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**INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS**  
GENEVA

**TECHNICAL WORKING PARTY  
FOR  
FRUIT CROPS**

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WORKING PAPER ON DRAFT TEST GUIDELINES FOR APPLE

*(MalusMill.)*

*Document prepared by expert from United Kingdom*

The attached document TG/14/9(proj.1) already incorporates the standard wording of document TGP/7.2, which was adopted by the Technical Committee at its thirty-eighth session in April 2002, and includes some additional standard wording from document TGP/7.1 Draft 1, also agreed at that session.

[Document TG/14/9(proj.1) follows]



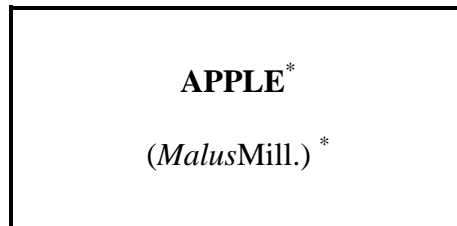


TG/14/9(proj.1) (TWF/33/11)

ORIGINAL: English

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**INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS**  
GENEVA



**GUIDELINES**

**FOR THE CONDUCT OF TESTS**

**FOR DISTINCTNESS, UNIFORMITY AND STABILITY**

Alternative Names: \*

Latin	English	French	German	Spanish
<i>Malus Mill.</i>	<b>Apple</b>	<b>Pommier</b>	<b>Apfel</b>	<b>Manzano</b>

**ASSOCIATED DOCUMENTS**

These guidelines should be read in conjunction with document TG/1/3, "General Introduction to the Examination of Distinctness, Uniformity and Stability and the Development of Harmonized Descriptions of New Varieties of Plants" (hereinafter referred to as the "General Introduction") and its associated "TGP" documents.

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\* 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](http://www.upov.int)), for the latest information.]

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1. Subject of these Guidelines

These Test Guidelines apply to all 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 trees, budwood or graftwood.

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

(a) Varieties resulting from crossing: 5 trees; 3 budsticks; or 5 dormant shoots for grafting;

(b) Varieties obtained from mutation: 10 trees; 6 budsticks; or 10 dormant shoots for grafting;

2.4 The plant material supplied should be visibly healthy, not lacking in vigor, nor affected by any important pest or disease.

2.5 The plant material should not have undergone any treatment which would affect the expression of the characteristics of the variety, unless the competent authorities allow or request such treatment. If it has been treated, full details of the treatment must be given.

3. Method of Examination

3.1 *Duration of Tests*

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

3.2 *Testing Place*

The tests should normally be conducted at one place. If any characteristics of the variety, which are relevant for the examination of DUS, cannot be seen at that place, the variety may be tested at an additional place.

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. In particular, it is essential that there is a satisfactory crop of fruit in both of the two growing cycles.

### 3.4 *Test Design*

3.4.1 Each test should be designed to result in a total of, at least, 5 trees for varieties resulting from crossing and 10 trees for varieties obtained from mutations.

3.4.2 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 *Number of Plants / Parts of Plants to be Examined*

#### 3.5.1 Varieties resulting from crossing

Unless otherwise indicated, all observations determined by measuring or counting should be made on 5 plants.

#### 3.5.2 Variety resulting from mutation

Unless otherwise indicated, all observations determined by measuring or counting should be made on 10 plants (2 parts taken from each of 5 plants or 1 part taken from each of 10 plants.)

### 3.6 *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 minimum duration of tests recommended in section 3.1 reflects, in general, the need to ensure that any differences in a characteristic are sufficiently consistent.

#### 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.

## 4.2 *Uniformity*

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:

4.2.1 In the case of varieties resulting from crossing, the acceptable number of off-types tolerated in a sample size of 5 plants is none on the basis of a population standard of 1% and an acceptance probability of 95%.

4.2.2 In the case of varieties obtained by mutation, the acceptable number of off-types tolerated in a sample size of 10 plants is 1 on the basis of a population standard of 2% and an acceptance probability of 95%.

## 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 tested, either by growing a further generation, or by testing a new seed or plant stock to ensure that it exhibits the same characteristics as those shown by the previous 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 is 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:

- (i) Fruit: shape (characteristic 36);
- (ii) Fruit: hue of over color of skin (characteristic 48);
- (iii) Fruit: pattern of over color of skin (characteristic 50);
- (iv) Fruit: striped varieties only – number of stripes (characteristic 51);
- (v) Time of beginning of flowering (characteristic 71);
- (vi) Time of maturity for consumption (characteristic 73).

5.4 Guidance for the use of grouping characteristics, in the process of examining distinctness, is provided through the General Introduction.

## 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*

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.

### 6.3 *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 Section 6.1.2

(QL) Qualitative characteristic – see Section 6.3

(QN) Quantitative characteristic – see Section 6.3

(PQ) Pseudo-Qualitative characteristic – see Section 6.3

(+) See Explanations on the Table of Characteristics in Chapter 8.



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

MoE <sup>o</sup>	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>1.</b> (+)	<b>Tree: vigor</b>	<b>Arbre: vigueur</b>	<b>Baum: Wuchsstärke</b>	<b>Árbol: vigor</b>		
	weak	faible	gering	débil	Akane	3
	medium	moyenne	mittel	medio	Golden Delicious	5
	strong	forte	stark	fuerte	Bramley's Seedling, Gloster	7
<b>2.</b> (*)	<b>Tree: type</b>	<b>Arbre: type</b>	<b>Baum: typ</b>	<b>Árbol:</b>		
	columnar	columnaire			Wijcik	1
	ramified	ramifié	verzweigt		Elstar	2
<b>3.</b> (*) (+)	<b>Tree: habit (columnar types excluded)</b>	<b>Arbre: port</b>	<b>Baum: Wuchsform</b>	<b>Árbol: porte</b>		
	fastigate	très dressé	sehr aufrecht	fastigiado	Benoni	1
	upright	dressé	aufrecht	erecto	Gloster	2
	spreading	divergent	auseinander fallend	rastrero	Bramley's Seedling, Jonagold	3
	drooping	retombant	überhängend	colgante	Jonathan	4
	weeping	pleureur	lang überhängend	llorón	Neild's Drooper, Summerred	5
<b>4.</b> (+)	<b>Tree: type of bearing</b>					
<b>NEW</b>	On spurs				Starkrimson Delicious	1
	On spurs and long shoots				Jonagold	2
	On long shoots				Rome Beauty	3

<sup>o</sup> MoE = Method of Examination

	MoE	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>5.</b>		<b>One-year-old shoot: thickness (CHANGED)</b>	<b>Rameau d'un an:</b>	<b>Einjähriger Trieb:</b>	<b>Rama de un año:</b>		
[5]		thin	mince	dunn		Laxton's Fortune, Remo	3
		medium	moyenne	mittel		Jonagold	5
		thick	epaisse	dick		Bramley's seedling	
		very thick				Charlotte, Telemon	7
<p><b>Proposal to delete: dependent to some extent on growing conditions, pruning etc; this year's wet early summer has produced very thick shoots on varieties previously recorded as medium. Also,shoots on one tree can be very variable – does one then only select the thickest?.</b></p>							
<b>6.</b>		<b>One-year-old shoot: length of internode</b>	<b>Rameau d'un an: longueur des entrenœuds</b>	<b>Einjähriger Trieb: Internodienlänge</b>	<b>Rama de un año: longitud del entrenudo</b>		
[6]		very short	très courts	sehr kurz		Wijcik	1
		short	courts	kurz	corta	Alkmene	3
		medium	moyens	mittel	media	Jonagold	5
		long	longs	lang	larga	Tumanga	7
		very long	très longs	sehr lang			9
<b>7.</b>		<b>One-year-old shoot: colour on sunny side</b>				<b>Examples need to be checked in winter.</b>	
<b>NEW</b>		greenish brown				Granny Smith	1
		reddish brown				Richared Delicious	2
		brown				Golden Delicoious	3

	MoE	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>8.</b>		<b>One-year-old shoot: pubescence (on upper half of shoot)</b>					
[4.]		absent or very weak	absente ou tres faible	fehlend oder sehr gering		Laxton's Fortune, Rewena	1
		weak	faible	gering		Golden Delicious	3
		medium	moyenne	mittel		Cox's Orange Pippin	5
		strong	forte	stark		Bramley's Seedling	7
		very strong	tres forte	sehr stark		Rambour d'Hiver	9
<b>9.</b>		<b>One-year-old shoot: number of lenticels</b>	<b>Rameau d'un an: nombre de lenticelles</b>	<b>Einjähriger Trieb: Anzahl der Lenticellen</b>	<b>Rama de un año: número de lenticelas</b>		
[7.]		few	petit	gering	escaso	Alkmene, Bramley's Seedling	3
		medium	moyen	mittel	medio	Cox's Orange Pippin	5
		many	grand	groß	muchos	Mutsu	7
<b>10.</b>		<b>One-year-old shoot: size of lenticels</b>				<b>Examples need to be checked in winter.</b>	
NEW		small				Beauty of Bath	3
		medium				James Grieve	5
		large				Jonagold	7
<b>11.</b>		<b>Leaf blade: attitude in relation to shoot</b>	<b>Limbe: port par rapport à la tige</b>	<b>Blattspreite: Haltung im Verhältnis zum Trieb</b>	<b>Limbo: porte en relación con la rama</b>		
[11]		upwards	dressé	aufwärts	ascendente	Katja, Redsleeves	3
		outwards	horizontal	abstehend	perpendicular	Bramley's Seedling	5
		downwards	retombant	abwärts	descendente	Belle de Boskoop, Granny Smith	7

**Comment:** In the new Pear guideline this characteristic is placed after the length/ width characteristics. As it is observed on the tree, before leaves are picked for measurement, it seems logical to leave the position of the characteristic as in TG 14/8.  
**Proposal:** to change wording of states to erect, horizontal, pendulous

	MoE	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>12.</b>		<b>Leaf blade: length</b>	<b>Limbe: longueur</b>	<b>Blattspreite: Länge</b>	<b>Limbo: longitud</b>		
(*)							
[12]		very short				Reanda	
		short	court	kurz	corta	Court Pendu Plat	3
		medium	moyen	mittel	media	Cox's Orange Pippin	5
		long	long	lang	larga	Bramley's Seedling	7
<b>13.</b>		<b>Leaf blade: width</b>	<b>Limbe: largeur</b>	<b>Blattspreite: Breite</b>	<b>Limbo: anchura</b>		
(*)							
		narrow	étroit	schmal	estrecha	Cox's Orange Pippin	3
		medium	moyen	mittel	media	Jonagold	5
		broad	large	breit	ancha	Bramley's Seedling	7
<b>14</b>		<b>Leaf blade: ratio length/width</b>	<b>Limbe: rapport longueur/largeur</b>	<b>Blattspreite: Ver- hältnis Länge/Breite</b>	<b>Limbo: relación entre la longitud y la anchura</b>		
(*)							
[14]		small	faible	klein	pequeña	Bramley's Seedling	3
		medium	moyen	mittel	media	Jonagold	5
		large	élevé	groß	grande	Granny Smith	7
<b>15.</b>		<b>Leaf blade: shape</b>					
(+)							
NEW		narrow elliptic				Granny Smith	1
		elliptic				Cox's Orange Pippin	2
		broad elliptic				Jonagold	3
		circular				Bramley's Seedling	4
<b>16.</b>		<b>Leaf blade: color</b>					
NEW		light green				Golden Delicious	2
		medium green				James Grieve	3
		dark green				Mutsu	4

	MoE	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>17.</b>		<b>Leaf blade: incisions of margin (upper half) (CHANGED)</b>	<b>Limbe: incisions du bord (moitié supérieure)</b>	<b>Blattspreite: Rand- einschnitte (obere Hälfte)</b>	<b>Limbo: incisiones del borde (mitad superior)</b>		
(+)							
[15]		crenate	crénelées	gekerbt	crenadas	Summerred	1
		bluntly serrate				Elstar, Gala	2
		sharply serrate				Sirprize	3

**Comment: biserrate was suggested by several people but without an example variety. The only good examples I can find are on obscure varieties that I am sure no one has heard of!**

<b>18.</b>		<b>Leaf blade: glossiness of upper surface</b>					
NEW (14/5)		absent or weak				Laxton's Superb	1
		intermediate				Alkmene, Granny Smith	2
		strong				Gala, Jonagold	3
<b>19.</b>		<b>Leaf blade: pubescence on lower side</b>	<b>Limbe : pilosité de la face inférieure</b>	<b>Blattspreite: Behaarung der Unterseite</b>			
NEW (14/5)		absent or weak				Golden Delicious	1
		intermediate				Cox's Orange Pippin, Elstar	2
		strong	forte	stark		James Grieve, Jonathan	3

**Comment on 17 and 18. These characteristics were in previous guidelines but were deleted from TG 14/5, mainly because of the difficulty in recording the correct state in the 3,5,7 scale. This difficulty should be solved by using weak, intermediate and strong states.**

<b>20.</b>		<b>Petiole: length</b>	<b>Pétiole: longueur</b>	<b>Blattstiel: Länge</b>	<b>Peciolo: longitud</b>		
(*)							
[16]		short	courte	kurz	corta	Jonagold	3
		medium	moyenne	mittel	media	Granny Smith	5
		long	longue	lang	larga	Falstaff	7

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>21</b>	<b>Petiole foot: amount of anthocyanin coloration</b>					
<b>NEW</b>	low				Golden Delicious, Jonagold	3
	medium				Cox's Orange Pippin, Gala	5
	high				Discovery, Richared Delicious	7
<b>22.</b>	<b>Stipule: size</b>	<b>Stipule : taille</b>	<b>Nebenblatt: Grosse</b>			
<b>NEW</b>	small	petite	klein		Granny Smith	3
	medium	moyenne	mittel		Gala	5
	large	grande	gross		Bramley's Seedling, Jonagold	7
<b>23. (* (+)</b>	<b>Unopened flower: Color (balloon stage)</b>	<b>Fleur non épanouie :Couleur (stade balloon)</b>	<b>UngeöffneteBlute: Farbe Ballonstadium)</b>			
<b>[8]</b>	white	blanche	weiss			1
	yellowish and pink	jaunatre et rose	gelblich und rosa		Schoner aus Herrenhut	2
	light pink	rose pale	hellrosa		Gravensteiner	3
	dark pink	rose fonce	dunkelrosa		Sylvia	4
	red	rouge	rot		Kidd's Orange red	5
	dark red				Weirouge	6
	purple	pourpre	purpur		Rafzubin	7

MoE	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>24.</b> (*)	<b>Flower : size: diameter of flower with petals pressed into horizontal position (CHANGED)</b>	<b>Fleur : taille : diametre de la fleur avec les petales etales dans un plan horizontal</b>	<b>Blute: Grosse – Durchmesser bei in waagrechte Position gedruckten Blütenblättern</b>			
[9]	very small	petite	klein		Spatbluhender Taffetapfel	1
	small				Jonafree	3
	medium	moyenne	mittel		Cox's Orange Pippin	5
	large	grande	gross		Belle de Boskoop	7

**Comment: In 14/8 there was a much larger difference between small and medium than between medium and large. In our conditions the examples are now correct and the difference between states are even.**

<b>25.</b> (*) (+)	<b>Flower: position of margins of petals (CHANGED)</b>	<b>Fleur: position des bords des pétales</b>	<b>Blüte: Stellung der Blütenblätter</b>	<b>Flor: posición de los bordes de los pétalos</b>		
[10]	apart	libres	freistehend	libres	Worcester Pearmain	1
	touching	tangents	sich berührend	tocándose	Golden Delicious, James Grieve	2
	overlapping	chevauchants	überlappend	solapándose	Belle de Boskoop, Golden Noble	3
	partly apart, partly touching or overlapping				Jonagold	4

**Comment: An alternative suggestion would be :- apart 1, partly apart, partly touching 2, touching 3 partly touching, partly overlapping 4 and overlapping 5. We need to have a characteristic for the state where only one or two petals are usually apart but the remaining petals are touching or overlapping. (Flowers of varieties of this type are often mixed and it would be difficult to say whether petals are predominantly touching or overlapping.)**

<b>26.</b> (+)	<b>Flower: petal shape</b>					
NEW	elliptic				Gala	2
	ovate				Golden Delicious	3
	circular				Bramley's Seedling	4

	English	français	deutsch	español	Example Varieties Exemples Beispielsorten Variedades ejemplo	Note/ Nota
<b>27</b>	<b>Flower: petal color</b>					
<b>NEW</b>	white				Worcester Pearmain	1
	yellowish white				Cox's Pomona	2
	pink				Bramley's seedling, Elstar	3
	red					4
<b>28.</b> (+)	<b>Flower: length of styles in relation to length of anthers</b>					
<b>NEW</b>	shorter					1
	same length				Cox's Orange Pippin	2
	longer				Golden Delicious	3
<b>29.</b> (+)	<b>Young fruit: amount of overcolor</b>					
<b>NEW</b>	absent or very low					1
	low					3
	medium					5
	high					7
	very high					9
<b>30.</b>	<b>Young fruit: intensity of overcolor</b>					
<b>NEW</b>	light					3
	medium					5
	dark					7
<b>31.</b> (*)	<b>Fruit: length</b>	<b>Fruit: longueur</b>	<b>Frucht: Länge</b>	<b>Fruto: longitud</b>		
<b>NEW</b>	short	court	kurz	corto		3
	medium	moyen	mittel	medio		5
	long	long	lang	largo		7



	English	français	deutsch	español	Example Varieties Exemples Beispielsorten Variedades ejemplo	Note/ Nota
<b>MoE</b>						
<b>32. (*)</b>	<b>Fruit: diameter</b>	<b>Fruit: diamètre</b>	<b>Frucht: Durchmesser</b>	<b>Fruto: diámetro</b>		
<b>NEW</b>	small	petit	klein	pequeño		3
	medium	moyen	mittel	medio		5
	large	grand	groß	grande		7

**Comment: The stalk to calyx axis of apple fruit is traditionally known as the ‘height’ and the transverse axis as the ‘width’. Do we use fruit ‘length’ and ‘diameter’ as in the new Pear Guidelines, (as above,) or ‘height’ and ‘width’ as in previous Apple Guidelines and in apple descriptions published during the last 200 years?**

<b>33. (*)</b>	<b>Fruit: ratio length/ diameter</b>	<b>Fruit: rapport longueur/diamètre</b>	<b>Frucht: Verhältnis Länge/Durchmesser</b>	<b>Fruto: relación longitud/diámetro</b>		
<b>[18]</b>	very small	très petit	sehr klein	muy pequeña	Court Pendu Plat, Ingol	1
	small	petit	klein	pequeña	Ontario	3
	medium	moyen	mittel	mediana	Jonagold	5
	large	grand	groß	grande	Golden Delicious	7
	very large	très grand	sehr groß	muy grande	Iduna	9
<b>34. (*)</b>	<b>Fruit: position of maximum width</b>	<b>Fruit: position de la largeur maximale</b>	<b>Frucht: Position des maximalen Breite</b>			
<b>[19]</b>	towards calyx	vers le calice	zum Kelch hin		Empire	1
	in middle	au milieu	in der Mitte		Idared	2
	towards stalk	vers le pedoncule	zum Stiel hin		Jonagold	3

**Proposal to delete: shape characteristic gives the same information. Examples in TG 14/8 may appear to be correct but measurements show that the eye is being deceived and the maximum width, especially for states 1 and 2, is usually in the middle. The degree of tapering of the fruit, either towards the stalk, or equally towards both stalk and calyx gives the impression that the maximum width is towards the calyx.**

	English	français	deutsch	español	Example Varieties Exemples Beispielsorten Variedades ejemplo	Note/ Nota
<b>35.</b> <b>(*)</b>	<b>Fruit: size</b>					
[17]	very small	tres petit	sehr klein		Api, Api Noir	1
	very small to small	tres petit a petit	sehr klein bis klein		Golden Harvey	2
	small	petit	klein		Miller's Seedling	3
	small to medium	petit a moyan	klein bis mittel		Alkmene	4
	medium	moyan	mittel		Cox's Orange Pippin	5
	medium to large	moyan a gros	mittel bis gross		Gravensteiner	6
	large	gros	gross		Mutsu	7
	large to very large	gros a tres gros	gross bis sehr gross		Bramley's Seedling	8
	very large	tres gros	sehr gross		Howgate Wonder	9

**Comment: The general opinion of the subgroup is to keep this characteristic in addition to height and width, however within the genetically controlled limits, there can be great variation in size dependant on the amount of crop, amount of thinning etc.**

MoE <sup>o</sup>	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>36.</b> (*) (+)	<b>Fruit:shape (CHANGED)</b>					
[20]	globose				Golden Noble, Resi	1
	globose conical				Cox's Orange Pippin, Jonagold	2
	obloid conical				Regia	3
	transverse ellipsoid				Court Pendu Plat, Discovery	4
	obloid				Bramley's Seedling, Idared	5
	conical				Adam's Pearmain, Pinova	6
	narrow conical				Kent, Saturn	7
	truncate conical				Kidd's Orange Red, Melodie	8
	ellipsoid				Spencer	9
	ovoid				Summerred	10
	oblong				Gravensteiner, Mutsu	11
	oblong conical				Catshead, Close	12
	oblong waisted				Gloster	13

**Comment:to discuss whether we continue to use these traditional shapes or to use a system as in Pear. A suggested scheme used by Germany will be included in the annex.**

<b>37.</b>	<b>Fruit: symmetry</b>					
<b>NEW</b>	symmetrical					1
	slightly asymmetrical					2
	strongly asymmetrical					3

	MoE	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>38.</b>		<b>Fruit: ribbing</b>					
[21]		absent or very weak	absent ou tres faible	fehlend oder sehr gering		Charles Ross, Discovery	1
		weak	faible	gering		James Grieve	3
		medium	moyenne	mittel		Golden Delicious	5
		strong	forte	stark		Red Delicious	7
		very strong	tres forte	sehr stark		Bloody Ploughman	9

**Propose to delete: characteristic is more for description than for DUS. Alternative would be to have shape in Transverse Section. (see annex)**

<b>39.</b>		<b>Crowning at calyx end (CHANGED)</b>					
[22]		absent or very weak	absent ou tres faible	fehlend oder sehr gering		Charles Ross, Discovery	1
		intermediate				Cox's Orange Pippin	2
		strong	forte	stark		Red Delicious	3

<b>40. (* )</b>		<b>Fruit: size of eye</b>					
[24]		small	petit	klein		McIntosh	3
		medium	moyen	mittel		Cox's Orange Pippin	5
		large	grand	gross		Ingol, Monarch	7

<b>41. (* )</b>		<b>Fruit: aperture of eye</b>					
[23]		closed	ferme	geschlossen		Worcester Pearmain	1
		partly open	partiellement ouvert	teilweise offen		Cox's Orange Pippin	2
		fully open	completement ouvert	vollkommen offen		Gravensteiner, Orleans Reinette	3

**Comment: At harvest or after storage? I think that we should state which, or record at both?**

	MoE	English	français	deutsch	español	Example Varieties Exemples Beispielsorten Variedades ejemplo	Note/ Nota
<b>42.</b>		<b>Fruit: length of sepal</b>					
[25]		short	court	kurz		McIntosh	3
		medium	moyen	mittel		Sampion	5
		long	long	lang		Gala	7
<b>43.</b>		<b>Fruit: scarf skin</b>					
<b>NEW from 14/5</b>		absent				Gala	1
		present				Ontario	9
<b>44.</b>		<b>Fruit: bloom of skin</b>	<b>Fruit : pruine de l'epiderme</b>	<b>Frucht: Bereifung der Schale</b>			
[32]		absent or very weak	absent ou tres faible	fehlend oder sehr gering		Golden Delicious	1
		weak	faible	gering		James Grieve	3
		strong	fort	stark		Vicking, Vista Bella	7
<b>45.</b>		<b>Fruit: greasiness of skin</b>	<b>Fruit : etat cireux de l'epiderme</b>	<b>Frucht: Fettigkeit der Schale</b>			
[33]		absent or very weak	absent ou tres faible	fehlend oder sehr gering		Belle de Boskoop	
		weak	faible	gering		James Grieve	
		strong	fort	stark		Arlet	

**Proposal to delete: greasiness can depend on maturity , time of examination, type of storage etc. If kept, the time of examination be stated eg. At harvest or after storage?**

	English	français	deutsch	español	Example Varieties Exemples Beispielsorten Variedades ejemplo	Note/ Nota
<b>46. (*)</b>	<b>Fruit: ground color of skin (CHANGED)</b>	<b>Fruit: couleur du fond de l'épiderme</b>	<b>Frucht: Grundfarbe der Schale</b>	<b>Fruto: color de fondo de la epidermis</b>		
[34]	not visible	non visible	nicht sichtbar	no visible	Red Jonaprince	1
	whitish yellow				White Transparent	2
	yellow	jaune	gelb	amarillo	Delorgue, Transparent de Croncels	3
	whitish green				Akane, Angold, White Transparent	4
	yellow green	vert-jaune	gelbgrün	verde amarillento	Cox's Orange Pippin	5
	green	vert	grün	verde	Granny Smith	6
<b>47. (*)</b>	<b>Fruit: relative area of over color of skin</b>	<b>Fruit: proportion de lavis de l'épiderme</b>	<b>Frucht: Deckfarbenanteil der Schale</b>	<b>Fruto: zona relativa de color superficial de la epidermis</b>		
[35]	absent or very small	nulle ou très petite	fehlend oder sehr klein	ausente o muy pequeña	Granny Smith	1
	small	petite	klein	pequeña	Cox's Orange Pippin, Tumanga	3
	medium	moyenne	mittel	media	Gala	5
	large	grande	groß	grande	Spartan	7
	very large	très grande	sehr groß	muy grande	Nouvelle Europe, Red Jonaprince	9

	MoE	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>48.</b>		<b>Fruit: hue of over color –bloom (if any) removed (CHANGED)</b>	<b>Fruit: teinte du lavis</b>	<b>Frucht: Ton der Deckfarbe</b>	<b>Fruto: tono del color superficial</b>		
[36]		orange red	rouge orangé	orangerot	rojo anaranjado	Cox's Orange Pippin, Egremont Russet	2
		pink red	rouge-rose	rosarot	rojo rosado	Cripps Pink, Delorgue	3
		light red	rouge clair	hellrot	rojo claro	Akane, Red Elstar	4
		dark red	rouge foncé	dunkelrot	rojo oscuro	Galaxy, Regal Prince	5
		very dark red				Red Jonaprince, Spartan	6
		brownish red				Fiesta, Lord Burghley	7

**Comment: Purple is replaced by 'very dark red'? Apples are only purple if covered in heavy bloom. We should look at the colour with the bloom removed, as in plums. The colour of the apples one has to describe as purple are not the colour of for example purple plums. The RHS colour chart does not have the exact match .**

<b>49.</b>		<b>Fruit: intensity of over color</b>					
[37]		light				Miller's Seedling	3
		medium				Red Elstar	5
		dark				Red Jonaprince	7

	MoE	English	français	deutsch	español	Example Varieties Exemples Beispielsorten Variedades ejemplo	Note/ Nota
<b>50.</b>		<b>Fruit: pattern of over color of skin</b>					
	(*)						
[38]		only solid flush				Red Jonaprince, Richard Delicious	1
		only striped (no flush)					2
		solid flush with indistinct stripes				Galaxy	3
		equally flushed and striped				Jonagored	4
		predominately striped with indistinct flush					5
		mottled				Elstar	6
		washed out (faded)				Gloster	7
<b>Comment: Suggestions for examples needed. Propose to delete 'only striped' as I do not think any varieties are striped on a background colour without any flush.</b>							
<b>51.</b>		<b>Fruit: striped varieties only – number of stripes</b>					
	(*)						
NEW		few					3
		medium					5
		many					7
<b>52.</b>		<b>Fruit: relative area of russet around stalk attachment</b>	<b>Fruit: proportion de liège autour du pédoncule</b>	<b>Frucht: anteilige Fläche der Berostung im Bereich des Stielansatzes</b>	<b>Fruto: zona relativa de russeting en torno a la base peduncular</b>		
	(*)						
[41]		absent or very small	nulle ou très petite	fehlend oder sehr klein	ausente o muy pequeña	Golden Noble, Piros	1
		small	petite	klein	pequeña	Elstar	3
		medium	moyenne	mittel	media	Alkmene	5
		high				Kaiser Wilhelm	7
		very high				Egremont Russet	9



MoE	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>53.</b>	<b>Fruit: relative area of russet on cheeks</b>	<b>Fruit: proportion de liège sur les joues</b>	<b>Frucht: anteilige Fläche der Berostung auf den Wangen</b>	<b>Fruto: zona relativa de russeting en las caras</b>		
[40]	absent or very small	nulle ou très petite	fehlend oder sehr klein	ausente o muy pequeña	Golden Noble	1
	small	petite	klein	pequeña		3
	medium	moyenne	mittel	media	Karmijn de Sonnaville	5
	large	grande	groß	grande	Zabergau Reinette	7
	very large	très grande	sehr groß	muy grande	Egremont Russet, Princesse	9
<b>54. (*)</b>	<b>Fruit: relative area of russet around eye basin</b>	<b>Fruit: proportion de liège autour de la cuvette de l'oeil</b>	<b>Frucht: anteilige Fläche der Berostung im Bereich der Kelchgrube</b>	<b>Fruto: zona relativa de russeting en la cavidad del ojo</b>		
[39]	absent or very small	nulle ou très petite	fehlend oder sehr klein	ausente o muy pequeña	Golden Noble	1
	small	petite	klein	pequeña		3
	medium	moyenne	mittel	media	Cox's Orange Pippin	5
	large	grande	groß	grande	Arlet	7
	very large	très grande	sehr groß	muy grande		9
<b>Comment: should russet characteristics be better described by the states: absent or very small, intermediate and large?</b>						
<b>55.</b>	<b>Fruit: number of lenticels</b>					
<b>NEW</b>	few				James Grieve	3
	medium				Golden Delicious	5
	many				Granny Smith	7
<b>56. (*)</b>	<b>Fruit: size of lenticels</b>	<b>Fruit: taille des lenticelles</b>	<b>Frucht: Grosse der Lentizellen</b>			
[42]	small	petites	klein		Jonathan	3
	medium	moyanne	mittel		Elstar	5
	large	grandes	gross		Reine de Reinettes	7

	MoE	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>57.</b>		<b>Fruit: thickness of skin</b>					
<b>NEW from 14/5</b>		thin				Gala, Rubin	3
		medium				Gloster, Jonagold	5
		thick				Florina, Starkrimson Delicious	7
<b>58. (*)</b>		<b>Fruit: length of stalk</b>	<b>Fruit: longueur du pédoncule</b>	<b>Frucht: Länge des Stiels</b>	<b>Fruto: longitud del pedúnculo</b>		
<b>[29]</b>		very short	tres court	sehr kurz		Egremont Russet	1
		short	court	kurz	corta	Cox's Orange Pippin	3
		medium	moyen	mittel	media	Worcester Pearmain	5
		long	long	lang	larga	Richared Delicious	7
		very long	tres long	sehr lang		Rewena	9
<b>59. (*)</b>		<b>Fruit: thickness of stalk</b>	<b>Fruit: grosseur du pédoncule</b>	<b>Frucht: Dicke des Stiels</b>	<b>Fruto: grosor del pedúnculo</b>		
<b>[28]</b>		thin	fin	dünn	fino	Golden Delicious	3
		medium	moyen	mittel	medio	Cox's Orange Pippin	5
		thick	gros	dick	grueso	Belle de Boskoop	7
<b>60. (*) (+)</b>		<b>Fruit: depth of stalk cavity</b>	<b>Fruit: profondeur de la cavité du pédoncule</b>	<b>Frucht: Tiefe der Stielgrube</b>	<b>Fruto: profundidad de la cavidad peduncular</b>		
<b>[30]</b>		shallow	peu profonde	flach	poco profunda	Edward VII	3
		medium	moyenne	mittel	media	Bramley's Seedling	5
		deep	profonde	tief	profunda	Belle de Boskoop	7
<b>61. (+)</b>		<b>Fruit: width of stalk cavity</b>					
<b>[31]</b>		narrow	Petite	schmal		Beauty of Bath	3
		mediuym	Moyenne	Mittel		Golden Delicious	5
		broad	grande	Breit		Bramley's Seedling	7

MoE <sup>o</sup>	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>62.</b> (* (+)	<b>Fruit: depth of eye basin</b>	<b>Fruit: profondeur de la cuvette de l'œil</b>	<b>Frucht: Tiefe der Kelchgrube</b>	<b>Fruto: profundidad de la cavidad del ojo</b>		
[26]	shallow	peu profonde	flach	poco profunda	Worcester Pearmain	3
	medium	moyenne	mittel	media	Golden Delicious	5
	deep	profonde	tief	profunda	Bramley's Seedling, Delcorf	7
<b>63.</b> (+)	<b>Fruit: width of eye basin</b>	<b>Fruit: largeur de la cuvette de</b>	<b>Frucht: Breite der</b>	<b>Fruto: anchura de la cavidad del ojo</b>		
[27]	narrow	étroite	schmal	estrecho	Worcester Pearmain Pinova	3
	medium	moyenne	mittel	medio	Golden Delicious	5
	broad	large	breit	ancho	Bramley's Seedling	7
<b>64.</b>	<b>Fruit: texture of flesh</b>	<b>Fruit: texture de la chair</b>	<b>Frucht: Textur des Fruchtfleisches</b>	<b>Fruto: textura de la pulpa</b>		
<b>NEW from 14/5</b>	fine	fine	fein	fina	McIntosh	3
	medium	moyenne	mittel	media	Cox's Orange Pippin	5
	coarse	grossière	grob	grosera	Mutsu	7
<b>65.</b> (* (+)	<b>Fruit: firmness of flesh</b>	<b>Fruit: fermeté de la chair</b>	<b>Frucht: Festigkeit des Fruchtfleisches</b>	<b>Fruto: firmeza de la pulpa</b>		
[43]	very soft	tres molle	sehr weich		Astrachan	1
	soft	molle	weich	blanda	Jonagold	3
	medium	moyenne	mittel	media	Cox's Orange Pippin	5
	firm	ferme	fest	firme	Kent	7
	very firm	tres ferme	sehr fest		Pilot	9

	MoE	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>66.</b>		<b>Fruit: juiciness of flesh</b>	<b>Fruit: succulence de la chair</b>	<b>Frucht: Saftigkeit des Fruchtfleisches</b>	<b>Fruto: succulencia de la pulpa</b>		
<b>NEW from 14/5</b>		dry	sèche	trocken	seca	Egremont Russet	3
		medium	moyenne	mittel	media	Cox's Orange Pippin	5
		juicy	juteuse	saftig	jugosa	Jonagold	7
<b>67. (*)</b>		<b>Fruit: color of flesh (CHANGED)</b>	<b>Fruit: couleur de la chair</b>	<b>Frucht: Farbe des Fruchtfleisches</b>			
<b>[44]</b>		white	blanche	weiss		Akane, Spartan	1
		whitish yellow				Jonagold	2
		yellowish	jaunatre	gellich		Delorina, Gala, Topaz	3
		pink	rose	rosa			4
		red				Weirouge	5
		greenish	verdatre	grunlich		Gloster, Granny Smith	6
<b>Proposal –Cox's Orange Pippin only has yellowish flesh when overripe. At maturity for consumption the flesh colour is similar to that of Jonagold. – whitish yellow.</b>							
<b>68. (*) (+)</b>		<b>Fruit in transverse section: aperture of locules</b>	<b>Fruit en section transversale: ouverture des loges carpellaires</b>	<b>Frucht im Querschnitt: Oeffnung der Kernkammern</b>			
<b>[45]</b>		closed	fermees	geschlossen		Worcester Pearmain	1
		partly open	Partiellement ouvertes	Teilweise offen		Reine de Reinettes	2
		fully open	Complettement ouvertes	Vollkommen offen		McIntosh	3
<b>69.</b>		<b>Seed: size</b>					
<b>NEW</b>		small					3
		medium					5
		large					7

MoE <sup>o</sup>	English	français	deutsch	español	Example Varieties Exemples Beispielsorten Variedades ejemplo	Note/ Nota
<b>70.</b>	<b>Seed: color</b>					
<b>NEW</b>	light brown					1
	dark brown					2
	red brown					3
	grey brown					4
	black brown					5
<b>71. (* )</b>	<b>Time of beginning of flowering</b>	<b>Époque de début de floraison</b>	<b>Zeitpunkt des Blüh- beginns</b>	<b>Época del inicio de la floración</b>		
<b>[46]</b>	very early	très précoce	sehr früh	muy precoz	Ein-Shemer	1
	early	précoce	früh	precoz	Idared	3
	medium	moyenne	mittel	media	Cox's Orange Pippin, Jonagold	5
	late	tardive	spät	tardía	Court Pendu Plat	7
	very late	très tardive	sehr spät	muy tardía	Feuilmorte, Spatbluhender Taffetapfel	9
<b>72.</b>	<b>Time of maturity for harvest</b>					
<b>NEW</b>	very early				Vista Bella	1
	early				Discovery, Jersey mac	3
	medium				Cox's Orange Pippin	5
	late				Golden Delicious, Jonagold	7
	very late				Braeburn, Fuji, Granny Smith	9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>73. (*)</b>	<b>Time of maturity for consumption</b>	<b>Époque de maturité pour la consommation</b>	<b>Zeitpunkt der Genussreife</b>	<b>Época de madurez para el consumo</b>		
[47]	very early	très précoce	sehr früh	muy precoz	Vista Bella	1
	early	précoce	früh	precoz	Discovery, Jersey mac	3
	medium	moyenne	mittel	media	Elstar	5
	late	tardive	spät	tardia	Fuji	7
	very late	très tardive	sehr spät	muy tardía	Cripps Pink, Granny Smith,	9

**Comment: This characteristic is very dependant on time picked and the storage conditions if stored at all. Early varieties are eaten straight from the tree and are not stored. Late varieties are either left on the tree for as long as possible and are then picked and may or may not undergo further storage before they are mature for consumption or they can be picked earlier and stored for longer. The latter is the main commercial practice. I.e.: Early varieties are treated differently from late varieties. TG 14/8 only gives that fruit is examined at peak maturity. Do we need some written guidance? (TG 14/1 states that fruit should be stored under natural storage conditions - advice on storage and examination was left out of subsequent guidelines) Should fruit be left on the tree to mature or picked at the commercial time for long-term storage or left that individual states do their own thing?**

8. Explanations on the Table of Characteristics

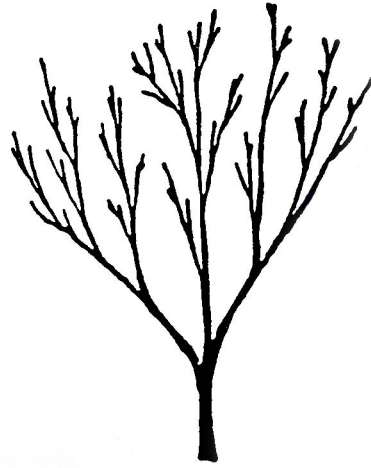
Ad. 1: Tree vigor

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

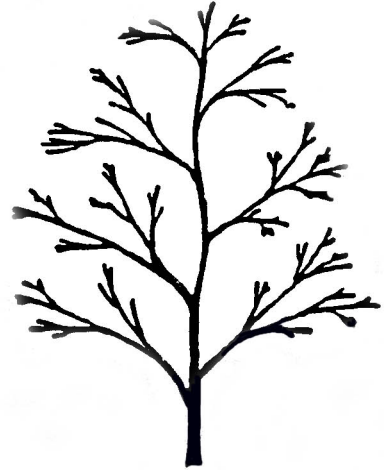
Ad. 3: Tree: habit



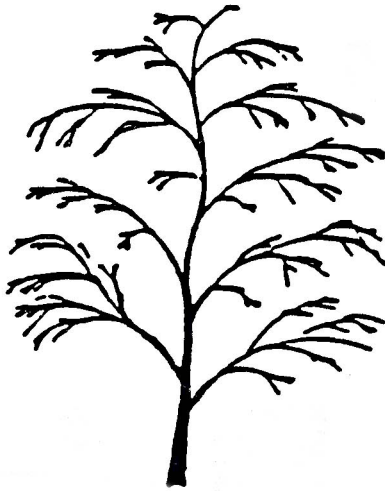
1  
fastigate



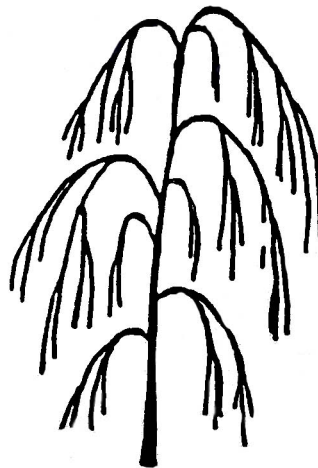
2  
upright



3  
spreading

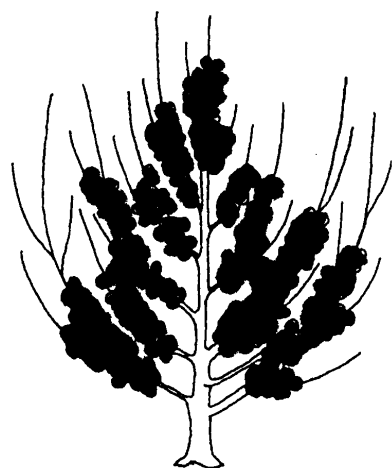


4  
drooping

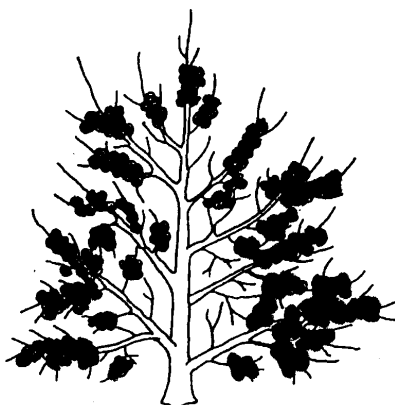


5  
weeping

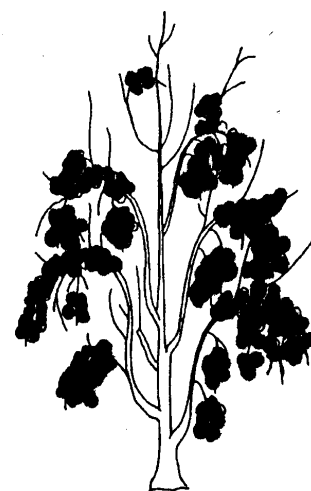
Ad. 4. Tree: type of bearing



1  
on spurs



2  
on spurs and long shoots



3  
on long shoots

Ad. 5 – Ad. 10: One-year-old shoot:

Unless otherwise stated, all observations on one-year-old shoots should be made on lateral dormant shoots in winter, on trees that have completed at least one growing season at the testing centre.

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

The thickness of the one-year-old shoot should be observed in the centre of the middle internode. Measurements can be made using a vernier caliper gauge.

Ad. 6: One-year-old shoot: length of internodes

The length of the internode should be observed in the middle third of the shoot.

Ad. 11 - :Ad. 23: Leaf blade, Petiole and stipule

Unless otherwise stated, all observations on the leaf, petiole and stipule should be made in summer on mature leaves from the middle third of vigorous current seasons shoots from the outside of the tree..



Ad. 11: Leaf blade: attitude in relation to shoot

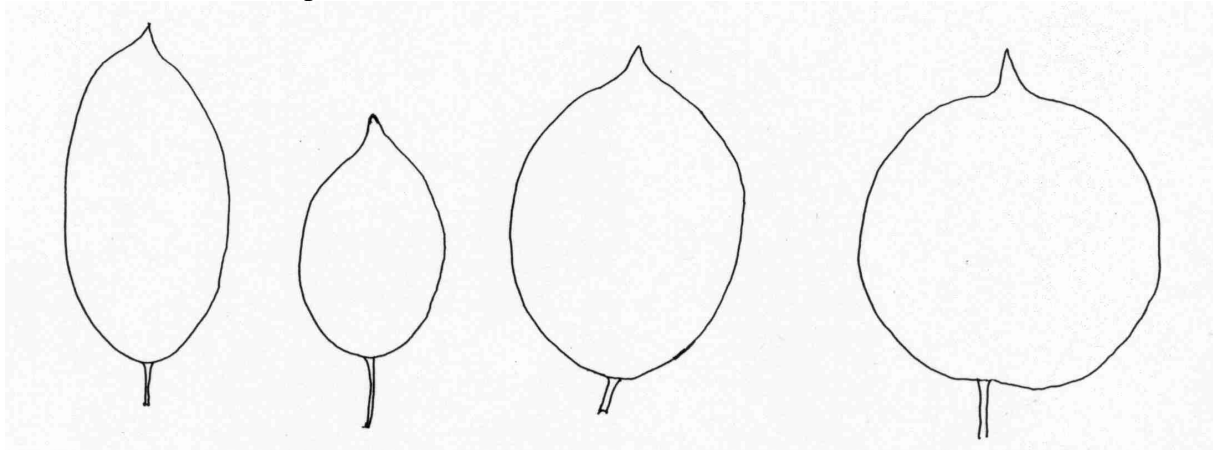


3  
upwards

5  
outwards

7  
downwards

Ad. 15: Leaf blade: shape



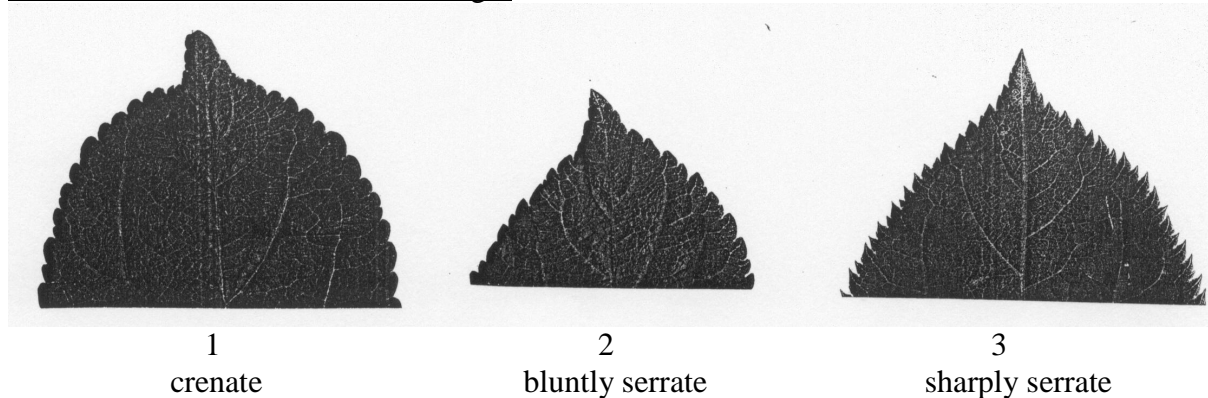
1  
narrow elliptic

2  
elliptic

3  
broad elliptic

4  
circular

Ad. 17: Leaf blade: incisions of margin



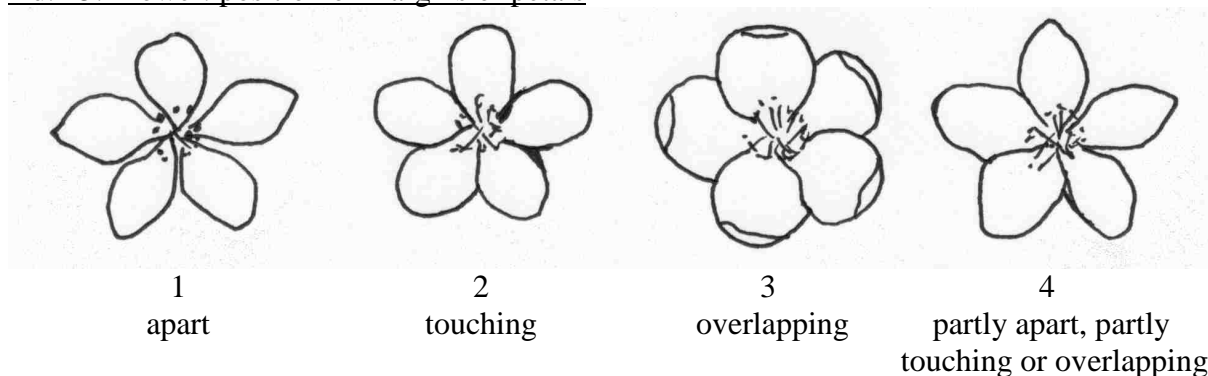
Ad. 23: Unopened flower

Unless otherwise stated, all observations on the unopened flower should be made on the second or third flower bud when the terminal (king) flower is opening.

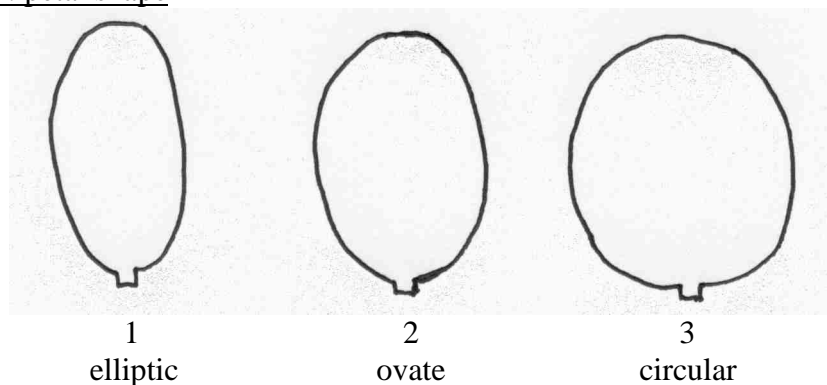
Ad 24 - Ad. 28: Flower

Unless otherwise stated, all observations on the flower should be made on the second or subsequent flowers, at the start of anther dehiscence.

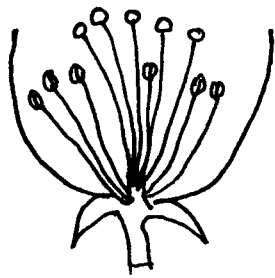
Ad. 25: Flower: position of margins of petals



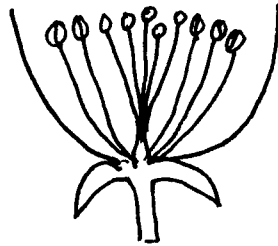
Ad. 26: Flower: petal shape



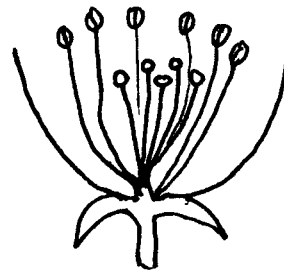
Ad 28 Flower: length of styles in relation to length of anthers



1  
shorter



2  
same length



3  
longer

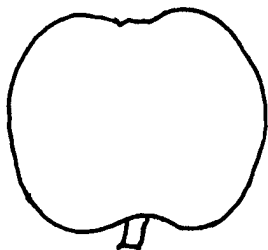
Ad. 29 – 30: Young fruit

Observations on the young fruit should be made forty days after flowering.

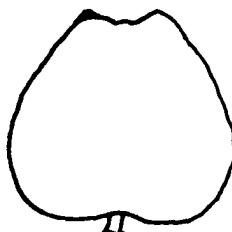
Ad 31 – 70: Fruit and seed:

Unless otherwise stated, all observations on the fruit and seed should be made on fruits at the time of maturity for consumption. Observations should be made on 10 typical fruits taken from a minimum of 20 fruits from 5 or 10 trees. The terminal (king) fruit should be excluded from the sample.

Ad. 36: Fruit: shape



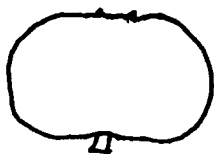
1  
globose



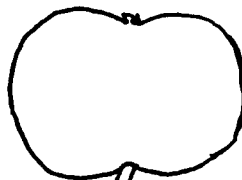
2  
globose conical



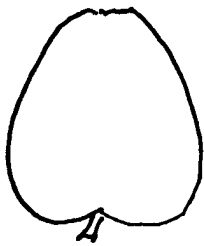
3  
obloid conical



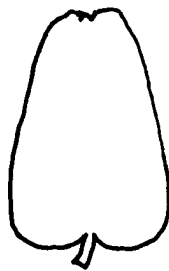
4  
transverse ellipsoid



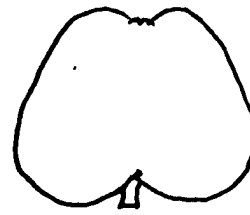
5  
obloid



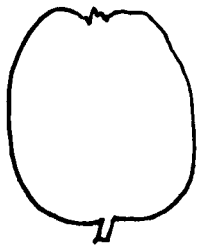
6  
conical



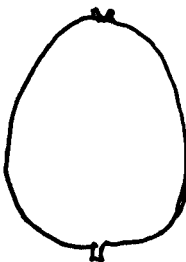
7  
narrow conical



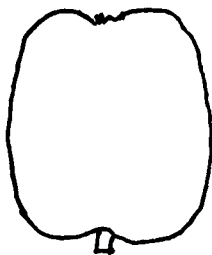
8  
truncate conical



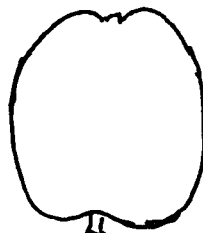
9  
ellipsoid



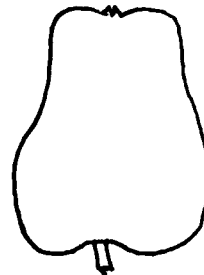
10  
ovoid



11  
oblong



12  
oblong conical



13  
oblong waisted

Ad. 60 – 63 Fruit: Depth and width of stalk cavity; depth and width of eye basin.

Fruits should be cut through the central axis as accurately as possible. Stalk cavity and eye basin depth and width should be measured from the sectioned fruits. The following diagram indicates the position of lines scored, using a knife or scalpel, on the fruit prior to measuring these characteristics.

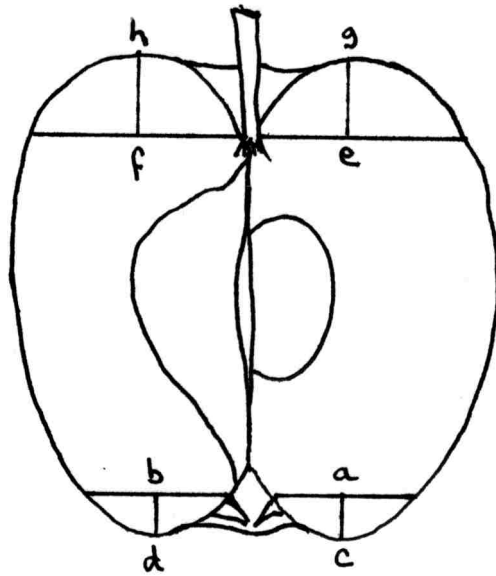
The lines a-b and e-f must be at right angles to the axis of the fruit. (A plastic protractor can be used to ensure accuracy.)

The line a-b is marked at the base of the sepals.

The line e-f is marked at the insertion of the stalk.

The lines a-c and b-d indicate the eye basin depth. They are drawn at right angles to the line a-b to the point where the basin curve levels out.

The lines e-g and f-h indicate the stalk cavity depth. They are drawn at right angles to the line e-f to the point where the stalk cavity curve levels out.



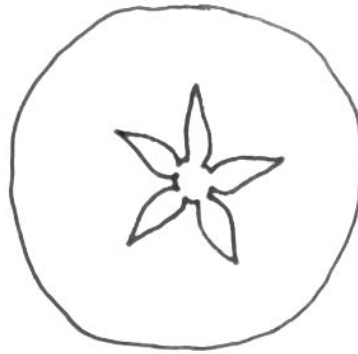
ab = width of eye basin (characteristic 63)      ef = width of stalk cavity (characteristic 61)

ac = depth of eye basin (characteristic 62)      fh = depth of stalk cavity (characteristic 60)

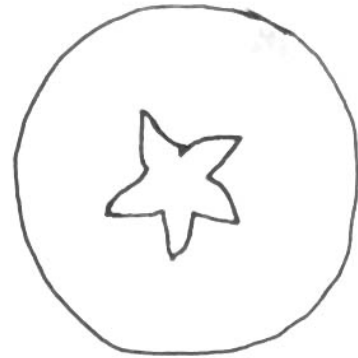
Ad 68 Fruit in transverse section: aperture of locules



1  
closed



2  
partly open



3  
open

**Synonyms of the example varieties:**

Example Varieties	Synonym(s)
Akane	Primrouge
Alkmene	Early Windsor
Belle de Boskoop	Schoner aus Boskoop
Cox's Orange Pippin	Cox Orangenrenette
Cripp's Pink	Pink Lady
Delorina	Harmonie
Florina	Querina`
Gloster	Gloster 69
Mutsu	Crispin
Nouvelle Europe	New Europe
Pinova	Corail
Rafzubin	Rubinette
Regal Prince	Prince Gala, Gala Must
Reine de Reinettes	King of the Pippins, Goldparmane
Sampion	Shampion
Tumanga	Aurelia
White Transparent	Weisser Klarapfel, Transparente Jaune

## 9. Literature

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Aomori-ken, 1977: "The report on the characterization and classification of apple varieties," Aomori-ken (By the consignment of the MAFF), JP

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

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Wye College, 1998: "Catalogue of Cultivars in the National Fruit Collection", GB

10. Technical Questionnaire

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
		Application date: (not to be filled in by the applicant)
<b>TECHNICAL QUESTIONNAIRE</b> to be completed in connection with an application for plant breeders' rights		
1. Subject of the Technical Questionnaire		
1.1 Latin Name	<input type="text" value="Malus Mill."/>	
1.2 Common Name	<input type="text" value="APPLE (fruit varieties)"/>	
2. Applicant		
Name	<input type="text"/>	
Address	<input type="text"/>	
Telephone No.	<input type="text"/>	
Fax No.	<input type="text"/>	
E-mail address	<input type="text"/>	
Breeder (if different from applicant)	<input type="text"/>	
3. Proposed denomination and breeder's reference		
Proposed denomination (if available)	<input type="text"/>	
Breeder's reference	<input type="text"/>	

TECHNICAL QUESTIONNAIRE

Page {x} of {y}

Reference Number:

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

## 4.1 Breeding Scheme

“4.1.1 Variety resulting from:

- (a) controlled cross  [ ]  
 (please state parent varieties)
- (b) partially unknown cross  [ ]  
 (please state known parent variety(ies))
- (c) totally unknown cross  [ ]

4.1.2 Mutation  [ ]  
 (please state parent variety)

4.1.3 Discovery  [ ]  
 (please state where, when and how developed)

4.1.4 Other  [ ]  
 (please provide details)

4.2 Method of Propagating the Variety  [ ]

4.2.1 *In vitro* propagation

The plant material of the candidate variety has been obtained  
 by *in vitro* propagation  [ ]  
 yes  [ ]  
 no  [ ]

4.2.2 Other type of multiplication (seed, leaf cutting, hardwood cutting,  
 layer):  [ ]  
 (please specify)

.....

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
<b>5.1 Fruit: shape (36)</b>		
globose	Golden Noble, Resi	1
globose conical	Cox's Orange Pippin, Jonagold	2
obloid conical	Regia	3
transverse ellipsoid	Court Pendu Plat, Discovery	4
obloid	Bramley's Seedling, Idared	5
conical	Adam's Pearmain, Pinova	6
narrow conical	Kent, Saturn	7
truncate conical	Kidd's Orange Red, Melodie	8
ellipsoid	Spencer	9
ovoid	Summerred	10
oblong	Gravensteiner, Mutsu	11
oblong conical	Close, Catshead	12
waisted	Gloster	13
<b>5.2 Fruit: hue of over color – bloom (if any) removed (48) (CHANGED)</b>		
orange red	Egremont Russet, Cox's Orange Pippin	2
pink red	Cripp,s Pink, Delorgue	3
light red	Akane, Red Elstar	4
dark red	Galaxy, Regal Prince	5
very dark red	Spartan, Red Jonaprince	6
brownish red	Lord Burghley, Fiesta	7

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
<b>5.3 Fruit: pattern of over color of skin (50)</b>		
only solid flush	Richared Delicious, Red Jonaprince	1
only striped (no flush)		2
solid flush with indistinct stripes	Galaxy	3
equally flushed and striped	Jonagored	4
predominately striped with indistinct flush		5
mottled	Elstar	6
washed out (faded)	Gloster	7
<b>5.4 Fruit: striped varieties only – number of stripes (51)</b>		
few		3
medium		5
many		7
<b>5.5 Time of beginning of flowering (71)</b>		
very early	Ein-Shemer	1
early	Idared	3
medium	Cox's Orange Pippin Jonagold	5
late	Court Pendu Plat,	7
very late	Feuilletmorte Spatbluhender Taffetapfel	9
<b>5.6 Time of maturity for consumption (73)</b>		
very early	Vista Bella	1
early	Jerseymac, Discovery	3
medium	Elstar	5
late	Fuji	7
very late	Granny Smith, Cripps Pink	9



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 Special conditions for the examination of the variety

7.2.1 Are there any special conditions for growing the variety or conducting the examination?

Yes [ ] No [ ]

7.2.2 If yes, please give details:

7.3 Other information

8. Authorization for release

(a) Does the variety require prior authorization for release under legislation concerning the protection of the environment, human and animal health?

Yes [ ] No [ ]

(b) Has such authorization been obtained?

Yes [ ] No [ ]

If the answer to (b) is yes, please attach a copy of the authorization.

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

Applicant's name

Signature

Date

## ANNEX

APPLE GUIDELINES 2002 : ANNEX OF ADDITIONAL CHARACTERISTICS THAT  
THE SUBGROUP WISHES TO DISCUSS AT THE TWF MEETING

	Characteristics	States suggested				
<b>1a</b>	<b>Dormant one-year-old shoot:</b> size of leaf bud	small medium large				3 5 7
<b>2a</b>	<b>Flower:</b> stance of petals (+)	horizontal, intermediate, cupped				1 2 3
<b>3a</b>	<b>Flower:</b> petal length	short medium long				3 5 7
<b>4a</b>	<b>Flower:</b> petal width	narrow medium broad				3 5 7
<b>5a</b>	<b>Flower:</b> petal: ratio length to width	very small – very large				1-9
<b>6a</b>	<b>Flower:</b> pedicel pubescence	absent – very strong				1-9
<b>7a</b>	<b>Leaf blade:</b> length of tip (+)	short medium long				3 5 7
<b>8a</b>	<b>Leaf blade:</b> curving of main vein (in profile) (+)	absent or very slight – very strong				1-9
<b>9a</b>	<b>Leaf blade:</b> shape in cross section (+)	folded straight recurved				1 2 3
<b>10a</b>	<b>Stipule:</b> shape (+)	narrow elliptic, falcate				1 2 3
<b>.11a</b>	<b>Fruit:</b> shape in transverse section (+)	circular slightly angled strongly angled				1 2 3
<b>12a</b>	<b>Fruit:</b> shape of calyx tube (LS) (+)	narrow tubular, broad tubular, funnel shaped, bulgy				1 2 3 4
<b>12b</b>	<b>Fruit:</b> shape of calyx tube (LS) (+)	shallow conical deep conical funnel shaped				1 2 3
<b>13a</b>	<b>Fruit:</b> intensity of aroma	weak medium strong				3 5 7
<b>14a</b>	<b>Fruit:</b> number of fully developed seeds	few medium many				3 5 7
<b>15a</b>	<b>Seed:</b> length	short, medium, long				3 5 7
<b>16a</b>	<b>Seed:</b> width	narrow, medium, broad				3 5 7



<b>17a</b>	<b>Seed:</b> Ratio length to width	very small – very large				1-9
<b>18a</b>	<b>Time of leaf bud burst in relation to flower bud burst during full bloom</b>	much earlier, earlier, same time, later, much later				1 3 5 7 9
<b>19a</b>	<b>Time of leaf fall</b>	very early, - very late				1-9
<b>20a</b>	<b>Flowering: duration</b>	short medium long				3 5 7
<b>21a</b>	<b>Flowering: tendency to biennial bearing</b>	Absent, present				1,9
<b>22a</b>	<b>Cold hours required</b>					
<b>23a</b>	<b>Length of fruit development period from full bloom until harvest</b>	very short short medium long very long				1 3 5 7 9
<b>24a</b>	<b>Ploidy</b>	diploid, triploid, tetraploid				1 2 3

Char. 36

Scheme of fruit shapes used in Germany. This, or a simplified scheme could be adapted instead of the traditional scheme in the Guidelines.

(UPOV-TG/14/8 rev.)

# Fruit: shape

	maximum width towards calyx (1)	maximum width in middle (2)	maximum width in middle to towards stalk (2, 3)		maximum width towards stalk (3)	
very flat (1)						
flat (3)						
medium (5)						
slightly elongated (7)						
clearly elongated (9)						
	convex		non-waisted	waisted	non-waisted	waisted

## TESTING DISTINCTNESS OF APPLE MUTANTS WHEN THEY ARE DISTINCT ONLY IN COLORATION

There is a special situation in the cases of mutants having different coloration. In this case regarding paragraph 81 of the document TC/37/9a we measure the skin colouration, because the above paragraph reads: if a normally visually assessed quantitative characteristic is the only distinguishing characteristic in relation to another variety, in case of doubt it should be measured where possible with reasonable effort.

In this case we use a tristimulus colour analyzer for measuring reflective colours of overcolour of the skin. We use the Minolta CR-200 Chroma Meter. It is calibrated first on a standard white calibration plate at illuminant C. We try to measure the overcolour on the part with the highest colour assessed visually. Minolta CR-200 has an 8 mm-diameter measuring area. In such a way we can get measured data for colours and we can decide more slightly using the standard method that the difference between two varieties is considered clear if it exceeds the LSD at the 1% probability level. Breeders can be convinced more slightly if the decision is supported by statistical analysis in the case if the difference is not clear.

Measuring absolute chromaticity we use data of the  $L^*$   $a^*$   $b^*$  and  $L^*$   $C^*$   $H^\circ$  colour systems.

Where:

$L^*$  = lightness factor (it is small for dark colours and large for light colours)

$a^*$  = chromaticity coordinate ( $a^*$  is negative for green and positive for red, extends from -60 to 60)

$b^*$  = chromaticity coordinate ( $b^*$  is negative for blue and positive for yellow, extends from -60 to 60)

$C^*$  = metric chroma (saturation) defined by  $a^*$  and  $b^*$  chromaticity coordinates

$H^\circ$  = metric hue angle defined by  $a^*$  and  $b^*$  chromaticity coordinates.

The table of characteristics of the original TG/14/8 is amended as follows:

	Characteristic		Example Varieties	Note
36.	Fruit: over colour			
36/a	Fruit: chromaticity coordinate a* of over colour	very low	Golden Delicious	1
		low	Redchief Delicious	3
		medium	Pilot	5
		high	Jonagold, Idared	7
36/b	Fruit: chromaticity coordinate b* of over colour	very low	Redchief Delicious	1
		low	Arlet, Priam	3
		medium	Jonagold, Pilot	5
		high	Granny Smith	7
		very high	Golden Delicious	9
36/c	Fruit: chroma (saturation) C* of over colour	very low	Redchief Delicious	1
		low	Staymared	3
		medium	Idared	5
		high	Jonagold	7
		very high	Golden Delicious	9
36/d	Fruit: hue angle H° of over colour	very low	Redchief Delicious	1
		low	Arlet, Priam	3
		medium	Jonagold, Pilot	5
		high	Granny Smith	7
		very high	Golden Delicious	9
37.	Fruit: intensity of over colour			
37/a	Fruit: lightness L* of over colour	very low	Redchief Delicious	1
		low	Arlet, Priam	3
		medium	Jonagold, Pilot	5
		high	Granny Smith	7
		very high	Golden Delicious	9

Mutation Varieties present the most problems in DUS testing and these are often varieties that differ in the fruit colour. Several test authorities use a colorimeter to record the colour of mutant varieties – mainly for information only. The following is a paper from Hungary outlining the method they use. If more test authorities are making use of colorimeters should we have a standardised method available?

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		low	Redchief Delicious	3
		medium	Pilot	5
		high	Jonagold, Idared	7
36/b	Fruit: chromaticity coordinate b* of over colour	very low	Redchief Delicious	1
		low	Arlet, Priam	3
		medium	Jonagold, Pilot	5
		high	Granny Smith	7
		very high	Golden Delicious	9
36/c	Fruit: chroma (saturation) C* of over colour	very low	Redchief Delicious	1
		low	Staymared	3
		medium	Idared	5
		high	Jonagold	7
		very high	Golden Delicious	9
36/d	Fruit: hue angle H° of over colour	very low	Redchief Delicious	1
		low	Arlet, Priam	3
		medium	Jonagold, Pilot	5
		high	Granny Smith	7
		very high	Golden Delicious	9
37.	Fruit: intensity of over colour			
37/a	Fruit: lightness L* of over colour	very low	Redchief Delicious	1
		low	Arlet, Priam	3
		medium	Jonagold, Pilot	5
		high	Granny Smith	7
		very high	Golden Delicious	9

#### Rootstock problem

I think, it is very important that the plants must be tested under the same conditions. This is mainly important for mutants where the differences are small, sometimes these mutants can have differences only in colouring. When testing these differences if they are clear or not, we have to assure the same conditions more precisely for mutants **than in other cases**.

In the case of apple rootstocks we know that some rootstock varieties, such as M 9 and MM 106 have different clones in different countries. That is why the Hungarian authority accepts only bud sticks and shoots in the case of mutants. In this case we propagate the mutants and the reference mutants or as a minimum the most similar mutant-variety on the same clone of the rootstock variety in the same nursery. Thus, we can test a plant material which is more standardised. In this case our results have no impacts of different rootstock clones and different applications in nurseries, the results are influenced only by the different genotypes of tested mutants. The disadvantage is of this method that it needs more time. This solution is in harmony with UPOV test guidelines because the competent authority can select which type of plant material (bud-stick, dormant shoot for grafting or tree) will be accepted for testing the candidate variety.

[End of Annex and of document]