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UPOV

INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

GENEVA

DRAFT

APPLE ROOTSTOCK

UPOV Code: MALUS

(*Malus* Mill.)

GUIDELINES

FOR THE CONDUCT OF TESTS

FOR DISTINCTNESS, UNIFORMITY AND STABILITY

prepared by an expert from South Africa

to be considered by the

Technical Working Party for Fruit Crops
at its forty-second session, to be held in Hiroshima, Japan, from November 14 to 18, 2011

Alternative Names:*

Botanical name	*English*	*French*	*German*	*Spanish*
Malus Mill.	Apple Rootstock	Porte-Greffes De Pommier	Apfel-Unterlagen	Portainjertos De 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.

* 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 vegetatively propagated rootstock varieties of *Malus* Mill. ~~If characteristics of the flower, the fruit or the seed are necessary to establish distinctness, the Test Guideline for Apple fruit Varieties (TG/14/8) should be used for those characteristics, if applicable.~~

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 plants (one-year-old) on their own roots.

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

~~25~~ 5 one-year-old rooted plants ~~(virus free).~~ (NZ: UPOV TG's do not normally specify virus free. 2.4 covers the option if an authority whishes to specify virus status)

DE propose 15 plants, otherwise growing in stoolbeds and additional plants grown as trees for the assessment of flower/ fruit characteristic would not be possible.

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

The minimum duration of tests should normally be two independent growing cycles. ~~In particular, it is essential that the plants produce a satisfactory crop of fruit in each of the two growing cycles.~~

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

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.

3.4 Test Design

3.4.1 Each test should be designed to result in a total of at least 5 plants.

3.4.2 ~~From the submitted 25 plants 20 plants should be cut back annually in the stoolbed and 5 plants should be grown to produce trees, in case characteristic of the adult tree are needed for the establishment of distinctness.~~

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 / Parts of Plants to be Examined

Unless otherwise indicated, for the purposes of distinctness, all observations on single plants should be made on ~~10~~ 5 plants or parts taken from each of ~~10~~ 5 plants and any other observations made on all plants in the test, disregarding any off-type plants. In the case of observations of parts taken from single plants, the number of parts to be taken from each of the plants should be ~~10~~ 5.

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 second column of 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 For the assessment of uniformity, 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-type are allowed. In the case of a sample size of 15 plants 1 off type are allowed.

4.3 Stability

4.3.1 In practice, it is not usual to perform tests of stability that produce results as certain as those of the testing of distinctness and uniformity. However, experience has demonstrated that, for many types of variety, when a variety has been shown to be uniform, it can also be considered to be stable.

4.3.2 Where appropriate, or in cases of doubt, stability may be further examined by testing a new 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:

5.4 Guidance for the use of grouping characteristics, in the process of examining distinctness, is provided through the General Introduction and document TGP/9 “Examining Distinctness”.

6. Introduction to the Table of Characteristics

6.1 Categories of Characteristics

6.1.1 Standard Test Guidelines Characteristics

Standard Test Guidelines characteristics are those which are approved by UPOV for examination of DUS and from which members of the Union can select those suitable for their particular circumstances.

6.1.2 Asterisked Characteristics

Asterisked characteristics (denoted by *) are those included in the Test Guidelines which are important for the international harmonization of variety descriptions and should always be examined for DUS and included in the variety description by all members of the Union, except when the state of expression of a preceding characteristic or regional environmental conditions render this inappropriate.

6.2 States of Expression and Corresponding Notes

6.2.1 States of expression are given for each characteristic to define the characteristic and to harmonize descriptions. Each state of expression is allocated a corresponding numerical note for ease of recording of data and for the production and exchange of the description.

6.2.2 In the case of qualitative and pseudo-qualitative characteristics (see Chapter 6.3), all relevant states of expression are presented in the characteristic. However, in the case of quantitative characteristics with 5 or more states, an abbreviated scale may be used to minimize the size of the Table of Characteristics. For example, in the case of a quantitative characteristic with 9 states, the presentation of states of expression in the Test Guidelines may be abbreviated as follows:

State	Note
small	3
medium	5
large	7

However, it should be noted that all of the following 9 states of expression exist to describe varieties and should be used as appropriate:

State	Note
very small	1
very small to small	2
small	3
small to medium	4
medium	5
medium to large	6
large	7
large to very large	8
very large	9

6.2.3 Further explanation of the presentation of states of expression and notes is provided in document TGP/7 “Development of Test Guidelines”.

6.3 Types of Expression

An explanation of the types of expression of characteristics (qualitative, quantitative and pseudo qualitative) is provided in the General Introduction.

6.4 Example Varieties

Where appropriate, example varieties are provided to clarify the states of expression of each characteristic.

6.5 Legend

(*) Asterisked characteristic – see Chapter 6.1.2

QL: Qualitative characteristic – see Chapter 6.3
QN: Quantitative characteristic – see Chapter 6.3
PQ: Pseudo-qualitative characteristic – see Chapter 6.3

MG, MS, VG, VS - see Chapter 4.1.5

(a)-(f) See Explanations on the Table of Characteristics in Chapter 8.1

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

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

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
DE: In stoolbeds the plants do not form trees so to reword into plants DE: to delete states 1 and 9							
1. (*) (+)	**VG**	**Tree/Plant: vigor**					
QN	**(a)**	very weak				CG 222	1
		weak				M 27	3
		medium				M 7, M 26	5
		strong				MM 106	7
		very strong				CG 934	9
DE : to delete M 9 as example variety NZ,FR to have branches instead of shoots							
2.	**VG**	**Tree/ Plant: number of branches ~~shoots~~**					
QN	**(a)**	very few				M 27	1
		few				M 9	3
		medium				M 26	5
		many				~~M 9~~, MM 106, MM 111	7
		very many				M 25	9
DE: in stoolbeds the plants do not form trees, so to reword onto Plants FR: to have state 4 weeping							
3. (*)	**VG**	**Tree/ Plant: habit ~~of shoot~~**					
QN	**(a)**	upright				M 4	1
		spreading				M 9 ~~Cepiland~~	2
		drooping				Marubakaido	3
		weeping					4

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
DE intermediate state is needed otherwise this char could not be QN, but it should be considered as QN. Propose to have the states straight, weakly wavy and strongly wavy. FR: To have state 3 as zigzag							
4. (*)	**VG**	**One-year-old shoot: growth**					
QN	**(a)**	straight				M 9	1
		wavy ~~or zigzag~~				M 2, M 25	2
DE: to reduce to 5 states							
5. (*) (+)	**VG**	**One-year-old shoot: pubescence**					
QN	**(b)**	absent or very weak					1
		weak				B 9, M 26	~~23~~
		medium				M 27	~~35~~
		strong				M 9	~~47~~
		very strong				Crab C	~~59~~
6. (*)	**VG**	**One-year-old shoot: glossiness of bark**					
QN	**(b)**	~~absent or very weak~~					~~1~~
		weak				M 26	~~13~~
		medium				M 9	~~25~~
		strong				M 27	~~37~~
		~~very strong~~					~~9~~
7. (*)	**VG/ MG**	**One-year-old shoot: thickness ~~(at midlength)~~**					
QN	**(b)**	thin				M 7, M 27	3
		medium				MM 111	5
		thick				MM 106	7

		English	français	deutsch	español	Example Varieties / Exemples / Beispielssorten / Variedades ejemplo	Note/ Nota
8. (*)	**VG/ MG**	**One-year-old shoot: length of internodes ~~(as for 7)~~**					
		short				M 25	3
(QN)	**(b)**	medium				M 26	5
		long				M 7	7
9. (*)	**VG**	**One-year-old shoot: number of lenticels**					
QN	**(b)**	absent or very few					1
		few				M 9	3
		medium				M 26	5
		many				M 2, MM 111	7
		very many				MM 104	9
DE: to reduce to 5 states							
10.	**VG**	**One-year-old shoot: size of lenticels**					
QN	**(b)**	small				CG 6210	~~13~~
		medium				M 9, M 26	~~35~~
		large				M 2	~~57~~
ZA: propose to delete too much variation and not easy to observe NZ/DE: Agree to delete FR: to keep							
11.	**VG**	**One-year-old shoot: shape of lenticels**					
PQ	**(b)**	elliptic				M 25	1
		broad elliptic				M 26, MM 111	2
		circular				M 9, M 27	3

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
FR: to delete state 5 example variety MM 106							
12. **(*)**	**VG**	**One-year-old shoot: predominant color on sunny side**					
PQ	**(b)**	greenish brown					1
		reddish brown				M 9	2
		medium brown				M 25, M 27	4
		dark brown				B 9, M 2, M 26, ~~MM 106~~	5
DE to reduce to 5 states only							
13. **(*)**	**VG**	**One-year-old shoot: size of bud**					
QN	**(b)**	small				M 25, MM 111	~~13~~
		medium				MM 106	~~35~~
		large				M 2, M 9, M 27	~~57~~
DE: without another state included it cannot be PQ, but QL-can it be QL? Otherwise to consider including state							
14. **(+)**	**VG**	**One-year-old shoot: shape of tip of bud**					
PQ	**(b)**	pointed				M 9, M 27	1
		obtuse					2
		rounded				Bemali, MM 111	3
15. **(+)**	**VG**	**One-year-old shoot: position of bud relative to axis**					
QN	**(b)**	adpressed				MM 106	1
		slightly held out				M 9, M 26	2
		markedly held out					3

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
DE to reduce to 5 states only							
16. **(+)**	**VG**	**One-year-old shoot: size of bud support**					
QN	**(b)**	small				M 9	~~13~~
		medium				M 7, M 27	~~35~~
		large				M 2	~~57~~
17. **(*)**	**VG**	**One-year-old shoot: color of growing tip**					
PQ	**(b)**	whitish				M 25	1
		greenish				M 2, M 27, MM 106	2
		reddish				M 9	3
		blackish				B 9, M 10, M 26	4
DE: change wording to intensity of …..Include state 5 “very strong” Fr: to have state 5 “very strong”							
18. **(*)** **(+)**	**VG**	**~~Expanding~~ Young leaf: intensity of anthocyanin coloration**					
QN	**(c)**	absent or very weak				M 27	1
		weak					2
		medium					3
		strong					4
		~~Present~~ very strong				B 9	~~59~~
NZ replace bronze with red brown DE: Add another state otherwise this char is not PQ but QL							
19. **(*)**	**VG**	**~~Expanding~~Young leaf: hue of anthocyanin coloration**					
PQ	**(c)**	~~bronze~~ red brown				P 22	1
		purple				B 9	2

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
DE to reduce to 5 states only							
20. **(+)**	**VG**	**Leaf blade: attitude in relation to shoot**					
QN	**(d)**	~~semi-~~upwards				M 111	~~13~~
		outwards				M 7, MM 106	~~35~~
		~~semi-~~downwards				CG 778	~~57~~
21. **(*)**	**VG/ MS**	**Leaf blade: length**					
QN	**(d)**	short				M 26, M 27	3
		medium				M 111	5
		long				M 9, P 16	7
22. **(*)**	**VG/ MS**	**Leaf blade: width**					
QN	**(d)**	narrow				M 26	3
		medium				M 9, M 27	5
		broad				P 14	7
NZ state 7 to have strongly elongated DE: to indicate as VG/MS							
23. **(*)**	**VG/ MS**	**Leaf blade: ratio length/width**					
QN	**(d)**	~~small~~slightly elongated				M 7	3
		~~medium~~ moderately elongated				M 26	5
		~~large~~ strongly elongated				P 16	7
24. **(*)**	**VG**	**Leaf blade: profile in cross section**					
QN	**(d)**	concave				M 27, M 111	1
		straight				M 9, M 7, CG 707	2
		convex				M 25	3

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
DE: to reduce to 5 notes							
25. (*)	**VG**	**Leaf blade: length of pointed tip**					
QN	**(d)**	short				M 27	~~1~~3
		medium				M 9	~~3~~5
		long				P 16	~~5~~7
26. (*) (+)	**VG**	**Leaf blade: incisions of margin**					
PQ	**(d)**	crenate			DE: J 9	CG 707	1
		bicrenate			DE: J-TE-G	M 7, CG 222	2
		serrate type 1			DE: M 9, J-TE-H	CG 778, MM 109	3
		serrate type 2			DE: J-TE-A		4
		biserrate			DE:MM 112, MM 114		5
DE: propose							
27.	**VG**	**Leaf blade: depth of incisions of margin**					
QN	**(d)**	very shallow					1
		shallow					2
		medium					3
		deep					4
		very deep					5

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
DE: to reduce to 5 notes							
28.	**VG**	**Leaf blade: undulation of margin**				new	
QN	**(d)**	absent or very weak			DE: Pi 80, MM 105	CN: CG 778, CG 222	1
		weak			DE: MM106, MM110	CN: M 9	~~2~~3
		medium			DE: Cepiland, J-TE-H	CN: M 26, M 7	~~3~~5
		strong			DE: CG 24, M 18	CN: CG 6210	~~5~~7
DE: propose to delete							
29. **old 27**	**VG**	**Leaf blade: pubescence on lower side**					
QN	**(d)**	weak				M 9	3
		medium				M 27	5
		strong				MM 106	7
DE; to reduce to 5 notes							
30.	**VG**	**Leaf blade: glossiness**				new	
QN	**(d)**	absent or very weak			DE: M 16, MM 114, P 60	CN: M 26, CG 707	1
		weak			DE: MM 111	CN: MM 106	~~2~~3
		medium			DE: M 14, M 17, MM 106	CN: M 9	~~3~~5
		strong			DE: M 9 MM 102, MM 110, MM 112, Pi-AU 9-24	CN: CG 4202, Marubakaido	~~5~~7

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
DE: intensity of ... DE: reduce to 5 notes							
31.	**VG**	**Leaf blade: intensity of green color**				new	
QN	**(d)**	light			DE: J-TE-G	CN: M 7, CG 778	~~13~~
		medium			DE: CG 24, M 9	CN: M 9, CG 707	~~35~~
		dark			DE: CG 10, M 26, P 60	CN: M 26, MM 109	~~57~~
DE: not a good characteristic under our growing conditions, as the veins color late in autumn when leaf fall occurs, if it maintained to propose to reduce to 5 states only							
32. (old 28) (*)	**VG**	**Leaf blade: antho-cyanin coloration of veins**					
QN	**(d)**	absent or very weak				M 9	1
		weak				DE: J-TE-D	3
		medium				M 26	5
		strong				MM 106, MM 109	7
33. (old 29) (*)	**VG/ MS**	**Petiole: length**					
QN	**(d)**	short				M 26, M 27	3
		medium				M 9	5
		long				MM 106, MM 111	7

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
DE: reduce to 5 notes NZ: to have limited range							
34. (old 30 (*)	**VG/ MG**	**Leaf: ratio length of blade/length of petiole**					
QN	**(d)**	small					~~13~~
		medium				B 9, M 9	~~35~~
		large				P 2, P 16	~~57~~
DE: reduce to 5 notes							
35. (+)	**VG**	**Petiole: extent of anthocyanin coloration from base**				New	
QN		small			DE: J- TE-F	M 9, CG 222	~~13~~
		medium			DE: M 9, M 14	CG 778	~~35~~
		large			DE: CG 10	CN: B 9, CG 5202	~~57~~
DE: reduce to 5 notes							
36. (old 31 (*)	**VG**	**Stipule: size**					
QN		small				M 27	~~13~~
		medium				M 9, M 26	~~35~~
		large				MM 106	~~57~~

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
DE: comments on characteristics 36-52 if plants are grown in stoolbeds as recommended with the guidelines in force, no flower and fruit characteristic can be observed if only 5 plants are intended to be included into the examination. Should another examination with additional plants grown as trees be considered? If these new characteristics are agreed to be included their wording should be harmonized with TG/14/9 Apple guideline							
NZ: propose new characteristic: Flower: presence Some varieties produce very few if any flowers during the test period where others flower readily.							
37.	**VG**	**Flower: presence**					
QN	**(e)**	absent or few					1
		medium					2
		many					3
FR: Insert white and white yellow							
38.	**VG**	**Flower: predominant color at balloon stage**				New	
(+)							
PQ	**(e)**	white					1
		white yellow					2
		light pink			DE: CG 80	CN: M 27, M 7	3
		dark pink			DE: J-TE-F	CN: M 9	4
		medium red			DE: Supporter 1		5
		dark red			DE : B 9		6
		purple			DE: J 9	CN: B 9	7
39.	**VG**	**Flower: arrangement of petals**				New	
(+)							
QN	**(e)**	free			DE: Cepiland	CN: M 9	1
		intermediate			DE: Bemali	CN: M 7	2
		overlapping			DE: J-TE-B	CN: M 27	3

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
FR: propose							
40.	**VG**	**Flower: diameter with petals pressed in horizontal position**					
QN	**(e)**	very small					1
		small					3
		medium					5
		large					7
41.	**VG**	**Flower: position of stigmas relative to anthers**				New	
(+)							
QN	**(e)**	below					1
		same level				DE: P 92	2
		above				DE: J-TE-B	3
42.	**VG**	**Fruit: size**				New	
QN	**(f)**	small				DE: J-TE-F	3
		medium				DE: J-TE-H	5
		large				DE: M 9	7
FR: propose							
43.	**VG**	**Fruit ratio height/diameter**					
QN	**(f)**	very small					1
		small					3
		medium					5
		large					7
		very large					9

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
44.	**VG**	**Fruit: general shape**				New	
(+)							
PQ	**(f)**	cylindrical waisted					1
		conic					2
		ovate				DE: Last minute	3
		elliptic				DE: M 11	4
		circular				DE: Bemali	5
		oblate					6
		cylindric					7
45.	**VG**	**Fruit: ribbing**				New	
QN	**(f)**	absent or very weak				DE: Bemali	1
		weak				DE: CG 24	3
		medium				DE: CG 80	5
		strong				DE: Lancep	7
46.	**VG**	**Fruit: crowning at calyx end**				New	
QN	**(f)**	absent or very weak				DE: M 3	1
		weak				DE J-TE-A	3
		medium				DE:Joha	5
		strong				DE: CG 80	7
47.	**VG**	**Fruit: size of eye**				New	
QN	**(f)**	small				DE: Bemali	3
		medium				DE: Cepiland	5
		large				DE: CG 24	7

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
48.	**VG**	**Fruit: bloom of skin**				New	
QN	**(f)**	absent or very weak				DE: Lancep	1
		weak				DE M 7	3
		moderate				DE: CG 24	5
		strong				DE: M 5	7
49.	**VG**	**Fruit: ground color**				New	
PQ	**(f)**	not visible					1
		whitish yellow				DE: M 8	2
		yellow				DE: M 9, P 92	3
		whitish green				DE: CG 24	4
		yellow green				DE: M 1	5
		green				DE: M 5	6
50.	**VG**	**Fruit: hue of over color – with bloom removed**				New	
PQ	**(f)**	orange red				DE: M 26	1
		pink red				DE: P 47, P 60	2
		red					3
		purple red				DE: MM 102	4
		brown red				DE: Mark	5
51.	**VG**	**Fruit: intensity of over color**				New	
QN	**(f)**	light				DE: P 47	3
		medium				DE: M 26	5
		dark				DE: MM 102	7

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
52.	**VG**	**Fruit: relative area of over color**				New	
QN	**(f)**	absent or very small				DE: MM 115	1
		small				DE: MM 105	3
		medium				DE: MM 104	5
		large				DE: M 26	7
		very large				DE: B 6	9
53.	**VG**	**Fruit: pattern of over color**				New	
PQ	**(f)**	only solid flush				DE: 9	1
		solid flush with weakly defined stripes				DE: MM112	2
		solid flush with strongly defined stripes				DE: M 26	3
		weakly defined flush with strongly defined stripes					4
		only stripes (no flush)					5
		flushed and mottled				DE: Lizzy	6
		flushed, mottled and striped				DE: MM 101	7
54.	**VG**	**Fruit: length of stalk**				New	
QN	**(f)**	very short				DE: Last Minute	1
		short				DE: P 92	3
		medium				DE: P 1	5
		long				De SU 57233	7
		very long				DE: Supporter 1	9

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
55.	**VG**	**Fruit: thickness of stalk**				New	
QN	**(f)**	thin				DE: B 9	3
		medium				DE: Bemali	5
		thick					7
56.	**VG**	**Fruit: aperture of locules**				New	
(+)							
QN	**(f)**	closed or slightly open				DE: M 5	1
		moderately open				DE: Last Minute	2
		fully open				DE: J-TE-F	3
57. **(old 32)** **(*)**	**VG**	**Time of beginning of bud burst**					
QN		very early				P 16	1
		early				M 9, MM 106	3
		medium				M 25	5
		late				MM 111	7
		very late				M 26	9
FR: propose							
58.	**VG**	**Time of beginning of flowering**					
QN		very early					1
		early					3
		medium					5
		late					7
		very late					9

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
DE: propose							
59.	**VG**	**Time of beginning of shoot growth**					
		very early				P 16	1
		early				MM 106	3
		medium				M 25	5
		late				MM 111	7
		very late				M 26	9

8. Explanations on the Table of Characteristics

8.1 Explanations covering several characteristics

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

(a) Plant: All observations on the plant should be made in the dormant season.

(b) One-year-old shoot: All observations of the shoot should be made on the middle third of the one-year-old shoot in the dormant season.

(c) Young leaf: All observation on the young leave should be done on the first opened young leaf.

(d) Leaf: All observations on the leave should be made on fully developed leaves from the middle third of vigorous current season shoots.

(e) Flower: Observations on the flower should be made on the second or subsequent flowers, at the start of dehiscence.

DE: what do you mean by second flower? Like for TG/14/9 the evaluation should be done on the second flower that opens.

(f) Fruit: All observations of the fruit should be made on 10 typical fruits taken from a minimum sample of 20 fruits, at time of visual ripeness.

DE: Do you mean " picking ripeness"? It is at picking ripeness, but because no test is done to determine ripeness of the fruit with e.g. iodine, it is done on a visual basis, merely on color.

8.2 Explanation for individual characteristics

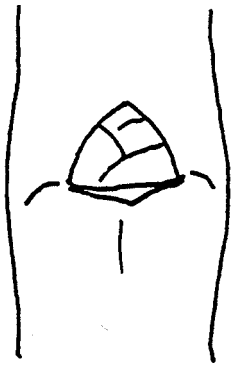
Ad. 1: Tree/Plant: vigor

The vigor of the plant should be considered as the overall abundance of vegetative growth.

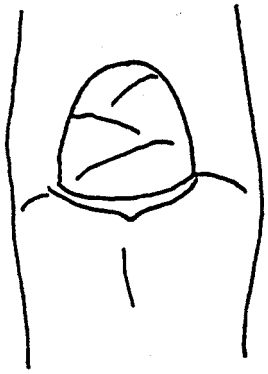
Ad. 5: One-year-old shoot: pubescence

The pubescence should be done on the distal half of the shoot.

Ad. 14: One-year-old shoot: shape of tip of bud

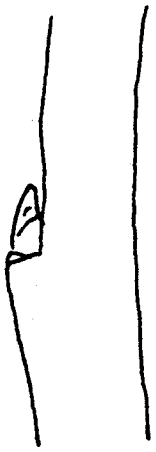


1
pointed



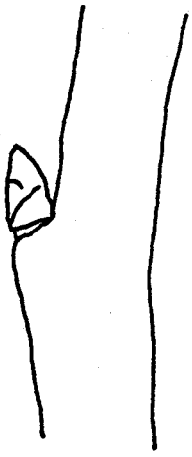
3
rounded

Ad. 15: One-year-old shoot: position of bud relative to axis



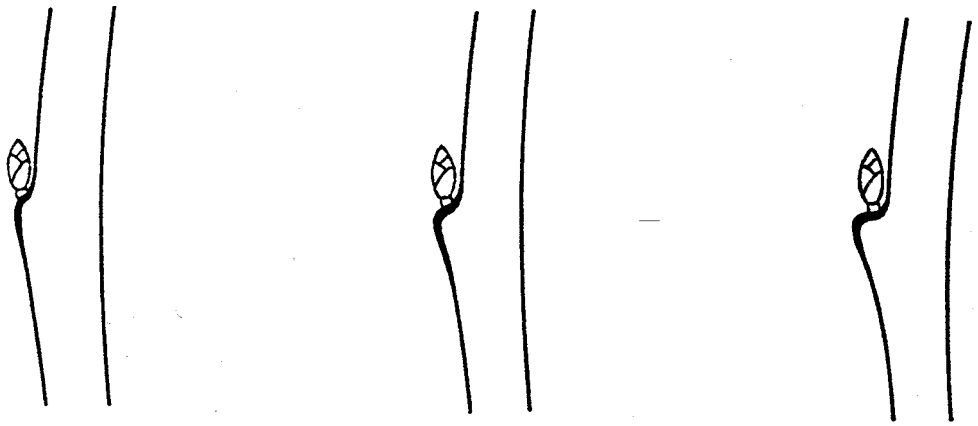
1
adpressed

2
slightly held out



3
markedly held out

Ad. 16: One-year-old shoot: size of bud support



1	3	5
small	medium	large

Ad. 20: Leaf blade: attitude in relation to shoot

1	3	5
~~semi-~~upwards	outwards	~~semi-~~downwards

Ad. 26: Leaf blade: incisions of margin

Observations should be done on the upper half of the leaf blade

1
crenate

2
bicrenate

3
serrate type 1

4
serrate type 2

5
biserrate

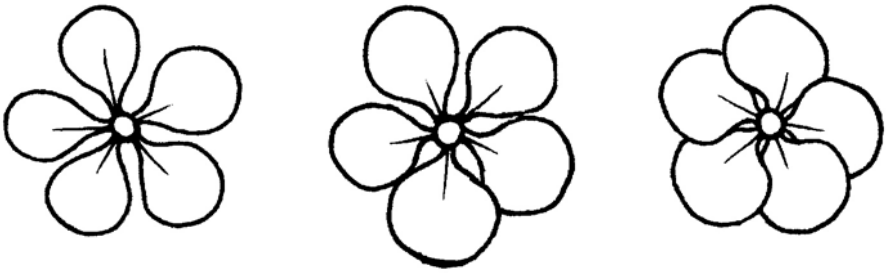
Ad. 35: Petiole: extent of anthocyanin coloration from base

Degree to which the amount of anthocyanin coloration extend from the petiole base

Ad. 38: Flower: predominant color at balloon stage

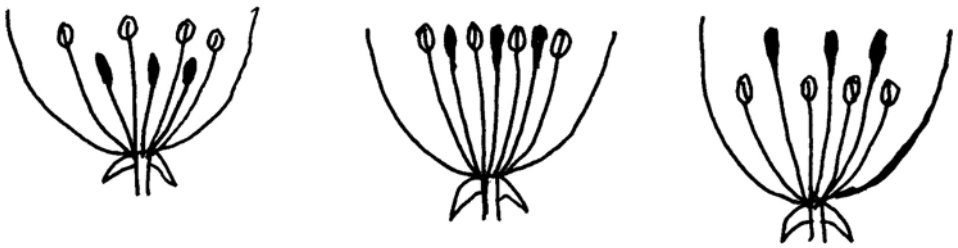
Balloon stage is the phenological stage in the course of the flower development when the calyx is fully expanded and the petals are recognizable, having partially expanded and inflated but are closed, covering the internal organs. Balloon stage is usually 1-2 days before the petals unfold.

Ad. 37: Flower: arrangement of petals



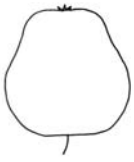
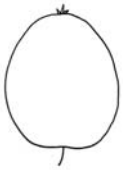
1	2	3
free	intermediate	overlapping

Ad. 41: Flower: position of stigmas relative to anthers

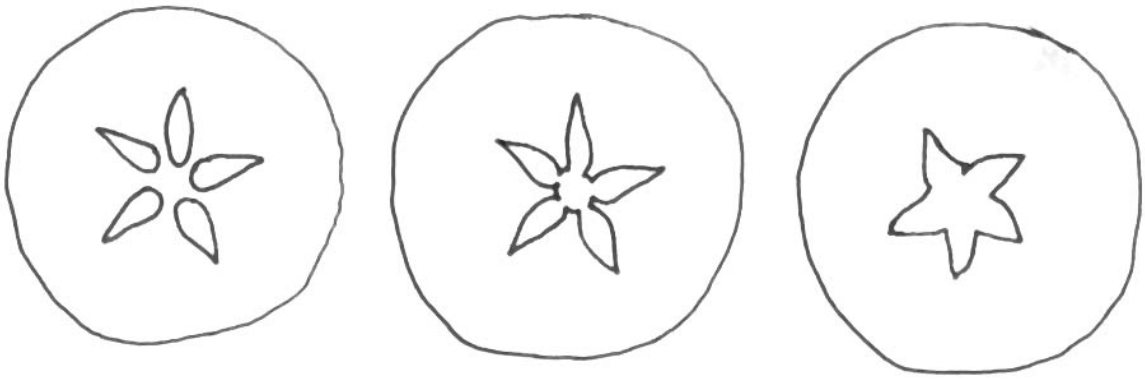


1	2	3
below	same level	above

Ad. 44: Fruit: general shape

← position of broadest part →	← lateral outline in apical half →			
	concave	flat tapering	rounded	flat parallel sides
at base ←	 1 cylindrical waisted	 2 conic	 3 ovate	 7 cylindric
at middle			 4,5,6 elliptic (includes circular and oblate)	

Ad. 56: Fruit aperture of locules



1
closed or slightly open

2
moderately open

3
fully open

9. Literature

Embree, C.G., 1995: A Photographic Description of the Fruit of Certain Apple Rootstocks. Fruit Varieties Journal, 49 (1). US, pp. 59-64

Ferree, D. C., Carlson, R. F., 1987: "Apple Rootstocks" in Rootstocks for Fruit Crops. Ed. Rom, Roy C. and Carlson, Robert F.. Wiley, US, pp. 107-143

Krümmel, H., 1956: Die vegetativ vermehrbaren Unterlagen des Kern- und Steinobstes. Deutscher Bauernverlag. Berlin, DE

Maurer, E.,1939: Die Unterlagen der Obstgehölze. Parey Verlag. Berlin, DE

Simons, R. K., 1986: Leaf Characteristics of Apple Dwarfing Rootstocks. Fruit Varieties Journal, 40 (3). US, pp. 71-79

Tydeman, H.M., 1953: A Description of Classification of the Malling-Herton and Malling XXV Apple Rootstocks. Report East Malling Research Station for 1952. GB, pp. 53-63

Tydeman, H.M., 1954: A Description of Certain MIX Crosses. Report East Malling Research Station for 1953. GB

Tydeman, H.M., 1955: Descriptions of the Malling Apple Rootstocks. Report East Malling Research Station for 1954. GB, pp. 64-66

10. Technical Questionaire

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* Mill.
1.2 Common name	Apple Rootstock

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 varieties)

(……..……..…) 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

{ GN 31 (Chapter 10: TQ 4.2) – information on method of propagating the variety }

Example 1

"4.2.1 Seed-propagated varieties

"(a)	Self-pollination	[ ]
"(b)	Cross-pollination	
	(i) population	[ ]
	(ii) synthetic variety	[ ]
"(c)	Hybrid	[ ]
	{…*see GN 32 for example*...}	
"(d)	Other (please provide details)"	[ ]

"4.2.2 Vegetatively propagated varieties

{...*see Example 2*...} [... ... ...]

"4.2.3 Other [ ]"
(please provide details)"

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

Example 2

"4.2.1 Vegetative propagation

"(a) cuttings [ ]

"(b) *in vitro* propagation [ ]

"(c) other (state method) [ ]

"4.2.2 Seed [ ]

"4.2.3 Other [ ]"
(please provide details)"

{ GN 32 (Chapter 10: TQ 4.2) – information on method of propagation of hybrid varieties }

"In the case of hybrid varieties the production scheme for the hybrid should be provided on a separate sheet. This should provide details of all the parent lines required for propagating the hybrid e.g.

"*Single Hybrid*

(……..……..) x (……..……..)
female parent male parent

"*Three-Way Hybrid*

(……..……..) x (……..……..)
female line male line

(……..……..) x (……..……..)
single hybrid used as female parent male parent

"and should identify in particular:

"(a) any male sterile lines
"(b) maintenance system of male sterile lines."

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

5. Characteristics of the variety to be indicated (the number in brackets refers to the corresponding characteristic in Test Guidelines; please mark the note which best corresponds).

	Characteristics	Example Varieties	Note
5.1 (3)	**Plant: habit of shoot**		
	upright	M 4	3[ ]
	spreading	Cepiland	5[ ]
	drooping	Marubakaido	7[ ]
5.2 (4)	**Plant: growth of shoot**		
	straight	M 9	1[ ]
	wavy or zigzag	M 2, M 25	2[ ]
5.3 (18)	**Expanding leaf: anthocyanin coloration of blade**		
	absent	M 27	1[ ]
	present	B 9	9[ ]
5.4 (32)	**Time of beginning of bud burst**		
	very early	P 16	1[ ]
	very early to early		2[ ]
	early	M 9, MM 106	3[ ]
	early to medium		4[ ]
	medium	M 25	5[ ]
	medium to late		6[ ]
	late	MM 111	7[ ]
	late to very late		8[ ]
	very late	M 26	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	{ GN 33 } (Chapter 10: TQ 6) – similar varieties }		

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

{ GN 34 (Chapter 10: TQ 7.3) – variety use}

{ **ASW 16** (Chapter 10: TQ 7.3) – where a photograph of the variety is to be provided }

"A representative color image of the variety should accompany the Technical Questionnaire."

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.

[#] 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:

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".

……

{ **ASW 17** (Chapter 10: TQ 9.3) – tests for the presence of virus or other pathogens }

"9.3 Has the plant material to be examined been tested for the presence of virus or other pathogens?

Yes [ ]
(please provide details as specified by the Authority)

No [ ]"

10. I hereby declare that, to the best of my knowledge, the information provided in this form is correct:

Applicant's name

Signature Date

[End of document]