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TG/14/10(proj.7)
ORIGINAL: English
DATE: 2023-05-17

INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

Geneva

DRAFT

APPLE

UPOV Code(s): MALUS_DOM

Malus domestica (Suckow) 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-fourth session, to be held in Nîmes, France,
from 2023-07-03 to 2023-07-07

Disclaimer: this document does not represent UPOV policies or guidance

Alternative names:*

Botanical name	*English*	*French*	*German*	*Spanish*
Malus domestica (Suckow) Borkh.	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 Apple Rootstocks
TG/192 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.]

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1. Subject of these Test Guidelines

These Test Guidelines apply to all varieties of *Malus domestica* (Suckow) Borkh. except for varieties used only as rootstock varieties (see TG/163) or only as ornamental varieties (see TG/192).

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 the dormany period, followed by bud burst (flowering and/or vegetative), flowering and fruit harvest and concluding when the following dormant period starts.

3.1.6 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

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.

For varieties resulting from crossing, in the case of parts of the tree, the number to be taken from each of the trees should be 2.

For varieties obtained from mutation, in the case of parts of the tree, the number to be taken from each of the trees should be 1.

4.1.5 Method of Observation

The recommended method of observing the characteristic for the purposes of distinctness is indicated by the following key in the Table of Characteristics (see document TGP/9 “Examining Distinctness”, Section 4 “Observation of characteristics”):

MG: single measurement of a group of plants or parts of plants
MS: measurement of a number of individual plants or parts of plants
VG: visual assessment by a single observation of a group of plants or parts of plants

VS: visual assessment by observation of individual plants or parts of plants

Type of observation: visual (V) or measurement (M)

"Visual" observation (V) is an observation made on the basis of the expert's judgment. For the purposes of this document, "visual" observation refers to the sensory observations of the experts and, therefore, also includes smell, taste and touch. Visual observation includes observations where the expert uses reference points (e.g. diagrams, example varieties, side-by-side comparison) or non-linear charts (e.g. color charts). Measurement (M) is an objective observation against a calibrated, linear scale e.g. using a ruler, weighing scales, colorimeter, dates, counts, etc.

Type of record: for a group of plants (G) or for single, individual plants (S)

For the purposes of distinctness, observations may be recorded as a single record for a group of plants or parts of plants (G), or may be recorded as records for a number of single, individual plants or parts of plants (S). In most cases, "G" provides a single record per variety and it is not possible or necessary to apply statistical methods in a plant-by-plant analysis for the assessment of distinctness.

In cases where more than one method of observing the characteristic is indicated in the Table of Characteristics (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 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) 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) Fruit: main color of flesh (characteristic 45)
(h) Time of beginning of flowering (characteristic 49)
(i) Time of eating maturity (characteristic 51)

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

1 Characteristic number

2 (*) Asterisked characteristic – see Chapter 6.1.2

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

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

5 (+) See Explanations on the Table of Characteristics in Chapter 8.2

6 (a)-(g) 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 Exemples Beispielssorten Variedades ejemplo	Note/ Nota
1.		**QN MG/VG**	**(+)**	**99**			
		Tree: vigor					
		very weak				Grenadier, 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, Cripps Pink	8
		very strong				Gloster, Ingrid Marie	9
2.	**(*)**	**QL VG**	**(+) (a)**	**99**			
		Tree: type					
		columnar				MacExcel, Wijcik	1
		ramified				Elstar, Golden Delicious	2
3.	**(*)**	**PQ VG**	**(+) (a)**	**99**			
		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

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
4.	**(*)**	**QN MG/VG**	**(+) (b)**	**99**			
		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)**	**99**			
		One-year-old shoot: number of lenticels					
		few				Alkmene, Bramley's Seedling	1
		medium				Cox's Orange Pippin	2
		many				Mutsu, SQ 159	3
6.	**(*)**	**QN VG**	**(+) (c)**	**71-77**			
		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 Exemples Beispielssorten Variedades ejemplo	Note/ Nota
7.	**(*)**	**QN MG/VG**	**(+) (c)**	**71-77**			
		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)**	**71-77**			
		Leaf blade: width					
		very narrow				Coxdwarf	1
		very narrow to narrow				Cox La Vera, Dalinco	2
		narrow				Braeburn, 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 Exemples Beispielssorten Variedades ejemplo	Note/ Nota
9.	**(*)**	**QN MG/VG**	**(+) (c)**	**71-77**			
		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.		**PQ VG**	**(c)**	**71-77**			
		Leaf blade: 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, R201	8
11.		**QN VG**	**(c)**	**71-77**			
		Leaf blade: glossiness					
		absent or weak				Blahova Libovice, Solaris	1
		medium				Elstar, Falstaff	2
		strong				Elise, Fresco, Idared	3
12.	**(*)**	**QN VG**	**(+) (c)**	**71-77**			
		Leaf blade: incisions of margin					
		crenate				Braeburn, Pinova, Santana	1
		crenate to serrate				Ecolette, Elstar, Tenroy	2
		serrate				Fuji, Jonagold, Mutsu	3

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
13.	**PQ VG**	**(+) (c)**	**71-77**			
	Leaf blade: shape in cross-section					
	v-shaped				Frureru	1
	concave				Alkmene, Clivia, Gloster, Piros	2
	flat with reflexed margins				Rambour d'Hiver	3
	flat				Bittenfelder Sämling, Minnewashta	4
	convex				Collina, Vicking	5
14. **(*)**	**QN MG/VG**	**(+) (c)**	**71-77**			
	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
	long to very long				Pomforyou, Trajan	8
	very long				Northpole, Pompink	9
15.	**QN MG/VG**	**(+) (c)**	**71-77**			
	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 Exemples Beispielssorten Variedades ejemplo	Note/ Nota
16.		**QN**	**VG**		**(c)**	**71-77**			
		Petiole: extent of anthocyanin coloration from base							
		absent or 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)**	**60-65**			
		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)**	**60-65**			
		Flower: arrangement of petals							
		free						Braeburn, Nicoter, Scifresh	1
		intermediate						Civni, Elstar, Pinova, Topaz	2
		overlapping						Cripps Red, Pomforyou, Šampion	3
19.		**QN**	**VG**	**(+)**	**(d)**	**60-65**			
		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

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
20.		**QN VG**	**(+) (d)**	**65-69**			
		Flower: anthocyanin coloration at base of filament					
		absent or very weak				Braeburn, Cripps Pink, Karneval, Minnewashta	1
		weak				Bruggers Festivale, Dalinbel, Red Jonaprince	2
		medium				Elstar	3
		strong				Weirouge	4
		very strong				Luregust	5
21.		**QN VG**		**73-74**			
		Young fruit: relative area of 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**		**(e)**	**89**		
		Fruit: weight					
		very low				Api Noir	1
		very low to low				Norhey	2
		low				Heco, Trajan	3
		low to medium				Bay 3484, Pomforyou	4
		medium				Cripps Pink, Elstar, Pinova, Topaz	5
		medium to high				Golden Delicious, Santana	6
		high				Jonagold, Nicoter	7
		high to very high				Nicogreen	8
		very high				Howgate Wonder, Pisaxa	9

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
23.	**(*)**	**QN MG/VG**	**(+) (e)**	**89**			
		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, La Flamboyante, Santana	5
		medium to tall				Cripps Pink, Pinova, Šampion	6
		tall				Golden Delicious, Jonagold	7
		tall to very tall				Pisaxa	8
		very tall				Befresh	9
24.	**(*)**	**QN MG/VG**	**(+) (e)**	**89**			
		Fruit: diameter					
		very small				Nela, Scarlet Surprise, Summerred	1
		very small to small				Heco	2
		small					3
		small to medium				Cox's Orange Pippin, Cripps Pink, Dalili, 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 Exemples Beispielssorten Variedades ejemplo	Note/ Nota
25.	**(*)**	**QN MG/VG**	**(e)**	**89**			
		Fruit: ratio height/diameter					
		very low					1
		very low to low				Brettacher, Ingol	2
		low				Auralia, Harmensz	3
		low to medium				Dalinbel, Elstar, Karmijn de Sonnaville	4
		medium				Ecolette, Fuji BC, Pomforyou, Santana	5
		medium to high				Civni, Jonagold, Rafzubin	6
		high				Braeburn, Golden Delicious, Pinova	7
		high to very high				Cripps Pink, Dalili	8
		very high				Rewena, Saturn	9
26.	**(*)**	**PQ VG**	**(+)** **(e)**	**89**			
		Fruit: shape					
		flat globose conic				Melrose	1
		oblate				Bramley's Seedling, Lipno	2
		circular				Dalinbel, Rubinola, Topaz	3
		elliptic				Fuji BC, Minnewashta	4
		square				Bonita	5
		oblong				Čadel , Renora	6
		ovate				Cripps Pink, Delcorf	7
		conic				Civni, Elstar, Nicoter, Pinova, Rafzubin	8
		conic waisted				Gloster, Redkan	9
		obconic				Empire	10
27.		**QN VG**	**(e)**	**89**			
		Fruit: ribbing					
		absent or weak				Elstar, Harmensz, Pinova, Scifresh, SQ 159	1
		medium				Cripps Pink, Dalili, Pilot, Santana	2
		strong				Redkan	3

		English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
28.		**QN**	**VG**		**(e)**	**89**			
		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**	**(+)**	**(e)**	**89**			
		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**	**(+)**	**(e), (f)**	**89**			
		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 Exemples Beispielssorten Variedades ejemplo	Note/ Nota
31.	**(*)**	**QN VG**	**(e), (f)**	**89**			
		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**	**(e), (f)**	**89**			
		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 Exemples Beispielssorten Variedades ejemplo	Note/ Nota
33.	**(*)**	**PQ VG**	**(+)**	**(e), (f)**	**89**		
		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				Dülmener Rosenapfel	3
		flushed and mottled				Dalinbel, Scifresh	4
		flushed, striped and mottled				Elstar, Pinova, Rafzubin, Topaz	5
		marbled				Karneval	6
34.		**QN VG**		**(e)**	**89**		
		Fruit: conspicuousness of stripes					
		absent or weak				Eden	1
		medium				Tenroy	2
		strong				Caudle	3
35.	**(*)**	**QN VG**	**(+)**	**(e)**	**89**		
		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**	**(+)**	**(e)**	**89**		
		Fruit: area of russet on cheeks					
		absent or small				Gala, Jonagold, Monidel, Obelisk, Pia, Pilot	1
		medium				Lurefresh, Schone van Boskoop, Suntan	2
		large				Canada gris, Egremont Russet, Zabergäurenette	3

		English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
37.	**(*)**	**QN**	**VG**	**(+)**	**(e)**	**89**			
		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**	**(+)**	**(e)**	**89**			
		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**	**(+)**	**(e)**	**89**			
		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**	**(+)**	**(e)**	**89**			
		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 Exemples Beispielssorten Variedades ejemplo	Note/ Nota
41.		**QN**	**VG**		**(e)**	**89**			
		Fruit: calyx eye							
		closed							1
		partially open							2
		fully open							3
42.	**(*)**	**QN**	**MG/VG**	**(+)**	**(e)**	**89**			
		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**	**(+)**	**(e)**	**89**			
		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**	**(+)**	**(e)**	**89**			
		Fruit: firmness of flesh							
		very soft						Transparent de Croncels	1
		soft						Bay 3484, Pia, Pingo, Piros, Tuscan	2
		medium						Obelisk, Red Fuji, Santana, Schone van Boskoop, Topaz	3
		firm						Braeburn, Pilot	4
		very firm						LB 4852	5

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
45.	**(*)**	**PQ VG**	**(+) (e)**	**89**			
		Fruit: main color of flesh					
		white				Akane, Minnewashta, Pia, Spartan	1
		greenish				Angold, Gloster, Granny Smith, Northpole, Telamon	2
		yellowish white				Elstar, Jonagold, Pinova, Rafzubin	3
		yellowish				Coxcolumnar, Pisaxa, Topaz, Zari	4
		orangish				Ladina, Transcendent Crab	5
		pinkish				Pomfit	6
		reddish				Bay 3484, Lureprec	7
46.	**(*)**	**PQ VG**	**(+) (e)**	**89**			
		Fruit: secondary color of flesh					
		none				Gloster, Pinova, Zari	1
		white				Luresweet, Pomfital 1	2
		greenish					3
		yellowish white				Bay 4584, Lureprec, Weirouge	4
		yellowish				Y101	5
		orangish					6
		pinkish				Tiara, Y102	7
		reddish					8
47.		**QN VG**	**(+) (e)**	**89**			
		Fruit: extent of secondary color					
		very small					1
		small					2
		medium				Bay 3484, Y102	3
		large					4
		very large				Luregust	5

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
48.	**(*)**	**PQ VG**	**(+) (e)**	**89**			
		Flesh color: distribution of pinkish or reddish coloration					
		none				Gloster, Pinova, Zari	1
		under skin only				Pomfit, Y102	2
		around core only				R 201	3
		under skin and around core				Lureprec	4
		throughout				Y101	5
49.	**(*)**	**QN MG/VG**	**(+)**	**61**			
		Time of beginning of flowering					
		very early				Anna, Ein-Shemer	1
		very early to early				Collina, Delblush, Pompink	2
		early				Astramel, Civni, Idared, Topaz	3
		early to medium				Cripps Red, Dalili, James Grieve, Jonagored	4
		medium				Braeburn, Rafzubin, Tenroy, White Transparent, Zari	5
		medium to late				Elise, Gala, Granny Smith, Sansa	6
		late				Golden Delicious, Karmijn de Sonnaville, Reine de Reinettes, Sirprize	7
		late to very late				Delorina, Suntan	8
		very late				Spätblühender Taffetapfel	9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
50.	**QN MG/VG**	**(+)**	**87**			
	Time for harvest					
	extremely early				Astramel, Collina, White Transparent	1
	extremely early to very early				Piros	2
	very early				Arkcharm, Lena, Minnewashta, Nela	3
	very early to early				Bruggers Festivale, Coxcolumnar, Dalili	4
	early				Akane, Delorgue, James Grieve, Monidel, Sansa	5
	early to medium				Gerlinde, Prima, Santana, Zari	6
	medium				Bay 3484, Fiesta, Rubinola	7
	medium to late				Civni, Elstar, Karmijn de Sonnaville, Saturn, Suntan, Tenroy	8
	late				Jonagold, Pomforyou, Redkan, Sirprize, Telamon	9
	late to very late				Florina, Golden Delicious, La Flamboyante, Pinova, Pompink, Topaz	10
	very late				Delblush, Delgollune, Fuji BC, Mutsu, Nicoter	11
	very late to extremely late				Braeburn, Fuji	12
	extremely late				Cripps Pink, Cripps Red, Granny Smith, Iduna	13

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
51. (*)	**QN MG/VG**	**(+)**	**89**			
	Time of eating maturity					
	extremely early				Samo	1
	extremely early to very early				Astramel, Julia	2
	very early				Discovery, Helios, Nela	3
	very early to early				Bruggers Festivale, Minnewashta	4
	early				Alkmene, Gravensteiner, James Grieve, Transparent de Croncels	5
	early to medium				Santana	6
	medium				Elstar, Gala, Holsteiner Cox, Reine de Reinettes	7
	medium to late				Honeycrisp, Karneval, Rubinstep	8
	late				Golden Delicious, Jonagold, Pinova, Topaz	9
	late to very late				Nicoter, Pilot, Scifresh, Solaris	10
	very late				Braeburn, Florina	11
	very late to extremely late				Elise	12
	extremely late				Cripps Pink, Granny Smith	13

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 satisfactory crop of fruit.

(b) Observations 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 (growth stage 39).

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

(e) Observations should be made on fruits when they are ripe for eating.

(f) The over color is considered a second color such as a flush which develops over time, covering the ground color of the fruit.

(g) Observations should be made on fruits when they are eating ripe.

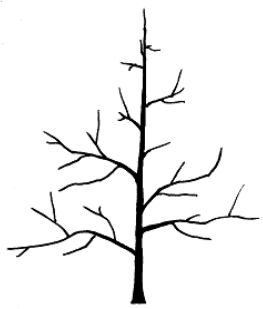
8.2 Explanations for individual characteristics

Ad. 1: Tree: vigor

The vigor of the tree should be considered as the overall abundance of vegetative growth, after at least one significant production of fruit. It can either be assessed at the peak of vegetative growth in summer (growth stage 39), or during the dormant season before pruning (stage 00), considering shoot length and thickness, and trunk diameter.

Ad. 2: Tree: type

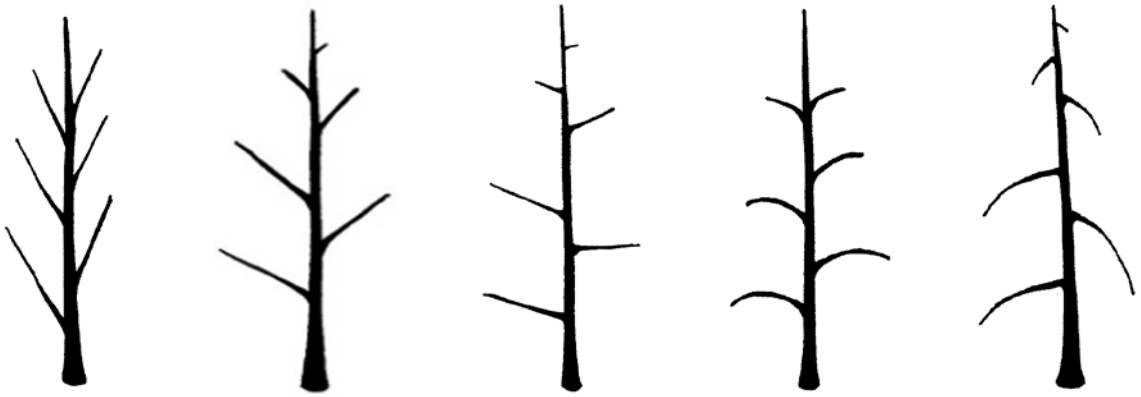
1
columnar



2
ramified

Ad. 3: 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

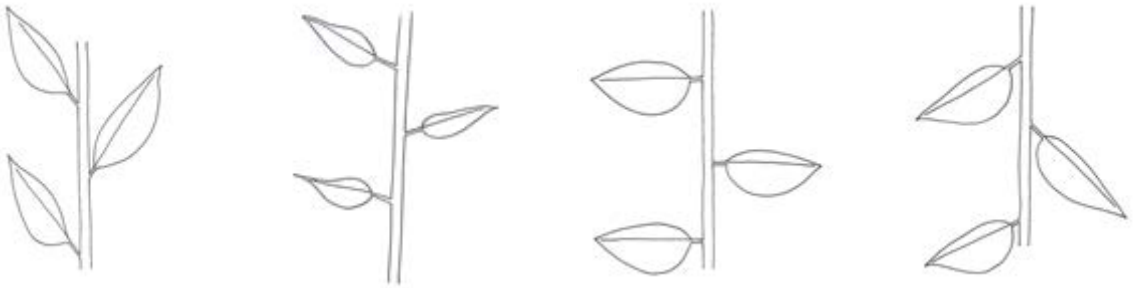
Ad. 4: One-year-old shoot: length of internode

Observations should be made 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

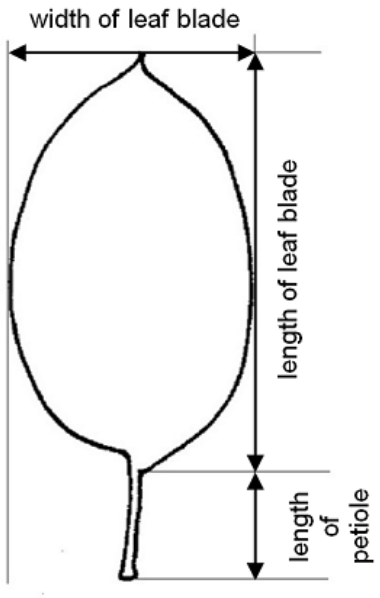
Observations should be made in the middle third of the shoot, by counting in a defined area or by visual assessment of the density of lenticels on the bark.

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
crenate

2
crenate to serrate

3
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

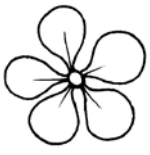
Ad. 15: Leaf: ratio length of leaf blade / length of petiole

See Ad. 7

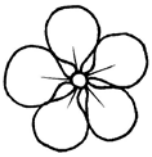
Ad. 17: Flower: diameter

Observations should be made with petals pressed into a horizontal position.

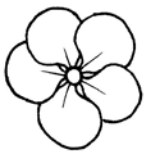
Ad. 18: Flower: arrangement of petals



1
free



2
intermediate



3
overlapping

Ad. 19: Flower: position of stigmas relative to anthers

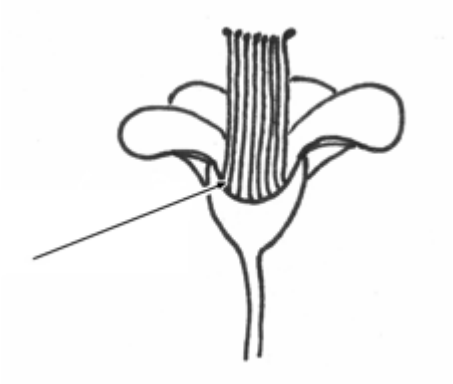
1
below

2
same level

3
above

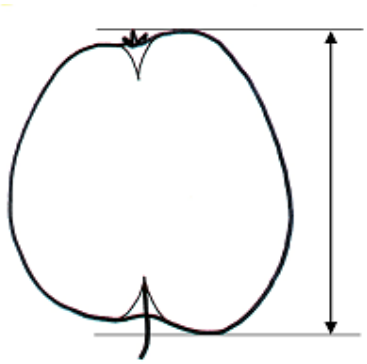
Ad. 20: Flower: anthocyanin coloration at base of filament

Observations should be made just after petal drop.



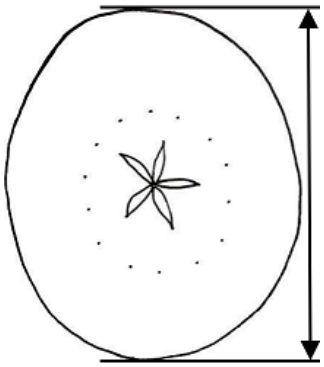
Ad. 23: Fruit: height

The maximum height should be observed.



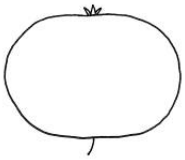
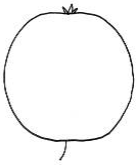
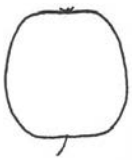
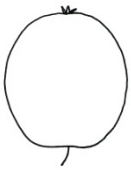
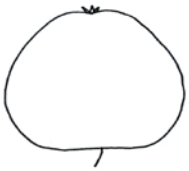
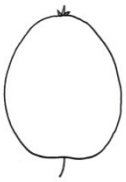
Ad. 24: Fruit: diameter

The maximum diameter should be observed.



Ad. 26: Fruit: shape

See Ad. 25

		← ratio height / diameter →		
		low	medium	high
↓ broadest part →	above middle		 10 obconical	
	at middle	 2 oblate	 3 circular  5 square	 4 elliptic  6 oblong
	below middle	 1 flat globose conical	 9 conical waisted	 8 conical  7 ovate

Ad. 29: Fruit: ground color

The ground color is the first color to appear chronologically during the development of the fruit.

Ad. 30: Fruit: hue of over color

Observations should be made after removing the bloom.

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. 35: Fruit: area of russet around stalk attachment

The russet should be considered as the dull brown rough finish on the skin of some apple fruit.

Ad. 36: Fruit: area of russet on cheeks

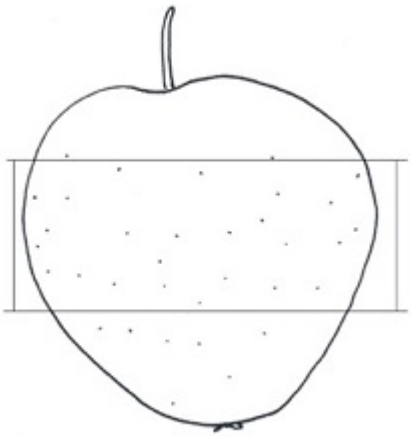
See Ad. 35.

Ad. 37: Fruit: area of russet around eye basin

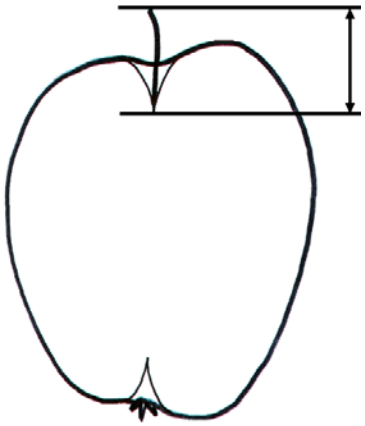
See Ad. 35.

Ad. 38: Fruit: number of lenticels

Observations should be made in the central part of the fruit, by counting (in a defined area [e.g. an area of 1 cm^2]) or by visual assessment of the density of lenticels on the skin.

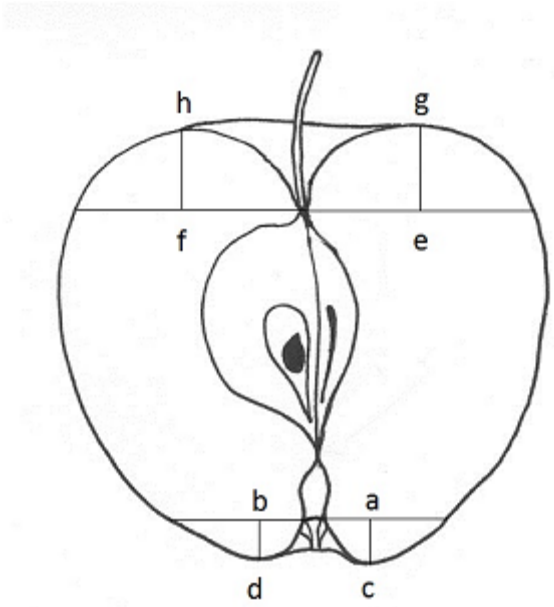


Ad. 39: Fruit: length of stalk



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: a-c instead of b-d).



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

Observations should be made at the time of ripeness for eating. It can be measured using a penetrometer.

Ad. 45: Fruit: main color of flesh

The main color is the color with the largest surface area. In cases where the areas of the main and secondary color are too similar to reliably decide which color has the largest area, the darkest color is considered to be the main color.

Ad. 46: Fruit: secondary color of flesh

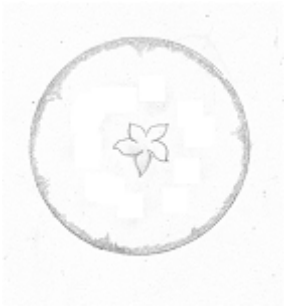
The color with the second largest area is the secondary color.

Ad. 47: Fruit: extent of secondary color

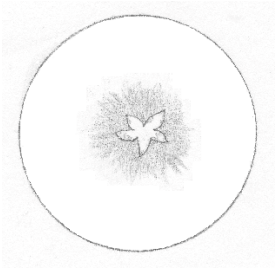
See Ad. 46.

Ad. 48: Flesh color: distribution of pinkish or reddish coloration

To be observed in cross section.

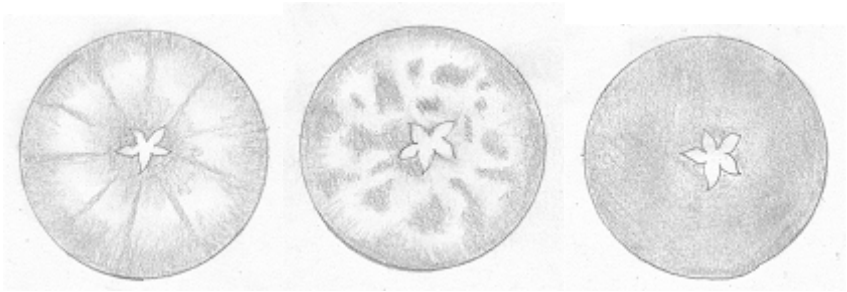


2
under skin only



3
around core only

4
under skin and around core



5
throughout

Ad. 49: Time of beginning of flowering

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

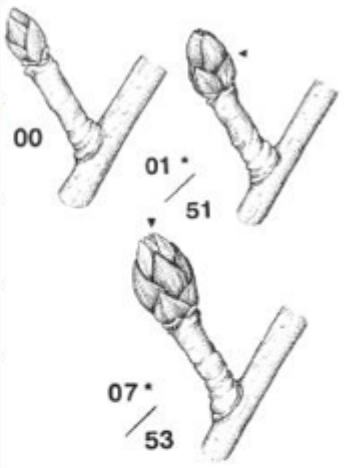
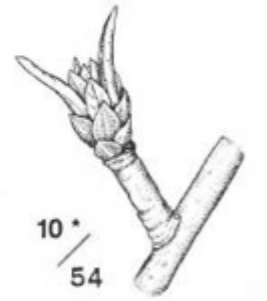
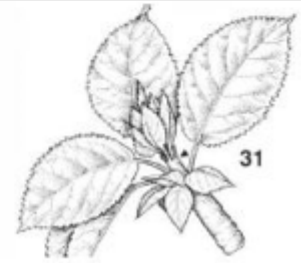
Ad. 50: Time for harvest

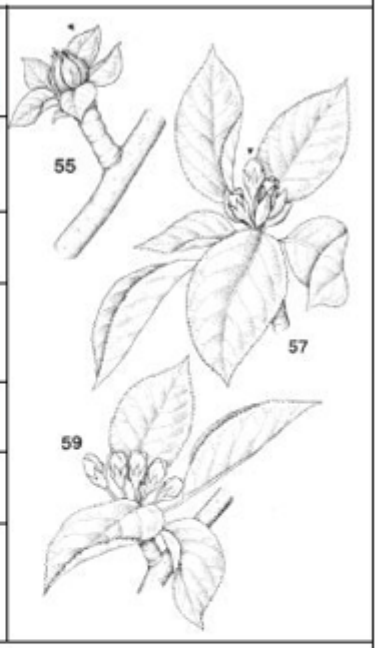
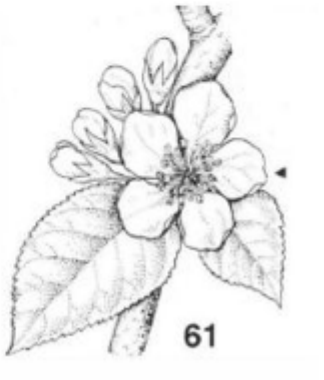
The time for harvest is reached when fruits are ripe for picking and can most easily be picked from the trees. As this physiological stage of the fruit is characterized by a degression of starch content in the flesh, the time for harvest can also be determined by assessing the starch content.

Ad. 51: Time of eating maturity

The time of eating maturity is reached when the fruit is ripe for eating and has reached its optimum of flavor and aroma. Eating maturity can be reached on trees or in cold chambers. As this physiological stage of the fruit is characterized by a degression of starch content in the flesh, the time of eating maturity can also be determined by assessing the starch content.

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	

(taken from: Biologische Bundesanstalt für Land- und Forstwirtschaft [1997])

8.4 Other Names of the Example Varieties

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 Klarapfel

9. Literature

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10. Technical Questionnaire

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

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

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

1. Subject of the Technical Questionnaire

1.1	Botanical name	*Malus domestica* (Suckow) 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)	**<u>Only varieties with Tree type: ramified</u>: 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**		
	flat globose conic	Melrose	1 [ ]
	oblate	Bramley's Seedling, Lipno	2 [ ]
	circular	Dalinbel, Rubinola, Topaz	3 [ ]
	elliptic	Fuji BC, Minnewashta	4 [ ]
	square	Bonita	5 [ ]
	oblong	Renora, Čadel	6 [ ]
	ovate	Cripps Pink, Delcorf	7 [ ]
	conic	Civni, Elstar, Nicoter, Pinova, Rafzubin	8 [ ]
	conic waisted	Gloster, Redkan	9 [ ]
	obconic	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	Dülmener Rosenapfel	3 [ ]
	flushed and mottled	Dalinbel, Scifresh	4 [ ]
	flushed, striped and mottled	Elstar, Pinova, Rafzubin, Topaz	5 [ ]
	marbled	Karneval	6 [ ]
5.7 (45)	**Fruit: main color of flesh**		
	white	Akane, Minnewashta, Pia, Spartan	1 [ ]
	greenish	Angold, Gloster, Granny Smith, Northpole, Telamon	2 [ ]
	yellowish white	Elstar, Jonagold, Pinova, Rafzubin	3 [ ]
	yellowish	Coxcolumnar, Pisaxa, Topaz, Zari	4 [ ]
	orangish	Ladina, Transcendent Crab	5 [ ]
	pinkish	Pomfit	6 [ ]
	reddish	Bay 3484, Lureprec	7 [ ]

	Characteristics	Example Varieties	Note
5.8 (49)	**Time of beginning of flowering**		
	very early	Anna, Ein-Shemer	1 [ ]
	very early to early	Collina, Delblush, Pompink	2 [ ]
	early	Astramel, Civni, Idared, Topaz	3 [ ]
	early to medium	Cripps Red, Dalili, James Grieve, Jonagored	4 [ ]
	medium	Braeburn, Rafzubin, Tenroy, White Transparent, Zari	5 [ ]
	medium to late	Elise, Gala, Granny Smith, Sansa	6 [ ]
	late	Golden Delicious, Karmijn de Sonnaville, Reine de Reinettes, Sirprize	7 [ ]
	late to very late	Delorina, Suntan	8 [ ]
	very late	Spätblühender Taffetapfel	9 [ ]
5.9 (50)	**Time for harvest**		
	extremely early	Astramel, Collina, White Transparent	1 [ ]
	extremely early to very early	Piros	2 [ ]
	very early	Arkcharm, Lena, Minnewashta, Nela	3 [ ]
	very early to early	Bruggers Festivale, Coxcolumnar, Dalili	4 [ ]
	early	Akane, Delorgue, James Grieve, Monidel, Sansa	5 [ ]
	early to medium	Gerlinde, Prima, Santana, Zari	6 [ ]
	medium	Bay 3484, Fiesta, Rubinola	7 [ ]
	medium to late	Civni, Elstar, Karmijn de Sonnaville, Saturn, Suntan, Tenroy	8 [ ]
	late	Jonagold, Pomforyou, Redkan, Sirprize, Telamon	9 [ ]
	late to very late	Florina, Golden Delicious, La Flamboyante, Pinova, Pompink, Topaz	10 [ ]
	very late	Delblush, Delgollune, Fuji BC, Mutsu, Nicoter	11 [ ]
	very late to extremely late	Braeburn, Fuji	12 [ ]
	extremely late	Cripps Pink, Cripps Red, Granny Smith, Iduna	13 [ ]

	Characteristics	Example Varieties	Note
5.10 (51)	**Time of eating maturity**		
	extremely early	Samo	1 [ ]
	extremely early to very early	Astramel, Julia	2 [ ]
	very early	Discovery, Helios, Nela	3 [ ]
	very early to early	Bruggers Festivale, Minnewashta	4 [ ]
	early	Alkmene, Gravensteiner, James Grieve, Transparent de Croncels	5 [ ]
	early to medium	Santana	6 [ ]
	medium	Elstar, Gala, Holsteiner Cox, Reine de Reinettes	7 [ ]
	medium to late	Honeycrisp, Karneval, Rubinstep	8 [ ]
	late	Golden Delicious, Jonagold, Pinova, Topaz	9 [ ]
	late to very late	Nicoter, Pilot, Scifresh, Solaris	10 [ ]
	very late	Braeburn, Florina	11 [ ]
	very late to extremely late	Elise	12 [ ]
	extremely late	Cripps Pink, Granny Smith	13 [ ]

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 the case of mutant varieties, (a) characteristic(s) should be indicated in which the candidate variety differs from the variety it has originated from, or from any other mutant variety of the 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]