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DRAFT

RYE

UPOV Code(s): SECAL_CER

Secale cereale L.

GUIDELINES

FOR THE CONDUCT OF TESTS

FOR DISTINCTNESS, UNIFORMITY AND STABILITY

*prepared by an expert from Germany**to be considered by the**Technical Committee at its fifty-sixth session
to be held in Geneva on October 26 and 27, 2020**Disclaimer: this document does not represent UPOV policies or guidance*

Alternative names:*

<i>Botanical name</i>	<i>English</i>	<i>French</i>	<i>German</i>	<i>Spanish</i>
<i>Secale cereale</i> L.	Rye	Seigle	Roggen	Centeno

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.]

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1. Subject of these Test Guidelines

These Test Guidelines apply to all varieties of *Secale cereale* 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.

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

Open-pollinated and hybrid varieties: 5 kg of seed
Parental components: 1.5 kg of seed

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.

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*

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

3.1.2 The testing of a variety may be conducted 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".

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 Table of Characteristics. The stages of development denoted by each number are described in Chapter 8.

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

A: Single spaced plants
B: Drill plots

3.3.4 For characteristics indicated by A, in case of inbred lines and single crosses from inbred lines, uniformity should be assessed on drill plots (see chapter 4.2)

3.4 *Test Design*

- 3.4.1 Open pollinated varieties, hybrid varieties and synthetic varieties: Each test should be designed to result in a total of at least 60 single spaced plants (A), which should be divided between at least 2 replicates. In addition, the test should include at least 300 plants in a drill plot (B).
- 3.4.2 Inbred lines and single crosses from inbred lines: Each test should be designed to result in a total of at least 20 single spaced plants (A). In addition, the test should include at least 600 plants in drill plots which should be divided between at least 2 replicates (B).
- 3.4.3 The assessment of the characteristic "Seasonal type" should be carried out on at least 300 plants.
- 3.4.4 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 *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.

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

Open pollinated varieties, hybrid varieties (excluding single crosses from inbred lines) and synthetic varieties: Unless otherwise indicated, for the purposes of distinctness, all observations on single plants should be made on 60 plants or parts of plants taken from each of 60 plants and any other observations made on all plants in the test. In the case of observations of parts of plants, the number of parts to be taken from each of the plants should be 1.

Inbred lines and single crosses from inbred lines: 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 of 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 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, observation on a group of plants (MG, VG) always refers to inbred lines and single crosses from inbred lines and observation on single plants (MS, VS) refers to open pollinated varieties, hybrid varieties and synthetic varieties.

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 These Test Guidelines have been developed for the examination of open pollinated varieties, hybrid varieties (excluding single crosses from inbred lines), synthetic varieties, inbred lines and single crosses from inbred lines. For varieties with other types of propagation the recommendations in the General Introduction and document TGP/13 “Guidance for new types and species”, Section 4.5 “Testing Uniformity” should be followed.

4.2.3 The assessment of uniformity for open pollinated, hybrid varieties other than single crosses from inbred lines and synthetic varieties should be according to the recommendations for cross-pollinated varieties in the General Introduction.

4.2.4 For the assessment of uniformity of inbred lines and single crosses from inbred lines, 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 600 plants, 6 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) Grain: intensity of color of aleurone layer (characteristic 1)
 - (b) Seasonal type (characteristic 21)
- 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 rye

(w) - winter rye

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 8.2
- 6 (a) See Explanations on the Table of Characteristics in Chapter 8.1
- 7 Growth stage key See Explanations on the Table of Characteristics in Chapter 8.3

A: Observation on single spaced plants
 B: Observation on drill plots

The example varieties are indicated as follows:

- (s) - spring rye
 (w) - winter rye

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

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
1. (*)	QL	VG A	(+)	00		
	Grain: intensity of color of aleurone layer	Grain : intensité de la couleur de la couche d'aleurone	Korn: Intensität der Farbe der Aleuronschicht	Grano: intensidad del color de la capa de aleurona		
	light	claire	hell	clara	(w) Helltop	1
	dark	foncée	dunkel	oscura	(s) Arantes, (w) Bonfire	2
2.	QN	VG A	(+)	00		
	Grain: coloration with phenol	Grain : coloration au phénol	Korn: Phenolfärbung	Grano: coloración al fenol		
	absent or very light	nulle ou très claire	fehlend oder sehr hell	ausente o muy clara		1
	light	claire	hell	clara		3
	medium	moyenne	mittel	media	(s) Tiroler, (w) Gonello	5
	dark	foncée	dunkel	oscura	(s) Arantes, (w) Marcelo	7
	very dark	très foncée	sehr dunkel	muy oscura	(w) SU Stakkato	9
3. (*)	QN	VG A	(+)	10-11		
	Coleoptile: anthocyanin coloration	Coléoptile : pigmentation anthocyanique	Keimscheide: Anthocyanfärbung	Coleóptilo: pigmentación antociánica		
	absent or very weak	nulle ou très faible	fehlend oder sehr gering	ausente o muy débil	(w) Helltop	1
	weak	faible	gering	débil		3
	medium	moyenne	mittel	media	(w) Tonus	5
	strong	forte	stark	fuerte	(s) Ovid, (w) Turbogreen	7
	very strong	très forte	sehr stark	muy fuerte		9
4.	QN	MS A	(a)	12-13		
	Coleoptile: length	Coléoptile : longueur	Keimscheide: Länge	Coleóptilo: longitud		
	very short	très courte	sehr kurz	muy corta		1
	short	courte	kurz	corta	(w) Dukato	3
	medium	moyenne	mittel	media	(s) Arantes, (w) Marcelo	5
	long	longue	lang	larga	(w) Highgreen	7
	very long	très longue	sehr lang	muy larga		9

	English		français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
5.	QN	MS A	(a)	12-13			
	First leaf: length of sheath	Première feuille : longueur de la gaine	Erstes Blatt: Länge der Blattscheide	Primera hoja: longitud de la vaina			
	very short	très courte	sehr kurz	muy corta			1
	short	courte	kurz	corta			3
	medium	moyenne	mittel	media	(s) Arantes, (w) Marcelo		5
	long	longue	lang	larga	(w) Jobaro		7
	very long	très longue	sehr lang	muy larga			9
6.	QN	MS A	(a)	12-13			
	First leaf: length of blade	Première feuille : longueur du limbe	Erstes Blatt: Länge der Blattspreite	Primera hoja: longitud del limbo			
	very short	très courte	sehr kurz	muy corta			1
	short	courte	kurz	corta	(w) Guttino		3
	medium	moyenne	mittel	media	(w) Marcelo		5
	long	longue	lang	larga	(w) Turbogreen		7
	very long	très longue	sehr lang	muy larga			9
7. (*)	QN	VG B VS A	(+)	25-29			
	Plant: growth habit	Plante : port	Pflanze: Wuchsform	Planta: hábito de crecimiento			
	erect	dressé	aufrecht	erecto			1
	semi-erect	demi-dressé	halbaufrecht	semierecto			3
	intermediate	intermédiaire	mittel	intermedio	(s) Tiroler, (w) Turbogreen		5
	semi-prostrate	demi-étalé	halbliiegend	semipostrado	(w) Guttino		7
	prostrate	étalé	liegend	postrado			9
8. (*)	QN	MG B MS A	(+)				
	Time of ear emergence	Époque d'épiaison	Zeitpunkt des Ährenschiebens	Época de espigado			
	very early	très précoce	sehr früh	muy precoz	(w) Bonfire		1
	early	précoce	früh	precoz	(w) Turbogreen		3
	medium	moyenne	mittel	media	(w) Jobaro		5
	late	tardive	spät	tardía			7
	very late	très tardive	sehr spät	muy tardía	(w) Tonus		9

	English		français		deutsch		español		Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
9.	(*)	QN	VG B	(+)	54-58					
		Flag leaf: glaucosity of sheath	Dernière feuille : glaucescence de la gaine	Fahnenblatt: Bereifung der Blattscheide	Última hoja: glaucescencia de la vaina					
		absent or very weak	nulle ou très faible	fehlend oder sehr gering	ausente o muy débil					1
		weak	faible	gering	débil	(w) Bonfire				3
		medium	moyenne	mittel	media	(w) Helltop				5
		strong	forte	stark	fuerte	(w) SU Stakkato				7
		very strong	très forte	sehr stark	muy fuerte					9
10.		QN	MS A		60-69					
		Penultimate leaf: length of blade	Avant-dernière feuille : longueur du limbe	Vorletztes Blatt: Länge der Blattspreite	Penúltima hoja: longitud del limbo					
		very short	très courte	sehr kurz	muy corta					1
		short	courte	kurz	corta	(w) Guttino				3
		medium	moyenne	mittel	media	(w) Helltop				5
		long	longue	lang	larga	(w) Turbogreen				7
		very long	très longue	sehr lang	muy larga					9
11.		QN	MS A		60-69					
		Penultimate leaf: width of blade	Avant-dernière feuille : largeur du limbe	Vorletztes Blatt: Breite der Blattspreite	Penúltima hoja: anchura del limbo					
		very narrow	très étroite	sehr schmal	muy estrecha					1
		narrow	étroite	schmal	estrecha	(w) Tonus				3
		medium	moyenne	mittel	media	(w) Marcelo				5
		broad	large	breit	ancha	(w) Virgjai				7
		very broad	très large	sehr breit	muy ancha					9
12.	(*)	QN	VG B VS A		69-75					
		Ear: glaucosity	Épi : glaucescence	Ähre: Bereifung	Espiga: glaucescencia					
		absent or very weak	nulle ou très faible	fehlend oder sehr gering	ausente o muy débil					1
		weak	faible	gering	débil	(w) Tonus				3
		medium	moyenne	mittel	media	(s) Tiroler, (w) Marcelo				5
		strong	forte	stark	fuerte					7
		very strong	très forte	sehr stark	muy fuerte					9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
13. (*)	QN	VG B VS A	(+)	70-85		
	Stem: density of hairiness below ear	Tige : densité de la pilosité au-dessous de l'épi	Halm: Dichte der Behaarung unterhalb der Ähre	Tallo: densidad de la vellosoidad bajo la espiga		
	absent or very weak	nulle ou très faible	fehlend oder sehr gering	ausente o muy débil		1
	weak	faible	gering	débil	(w) Guttino	3
	medium	moyenne	mittel	media	(w) Tonus	5
	strong	forte	stark	fuerte	(w) KWS Dolaro	7
	very strong	très forte	sehr stark	muy fuerte		9
14. (*)	QN	MS A	(+)	80-92		
	Plant: length	Plante : longueur	Pflanze: Länge	Planta: longitud		
	very short	très courte	sehr kurz	muy corta		1
	short	courte	kurz	corta	(w) Guttino	3
	medium	moyenne	mittel	media	(s) Ovid, (w) Marcelo	5
	long	longue	lang	larga	(w) Jobaro	7
	very long	très longue	sehr lang	muy larga	(w) Bonfire	9
15.	QN	MS A		80-92		
	Stem: length between upper node and ear	Tige : longueur entre le dernier nœud et l'épi	Halm: Länge zwischen oberstem Knoten und Ähre	Tallo: longitud entre el nudo superior y la espiga		
	very short	très courte	sehr kurz	muy corta		1
	short	courte	kurz	corta	(w) KWS Dolaro	3
	medium	moyenne	mittel	media	(w) Marcelo	5
	long	longue	lang	larga	(w) Tonus	7
	very long	très longue	sehr lang	muy larga	(w) Turbogreen	9
16. (*)	QN	MS A	(+)	80-92		
	Ear: length	Épi : longueur	Ähre: Länge	Espiga: longitud		
	very short	très courte	sehr kurz	muy corta		1
	short	courte	kurz	corta	(s) Arantes, (w) Imperator	3
	medium	moyenne	mittel	media	(w) Turbogreen	5
	long	longue	lang	larga	(s) Tiroler, (w) Tonus	7
	very long	très longue	sehr lang	muy larga		9

	English		français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
17. (*)	QN	MS A	(+)	80-92			
	Ear: density	Épi : densité	Ähre: Dichte	Espiga: densidad			
	very lax	très lâche	sehr locker	muy laxa			1
	lax	lâche	locker	laxa	(w) Bonfire		3
	medium	moyenne	mittel	media	(s) Ovid, (w) Gonello		5
	dense	dense	dicht	densa	(w) Helltop		7
	very dense	très dense	sehr dicht	muy densa			9
18.	QN	VG B VS A	(+)	90-92			
	Ear: attitude	Épi : port	Ähre: Haltung	Espiga: porte			
	erect	dressé	aufrecht	erecto			1
	semi-erect	demi- dressé	halbaufrecht	semierecto			3
	horizontal	horizontal	waagrecht	horizontal	(w) Terogrün		5
	semi-recurved	demi-incurvé	überhängend	semirrecurvado	(w) Helltop		7
	recurved	incurvé	stark überhängend	recurvado			9
19. (*)	QN	MG	(+)	92			
	Grain: thousand grain weight	Grain : poids de 1000 grains	Korn: Tausendkorngewicht	Grano: peso de mil granos			
	very small	très faible	sehr niedrig	muy bajo			1
	small	faible	niedrig	bajo	(w) Tonus		3
	medium	moyen	mittel	medio	(w) Turbogreen		5
	large	élevé	hoch	alto	(w) Jobaro		7
	very large	très élevé	sehr hoch	muy alto			9
20. (*)	QN	MG	(+)	92			
	Grain: length	Grain : longueur	Korn: Länge	Grano: longitud			
	very short	très courte	sehr kurz	muy corta			1
	short	courte	kurz	corta	(w) Tonus		3
	medium	moyenne	mittel	media	(s) Arantes, (w) Gonello		5
	long	longue	lang	larga	(w) Jobaro		7
	very long	très longue	sehr lang	muy larga			9
21. (*)	PQ	VG	(+)				
	Seasonal type	Type de développement	Wechselverhalten	Tipo de desarrollo			
	winter	hiver	Winterform	de invierno	(w) SU Stakkato		1
	alternative	alternatif	Wechselform	alternativo			2
	spring	printemps	Sommerform	de primavera	(s) Arantes		3

8. Explanations on the Table of Characteristics

8.1 *Explanations covering several characteristics*

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

- (a) 3 x 24 seeds are sown in multipot plates with standard soil in 1 cm sowing depth. The plants are produced in the greenhouse at 20 °C and with additional light for 12 hours per day for 12 days. 20 plants per replicate are measured.

8.2 *Explanations for individual characteristics*

Ad. 1: Grain: intensity of color of aleurone layer

The observation should be made on a sample of 100 seeds.

Ad. 2: Grain: coloration with phenol

Number of grains per test:	100 The grains should not have been treated chemically
Preparation of grains:	Soak in tap water for 16 to 20 hours, drain and remove surface water, place the grains with crease downwards, cover dish with lid
Concentration of solution:	1% Phenol-solution (freshly made up)
Amount of solution:	2 ml in a petri-dish on filter paper
Place:	Laboratory
Light:	Daylight, out of direct sunshine
Temperature:	18 to 20 °C
Time of recording:	4 hours after adding solution
Scale of recording:	See chapter 7. Table of Characteristics
Note:	At least two of the example varieties should be included as a control

Ad. 3: Coleoptile: anthocyanin coloration

Number of seeds per test: 100

Preparation of seeds: Set up non-dormant seeds on moistened filter paper covered with Petri dish lid during germination

Place: Laboratory or greenhouse

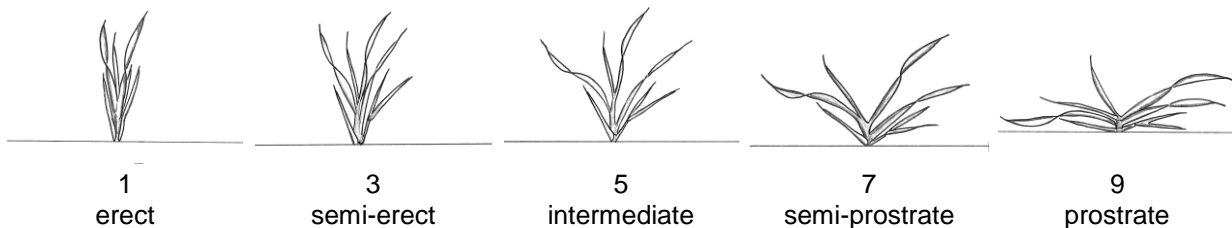
Temperature and light: When the coleoptiles have reached a length of about 1 cm at 15 to 16 °C in the dark, they are placed in continuous light (daylight equivalent) of 13000 to 15000 lux at 18 to 19 °C for 4 days

Time of recording: Coleoptiles fully developed, growth stage 09-11

Note: At least two example varieties should be included as a control

Any alternative method may be used if it gives the same results.

Ad. 7: Plant: growth habit



Ad. 8: Time of ear emergence

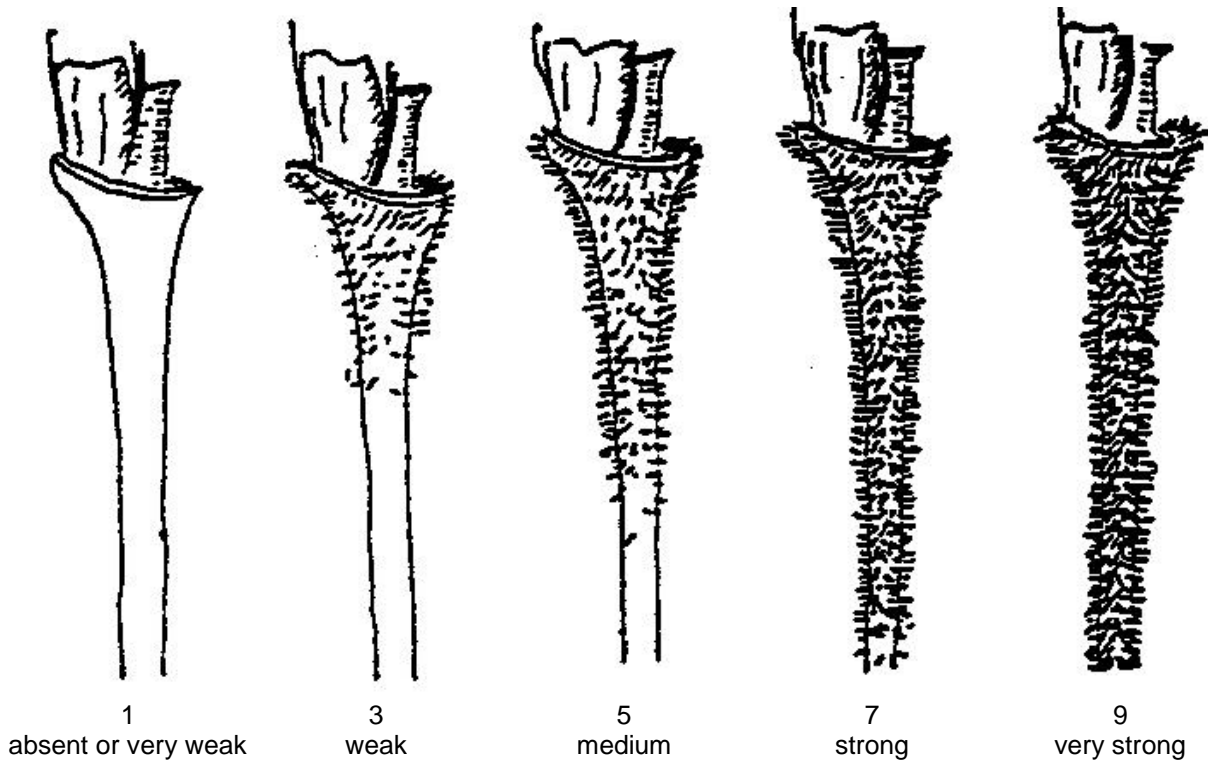
Open pollinated varieties, hybrid varieties and synthetic varieties (MS/A): The number of plants which have reached growth stage 52 should be recorded at two-day intervals. From this data the average time of ear emergence of the variety should be calculated.

Inbred lines and single crosses from inbred lines (MG/B): Time of ear emergence is reached when 50% of the plants have reached growth stage 52.

Ad. 9: Flag leaf: glaucosity of sheath

The observation should be done on the upper third of the sheath.

Ad. 13: Stem: density of hairiness below ear



Ad. 14: Plant: length

Plant length should be measured including stem, ear and awns.

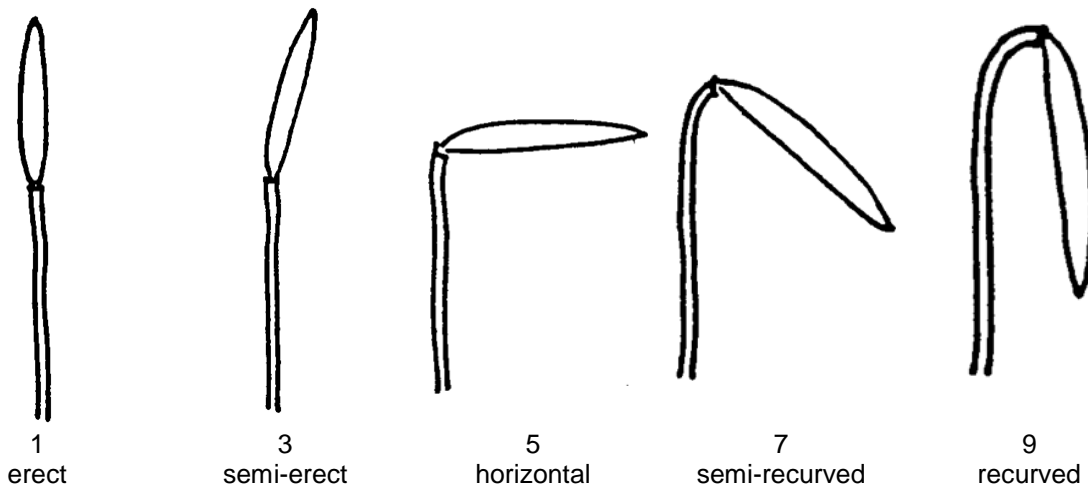
Ad. 16: Ear: length

Ear length should be measured without awns.

Ad. 17: Ear: density

Ear density is the number of rachis segments divided by length of ear.

Ad. 18: Ear: attitude



Ad. 19: Grain: thousand grain weight

Thousand grain weight and grain length should be assessed in a harvested bunch.

Ad. 20: Grain: length

See Ad. 19

Ad. 21: 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 their descriptions, 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:

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

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

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

8.3 Descriptions of the growth stages of the Zadoks decimal code for cereals (ZADOKS et al., 1974)

Zadoks Decimal code	Description	Zadoks Decimal code	Description
	<u>Germination</u>		<u>Inflorescence emergence</u>
00	Dry seed	51	First spikelet of inflorescence visible
01	Start of imbibition	52	-
03	Imbibition complete	53	¼ of inflorescence emerged
05	Radicle emerged from seed	54	-
07	Coleoptile emerged from seed	55	½ of inflorescence emerged
09	Leaf just at coleoptile tip	57	¾ of inflorescence emerged
	<u>Seedling growth</u>	58	-
10	First leaf through coleoptile	59	Emergence of inflorescence completed
11	First leaf unfolded		
12	2 leaves unfolded		
13	3 leaves unfolded		<u>Anthesis</u>
14	4 leaves unfolded	60	-
15	5 leaves unfolded	61	Beginning of anthesis
16	6 leaves unfolded	65	Anthesis half-way
17	7 leaves unfolded	69	Anthesis completed
18	8 leaves unfolded		
19	9 or more leaves unfolded		<u>Milk development</u>
	<u>Tillering</u>	70	-
20	Main shoot only	71	Caryopsis watery ripe
21	Main shoot only and 1 tiller	73	Early milk
22	Main shoot only and 2 tillers	75	Medium milk
23	Main shoot only and 3 tillers	77	Late milk
24	Main shoot only and 4 tillers		
25	Main shoot only and 5 tillers	80	-
26	Main shoot only and 6 tillers	83	Early dough
27	Main shoot only and 7 tillers	85	Soft dough
28	Main shoot only and 8 tillers	87	Hard dough
29	Main shoot only and 9 or more tillers		
	<u>Stem elongation</u>		<u>Ripening</u>
30	Pseudo stem erection	91	Caryopsis hard (difficult to divide with thumbnail)
31	1 st node detectable	92	Caryopsis hard (no longer dented with thumbnail)
32	2 nd node detectable	93	Caryopsis loosening in daytime
33	3 rd node detectable	94	Overripe, straw dead and collapsing
34	4 th node detectable	95	Seed dormant
35	5 th node detectable	96	Viable seed giving 50% germination
36	6 th node detectable	97	Seed not dormant
37	Flag leaf just visible	98	Secondary dormancy induced
39	Flag leaf ligule/collar just visible	99	Secondary dormancy lost
	<u>Booting</u>		
41	Flag leaf sheath extending		
43	Boots just visibly swollen		
45	Boots swollen		
47	Flag leaf sheath opening		
49	First awn visible		

9. Literature

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

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		
1. Subject of the Technical Questionnaire		
1.1	Botanical name	<input type="text" value="Secale cereale L."/>
1.2	Common name	<input type="text" value="Rye"/>
2. Applicant		
	Name	<input type="text"/>
	Address	<input type="text"/>
	Telephone No.	<input type="text"/>
	Fax No.	<input type="text"/>
	E-mail address	<input type="text"/>
	Breeder (if different from applicant)	<input type="text"/>
3. Proposed denomination and breeder's reference		
	Proposed denomination (if available)	<input type="text"/>
	Breeder's reference	<input type="text"/>

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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#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 variety)

(.....) 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.

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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4.2 Method of propagating the variety

4.2.1 Seed-propagated varieties

(a) Open pollinated variety

(b) Inbred line

(c) Single hybrid

(d) Three-way hybrid

(e) Double hybrid

(f) Top-cross hybrid

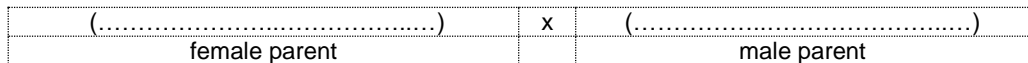
(g) Synthetic variety

(h) Other
 (please provide details)

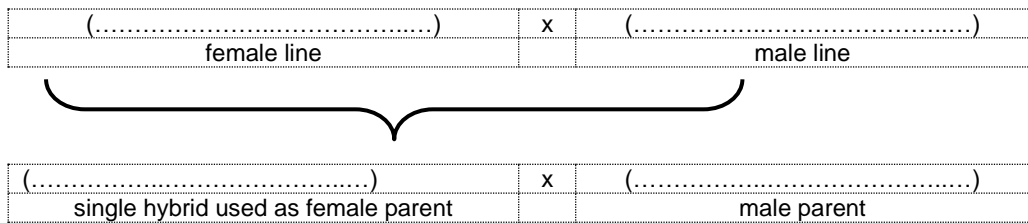
4.2.2 Other
 (Please provide details)

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



Three-Way Hybrid



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:
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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 Grain: intensity of color of aleurone layer (1)		
light	(w) Helltop	1 []
dark	(s) Arantes, (w) Bonfire	2 []
5.2 Coleoptile: anthocyanin coloration (3)		
absent or very weak	(w) Helltop	1 []
very weak to weak		2 []
weak		3 []
weak to medium		4 []
medium	(w) Tonus	5 []
medium to strong		6 []
strong	(s) Ovid, (w) Turbogreen	7 []
strong to very strong		8 []
very strong		9 []
5.3 Time of ear emergence (8)		
very early	(w) Bonfire	1 []
very early to early		2 []
early	(w) Turbogreen	3 []
early to medium		4 []
medium	(w) Jobaro	5 []
medium to late		6 []
late		7 []
late to very late		8 []
very late	(w) Tonus	9 []

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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Characteristics	Example Varieties	Note
5.4 Stem: density of hairiness below ear (13)		
absent or very weak		1 []
very weak to weak		2 []
weak	(w) Guttino	3 []
weak to medium		4 []
medium	(w) Tonus	5 []
medium to strong		6 []
strong	(w) KWS Dolaro	7 []
strong to very strong		8 []
very strong		9 []
5.5 Plant: length (14)		
very short		1 []
very short to short		2 []
short	(w) Guttino	3 []
short to medium		4 []
medium	(s) Ovid, (w) Marcelo	5 []
medium to long		6 []
long	(w) Jobaro	7 []
long to very long		8 []
very long	(w) Bonfire	9 []
5.6 Seasonal type (21)		
winter	(w) SU Stakkato	1 []
alternative		2 []
spring	(s) Arantes	3 []

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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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
<i>Example</i>	<i>Time of ear emergence</i>	<i>early to medium</i>	<i>late</i>
Comments:			

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

7.3.1 Ploidy
diploid []
tetraploid []

7.3.2 Other

.....

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

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

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