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|  | FODDER BEETUPOV Code(s): BETAA\_VUL\_GVA*Beta vulgaris* L.  Fodder Beet Group | \* |

GUIDELINESFOR THE CONDUCT OF TESTS
FOR DISTINCTNESS, UNIFORMITY AND STABILITY

prepared by an expert from France

to be considered by the

Technical Working Party for Agricultural Crops at its fifty-fourth session,

to be held in Arusha, United Republic of Tanzania, from 2025-05-19 to 2025-05-22

Disclaimer: this document does not represent UPOV policies or guidance

Alternative Names:\*

| *Botanical name* | *English* | *French* | *German* | *Spanish* |
| --- | --- | --- | --- | --- |
| *Beta vulgaris* L. Fodder Beet Group, *Beta vulgaris* L. ssp. *vulgaris* var. *alba* DC., *Beta vulgaris* L. ssp. *vulgaris* var. *crassa* Alef., *Beta vulgaris* L. ssp. *vulgaris* var. *crassa* Mansf., *Beta vulgaris* L. ssp. *vulgaris* var. *rapacea* K. Koch | Fodder beet | Betterave fourragère | Runkelrübe | Remolacha forrajera |

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.

TABLE OF CONTENTS PAGE

[1. Subject of these Test Guidelines 3](#_Toc_1_3_0000000001)

[2. Material Required 3](#_Toc_1_3_0000000002)

[3. Method of Examination 3](#_Toc_1_3_0000000003)

[3.1  Number of Growing Cycles 3](#_Toc_1_3_0000000004)

[3.2  Testing Place 3](#_Toc_1_3_0000000005)

[3.3  Conditions for Conducting the Examination 3](#_Toc_1_3_0000000006)

[3.4  Test Design 3](#_Toc_1_3_0000000007)

[3.5  Additional Tests 3](#_Toc_1_3_0000000008)

[4. Assessment of Distinctness, Uniformity and Stability 4](#_Toc_1_3_0000000009)

[4.1  Distinctness 4](#_Toc_1_3_0000000010)

[4.2  Uniformity 5](#_Toc_1_3_0000000011)

 [4.3  Stability 5](#_Toc_1_3_0000000012)

[5. Grouping of Varieties and Organization of the Growing Trial 5](#_Toc_1_3_0000000013)

[6. Introduction to the Table of Characteristics 6](#_Toc_1_3_0000000014)

[6.1  Categories of Characteristics 6](#_Toc_1_3_0000000015)

[6.2  States of Expression and Corresponding Notes 6](#_Toc_1_3_0000000016)

[6.3  Types of Expression 6](#_Toc_1_3_0000000017)

[6.4  Example Varieties 6](#_Toc_1_3_0000000018)

[6.5  Legend 7](#_Toc_1_3_0000000019)

[7. Table of Characteristics/Tableau des caracteres/Merkmalstabelle/Tabla de caracteres 8](#_Toc_1_3_0000000020)

[8. Explanations on the Table of Characteristics 15](#_Toc_1_3_0000000021)

[8.1  Explanations for individual characteristics 15](#_Toc_1_3_0000000022)

[8.2  Additional Explanations on the Table of Characteristics 17](#_Toc_1_3_0000000023)

[9. Literature 18](#_Toc_1_3_0000000024)

[10. Technical Questionnaire 19](#_Toc_1_3_0000000025)

# Subject of these Test Guidelines

 These Test Guidelines apply to all varieties of *Beta vulgaris* L. Fodder Beet Group.

# 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 naked seeds.

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

350 g

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.

# Method of Examination

## 3.1  Number of Growing Cycles

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

3.1.2 The two independent growing cycles should be in the form of two separate plantings.

3.1.3 The testing of a variety may be concluded when the competent authority can determine with certainty the outcome of the test.

## 3.2  Testing Place

 Tests are normally conducted at one place. In the case of tests conducted at more than one place, guidance is provided in TGP/9 “Examining Distinctness”.

## 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.

## 3.4  Test Design

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

## 3.5  Additional Tests

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

# 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

Unless otherwise indicated, for the purposes of distinctness, all observations on single plants should be made on 45 plants or parts of plants taken from each of 45 plants and any other observations made on all plants in the test, disregarding any off-type plants.

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 (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 These Test Guidelines have been developed for the examination of cross-pollinated and hybrid 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 should be according to the recommendations for cross-pollinated varieties in the General Introduction.

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 200 plants

4.2.5 If not otherwise indicated, for the assessment of uniformity, a population standard of 2% and an acceptance probability of at least 95% should be applied. In the case of a sample size of 200 plants, 7 off-types are allowed. For the assessment of uniformity of ploidy, a population standard of 10% and an acceptance probability of at least 95% should be applied. In the case of a sample of 15 plants, 1 off-type is allowed.

4.2.6 For root characteristics, the assessment of uniformity can be done in 2 steps. In a first step, 45 roots are observed. If 3 or less off-types are observed, the variety is declared to be uniform. If more than 3 off-types are observed, an additional sample of 55 roots must be observed.

##  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.

# 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) Germity (characteristic 1)

(b) Ploidy (characteristic 2)

(c) Root: shape (characteristic 15)

(d) Root: color below ground (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”.

# 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 All relevant states of expression are presented in the characteristic.

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.

## 6.5  Legend

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | English | français | deutsch | español | Example VarietiesExemplesBeispielssortenVariedades 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)-(x) See Explanations on the Table of Characteristics in Chapter 8.1

7 Growth stage key (if applicable) See Explanations on the Table of Characteristics in Chapter 8.3

# Table of Characteristics/Tableau des caracteres/Merkmalstabelle/Tabla de caracteres

|  | English | français | deutsch | español | Example VarietiesExemplesBeispielssortenVariedades ejemplo | Note/Nota |
| --- | --- | --- | --- | --- | --- | --- |
| **1.** | **(\*)** | **QN** | **VG** | **(+)** |  | **10-20** |  |  |  |
|  | **Germity** |  |  |  |  |  |
| monogerm |  |  |  | Brick | 1  |
| partly monogerm/ partly multigerm |  |  |  |  | 2  |
| multigerm |  |  |  | Jaune d'Eckendor | 3  |
| **2.** | **(\*)** | **PQ** | **MS** | **(+)** |  | **10-20** |  |  |  |
|  | **Ploidy** |  |  |  |  |  |
| diploid |  |  |  | Brick | 2  |
| triploid |  |  |  | Jamon | 3  |
| tetraploid |  |  |  |  | 4  |
| polyploid |  |  |  |  | 5  |
| **3.** |  | **PQ** | **VG/VS** | **(+)** |  | **10-20** |  |  |  |
|  | **Hypocotyl: color** |  |  |  |  |  |
| white |  |  |  |  | 1  |
| green |  |  |  | Bergman, Perrine | 2  |
| yellow |  |  |  | Bangor, Cerise | 3  |
| orange |  |  |  | Splendide | 4  |
| pink |  |  |  | Brick | 5  |
| red |  |  |  |  | 6  |
| red purple |  |  |  |  | 7  |
| **4.** |  | **QN** | **VG|B** | **(+)** |  | **33-39** |  |  |  |
|  | **Leaf: attitude** |  |  |  |  |  |
| erect |  |  |  |  | 1  |
| erect to semi-erect |  |  |  | Cerise | 2  |
| semi-erect |  |  |  |  | 3  |
| semi-erect to intermediate |  |  |  |  | 4  |
| intermediate |  |  |  | Jamon | 5  |
| intermediate to semi-prostrate |  |  |  |  | 6  |
| semi-prostrate |  |  |  |  | 7  |
| semi-prostrate to prostrate |  |  |  |  | 8  |
| prostrate |  |  |  |  | 9  |
| **5.** | **(\*)** | **QN** | **VG|B** |  |  | **33-39** |  |  |  |
|  | **Leaf: blistering** |  |  |  |  |  |
| weak |  |  |  | Brunium | 1  |
| weak to medium |  |  |  | Jamon | 2  |
| medium |  |  |  | Brick | 3  |
| medium to strong |  |  |  | Eloquenta KWS | 4  |
| strong |  |  |  |  | 5  |
| **6.** |  | **QN** | **VG|B** |  |  | **33-39** |  |  |  |
|  | ***Propose to delete* Leaf: glossiness** |  |  |  |  |  |
| absent or weak |  |  |  |  | 1  |
| weak to medium |  |  |  |  | 2  |
| medium |  |  |  |  | 3  |
| medium to strong |  |  |  |  | 4  |
| strong |  |  |  |  | 5  |
| **7.** |  | **QN** | **VG|B** |  |  | **33-39** |  |  |  |
|  | **Leaf: undulation of margin** |  |  |  |  |  |
| weak |  |  |  | Brunium, Cerise | 1  |
| weak to medium |  |  |  |  | 2  |
| medium |  |  |  | Perrine | 3  |
| medium to strong |  |  |  | Eloquenta KWS | 4  |
| strong |  |  |  |  | 5  |
| **8.** |  | **QN** | **VG|B** |  |  | **33-39** |  |  |  |
|  | **Leaf blade: intensity of green color**  |  |  |  |  |  |
| very light |  |  |  |  | 1  |
| very light to light |  |  |  |  | 2  |
| light |  |  |  | Lactimo | 3  |
| light to medium |  |  |  |  | 4  |
| medium |  |  |  | Jamon, Perrine | 5  |
| medium to dark |  |  |  |  | 6  |
| dark |  |  |  | Laurena KWS | 7  |
| dark to very dark |  |  |  |  | 8  |
| very dark |  |  |  |  | 9  |
| **9.** | **(\*)** | **QN** | **MS/VG|B** | **(+)** |  | **33-39** |  |  |  |
|  | **Leaf: length** |  |  |  |  |  |
| very short |  |  |  |  | 1  |
| very short to short |  |  |  |  | 2  |
| short |  |  |  | Eloquenta KWS | 3  |
| short to medium |  |  |  | Bergman, Brunium | 4  |
| medium |  |  |  | Jamon, Laurena KWS | 5  |
| medium to long |  |  |  | Derixia, Girida | 6  |
| long |  |  |  | Bolero | 7  |
| long to very long |  |  |  |  | 8  |
| very long |  |  |  |  | 9  |
| **10.** |  | **QN** | **MS/VG|B** |  |  | **33-39** |  |  |  |
|  | **Leaf: width** |  |  |  |  |  |
| very narrow |  |  |  |  | 1  |
| very narrow to narrow |  |  |  |  | 2  |
| narrow |  |  |  | Laurena KWS | 3  |
| narrow to medium |  |  |  | Bergman, Girida | 4  |
| medium |  |  |  | Bolero, Brunium | 5  |
| medium to broad |  |  |  | Derixia, Jamon | 6  |
| broad |  |  |  | Géante Rouge | 7  |
| broad to very broad |  |  |  |  | 8  |
| very broad |  |  |  |  | 9  |
| **11.** |  | **QN** | **MS/VG|B** |  |  | **33-39** |  |  |  |
|  | **Leaf blade: width in relation to length** |  |  |  |  |  |
| very narrow |  |  |  |  | 1  |
| very narrow to narrow |  |  |  |  | 2  |
| narrow |  |  |  |  | 3  |
| narrow to medium |  |  |  | Brunium, Jamon | 4  |
| medium |  |  |  | Bergman | 5  |
| medium to broad |  |  |  | Bolero | 6  |
| broad |  |  |  | Girida, Laurena KWS | 7  |
| broad to very broad |  |  |  |  | 8  |
| very broad |  |  |  |  | 9  |
| **12.** |  | **PQ** | **VG|B** | **(+)** |  | **33-39** |  |  |  |
|  | **Leaf blade: shape of apex** |  |  |  |  |  |
| strongly acute |  |  |  | Laurena KWS, Splendide | 1  |
| right angle |  |  |  | Bolero, Brick, Jamon | 2  |
| obtuse |  |  |  | Cerise, Feldherr, Kokomo | 3  |
| **13.** |  | **QN** | **MS/VG|B** |  |  | **33-39** |  |  |  |
|  | **Petiole: length** |  |  |  |  |  |
| very short |  |  |  |  | 1  |
| very short to short |  |  |  |  | 2  |
| short |  |  |  | Bolero | 3  |
| short to medium |  |  |  |  | 4  |
| medium |  |  |  | Brick, Laurena KWS | 5  |
| medium to long |  |  |  |  | 6  |
| long |  |  |  | Girida | 7  |
| long to very long |  |  |  |  | 8  |
| very long |  |  |  |  | 9  |
| **14.** |  | **QN** | **MG/VG|B** |  |  | **49** |  |  |  |
|  | **Plant: natural height** |  |  |  |  |  |
| short |  |  |  |  | 1  |
| short to medium |  |  |  | Brunium | 2  |
| medium |  |  |  | Bolero, Brick | 3  |
| medium to tall |  |  |  | Enermax, Perrine | 4  |
| tall |  |  |  | Abramo | 5  |
| **15.** | **(\*)** | **PQ** | **VG|A** | **(+)** |  | **49** |  |  |  |
|  | **Root: shape** |  |  |  |  |  |
| obloid |  |  |  |  | 1  |
| elongated obloid |  |  |  |  | 2  |
| obovoid |  |  |  | Aversa | 3  |
| narrow obovoid |  |  |  |  | 4  |
| obconic |  |  |  | Girida, Perrine | 5  |
| broad obconic |  |  |  |  | 6  |
| compressed oblong |  |  |  | Bolero | 7  |
| oblong |  |  |  |  | 8  |
| elongated oblong |  |  |  | Jaune d'Eckendor | 9  |
| **16.** |  | **QN** | **MS/VG|A** |  |  | **49** |  |  |  |
|  | **Root: length** |  |  |  |  |  |
| very short |  |  |  |  | 1  |
| very short to short |  |  |  |  | 2  |
| short |  |  |  | Brick | 3  |
| short to medium |  |  |  | Energarci | 4  |
| medium |  |  |  | Cerise | 5  |
| medium to long |  |  |  | Bangor, Ribambelle | 6  |
| long |  |  |  | Géante Blanche | 7  |
| long to very long |  |  |  |  | 8  |
| very long |  |  |  |  | 9  |
| **17.** |  | **QN** | **MS/VG|A** |  |  | **49** |  |  |  |
|  | **Root: width** |  |  |  |  |  |
| very narrow |  |  |  |  | 1  |
| very narrow to narrow |  |  |  |  | 2  |
| narrow |  |  |  | Géante Blanche | 3  |
| narrow to medium |  |  |  | Bangor | 4  |
| medium |  |  |  | Brick, Cerise | 5  |
| medium to broad |  |  |  | Ribambelle | 6  |
| broad |  |  |  |  | 7  |
| broad to very broad |  |  |  |  | 8  |
| very broad |  |  |  |  | 9  |
| **18.** |  | **QN** | **MS/VG|A** |  |  | **49** |  |  |  |
|  | **Root: length in relation to width** |  |  |  |  |  |
| very short |  |  |  |  | 1  |
| very short to short |  |  |  |  | 2  |
| short |  |  |  |  | 3  |
| short to medium |  |  |  | Brick | 4  |
| medium |  |  |  | Energarci, Ribambelle | 5  |
| medium to long |  |  |  |  | 6  |
| long |  |  |  | Bangor | 7  |
| long to very long |  |  |  |  | 8  |
| very long |  |  |  | Géante Blanche | 9  |
| **19.** |  | **QN** | **MS/VG|A** | **(+)** |  | **49** |  |  |  |
|  | **Root: position in soil** |  |  |  |  |  |
| very shallow |  |  |  |  | 1  |
| very shallow to shallow |  |  |  |  | 2  |
| shallow |  |  |  | Feldherr | 3  |
| shallow to medium |  |  |  |  | 4  |
| medium |  |  |  | Tarine | 5  |
| medium to deep |  |  |  | Cerise | 6  |
| deep |  |  |  | Brick, Eloquenta KWS | 7  |
| deep to very deep |  |  |  |  | 8  |
| very deep |  |  |  |  | 9  |
| **20.** |  | **PQ** | **VG|A** |  |  | **49** |  |  |  |
|  | **Root: color above ground** |  |  |  |  |  |
| white |  |  |  |  | 1  |
| green |  |  |  | Brick, Laurena KWS | 2  |
| yellow |  |  |  |  | 3  |
| orange |  |  |  |  | 4  |
| red |  |  |  | Kokomo | 5  |
| red purple |  |  |  |  | 6  |
| **21.** | **(\*)** | **PQ** | **VG|A** |  |  | **49** |  |  |  |
|  | **Root: color below ground** |  |  |  |  |  |
| white |  |  |  | Brick, Laurena KWS | 1  |
| yellowish white |  |  |  |  | 2  |
| yellow |  |  |  | Cerise | 3  |
| yellow orange |  |  |  | Feldherr | 4  |
| orange |  |  |  | Valence | 5  |
| orange red |  |  |  | Dynamo, Kokomo | 6  |
| red |  |  |  | Caribou | 7  |
| light pink |  |  |  | Tarine | 8  |
| pink |  |  |  | Merveille | 9  |
| red purple |  |  |  |  | 10  |
| **22.** |  | **QN** | **MG/MS** | **(+)** |  | **49** |  |  |  |
|  | **Root: dry matter content** |  |  |  |  |  |
| very low |  |  |  |  | 1  |
| very low to low |  |  |  |  | 2  |
| low |  |  |  |  | 3  |
| low to medium |  |  |  |  | 4  |
| medium |  |  |  | Jamon | 5  |
| medium to high |  |  |  | Valence | 6  |
| high |  |  |  | Brunium | 7  |
| high to very high |  |  |  | Enermax, Tarine | 8  |
| very high |  |  |  | Brick, Perrine | 9  |

# Explanations on the Table of Characteristics

## 8.1  Explanations for individual characteristics

Ad. 1: Germity

Germity should be observed on 100 seeds.
The attribution of notes for state of expressions is as follows:
Note 1 = monogerm with equal or more than 95% of monogerm seeds
Note 2 = partly monogerm/partly multigerm with less then 95% and more then 15% monogerm seeds Note 3 = multigerm with equal or less than 15% monogerm seeds
For partly monogerm/partly multigerm varieties this characteristic should not be used to establish distinctness.

Ad. 2: Ploidy

Observations should be done on at least 5 plants. If any off-type is observed in a sample of 5 plants, another 10 plants should be observed.
The state of expression 5 - Polyploid is a mixture of diploids, triploids and tetraploids. For polyploid varieties this characteristic should not be used to establish distinctness

Ad. 3: Hypocotyl: color

Observations should be made on at least 100 seedlings, grown in the greenhouse, when plants are about 5 cm high.  The occurrence of more than one color should not be regarded as a lack of uniformity but for varieties with more than one color this characteristic should not be used to establish distinctness.

Ad. 4: Leaf: attitude

Observations should be made from the angle formed by the petiole and the vertical axis through the root.

Ad. 9: Leaf: length

Observation should be made on the largest, fully expanded leaf including the petiole.

Ad. 12: Leaf blade: shape of apex

Ad. 15: Root: shape

Ad. 19: Root: position in soil

Observations should be made on the roots by measuring the height above the soil, without harvesting.

Ad. 22: Root: dry matter content

Observations should be made either on a bulk sample of 30 roots or on a sample of 30 individual roots.

## 8.2  Additional Explanations on the Table of Characteristics

Growth stage of *Beta vulgaris* L. adopted to the BBCH scale (Meier U., 1993)

Code    Description

Principal growth stage 0: Germination
00        Dry seed
01        Imbibition – seed begins to take up water
03        End of seed imbibition – seed coat opened (pellet cracked)
05        Radicle emerged from seed
07        Shoot emerged from seed (pellet)
09        Emergence - shoot emerges at the soil surface

Principal growth stage 1: Leaf development (youth stage)
10        Cotyledons horizontally unfolded; 1st leaf of pin-head-size
11        1st pair of leaves visible, of pea-size
12        2 leaves (first pair) unfolded
14        4 leaves (second pair) unfolded
15        5 leaves unfolded
So on to…
19        9 and more leaves unfolded

Principal growth stage 3: Rosette growth (crop cover)
30        Beginning of crop cover formation - leaf contact of 10 % of plants in adjacent rows
33        Contact of 30 % of plants in adjacent rows
39        Crop cover complete - contact of more than 90 % of plants in adjacent rows

Principal growth stage 4: Development of harvestable vegetative plant parts-  Beet-root
49         Beet-root has reached harvestable size

Principal growth stage 5: Development of inflorescence/flower buds (2nd year of growth)
...

# Literature

* Meier, U.; L. Bachmann; H. Buhtz; H. Hack; R. Klose; B. Marlander; E. Weber (1993). "Phänologische Entwicklungsstadien der Beta-Rüben (Beta vulgaris L. ssp.). Codierung und Beschreibung nach der erweiterten BBCH-Skala (mit Abbildungen)". Nachrichtenbl. Deut. Pflanzenschutzd. 45: 37–41.

# 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  |
|  1.1.1 Botanical name  | *Beta vulgaris* L. Fodder Beet Group | [ ]  |
|  |  |  |
|  1.1.2 Common name | Fodder beet |  |
| 2. Applicant  |
|  Name |  |  |
|  |  |  |
|  Address |  |  |
|  |  |  |
|  Telephone No. |  |  |
|  |  |  |
|  Fax No. |  |  |
|  |  |  |
|  E-mail address |  |  |
|  |  |  |
|  Breeder (if different from  applicant) |  |  |
|  |  |  |

|  |  |  |
| --- | --- | --- |
| TECHNICAL QUESTIONNAIRE | Page {x} of {y} | Reference Number: |
|  |
|  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 variety) (…………………..……………..…) x (……………..…………………..…) female parent male parent  (b) partially known cross [ ] (please state 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) |

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

|  |
| --- |
|  4.2 Method of propagating the variety 4.2.1 Seed-propagated varieties (a) Other (please provide details) [ ] 4.2.2 Vegetative propagation (a) Other (state method) [ ] 4.2.3 Other (Please provide details) [ ] |
|  |

|  |  |  |
| --- | --- | --- |
| 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)** | **Germity** |  |  |
|  | monogerm | Brick | 1 [ ] |
|  | partly monogerm/ partly multigerm |  | 2 [ ] |
|  | multigerm | Jaune d'Eckendor | 3 [ ] |
| **5.2****(2)** | **Ploidy** |  |  |
|  | diploid | Brick | 2 [ ] |
|  | triploid | Jamon | 3 [ ] |
|  | tetraploid |  | 4 [ ] |
|  | polyploid |  | 5 [ ] |
| **5.3****(3)** | **Hypocotyl: color** |  |  |
|  | white |  | 1 [ ] |
|  | green | Bergman, Perrine | 2 [ ] |
|  | yellow | Bangor, Cerise | 3 [ ] |
|  | orange | Splendide | 4 [ ] |
|  | pink | Brick | 5 [ ] |
|  | red |  | 6 [ ] |
|  | red purple |  | 7 [ ] |
| **5.4****(15)** | **Root: shape** |  |  |
|  | obloid |  | 1 [ ] |
|  | elongated obloid |  | 2 [ ] |
|  | obovoid | Aversa | 3 [ ] |
|  | narrow obovoid |  | 4 [ ] |
|  | obconic | Girida, Perrine | 5 [ ] |
|  | broad obconic |  | 6 [ ] |
|  | compressed oblong | Bolero | 7 [ ] |
|  | oblong |  | 8 [ ] |
|  | elongated oblong | Jaune d'Eckendor | 9 [ ] |
|  |  |  |  |

|  |  |  |
| --- | --- | --- |
| TECHNICAL QUESTIONNAIRE | Page {x} of {y} | Reference Number: |
|  |  |  |
|  | Characteristics  | Example Varieties  | Note  |
| **5.5****(21)** | **Root: color below ground** |  |  |
|  | white | Brick, Laurena KWS | 1 [ ] |
|  | yellowish white |  | 2 [ ] |
|  | yellow | Cerise | 3 [ ] |
|  | yellow orange | Feldherr | 4 [ ] |
|  | orange | Valence | 5 [ ] |
|  | orange red | Dynamo, Kokomo | 6 [ ] |
|  | red | Caribou | 7 [ ] |
|  | light pink | Tarine | 8 [ ] |
|  | pink | Merveille | 9 [ ] |
|  | red purple |  | 10 [ ] |
|  |  |  |  |

|  |  |  |
| --- | --- | --- |
| 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* | *Root: shape* | *obloid* | *obconic* |
|  |
|  |
|  |
|  Comments |

|  |  |  |
| --- | --- | --- |
| TECHNICAL QUESTIONNAIRE | Page {x} of {y} | Reference Number: |
|  |
| #7. Additional information which may help in the examination of the variety7.1 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 informationResistance to pests and diseases |

|  |  |  |
| --- | --- | --- |
| 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 examination9.1 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”. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_9.3 Has the plant material to be examined been tested for the presence of virus or other pathogens? Yes [ ] (please provide details as specified by the Authority) No [ ] |
| 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] |