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# INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

Geneva

DRAFT

**RYE**

UPOV Code(s): SECAL_CER

*Secale cereale* 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-ninth session, to be held in Saskatoon, Canada,*
*from 2020-06-22 to 2020-06-26*

*Disclaimer: this document does not represent UPOV policies or guidance*

Alternative names:*

| *Botanical name* | *English* | *French* | *German* | *Spanish* |
|---|---|---|---|---|
| *Secale cereale* 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.]

TABLE OF CONTENTS PAGE

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

3.3.5 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 [type or types of propagation] varieties. 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<br>Exemples<br>Beispielssorten<br>Variedades ejemplo | Note/<br>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

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<br>Exemples<br>Beispielssorten<br>Variedades ejemplo | Note/<br>Nota |
|---|---|---|---|---|---|---|---|
| **1.** | **(*)** | **QL VG\|A** | **(+)** | **00** | | | |
| | | **Grain: intensity of color of aleurone layer** | | | | | |
| | | light | | | | (w) Helltop | 1 |
| | | dark | | | | (s) Arantes, (w) Bonfire | 2 |
| **2.** | | **QN VG\|A** | **(+)** | **00** | | | |
| | | **Grain: coloration with phenol** | | | | | |
| | | absent or very light | | | | | 1 |
| | | light | | | | | 3 |
| | | medium | | | | (s) Tiroler, (w) Gonello | 5 |
| | | dark | | | | (s) Arantes, (w) Marcelo | 7 |
| | | very dark | | | | (w) SU Stakkato | 9 |
| **3.** | **(*)** | **QN VG\|A** | **(+)** | **10-11** | | | |
| | | **Coleoptile: anthocyanin coloration** | | | | | |
| | | absent or very weak | | | | (w) Helltop | 1 |
| | | weak | | | | | 3 |
| | | medium | | | | (w) Tonus | 5 |
| | | strong | | | | (s) Ovid, (w) Turbogreen | 7 |
| | | very strong | | | | | 9 |
| **4.** | | **QN MS\|A** | **(a)** | **12-13** | | | |
| | | **Coleoptile: length** | | | | | |
| | | very short | | | | | 1 |
| | | short | | | | (w) Dukato | 3 |
| | | medium | | | | (s) Arantes, (w) Marcelo | 5 |
| | | long | | | | (w) Highgreen | 7 |
| | | very long | | | | | 9 |

| | | English | français | deutsch | español | Example Varieties<br>Exemples<br>Beispielssorten<br>Variedades ejemplo | Note/<br>Nota |
|---|---|---|---|---|---|---|---|
| **5.** | | **QN MS\|A** | **(a)** | **12-13** | | | |
| | | **First leaf: length of sheath** | | | | | |
| | | very short | | | | | 1 |
| | | short | | | | | 3 |
| | | medium | | | | (s) Arantes, (w) Marcelo | 5 |
| | | long | | | | (w) Jobaro | 7 |
| | | very long | | | | | 9 |
| **6.** | | **QN MS\|A** | **(a)** | **12-13** | | | |
| | | **First leaf: length of blade** | | | | | |
| | | very short | | | | | 1 |
| | | short | | | | (w) Guttino | 3 |
| | | medium | | | | (w) Marcelo | 5 |
| | | long | | | | (w) Turbogreen | 7 |
| | | very long | | | | | 9 |
| **7.** | **(*)** | **QN VG\|B/VS\|A** | **(+)** | **25-29** | | | |
| | | **Plant: growth habit** | | | | | |
| | | erect | | | | | 1 |
| | | semi-erect | | | | | 3 |
| | | intermediate | | | | (s) Tiroler, (w) Turbogreen | 5 |
| | | semi-prostrate | | | | (w) Guttino | 7 |
| | | prostrate | | | | | 9 |
| **8.** | **(*)** | **QN MG\|B/MS\|A** | **(+)** | | | | |
| | | **Time of ear emer-gence** | | | | | |
| | | very early | | | | (w) Bonfire | 1 |
| | | early | | | | (w) Turbogreen | 3 |
| | | medium | | | | (w) Jobaro | 5 |
| | | late | | | | | 7 |
| | | very late | | | | (w) Tonus | 9 |

| | | English | | français | | deutsch | español | Example Varieties<br>Exemples<br>Beispielssorten<br>Variedades ejemplo | Note/<br>Nota |
|---|---|---|---|---|---|---|---|---|---|
| **9.** | **(*)** | **QN** | **VG\|B** | **(+)** | | **54-58** | | | |
| | | **Flag leaf: glau-cosity of sheath** | | | | | | | |
| | | absent or very weak | | | | | | | 1 |
| | | weak | | | | | | (w) Bonfire | 3 |
| | | medium | | | | | | (w) Helltop | 5 |
| | | strong | | | | | | (w) SU Stakkato | 7 |
| | | very strong | | | | | | | 9 |
| **10.** | | **QN** | **MS\|A** | | | **60-69** | | | |
| | | **Penultimate leaf: length of blade** | | | | | | | |
| | | very short | | | | | | | 1 |
| | | short | | | | | | (w) Guttino | 3 |
| | | medium | | | | | | (w) Helltop | 5 |
| | | long | | | | | | (w) Turbogreen | 7 |
| | | very long | | | | | | | 9 |
| **11.** | | **QN** | **MS\|A** | | | **60-69** | | | |
| | | **Penultimate leaf: width of blade** | | | | | | | |
| | | very narrow | | | | | | | 1 |
| | | narrow | | | | | | (w) Tonus | 3 |
| | | medium | | | | | | (w) Marcelo | 5 |
| | | broad | | | | | | (w) Virgiai | 7 |
| | | very broad | | | | | | | 9 |
| **12.** | **(*)** | **QN** | **VG\|B/VS\|A** | | | **69-75** | | | |
| | | **Ear: glaucosity** | | | | | | | |
| | | absent or very weak | | | | | | | 1 |
| | | weak | | | | | | (w) Tonus | 3 |
| | | medium | | | | | | (s) Tiroler, (w) Marcelo | 5 |
| | | strong | | | | | | | 7 |
| | | very strong | | | | | | | 9 |

| | | English | | français | | deutsch | español | Example Varieties<br>Exemples<br>Beispielssorten<br>Variedades ejemplo | Note/<br>Nota |
|---|---|---|---|---|---|---|---|---|---|
| **13.** | **(*)** | **QN** | **VG\|B/VS\|A** | **(+)** | | **70-85** | | | |
| | | **Stem: density of hairiness below ear** | | | | | | | |
| | | absent or very weak | | | | | | | 1 |
| | | weak | | | | | | (w) Guttino | 3 |
| | | medium | | | | | | (w) Tonus | 5 |
| | | strong | | | | | | (w) KWS Dolaro | 7 |
| | | very strong | | | | | | | 9 |
| **14.** | **(*)** | **QN** | **MS\|A** | **(+)** | | **80-92** | | | |
| | | **Plant: length** | | | | | | | |
| | | very short | | | | | | | 1 |
| | | short | | | | | | (w) Guttino | 3 |
| | | medium | | | | | | (s) Ovid, (w) Marcelo | 5 |
| | | long | | | | | | (w) Jobaro | 7 |
| | | very long | | | | | | (w) Bonfire | 9 |
| **15.** | | **QN** | **MS\|A** | | | **80-92** | | | |
| | | **Stem: length between upper node and ear** | | | | | | | |
| | | very short | | | | | | | 1 |
| | | short | | | | | | (w) KWS Dolaro | 3 |
| | | medium | | | | | | (w) Marcelo | 5 |
| | | long | | | | | | (w) Tonus | 7 |
| | | very long | | | | | | (w) Turbogreen | 9 |
| **16.** | **(*)** | **QN** | **MS\|A** | **(+)** | | **80-92** | | | |
| | | **Ear: length** | | | | | | | |
| | | very short | | | | | | | 1 |
| | | short | | | | | | (s) Arantes, (w) Imperator | 3 |
| | | medium | | | | | | (w) Turbogreen | 5 |
| | | long | | | | | | (s) Tiroler, (w) Tonus | 7 |
| | | very long | | | | | | | 9 |

| | | English | | français | | deutsch | español | Example Varieties<br>Exemples<br>Beispielssorten<br>Variedades ejemplo | Note/<br>Nota |
|---|---|---|---|---|---|---|---|---|---|
| **17.** | **(*)** | **QN** | **MS\|A** | **(+)** | | **80-92** | | | |
| | | **Ear: density** | | | | | | | |
| | | very lax | | | | | | | 1 |
| | | lax | | | | | | (w) Bonfire | 3 |
| | | medium | | | | | | (s) Ovid, (w) Gonello | 5 |
| | | dense | | | | | | (w) Helltop | 7 |
| | | very dense | | | | | | | 9 |
| **18.** | | **QN** | **VG\|B/VS\|A** | **(+)** | | **90-92** | | | |
| | | **Ear: attitude** | | | | | | | |
| | | erect | | | | | | | 1 |
| | | semi-erect | | | | | | | 3 |
| | | horizontal | | | | | | (w) Terogrün | 5 |
| | | semi-recurved | | | | | | (w) Helltop | 7 |
| | | recurved | | | | | | | 9 |
| **19.** | **(*)** | **QN** | **MG** | **(+)** | | **92** | | | |
| | | **Grain: thousand grain weight** | | | | | | | |
| | | very small | | | | | | | 1 |
| | | small | | | | | | (w) Tonus | 3 |
| | | medium | | | | | | (w) Turbogreen | 5 |
| | | large | | | | | | (w) Jobaro | 7 |
| | | very large | | | | | | | 9 |
| **20.** | **(*)** | **QN** | **MG** | **(+)** | | **92** | | | |
| | | **Grain: length** | | | | | | | |
| | | very short | | | | | | | 1 |
| | | short | | | | | | (w) Tonus | 3 |
| | | medium | | | | | | (s) Arantes, (w) Gonello | 5 |
| | | long | | | | | | (w) Jobaro | 7 |
| | | very long | | | | | | | 9 |
| **21.** | **(*)** | **PQ** | **VG** | **(+)** | | | | | |
| | | **Seasonal type** | | | | | | | |
| | | winter | | | | | | (w) SU Stakkato | 1 |
| | | alternative | | | | | | | 2 |
| | | spring | | | | | | (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 ºC 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<br>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 20o 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 a 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

| 1 | 3 | 5 | 7 | 9 |
|---|---|---|---|---|
| erect | semi-erect | intermediate | semi-prostrate | prostrate |

Ad. 8: Time of ear emer-gence

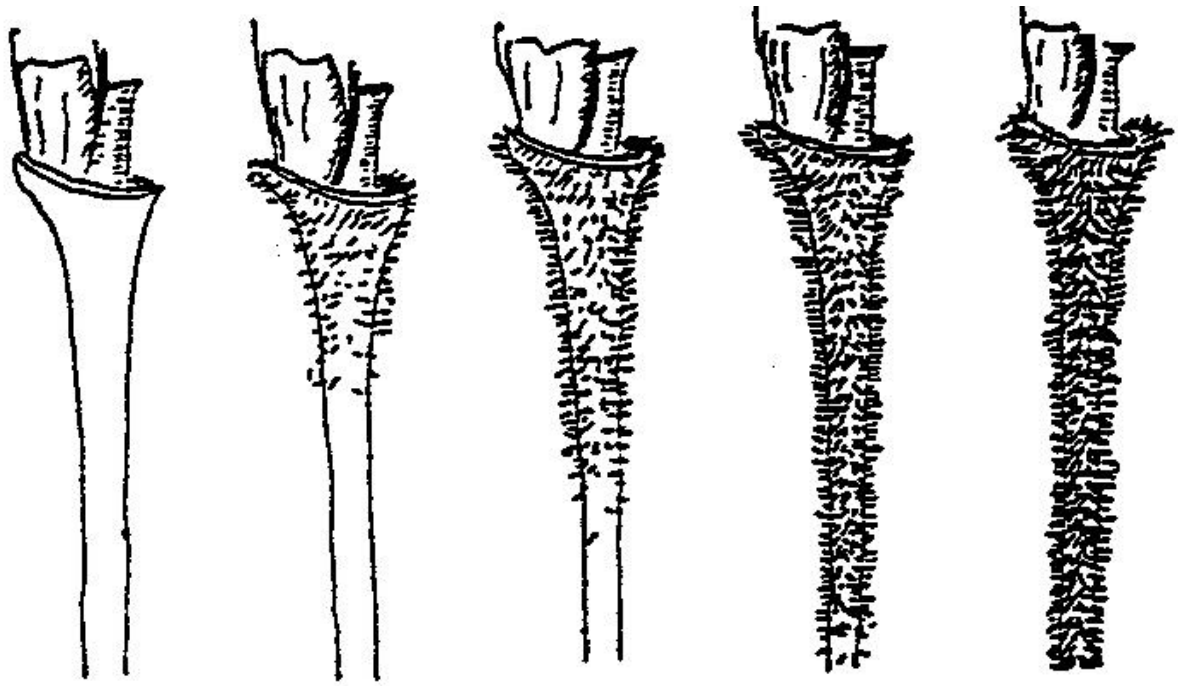
Open pollinated varieties, hybrid varieties and synthetic varieties (MS/A): The number of plants which have reached growth stage 52 should be recorded at two-day intervals. From this data the average time of ear emergence of the variety should be calculated.

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: glau-cosity of sheath

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

Ad. 13: Stem: density of hairiness below ear



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

Ad. 14: Plant: length

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

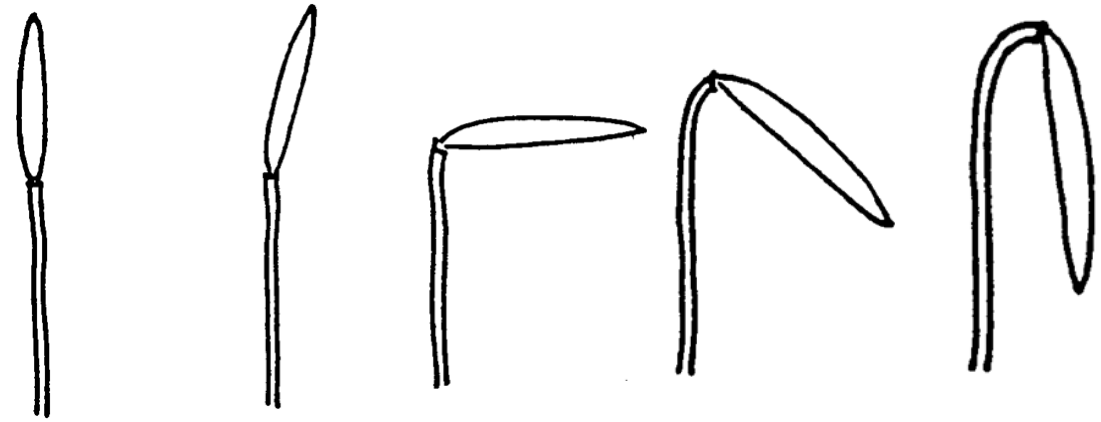
Ad. 16: Ear: length

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



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

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** |
|---|---|
| | 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 only and 1 tiller |
| 22 | Main shoot only and 2 tillers |
| 23 | Main shoot only and 3 tillers |
| 24 | Main shoot only and 4 tillers |
| 25 | Main shoot only and 5 tillers |
| 26 | Main shoot only and 6 tillers |
| 27 | Main shoot only and 7 tillers |
| 28 | Main shoot only and 8 tillers |
| 29 | Main shoot only 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 |
| | Booting |
| 41 | Flag leaf sheath extending |
| 43 | Boots just visibly swollen |
| 45 | Boots swollen |
| 47 | Flag leaf sheath opening |
| 49 | First awn visible |
| | Inflorescence emergence |
| 51 | First spikelet of inflorescence visible |
| 52 | - |
| 53 | ¼ of inflorescence emerged |
| 54 | - |
| 55 | ½ of inflorescence emerged |
| 57 | ¾ of inflorescence emerged |
| 58 | - |
| 59 | Emergence of inflorescence completed |

| | |
|---|---|
| | Anthesis |
| 60 | - |
| 61 | Beginning of anthesis |
| 65 | Anthesis half-way |
| 69 | Anthesis completed |
| | |
| | Milk development |
| 70 | - |
| 71 | Caryopsis watery ripe |
| 73 | Early milk |
| 75 | Medium milk |
| 77 | Late milk |
| | |
| | Dough development |
| 80 | - |
| 83 | Early dough |
| 85 | Soft dough |
| 87 | Hard dough |
| | |
| | Ripening |
| 91 | Caryopsis hard (difficult to divide with thumbnail) |
| | |
| 92 | Caryopsis hard (no longer dented with thumbnail) |
| | |
| 93 | Caryopsis 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. 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:<br>(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 | *Secale cereale* L. |
| 1.2 Common name | Rye |

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 [ ]

(b) partially known cross [ ]

(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: |
|---|---|---|

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<br>(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 line | | male line |

| | | |
|---|---|---|
| (……..……..…) | 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 (1)** | **Grain: intensity of color of aleurone layer** | | |
| | light | (w) Helltop | 1 [ ] |
| | dark | (s) Arantes, (w) Bonfire | 2 [ ] |
| **5.2 (3)** | **Coleoptile: anthocyanin coloration** | | |
| | absent or very weak | (w) Helltop | 1 [ ] |
| | weak | | 3 [ ] |
| | medium | (w) Tonus | 5 [ ] |
| | strong | (s) Ovid, (w) Turbogreen | 7 [ ] |
| | very strong | | 9 [ ] |
| **5.3 (8)** | **Time of ear emer-gence** | | |
| | very early | (w) Bonfire | 1 [ ] |
| | early | (w) Turbogreen | 3 [ ] |
| | medium | (w) Jobaro | 5 [ ] |
| | late | | 7 [ ] |
| | very late | (w) Tonus | 9 [ ] |
| **5.4 (13)** | **Stem: density of hairiness below ear** | | |
| | 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 [ ] |

| | Characteristics | Example Varieties | Note |
|---|---|---|---|
| **5.5 (14)** | **Plant: length** | | |
| | 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 (21)** | **Seasonal type** | | |
| | winter | (w) SU Stakkato | 1 [ ] |
| | alternative | | 2 [ ] |
| | spring | (s) Arantes | 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 | Characteristic(s) in which your candidate variety differs | Describe the expression of the characteristic(s) for the | Describe the expression of the characteristic(s) for **your** |
|---|---|---|---|
| *Example* | *Time of ear emergence* | *early to medium* | *late* |
| | | | |
| | | | |
| | | | |

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

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: |
|---|---|---|

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

[End of document]