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INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

Geneva

DRAFT**APPLE ROOTSTOCK**

UPOV Code: MALUS

Malus Mill.

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GUIDELINES**FOR THE CONDUCT OF TESTS****FOR DISTINCTNESS, UNIFORMITY AND STABILITY***prepared by an expert from South Africa**to be considered by the**Technical Committee at its fifty-first session,
to be held in Geneva from March 23 to 25, 2015**Disclaimer: this document does not represent UPOV policies or guidance*

Alternative Names:*

<i>Botanical name</i>	<i>English</i>	<i>French</i>	<i>German</i>	<i>Spanish</i>
<i>Malus</i> Mill.	Apple Rootstock	Porte-greffe 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 rootstock varieties of *Malus* Mill..

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 one-year-old rooted trees, or in the form of one-year-old rooted plants (for stoolbeds).

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

5 one-year-old rooted trees or
10 one-year-old rooted plants for stoolbeds.

2.4 The plant material supplied should be visibly healthy, not lacking in vigor, nor affected by any important pest or disease. It should not be obtained directly from *in vitro* propagation.

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

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 In the case of trees, each test should be designed to result in a total of at least 5 plants.

3.4.2 In the case of stoolbeds, each test should be designed to result in a total of at least 10 plants.

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 should be made on 5 plants or parts taken from each of 5 plants for trees and 9 plants for stoolbeds disregarding any off-type plants. In the case of observations of parts of plants, the number of parts to be taken from each of the plants should be 2.

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 In the case of trees, 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-types are allowed.

4.2.3 In the case of stoolbeds, 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 10 plants, one 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) Plant: vigor (characteristic 1)
- (b) Plant: habit (characteristic 4)
- (c) Young shoot: extent of anthocyanin coloration (characteristic 19)
- (d) Leaf blade: attitude in relation to shoot (characteristic 20)
- (e) Leaf blade: incisions of margin (characteristic 26)

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.

Example varieties for Asia, Europe, New Zealand and South Africa are included as regional sets in the Annex to these Test Guidelines.

The example varieties provided for a particular region are not exclusive and might also be applicable in other regions.

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] - Applies only for stoolbeds

[B] - Applies only for fully grown trees

(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
1.	VG	Plant: vigor	Plante : vigueur	Pflanze: Wuchsstärke	Planta: vigor		
(*)							
(+)							
QN	(a)	very weak	très faible	sehr gering	muy débil		1
		very weak to weak	très faible à faible	sehr gering bis gering	muy débil a débil		2
		weak	faible	gering	débil		3
		weak to medium	faible à moyenne	gering bis mittel	débil a medio		4
		medium	moyenne	mittel	medio		5
		medium to strong	moyenne à forte	mittel bis stark	medio a fuerte		6
		strong	forte	stark	fuerte		7
		strong to very strong	forte à très forte	stark bis sehr stark	fuerte a muy fuerte		8
		very strong	très forte	sehr stark	muy fuerte		9
2.	[B]	Plant: number of branches	Plante : nombre de ramifications	Pflanze: Anzahl Zweige	Planta: número de ramas		
	VG						
QN	(a)	very few	très petit	sehr gering	muy bajo		1
		few	petit	gering	bajo		2
		medium	moyen	mittel	medio		3
		many	grand	groß	alto		4
		very many	très grand	sehr groß	muy alto		5
3.	[A]	Plant: number of shoots	Plante : nombre de rameaux	Pflanze: Anzahl Triebe	Planta: número de ramas		
	VG						
QN	(a)	very few	très petit	sehr gering	muy bajo		1
		few	petit	gering	bajo		2
		medium	moyen	mittel	medio		3
		many	grand	groß	alto		4
		very many	très grand	sehr groß	muy alto		5
4.	VG	Plant: habit	Plante : port	Pflanze: Haltung	Planta: hábito		
(*)							
(+)							
PQ	(a)	upright	dressé	aufrecht	erguida		1
		upright to spreading	dressé à étalé	aufrecht bis breitwüchsig	erguida a extendida		2
		spreading	étalé	breitwüchsig	extendida		3
		drooping	retombant	hängend	colgante		4
5.	[B]	Plant: number of spines	Plante : nombre d'épines	Pflanze: Anzahl Dornen	Planta: número de espinas		
	VG						
QN	(a)	absent or few	nul ou petit	fehlend oder sehr wenige	nulo o bajo		1
		medium	moyen	mittel	medio		2
		many	grand	viele	alto		3

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
6.	VG	One-year-old shoot: growth pattern	Rameau d'un an : type de croissance	Einjähriger Trieb: Wuchsform	Rama de un año: patrón de crecimiento		
QN	(b)	straight	droit	gerade	recta		1
		moderately wavy	moyennement ondulé	mäßig gewellt	moderadamente ondulada		2
		strongly wavy	fortement ondulé	stark gewellt	muy ondulada		3
7.	VG	One-year-old shoot: pubescence	Rameau d'un an : pubescence	Einjähriger Trieb: Behaarung	Rama de un año: pubescencia		
QN	(b)	absent or very weak	absente ou très faible	fehlend oder sehr gering	ausente o muy escasa		1
		weak	faible	gering	escasa		2
		medium	moyenne	mittel	media		3
		strong	forte	stark	abundante		4
		very strong	très forte	sehr stark	muy abundante		5
8.	VG	One-year-old shoot: glossiness	Rameau d'un an : brillance	Einjähriger Trieb: Glanz	Rama de un año: brillo		
QN	(b)	absent or weak	absente ou faible	fehlend oder gering	ausente o débil		1
		medium	moyenne	mittel	medio		3
		strong	forte	stark	fuerte		5
9.	VG/ MS	One-year-old shoot: thickness	Rameau d'un an : épaisseur	Einjähriger Trieb: Dicke	Rama de un año: grosor		
QN	(b)	thin	mince	dünn	delgada		1
		medium	moyen	mittel	media		2
		thick	épais	dick	gruesa		3
10.	VG/ MG	One-year-old shoot: length of internodes	Rameau d'un an : longueur des entre-nœuds	Einjähriger Trieb: Internodienlänge	Rama de un año: longitud de los entrenudos		
QN	(b)	short	courts	kurz	cortos		1
		medium	moyens	mittel	medios		2
		long	longs	lang	largos		3
11.	VG	One-year-old shoot: number of lenticels	Rameau d'un an : nombre de lenticelles	Einjähriger Trieb: Anzahl Lentizellen	Rama de un año: número de lenticelas		
QN	(b)	very few	très petit	sehr gering	muy bajo		1
		few	petit	gering	bajo		2
		medium	moyen	mittel	medio		3
		many	grand	groß	alto		4
		very many	très grand	sehr groß	muy alto		5
12.	VG	One-year-old shoot: size of lenticels	Rameau d'un an : taille des lenticelles	Einjähriger Trieb: Größe der Lentizellen	Rama de un año: tamaño de las lenticelas		
QN	(b)	small	petites	klein	pequeñas		1
		medium	moyennes	mittel	medianas		2
		large	grandes	groß	grandes		3

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
13.	VG	One-year-old shoot: color on sunny side	Rameau d'un an : couleur de la face exposée au soleil	Einjähriger Trieb: Farbe auf der Sonnenseite	Rama de un año: color de la parte soleada		
PQ	(b)	greenish brown	brun verdâtre	grünlichbraun	marrón verdoso		1
		reddish brown	brun rougeâtre	rötlichbraun	marrón rojizo		2
		medium brown	brun moyen	mittelbraun	marrón medio		3
		dark brown	brun foncé	dunkelbraun	marrón oscuro		4
14.	VG	One-year-old shoot: size of vegetative bud	Rameau d'un an : taille du bourgeon à bois	Einjähriger Trieb: Größe der vegetativen Knospe	Rama de un año: tamaño de la yema vegetativa		
QN	(b)	small	petit	klein	pequeña		1
		medium	moyen	mittel	mediana		2
		large	grand	groß	grande		3
15.	VG	One-year-old shoot: shape of apex of vegetative bud	Rameau d'un an : forme du sommet du bourgeon à bois	Einjähriger Trieb: Form der Spitze der vegetativen Knospe	Rama de un año: forma del ápice de la yema vegetativa		
PQ	(b)	acute	aigu	spitz	agudo		1
		obtuse	obtus	stumpf	obtuso		2
		rounded	arrondi	abgerundet	redondeado		3
16.	[A] VG	One-year-old shoot: position of vegetative bud in relation to shoot	Rameau d'un an : position du bourgeon à bois par rapport au rameau	Einjähriger Trieb: Stellung der vegetativen Knospe im Verhältnis zum Trieb	Rama de un año: posición de la yema vegetativa en relación con la rama		
QN	(b)	adpressed	appliqué	anliegend	adpresa		1
		slightly held out	légèrement divergent	leicht abstehend	ligeramente divergente		2
		strongly held out	fortement divergent	deutlich abstehend	muy divergente		3
17.	VG	One-year-old shoot: size of vegetative bud support	Rameau d'un an : taille du support du bourgeon à bois	Einjähriger Trieb: Größe des Wulstes der vegetativen Knospe	Rama de un año: tamaño del soporte de la yema vegetativa		
QN	(b)	small	petit	klein	pequeño		1
		medium	moyen	mittel	mediano		2
		large	grand	groß	grande		3
18.	VG	Young shoot: color of upper part	Jeune rameau : couleur de la partie supérieure	Einjähriger Trieb: Farbe der Oberseite	Rama joven: color de la parte superior		
PQ	(c)	whitish	blanchâtre	weißlich	blanquecino		1
		greenish	verdâtre	grünlich	verdoso		2
		reddish	rougeâtre	rötlich	rojizo		3
		blackish	noirâtre	schwärzlich	negruzco		4

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
19. (*)	VG	Young shoot: extent of anthocyanin coloration	Jeune rameau : étendue de la pigmentation anthocyanique	Junger Trieb: Ausdehnung der Anthocyanfärbung	Rama joven: extensión de la pigmentación antocianica		
QN	(c)	absent or very small	absente ou très faible	fehlend oder sehr gering	ausente o muy pequeña		1
		small	faible	gering	pequeña		2
		medium	moyenne	mittel	media		3
		large	forte	groß	grande		4
		very large	très forte	sehr groß	muy grande		5
20. (*) (+)	VG	Leaf blade: attitude in relation to shoot	Limbe : port par rapport au rameau	Blattspreite: Haltung im Verhältnis zum Trieb	Limbo: porte en relación con la rama		
QN	(d)	upwards	dressé	aufrecht	erecto		1
		outwards	perpendiculaire	waagrecht	hacia afuera		2
		downwards	retombant	hängend	hacia abajo		3
21. (*)	VG/ MS	Leaf blade: length	Limbe : longueur	Blattspreite: Länge	Limbo: longitud		
QN	(d)	short	court	kurz	corto		3
		medium	moyen	mittel	medio		5
		long	long	lang	largo		7
22. (*)	VG/ MS	Leaf blade: width	Limbe : largeur	Blattspreite: Breite	Limbo: anchura		
QN	(d)	narrow	étroit	schmal	estrecho		3
		medium	moyen	mittel	medio		5
		broad	large	breit	ancho		7
23. (*) (+)	VG/ MS	Leaf blade: ratio length/width	Limbe : rapport longueur/largeur	Blattspreite: Verhältnis Länge/Breite	Limbo: relación longitud/anchura		
QN	(d)	very low	très bas	sehr klein	muy pequeña		1
		low	bas	klein	pequeña		2
		medium	moyen	mittel	media		3
		high	élevé	groß	grande		4
		very high	très élevé	sehr groß	muy grande		5
24. (*) (+)	VG	Leaf blade: profile in cross section	Limbe : profil en section transversale	Blattspreite: Profil im Querschnitt	Limbo: perfil de la sección transversal		
QN	(d)	concave	concave	konkav	cóncavo		1
		flat	plat	gerade	plano		2
		convex	convexe	konvex	convexo		3
25. (+)	VG	Leaf blade: length of tip	Limbe : longueur de l'extrémité	Blattspreite: Länge der Spitze	Limbo: longitud de la punta		
QN	(d)	short	courte	kurz	corta		1
		medium	moyenne	mittel	media		2
		long	longue	lang	larga		3

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
26.	VG	Leaf blade: incisions of margin	Limbe : incisions du bord	Blattspreite: Randeinschnitte	Limbo: incisiones del borde		
PQ	(d)	crenate	crênelées	gekerbt	crenadas		1
		bicrenate	bicrênelées	doppelt gekerbt	bicrenadas		2
		serrate type 1	dentelées type 1	gesägt Typ 1	serradas (tipo 1)		3
		serrate type 2	dentelées type 2	gesägt Typ 2	serradas (tipo 2)		4
		biserrate	bidentelées	doppelt gesägt	biserradas		5
27.	VG	Leaf blade: depth of incisions of margin	Limbe : profondeur des incisions du bord	Blattspreite: Tiefe der Randeinschnitte	Limbo: profundidad de las incisiones del borde		
QN	(d)	very shallow	très peu profondes	sehr flach	muy poco profundas		1
		shallow	peu profondes	flach	poco profundas		2
		medium	moyennes	mittel	medias		3
		deep	profondes	tief	profundas		4
		very deep	très profondes	sehr tief	muy profundas		5
28.	VG	Leaf blade: undulation of margin	Limbe : ondulation du bord	Blattspreite: Randwellung	Limbo: ondulación del borde		
QN	(d)	absent or very weak	absente ou très faible	fehlend oder sehr gering	ausente o muy débil		1
		weak	faible	gering	débil		2
		medium	moyenne	mittel	media		3
		strong	forte	stark	fuerte		4
29.	VG	Leaf blade: pubescence on lower side	Limbe : pubescence sur la face inférieure	Blattspreite: Behaarung der Unterseite	Limbo: pubescencia del envés		
QN	(d)	weak	faible	gering	escasa		1
		medium	moyenne	mittel	media		2
		strong	forte	stark	abundante		3
30.	VG	Leaf blade: glossiness of upper side	Limbe : brillance de la face supérieure	Blattspreite: Glanz der Oberseite	Limbo: brillo del haz		
QN	(d)	absent or very weak	absente ou très faible	fehlend oder sehr gering	ausente o muy débil		1
		weak	faible	gering	débil		2
		medium	moyenne	mittel	medio		3
		strong	forte	stark	fuerte		4
31.	VG	Leaf blade: intensity of green color	Limbe : intensité de la couleur verte	Blattspreite: Intensität der Grünfärbung	Limbo: intensidad del color verde		
QN	(d)	light	claire	hell	claro		1
		medium	moyenne	mittel	medio		3
		dark	foncée	dunkel	oscuro		5

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
32.	VG/ MS	Petiole: length	Pétiole : longueur	Blattstiel: Länge	Pecíolo: longitud		
QN	(d)	short	court	kurz	corto		1
		medium	moyen	mittel	medio		3
		long	long	lang	largo		5
33.	VG/ MS	Petiole: length relative to length of blade	Pétiole : longueur par rapport à la longueur du limbe	Blattstiel: Länge im Verhältnis zur Länge der Blattspreite	Pecíolo: longitud en relación con la longitud del limbo		
QN	(d)	short	bas	kurz	corto		1
		medium	moyen	mittel	medio		3
		long	élevé	lang	largo		5
34.	VG	Petiole: extent of anthocyanin coloration	Pétiole : étendue de la pigmentation anthocyanique	Blattstiel: Ausbreitung der Anthocyanfärbung	Pecíolo: extensión de la pigmentación antocianica		
QN	(d)	small	petite	gering	pequeña		1
		medium	moyenne	mittel	media		2
		large	grande	groß	grande		3
35.	VG	Stipule: size	Stipule : taille	Nebenblatt: Größe	Estípula: tamaño		
QN	(d)	small	petit	klein	pequeña		1
		medium	moyen	mittel	mediana		2
		large	grand	groß	grande		3
36.	[B] VG	Plant: number of flowers	Plante : nombre de fleurs	Pflanze: Anzahl Blüten	Planta: número de flores		
QN	(e)	none or few	nul ou petit	fehlend oder gering	nulo o bajo		1
		medium	moyen	mittel	medio		2
		many	grand	groß	alto		3
37.	[B] VG	Flower: color at balloon stage	Fleur : couleur au stade ballon	Blüte: Farbe im Ballonstadium	Flor: color en la fase de capullo		
PQ	(e)	light pink	rose pâle	hellrosa	rosa claro		1
		medium pink	rose moyen	mittelrosa	rosa medio		2
		medium red	rouge moyen	mittelrot	rojo medio		3
		dark red	rouge foncé	dunkelrot	rojo oscuro		4
		purple	pourpre	purpurn	púrpura		5
38.	[B] VG	Flower: arrangement of petals	Fleur : disposition des pétales	Blüte: Anordnung der Blütenblätter	Flor: disposición de los pétalos		
QN	(e)	free	disjoints	freistehend	libres		1
		intermediate	intermédiaires	mittel	intermedios		2
		overlapping	chevauchants	überlappend	solapados		3

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
39.	[B] VG (+)	Flower: diameter	Fleur : diamètre	Blüte: Durchmesser	Flor: diámetro		
QN	(e)	very small	très petit	sehr klein	muy pequeño		1
		small	petit	klein	pequeño		2
		medium	moyen	mittel	medio		3
		large	grand	groß	grande		4
40.	[B] VG (+)	Flower: position of stigmas relative to anthers	Fleur : position des stigmates par rapport aux anthères	Blüte: Stellung der Narben zu den Antheren	Flor: posición de los estigmas en relación con las anteras		
QN	(e)	below	en dessous	unterhalb	por debajo		1
		same level	au même niveau	auf gleicher Höhe	al mismo nivel		2
		above	au-dessus	oberhalb	por encima		3
41.	[B] VG	Fruit: size	Fruit : taille	Frucht: Größe	Fruto: tamaño		
QN	(f)	very small	très petit	sehr klein	muy pequeño		1
		small	petit	klein	pequeño		3
		medium	moyen	mittel	mediano		5
		large	gros	groß	grande		7
		very large	très gros	sehr groß	muy grande		9
42.	[B] VG (+)	Fruit: ratio length/width	Fruit : rapport longueur/largeur	Frucht: Verhältnis Länge/Breite	Fruto: relación longitud/anchura		
QN	(f)	very low	très bas	sehr klein	muy pequeña		1
		low	bas	klein	pequeña		2
		medium	moyen	mittel	media		3
		high	élevé	groß	grande		4
43.	[B] VG (+)	Fruit: shape	Fruit : forme	Frucht: Form	Fruto: forma		
PQ	(f)	conic waisted	conique étranglé	kegelförmig tailliert	cónico entallado		1
		conic	conique	kegelförmig	cónico		2
		ovate	ovale	eiförmig	oval		3
		oblate	aplatis	breitrund	achatado		4
		circular	circulaire	rundlich	circular		5
		elliptic	elliptique	elliptisch	elíptico		6
		oblong	oblong	rechteckig	oblongo		7
44.	[B] VG	Fruit: ribbing	Fruit : côtes	Frucht: Rippung	Fruto: acostillado		
QN	(f)	absent or very weak	absentes ou très faibles	fehlend oder sehr gering	ausente o muy débil		1
		weak	faibles	gering	débil		2
		medium	moyennes	mittel	medio		3
		strong	fortes	stark	fuerte		4

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
45.	[B] VG	Fruit: crowning at calyx end	Fruit : couronnement au sommet du calice	Frucht: Wülste oder Höcker am Kelchende	Fruto: remate del extremo calicinal		
QN	(f)	absent or very weak	absent ou très faible	fehlend oder gering	ausente o muy débil		1
		weak	faible	gering	débil		2
		medium	moyen	mittel	medio		3
		strong	fort	stark	fuerte		4
46.	[B] VG (+)	Fruit: ground color	Fruit : couleur de fond	Frucht: Grundfarbe	Fruto: color de fondo		
PQ	(f)	not visible	non visible	nicht sichtbar	no visible		1
		whitish yellow	jaune blanchâtre	weißlichgelb	amarillo blanquecino		2
		yellow	jaune	gelb	amarillo		3
		whitish green	vert blanchâtre	weißlichgrün	verde blanquecino		4
		yellow green	vert jaune	gelbgrün	verde amarillento		5
		green	vert	grün	verde		6
47.	[B] VG (+)	Fruit: over color	Fruit : couleur du lavis	Frucht: Deckfarbe	Fruto: color superficial		
PQ	(f)	orange red	rouge orangé	orangerot	rojo anaranjado		1
		pink red	rouge-rose	rosarot	rojo rosado		2
		red	rouge	rot	rojo		3
		purple red	rouge-pourpre	purpurrot	rojo púrpura		4
		brown red	rouge-brun	braunrot	rojo amarronado		5
48.	[B] VG	Fruit: relative area of over color	Fruit : surface relative du lavis	Frucht: Flächenanteil der Deckfarbe	Fruto: superficie relativa del color superficial		
QN	(f)	absent or very small	nulle ou très petite	fehlend oder sehr klein	nula o muy pequeña		1
		small	petite	klein	pequeña		3
		medium	moyenne	mittel	media		5
		large	grande	groß	grande		7
		very large	très grande	sehr groß	muy grande		9
49.	[B] VG	Fruit: length of stalk	Fruit : longueur du pédoncule	Frucht: Länge des Stieles	Fruto: longitud del pedúnculo		
QN	(f)	very short	très court	sehr kurz	muy corto		1
		short	court	kurz	corto		3
		medium	moyen	mittel	medio		5
		long	long	lang	largo		7
		very long	très long	sehr lang	muy largo		9

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
50.	[B] VG (+)	Fruit: aperture of locules in transverse section	Fruit : ouverture des loges carpellaires en section transversale	Frucht: Öffnung der Kernkammern im Querschnitt	Fruto: apertura de los lóculos en sección transversal		
QN	(f)	closed or slightly open	fermées ou légèrement ouvertes	geschlossen oder leicht offen	cerrados o ligeramente abiertos		1
		moderately open	modérément ouvertes	leicht offen	moderadamente abiertos		2
		fully open	complètement ouvertes	vollständig offen	completamente abiertos		3
51.	MG (*) (+)	Time of beginning of bud burst	Époque de début du débourrement	Zeitpunkt des Beginns des Knospenaufbruchs	Época de inicio de la brotación de las yemas		
QN		very early	très précoce	sehr früh	muy temprana		1
		early	précoce	früh	temprana		3
		medium	moyenne	mittel	media		5
		late	tardive	spät	tardía		7
		very late	très tardive	sehr spät	muy tardía		9
52.	[B] MG (+)	Time of beginning of flowering	Époque de début de la floraison	Zeitpunkt des Blühbeginns	Época de inicio de la floración		
QN		very early	très précoce	sehr früh	muy temprana		1
		early	précoce	früh	temprana		3
		medium	moyenne	mittel	media		5
		late	tardive	spät	tardía		7
		very late	très tardive	sehr spät	muy tardía		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:

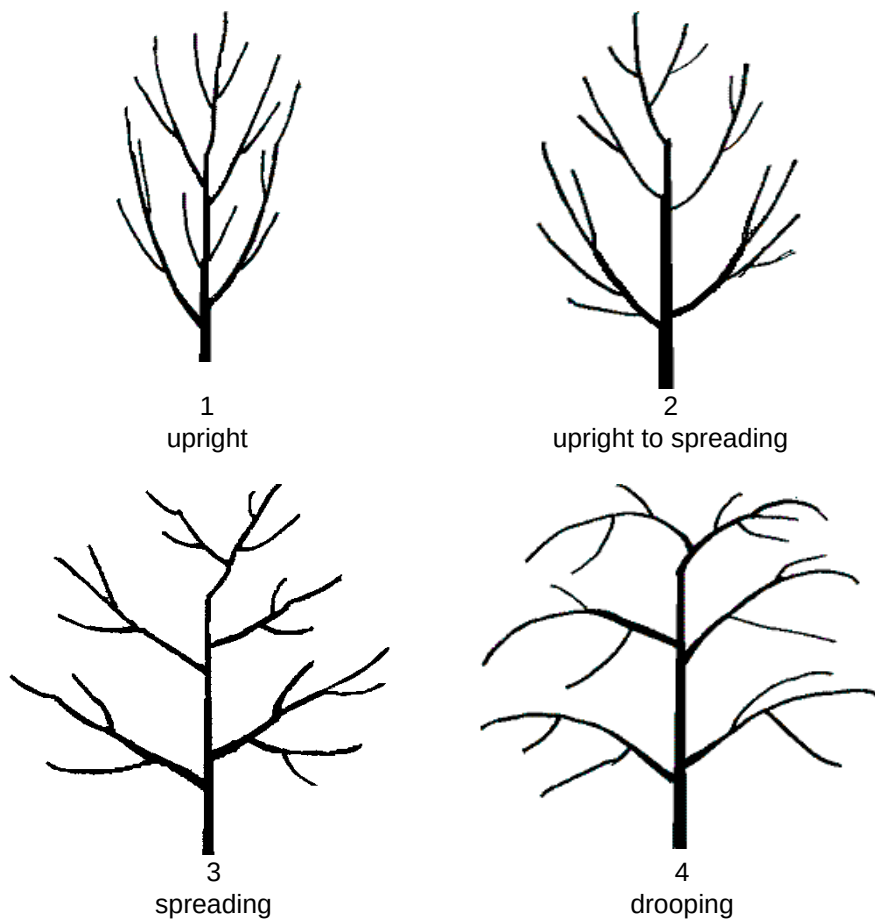
- (a) Plant: Observations on the plant should be made in the dormant season.
- (b) One-year-old shoot: Observations on the shoot should be made on the middle third of the one-year-old shoot in the dormant season.
- (c) Young shoot: Observation of the young shoot should be made on the upper third of the one-year-old shoot during rapid growth.
- (d) Leaf: Observations on the leaf should be made on fully developed leaves from the middle third of vigorous current season shoots.
- (e) Flower: Observations on the flower should be done on fully grown trees. Observations on the flower should be made on the second or subsequent flowers, at the start of dehiscence.
- (f) Fruit: Observations on the fruit should be done on fully grown trees. 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.

8.2 *Explanations for individual characteristics*

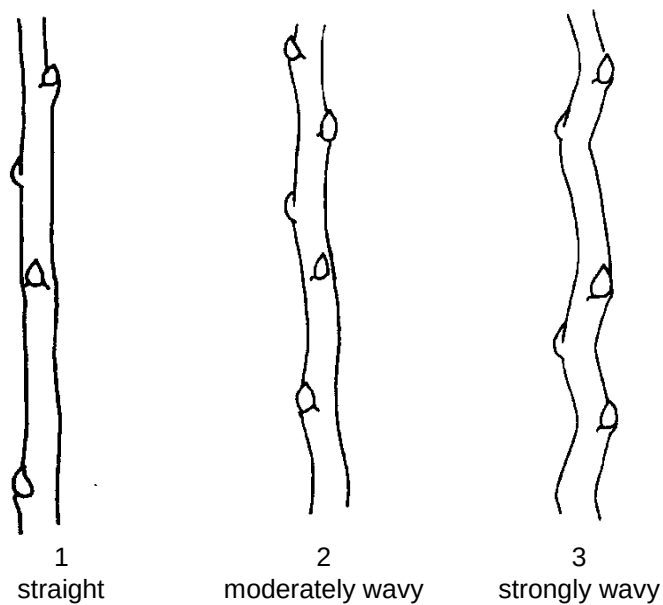
Ad. 1: Plant: vigor

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

Ad. 4: Plant: habit



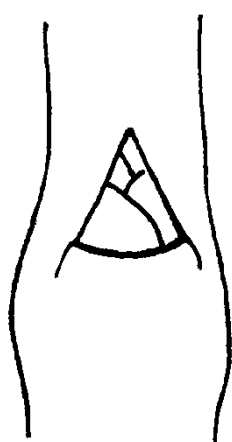
Ad. 6: One-year-old shoot: growth pattern



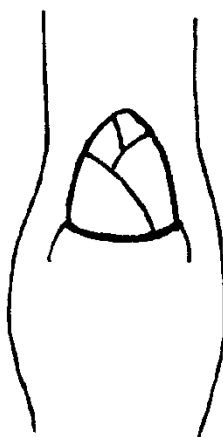
Ad. 7: One-year-old shoot: pubescence

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

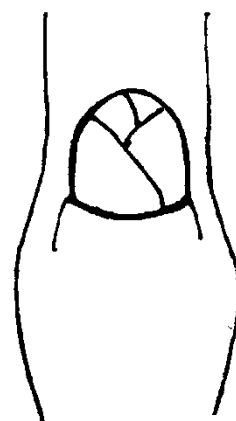
Ad. 15: One-year-old shoot: shape of apex of vegetative bud



1
acute

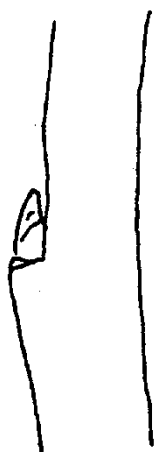


2
obtuse



3
rounded

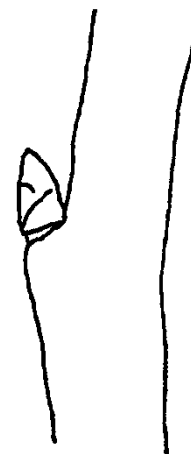
Ad. 16: One-year-old shoot: position of vegetative bud in relation to shoot



1
adpressed

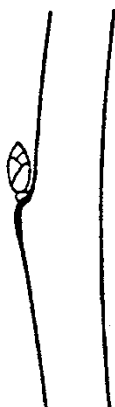


2
slightly held out



3
strongly held out

Ad. 17: One-year-old shoot: size of vegetative bud support



1
small



2
medium



3
large

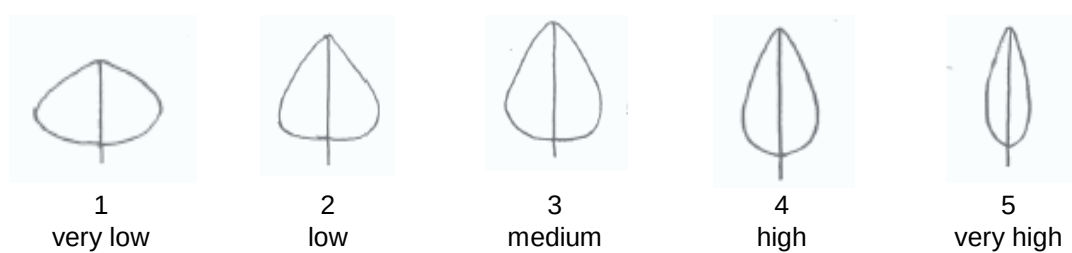
Ad. 18: Young shoot: color of upper part

The color observed should be of the underlying skin underneath the pubescence.

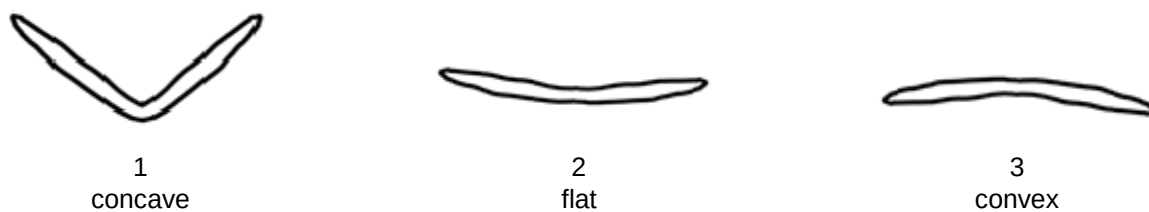
Ad. 20: Leaf blade: attitude in relation to shoot



Ad 23: Leaf blade: ratio length/width



Ad. 24: Leaf blade: profile in cross section



Ad. 25: Leaf blade: length of the tip



1
short



2
medium



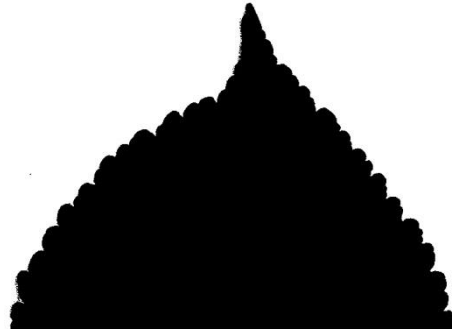
3
long

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. 33: Petiole: length relative to length of blade

Should be assessed regarding the length of the petiole compared to the length of the middle vein of the leaf.

Ad. 34: Petiole: extent of anthocyanin coloration

Should be assessed regarding the degree to which the anthocyanin coloration extends from the petiole base towards the base of the leaf.

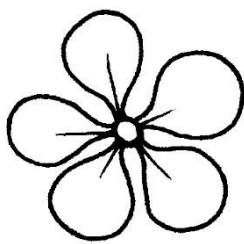
Ad. 36: Plant: number of flowers

Should be assessed as the amount of flowers present during the flowering period.

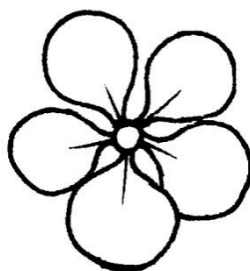
Ad. 37: Flower: color at balloon stage

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.

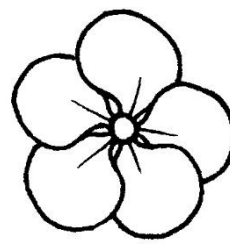
Ad. 38: Flower: arrangement of petals



1
free



2
intermediate

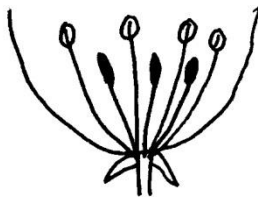


3
overlapping

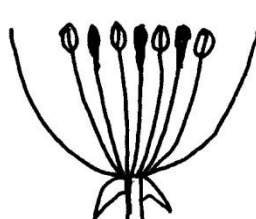
Ad. 39: Flower: diameter

The observation should be done with the petals pressed into a horizontal position.

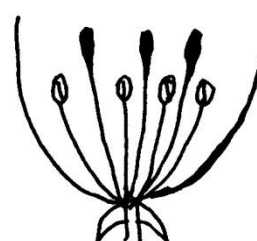
Ad. 40: Flower: position of stigmas relative to anthers



1
below



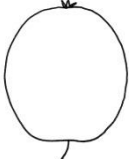
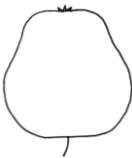
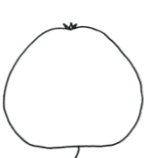
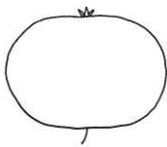
2
same level



3
above

Ad. 42: Fruit: ratio length/width

Ad. 43: Fruit: shape

← broadest part →		
below middle		at middle
narrow (high) ↑ width (ratio length/width) ↓ broad (low)		 7 oblong
		 6 elliptic
	 1 conic waisted	 2 conic
		 4 oblate

Ad. 46: Fruit: ground color

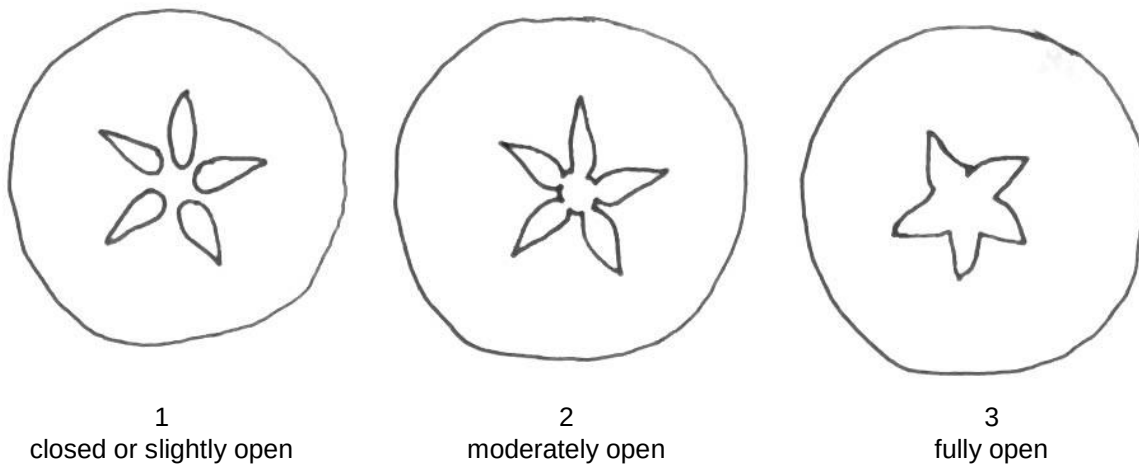
The ground color is the first color to appear chronologically during the development of the fruit. Other colors may develop in time in the form of spots, blotches, or a flush. The ground color is the color which has a continuous dispersion across the surface of the fruit.

Ad. 47: Fruit: over color

All observation should be done with the bloom removed.

In the case where the fruit has a ground color upon which a second color such as a flush develops over time, the flush is considered the over color. The over color is not always the color occupying the smallest surface area of the fruit concerned.

Ad. 50: Fruit: aperture of locules in transverse section



Ad. 51: Time of beginning of bud burst

The time of beginning of bud burst is when 10% of the buds show green points.

Ad. 52: Time of beginning of flowering

The time of beginning of flowering is when 10% of the flowers on the 5 trees are fully open.

9. Literature

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

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

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

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

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

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

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 Mallington Apple Rootstocks. Report East Malling Research Station for 1954, pp. 64-66, GB

10. Technical Questionnaire

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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	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 Genus	
1.1.1 Botanical name	Malus Mill.
1.1.2 Common name (please complete)	Apple Rootstocks
1.2 Species	
1.2.1 Botanical name (please complete)	
1.2.2 Common name	

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:
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#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)

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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4.2 Method of propagating the variety

4.2.1 Vegetative propagation

(a) cuttings []

(b) *in vitro* propagation []

(c) other (state method) []

4.2.2 Other []
(please provide details)

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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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 Plant: vigor (1)		
very weak		1[]
very weak to weak		2[]
weak		3[]
weak to medium		4[]
medium		5[]
medium to strong		6[]
strong		7[]
strong to very strong		8[]
very strong		9[]
5.2 Plant: number of shoots (in stoolbeds) (3)		
very few		1[]
few		2[]
medium		3[]
many		4[]
very many		5[]
5.3 Plant: habit (4)		
upright		1[]
upright to spreading		2[]
spreading		3[]
drooping		4[]
5.4 One-year-old-shoot: growth pattern (6)		
straight		1[]
moderately wavy		2[]
strongly wavy		3[]

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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Characteristics	Example Varieties	Note
5.5 Young shoot: extent of anthocyanin coloration (19)		
absent or very small		1[]
small		2[]
medium		3[]
large		4[]
very strong		5[]
5.6 Leaf blade: attitude in relation to shoot (20)		
upwards		1[]
outwards		2[]
downwards		3[]
5.7 Leaf blade: incisions of margin (26)		
crenate		1[]
bicrenate		2[]
serrate type 1		3[]
serrate type 2		4[]
biserrate		5[]
5.8 Time of beginning of bud burst (51)		
very early		1[]
very early to early		2[]
early		3[]
early to medium		4[]
medium		5[]
medium to late		6[]
late		7[]
late to very late		8[]
very late		9[]

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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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 the characteristic(s) for your candidate variety
<i>Example</i>	<i>Plant: vigor</i>	<i>weak</i>	<i>strong</i>
Comments:			

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
#7. Additional information which may help in the examination of the variety 7.1 Resistance to pests and diseases 7.2 Special conditions for the examination of the variety 7.3 Virus status (a) The variety is free from all known viruses as follows: [] (indicate from which viruses) (b) The plant material is virus tested [] (indicate against which viruses) (c) The virus status is unknown []		
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.		

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

.....

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	

[Annex follows]

REGIONAL SETS OF EXAMPLE VARIETIES

1. Asia

	Variety										
Characteristic	B 9	CG 6210	CG 4202	G 222	G 778	M 26	M 27	M 7	M 9	Marubakaido	MM 106
25.							1		2		
28.		4		1	1	3		3	2		
30.			4			1			3	4	2
37.	5						1	1	2		
38.							3	2	1		

2. Europe

[illegible]

3. New Zealand

	Variety												
Characteristic	Cepiland	CG 935	G 222	CG 202	M 116	M 793	M 25	M 26	M 27	M 9	M 7	MM 106	JM7
1.		6	1	3		6		4	3	2	5	7	2
2.				4			5	5	1	2		4	
4.	3			1	1								
5.				3						1			
6.				2			2			1			
7.								2	3	4		5	
8.				3				2	4			5	1
9.									1			2	
10.					2		1	2	1				
11.								3		2			
12.				2						2			
13.				2					3	2		4	2
14.				2					2	3		2	
15.					3					1			1
16.										2		1	
17.										1		3	
18.				3	1			4		3		2	
20.				2	1							2	3
24.					1					2			
25.				2	1				1	2			
32.				2					1	3		5	3
33.				3									
37													1
38													3
41.				3	7			7				9	1
43													5
46.								3		3		3	
48.					3								1
51.				1			5	9				3	

4. South Africa

Characteristic	Variety															
	Cepiland	CG 6210	CG 4204	CG 934	CG 202	G 222	G 228	G 707	G 778	M 793	M 27	M 26	M 25	M 9	M 7	Marubakaïdo
1				9		1				6	3	4		2	5	
2					4	1		4				3	5	2		7
3												3	5	2		
4						3		2							1	4
5					3								2	1		
6					2					2			3	1		
7										3				4		5
8					3						5					
9															1	2
10								3				2	1			
11										3				2		4
12														2		3
13											2	4	3	1		
14					2								1	3		
15										2				1	3	
16														2	1	
17														1	2	3
18												4		3		2
19					3	2					1				4	5
20								2	3	1					2	
21									7	5		3				
22									7			3		5		
23						2			4				1	5	2	3
24								2	1					2	2	
25					2							1				
26						2		1	5	2					2	5
27			2					3	4			1				3
28	3	4				1			1			3		2	3	2
29											2			1		3
30			4									1		3		4
31								3	1			5		3	1	5
32								5				1		3		
33					3				5						1	
34						1			2							3
35											1			2		3
36								3							2	1
37							4	3						2	1	
38	1					3								1	2	
39							1	3		2	4					
40							3			3					2	
41						3				5					5	7
42						4				1		2			3	
43										4						
44						4	2		1							
45						4	2	1								3
46							4		2	5				3		
47						3	2	3								
48							3	5		7						1

Characteristic	Variety																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
	MM 111			MM 109	5	3		MM 106			Marubakaïdo			M 7	1	M 9	3	M 25	5	M 26	9	M 27		M 793	1	G 778	3	G 707	9	G 228	7	2	G 222			CG 202	1	1	CG 934			CG 4204			CG 6210			Cepiland																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
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