E

TG/14/10(proj.4)
**ORIGINAL:** English
**DATE:** 2021-05-28

# INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

Geneva

DRAFT

**APPLE**

UPOV Code(s): MALUS_DOM

*Malus domestica* Borkh.

**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 Fruit Crops*
*at its fifty-second session, to be held in Zhengzhou, China,*
*from 2021-07-12 to 2021-07-16*

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

Alternative names:*

| *Botanical name* | *English* | *French* | *German* | *Spanish* |
|---|---|---|---|---|
| *Malus domestica* Borkh., *Malus pumila* Mill var. *domestica*, *Pyrus malus* L. | Apple | Pommier, Pommier commun | Apfel, Kultur-Apfel | Manzano |

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.

Other associated UPOV documents: TG/163/4 Apple Rootstocks
TG/192/1 Ornamental Apple

* 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 *Malus domestica* Borkh. except for varieties used only as rootstock varieties (see TG/163/3) or only as ornamental varieties (see TG/192/1).

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 trees, on a rootstock specified by the competent authority, or in the form of budsticks or graftwood.

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

(a) varieties resulting from crossing:
5 trees; 5 budsticks; or 5 dormant shoots for grafting;
(b) varieties resulting from mutation:
10 trees; 10 budsticks; or 10 dormant shoots for grafting.

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 two independent growing cycles may be observed from a single planting, examined in two separate growing cycles.

3.1.3 In particular, it is essential that the trees produce a satisfactory crop of fruit in each of the two growing cycles.

3.1.4 The growing cycle is considered to be the duration of a single growing season, beginning with bud burst (flowering and/or vegetative), flowering and fruit harvest and concluding when the following dormant period ends with the swelling of new season buds.

3.1.5 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*

3.4.1 In the case of varieties resulting from crossing, each test should be designed to result in a total of at least 5 trees.

3.4.2 In the case of varieties resulting from mutation, each test should be designed to result in a total of at least 10 trees.

3.4.3 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

Unless otherwise indicated, for the purposes of distinctness, all observations on single plants should be made on 3 plants or parts of plants taken from each of 3 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 vegetatively propagated 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 For the assessment of uniformity of varieties resulting from crossing, a population standard of 1% and an acceptance probability of at least 95% should be applied. In the case of a sample size of 5 plants, no off-types are allowed.

4.2.4 In the case of a sample size of 5 plants, no off-types are allowed. In the case of a sample size of 10 plants, 1 off-type is allowed.

4.2.5 For the assessment of uniformity of varieties resulting from mutation, a population standard of 1% and an acceptance probability of at least 95% should be applied. In the case of a sample size of 10 plants, 1 off-type is 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 plant stock to ensure that it exhibits the same characteristics as those shown by the initial material supplied.

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) Tree: type (characteristic 2)
(b) (to consider to delete) Only varieties with Tree type: ramified: Tree: habit (characteristic 3)
(c) Fruit: shape (characteristic 26)
(d) Fruit: hue of over color (characteristic 30)
(e) Fruit: relative area of over color (characteristic 32)
(f) Fruit: pattern of over color (characteristic 33)
(g) (New state of expr. added) Fruit: color of flesh (characteristic 45)
(h) Time of beginning of flowering (characteristic 48)
(i) Time for harvest (characteristic 49)
(j) Time of eating maturity (characteristic 50)

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 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 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)-(f) 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

## 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.** | | **QN VG** | **(+) (a)** | **00** | | | |
| | | **Tree: vigor** | | | | | |
| | | very weak | | | | Grenadier,<br>Nield's Drooper | 1 |
| | | very weak to weak | | | | James Grieve, Redkan | 2 |
| | | weak | | | | Alkmene, Regine | 3 |
| | | weak to medium | | | | Piros, Pomforyou, Renora | 4 |
| | | medium | | | | Gala, Pinova, Trajan | 5 |
| | | medium to strong | | | | Dalili, Pia, Pivita | 6 |
| | | strong | | | | Elstar, Rafzubin, Santana | 7 |
| | | strong to very strong | | | | Bay 3484, Collina,<br>Cripps Pink | 8 |
| | | very strong | | | | Gloster, Ingrid Marie | 9 |
| **2.** | **(*)** | **QL VG** | **(a)** | **00** | | | |
| | | **Tree: type** | | | | | |
| | | columnar | | | | MacExcel, Wijcik | 1 |
| | | ramified | | | | Elstar, Golden Delicious | 2 |
| **3.** | **(*)** | **PQ VG** | **(+) (a)** | **00** | | | |
| | | **(to consider to delete)**<br>**Only varieties with**<br>**Tree type: ramified:**<br>**Tree: habit** | | | | | |
| | | upright | | | | Alkmene, Fresco, Solaris | 1 |
| | | upright to spreading | | | | Akane, Arkcharm,<br>Harmensz, Katrina, Reka | 2 |
| | | spreading | | | | Pinova, Redkan, Topaz | 3 |
| | | drooping | | | | Idared, James Grieve,<br>Pivita | 4 |
| | | weeping | | | | Gerlinde, Nield's Drooper | 5 |

| | | English | français | deutsch | español | Example Varieties<br>Exemples<br>Beispielssorten<br>Variedades ejemplo | Note/<br>Nota |
|---|---|---|---|---|---|---|---|
| **4.** | **(*)** | **QN MG/VG** | **(+) (b)** | **00** | | | |
| | | **One-year-old shoot: length of internode** | | | | | |
| | | very short | | | | MacExcel, Wijcik | 1 |
| | | very short to short | | | | Alkmene, Coxcolumnar, Tuscan | 2 |
| | | short | | | | Florina | 3 |
| | | short to medium | | | | Ahrista, Margol | 4 |
| | | medium | | | | Jonagold, Redaphough | 5 |
| | | medium to long | | | | Constance, Crowngold, Nicoter, Stela | 6 |
| | | long | | | | Auralia | 7 |
| | | long to very long | | | | Angold | 8 |
| | | very long | | | | Teser | 9 |
| **5.** | **(*)** | **QN MG/VG** | **(+) (b)** | **75/77** | | | |
| | | **One-year-old shoot: number of lenticels** | | | | | |
| | | few | | | | Alkmene,<br>Bramley's Seedling | 1 |
| | | medium | | | | Cox's Orange Pippin | 2 |
| | | many | | | | Mutsu, SQ 159 | 3 |
| **6.** | **(*)** | **QN VG** | **(+) (c)** | **75/77** | | | |
| | | **Leaf blade: attitude in relation to shoot** | | | | | |
| | | upwards | | | | Delblush, Elstar, Fresco, Redkan, Santana | 1 |
| | | upwards to outwards | | | | Jugala, Prem A 153, Resista, Sweet Lady | 2 |
| | | outwards | | | | Cripps Pink, Jonagold, Pinova, Pomforyou, Schone van Boskoop | 3 |
| | | downwards | | | | Fuji BC, Himekami, Rewena | 4 |

| | | English | | français | | deutsch | español | Example Varieties<br>Exemples<br>Beispielssorten<br>Variedades ejemplo | Note/<br>Nota |
|---|---|---|---|---|---|---|---|---|---|
| **7.** | **(*)** | **QN** | **MG/VG** | **(+)** | **(c)** | **75/77** | | | |
| | | **Leaf blade: length** | | | | | | | |
| | | very short | | | | | | Mars, Reanda | 1 |
| | | very short to short | | | | | | Coxcolumnar, Goldstar | 2 |
| | | short | | | | | | Ariwa, Gusto | 3 |
| | | short to medium | | | | | | Braeburn, Fuji BC, Topaz | 4 |
| | | medium | | | | | | Cripps Red, Dalili, Elstar | 5 |
| | | medium to long | | | | | | Jonagold, Pinova, Santana | 6 |
| | | long | | | | | | Fresco, Minnewashta, Monidel | 7 |
| | | long to very long | | | | | | Pomforyou, Pompink | 8 |
| | | very long | | | | | | Northpole, Telamon | 9 |
| **8.** | **(*)** | **QN** | **MG/VG** | **(+)** | **(c)** | **75/77** | | | |
| | | **Leaf blade: width** | | | | | | | |
| | | very narrow | | | | | | Coxdwarf | 1 |
| | | very narrow to narrow | | | | | | Cox La Vera, Dalinco | 2 |
| | | narrow | | | | | | Braeburn,<br>La Flamboyante | 3 |
| | | narrow to medium | | | | | | Dalili, Dalinbel, Elstar, Topaz | 4 |
| | | medium | | | | | | Cripps Red, Nicoter, Pinova, Santana | 5 |
| | | medium to broad | | | | | | Cripps Pink, Jonagold, Rubinola, Zari | 6 |
| | | broad | | | | | | Jonagored, Rubinstep | 7 |
| | | broad to very broad | | | | | | Pomforyou | 8 |
| | | very broad | | | | | | Charlotte, Northpole | 9 |

| | | English | français | deutsch | español | Example Varieties<br>Exemples<br>Beispielssorten<br>Variedades ejemplo | Note/<br>Nota |
|---|---|---|---|---|---|---|---|
| **9.** | **(*)** | **QN MG/VG** | **(+) (c)** | **75/77** | | | |
| | | **Leaf blade: ratio length/width** | | | | | |
| | | very low | | | | | 1 |
| | | very low to low | | | | Reanda | 2 |
| | | low | | | | Goldstar | 3 |
| | | low to medium | | | | Bay 3484, Rubinola | 4 |
| | | medium | | | | Cripps Pink, Rafzubin, Santana | 5 |
| | | medium to high | | | | Braeburn, Cripps Red, Elstar, Pinova | 6 |
| | | high | | | | Fiesta, Minnewashta | 7 |
| | | high to very high | | | | Civni, Monidel | 8 |
| | | very high | | | | Dalinco, Telamon | 9 |
| **10** | | **QN MG/VG** | **(c)** | **75/77** | | | |
| | | **(Proposal to change wording and add states of ex.) Leaf blade: intensity of color** | | | | | |
| | | light green | | | | | 1 |
| | | light to medium green | | | | Maribelle | 2 |
| | | medium green | | | | Civni, Cripps Pink, Ecolette | 3 |
| | | medium to dark green | | | | Braeburn, Karmijn de Sonnaville, La Flamboyante, Pomforyou | 4 |
| | | dark green | | | | | 5 |
| | | light purple red | | | | | 6 |
| | | medium purple red | | | | | 7 |
| | | dark purple red | | | | Luresweet | 8 |
| **11** | | **QN VG** | **(c)** | **75/77** | | | |
| | | **Leaf blade: glossiness** | | | | | |
| | | absent or weak | | | | Blahova Libovice, Solaris | 1 |
| | | medium | | | | Elstar, Falstaff | 2 |
| | | strong | | | | Elise, Fresco, Idared | 3 |

| | | English | français | deutsch | español | Example Varieties<br>Exemples<br>Beispielssorten<br>Variedades ejemplo | Note/<br>Nota |
|---|---|---|---|---|---|---|---|
| **12** | **(*)** | **QN VG** | **(+) (c)** | **75/77** | | | |
| | | **Leaf blade: incisions of margin** | | | | | |
| | | crenate | | | | Braeburn, Pinova, Santana | 1 |
| | | crenate to serrate | | | | Ecolette, Elstar, Tenroy | 2 |
| | | serrate | | | | Fuji, Jonagold, Mutsu | 3 |
| **13** | | **PQ VG** | **(+) (c)** | **65** | | | |
| | | **Leaf blade: shape in cross section** | | | | | |
| | | v-shaped | | | | Frureru | 1 |
| | | concave | | | | Alkmene, Clivia, Gloster, Piros | 2 |
| | | flat with raised margins | | | | Rambour d'Hiver | 3 |
| | | flat | | | | Bittenfelder Sämling, Minnewashta | 4 |
| | | convex | | | | Collina, Vicking | 5 |
| **14** | **(*)** | **QN MG/VG** | **(+) (c)** | **65** | | | |
| | | **Petiole: length** | | | | | |
| | | very short | | | | | 1 |
| | | very short to short | | | | Jonagold | 2 |
| | | short | | | | Delgollune, Jonagored | 3 |
| | | short to medium | | | | Bay 3484, Dalinbel | 4 |
| | | medium | | | | Cripps Pink, Ecolette, Nicoter, Pinova, Topaz | 5 |
| | | medium to long | | | | Civni, Cripps Red, Elstar | 6 |
| | | long | | | | Resista | 7 |
| | | high to very long | | | | Pomforyou, Trajan | 8 |
| | | very long | | | | Northpole, Pompink | 9 |
| **15** | | **QN MG/VG** | **(+)** | | | | |
| | | **Leaf: ratio length of leaf blade / length of petiole** | | | | | |
| | | very low | | | | | 1 |
| | | low | | | | | 2 |
| | | medium | | | | | 3 |
| | | high | | | | | 4 |
| | | very high | | | | | 5 |

| | | English | français | deutsch | español | Example Varieties<br>Exemples<br>Beispielssorten<br>Variedades ejemplo | Note/<br>Nota |
|---|---|---|---|---|---|---|---|
| **16** | | **QN VG** | **(c)** | **74** | | | |
| | | **Petiole: extension of anthocyanin coloration from base** | | | | | |
| | | very small | | | | Befresh | 1 |
| | | small | | | | Civni, Cripps Red, Jonagold | 2 |
| | | medium | | | | Braeburn, Dalinbel, Pilot | 3 |
| | | large | | | | Pomforyou, Scired | 4 |
| | | very large | | | | Bay 3484 | 5 |
| **17** | **(*)** | **QN MG/VG** | **(+) (d)** | **87** | | | |
| | | **Flower: diameter** | | | | | |
| | | very small | | | | Spätblühender Taffetapfel | 1 |
| | | small | | | | Pia, Pingo | 2 |
| | | medium | | | | Civni, Elstar, Pinova | 3 |
| | | large | | | | Delcorf, Rafzubin, Zari | 4 |
| | | very large | | | | Astramel | 5 |
| **18** | | **QN VG** | **(+) (d)** | **87** | | | |
| | | **Flower: position of stigmas relative to anthers** | | | | | |
| | | below | | | | Bay 3484, Braeburn, Pomforyou, Topaz | 1 |
| | | same level | | | | Cripps Pink, Ecolette, Pinova, Santana | 2 |
| | | above | | | | Civni, Elstar, Nicoter, Rafzubin | 3 |
| **19** | | **QN VG** | **(+) (d)** | **87** | | | |
| | | **Flower: intensity of anthocyanin coloration at base of filament** | | | | | |
| | | absent or light | | | | Golden Noble | 1 |
| | | light to medium | | | | Devil Gala | 2 |
| | | medium | | | | Elshof | 3 |
| | | medium to dark | | | | | 4 |
| | | dark | | | | Lurefresh | 5 |

| | | English | français | deutsch | español | Example Varieties<br>Exemples<br>Beispielssorten<br>Variedades ejemplo | Note/<br>Nota |
|---|---|---|---|---|---|---|---|
| **20** | **(*)** | **QN VG** | **(+) (d)** | **87** | | | |
| | | **Flower: arrangement of petals** | | | | | |
| | | free | | | | Braeburn, Nicoter, Scifresh | 1 |
| | | intermediate | | | | Civni, Elstar, Pinova, Topaz | 2 |
| | | overlapping | | | | Cripps Red, Pomforyou, Šampion | 3 |
| **21** | | **QN VG** | **(e)** | **87** | | | |
| | | **Young fruit: extent of anthocyanin over color** | | | | | |
| | | absent or very small | | | | Norhey | 1 |
| | | very small to small | | | | Nicogreen | 2 |
| | | small | | | | Cripps Pink, Delcorf, Nicoter | 3 |
| | | small to medium | | | | Braeburn, Tenroy, Topaz | 4 |
| | | medium | | | | Elstar, Golden Delicious | 5 |
| | | medium to large | | | | Pinova, Solaris | 6 |
| | | large | | | | Delblush, Rafzubin | 7 |
| | | large to very large | | | | Jolana | 8 |
| | | very large | | | | Bay 3484, Luregust | 9 |
| **22** | **(*)** | **QN MG/VG** | **(f)** | **87** | | | |
| | | **(Propose to reword; and to delete explanation; exam. varieties need being checked) Fruit: weight** | | | | | |
| | | very light | | | | Api Noir | 1 |
| | | very light to light | | | | Norhey | 2 |
| | | light | | | | Heco, Trajan | 3 |
| | | light to medium | | | | Bay 3484, Pomforyou | 4 |
| | | medium | | | | Cripps Pink, Elstar, Pinova, Topaz | 5 |
| | | heavy | | | | Golden Delicious, Santana | 6 |
| | | medium to heavy | | | | Jonagold, Nicoter | 7 |
| | | heavy to very heavy | | | | Nicogreen | 8 |
| | | very heavy | | | | Howgate Wonder, Pisaxa | 9 |

| | | English | | français | | deutsch | español | Example Varieties<br>Exemples<br>Beispielssorten<br>Variedades ejemplo | Note/<br>Nota |
|---|---|---|---|---|---|---|---|---|---|
| **23** | **(*)** | **QN** | **MG/VG** | **(+)** | **(f)** | **87** | | | |
| | | **Fruit: height** | | | | | | | |
| | | very short | | | | | | Norhey | 1 |
| | | very short to short | | | | | | Heco | 2 |
| | | short | | | | | | Trajan | 3 |
| | | short to medium | | | | | | Elstar, Pomforyou, Topaz | 4 |
| | | medium | | | | | | Bay 3484,<br>La Flamboyante, Santana | 5 |
| | | medium to tall | | | | | | Cripps Pink, Pinova,<br>Šampion | 6 |
| | | tall | | | | | | Golden Delicious,<br>Jonagold | 7 |
| | | tall to very tall | | | | | | Pisaxa | 8 |
| | | very tall | | | | | | Befresh | 9 |
| **24** | **(*)** | **QN** | **MG/VG** | **(+)** | **(f)** | **87** | | | |
| | | **Fruit: diameter** | | | | | | | |
| | | very small | | | | | | Nela, Scarlet Surprise,<br>Summerred | 1 |
| | | very small to small | | | | | | Heco | 2 |
| | | small | | | | | | | 3 |
| | | small to medium | | | | | | Cox's Orange Pippin,<br>Cripps Pink, Dalili,<br>Pomforyou | 4 |
| | | medium | | | | | | Elstar, Pinova, Topaz | 5 |
| | | medium to large | | | | | | Braeburn, Nicoter | 6 |
| | | large | | | | | | Dalinbel, Jonagold | 7 |
| | | large to very large | | | | | | Befresh, Ontario | 8 |
| | | very large | | | | | | Bramley's Seedling | 9 |

| | | English | français | deutsch | español | Example Varieties<br>Exemples<br>Beispielssorten<br>Variedades ejemplo | Note/<br>Nota |
|---|---|---|---|---|---|---|---|
| **25** | **(*)** | **QN MG/VG** | **(+) (f)** | **87** | | | |
| | | **Fruit: ratio height/diameter** | | | | | |
| | | very low | | | | | 1 |
| | | very low to low | | | | Brettacher, Ingol | 2 |
| | | low | | | | Auralia, Harmensz | 3 |
| | | low to medium | | | | Dalinbel, Elstar,<br>Karmijn de Sonnaville | 4 |
| | | medium | | | | Ecolette, Fuji BC,<br>Pomforyou, Santana | 5 |
| | | medium to high | | | | Civni, Jonagold, Rafzubin | 6 |
| | | high | | | | Braeburn,<br>Golden Delicious, Pinova | 7 |
| | | high to very high | | | | Cripps Pink, Dalili | 8 |
| | | very high | | | | Rewena, Saturn | 9 |
| **26** | **(*)** | **PQ VG** | **(+) (f)** | **87** | | | |
| | | **Fruit: shape** | | | | | |
| | | conical waisted | | | | Gloster, Redkan | 1 |
| | | conical | | | | Civni, Elstar, Nicoter,<br>Pinova, Rafzubin | 2 |
| | | flat globose conical | | | | Melrose | 3 |
| | | ovate | | | | Cripps Pink, Delcorf | 4 |
| | | square | | | | Bonita | 5 |
| | | oblong | | | | Čadel , Renora | 6 |
| | | elliptic | | | | Fuji BC, Minnewashta | 7 |
| | | circular | | | | Dalinbel, Rubinola, Topaz | 8 |
| | | oblate | | | | Bramley's Seedling, Lipno | 9 |
| | | obconical | | | | Empire | 10 |
| **27** | | **QN VG** | **(f)** | **87** | | | |
| | | **Fruit: ribbing** | | | | | |
| | | absent or weak | | | | Elstar, Harmensz, Pinova,<br>Scifresh, SQ 159 | 1 |
| | | moderate | | | | Cripps Pink, Dalili, Pilot,<br>Santana | 2 |
| | | strong | | | | Redkan | 3 |

| | | English | | français | | deutsch | español | Example Varieties<br>Exemples<br>Beispielssorten<br>Variedades ejemplo | Note/<br>Nota |
|---|---|---|---|---|---|---|---|---|---|
| **28** | | **QN** | **VG** | | **(f)** | **87** | | | |
| | | **Fruit: crowning at calyx end** | | | | | | | |
| | | absent or weak | | | | | | Elstar, Fresco, Heco, Schone van Boskoop | 1 |
| | | medium | | | | | | Luregust, Pinova, Santana, Scifresh, Topaz | 2 |
| | | strong | | | | | | Redkan | 3 |
| **29** | **(*)** | **PQ** | **VG** | | **(f)** | **87** | | | |
| | | **Fruit: ground color** | | | | | | | |
| | | not visible | | | | | | Bay 3484, Lurefresh, Luregust, Red Jonaprince | 1 |
| | | whitish yellow | | | | | | Heco | 2 |
| | | yellow | | | | | | Rea Gold, Scifresh, Solaris | 3 |
| | | whitish green | | | | | | Fuji BC, MC 38, Pomforyou, Pompink | 4 |
| | | yellow green | | | | | | Jonagold, Pia, Suntan | 5 |
| | | green | | | | | | Canada gris, Granny Smith, Ontario, Tuscan | 6 |
| **30** | **(*)** | **PQ** | **VG** | **(+)** | **(f)** | **87** | | | |
| | | **Fruit: hue of over color** | | | | | | | |
| | | orange red | | | | | | Goldstar, Rea Gold, Solaris | 1 |
| | | pink red | | | | | | Cripps Pink, Delorgue | 2 |
| | | red | | | | | | Pinova, Prima, Red Elstar, Tenroy | 3 |
| | | purple red | | | | | | Bay 3484, Luresweet, MC 38, Spartan | 4 |
| | | brown red | | | | | | Braeburn, Fiesta, Fresco, Fuji BC, Suntan | 5 |

| | | English | français | deutsch | español | Example Varieties<br>Exemples<br>Beispielssorten<br>Variedades ejemplo | Note/<br>Nota |
|---|---|---|---|---|---|---|---|
| **31** | **(*)** | **QN VG** | **(+) (f)** | **87** | | | |
| | | **Fruit: intensity of over color** | | | | | |
| | | very light | | | | Alexis | 1 |
| | | very light to light | | | | Golden Delicious, Solaris | 2 |
| | | light | | | | Tenroy, Tuscan | 3 |
| | | light to medium | | | | Elstar, Monidel, Rafzubin | 4 |
| | | medium | | | | Cripps Pink, Pia, Pilot, Remo | 5 |
| | | medium to dark | | | | Fiesta, James Grieve, Jonagold, Suntan | 6 |
| | | dark | | | | Elise, Jonagored, Lurefresh, Scired | 7 |
| | | dark to very dark | | | | Bay 3484, Obelisk, Red Jonaprince, Redkan | 8 |
| | | very dark | | | | B 8 A 3-323, CIVG 198 | 9 |
| **32** | **(*)** | **QN VG** | **(f)** | **87** | | | |
| | | **Fruit: relative area of over color** | | | | | |
| | | absent or very small | | | | Granny Smith, Tuscan | 1 |
| | | very small to small | | | | Golden Delicious | 2 |
| | | small | | | | Auralia, Cox's Orange Pippin, Goldstar, Solaris | 3 |
| | | small to medium | | | | Charlotte, Schone van Boskoop | 4 |
| | | medium | | | | Dalili, Elstar, Minnewashta, Rea Gold | 5 |
| | | medium to large | | | | Heco, Pia, Rafzubin | 6 |
| | | large | | | | Fiesta, Santana, Suntan, Tenroy | 7 |
| | | large to very large | | | | Mars, Rosy Glow, SQ 159 | 8 |
| | | very large | | | | Bay 3484, MC 38, Red Jonaprince, Redkan | 9 |

| | | English | | français | | deutsch | español | Example Varieties<br>Exemples<br>Beispielssorten<br>Variedades ejemplo | Note/<br>Nota |
|---|---|---|---|---|---|---|---|---|---|
| **33** | **(*)** | **PQ** | **VG** | **(+)** | **(f)** | **87** | | | |
| | | **Fruit: pattern of over color** | | | | | | | |
| | | only solid flush | | | | | | Bay 3484,<br>Red Jonaprince, Telamon | 1 |
| | | solid flush with stripes | | | | | | Bruggers Festivale, Charlotte, Cripps Pink, Dalili,<br>James Grieve Esselborn, Pingo | 2 |
| | | only stripes (no flush) | | | | | | Dülmener Rosenapfel | 3 |
| | | flushed and mottled | | | | | | Dalinbel, Scifresh | 4 |
| | | flushed, striped and mottled | | | | | | Elstar, Pinova, Rafzubin, Topaz | 5 |
| | | marbled | | | | | | Karneval | 6 |
| **34** | | **QN** | **VG** | | | **87** | | | |
| | | **Fruit: conspicuousness of stripes** | | | | | | | |
| | | absent or weak | | | | | | | 1 |
| | | medium | | | | | | | 2 |
| | | strong | | | | | | | 3 |
| **35** | **(*)** | **QN** | **VG** | | **(f)** | **87** | | | |
| | | **Fruit: area of russet around stalk attachment** | | | | | | | |
| | | absent or small | | | | | | Dalili, Jonagold, Pinova, Tuscan | 1 |
| | | medium | | | | | | Charlotte, Nela, Pilot, Prima | 2 |
| | | large | | | | | | Elstar, Holsteiner Cox, Schone van Boskoop, Suntan | 3 |
| **36** | | **QN** | **VG** | | **(f)** | **87** | | | |
| | | **Fruit: area of russet on cheeks** | | | | | | | |
| | | absent or small | | | | | | Gala, Jonagold, Monidel, Obelisk, Pia, Pilot | 1 |
| | | medium | | | | | | Lurefresh,<br>Schone van Boskoop, Suntan | 2 |
| | | large | | | | | | Canada gris,<br>Egremont Russet, Zabergäurenette | 3 |

| | | English | | français | | deutsch | español | Example Varieties<br>Exemples<br>Beispielssorten<br>Variedades ejemplo | Note/<br>Nota |
|---|---|---|---|---|---|---|---|---|---|
| **37** | **(*)** | **QN** | **VG** | | **(f)** | **87** | | | |
| | | **Fruit: area of russet around eye basin** | | | | | | | |
| | | absent or small | | | | | | Gala, Jonagold, Pinova, Prima | 1 |
| | | medium | | | | | | Elstar, Holsteiner Cox | 2 |
| | | large | | | | | | Egremont Russet, Fresco, Schone van Boskoop, Suntan | 3 |
| **38** | | **QN** | **MG/VG** | **(+)** | **(f)** | **87** | | | |
| | | **Fruit: number of lenticels** | | | | | | | |
| | | very few | | | | | | | 1 |
| | | few | | | | | | Coxcolumnar, Rewena | 2 |
| | | medium | | | | | | Elstar, Pia, Pinova, Redkan, Tenroy | 3 |
| | | many | | | | | | Dalili, Honeycrisp, Jonagored, Scifresh | 4 |
| | | very many | | | | | | Hidden Rose | 5 |
| **39** | **(*)** | **QN** | **MG/VG** | **(+)** | **(f)** | **87** | | | |
| | | **Fruit: length of stalk** | | | | | | | |
| | | very short | | | | | | | 1 |
| | | short | | | | | | Holsteiner Cox, Minnewashta, Telamon, Trajan, Tuscan | 2 |
| | | medium | | | | | | Bay 3484, Lurefresh, Nicoter | 3 |
| | | long | | | | | | Elise, Pinova, Rafzubin, Tenroy | 4 |
| | | very long | | | | | | Rewena | 5 |
| **40** | **(*)** | **QN** | **MG/VG** | **(+)** | **(f)** | **87** | | | |
| | | **Fruit: depth of stalk cavity** | | | | | | | |
| | | very shallow | | | | | | | 1 |
| | | shallow | | | | | | Pomfit, Pompink, Rafzubin, Suntan, Trajan | 2 |
| | | medium | | | | | | Dalili, Elstar, Fiesta, Topaz | 3 |
| | | deep | | | | | | Jonagold, MC 38, Rosy Glow | 4 |
| | | very deep | | | | | | | 5 |

| | | English | français | deutsch | español | Example Varieties<br>Exemples<br>Beispielssorten<br>Variedades ejemplo | Note/<br>Nota |
|---|---|---|---|---|---|---|---|
| **41** | | **QN VG** | | | | | |
| | | **Fruit: calyx eye** | | | | | |
| | | closed | | | | | 1 |
| | | partially open | | | | | 2 |
| | | fully open | | | | | 3 |
| **42** | **(*)** | **QN MG/VG** | **(+) (f)** | **87** | | | |
| | | **Fruit: depth of eye basin** | | | | | |
| | | very shallow | | | | | 1 |
| | | shallow | | | | Braeburn, Lurefresh | 2 |
| | | medium | | | | Obelisk, Pinova, Scifresh, Topaz | 3 |
| | | deep | | | | Dalili, Elstar, Jonagold | 4 |
| | | very deep | | | | MC 38 | 5 |
| **43** | **(*)** | **QN MG/VG** | **(+) (f)** | **87** | | | |
| | | **Fruit: width of eye basin** | | | | | |
| | | very narrow | | | | | 1 |
| | | narrow | | | | SQ 159 | 2 |
| | | medium | | | | Braeburn, Elstar, Minnewashta, Pia, Tenroy | 3 |
| | | broad | | | | Bruggers Festivale, Dalili, Dalinbel, Obelisk | 4 |
| | | very broad | | | | Solaris | 5 |
| **44** | **(*)** | **QN MG/VG** | **(+) (f)** | **89** | | | |
| | | **Fruit: firmness of flesh** | | | | | |
| | | very soft | | | | Transparent de Croncels | 1 |
| | | soft | | | | Bay 3484, Pia, Pingo, Piros, Tuscan | 2 |
| | | medium | | | | Obelisk, Red Fuji, Santana,<br>Schone van Boskoop, Topaz | 3 |
| | | firm | | | | Braeburn, Pilot | 4 |
| | | very firm | | | | LB 4852 | 5 |

| | | English | français | deutsch | español | Example Varieties<br>Exemples<br>Beispielssorten<br>Variedades ejemplo | Note/<br>Nota |
|---|---|---|---|---|---|---|---|
| **45** | **(*)** | **PQ VG** | **(f)** | **89** | | | |
| | | **(New state of expr. added) Fruit: color of flesh** | | | | | |
| | | white | | | | Akane, Minnewashta, Pia, Spartan | 1 |
| | | yellowish white | | | | Elstar, Jonagold, Pinova, Rafzubin | 2 |
| | | yellowish | | | | Coxcolumnar, Pisaxa, Topaz, Zari | 3 |
| | | orange | | | | | 4 |
| | | greenish | | | | Angold, Gloster, Granny Smith, Northpole, Telamon | 5 |
| | | pinkish | | | | Pomfit | 6 |
| | | reddish | | | | Bay 3484, Baya Marisa, Lureprec | 7 |
| | | bicolored | | | | | 8 |
| **46** | | **QN VG** | **(+)** | **89** | | | |
| | | **(Reworded) Only varieties with Fruit color of flesh pinkish or reddish or bicolored: Flesh color: extent** | | | | | |
| | | very small | | | | | 1 |
| | | small | | | | | 2 |
| | | medium | | | | Bay 3484 | 3 |
| | | large | | | | | 4 |
| | | very large | | | | Luregust | 5 |
| **47** | **(*)** | **PQ VG** | **(+)** | | | | |
| | | **Only varieties with Fruit color of flesh pink or red: Flesh color: distribution** | | | | | |
| | | predominantly under skin | | | | | 1 |
| | | predominantly around core | | | | | 2 |
| | | radial | | | | | 3 |
| | | mottled | | | | | 4 |
| | | entire | | | | | 5 |

| | | English | français | deutsch | español | Example Varieties<br>Exemples<br>Beispielssorten<br>Variedades ejemplo | Note/<br>Nota |
|---|---|---|---|---|---|---|---|
| **48** | **(*)** | **QN MG/VG** | **(+)** | **61** | | | |
| | | **Time of beginning of flowering** | | | | | |
| | | very early | | | | Anna, Ein-Shemer | 1 |
| | | very early to early | | | | Egremont Russet, Nela | 2 |
| | | early | | | | Idared, Minnewashta, Prima | 3 |
| | | early to medium | | | | Dalili, James Grieve, Pomforyou | 4 |
| | | medium | | | | Elstar, Jonagold, Pinova, Rafzubin, Santana | 5 |
| | | medium to late | | | | Elise, Gala, Redkan | 6 |
| | | late | | | | Obelisk, Pia, Saturn, Suntan | 7 |
| | | late to very late | | | | Delorina | 8 |
| | | very late | | | | Spätblühender Taffetapfel | 9 |
| **49** | **(*)** | **QN MG/VG** | **(+)** | | | | |
| | | **Time for harvest** | | | | | |
| | | very early | | | | | 1 |
| | | very early to early | | | | | 2 |
| | | early | | | | | 3 |
| | | early to medium | | | | | 4 |
| | | medium | | | | | 5 |
| | | medium to late | | | | | 6 |
| | | late | | | | | 7 |
| | | late to very late | | | | | 8 |
| | | very late | | | | | 9 |

| | | English | | français | | deutsch | español | Example Varieties<br>Exemples<br>Beispielssorten<br>Variedades ejemplo | Note/<br>Nota |
|---|---|---|---|---|---|---|---|---|---|
| **50** | **(*)** | **QN** | **MG/VG** | | | **89** | | | |
| | | **Time of eating maturity** | | | | | | | |
| | | very early | | | | | | Astramel, Vista Bella | 1 |
| | | very early to early | | | | | | Beauty of Bath,<br>White Transparent | 2 |
| | | early | | | | | | Discovery, Jerseymac,<br>Nela | 3 |
| | | early to medium | | | | | | Akane, Dalili,<br>James Grieve, Pia,<br>Summerred | 4 |
| | | medium | | | | | | Bay 3484, Elstar,<br>Rubinola, Santana | 5 |
| | | medium to late | | | | | | Fiesta, Jonagold,<br>Rafzubin, Topaz | 6 |
| | | late | | | | | | Ecolette,<br>Golden Delicious,<br>Renora, Rewena | 7 |
| | | late to very late | | | | | | Braeburn, Fuji, MC 38,<br>Pilot, Suntan | 8 |
| | | very late | | | | | | Cripps Pink,<br>Granny Smith | 9 |

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) Observations should be made on bare trees in winter, after at least one significant production of fruit.

(b) Observations on one-year-old shoots should be made on lateral dormant shoots in winter, on trees that have completed at least one growing season.

(c) Observations should be made on fully developed leaves from the middle third of vigorous vegetative current season shoot

(d) Observations should be made on second or subsequent flowers, at the start of anther dehiscence.

(e) Observations should be made 40 days after flowering.

(f) Observations on the fruit should be made on fruits when they are eating ripe.

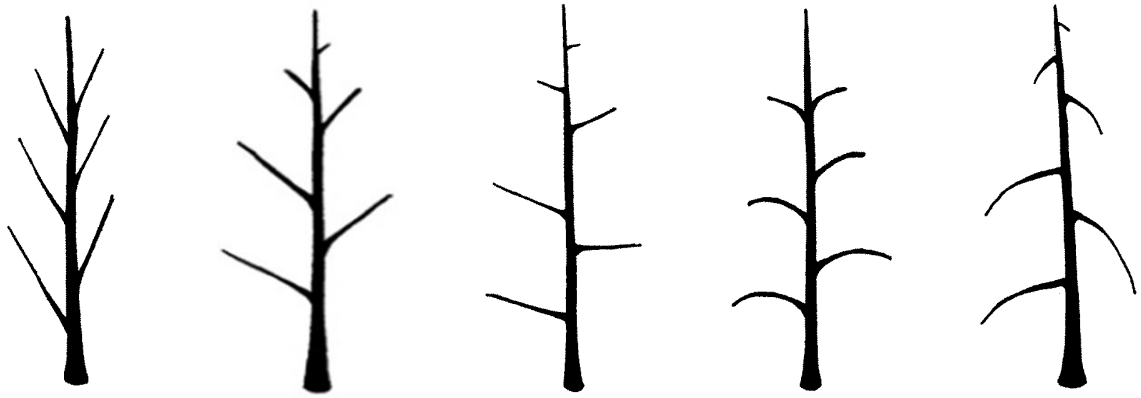
*8.2 Explanations for individual characteristics*

Ad. 1: Tree: vigor

The vigor of the tree should be considered as the overall abundance of vegetative growth, after at least 1 significant production of fruit.

Ad. 3: (to consider to delete) Only varieties with Tree type: ramified: Tree: habit

The habit of the tree should be assessed in dormant period, after at least one sufficient fruit production.



| 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|
| upright | upright to spreading | spreading | drooping | weeping |

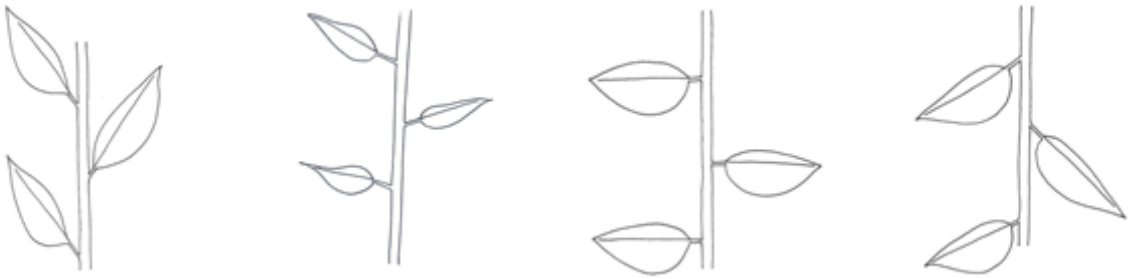
Ad. 4: One-year-old shoot: length of internode

The length of the internode should be observed in the middle third of the shoot. Measurements can be made using a vernier caliper gauge.

Ad. 5: One-year-old shoot: number of lenticels

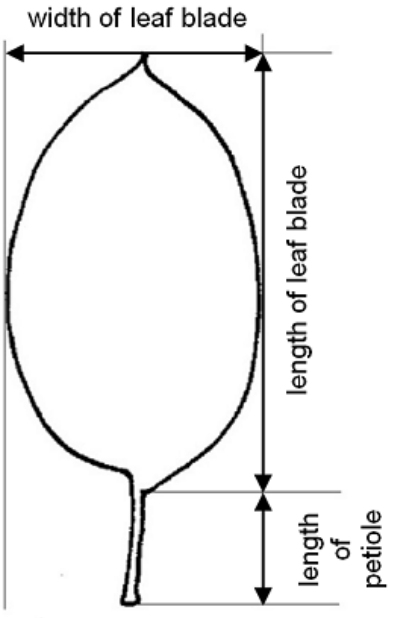
The nimber of lenticels should be assessed at midlength of the shoot, by counting (in a defined area [e.g. a shoot length of 1 cm]) or by visual assessment of the density of lenticels on the bark.

Ad. 6: Leaf blade: attitude in relation to shoot



| 1 | 2 | 3 | 4 |
|---|---|---|---|
| upwards | upwards to outwards | outwards | downwards |

Ad. 7: Leaf blade: length




Ad. 8: Leaf blade: width

See Ad. 7

Ad. 9: Leaf blade: ratio length/width

See Ad. 7

Ad. 12: Leaf blade: incisions of margin

The predominant type of incision at distal half should be observed.

| 1 | 2 | 3 |
|---|---|---|
| crenate | crenate to serrate | serrate |

Ad. 13: Leaf blade: shape in cross section

1
v-shaped

2
concave

3
flat with raised margins

4
flat

5
convex

Ad. 14: Petiole: length

See Ad. 7

Ad. 15: Leaf: ratio length of leaf blade / length of petiole

See Ad. 7

Ad. 17: Flower: diameter

The diameter of the flower should be assessed with petals pressed into horizontal position.

Ad. 18: Flower: position of stigmas relative to anthers

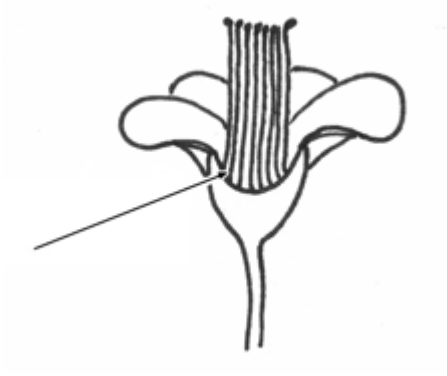
1
below

2
same level

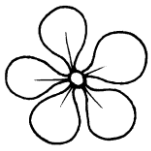
3
above

Ad. 19: Flower: intensity of anthocyanin coloration at base of filament

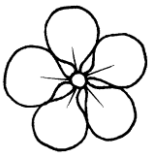
The anthocyanin coloration at the base of filament should be observed just after petal drop.



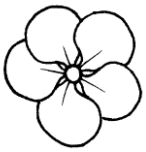
Ad. 20: Flower: arrangement of petals



1
free



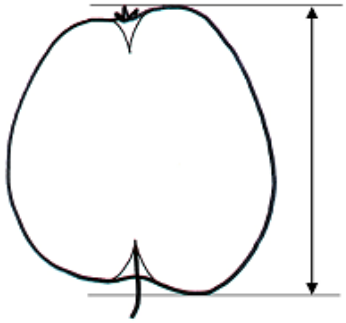
2
intermediate



3
overlapping

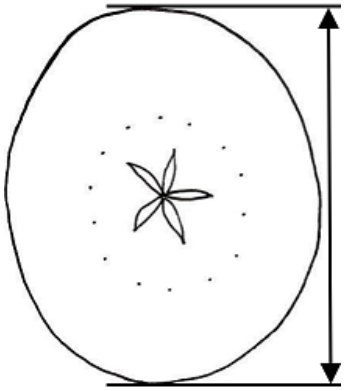
Ad. 23: Fruit: height

The maximum height should be observed.



Ad. 24: Fruit: diameter

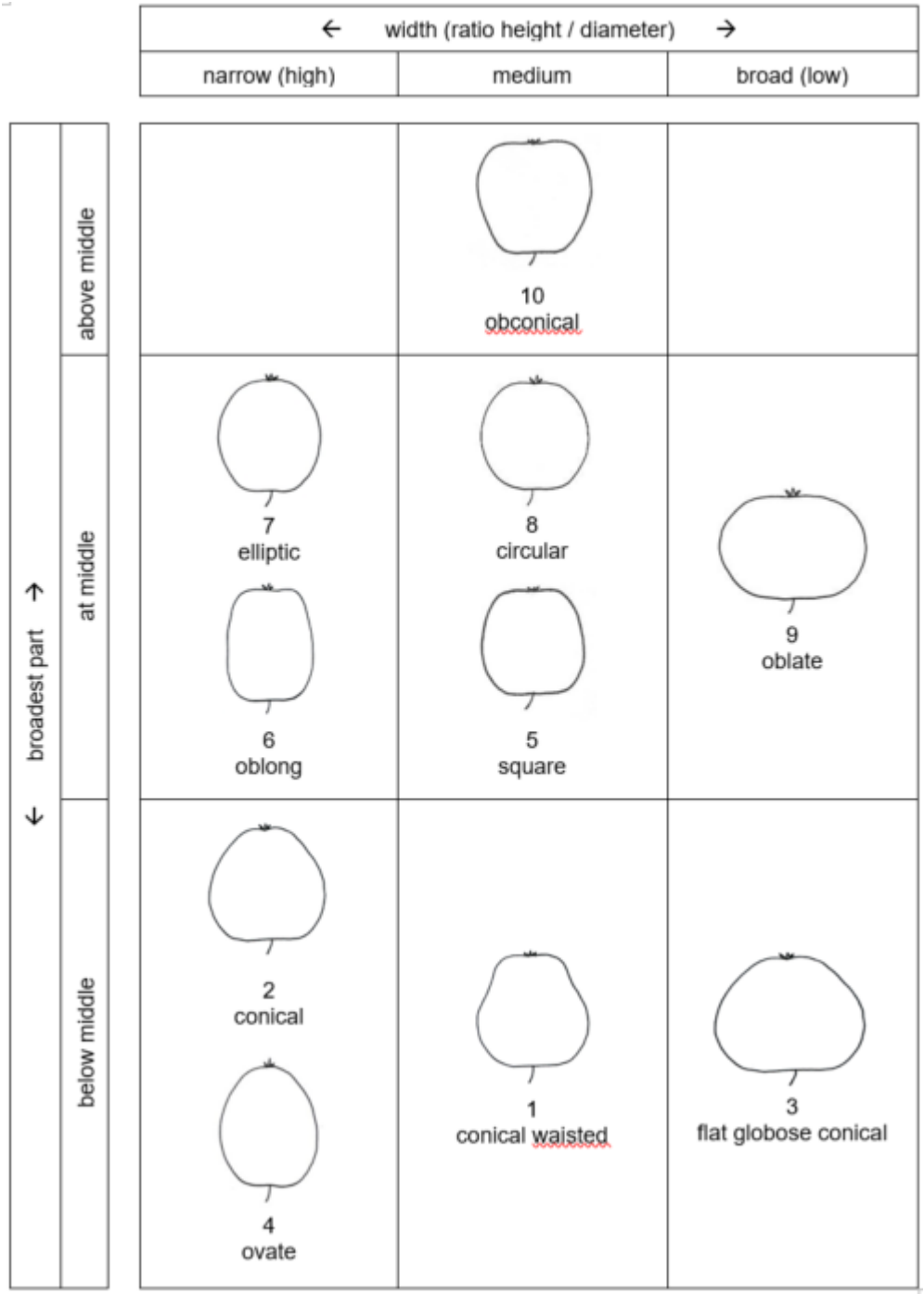
The maximum diameter should be observed.



Ad. 25: Fruit: ratio height/diameter

A ratio in the middle of the possible range represents states 1, 3, 6, 9 or 11; values smaller than the middle would result in notes 4 or 10; values larger than the middle would be notes 2, 5, 7 or 8.

Ad. 26: Fruit: shape




Ad. 30: Fruit: hue of over color

The over color should be observed after removing bloom.

## Ad. 31: Fruit: intensity of over color

(to be updated)

| | ← Ad. 45: Fruit: intensity of over color → | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | very light | very light to light | light | light to medium | medium | medium to dark | dark | dark to very dark | very dark |
| orange red | | | Egremont Russet, Scigold, Sirprize | | Cox's Orange Pippin, Reine des Reinettes | | | | |
| pink red | | | Lady Williams | | Cripps Pink | | Delorgue | | |
| red | | | Winter Banana | | Gala | | Akane, Galaxy, Red Elstar, Regal Prince | | |
| purple red | | | | | | | Red Jona-prince, Spartan | | |
| brown red | | | Sturmer Pippin | | Fiesta | | Lord Burgley, Joburn | | |

## Ad. 33: Fruit: pattern of over color

1
only solid flush

2
solid flush with stripes

3
only stripes (no flush)

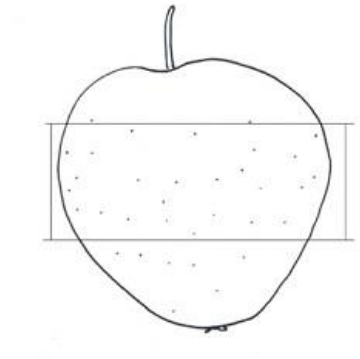
4
flushed and mottled

5
flushed, striped and mottled

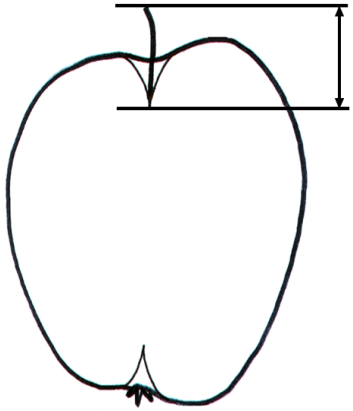
6
marbled

Ad. 38: Fruit: number of lenticels

The number of lenticels should be assessed at midlength of the fruit, by counting (in a defined area [e.g. a window of 1 cm²] or by visual assessment of the density of lenticels on the skin.

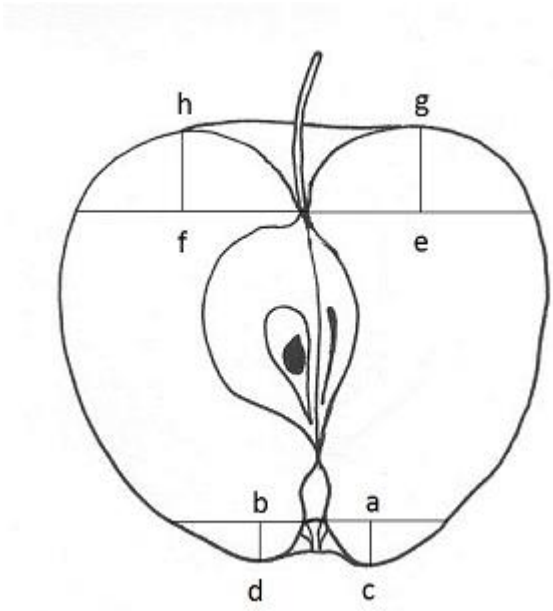


Ad. 39: Fruit: length of stalk



Ad. 40: Fruit: depth of stalk cavity

Fruits should be cut through the central axis as accurately as possible. Stalk cavity and eye basin depth and width should be measured from the sectioned fruits. The following diagram indicates the position of lines scored, using a knife or scalpel, on the fruit prior to measuring these characteristics.
• The lines a-b and e-f must be at right angles to the axis of the fruit. (A plastic protractor can be used to ensure accuracy.)
• The line a-b is marked at the base of the sepals.
• The line e-f is marked at the insertion of the stalk.
• The lines a-c and b-d indicate the eye basin depth. They are drawn at right angles to the line a-b to the point where the basin curve levels out.
• The lines e-g and f-h indicate the stalk cavity depth. They are drawn at right angles to the line e-f to the point where the stalk cavity curve levels out.
• In the case of asymmetric or irregular sections, the larger side should be considered (i.e. in case of depths of stalk cavity: e-g instead of f-h; in case of depth of eye basin: b-d instead of a-c).




f-h = depth of stalk cavity (characteristic 40)
a-c = depth of eye basin (characteristic 42)
a-b = width of eye basin (characteristic 43)

Ad. 42: Fruit: depth of eye basin

See Ad. 40.

Ad. 43: Fruit: width of eye basin

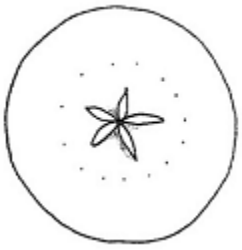
See Ad. 40.

Ad. 44: Fruit: firmness of flesh

Firmness of flesh should be assessed at time of ripeness for eating. It can be measured using a penetrometer.

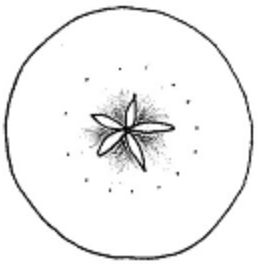
Ad. 46: (Reworded) Only varieties with Fruit color of flesh pinkish or reddish or bicolored: Flesh color: extent

to be provided



1
very small

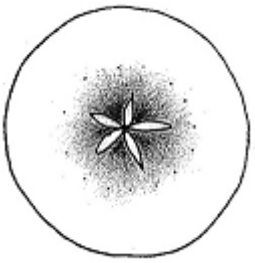
2
small



3
medium

to be provided

4
large

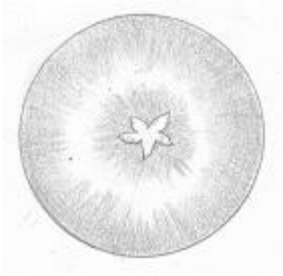


5
very large

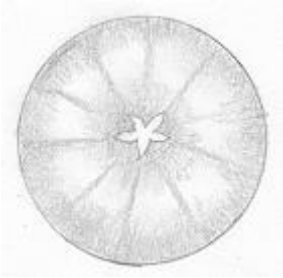
Ad. 47: Only varieties with Fruit color of flesh pink or red: Flesh color: distribution

To be observed in cross section.

1
predominantly under skin

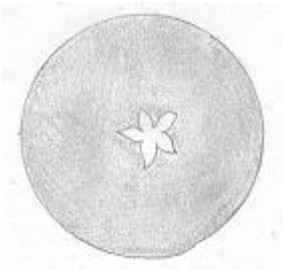


2
predominantly around core



3
radial

4
mottled



5
entire

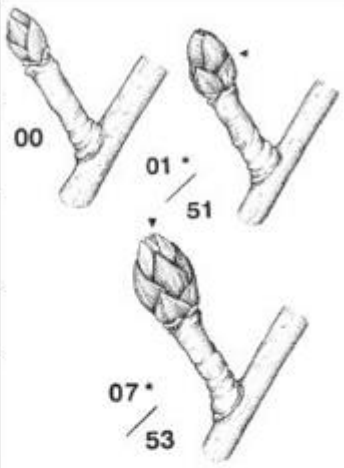
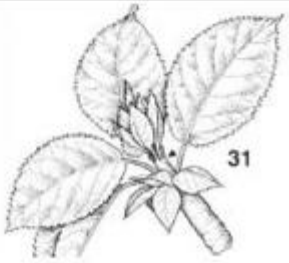
Ad. 48: Time of beginning of flowering

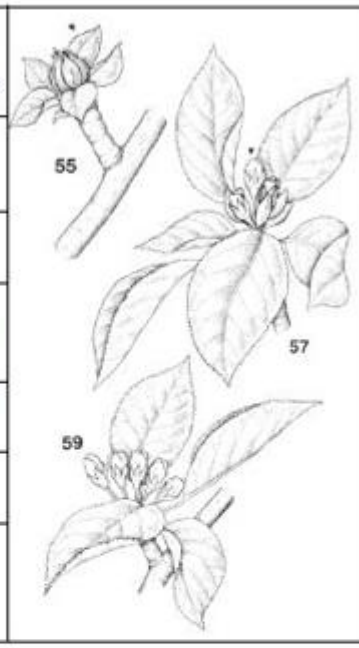
The time of beginning of flowering is when 10% of the flowers are fully open.

Ad. 49: Time for harvest

The time for harvest should be assessed as time when fruits are picking ripe and can most easily be picked from the trees. As this physiological stage of the fruit is characterized by a degression of starch content in the flesh, the time for harvest can also be assessed by measuring the starch content: the fruit is picking ripe when its starch content has reached 50% of its original value.

*8.3* **BBCH-Scale for the description of the phenological growth stages of pome fruit**

| Stage | Explanation | |
|---|---|---|
| **Principal growth stage 0: Bud development** | | |
| 00 | Dormancy: leaf buds and the thicker inflorescence buds closed and covered by dark brown scales |   |
| 01 | Beginning of bud swelling (leaf buds); buds visibly swollen, bud scales elongated, with light colored patches | |
| 03 | End of leaf bud swelling: bud scales light colored with some parts densely covered by hairs | |
| 07 | Beginning of bud break: first green leaf tips just visible | |
| 09 | Green leaf tips about 5 mm above bud scales | |
| **Principal growth stage 1: Leaf development** | | |
| 10 | Green leaf tips 10 mm above the bud scales; first leaves separating (mouse-ear stage) |   |
| 11 | First leaves unfolded (others still unfolding) | |
| 15 | More leaves unfolded, not yet at full size | |
| 19 | First leaves fully expanded | |
| **Principal growth stage 2: (not applicable)** | | |
| **Principal growth stage 3: Shoot development**[4] [4] From terminal buds | | |
| 31 | Beginning of shoot growth: axes of developing shoots visible |   |
| 32 | Shoots about 20 % of final length | |
| 39 | Shoots about 90 % of final length | |

| | | |
|---|---|---|
| **Principal growth stage 4: Development of stolons and young plants (not applicable)** | | |
| **Principal growth stage 5: Inflorescence emergence** | | |
| 51 | Inflorescence buds swelling: Inflorescence buds swelling: bud scales elongated, with light buds closed, light brown scales colored patches visible |  |
| 52 | End of bud swelling: light colored bud scales visible with parts densely covered by hairs | |
| 53 | Bud burst: green leaf tips enclosing flowers visible | |
| 54 | Mouse-ear stage: green leaf tips 10 mm above bud scales; first leaves separating Flower buds visible (still closed) | |
| 56 | Green bud stage: single flowers separating (still closed) | |
| 57 | Red bud stage: flower petals elongating; sepals slightly open; petals just visible | |
| 59 | Most flowers with petals forming a hollow ball | |
| **Principal growth stage 6: Flowering** | | |
| 60 | First flowers open |  |
| 61 | Beginning of flowering: about 10 % of flowers open | |
| 65 | Full flowering: at least 50 % of flowers open, first petals falling | |
| 67 | Flowers fading: majority of Flowers fading: majority of petals fallen | |
| 69 | End of flowering: all petals fallen | |

| | | |
|---|---|---|
| **Principal growth stage 7: Development of fruit** | | |
| 71 | Fruit size up to 10 mm; fruit fall after flowering |  75 |
| 72 | Fruit size up to 20 mm | |
| 73 | Second fruit fall | |
| 74 | Fruit diameter up to 40 mm; fruit erect (T-stage: underside of fruit and stalk forming a T) | |
| 75 | Fruit about half final size | |
| 77 | Fruit about 70 % of final size | |
| **Principal growth stage 8: Maturity of fruit and seed** | | |
| 81 | Beginning of ripening: lightening of cultivar-specific fruit color | (no drawing) |
| 85 | Advanced ripening: increase in intensity of cultivar-specific color | |
| 87 | Fruit ripe for picking | |
| 89 | Fruit ripe for consumption: fruit have typical taste and firmness | |
| **Principal growth stage 9: Senescence, beginning of dormancy** | | |
| 91 | Shoot growth completed; terminal bud developed; foliage still fully green | (no drawing) |
| 92 | Leaves begin to discolor | |
| 93 | Beginning of leaf fall | |
| 97 | All leaves fallen | |
| 99 | Harvested product | |

| **Example varieties** | **Synonyms** |
|---|---|
| Api Noir | Schwarzer Noir |
| Auralia | Tumanga |
| Canada gris | Kanadarenette; Reinette de Caen |
| Cox's Orange Pippin | Cox Orangenrenette |
| Gloster | Gloster 69 |
| Golden Delicious | Gelber Köstlicher |
| Golden Noble | Gelber Edelapfel |
| Ingrid Marie | Hoed Orange |
| Rambour d'Hiver | Rheinischer Winterrambur |
| Teser | TSR 29 |
| Transparente de Croncels | Yellow Transparent |
| Šampion | Shampion |
| Schone van Boskoop | Belle de Boskoop; Schöner aus Boskoop |
| White Transparent | Papirovka, Transparente Jaune, Weißer |

## 9. Literature

Aeppli, A., Gremminger, U., Rapillard, Ch., Röthlisberger, K., 1983: “100 Obstsorten”, Verlag Landwirtschaftliche Lehrmittelzentrale Zollikofen, CH

Aomori-ken, 1977: “The report on the characterization and classification of apple varieties,” Aomori-ken, JP

Baldini, E., Sansavini, S., 1967: “Monografia delle principale cultivar di melo,” Istituto di coltivazioni arboree dell’Università di Bologna, IT

Bergamini, A., Faedi, W. 1983 and 1985: “Monografia di cultivar di melo”, Volumes I + II, Ministero Agricoltura e Foreste, Roma, IT

Brozik, S., Regius J., 1957: “Termeszett gyumolcsfajtaink Almastermesuek. Alma Fruit varieties Apple,” Mezogazdasagi Kiado, Budapest, HU

Bultitude, J., 1983: “A Guide to the Identification of International Varieties,” Macmillan Reference Books, Macmillan Press, London, GB

Dvorak, A., et al., 1956: “Jablka (Apple),” Academia Praha, CZ

Fischer, M., 1995: “Farbatlas Obstsorten,” Eugen Ulmer Verlag, Stuttgart, DE

Fleckinger, J., 1948: "Les stades végétatives des arbres frutiers, en rapport avec les traitements." Pomology Français 1948, supplements 81-93, FR

Khanizadeh, S. and Cousineau, J., 1998: “Our Apples – Les Pommiers de chez nous”, Agriculture and Agri-Food Canada, St.-Jean-sur Richelieu, Quebec, CA

Kessler, H., 1948: “Apfelsorten der Schweiz”, Verlag Verbandsdruckerei AG Bern, CH

Krümmel, H., Groh W., Friedrich, G., 1956: “Deutsche Obstsorten”, Deutscher Bauernverlag, Berlin, DE

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

Morgan, J., Richards, A., 2002: “The Book of Apples,” Ebury Press, London, GB

Nilsson, Anton, 1987: “Vara applesorter” Allmanna Forlaget AB, Stockholm SE

Petzold, H., 1990: “Apfelsorten”, Verlag Neumann, Leipzig, Radebeul, DE

Silbereisen, R., 1980: “Apfelsorten” 2nd. ed., Verlag Eugen Ulmer, Stuttgart, DE

Smith, M.W.G., 1971: “National Apple Register of the United Kingdom,” Ministry of Agriculture, Fisheries & Food, London, GB

Toth, G. M., 2001: “Gyumolcseszet” Primom, Nyiregyhaza, HU

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 | *Malus domestica* Borkh. |
| 1.2 | Common name | Apple |

2. Applicant

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

3. Proposed denomination and breeder's reference

| | |
|---|---|
| Proposed denomination (if available) | |
| Breeder's reference | |

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

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

4.1 Breeding scheme

Variety resulting from:

4.1.1 Crossing

(a) controlled cross [ ]

(please state parent 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: |
|---|---|---|

4.2 Method of propagating the variety

4.2.1 Vegetative propagation

(a) Budding or grafting [ ]
(b) Other (state method) [ ]

4.2.2 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 (2)** | **Tree: type** | | |
| | columnar | MacExcel, Wijcik | 1 [ ] |
| | ramified | Elstar, Golden Delicious | 2 [ ] |
| **5.2 (3)** | **(to consider to delete) Only varieties with Tree type: ramified: Tree: habit** | | |
| | upright | Alkmene, Fresco, Solaris | 1 [ ] |
| | upright to spreading | Akane, Arkcharm, Harmensz, Katrina, Reka | 2 [ ] |
| | spreading | Pinova, Redkan, Topaz | 3 [ ] |
| | drooping | Idared, James Grieve, Pivita | 4 [ ] |
| | weeping | Gerlinde, Nield's Drooper | 5 [ ] |
| **5.3 (26)** | **Fruit: shape** | | |
| | conical waisted | Gloster, Redkan | 1 [ ] |
| | conical | Civni, Elstar, Nicoter, Pinova, Rafzubin | 2 [ ] |
| | flat globose conical | Melrose | 3 [ ] |
| | ovate | Cripps Pink, Delcorf | 4 [ ] |
| | square | Bonita | 5 [ ] |
| | oblong | Renora, Čadel | 6 [ ] |
| | elliptic | Fuji BC, Minnewashta | 7 [ ] |
| | circular | Dalinbel, Rubinola, Topaz | 8 [ ] |
| | oblate | Bramley's Seedling, Lipno | 9 [ ] |
| | obconical | Empire | 10 [ ] |
| **5.4 (30)** | **Fruit: hue of over color** | | |
| | orange red | Goldstar, Rea Gold, Solaris | 1 [ ] |
| | pink red | Cripps Pink, Delorgue | 2 [ ] |
| | red | Pinova, Prima, Red Elstar, Tenroy | 3 [ ] |
| | purple red | Bay 3484, Luresweet, MC 38, Spartan | 4 [ ] |
| | brown red | Braeburn, Fiesta, Fresco, Fuji BC, Suntan | 5 [ ] |

| | Characteristics | Example Varieties | Note |
|---|---|---|---|
| **5.5 (32)** | **Fruit: relative area of over color** | | |
| | absent or very small | Granny Smith, Tuscan | 1 [ ] |
| | very small to small | Golden Delicious | 2 [ ] |
| | small | Auralia, Cox's Orange Pippin, Goldstar, Solaris | 3 [ ] |
| | small to medium | Charlotte, Schone van Boskoop | 4 [ ] |
| | medium | Dalili, Elstar, Minnewashta, Rea Gold | 5 [ ] |
| | medium to large | Heco, Pia, Rafzubin | 6 [ ] |
| | large | Fiesta, Santana, Suntan, Tenroy | 7 [ ] |
| | large to very large | Mars, Rosy Glow, SQ 159 | 8 [ ] |
| | very large | Bay 3484, MC 38, Red Jonaprince, Redkan | 9 [ ] |
| **5.6 (33)** | **Fruit: pattern of over color** | | |
| | only solid flush | Bay 3484, Red Jonaprince, Telamon | 1 [ ] |
| | solid flush with stripes | Bruggers Festivale, Charlotte, Cripps Pink, Dalili, James Grieve Esselborn, Pingo | 2 [ ] |
| | only stripes (no flush) | Dülmener Rosenapfel | 3 [ ] |
| | flushed and mottled | Dalinbel, Scifresh | 4 [ ] |
| | flushed, striped and mottled | Elstar, Pinova, Rafzubin, Topaz | 5 [ ] |
| | marbled | Karneval | 6 [ ] |
| **5.7 (48)** | **Time of beginning of flowering** | | |
| | very early | Anna, Ein-Shemer | 1 [ ] |
| | very early to early | Egremont Russet, Nela | 2 [ ] |
| | early | Idared, Minnewashta, Prima | 3 [ ] |
| | early to medium | Dalili, James Grieve, Pomforyou | 4 [ ] |
| | medium | Elstar, Jonagold, Pinova, Rafzubin, Santana | 5 [ ] |
| | medium to late | Elise, Gala, Redkan | 6 [ ] |
| | late | Obelisk, Pia, Saturn, Suntan | 7 [ ] |
| | late to very late | Delorina | 8 [ ] |
| | very late | Spätblühender Taffetapfel | 9 [ ] |

| | Characteristics | Example Varieties | Note |
|---|---|---|---|
| **5.8 (49)** | **Time for harvest** | | |
| | very early | | 1 [ ] |
| | very early to early | | 2 [ ] |
| | early | | 3 [ ] |
| | early to medium | | 4 [ ] |
| | medium | | 5 [ ] |
| | medium to late | | 6 [ ] |
| | late | | 7 [ ] |
| | late to very late | | 8 [ ] |
| | very late | | 9 [ ] |
| **5.9 (50)** | **Time of eating maturity** | | |
| | very early | Astramel, Vista Bella | 1 [ ] |
| | very early to early | Beauty of Bath, White Transparent | 2 [ ] |
| | early | Discovery, Jerseymac, Nela | 3 [ ] |
| | early to medium | Akane, Dalili, James Grieve, Pia, Summerred | 4 [ ] |
| | medium | Bay 3484, Elstar, Rubinola, Santana | 5 [ ] |
| | medium to late | Fiesta, Jonagold, Rafzubin, Topaz | 6 [ ] |
| | late | Ecolette, Golden Delicious, Renora, Rewena | 7 [ ] |
| | late to very late | Braeburn, Fuji, MC 38, Pilot, Suntan | 8 [ ] |
| | very late | Cripps Pink, Granny Smith | 9 [ ] |

| 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* | *One-year-old shoot: number of lenticels* | *few* | *many* |
| | | | |
| | | | |
| | | | |

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

A representative color photograph of the variety displaying its main distinguishing feature(s), should accompany the Technical Questionnaire. The photograph will provide a visual illustration of the candidate variety which supplements the information provided in the Technical Questionnaire.

The key points to consider when taking a photograph of the candidate variety are:

- Indication of the date and geographic location
- Correct labeling (breeder's reference)
- Good quality printed photograph (minimum 10 cm x 15 cm) and/or sufficient resolution electronic format version (minimum 960 x 1280 pixels)"

Further guidance on providing photographs with the Technical Questionnaire is available in document TGP/7 "Development of Test Guidelines", Guidance Note 35 (http://www.upov.int/tgp/en/).

[The link provided may be deleted by members of the Union when developing authorities' own test guidelines.]

In case of a mutant varieties, (a) characteristic(s) should be indicted in which the candidate variety differs from the variety it has originated from, or from any other mutant variety of same origin, if not provided already under 6.

| Denomination(s) of variety(ies) similar to your candidate variety | Characteristic(s) in which your candidate variety differs | Describe the expression of the characteristic(s) for the **similar** variety(ies) | Describe the expression of the characteristic(s) for **your** candiate variety |
|---|---|---|---|
| | | | |
| | | | |

# 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]