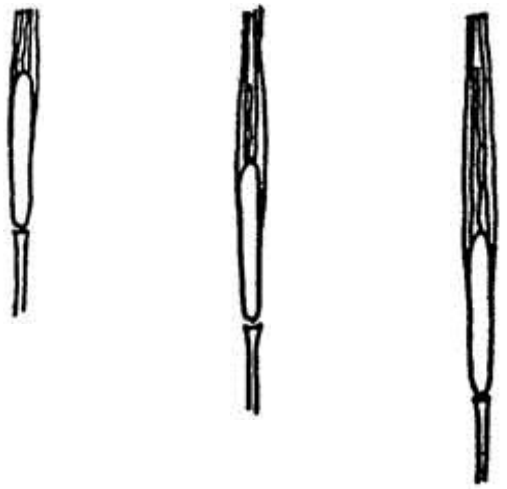
Ad. 16: Ear: shape

1	2	3	4	5
clearly tapering	slightly tapering	parallel	slightly fusiform	clearly fusiform

Ad. 18: Ear: length

Ear length should be assessed without awns.

Ad. 19: Awn: length compared to ear



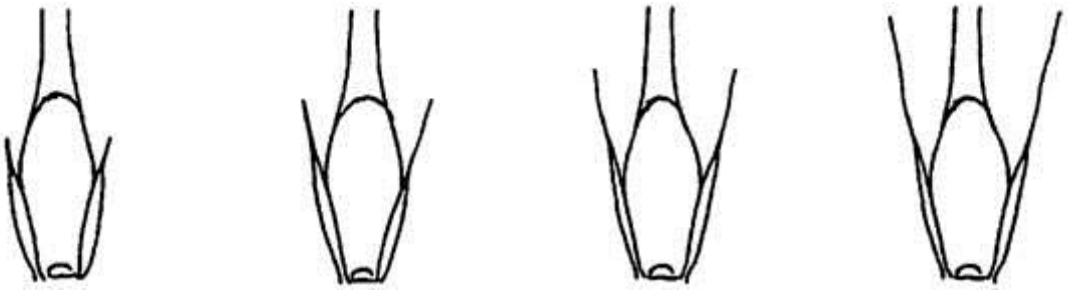
3 short | 5 medium | 7 long

The state "medium" means that the length of the awns is equal to that of the ear.

Ad. 21: Rachis: curvature of first segment

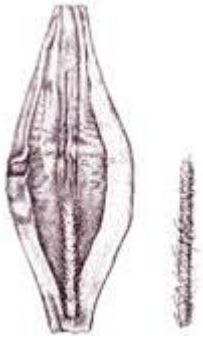
1 absent or very weak | 3 weak | 5 medium | 7 strong | 9 very strong

Ad. 22: Median spikelet: length of glume and its awn relative to grain

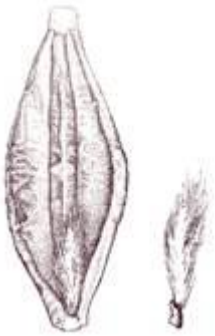


1 shorter | 2 equal | 3 slightly longer | 4 much longer

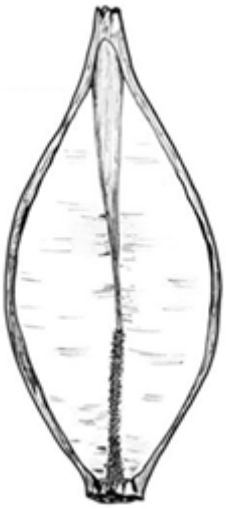
Ad. 23: Grain: rachilla hair type



1
short



2
long



Different diagrams are presented for choice. Finally, only one type to be kept.

Ad. 24: Grain: spiculation of inner lateral nerves of dorsal side of lemma

none or occasionally
1 or 2 small spicules

1
absent or very weak

3
weak

5
medium

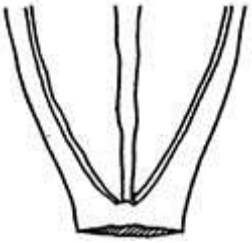
7
strong

10 or more large
regular spicules

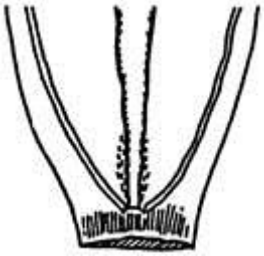
9
very strong

Ad. 26: Grain: hairiness of ventral furrow

The ventral furrow should be observed after moving the rachilla. It is of particular importance to have installed the light source at the right place. A very little number of hairs should be assessed as “present”.

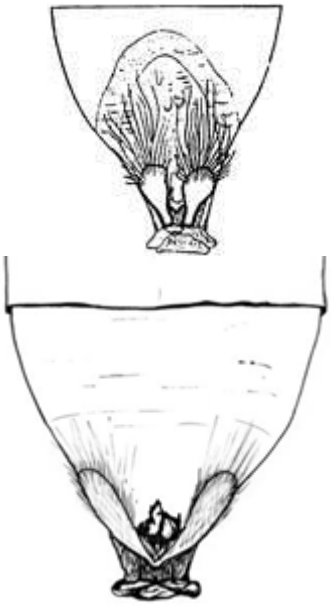


1
absent

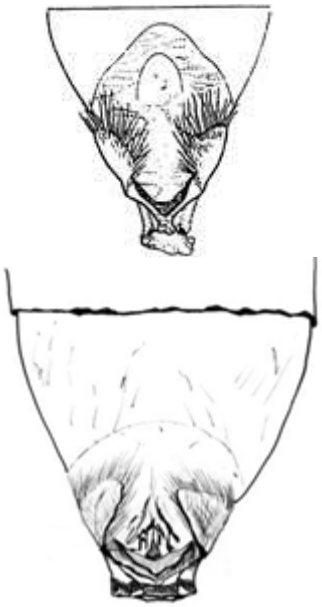


9
present

Ad. 27: Grain: disposition of lodicules



1
frontal



2
clasping

Different diagrams are presented for choice. Finally, only one type to be kept.

Ad. 28: Seasonal type

The seasonal type (need of vernalization) should be assessed on plots sown in springtime. Example varieties should always be included in the trial. When the example varieties behave according to its description, the varieties under study can be described. At the time when the latest spring type variety is fully mature (stage 91-92 of the Zadoks decimal code) the growth stage reached by the respective variety should be assessed. The states of expression are defined as follows:

Winter type (high need of vernalization): The plants have reached stage 45 of the Zadoks decimal code (boots swollen) at maximum.

Alternative type (partial need of vernalization): The plants have exceeded stage 45 of the Zadoks decimal code (in general they have exceeded stage 75) and have reached stage 90 at maximum.

Spring type (no need or very weak need of vernalization): The plants have exceeded stage 90 of the Zadoks decimal code.

8.2 The descriptions of the growth stages of the Zadoks decimal code for cereals (ZADOKS et al., 1974)

Zadoks Decimal code	Description
	Germination
00	Dry seed
01	Start of imbibition
03	Imbibition complete
05	Radicle emerged from seed
07	Coleoptile emerged from seed
09	Leaf just at coleoptile tip
	Seedling growth
10	First leaf through coleoptile
11	First leaf unfolded
12	2 leaves unfolded
13	3 leaves unfolded
14	4 leaves unfolded
15	5 leaves unfolded
16	6 leaves unfolded
17	7 leaves unfolded
18	8 leaves unfolded
19	9 or more leaves unfolded
	Tillering
20	Main shoot only
21	Main shoot and 1 tiller
22	Main shoot and 2 tillers
23	Main shoot and 3 tillers
24	Main shoot and 4 tillers
25	Main shoot and 5 tillers
26	Main shoot and 6 tillers
27	Main shoot and 7 tillers
28	Main shoot and 8 tillers
29	Main shoot and 9 or more tillers
	Stem elongation
30	Pseudo stem erection
31	1st node detectable
32	2nd node detectable
33	3rd node detectable
34	4th node detectable
35	5th node detectable
36	6th node detectable
37	Flag leaf just visible
39	Flag leaf ligule/collar just visible

Zadoks Decimal code	Description
	Booting
41	Flag leaf sheath extending
43	Boots just visibly swollen
45	Boots swollen
47	Flag leaf sheath opening
49	First awns visible
	Inflorescence emergence
50	First spikelet of inflorescence visible
53	1/4 of inflorescence emerged
55	1/2 of inflorescence emerged
57	3/4 of inflorescence emerged
59	Emergence of inflorescence completed
	Anthesis
60	Beginning on anthesis
65	Anthesis half-way
69	Anthesis completed
	Milk development
71	Caryopses watery ripe
73	Early milk
75	Medium milk
77	Late milk
	Dough development
83	Early dough
85	Soft dough
87	Hard dough
	Ripening
91	Caryopses hard (difficult to divide with thumbnail)
92	Caryopses hard (can no longer be dented with thumbnail)
93	Caryopses loosening in daytime
94	Overripe, straw dead and collapsing
95	Seed dormant
96	Viable seed giving 50% germination
97	Seed not dormant
98	Secondary dormancy induced
99	Secondary dormancy lost

9. Literature

Zadoks, J.C., Chang, T.T., Konzak, C.F., 1974: A Decimal code for the Growth Stages of Cereals. Weed Research. NL, 14: 415-421

10. Technical Questionnaire

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:

	Application date: (not to be filled in by the applicant)

TECHNICAL QUESTIONNAIRE
to be completed in connection with an application for plant breeders' rights

In the case of hybrid varieties which are the subject of an application for plant breeders' rights, and where the parent lines are to be submitted as a part of the examination of the hybrid variety, this Technical Questionnaire should be completed for each of the parent lines, in addition to being completed for the hybrid variety.

1. Subject of the Technical Questionnaire

1.1 Botanical name	*Hordeum vulgare* L.
1.2 Common name	Barley

2. Applicant

Name	
Address	
Telephone No.	
Fax No.	
E-mail address	
Breeder (if different from applicant)	

3. Proposed denomination and breeder's reference

Proposed denomination (if available)	
Breeder's reference	

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:

#4. Information on the breeding scheme and propagation of the variety

4.1 Breeding scheme

Variety resulting from:

4.1.1 Crossing

(a) controlled cross [ ]

(please state parent varieties)

(……..……..…) x (……..……..…)

female parent male parent

(b) partially known cross [ ]

(please state known parent variety(ies))

(……..……..…) x (……..……..…)

female parent male parent

(c) unknown cross [ ]

4.1.2 Mutation [ ]

(please state parent variety)

4.1.3 Discovery and development [ ]

(please state where and when discovered and how developed)

4.1.4 Other [ ]

(please provide details)

Authorities may allow certain of this information to be provided in a confidential section of the Technical Questionnaire.

4.2 Method of propagating the variety

4.2.1 Seed-propagated varieties

(a) Self-pollination [ ]
(b) Hybrid [ ]
(c) Other (please provide details) [ ]

4.2.2 Other [ ]
(Please provide details)

In the case of hybrid varieties the production scheme for the hybrid should be provided on a separate sheet. This should provide details of all the parent lines required for propagating the hybrid e.g.

Single Hybrid

(……..……..…) x (……..……..…)

female parent male parent

"Three-Way Hybrid

(……..……..…) x (……..……..…)

female parent male parent

(……..……..…) x (……..……..…)

single hybrid used as female parent male parent

and should identify in particular:

(a) any male sterile lines

(b) maintenance system of male sterile lines.

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:

5. Characteristics of the variety to be indicated (the number in brackets refers to the corresponding characteristic in Test Guidelines; please mark the note which best corresponds).

	Characteristics	Example Varieties	Note
5.1	**Lowest leaves: hairiness of leaf sheath**		
(3)			
	absent	(S) Grace, (W) California	1 [ ]
	present	(S) ---, (W) Henriette	9 [ ]
5.2	**Time of ear emergence**		
(6)			
	very early	(S) ---, (W) ---	1 [ ]
	early	(S) Lilly, (W) Meseta	3 [ ]
	medium	(S) Natasia, (W) California	5 [ ]
	late	(S) ---, (W) Saffron	7 [ ]
	very late	(S) ---, (W) ---	9 [ ]
5.3	**Awns: intensity of anthocyanin coloration of tips**		
(8)			
	absent or very weak	(S) ---, (W) California	1 [ ]
	very weak to weak		2 [ ]
	weak	(S) Pirona, (W) Lomerit	3 [ ]
	weak to medium		4 [ ]
	medium	(S) Ebson, (W) Marielle	5 [ ]
	medium to strong		6 [ ]
	strong	(S) Grace, (W) Semper	7 [ ]
	srtong to very strong		8 [ ]
	very strong	(S) Wilma, (W) Semper	9 [ ]
5.4	**Plant: length**		
(12)			
	very short	(S) ---, (W) ---	1 [ ]
	short	(S) Frontier, (W) Findora	3 [ ]
	medium	(S) Quench, (W) Henriette	5 [ ]
	long	(S) Pirona, (W) Semper	7 [ ]
	very long	(S) ---, (W) ---	9 [ ]
5.5	**Ear: number of rows**		
(13)			
	two	(S) Grace, (W) California	1 [ ]
	more than two	(S) Olsok, (W) Henriette	2 [ ]

	Characteristics	Example Varieties	Note
5.6	**Grain: rachilla hair type**		
(23)			
	short	(S) Quench, (W) KWS Joy	1 [ ]
	long	(S) Grace, (W) California	2 [ ]
5.7	**Grain: type**		
(25)			
	non-husked	(S) Pirona, (W) ---	1 [ ]
	husked	(S) Grace, (W) Henriette	9 [ ]
5.8	**Grain: hairiness of ventral furrow**		
(26)			
	absent	(S) Grace, (W) Henriette	1 [ ]
	present	(S) ---, (W) Saffron	9 [ ]
5.9	**Seasonal type**		
(28)			
	winter type	(S) ---, (W) Henriette	1 [ ]
	alternative type	(S) ---, (W) ---	2 [ ]
	spring type	(S) Grace, (W) Cierzo	3 [ ]

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:

6. Similar varieties and differences from these varieties

Please use the following table and box for comments to provide information on how your candidate variety differs from the variety (or varieties) which, to the best of your knowledge, is (or are) most similar. This information may help the examination authority to conduct its examination of distinctness in a more efficient way.

Denomination(s) of variety(ies) similar to your candidate variety	Characteristic(s) in which your candidate variety differs from the similar variety(ies)	Describe the expression of the characteristic(s) for the **similar** variety(ies)	Describe the expression of the characteristic(s) for **your** candidate variety
Example	*Ear: glaucosity*	*weak*	*medium to strong*

Comments:

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:

#7. Additional information which may help in the examination of the variety

7.1 In addition to the information provided in sections 5 and 6, are there any additional characteristics which may help to distinguish the variety?

Yes [ ] No [ ]

(If yes, please provide details)

7.2 Are there any special conditions for growing the variety or conducting the examination?

Yes [ ] No [ ]

(If yes, please provide details)

7.3 Other information

Authorities may allow certain of this information to be provided in a confidential section of the Technical Questionnaire.

8. Authorization for release

(a) Does the variety require prior authorization for release under legislation concerning the protection of the environment, human and animal health?

Yes [ ] No [ ]

(b) Has such authorization been obtained?

Yes [ ] No [ ]

If the answer to (b) is yes, please attach a copy of the authorization.

9. Information on plant material to be examined or submitted for examination

9.1 The expression of a characteristic or several characteristics of a variety may be affected by factors, such as pests and disease, chemical treatment (e.g. growth retardants or pesticides), effects of tissue culture, different rootstocks, scions taken from different growth phases of a tree, etc.

9.2 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 the plant material has undergone such treatment, full details of the treatment must be given. In this respect, please indicate below, to the best of your knowledge, if the plant material to be examined has been subjected to:

(a)	Microorganisms (e.g. virus, bacteria, phytoplasma)	Yes [ ]	No [ ]
(b)	Chemical treatment (e.g. growth retardant, pesticide)	Yes [ ]	No [ ]
(c)	Tissue culture	Yes [ ]	No [ ]
(d)	Other factors	Yes [ ]	No [ ]

Please provide details for where you have indicated “yes”.

.....

10. I hereby declare that, to the best of my knowledge, the information provided in this form is correct:

Applicant’s name

Signature Date

[Annex follows]