



CALIBRATION MANUAL

Harmonized with
Naktuinbouw and
NCSS(/NARO)



DUS Test for TOMATO

Solanum lycopersicum L.



Established in January 24, 2020

Comply with UPOV TG/44/11

CALIBRATION MANUAL

DUS Test for TOMATO

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1. Purpose

This Calibration Manual was established by collaborative activities between Naktuinbouw (Netherlands) and NCSS (/NARO) (Japan).

The purpose of this Calibration Manual is to harmonize technique of DUS examination in the two countries and use it also internationally.

2. Use of this Calibration Manual

This Calibration Manual indicates only methods of observation for morphological characteristics included in UPOV Test Guidelines.

3. Explanations covering several characteristics

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

4. Grouping characteristics:

The following have been agreed as useful grouping characteristics:

- (a) Plant: growth type (characteristic 2)
- (b) Leaf: type of blade (characteristic 10)
- (c) Peduncle: abscission layer (characteristic 19)
- (d) Fruit: green shoulder (before maturity) (characteristic 21)
- (e) Fruit: size (characteristic 26)
- (f) Fruit: shape in longitudinal section (characteristic 28)
- (g) Fruit: number of locules (characteristic 36)
- (h) Fruit: color (at maturity) (characteristic 37)
- (i) Resistance to *Meloidogyne incognita* (Mi) (characteristic 46)
- (j) Resistance to *Verticillium* sp. (Va and Vd) - Race 0 (characteristic 47)
- (k) Resistance to *Fusarium oxysporum* f. sp. *lycopersici* (Fol) - Race 0 (ex 1) (characteristic 48.1)
- (l) Resistance to *Fusarium oxysporum* f. sp. *lycopersici* (Fol) - Race 1 (ex 2) (characteristic 48.2)
- (m) Resistance to Tomato mosaic virus (ToMV) - Strain 0 (characteristic 51.1)
- (n) Resistance to Tomato spotted wilt virus (TSWV) - Race 0 (characteristic 58)

5. Disclaimer

The information contained in this Calibration Manual is for general information purposes only. The information is provided by Naktuinbouw and NCSS(/NARO) and while we endeavor to keep the information up to date and correct, we make no representations or warranties of any kind, express or implied, about the completeness, accuracy, reliability, suitability or availability with respect to the Calibration Manual or the information contained on the Calibration Manual for any purpose. Any reliance you place on such information is therefore strictly at your own risk.

6. Method of Observation

Legend

Method of Observation

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.

Types of Expression of Characteristics

To enable the appropriate use of characteristics in DUS testing, it is important to understand the different ways in which characteristics can be expressed. The following section identifies the different types of expression and considers their application in DUS testing.

QL: Qualitative Characteristics

“Qualitative characteristics” are those that are expressed in discontinuous states (e.g. sex of plant: dioecious female (1), dioecious male (2), monoecious unisexual (3), monoecious hermaphrodite(4)). These states are self-explanatory and independently meaningful. All states are necessary to describe the full range of the characteristic, and every form of expression can be described by a single state. The order of states is not important. As a rule, the characteristics are not influenced by environment.

QN: Quantitative Characteristics

“Quantitative characteristics” are those where the expression covers the full range of variation from one extreme to the other. The expression can be recorded on a one-dimensional, continuous or discrete, linear scale. The range of expression is divided into a number of states for the purpose of description (e.g. length of stem: very short (1), short (3), medium (5), long (7), very long (9)). The division seeks to provide, as far as is practical, an even distribution across the scale. The Test Guidelines do not specify the difference needed for distinctness. The states of expression should, however, be meaningful for DUS assessment.

PQ: Pseudo-Qualitative Characteristics

In the case of “pseudo-qualitative characteristics,” the range of expression is at least partly continuous, but varies in more than one dimension (e.g. shape: ovate (1), elliptic (2), circular (3), obovate (4)) and cannot be adequately described by just defining two ends of a linear range. In a similar way to qualitative (discontinuous) characteristics - hence the term “pseudo-qualitative” - each individual state of expression needs to be identified to adequately describe the range of the characteristic.

(*) Asterisked characteristic

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.

(+) Explanations on the Table of Characteristics is indicated by TG/44/11 Rev, Chapter 8.2.

6. Method of observation (example of characterization)

	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
1. VG	<u>Seed-propagated varieties only:</u>				
(+)	Seedling: anthocyanin coloration of hypocotyl				
QL	absent	Colt, Heinz 8104, Mogeor, Momorvert, VTM215			1
	present	DG-039, Montfavet H 63.4		Fruits	9

Remarks

Stage of observation: Approximately 10 days after sowing.

Method of observation: Observe every seedling of a variety. The anthocyanin coloration of hypocotyl is sometimes difficult to see. If it has slight coloration, the expression is “present”.



1
absent



9
present

6. Method of observation (example of characterization)

	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
2. VG Plant: growth type (*) (+)					
QL	determinate	Campbell 1327, Prisca	Campbell 1327, Prisca	Kurikoma	1
	indeterminate	Marmande VR, Saint-Pierre, San Marzano 2	Marmande VR, Saint Pierre, San Marzano 2	Fruits	2

Stage of observation: Flowering second or third inflorescence. In case of determinate variety, observation stage is growing shoot stopped. (JP)

Continuous following of the crop. The observations must be started in an early stage, because the plants will produce side shoots in a later stage. They will hamper the possibility to follow the main stem. (NL)

Method of observation: It should be observed whether the main stem continues to grow, or if it ends in a truss. When in doubt, please check on the number of leaves or internodes between inflorescences. (NL)

Remarks

UPOV explanation: Determinate (1): This type produces a fix number of trusses on each stem. The number of trusses is different among varieties (Note: can be influenced by agro climatic conditions). In this type, the number of leaves or internodes between inflorescence is irregular within a plant and varies from one to three. The stem ends with an inflorescence and no lateral shoots are produced.

This type also includes some so-called “semi-determinate” varieties which do not have consistently three leaves or internodes between inflorescences, and show semi-determinate growth, for example, with the termination of the stem with the 9th inflorescence (e.g. ‘Prisca’ type) or higher than the 20th inflorescence (e.g. Early Pack type).

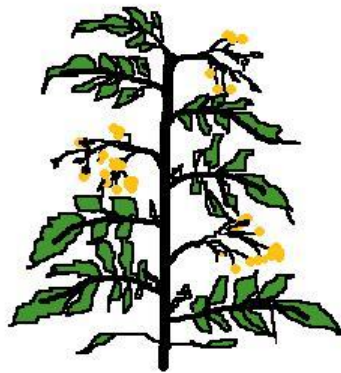
Indeterminate (2): In this type, as a rule, three leaves or internodes are observed between inflorescences. After every group of three leaves, the plant produces three buds: the terminal bud is transformed into an inflorescence and one of the two lateral buds starts the prolongation of stem. Plants of this type grow with the continuous repetition of this growth pattern.

It should be noted that sometimes only two leaves or internodes might be observed between inflorescences in some parts of plants in a certain group of indeterminate variety types (e.g. varieties originating from ‘Daniela’). These varieties nevertheless are indeterminate.

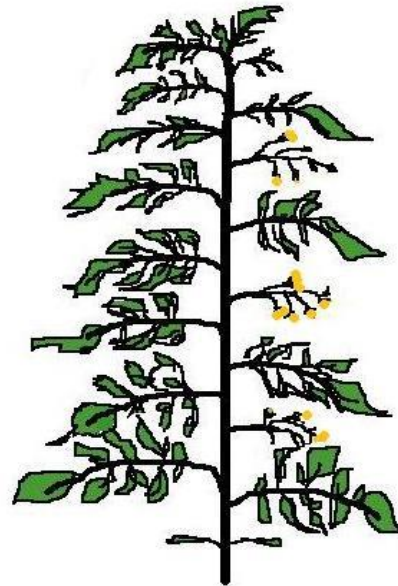
This type includes ‘Marmande’ and ‘Costoluto Fiorentino’ types which might be considered to be categorized into an intermediate class between indeterminate and determinate, but they always

6. Method of observation (example of characterization)

have three leaves or internodes between inflorescences. They should therefore be categorized into the indeterminate type.



1. determinate



2. Indeterminate



1: Determinate. This picture shows the truss at the end of the main stem. The stem ends in a truss/leaf division.

6. Method of observation (example of characterization)

	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
3. VG/ MS	<u>Only varieties with plant growth type determinate:</u> Plant: number of inflorescences on main stem (side shoots to be removed)				
QN	few	Campbell 1327			3
	medium	Montfavet H 63.4			5
	many	Prisca			7

Remarks

Stage of observation: From the beginning of flowering it should be regularly observed whether the main stem has ended in a truss/leaf division. At that moment the inflorescences must be counted.

Method of observation: Count the number of inflorescences on the main stem as soon as the main stem has ended in a truss/leaf division. Do not delay this, because it gets more and more difficult to recognize the main stem as side shoots are starting to grow. Do not include the plants from which the main stem has splitted. Use example varieties to determine the proper note.

6. Method of observation (example of characterization)

	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
4. VG Stem: anthocyanin coloration (+)					
QN (a)	absent or very weak	Mogeor, Momorvert,			1
	weak	Montfavet H 63.5		Aichi First	3
	medium	Rondello		Fruits	5
	strong	Grinta, Nemato		Red Ore	7
	very strong				9

Remarks

Stage of observation: Indeterminate growth type varieties: observe when you can still have an overview of the plants. Determinate growth type varieties: observe before the main stem is ended in a truss/leaf division, so in an early stage. (NL)

Method of observation: Visual observation of the degree of anthocyanin coloration in the upper part of the stem. Note: the expression of this characteristic is highly influenced by temperature and light conditions. (NL)

UPOV explanation: Most of the varieties are classed 1 to 5. Expression of anthocyanin coloration is influenced by daily temperature. Under greenhouse conditions, the variation is rather low, except for the varieties with TM2 allele which is linked to the anthocyanin coloration of the stem (especially at the internode).



These images serve only to illustrate the variation present in the crop and should not be used as absolute reference.

6. Method of observation (example of characterization)

	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
5. VG/ MS (+)	<u>Only varieties with plant growth type indeterminate:</u> Stem: length of internode				
QN (a)	short	Dombito, Manific, Paso, Trend			3
	medium	Montfavet H 63.5		Fruits	5
	long	Berdy, Calimero			7

Remarks

Stage of observation: Observations on the plant, stem and leaf should be done after fruit set on at least five trusses and before ripening of the second truss.

Method of observation: See UPOV explanation

UPOV explanation: The length of the internode should be observed/measured at one time for the whole trial, e.g. after a fruit set on approximately 5 nodes. The total length of the stem should be observed/measured between the 1st and 4th trusses. In case of measurements, this measure is divided by the number of internodes in between, an indication of the length of the internode is given.

6. Method of observation (example of characterization)

	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
6. VG/ MS (+)	<u>Only varieties with plant growth type indeterminate:</u> Plant: height				
QN	very short	Cherry Belle	Cherry Belle		1
	short	Carson, Despina	Carson, Despina		3
	medium	Brooklyn, Buffalo, Vision	Brooklyn, Buffalo, Vision		5
	long	Classy, Clarence, Climberly, Massada	Classy, Clarence, Climberly, Massada		7
	very long	Daydream, Minired	Daydream, Minired		9

Remarks

Stage of observation: To be observed after a fruit set on 5 nodes.

Method of observation: Observe the plant height at the mentioned stage. Compare with the example varieties to decide on the proper notes.

UPOV explanation: The height of the plant should be measured at the same time for the whole trial, e.g. 60 days after planting, or after a fruit set on approximately 5 nodes, or when the first variety in the trial has reached the wire in the green house or the top of the stake.

6. Method of observation (example of characterization)

	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
7. VG	Leaf: attitude				
(*)					
(+)					
QN	(a)				
	erect				1
	semi-erect	Allround, Drakar, Vitador			3
	horizontal	Aromata, Triton		Fruits	5
	semi-drooping	Montfavel H 63.5			7
	drooping	Multolino, Naram, Tibet			9

Remarks

Stage of observation: Before ripening of the second truss. (JP)

In the case of indeterminate varieties, observations on the plant, stem and leaf should be done after a fruit set on at least five truss and before ripening of the second truss. In the case of determinate varieties, all observations on the plant and leaves should be done after a fruit set on de second truss. Observations should be done before deterioration of the leaves. (NL)

Method of observation: Visual observation in the middle third part of the plant. Observe the attitude of the middle third part of the leaf in respect to the main stem. Compare with the example varieties to decide on the proper notes.



3. semi-erect



5. horizontal



7. semi-drooping



9. drooping

6. Method of observation (example of characterization)

	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
8. VG/ MS	Leaf: length				
QN (a)	short	Nelson, Red Robin, Tiny Tim		Kurikoma	3
	medium	Lorena		Fruits	5
	long	Montfavet H 63.5			7

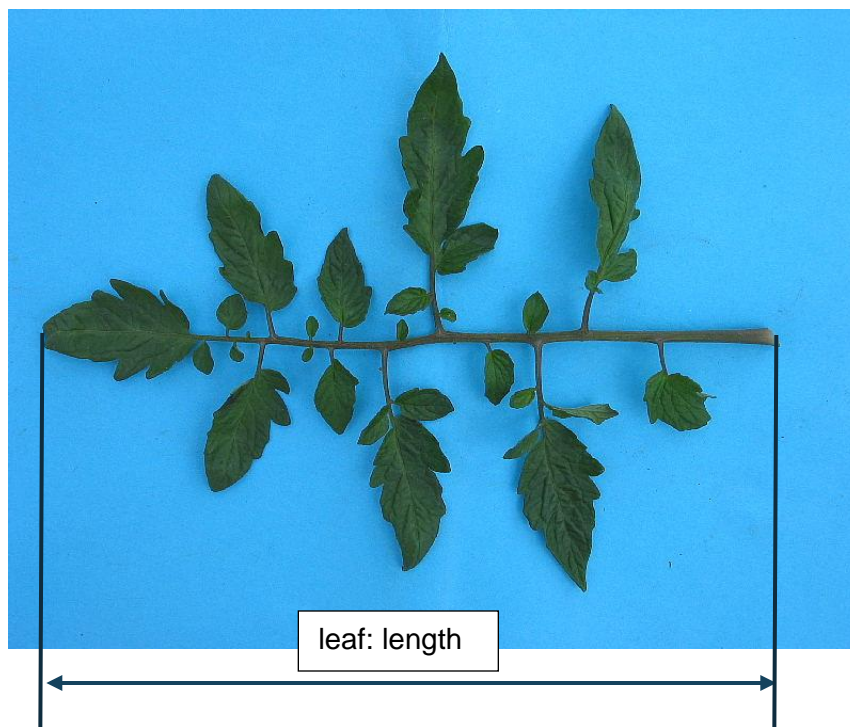
Remarks

Stage of observation: Before ripening of the second truss. (JP)

In the case of indeterminate varieties, observations on the plant, stem and leaf should be done after a fruit set on at least five truss and before ripening of the second truss. In the case of determinate varieties, all observations on the plant and leaves should be done after a fruit set on de second truss. Observations should be done before deterioration of the leaves. (NL)

Method of observation: Visual observation at the middle third part of the plant. The leaf length covers the entire length of the leaf, which is from the attachment to the main stem to the tip of the terminal leaflet. (NL) Compare with the example varieties to decide on the proper notes.

Measure the biggest leaf from the base of the leaf to the tip of the leaflet with the leaf extended. (JP)



6. Method of observation (example of characterization)

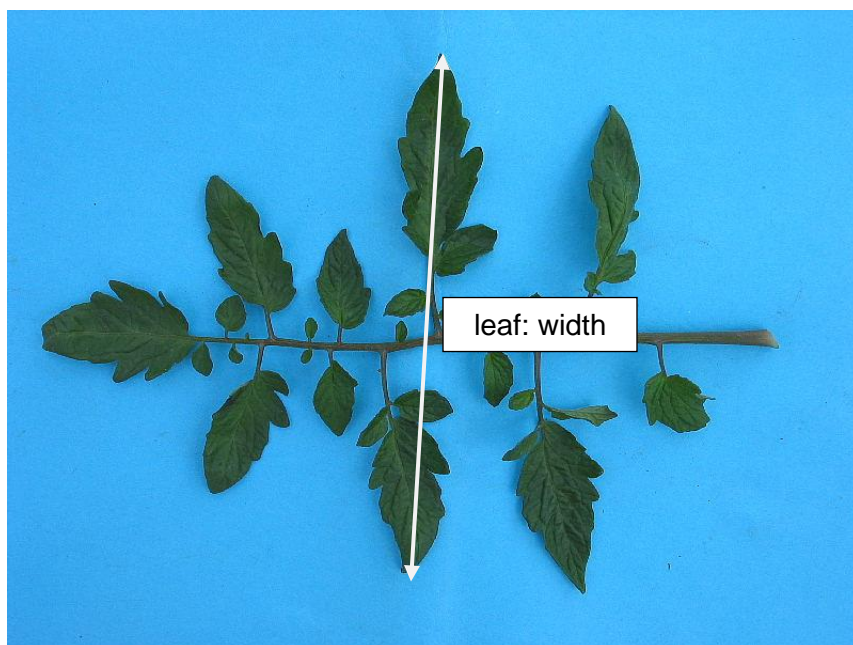
	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
9. VG/ MS	Leaf: width				
QN (a)	narrow	Marmande VR, Red Robin, Tiny Tim		Kurikoma	3
	medium			Fruits	5
	broad	Saint-Pierre		Sainte-Pierre	7

Remarks

Stage of observation: Before ripening of the second truss. (JP)

In the case of indeterminate varieties, observations on the plant, stem and leaf should be done after a fruit set on at least five truss and before ripening of the second truss. In the case of determinate varieties, all observations on the plant and leaves should be done after a fruit set on the second truss. Observations should be done before deterioration of the leaves. (NL)

Method of observation: Visual observation of the middle third part of the plant. Leaf width should be scored at the widest point of the leaf. (NL) Compare with the example varieties to decide on the proper notes. Measure the biggest leaf width with the leaf extended. (JP)



6. Method of observation (example of characterization)

	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
10. VG (*) (+)	Leaf: type of blade				
QL (a)	pinnate	Mikado, Pilot, Red Jacket	Mikado, Pilot, Red Jacket	Tiny Tim	1
	bipinnate	Lukullus, Saint-Pierre	Lukullus, Saint Pierre	Fruits	2

Remarks

Stage of observation: Before ripening of the second truss. (JP)

In the case of indeterminate varieties, observations on the plant, stem and leaf should be done after a fruit set on at least five truss and before ripening of the second truss. In the case of determinate varieties, all observations on the plant and leaves should be done after a fruit set on de second truss. Observations should be done before deterioration of the leaves. (NL)

UPOV explanation:

Pinnate leaf: primary leaflets do not bear secondary leaflets

Bipinnate leaf: primary leaflets as well are pinnate, so they bear secondary leaflets



pinnate



bipinnate

6. Method of observation (example of characterization)

	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
11. VG	Leaf: size of leaflets				
(+)					
QN (a)	very small	Minitom			1
	small	Tiny Tim		Tiny Tim	3
	medium	Marmande VR, Royesta		Fruits	5
	large	Daniela, Hynema			7
	very large	Dombo			9

Remarks

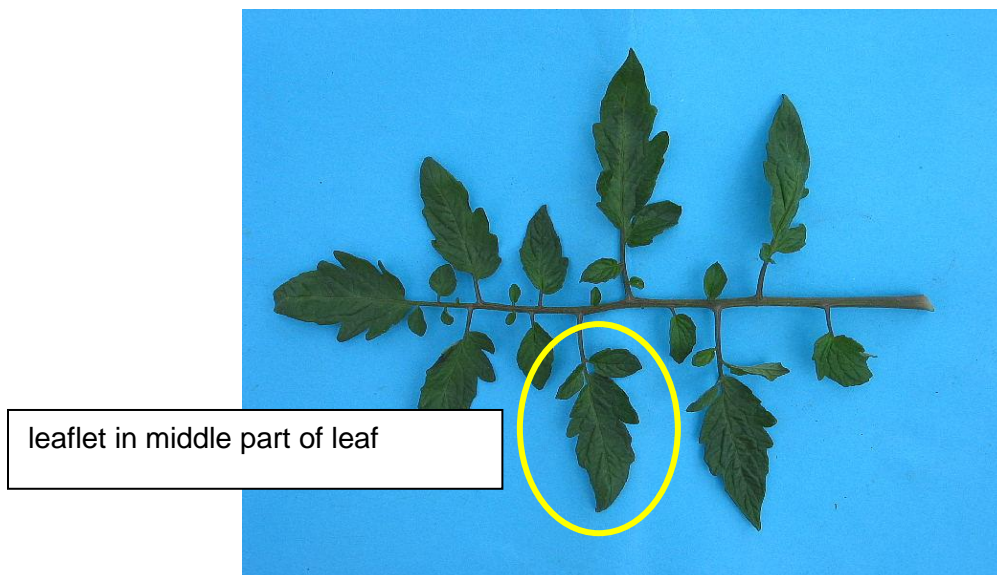
Stage of observation: Before ripening of the second truss. (JP)

In the case of indeterminate varieties, observations on the plant, stem and leaf should be done after a fruit set on at least five truss and before ripening of the second truss. In the case of determinate varieties, all observations on the plant and leaves should be done after a fruit set on de second truss. Observations should be done before deterioration of the leaves. (NL)

Method of observation: Visual observation of the middle of the leaves of the plant. Make sure that the score is not influenced by the sometimes much larger terminal leaflets. Compare with the example varieties to decide on the proper notes. (NL)

Size of the leaflet in the middle part of leaf should be observed. (JP)

UPOV explanation: The size of leaflet should be observed in the middle of the leaf.



6. Method of observation (example of characterization)

	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
12. VG	Leaf: intensity of green color				
QN (a)	light	Macero II, Poncette, Rossol	Macero II, Poncette, Rossol		3
	medium	Lucy	Lucy	Fruits	5
	dark	Allround, Daniela, Lorena, Red Robin	Allround, Daniela, Lorena, Red Robin		7

Remarks

Stage of observation: Before ripening of the second truss. (JP)

In the case of indeterminate varieties, observations on the plant, stem and leaf should be done after a fruit set on at least five truss and before ripening of the second truss. In the case of determinate varieties, all observations on the plant and leaves should be done after a fruit set on de second truss. Observations should be done before deterioration of the leaves. (NL)

Method of observation: Visual observation of the leaves in middle third part of the plants. Compare with the example varieties to decide on the proper notes.

Observation should be made at middle third of the plant. (JP)

6. Method of observation (example of characterization)

	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
13. VG Leaf: glossiness (+)					
QN (a)	weak	Daniela			3
	medium	Marmande VR			5
	strong	Guindilla			7

Remarks

Stage of observation: In the case of indeterminate varieties, observations on the plant, stem and leaf should be done after a fruit set on at least five truss and before ripening of the second truss. In the case of determinate varieties, all observations on the plant and leaves should be done after a fruit set on de second truss. Observations should be done before deterioration of the leaves. (NL)

Method of observation: Visual observation of the leaves in middle third part of the plants. Compare with the example varieties to decide on the proper notes.

UPOV explanation: The glossiness of the leaf should be observed in the middle of the plant.



Diversity in glossiness of leaf.

These images serve only to illustrate the variation present in the crop and should not be used as absolute reference.

6. Method of observation (example of characterization)

	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
14. VG Leaf: blistering					
(+)					
QN (a)	weak	Daniela			3
	medium	Marmande VR			5
	strong	Delfine, Tiny Tim			7

Remarks

Stage of observation: In the case of indeterminate varieties, observations on the plant, stem and leaf should be done after a fruit set on at least five truss and before ripening of the second truss. In the case of determinate varieties, all observations on the plant and leaves should be done after a fruit set on de second truss. Observations should be done before deterioration of the leaves. (NL)

Method of observation: Visual observation of the middle third part of the plant. Blistering and creasing of the leaf are easily confused, so take caution to describe the actual blistering. Blistering is the difference in height of the surface between the veins, whereas creasing is independent from the veins. Compare with the example varieties to decide on the proper notes.

UPOV explanation: Caution is required for confusion between blistering and creasing. Blistering is the difference in height of the surface of the leaf between the veins. Creasing is independent form the veins. The blistering should be observed in the middle third of the plant.



blistering



creasing

6. Method of observation (example of characterization)

14. Leaf: blistering



These images serve only to illustrate the variation present in the crop and should not be used as absolute reference.

6. Method of observation (example of characterization)

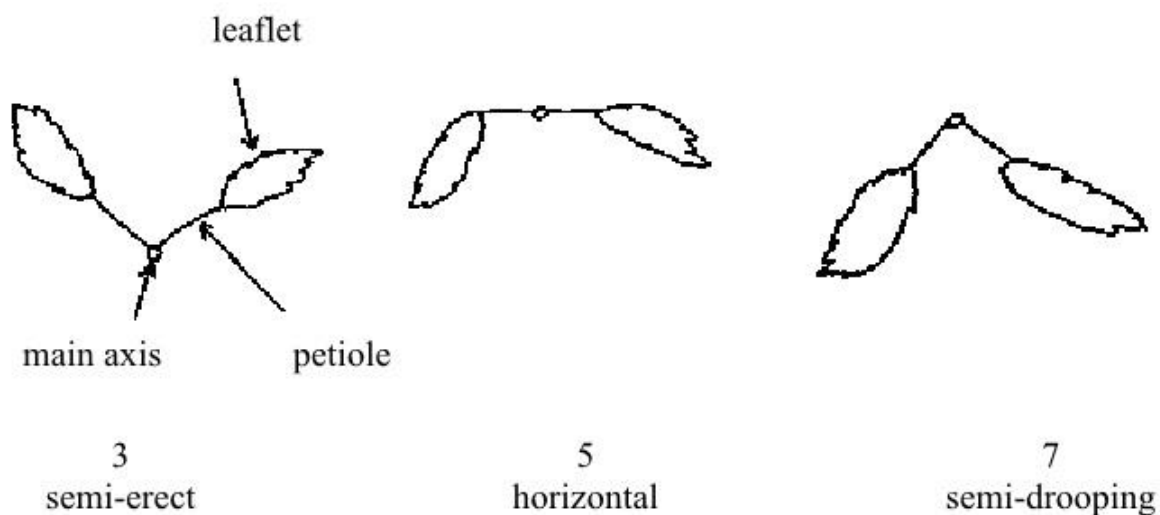
	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
15. VG (+)	Leaf: attitude of petiole of leaflet in relation to main axis				
QN (a)	semi-erect	Blizzard, Marmande VR			3
	horizontal	Sonatine		Fruits	5
	semi-drooping	Montfavet H63.5			7

Remarks

Stage of observation: In the case of indeterminate varieties, observations on the plant, stem and leaf should be done after a fruit set on at least five truss and before ripening of the second truss. In the case of determinate varieties, all observations on the plant and leaves should be done after a fruit set on de second truss. Observations should be done before deterioration of the leaves. (NL)

Method of observation: Visual observation of the petioles of leaflets in the middle third of the leaf and middle third of the plant. The state of expression 'drooping' is rarely seen.

UPOV explanation: The attitude should be observed in the middle third of the plant.



6. Method of observation (example of characterization)

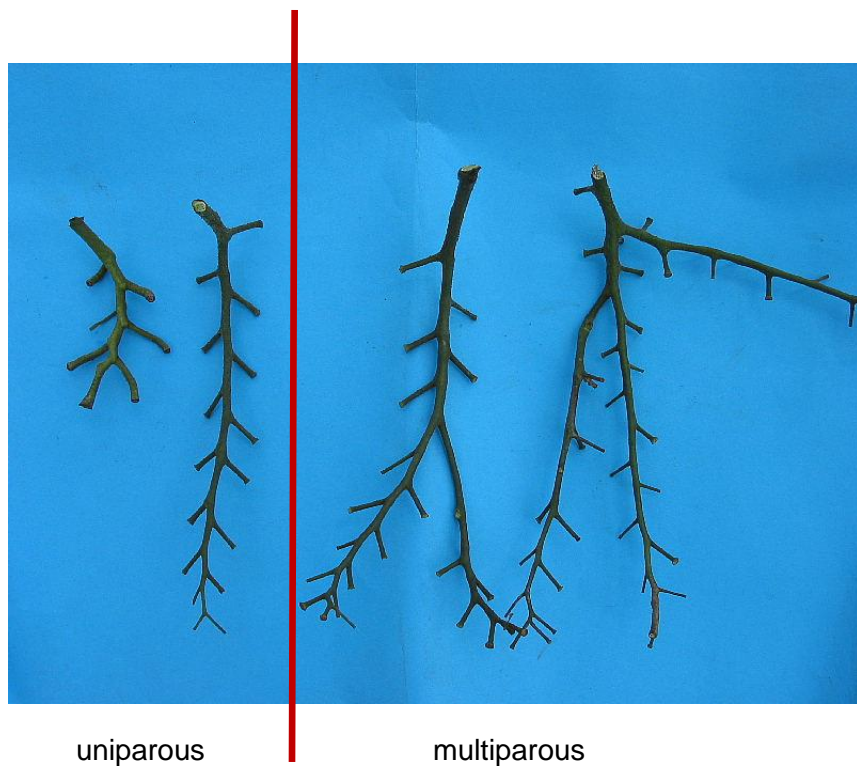
	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
16. VG/ MS (+)	Inflorescence: type				
QN	mainly uniparous	Dynamo		Fruits	1
	equally uniparous and multiparous	Harzfeuer			2
	mainly multiparous	Marmande VR		Aichi First	3

Remarks

Stage of observation: At the time of the second and third truss are flowering. (JP)

After fruit set on the second and third trusses. (NL)

Method of observation: Observe the second and third truss on ten plants and count the number of uniparous and multiparous trusses. If out of the counted trusses between 40 to 60 per cent is multiparous, the variety can be considered equally uniparous and multiparous. This relates to eight to twelve multiparous trusses out of the twenty that should be counted. (NL)



6. Method of observation (example of characterization)

	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
17. VG Flower: color (*)					
QL	yellow	Exota, Marmande VR		Fruits	1
	orange	Orama, Pericherry		High Crimson	2

Remarks

Stage of observation: At the time of the second and third truss are flowering, but before the flowers begin to age. (NL)

Method of observation: It is essential to look at freshly opened flowers. Obsolete flowers are often discolored and can therefore not give an accurate representation of the actual color. There is only a very slight difference between yellow and orange flowers. Orange could better be interpreted as orange-ish yellow. (NL)

Note that the flower color is linked with the fruit color genes. In general, varieties with orange fruits that contain the Tangerine gene will have orange flowers, whereas varieties with orange fruit with the Beta-carotene gene have yellow flowers. (NL)



yellow

orange

6. Method of observation (example of characterization)

	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
18. VG Flower: pubescence of style (+)					
QL	absent	Campbell 1327			1
	present	Saint Pierre			9

Remarks

Stage of observation: At the time of the second and third trusses are flowering.

Method of observation: Pick flowers from the second and third truss. Carefully remove, by hand, the stamens of the flower tube, so the style is visible. View the style with a magnifying-glass to see whether hairs are present. (NL)

UPOV explanation: Some varieties can present some rare and small hairs at the base of the style. These should also be included in the expression present.



9: present

6. Method of observation (example of characterization)

	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
19. VG Peduncle: (*) abscission layer (+)					
QL	absent	Aledo, Bandera, Count, Lerica	Aledo, Bandera, Count, Lerica	Rio Grande	1
	present	Montfavel H 63.5, Roma	Montfavel H 63.5, Roma Fruits		9

Remarks

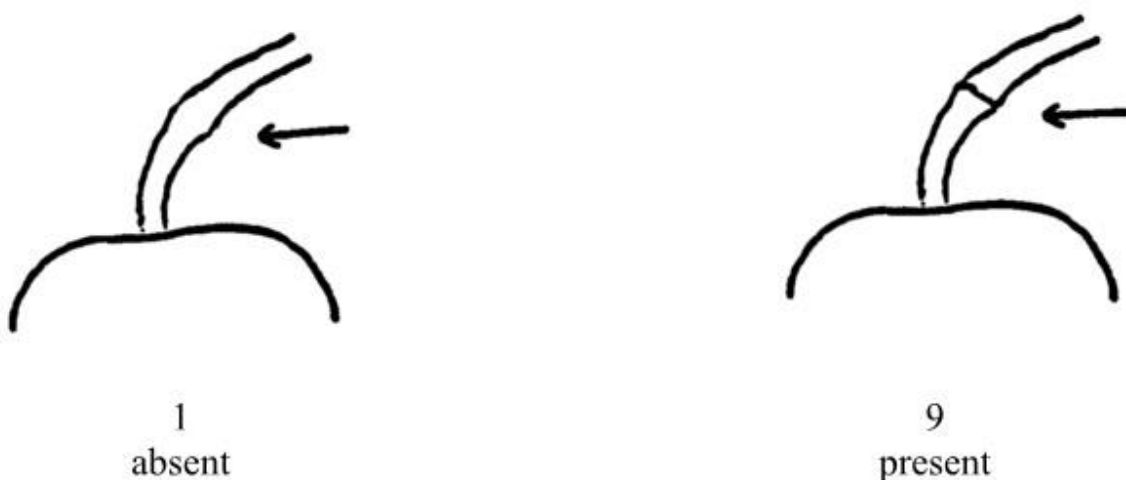
Stage of observation: When the second or third trusses are maturing.

Method of observation: View the peduncles when fruits are still on the plant. An abscission layer is visible as a little line in the peduncle. If not clear, check whether the fruits can be picked from the truss by pushing with the thumb on the abscission layer/thickening in the peduncle (kind of leverage). If the peduncle breaks, the abscission layer is present.

This method is not reliable at a very young stage. When flowering or in the case of very young fruits, a peduncle might break while in mature stage the abscission layer appears to be absent.

In some varieties, particularly of the determinate growth type, an abscission layer is visible, but it is difficult to break. This is called arthritic. In that case, the abscission layer is scored present.

Some varieties only have a thickening without an abscission layer (heterozygous for the genes that control the presence of the abscission layer). These varieties are considered to be jointless (abscission layer absent). (NL)



6. Method of observation (example of characterization)

19. Peduncle: abscission layer



1: absent (no thickening, no abscission layer)



1: absent (with thickening, no abscission layer)



9: present (with thickening, with abscission layer)

6. Method of observation (example of characterization)

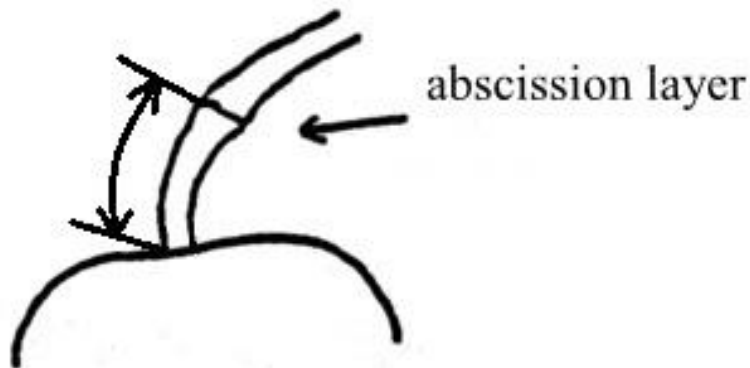
	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
20. VG/ MS (+)	<u>Only varieties with peduncle abscission layer present:</u> Pedicel: length				
QN	short	Cerise, Ferline, Montfavet H 63.18, Rossol		Cerise	3
	medium	Dario, Primosol		Fruits	5
	long	Erlidor, Ramy, Ranco			7

Remarks

Stage of observation: When the second or third trusses are maturing. (JP)

Method of observation: Observe the length of the peduncles from the base until the abscission layer on harvested fruits. Use example varieties to determine the proper note. (NL)

Measure the length of the peduncles from the base to the abscission layer. (JP)



6. Method of observation (example of characterization)

	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
21. VG (*) (+)	Fruit: green shoulder (before maturity)				
QL (b)	absent	Felicia, Rio Grande, Trust	Felicia, Rio Grande, Trust	Kurikoma	1
	present	Daniela, Montfavet H 63.5	Daniela, Montfavet H 63.5	Fruits	9

Remarks

Stage of observation: Before ripening on fully developed fruits of the second or third trusses.

Method of observation: Observe fruits of every plant, preferably the ones that do not hang in full light (because fruits in full light have less contrast between the unripe colour and the green shoulder). In some varieties the green shoulder is very hard to distinct. In that case, look at small, not yet fully developed fruits. The green shoulder should be visible then. The green shoulder is noted present regardless of its size.

UPOV explanation: The gene for green shoulder might not be clearly expressed in some conditions, which is why it is important to have the example variety 'Daniela' to observe the expression of these characteristics.



1
absent



9
present

6. Method of observation (example of characterization)

	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
22. VG (+)	Fruit: extent of green shoulder (before maturity)				
QN (b)	very small	Daniela			1
	small	Ballet, Cristy, Firestone, Siluet			3
	medium	Erlidor, Foxy, Montfavet H 63.5		Fruits	5
	large	Cobra, Delisa, Epona, Manific			7

Remarks

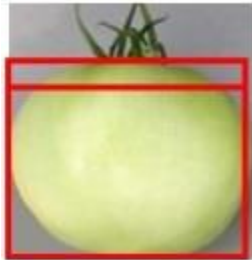
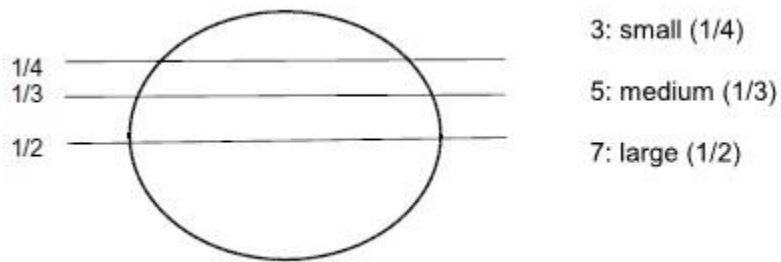
Stage of observation: Before ripening on fully developed fruits of the second or third trusses.

Method of observation: Only to be observed in varieties with a green shoulder. Observe fruits of every plant, preferably the ones that do not hang in full light (because fruits in full light have less contrast between the unripe color and the green shoulder). When the green shoulder extends half-way across the unripe fruit, it is scored as large. See the illustration below to determine the proper note. (NL)

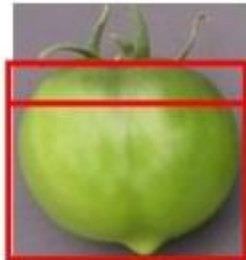
UPOV explanation: The gene for green shoulder might not be clearly expressed in some conditions, which is why it is important to have the example variety 'Daniela' to observe the expression of these characteristics.

6. Method of observation (example of characterization)

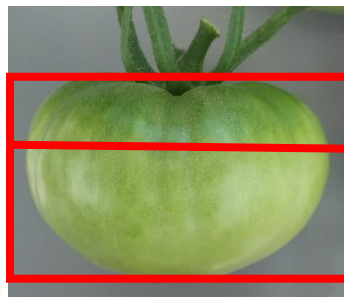
22. Fruit: extent of green shoulder (before maturity)



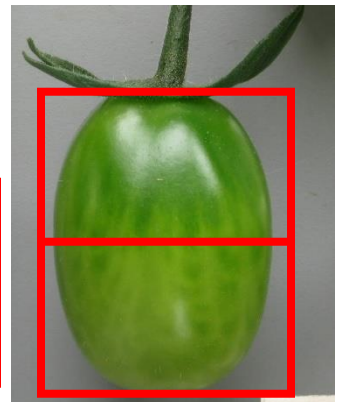
1. very small



3. small



5. medium



7. large

6. Method of observation (example of characterization)

	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
23. VG (+)	Fruit: intensity of green color of shoulder (before maturity)				
QN (b)	light	Ballet, Daniela, Juboline			3
	medium	Montfavet H 63.5, Siluet			5
	dark	Ayala, Erlidor, Xenon			7

Remarks

Stage of observation: Before ripening on fully develop fruit of the second or third trusses.

Method of observation (UPOV explanation): Intensity of green color of shoulder and intensity of green color excluding shoulder have to be observed on the same scale. This means that the note for intensity of green color of shoulder should be higher than the note for intensity of green color excluding shoulder, or in exceptional cases the same if the difference in intensity is very small. The gene for green shoulder might not be clearly expressed in some conditions, which is why it is important to have the example variety 'Daniela' to observe the expression of these characteristics.

6. Method of observation (example of characterization)

	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
24. VG (*) (+)	Fruit: intensity of green color excluding shoulder (before maturity)				
QN (b)	very light	Clarée			1
	light	Capello, Daniela, Duranto, Durinta, Trust			3
	medium	Marmande, Rody			5
	dark	Ayala, Centella, Tatiana, Uragano			7
	very dark	Verdi			9

Remarks

Stage of observation: Before ripening on fully develop fruit of the second or third trusses.

Method of observation (UPOV explanation):

Only to be observed in varieties with a green shoulder. Observe fruits of every plant, preferably the ones that do not hang in full light (because fruits in full light have less contrast between the unripe colour and the green shoulder).

Intensity of green color of shoulder and intensity of green color excluding shoulder have to be observed on the same scale. This means that the note for intensity of green color of shoulder should be higher than the note for intensity of green color excluding shoulder, or in exceptional cases the same if the difference in intensity is very small. The gene for green shoulder might not be clearly expressed in some conditions, which is why it is important to have the example variety 'Daniela' to observe the expression of these characteristics.

6. Method of observation (example of characterization)

24. Fruit: intensity of green color excluding shoulder (before maturity)



1: very light



3: light



5: medium



7: dark



9: very dark

6. Method of observation (example of characterization)

	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
25. VG (+)	Fruit: green stripes (before maturity)				
QL (b)	absent	Daniela	Daniela		1
	present	Green Zebra, Tigerella	Green Zebra, Tigerella		9

Remarks

Stage of observation: Observations should be made on the plant before maturity. (NL)

Method of observation: Visually observe the presence of green stripes on unripe fruits, excluding the green shoulder to determine the presence of green stripes before maturity. (NL)

Be aware that the green stripes have no relation with the greenback. Sometimes very narrow stripes which are related to the presence of the greenback, can be observed when the greenback is present. In this case green stripes are absent. (NL)

UPOV explanation: The green stripes should be observed before maturity, excluding the green shoulder.



1
absent



9
present

6. Method of observation (example of characterization)

	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
26. VG Fruit: size (*)					
QN (c)	very small	Cerise, Sweet 100	Cerise, Sweet 100	Cerise	1
	small	Early Mech, Europeel,	Early Mech, Europeel,	Money Maker	3
	medium	Alphamech, Diego	Alphamech, Diego	Jun Pink	5
	large	Carmello, Ringo	Carmello, Ringo	Fruits, Carmello	7
	very large	Erlidor, Lydia, Muril	Erlidor, Lydia, Muril	Ponte Rosa	9

Remarks

Stage of observation: When the second or third truss are maturing. (JP)

Observations should be made on fruits at maturity. (NL)

Method of observation: This characteristic is observed in two ways, by visual observation and by measurement. (NL)

1. Visual observation gives a general impression of the sample. To determine the average image, leave aside the largest (usually the first fruit from the truss) and smallest (usually the last fruit from the truss) fruits in the sample. Compare with the example varieties to decide on the proper notes. (NL)

2. Measurement is done by weighing twenty average fruits per sample. Again, the largest and smallest fruits have to be left out. Weigh preferably fruits from the second truss or higher. Compare with the example varieties to decide on the proper notes. (NL)

Measure the weight of fruit (third fruits of second or third truss). (JP)

6. Method of observation (example of characterization)

	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
27. VG/ MS (*)	Fruit: ratio length/diameter				
QN (c)	very compressed	Campbell 28, Marmande VR			1
	moderately compressed	Alicia			3
	medium	Early Mech, Peto Gro			5
	moderately elongated	Rimone, Rio Grande			7
	very elongated	Elko, Macero II			9

Remarks

Stage of observation: Observations should be made on mature fruits of second or third truss.

Method of observation: Visual observation of the harvested fruit gives a general impression of the sample. To determine the average image, leave aside the largest (usually the first fruit from the truss) and smallest (usually the last fruit from the truss) fruits in the sample. (NL)

Measurement: Third fruits from second or third truss are measure the length and diameter and calculate length divided diameter. (JP)

6. Method of observation (example of characterization)

27. Fruit: ratio length/diameter



1: very small



2: very small to small



3: small



4: small to medium



5: medium



6: medium to large



7: large



8: large to very large



9: very large



4: small to medium



5: medium



6: medium to large



7: large

6. Method of observation (example of characterization)

	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
28. VG (*) (+)	Fruit: shape in longitudinal section				
PQ (c)	flattened	Campbell 28, Marmande VR	Campbell 28, Marmande VR	Aichi First	1
	oblate	Montfavet H 63.4, Montfavet H 63.5	Montfavet H 63.4, Montfavet H 63.5	Fruits	2
	circular	Cerise, Moneymaker	Cerise, Moneymaker	Mini Carol, Cerise	3
	oblong	Early Mech, Peto Gro	Early Mech, Peto Gro	Intermediate Mother Nou 7 gou, Early Mech	4
	cylindric	Hypeel 244, Macero II, San Marzano 2	Hypeel 244, Macero II, San Marzano 2	San Marzano	5
	elliptic	Alcaria, Castone	Alcaria, Castone		6
	cordate	Valenciano	Valenciano	Valenciano	7
	ovate	Dualrow, Soto	Dualrow, Soto		8
	obovate	Duquesa, Estelle Rimone, Rio Grande	Duquesa, Estelle Rimone, Rio Grande	Rio Grande	9
	pyriform	Europeel	Europeel	Yellow Pear	10
	obcordate	Cuore del Ponente, Magno	Cuore del Ponente, Tomawak, Magno		11








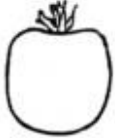



Remarks

Stage of observation: Observations should be made on mature fruits of second or third truss.

Method of observation: Visual observation of the harvested fruit gives a general impression of the sample. To determine the average image, leave aside the largest (usually the first fruit from the truss) and smallest (usually the last fruit from the truss) fruits in the sample. It is allowed to exceed the notes and give an expression such as 'flat round to pear-shaped'. (NL)

6. Method of observation (example of characterization)

28. Fruit: shape in longitudinal section

		← broadest part →					
		(below middle)	at middle	(above middle)			
narrow (elongated) → width (ratio length/width) ← broad (compressed)	narrow (elongated)			(parallel) 	(rounded) 		
		10 pyriform	8 ovate	5 cylindric	6 elliptic	9 obovate	7 cordate
	width (ratio length/width)			(parallel)	(rounded) 		
		11 obcordate	4 oblong		3 circular		
broad (compressed)							
		2 oblate					
							
		1 flattened					

6. Method of observation (example of characterization)

28. Fruit: shape in longitudinal section



1. flattened



2. oblate



3. circular



4: oblong



5: cylindric



6: elliptic



7: cordate



8: ovate



9: obovate



10: pyriform



11: obcordate

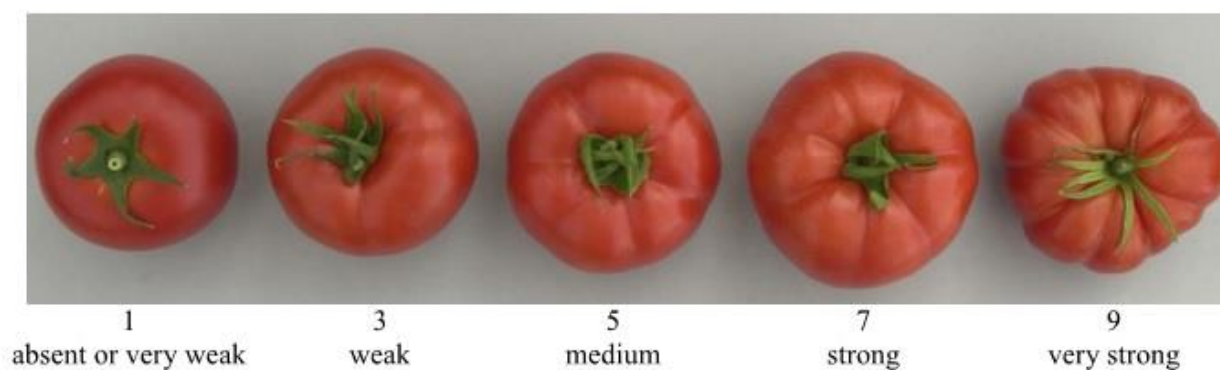
6. Method of observation (example of characterization)

	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
29. VG (*) (+)	Fruit: ribbing at peduncle end				
QN (c)	absent or very weak	Calimero, Cerise	Calimero, Cerise	Mini Carol, Cerise	1
	weak	Early Mech, Hypeel 244, Melody, Peto Gro, Rio Grande	Early Mech, Hypeel 244, Melody, Peto Gro, Rio Grande	Rio Grande, Moneymaker	3
	medium	Montfabet H 63.4, Montfabet H 63.5	Montfabet H 63.4, Montfabet H 63.5	Fruits	5
	strong	Campbell 1327, Carmello, Count	Campbell 1327, Carmello, Count	Campbell 1327, Aichi First	7
	very strong	Costeluto Fiorentino, Ingrid, Marmande VR	Costeluto Fiorentino, Ingrid, Marmande VR	Marmande	9

Remarks

Stage of observation: Observations should be made on mature fruits of second or third truss.

Method of observation: Visual observation of the harvested fruit gives a general impression of the sample. To determine the average image, leave aside the largest (usually the first fruit from the truss) and smallest (usually the last fruit from the truss) fruits in the sample. It concerns mainly the depth of the grooves. This is to some extent connected with the degree of ribbing. Compare with the example varieties to decide on the proper notes. (NL)



6. Method of observation (example of characterization)

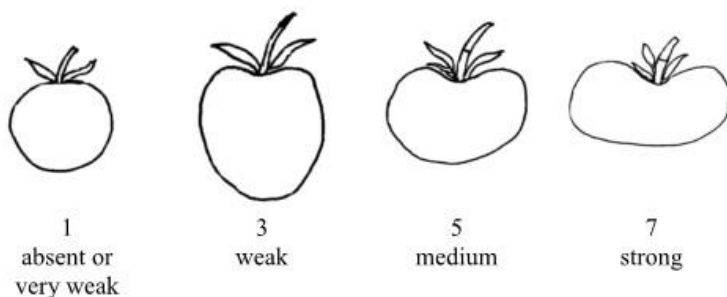
	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
30. VG (+)	Fruit: depression at peduncle end				
QN (c)	absent or very weak	Europeel, Heinz 1706, Rossol, Sweet Baby			1
	weak	Futura, Melody		Kurikoma	3
	medium	Carmello, Count, Fandango, Saint-Pierre		Fruits	5
	strong	Ballon Rouge, Marmande VR		Aichi First	7

Remarks

Stage of observation: Observations should be made on mature fruits of second or third truss.

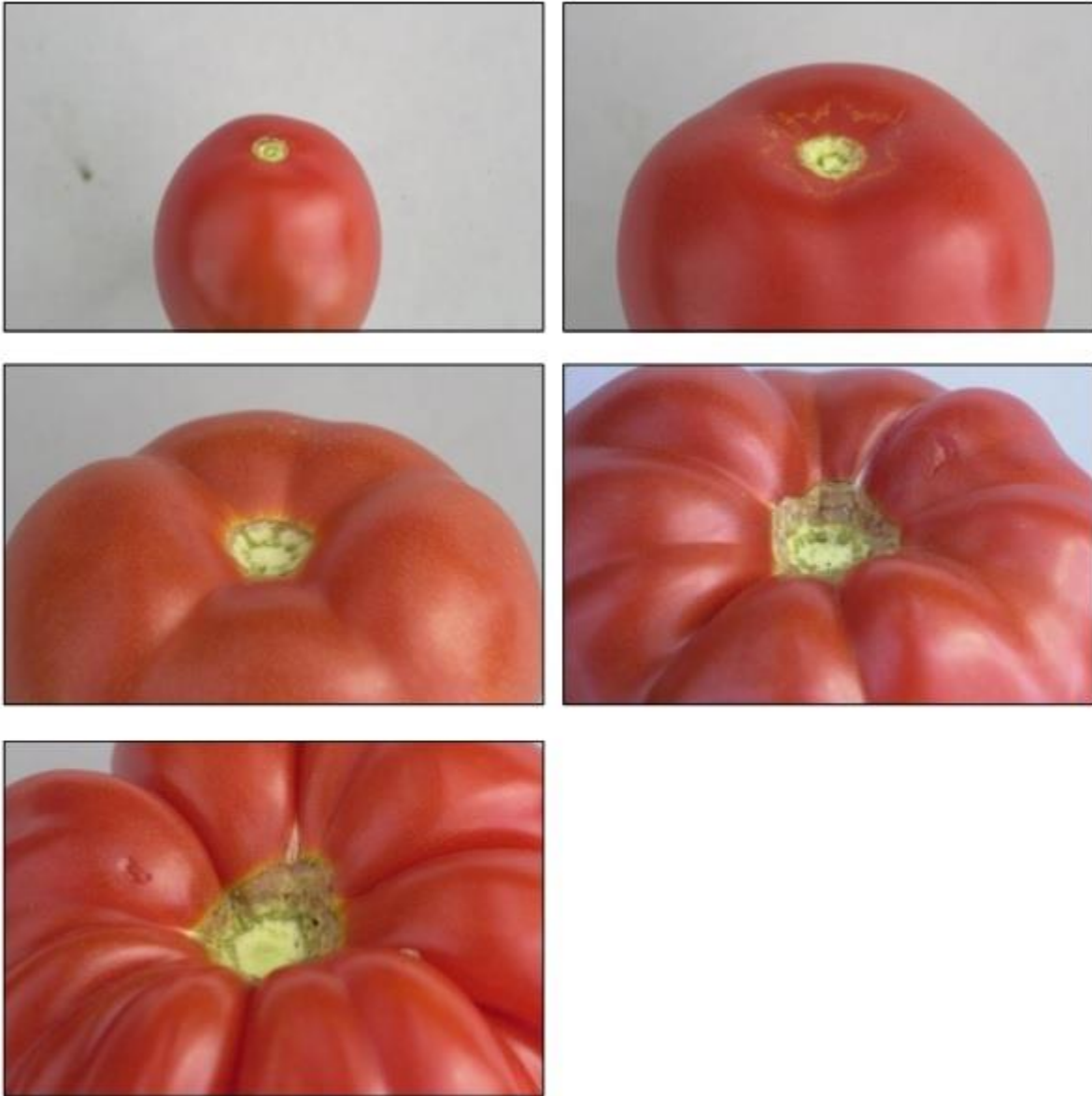
Method of observation: Visual observation of the harvested fruit gives a general impression of the sample. To determine the average image, leave aside the largest (usually the first fruit from the truss) and smallest (usually the last fruit from the truss) fruits in the sample. It concerns the depth of the corky part that is visible when peduncle and crown are removed. Often, this depression is stronger in highly ribbed, flattened fruit than in round, slightly ribbed fruits. Compare with the example varieties to decide on the proper notes. (NL)

Judging from the ratio of fruit height and depth of peduncle end. (JP)



6. Method of observation (example of characterization)

30. Fruit: depression at peduncle end



These images serve only to illustrate the variation present in the crop and should not be used as absolute reference.

6. Method of observation (example of characterization)

	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
31. VG/ MS (+)	Fruit: size of peduncle scar				
QN (c)	very small	Cerise, Heinz 1706, Sweet Baby		Mini Carol, Cerise	1
	small	Early Mech, Peto Gro, Rio Grande		Kurikoma, Rio Grande	3
	medium	Montfavet H 63 4, Montfavet H 63 5		Fruits	5
	large	Apla, Campbell 1327, Carmello, Fandango, Flora Dade		Aichi First, Campbell 1327	7
	very large	Marmande VR			9

Remarks

Stage of observation: Observations should be made on mature fruits of second or third truss.

Method of observation: Visual observation of the harvested fruit gives a general impression of the sample. To determine the average image, leave aside the largest (usually the first fruit from the truss) and smallest (usually the last fruit from the truss) fruits in the sample. Remove peduncle and crown from the fruits and observe the size of the inner ring that is visible in the corky part. This ring is often still green. The size should be observed as an absolute characteristic, irrespective of the size of the fruit. Compare with the example varieties to decide on the proper notes.

UPOV explanation: The size of the peduncle scar has to be observed as an absolute characteristic, i.e. irrespective of the size of the fruit. The peduncle should be removed and the green ring observed (not the full scar).

6. Method of observation (example of characterization)

31. Fruit: size of peduncle scar



Diversity in peduncle scar size

These images serve only to illustrate the variation present in the crop and should not be used as absolute reference.

6. Method of observation (example of characterization)

	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
32. VG/ MS (+)	Fruit: size of blossom scar				
QN (c)	very small	Cerise, Early Mech, Europeel, Heinz 1706, Peto Gro, Rio Grande		Mini Carol, Rio Grande	1
	small	Montfavet H 63.4, Montfavet H 63.5		Moneymaker	3
	medium	Alphamech, Apla, Carmello, Floradade		Aichi First	5
	large	Campbell 1327, Count, Marmande VR, Saint-Pierre		Fruits	7
	very large	Rozova Magia			9

Remarks

Stage of observation: Observations should be made on mature fruits of second or third truss.

Method of observation: Visual observation of the harvested fruit gives a general impression of the sample. To determine the average image, leave aside the largest (usually the first fruit from the truss) and smallest (usually the last fruit from the truss) fruits in the sample. A very small flower scar is almost invisible (as small as a pinprick). A small flower scar is a kind of small "triangle" (asterisk). In practice the size of the blossom scar is not an entirely sliding scale. The size of the scar should be measured as an absolute characteristic, regardless of the size of the fruit. (NL)

UPOV explanation: The size of the blossom scar has to be observed as an absolute characteristic, i.e. irrespective of the size of the fruit.

6. Method of observation (example of characterization)

32. Fruit: size of blossom scar



These images serve only to illustrate the variation present in the crop and should not be used as absolute reference.

6. Method of observation (example of characterization)

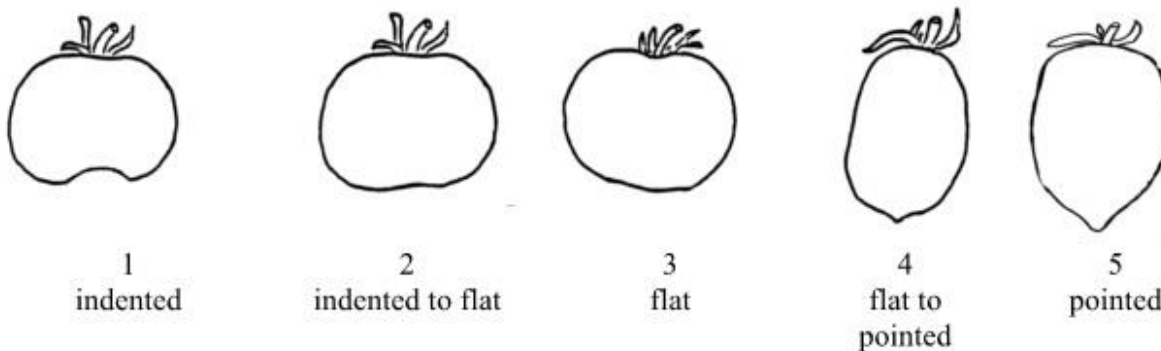
	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
33. VG (+)	Fruit: shape at blossom end				
QN (c)	indented	Marmande VR, Super Mech			1
	indented to flat				2
	flat	Montfavet H 63.4, Montfavet H 63.5		Fruits	3
	flat to pointed	Cal J, Early Mech, Peto Gro			4
	pointed	Europeel, Heinz 1706, Hypeel 244, Roma VF			5

Remarks

Stage of observation: Observations should be made on mature fruits of second or third truss.

Method of observation: Visual observation of the harvested fruits gives a general impression of the sample. To determine the average shape, leave aside the largest (usually the first fruit from the truss) and smallest (usually the last fruit from the truss) fruits in the sample. Compare with the example varieties to decide on the proper notes.

UPOV explanation:



6. Method of observation (example of characterization)

33. Fruit: shape at blossom end



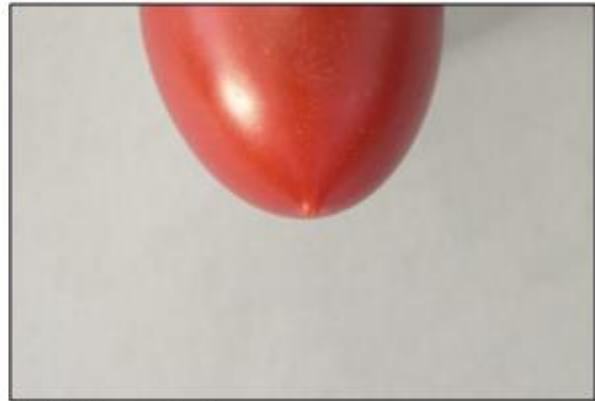
1: indented



2: indented to flat



3: flat



4: flat to pointed



5: pointed

6. Method of observation (example of characterization)

	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
34. VG/ MS (+)	Fruit: diameter of core in cross section in relation to total diameter				
QN (c)	very small	Cerise		Cerise	1
	small	Early Mech, Europeel, Heinz 1706, Peto Gro, Rio Grande, Rossol		Kurikoma, Moneymaker	3
	medium	Montfavet H 63.4, Montfavet H 63.5		Fruits	5
	large	Apla, Campbell 1327, Carmello, Count, Fandango, Floradade		Ponte rosa	7
	very large	Marmande VR, Valenciano		Marmande	9

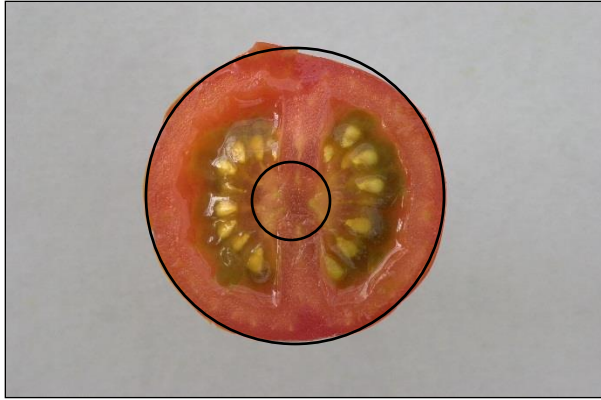
Remarks

Stage of observation: Observations should be made on mature fruits of second or third truss.

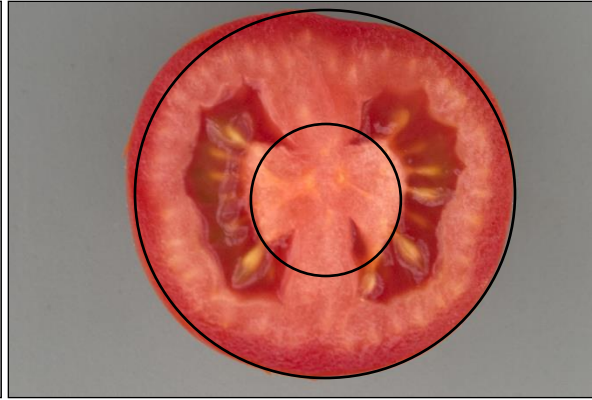
Method of observation: Visual observation on the harvested fruits gives a general impression of the sample. To determine the average, leave aside the largest (usually the first fruit from the truss) and smallest (usually the last fruit from the truss) fruits in the sample. Cut the fruits in half. The size of the core in cross section has to be observed in relation to the total diameter of the fruit. Compare with the example varieties to decide on the proper notes.

If the diameter of the core is half the diameter of the fruit, it is scored as medium (5).

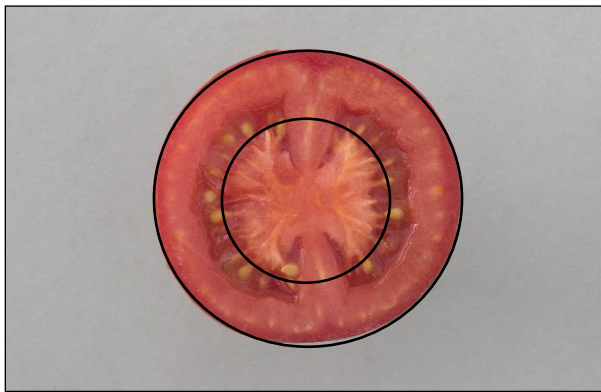
6. Method of observation (example of characterization)



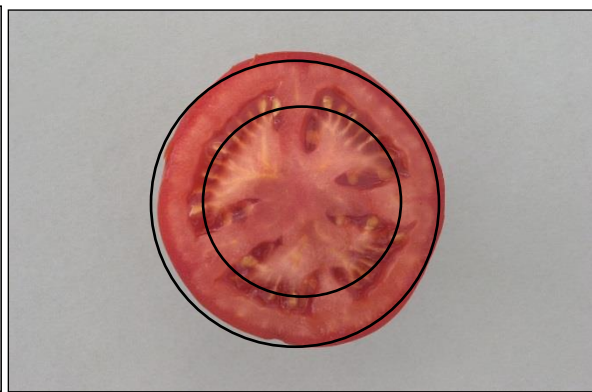
1: very small



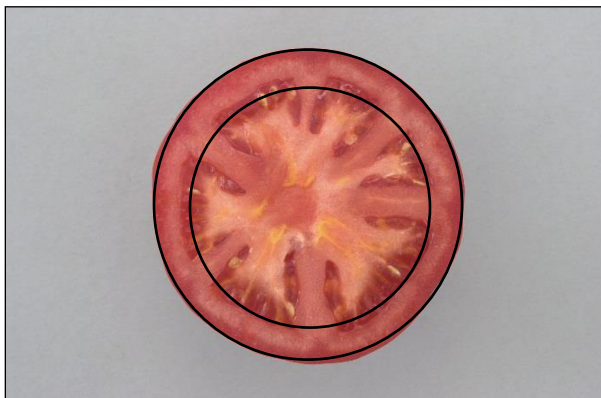
3: small



5: medium



7: large



9: very large

6. Method of observation (example of characterization)

	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
35. VG	Fruit: thickness of pericarp				
(+)					
QN (c)	very thin	Cerise			1
	thin	Marmande VR			3
	medium	Carmello, Europeel, Floradade, Heinz 1706, Montfavet H 63.5		Fruits	5
	thick	Cal J, Daniela, Ferline, Peto Gro, Rio Grande			7
	very thick	Myriade, Rondex			9

Remarks

Stage of observation: Observations should be made on mature fruits of second or third truss.

Method of observation: Cut the center of the fruit horizontally, measure the maximum width of the flesh. (JP)

Visual observation of the harvested fruit gives a general impression of the sample. To determine the average thickness, take out the largest (usually the first fruit from the truss) and smallest (usually the last fruit from the truss) fruits in the sample. Cut the fruits in half. To observe the thickness of the pericarp, the size of the fruit must not be taken into account. This implies that cherry tomatoes usually score no more than 3 (thin). Compare with the example varieties to decide on the proper notes.

UPOV explanation: The absolute thickness of the pericarp should be observed, i.e. irrespective of the size of the fruit.

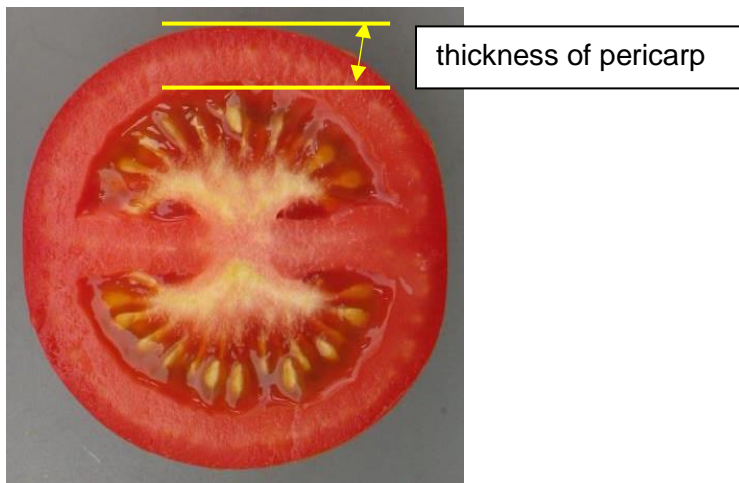
6. Method of observation (example of characterization)

35. Fruit: thickness of pericarp



Variety in thickness of pericarp

This image serves only to illustrate the variation present in the crop and should not be used as an absolute reference.



6. Method of observation (example of characterization)

	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
36. VG/ MS (+)	Fruit: number of locules				
QN (c)	only two	Early Mech, Europeel, San Marzano,			1
	two and three	Alphamech, Futuria			2
	three and four	Montfavet H 63.5			3
	four, five or six	Raïssa, Tradiro			4
	more than six	Marmande VR			5

Remarks

Stage of observation: Observations should be made on mature fruits of second or third truss.

Method of observation: Cut the center of the fruit horizontally, count the number of locules. (JP)

Visual observation of the harvested fruit gives a general impression of the sample. To determine the average number, leave aside the largest (usually the first fruit from the truss) and smallest (usually the last fruit from the truss) fruits in the sample. Cut the fruits in half and count the number of locules per fruit and record the results. When the observation overlaps two expressions, cut more fruits until the number of locules of the variety is clear. E.g., it could occur that you have a variety with two, three and four locules. In this case, cut more tomatoes to see the leading expression. (NL)

UPOV explanation: This characteristic is assessed by making cross sections of representative shaped and sized fruits but excluding the first and last fruits from the truss.

6. Method of observation (example of characterization)

36. Fruit: number of locules



1. only two



2. two or three



3. three or four



4. four, five or six



5. more than six

6. Method of observation (example of characterization)

	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
37. VG (*) (+)	Fruit: color (at maturity)				
PQ (c)	cream	Jazon, White Mirabell	Jazon, White Mirabell		1
	yellow	Goldene Königin, Yellow Pear	Goldene Königin, Yellow Pear	Yellow Pear	2
	orange	Sungold	Sungold	Sungold	3
	pink	Aichi First	Aichi First	House Momotaro	4
	red	Daniela, Ferline, Montfavet H 63.5	Daniela, Ferline, Montfavet H 63.5	Moneymaker	5
	brown	Ozyrys	Ozyrys		6
	green	Green Grape, Green Zebra	Green Grape, Green Zebra		7

Remarks

Stage of observation: Observations should be made on mature fruits of second or third truss.

Method of observation: Visual observation of the fully matured, harvested fruit gives a general impression of the sample. (NL)

UPOV explanation: The color at maturity has to be observed after a full change of color, when placenta is found clearly in the cross section.

It should be noted that parent lines homozygous for the RIN gene do not ripen at all. In that case this characteristic is not applicable.

6. Method of observation (example of characterization)

37. Fruit: color (at maturity)



1. white



2. yellow



3. orange



4. pink



5. red



6. brown



7. green

6. Method of observation (example of characterization)

	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
38. VG (*) (+)	Fruit: color of flesh (at maturity)				
PQ (c)	cream	Jazon			1
	yellow	Jubilée		Yellow pear	2
	orange	Sungold		Sungold	3
	pink	Regina		House Momotaro	4
	red	Ferline, Saint-Pierre		Moneymaker	5
	brown	Ozyrys			6
	green	Green Grape, Green Zebra			7

Remarks

Stage of observation: Observations should be made on mature fruits of second or third truss.

Method of observation: Visual observation of the harvested fruit gives a general impression of the sample. The colour of the flesh is not necessarily the same as the colour of the fruit. Pink fruits have a colourless epidermis (skin of the fruit), but red flesh. Fruits with an orange epidermis and red flesh are red. (NL)

UPOV explanation: The color of flesh should be observed at maturity (see Ad. 44).



1. cream



2. yellow



3. orange



4. pink



5. red



6. brown



7. green

6. Method of observation (example of characterization)

	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
39. VG	Fruit:				
	glossiness of skin				
QN (c)	weak	Josefina			1
	medium	Roncardo			2
	strong	Mecano			3

Remarks

Stage of observation Observations should be made on mature fruits of second or third truss.

Method of observation: Visually observe the degree of glossiness. Compare with the example varieties to decide on the proper notes.



1: weak



2: medium



3. strong

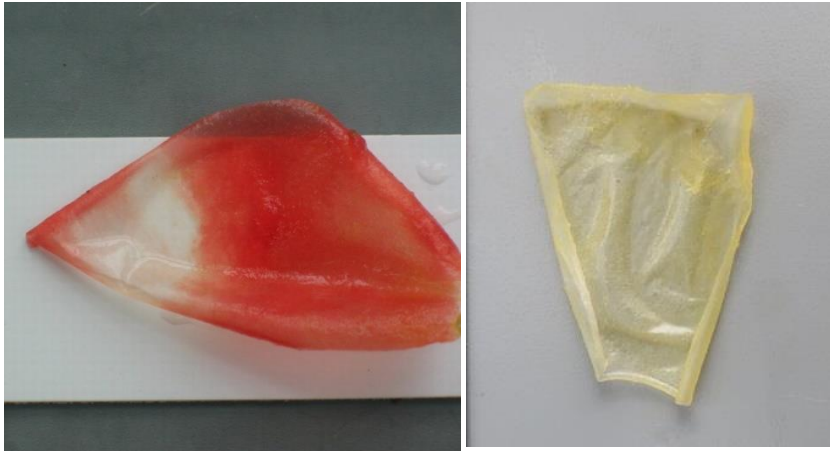
6. Method of observation (example of characterization)

	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
40. VG (+)	Fruit: color of epidermis				
QL (c)	colorless	Fruits, House Momotaro		Fruits	1
	yellow	Black Cherry, Daniela, Kurikoma		Kurikoma	2

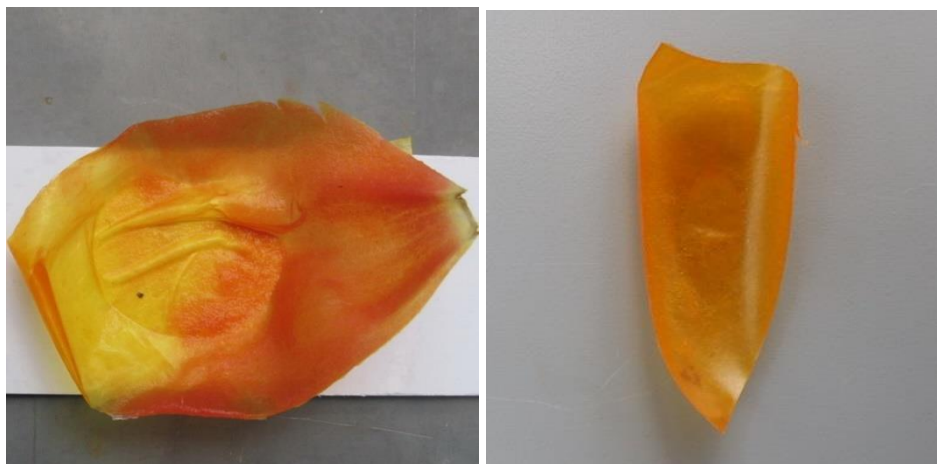
Remarks Not applicable in CPVO

Stage of observation: Observations should be made on mature fruits of second or third truss.

Method of observation: Peel the skin of the fruit and observe. Compare with the example varieties to decide on the proper notes.



1: colorless



2: yellow

6. Method of observation (example of characterization)

	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
41. VG Fruit: firmness (*) (+)					
QN (c)	very soft	Marmande VR	Marmande VR		1
	soft	Trend	Trend	Moneymaker	3
	medium	Cristina	Cristina	Fruits	5
	firm	Fernova, Konsul, Tradiro	Fernova, Konsul, Tradiro	Momotaro	7
	very firm	Daniela, Karat, Lolek	Daniela, Karat, Lolek		9

Remarks

Stage of observation: Observations should be made on mature fruits of second or third truss.

Method of observation: Observation of the harvested fruit gives a general impression of the sample. To determine the average image, leave aside the largest (usually the first fruit from the truss) and smallest (usually the last fruit from the truss) fruits in the sample, as well as any damaged fruits. Determine, by gently squeezing the fruit, the firmness of the fruit. Compare with the example varieties to decide on the proper notes.

UPOV explanation: Harvesting stage: fruits must be harvested when they are completely colored. Determining firmness: Determine by hand the firmness of the fruits compared to the standard varieties.

6. Method of observation (example of characterization)

	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
42. VG Fruit: shelf-life					
(+)					
QN	very short	Marmande VR		Marmande	1
	short	Rambo		Fruits	3
	medium	Durinta		Momotaro	5
	long	Daniela			7
	very long	Ernesto			9

Remarks

Not applicable in CPVO

Remarks:

Stage of observation: Observations should be made on mature fruits of second or third truss.

Method of observation: Observe how many weeks the fruit is available for sale. Two fruits (early colored) are collected from each plant. Place the fruit in the box so that they do not overlap. The place should be shade indoors and well ventilated. The storage location does not need to control for temperature and humidity but should be suitable for storing fruits. Gently press with your finger to check the firmness so that the fruit is not damaged. Observe twice a week and record the weeks when the firmness of the fruits become "3. soft". The observation ends at the 8th week. Compare with the example varieties to decide on the proper notes.

6. Method of observation (example of characterization)

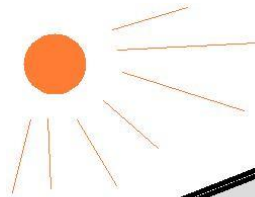
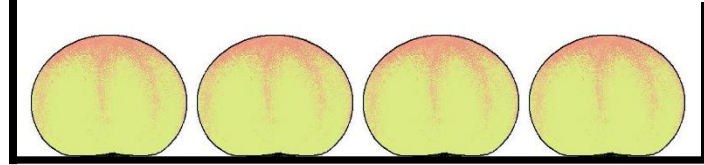
42. Fruit: shelf-life



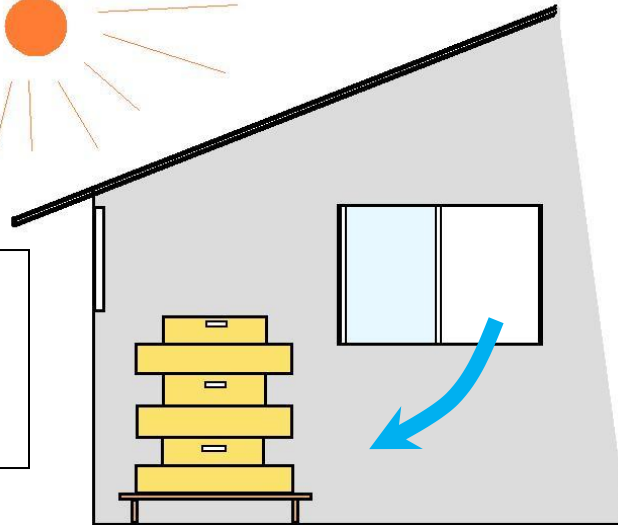
Coloring sample



Place the fruits in a box so that they do not overlap.
20 fruits per one plot



Place the box indoors in a well-ventilated shade.
Observe twice a week.
Remove damaged or rotten fruit.



6. Method of observation (example of characterization)

	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
43. MS	Time of flowering				
(+)					
QN	early	Feria, Primabel			3
	medium	Montfavet H 63.5, Prisca		Fruits	5
	late	Manific, Saint-Pierre			7

Remarks

Stage of observation: The flowering time of the third flower of second truss.

Method of observation: Record the flowering time of all plants and calculate average date. (JP)

Record the date when in 50% of the plants the third flower of the second truss is flowering (that is fully opened). Compare with the example varieties to decide on the proper notes.(NL)

During several years observations have been made on the second and third truss. A clear correlation is shown between the time of flowering of the second and the third truss. Therefore it is sufficient to make observations only on the second truss. (NL)

UPOV explanation: For staked varieties, this characteristic is assessed by observing the flowering date of the third flower on the second and third trusses, plant by plant. It is recommended not to record the time of flowering on the first truss, as the expression on the first truss is more influenced by the seed vigor and the plantation quality. The date of flowering is recorded by the plot average, truss by truss.

For determinate non-staked varieties, it is recommended to grow them on pruned stakes on the main stem and to record the characteristics in the same way as those for 'staked varieties'. On non-staked crops, this characteristic cannot be observed due to the branching of the plant.

6. Method of observation (example of characterization)

	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
44. MG	Time of maturity				
(*)					
(+)					
QN	very early	Dolcevita, Sungold, Sweet Baby			1
	early	Bianca, Rossol, Shiren			3
	medium	Gourmet, UC 82B		Fruits	5
	late	Arletta, Durinta			7
	very late	Daniela			9

Remarks

Stage of observation: When the third fruit of the second truss is matured.

Method of observation: Record the maturing date of all plants and calculate average date. (JP)

Record the date when 50% of the plants have one truss with harvestable (ripe) fruits. Compare with the example varieties to decide on the proper notes.

Note that the location of the sample in the greenhouse (for example near the window) can disturb the normal expression of time of maturity. Be sure that there are sufficient example varieties around to compensate for the environmental effects. (NL)

UPOV explanation: This characteristic is assessed by observing the date of maturity of the first fully ripe fruit on the second truss, plant by plant. It is recommended not to record the time of maturity on the first truss, as the expression on the first truss is more influenced by the seed vigor and the plantation quality.

The date of maturity is recorded by the plot average, truss by truss.

This characteristic can be observed as described on all types of tomato varieties, irrespective whether the plants are staked or non-staked.

6. Method of observation (example of characterization)

	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
45. VG	Sensitivity to silvering				
(+)					
QL	insensitive	Marathon, Quest, Sano, Tradiro			1
	sensitive	Belliro, Paradiso, Sonatine			9

Remarks

Not applicable in CPVO and Japan

6. Method of observation (example of characterization)

Characteristic 46-61 are physiological characteristics.

See explanation of UPOV test guideline.

	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
46. VG	Resistance to				
(*)	<i>Meloidogyne</i>				
(+)	<i>incognita</i> (Mi)				
QN	susceptible	Casaque Rouge			1
	moderately resistant	Campeon, Madyta, Vinchy			2
	highly resistant	Anabel, Anahu			3
47. VG	Resistance to				
(*)	<i>Verticillium</i> sp.				
(+)	(Va and Vd)				
	- Race 0				
QL	absent	Anabel, Marmande verte			1
	present	Daniela, Marmande VR			9
48. VG	Resistance to				
(+)	<i>Fusarium</i>				
	<i>oxysporum</i> f.				
	sp. <i>lycopersici</i>				
	(Fol)				
48.1 VG	- Race 0 (ex 1)				
(*)					
QL	absent	Marmande verte			1
	present	Anabel, Marporum, Marsol			9
48.2 VG	- Race 1 (ex 2)				
(*)					
QL	absent	Marmande verte			1
	present	Motelle, Walter			9

6. Method of observation (example of characterization)

	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
48.3 VG - Race 2 (ex 3)					
QL	absent	Marmande verte, Motelle			1
	present	Alliance, Florida, Ivanhoé, Tributes			9
49. VG Resistance to <i>Fusarium oxysporum</i> f. sp. <i>radicis-lycopersici</i> (Forl) (+)					
QL	absent	Motelle			1
	present	Momor			9
50. VG Resistance to <i>Fulvia fulva</i> (Ff) (ex <i>Cladosporium fulvum</i>) (+)					
50.1 VG - Race 0					
QL	absent	Monalbo			1
	present	Angela, Estrella, Sonatine, Sonato, Vemone			9
50.2 VG - Group A					
QL	absent	Monalbo			1
	present	Angela, Estrella, Sonatine, Sonato			9
50.3 VG - Group B					
QL	absent	Monalbo			1
	present	Angela, Estrella, Sonatine, Sonato, Vemone			9

6. Method of observation (example of characterization)

	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
50.4	VG - Group C				
QL	absent	Monalbo			1
	present	Angela, Estrella, Sonatine			9
50.5	VG - Group D				
QL	absent	Monalbo			1
	present	Estrella, Sonatine, Vemone			9
50.6	VG - Group E				
QL	absent	Monalbo			1
	present	Jadviga, Rhianna, Sonatine			9
51.	VG Resistance to Tomato mosaic virus (ToMV)				
(+)					
51.1	VG - Strain 0				
QL	absent	Monalbo			1
	present	Mobaci, Mocimor, Moperou			9
51.2	VG - Strain 1				
QL	absent	Monalbo			1
	present	Mocimor, Moperou			9
51.3	VG - Strain 2				
QL	absent	Monalbo			1
	present	Mobaci, Mocimor			9
52.	VG Resistance to <i>Phytophthora infestans</i> (Pi)				
(+)					
QL	absent	Heinz 1706, Saint Pierre			1
	present	Fline, Heline, Pieraline, Pyros			9

6. Method of observation (example of characterization)

	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
53. VG (+)	Resistance to <i>Pyrenochaeta lycopersici</i> (PI)				
QL	absent	Montfavet H 63.5			1
	present	Kyndia, Moboglan, Pyrella			9
54. VG (+)	Resistance to <i>Stemphylium</i> spp. (Ss)				
QL	absent	Monalbo			1
	present	Motelle			9
55. VG (+)	Resistance to <i>Pseudomonas syringae</i> pv. <i>tomato</i> (Pst)				
QL	absent	Monalbo			1
	present	Ontario 7710			9
56. VG (+)	Resistance to <i>Ralstonia solanacearum</i> (Rs) - Race 1				
QL	absent	Floradel			1
	present	Caraïbo			9
57. VG (+)	Resistance to Tomato yellow leaf curl virus (TYLCV)				
QL	absent	Montfavet H 63.5			1
	present	Anastasia, Mohawk, TY 20			9

6. Method of observation (example of characterization)

	English	UPOV Example Varieties	Netherlands Example Varieties	Japan Example Varieties	Note
58.	VG	Resistance to Tomato spotted wilt virus (TSWV)			
(+)					
		- Race 0			
QL	absent	Montfavet H 63.5			1
	present	Lisboa			9
59.	VG	Resistance to <i>Leveillula taurica</i> (Lt)			
(+)					
QL	absent	Montfavet H 63.5			1
	present	Atlanta			9
60.	VG	Resistance to <i>Oidium neolycopersici</i> (On) (ex <i>Oidium lycopersicum</i> (Ol))			
(+)					
QL	absent	Montfavet H 63.5			1
	present	Romiro			9
61.	VG	Resistance to Tomato torrado virus (ToTV)			
(+)					
QL	absent	Daniela			1
	present	Matias			9