

UPOV

TG/76/8(proj.3)

ORIGINAL: English

DATE: 2005-05-02

INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

GENEVA

DRAFT

**SWEET PEPPER, HOT PEPPER,
PAPRIKA, CHILI**

UPOV Code: CAPSI_ANN

Capsicum annuum L.

GUIDELINES

FOR THE CONDUCT OF TESTS

FOR DISTINCTNESS, UNIFORMITY AND STABILITY

prepared by an expert from Hungary

*to be considered by the
Technical Working Party for Vegetables (TWV) at its thirty-ninth session,
to be held in Nitra, Slovakia, from June 6 to 10, 2005*

Alternative Names: *

<i>Botanical name</i>	<i>English</i>	<i>French</i>	<i>German</i>	<i>Spanish</i>
<i>Capsicum annuum</i> L.	Sweet Pepper, Hot Pepper, Paprika, Chili	Piment, Poivron(s)	Paprika	Aji, Chile, Pimiento

The purpose of these guidelines (“Test Guidelines”) is to elaborate the principles contained in the General Introduction (document TG/1/3), and its associated TGP documents, into detailed practical guidance for the harmonized examination of distinctness, uniformity and stability (DUS) and, in particular, to identify appropriate characteristics for the examination of DUS and production of harmonized variety descriptions.

ASSOCIATED DOCUMENTS

These Test Guidelines should be read in conjunction with the General Introduction and its associated TGP documents.

* These names were correct at the time of the introduction of these Test Guidelines but may be revised or updated. [Readers are advised to consult the UPOV Code, which can be found on the UPOV Website (www.upov.int), for the latest information.]

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1. Subject of these Test Guidelines

These Test Guidelines apply to all varieties of *Capsicum annuum* L.

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 seed.

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

2,500 seeds.

2.4 The seed should meet the minimum requirements for germination, species and analytical purity, health and moisture content, specified by the competent authority.

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

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

3. Method of Examination

3.1 *Number of Growing Cycles*

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

3.2 *Testing Place*

Tests are normally conducted at one place. In the case of tests conducted at more than one place, guidance is provided in TGP/9 "Examining Distinctness".

3.3 *Conditions for Conducting the Examination*

3.3.1 The tests should be carried out under conditions ensuring satisfactory growth for the expression of the relevant characteristics of the variety and for the conduct of the examination.

3.3.2 The recommended method of observing the characteristic is indicated by the following key in the second column of the Table of Characteristics:

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

3.4 *Test Design*

3.4.1 Each test should be designed to result in a total of at least 20 plants which should be divided between 2 replicates.

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*

Unless otherwise indicated, all observations should be made on 20 plants or parts taken from each of 20 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 differences observed between varieties may be so clear that more than one growing cycle is not necessary. In addition, in some circumstances, the influence of the environment is not such that more than a single growing cycle is required to provide assurance that the differences observed between varieties are sufficiently consistent. One means of ensuring that a difference in a characteristic, observed in a growing trial, is sufficiently consistent is to examine the characteristic in at least two independent growing cycles.

4.1.3 *Clear Differences*

Determining whether a difference between two varieties is clear depends on many factors, and should consider, in particular, the type of expression of the characteristic being examined, i.e. whether it is expressed in a qualitative, quantitative, or pseudo-qualitative manner. Therefore, it is important that users of these Test Guidelines are familiar with the

recommendations contained in the General Introduction prior to making decisions regarding distinctness.

4.2 *Uniformity*

4.2.1 It is of particular importance for users of these Test Guidelines to consult the General Introduction prior to making decisions regarding uniformity. However, the following points are provided for elaboration or emphasis in these Test Guidelines:

4.2.2 For the assessment of uniformity of cross-pollinated varieties, a population standard of 2% and an acceptance probability of at least 95% should be applied. In the case of a sample size of 20 plants, 2 off-types are allowed.

4.2.3 For the assessment of uniformity of hybrids, a population standard of 1% and an acceptance probability of at least 95% should be applied. In the case of a sample size of 20 plants, 1 off-type is allowed.

4.3 *Stability*

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

4.3.2 Where appropriate, or in cases of doubt, stability may be tested, either by growing a further generation, or by testing a new seed 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 are aided by the use of grouping characteristics.

5.2 Grouping characteristics are those in which the documented states of expression, even where produced at different locations, can be used, either individually or in combination with other such characteristics: (a) to select varieties of common knowledge that can be excluded from the growing trial used for examination of distinctness; and (b) to organize the growing trial so that similar varieties are grouped together.

5.3 The following have been agreed as useful grouping characteristics:

- (a) Seedling: anthocyanin coloration of hypocotyl (characteristic 1)
- (b) Plant: shortened internodes (in upper part) (characteristic 4)
- (c) Fruit: color (before maturity) (characteristic 22)
- (d) Fruit: shape in longitudinal section (characteristic 29)
- (e) Fruit: color (at maturity) (characteristic 34)
- (f) Fruit: capsaicin in placenta (characteristic 46)

- (g) Resistance to Tobamovirus - Pathotype 0 (Tobacco Mozaic Virus (0)) (characteristic 49.1)
- (h) Resistance to Tobamovirus - Pathotype 1-2 (Pepper Mild Mottle Virus (1-2)) (characteristic 49.3)
- (j) Resistance to Tobamovirus - Pathotype 1-2-3 (Pepper Mild Mottle Virus (1-2-3)) (characteristic 49.4)
- (k) Resistance to Potato Virus Y (PVY) - Pathotype 0 (characteristic 50.1)

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 Chapter 6.1.2

QL: Qualitative characteristic – see Chapter 6.3

QN: Quantitative characteristic– see Chapter 6.3

PQ: Pseudo-qualitative characteristic – see Chapter 6.3

MG: single measurement of a group of plants or parts of plants - see Chapter 3.3.2

MS: measurement of a number of individual plants or parts of plants - see Chapter 3.3.2

VG: visual assessment by a single observation of a group of plants or parts of plants -
see Chapter 3.3.2

VS: visual assessment by observation of individual plants or parts of plants -
see Chapter 3.3.2

(a) and (b) See Explanations on the Table of Characteristics in Chapter 8.1

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

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

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielsorten/ Variedades ejemplo	Note/ Nota
1. VS (*)	Seedling: anthocyanin coloration of hypocotyl	Plantule: pigmentation anthocyanique de l'hypocotyle	Keimpflanze: Anthocyanfärbung des Hypokotyls	Plántula: pigmentación antociánica del hipocotilo		
QL	absent	absente	fehlend	ausente	Albaregia, Albena	1
	present	présente	vorhanden	presente	Lamuyo	9
2. VG	Plant: habit	Plante: port	Pflanze: Stellung	Planta: porte		
PQ	upright	érigé	aufrecht	erecto	De Cayenne, Doux long des Landes, Piquant d'Algérie	1
	semi-upright	demi-érigé	halbaufrecht	semierecto	Clovis, Sonar	2
	prostrate	étalé	liegend	postrado	Delphin, Trophy	3
3. MS (+)	Plant: length of stem	Plante: longueur de la tige (des cotylédons à la première fleur/ ramification)	Pflanze: Länge des Stengels (von den Keimblättern bis zur ersten Blüte/Verzweigung)	Planta: longitud del tallo (desde los cotiledones hasta la primera flor/ramificación)		
QN	short	courte	kurz	corta	Delphin, Trophy	3
	medium	moyenne	mittel	media	Belsir, Lamuyo	5
	long	longue	lang	larga	Lipari, Marconi, Rouge long ordinaire	7
4. VS (*) (+)	Plant: shortened internodes (in upper part)	Plante: entre-nœud raccourci (à la partie supérieure)	Pflanze: verkürztes Internodium (im oberen Teil)	Planta: entrenudo acortado (en la parte superior)		
QL	absent	absent	fehlend	ausente	California Wonder, De Cayenne	1
	present	présent	vorhanden	presente	Fehér, Kalocsai 601	9

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
5. MS	<u>Varieties with shortened internodes only:</u> Plant: number of internodes between the first flower and shortened internodes	<u>Variétés à entre-nœuds raccourcis seulement:</u> Plante: nombre d'entre-nœuds entre la première fleur et les entre-nœuds raccourcis	<u>Nur Sorten mit verkürzten Internodien:</u> Pflanze: Anzahl Internodien zwischen der ersten Blüte und den verkürzten Internodien	<u>Variedades con entrenudos acortados únicamente:</u> Planta: número de entrenudos entre la primera flor y los entrenudos acortados		
(+)						
PQ	none	aucun	keine	ninguno	Kalocsai 601	1
	one to three	un à trois	eines bis drei	uno a tres	Fehér	2
	more than three	plus de trois	mehr als drei	más de tres	Kalocsai 702	3
6. MS	<u>Varieties without shortened internodes only:</u> Plant: length of internode (on primary side shoots)	<u>Variétés sans entre-nœuds raccourcis seulement:</u> Plante: longueur de l'entre-nœud (sur ramifications primaires)	<u>Nur Sorten ohne verkürzte Internodien:</u> Pflanze: Länge des Internodiums (an Verzweigungen erster Ordnung)	<u>Variedades sin entrenudos acortados únicamente:</u> Planta: longitud del entrenudo (en los brotes laterales principales)		
QN	very short	très court	sehr kurz	muy corta	Albaregia	1
	short	court	kurz	corta	Blondy, Bandero, Danubia, Tenor	3
	medium	moyen	mittel	media	Dolmi, Florian, Órias	5
	long	long	lang	larga	Coro di toro rosso	7
	very long	très long	sehr lang	muy larga	Fenice, Kalocsai M, Sienor	9
7.	Plant: anthocyanin coloration of nodes	Plante: pigmentation anthocyanique des nœuds	Pflanze: Anthocyanfärbung der Knoten	Planta: pigmentación antocianica los nudos		
QL	absent	absent	fehlend	ausente	Albaregia	1
	present	présent	vorhanden	presente	California Wonder, Albena	9

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
8. VS	Stem: intensity of anthocyanin coloration of nodes	Plante: pigmentation anthocyanique au niveau des nœuds	Pflanze: Anthocyanfärbung in Höhe der Knoten	Planta: pigmentación antocianica a nivel de los nudos		
QN	very weak	très faible	sehr gering	muy débil	Albena	1
	weak	faible	gering	débil	California Wonder, Clio, Doux d'Espagne, Doux long des Landes, Golden Calwonder	3
	medium	moyenne	mittel	media	Clovis, Lamuyo, Sonar	5
	strong	forte	stark	fuerte	Piquant d'Algérie, Zarai	7
	very strong	très forte	sehr stark	muy fuerte	Alwin, Korai, Lito, Pusztagold	9
9. VG (+)	Stem: hairiness of nodes	Tige: pilosité des nœuds	Stengel: Behaarung der Knoten	Tallo: pilosidad de los nudos		
QN	absent or very weak	nulle ou très faible	fehlend oder sehr gering	ausente o muy débil	Arlequin	1
	weak	faible	gering	débil	Andevalo, Clovis	3
	medium	moyenne	mittel	media	Doux très long des Landes, Farmese	5
	strong	forte	stark	fuerte	Fenice, Solario	7
	very strong	très forte	sehr stark	muy fuerte	Alby, Ibleor	9
10. VS/MS (+)	Plant: height (at maturity)	Plante: hauteur (à maturité)	Pflanze: Höhe (bei Reife)	Planta: altura (a la madurez)		
QN (b)	very short	très basse	sehr niedrig	muy baja	Kalocsai 601	1
	short	basse	niedrig	baja	Albaregia	3
	medium	moyenne	mittel	media		5
	tall	haute	hoch	alta		7
	very tall	très haute	sehr hoch	muy alta	Hot chilli	9

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
11.	MS/ VG	Leaf: length of blade	Feuille: longueur du limbe	Blatt: Länge der Blattspreite	Hoja: longitud del limbo	
QN	very short	très courte	sehr kurz	muy corta	Macska sárga, Tüzes piros	1
	short	courte	kurz	corta	De Cayenne, Szentesi cseresznye	3
	medium	moyenne	mittel	media	Atol, Blondy, Marconi, Merit Anthea	5
	long	longue	lang	larga	Dolmy, Cupido, Encore, Mazurka, Monte	7
	very long	très longue	sehr lang	muy larga	Predi, Solario	9
12.	MS/ VG	Leaf: width of blade	Feuille: largeur du limbe	Blatt: Breite der Blattspreite	Hoja: anchura del limbo	
QN	very narrow	très étroite	sehr schmal	muy estrecha	Macska sárga, Recio, Tüzes piros	1
	narrow	étroite	schmal	estrecha	De Cayenne, Pusztagold Szentesi cseresznye	3
	medium	moyenne	mittel	media	Albargia, Balaton, Danubia, Marconi, Merit	5
	broad	large	breit	ancha	California wonder, Golden calwonder, Sienor, Solario	7
13.	VG	Leaf: color	Feuille: pigmentation anthocyanique	Blatt: Anthocyanfärbung	Hoja: pigmentación antociánica	
PQ	yellow				Lombardo	1
	green				California wonder	2
	purple				Purple	3

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielsorten/ Variedades ejemplo	Note/ Nota
14. VG	<u>Only varieties with leaf color: green:</u> Leaf: intensity of green color	<u>Variétés avec des feuilles vertes uniquement:</u> Feuille: couleur verte	<u>Nur Sorten mit grünen Blättern:</u> Blatt: Grünfärbung	<u>Sólo variedades de hojas verdes:</u> hoja: color verde		
QN	very light	très claire	sehr hell	muy claro	Amaryllis, Lombardo	1
	light	claire	hell	claro	Piquant d'Algérie, Pusztagold	3
	medium	moyenne	mittel	medio	Doux long des Landes, Merit	5
	dark	foncée	dunkel	oscuro	Dolmy, Tinto	7
	very dark	très foncée	sehr dunkel	muy oscuro	Hot chilli, Recio, Soleor	9
15. VS	Leaf: shape	Feuille: forme	Blatt: Form	Hoja: forma		
	(+)					
	lanceolate	lancéolée	lanzettlich	lanceolada	Diavolo, Recio	1
PQ	ovate	ovale	eiförmig	oval	Balico, Sonar	2
	broad elliptic	cordiforme	herzförmig	cordiforme	Solario	3
16. VG	Leaf: undulation of margin	Feuille: ondulation du bord	Blatt: Randwellung	Hoja: ondulación del margen		
QN	absent or very weak	nulle ou très faible	fehlend oder sehr gering	ausente o muy débil	De Cayenne	1
	weak	faible	gering	débil	Doux très long des Landes	3
	medium	moyenne	mittel	media	Tenor	5
	strong	forte	stark	fuerte	Sucette de Provence, Tosca	7
	very strong	très forte	sehr stark	muy fuerte	Farya	9

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
17. VG	Leaf: blistering	Feuille: cloûre	Blatt: Blasigkeit	Hoja: abullonado		
QN	very weak	très faible	sehr gering	muy débil	Century, Recio, Sofiane	1
	weak	faible	gering	débil	Pusztagold	3
	medium	moyenne	mittel	medio	Merit	5
	strong	forte	stark	fuerte	Greygo, PAZ pallagi	7
	very strong	très forte	sehr stark	muy fuerte	Florian	9
18. VG	Leaf: profile in cross section	Feuille: profil en section transversale	Blatt: Profil im Querschnitt	Hoja: perfil en sección transversal		
(+)						
QN	strongly convex				Slávy	1
	moderately convex				Doux Italien, Favolor	3
	flat	plat	flach	plano	De Cayenne, Recio	5
	moderately concave				Albaregia	7
	strongly concave				? Ducato, Tinto	9
19. VG	Leaf: glossiness	Feuille: brillance	Blatt: Glanz	Hoja: brillo		
QN	very weak	très faible	sehr gering	muy débil	Diavolo	1
	weak	faible	gering	débil	De Cayenne, Doux très long des Landes	3
	medium	moyenne	mittel	medio	Alby, Eolo	5
	strong	forte	stark	fuerte	Andevalo, Floridor	7
	very strong	très forte	sehr stark	muy fuerte	Cubor, Petit marseillais	9

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota	
20.	VS	Peduncle: attitude	Fleur: port du pédoncule	Blüte: Haltung des Blütenstiels	Flor: porte del pedúnculo		
		erect	dressé	aufrecht	erecto	Fehér, Red Chili	1
	PQ	semi-drooping	intermédiaire	intermediär	intermedio	Blondy	2
		drooping	retombant	hängend	colgante	Heldor, Lamuyo	3
21.	VS	Flower: anthocyanin coloration in filament	Fleur: pigmentation anthocyanique du filament	Blüte: Anthocyanfärbung des Staubfadens	Flor: pigmentación antocianica del filamento		
	QL	absent	absente	fehlend	ausente	Danza	1
		present	présente	vorhanden	presente	Lamuyo	9
22.	VS	Fruit: color (before maturity)	Fruit: couleur (avant maturité)	Frucht: Farbe (vor der Reife)	Fruto: color (antes de la madurez)		
	PQ (a)	greenish white	blanc verdâtre	grünlichweiß	blanco verdoso	Blanc d'Espagne, Twiggy	1
		yellow	jaunâtre	gelblich	amarillento	Fehér, Sweet Banana	2
		green	vert	grün	verde	California Wonder, Lamuyo	3
		purple	pourpre	purpurn	púrpura	Violetta	4
23.	VS	Fruit: intensity of color (before maturity)	Fruit: intensité de la couleur (avant maturité)	Frucht: Intensität der Farbe (vor der Reife)	Fruto: intensidad del color (antes de la madurez)		
	QN (a)	very light	très claire	sehr hell	muy clara	Kaméleon, Jackson, Milka, Sofiane, Savó	1
		light	claire	hell	clara	Anthea, Daras, PCR	3
		medium	moyenne	mittel	media	Demon, PAZ szentesi	5
		dark	foncée	dunkel	oscura	California wonder, Greygo	7
		very dark	très foncée	sehr dunkel	muy oscura	Amato, Hot chilli, Kalocsai A, Olimpo	9

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
24. VS	Fruit: anthocyanin coloration (before maturity)	Fruit: pigmentation anthocyanine (avant maturité)	Frucht: Anthocyanfärbung (vor der Reife)	Fruto: pigmentación antocianica (antes de la madurez)		
QL (a)	absent	absente	fehlend	ausente	Lamuyo	1
	present	présente	vorhanden	presente	Violette, Purple beauty	9
25. VS	Fruit: attitude	Fruit: port	Frucht: Haltung	Fruto: porte		
PQ (b)	erect	dressé	aufrecht	erecto	Kalocsai 601, Red Chili	1
	horizontal	horizontal	waagrecht	horizontal	PAZ szentesi, Vinedale	2
	drooping	retombant	hängend	colgante	De Cayenne, Lamuyo	3
26. VS/MS	Fruit: length	Fruit: longueur	Frucht: Länge	Fruto: longitud		
QN (b)	very short	très courte	sehr kurz	muy corta	Cherry Sweet, Topgirl	1
	short	courte	kurz	corta	Delphin, Petit carré doux	3
	medium	moyenne	mittel	media	Fehér, Lamuyo	5
	long	longue	lang	larga	Doux d'Espagne, Majister	7
	very long	très longue	sehr lang	muy larga	Arabal, Corno di toro, Marconi	9
27. VS/MS	Fruit: diameter	Fruit: diamètre	Frucht: Durchmesser	Fruto: diámetro		
QN (b)	very small	très petit	sehr klein	muy pequeño	De Cayenne, Recio	1
	small	petit	klein	pequeño	Doux long des Landes	3
	medium	moyen	mittel	medio	Doux Italien, Corno di toro	5
	large	grand	groß	grande	Clovis, Lamuyo	7
	very large	très grand	sehr groß	muy grande	Floridor, Ibleor, Inca, Joly rosso, Quadrato d'Asti, Surpas	9

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
28. MS (*) (+)	Fruit: ratio length/diameter	Fruit: rapport longueur/diamètre	Frucht: Verhältnis Länge/Durchmesser	Fruto: relación entre la longitud y el diámetro		
QN (b)	very small	très faible	sehr klein	muy pequeña	Liebesapfel, PAZszentesi, Rotopa	1
	small	faible	klein	pequeña	Bucano, Topgirl	3
	medium	moyen	mittel	media	Adra, Cherry Sweet, Daniel, Delphin, Edino	5
	large	élevé	groß	grande	Heldor, Lamuyo, Magister, Tenno, Vidi	7
	very large	très élevé	sehr groß	muy grande	De Cayenne, Doux Italien, Kusamon, Spadi, Ursus	9
29. VS (*) (+)	Fruit: shape in longitudinal section	Fruit: forme prédominante de la section longitudinale	Frucht: überwiegende Form des Längsschnitts	Fruto: forma predominante en sección longitudinal		
PQ (b)	oblate	aplatie	flach	plana	Liebesapfel, PAZ szentesi, Topepo rosso	1
	round	arrondie	rund	redonda	Cherry Sweet	2
	cordate	cordiforme	herzförmig	acorazonada	Daniel, Pimiento L.	3
	square	quadrangulaire	quadratisch	cuadrada	Delphin, Yolo Wonder	4
	rectangular	rectangulaire	rechteckig	rectangular	Clovis, Nocera rosso	5
	trapezoid	trapézoïdale	trapezförmig	trapezoidal	Piperade, Delta	6
	triangular	triangulaire	dreieckig	triangular	Marconi, Fehér	7
	narrow triangular	triangulaire étroite	schmal dreieckig	triangular estrecha	Demon, De Cayenne	8
	hornshaped	en corne	hornförmig	en forma de cuerno	Corno di toro rosso, Lipari	9

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
30.	VS	Fruit: shape in cross section (at level of placenta)	Fruit: forme prédominante de la section transversale (au niveau du placenta)	Frucht: überwiegende Form des Querschnitts (auf Höhe der Plazenta)	Fruto: forma predominante en sección transversal (a nivel de la placenta)	
PQ	(b)	elliptic	elliptique	elliptisch	elíptica	Sweet Banana 1
		angular	angulaire	eckig	angular	Vinedale 2
		circular	arrondie	rund	circular	Cherry Sweet, Doux long des Landes 3
31.	VS	Fruit: sinuation of pericarp at basal part	Fruit: sinuosité du péricarpe	Frucht: Wellung des Perikarps	Fruto: sinuosidad del pericarpio	
(+)						
QN	(b)	absent or very weak	absente ou très faible	fehlend oder sehr gering	ausente o muy débil	Kalocsai V-2, Delphin, Milord 1
		weak	faible	gering	débil	Donat 3
		medium	moyenne	mittel	media	Duna, Banán 5
		strong	forte	stark	fuerte	Alfa 7
		very strong	très forte	sehr stark	muy fuerte	Édes spiral, Doux Italien 9
32.	VS	Fruit: sinuation of pericarp excluding basal part	Fruit: sinuosité du péricarpe ???	Frucht: Wellung des Perikarps ???	Fruto: sinuosidad del pericarpio???	
(+)						
QN	(b)	absent or very weak	absente ou très faible	fehlend oder sehr gering	ausente o muy débil	Delphin, Milord 1
		weak	faible	gering	débil	Clovis, Sonar 3
		medium	moyenne	mittel	media	Ursus 5
		strong	forte	stark	fuerte	De Cayenne, Doux Italien 7
		very strong	très forte	sehr stark	muy fuerte	Arabal 9

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
33. VS (*)	Fruit: texture of surface	Fruit: texture de la surface	Frucht: Textur der Oberfläche	Fruto: textura de la superficie		
QN (b)	smooth	lisse	glatt	lisa	Milord, Pimiento L.	1
	slightly wrinkled	légèrement ridée	leicht gerieft	ligeramente arrugada	Doux long des Landes	2
	strongly wrinkled	fortement ridée	stark gerieft	fuertemente arrugada	Sierra Nevada	3
34. VS (*)	Fruit: color (at maturity)	Fruit: couleur après la première modification de couleur	Frucht: Farbe nach der ersten Änderung der Farbe	Fruto: color luego del primer cambio de color		
PQ (b)	yellow	jaune	gelb	amarillo	Golden Calwonder, Heldor	1
	orange	orange	orange	naranja	Ariane	2
	red	rouge	rot	rojo	Fehér, Lamuyo	3
	brown	brun	braun	marrón	Brupa, Negral	4
35. VG	Fruit: intensity of color (at maturity)	Fruit: intensité de la couleur (à maturité)	Frucht: Intensität der Farbe (bei Reife)	Fruto: intensidad del color (a la madurez)		
(b)	light	claire	hell	clara		3
	medium	moyenne	mittel	media		5
	dark	foncée	dunkel	oscura		7
36. VG	Fruit: glossiness	Fruit: brilliance	Frucht: Glanz	Fruto: brillo		
QN (b)	very weak	très faible	sehr gering	muy débil	Macska sárگا, Pikanta	1
	weak	faible	gering	débil	Doux très long des Landes	3
	medium	moyenne	mittel	medio	Carré doux extra hâtif, Lamuyo, Sonar	5
	strong	forte	stark	fuerte	Doux Italien, Trophy	7
	very strong	très forte	sehr stark	muy fuerte	Floridor, Kappy	9

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
37. VG (*)	Fruit: stalk cavity	Fruit: dépression pédonculaire	Frucht: Stielhöhle	Fruto: cavidad peduncular		
QL (b)	absent	absente	fehlend	ausente	Corinto, Corno di toro, Sweet Banana, Sucette de Provence	1
	present	présente	vorhanden	presente	Bingor, Lamuyo	9
38. VS	Fruit: depth of stalk cavity	Fruit: profondeur de la dépression pédonculaire	Frucht: Tiefe der Stielhöhle	Fruto: profundidad de la cavidad peduncular		
QN (b)	very shallow	très peu profonde	sehr flach	muy poco profunda	Flush, Kaméleon, Niagara	1
	shallow	peu profonde	flach	poco profunda	Delphin, Doux Italien, Fehér, Latino	3
	medium	moyenne	mittel	media	Lamuyo, Magister	5
	deep	profonde	tief	profunda	Osir, Quadrato d'Asti rosso, Surpas	7
	very deep	très profonde	sehr tief	muy profunda	Cancun, Cubor, Pablor, Shy Beauty	9
39. VS	Fruit: shape of apex	Fruit: forme du sommet	Frucht: Form der Spitze	Fruto: forma del ápice		
PQ (b)	very acute	très pointue	sehr spitz	muy aguda	De Cayenne, Hot chilli	1
	moderately acute	pointue	spitz	aguda	Pimiento L.	2
	rounded	arrondie	abgerundet	redondeada	Cherry Sweet	3
	moderately depressed	déprimée	eingesenkt	hundida	Quadrato d'Asti rosso	4
	very depressed	très déprimée	stark eingesenkt	muy hundida	Kerala, Monte, Osir	5
40. VS (+)	Fruit: depth of interloculary grooves	Fruit: profondeur des dépressions interlocaires	Frucht: Tiefe der Furchen zwischen den Kammern	Fruto: profundidad de los surcos interloculares		
QN (b)	absent or very shallow	nulles ou très peu profondes	fehlend oder sehr flach	ausente o muy poco profunda	De Cayenne	1
	shallow	peu profondes	flach	poco profunda	Milord, Topgirl	3
	medium	moyennes	mittel	media	Clovis, Lamuyo, Marconi	5
	deep	profondes	tief	profunda	Majister, Surpas	7

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
41. MS (*)	Fruit: number of locules	Fruit: nombre prédominant de loges	Frucht: überwiegende Anzahl Kammern	Fruto: número predominante de lóculos		
PQ (b)	only two	seulement deux	nur zwei	sólo dos	De Cayenne	1
	two and three	deux et trois	zwei und drei	dos y tres	Fehér	2
	only three	seulement trois	nur drei	sólo tres	Century	3
	three and four	trois et quatre	drei und vier	tres y cuatro	Lamuyo, Sonar	4
	four and more	quatre et plus	vier und mehr	cuatro y más	Palio, PAZ szentesi	5
42. VG (*)	Fruit: thickness of flesh	Fruit: épaisseur de la chair	Frucht: Dicke des Fleisches	Fruto: espesor de la pulpa		
QN (b)	very thin	très mince	sehr dünn	muy delgado	De Cayenne, Macska sárga, Petit Marseillais, Recio	1
	thin	mince	dünn	delgado	Banán, Carré doux extra hâtif, Doux long des Landes	3
	medium	moyenne	mittel	medio	Fehér, Lamuyo	5
	thick	épaisse	dick	grueso	Andevalo, Bingor, Daniel, Pimiento L., Topgirl	7
	very thick	très épaisse	sehr dick	muy grueso	Dragox Roda, Regolo, Solario	9
43. VS/MS	Stalk: length	Pédoncule: longueur	Fruchtsiel: Länge	Pedúnculo: longitud		
QN (b)	very short	très courte	sehr kurz	muy corta	Greygo, Golden calwonder	1
	short	courte	kurz	corta	Surpas, Yolo Wonder, Zenith	3
	medium	moyenne	mittel	media	Fehér, Sonar	5
	long	longue	lang	larga	De Cayenne, Sierra Nevada, Sweet Banana	7
	very long	très longue	sehr lang	muy larga	Farnese, Lipari, Oasis	9

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
44.	VS/ MS	Stalk: thickness	Pédoncule: grosseur	Fruchtsiel: Dicke	Pedúnculo: espesor	
QN (b)	very thin	très mince	sehr dünn	muy delgado	De Cayenne, Doux long des Landes, Macska sárğa, Recio	1
	thin	mince	dünn	delgado	Sweet Banana	3
	medium	moyenne	mittel	medio	Doux Italien, Surpas	5
	thick	épaisse	dick	grueso	Lamuyo, Trophy Palio	7
	very thick	très épaisse	sehr dick	muy grueso	Domingo, Galaxy, Paraiso	9
45.	VS (+)	Calyx: aspect	Calice: aspect	Kelch: Aussehen	Cáliz: aspecto	
QL (b)	non enveloping	non enrobant	nicht umhüllend	no envolvente	Lamuyo, Sonar	1
	enveloping	enrobant	umhüllend	envolvente	De Cayenne, Sweet Banana	2
46.	MS (*)	Fruit: capsaicin in placenta	Fruit: capsaicin dans le placenta	Frucht: Capsaicin in der Plazenta	Fruto: capsaicina en la placenta	
QL (b)	absent	absent	fehlend	ausente	Sonar	1
	present	présent	vorhanden	presente	De Cayenne	9
47.	VS	Time of beginning of flowering (first flower on second flowering node)	Époque de début de floraison (première fleur au deuxième nœud florifère)	Zeitpunkt des Blühbeginns (erste Blüte am zweiten blütentragenden Knoten)	Época de comienzo de la floración (primera flor en el segundo nudo floral)	
QN	early	précoce	früh	temprana	Carré doux extra hâtif, Cupido, Fehér, Flaviano, Lito, Trophy	3
	medium	moyenne	mittel	media	Lamuyo, Latino	5
	late	tardive	spät	tardía	Daniel, Piquant d'Algérie, Zingaro	7

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
48. VS	Time of maturity	Époque de maturité	Zeitpunkt der Reife	Época de		
(+)		(changement de la	(Änderung der	maduración (cambio		
		couleur des fruits)	Farbe der Früchte)	de color del fruto)		
QN	very early	très précoce	sehr früh	muy temprana	Macska sárga, Koral, Madison	1
	early	précoce	früh	temprana	Fehér, Lady Bell, Topgirl	3
	medium	moyenne	mittel	media	Lamuyo, Latino, Sonar	5
	late	tardive	spät	tardía	Daniel, Doux d'Espagne	7
	very late	très tardive	sehr spät	muy tardía	Cancun, California wonder	9
49.	Resistance to	Résistance	Resistenz gegen	Resistencia al		
(+)	Tobamovirus	au tobamovirus	Tobamovirus	tobamovirus		
49.1	Pathotype 0	Pathotype 0	Pathotyp 0	Patotipo 0		
(*)	(Tobacco Mozaic	(virus de la	(Tabakmosaikvirus	(Virus del mosaico		
	Virus (0))	mosaïque du tabac	(0))	del tabaco (0))		
		(0))				
QL	absent	absente	fehlend	ausente	Doux Italien, Piperade	1
	present	présente	vorhanden	presente	Lamuyo, Sonar, Yolo Wonder	9
49.2	Pathotype 1	Pathotype 1	Pathotyp 1	Patotipo 1		
	(Pepper Mild Mottle	(virus de la	(Pepper Mild Mottle	(Virus del moteado		
	Virus (1))	marbrure nervaire	Virus (1))	suave del pimiento		
		du piment (1))		(1))		
QL	absent	absente	fehlend	ausente	Piperade, Yolo Wonder	1
	present	présente	vorhanden	presente	??	9
49.3	Pathotype 1-2	Pathotype 1-2	Pathotyp 1-2	Patotipo 1-2		
(*)	(Pepper Mild Mottle	(virus de la	(Pepper Mild Mottle	(Virus del moteado		
	Virus (1-2))	marbrure nervaire	Virus (1-2))	suave del pimiento		
		du piment (1-2))		(1-2))		
QL	absent	absente	fehlend	ausente	Piperade, Yolo Wonder	1
	present	présente	vorhanden	presente	Delgado, Festos, Novi, Orion	9

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
49.4 (*)	Pathotype 1-2-3 (Pepper Mild Mottle Virus (1-2-3))	Pathotype 1-2-3 (virus de la marbrure nervaire du piment (1-2-3))	Pathotyp 1-2-3 (Pepper Mild Mottle Virus (1-2-3))	Patotipo 1-2-3 (Virus del moteado suave del pimiento (1-2-3))		
QL	absent	absente	fehlend	ausente	Piperade, Yolo Wonder	1
	present	présente	vorhanden	presente	Cuby, Tasty	9
50. (+)	Resistance to Potato Virus Y (PVY)	Résistance au virus Y de la pomme de terre (PVY)	Resistenz gegen Kartoffel-Y-Virus (PVY)	Resistencia al virus Y de la papa (PVY)		
50.1 (*)	Pathotype 0	Pathotype 0	Pathotyp 0	Patotipo 0		
QL	absent	absente	fehlend	ausente	Yolo Wonder	1
	present	présente	vorhanden	presente	Yolo Y	9
50.2	Pathotype 1	Pathotype 1	Pathotyp 1	Patotipo 1		
QL	absent	absente	fehlend	ausente	Yolo Wonder, Yolo Y	1
	present	présente	vorhanden	presente	Florida VR2	9
50.3	Pathotype 1-2	Pathotype 1-2	Pathotyp 1-2	Patotipo 1-2		
QL	absent	absente	fehlend	ausente	Florida VR2, Yolo Wonder, Yolo Y	1
	present	présente	vorhanden	presente	Criollo de Morenos, Serrano	9
51. (+)	Resistance to <i>Phytophthora capsici</i>	Résistance à <i>Phytophthora capsici</i>	Resistenz gegen <i>Phytophthora capsici</i>	Resistencia al <i>Phytophthora capsici</i>		
QL	absent	absente	fehlend	ausente	Yolo Wonder	1
	present	présente	vorhanden	presente	Phyo 636, Picador, PM 217	9
52. (+)	Resistance to Cucumber Mozaic Virus (CMV)	Résistance au virus de la mosaïque du concombre (CMV)	Resistenz gegen Gurkenmosaikvirus (CMV)	Resistencia al virus del mosaico del pepino (CMV)		
QL	absent	absente	fehlend	ausente	Yolo Wonder	1
	present	présente	vorhanden	presente	Alby, Favolor	9

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielsorten/ Variedades ejemplo	Note/ Nota
53.	Resistance to					
(+)	Xanthomonas					
	vesicatoria					
QL	absent				Fehérözön, Yolo Wonder	1
	present				Pasa, Kaldóm, Kalorez, Lancelot, Aladin, Camelot, ECR-20R	9

8. Explanations on the Table of Characteristics

8.1 Explanations covering several characteristics

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

- (a) characteristics which should be examined before maturity, i.e. before the first color change
- (b) characteristics which should be examined at maturity, i.e. at the time of the first color change

8.2 Explanations for individual characteristics

Ad. 3: Plant: length of stem: the length of the stem is measured from the cotyledons to the first flower branch

Ads. 4 and 5: Plant: shortened internodes (in upper part); Varieties with shortened internodes only: Plants: number of internodes between the first flower and shortened internodes

The tests should be done on plants which have not been pruned.

The shoot system of pepper consists of main stems, which are branches from the main axis and side shoots. Two growth types of the main stems can be distinguished:

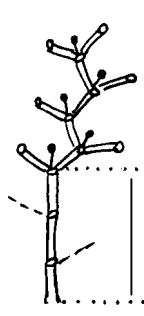
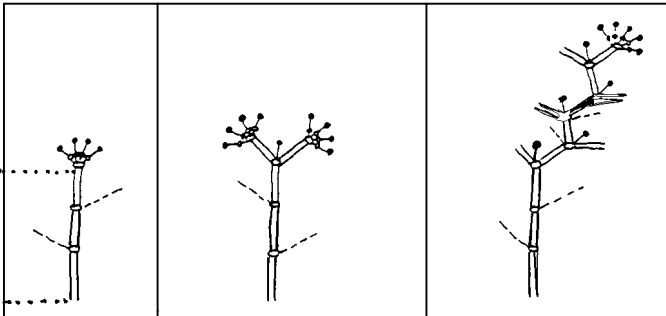
Growth type A: the main stems grow indeterminately; one or two flowers develop per node and shortened internodes never develop.

Growth type B: After the first branching of the main axis, shorter internodes appear and the growth of the main stem ends in a bunch of flowers (it appears as if there are more than two flowers per node).

Side shoots develop from the nodes on the main axis and on the main stems.

Growth type A

Growth type B

Char. 4: Plant: shortened internodes (in upper part)			
absent		present	
			

Char. 5: <u>Varieties with shortened internodes only</u> : Plant: length of internode (on primary side shoots)	none (1)	one to three (2)	more than three (3)

- flower
- node
- || main stem
- | side shoots

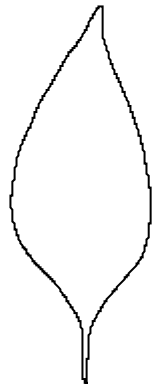
Ad. 9: Stem: hairiness of nodes

To be observed at nodes.

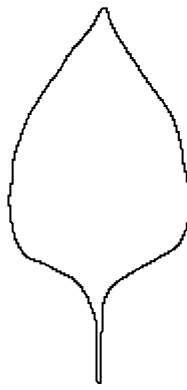
Ad. 10: Plant: height (at maturity)

To be observed after good fruit set on several nodes. Poor fruit set may influence the vigor and thus the height of the plant.

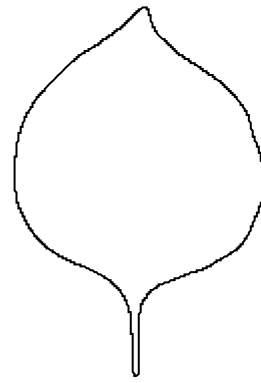
Ad. 15: Leaf: shape



1
lanceolate



2
ovate

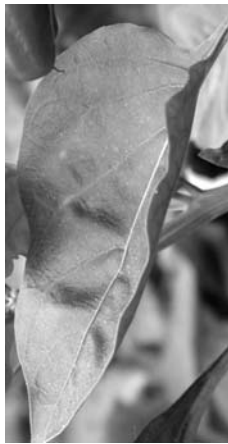


3
broad elliptic

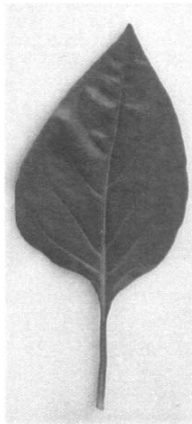
Ad. 18: Leaf: profile in cross section



1.
strongly convex



3.
moderately
convex



5.
flat

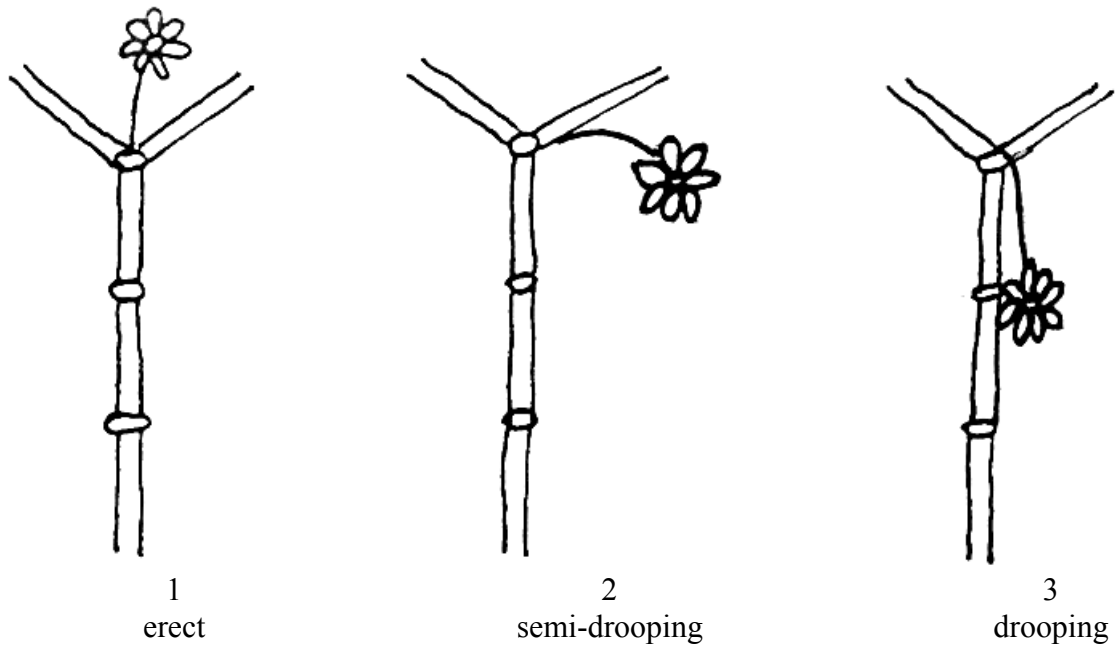


7.
moderately concave



9.
strongly concave

Ad. 20: Peduncle: attitude



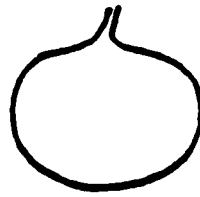
Ad. 28: Fruit: ratio length/diameter

- 1 < 0.5
- 2 0.5 – 0.65
- 3 0.65 - 0.8
- 4 0.8 – 0.94
- 5 0.94 - 1.25
- 6 1.25 – 1.75
- 7 1.75 - 2.75
- 8 2.75- 4
- 9 >4

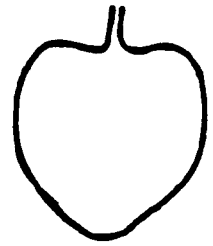
Ad. 29: Fruit: shape in longitudinal section



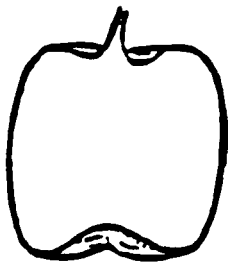
1
oblate



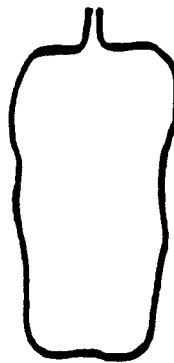
2
round



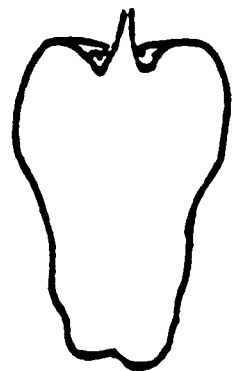
3
cordate



4
square



5
rectangular



6
trapezoid



7
triangular



8
narrow triangular



9
hornshaped

Ad. 31: Fruit: sinuation of pericarp at basal part



1.
absent or very
weak



3.
weak



5.
medium



7.
strong

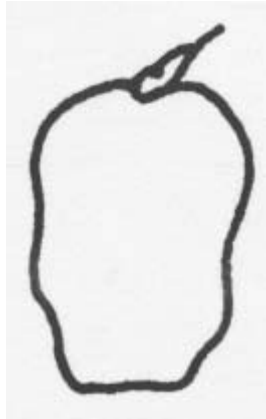


9.
very strong

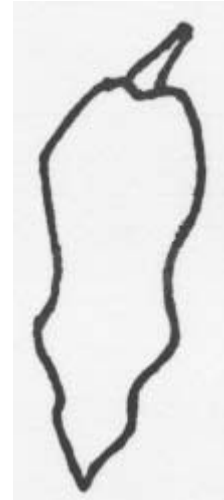
Ad. 32: Fruit: sinuation of pericarp excluding basal part



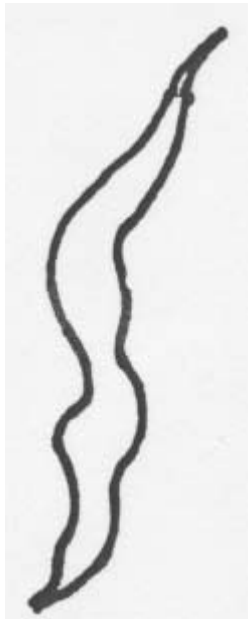
1
absent or very weak



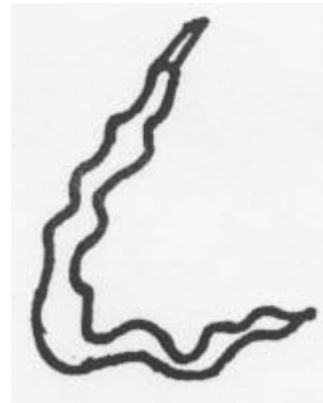
3
weak



5
medium



7
strong

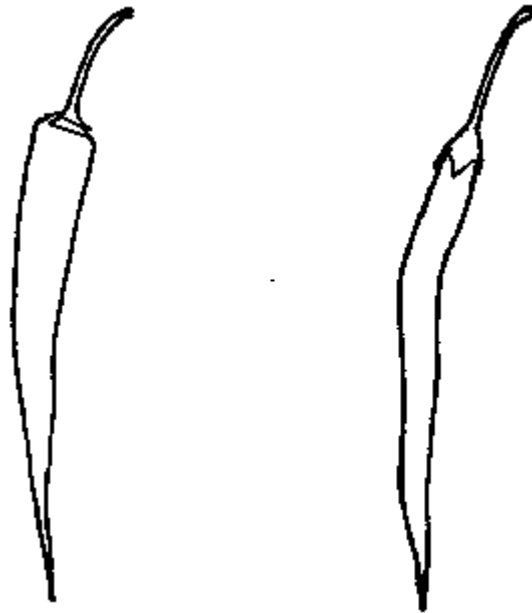


9
very strong

Ad. 40: Fruit: depth of inter loculary grooves

To be observed in the middle part of the fruit.

Ad. 45: Calyx: aspect



1
non enveloping

2
enveloping

Ad. 48: Time of maturity

Maturity is reached at the first color change of the fruit.

Ads. 49.1 to 49.4: Resistance to Tobamovirus

Maintenance of pathotypes

Type of medium: On plants or dehydrated leaves (in deep-freezer or method BOS)
Special conditions: Regeneration of the virus on plant material before inoculum preparation

Execution of test

Growth stage of plants: When cotyledons are fully developed or at “first leaf” stage
Temperature: 20-25°C
Growing method: Sowing and raising of seedlings in boxes or soil blocks in glasshouse
Method of inoculation: Rubbing of cotyledons with a virus suspension.

Duration of test

- Sowing to inoculation: 10 to 15 days
- Inoculation to reading: 10 days

Number of plants tested: 15 to 30 plants

Remarks To avoid the risk of necrosis, the test should not be performed at high temperatures and should not use over-developed plants

Genetics of virus pathotypes and resistant genotypes:

The genetic resistance to Tobamoviruses is controlled by 5 alleles located on the same locus. The table below shows the relationship between virus pathotypes and resistance genotypes:

Pepper Genotype reactions to Tobamovirus Pathotypes

Pepper Genotypes	Pepper Tobamovirus Pathotypes			
	P ₀ TMV, ToMV, BePMV, TMGMV	P ₁ ToMV, TMGMV, OPMV	P ₁₋₂ PMMV	P ₁₋₂₋₃ PMMV
L-L-	S	S	S	S
L ¹ L ¹	R	S	S	S
L ² L ²	R	R	S	S
L ³ L ³	R	R	R	S
L ⁴ L ⁴	R	R	R	R

Legend: S = not resistant TMV = Tobacco Mosaic Virus
R = resistant ToMV = Tomato Mosaic Virus
BePMV = Bell Pepper Mosaic Virus
TMGMV = Tobacco Mild Green Mosaic Virus
OPMV = Obuda Pepper Mosaic Virus
PMMV = Pepper Mild Mottle Virus

Ad. 50: Resistance to Potato Virus Y (PVY)

Maintenance of pathotypes

Type of medium: On susceptible plants.

Special conditions: For the strain PVY(0): use the line TO72(A)
 For the strain PVY(1): use the line Sicile 15
 For the strain PVY(1-2): use the line SON41

Execution of test

Growth stage of plants: Young plants at the stage of developed cotyledons - first pointing leaf.

Temperature: 18-25°C

Growing method: Raising of plants in glasshouse.

Method of inoculation: Rubbing of cotyledons with a virus solution.
 Composition of the solution:
inoculum: 4 ml extraction solution for 1 g infected leaves + 80 g activated carbon + 80 mg carborundum;
extraction solution: buffer solution diluted 1/20 with 0.2% diethyl dithiocarbamate of sodium (DIECA);
buffer solution: (for 100 ml sterile water) 10.8 g Na_2HPO_4 + 1.18 g K_2HPO_4 at pH 7.1-7.2

Duration of test

- Sowing to inoculation: 10 to 15 days
 - Inoculation to reading: 3 weeks (2 weeks minimum, 4 weeks maximum)

Number of plants tested: 60 plants

Remarks: The test should not be conducted at high temperatures.

Standard varieties:	Pathotype 0	Pathotype 1	Pathotype 1-2
Sensitive varieties:	Yolo Wonder	Yolo Wonder, Yolo Y	Florida VR2,* Yolo Wonder, Yolo Y
Resistant varieties:	Yolo Y	Florida VR2	Criollo de Morenos, Serrano

* Florida VR2 can exhibit diffused and very late symptoms.

Ad. 51: Resistance to *Phytophthora capsici*

Maintenance of inoculum

Type of medium: Phytophthora capsici isolate S 101 cultivated on agar (1%)
?? V8 in Petri dish.

Preparation of inoculum

The inoculum is prepared from 4 mycelial plugs of 4 mm diameter cultured in Petri dishes.

Conduct of test

Growth stage of plants: When cotyledons are fully developed.

Temperature: 22°C

Light: 12h/day

Growing method: In climatic chamber in a mixture of peat and sand
(1/1 by vol.).

Method of inoculation: The young plants should be carefully uprooted and the roots washed in water. Then the plants should be regrouped in samples of 10 plants and placed in a liquid growth medium (Knop diluted twice) or a nutrient solution. After one week of culture in liquid medium the plants should be inoculated by the introduction of 4 mycelial plugs into the liquid growth medium. The inoculation takes place through the infection of the roots by the free zoospores. The mycelial plugs are kept in this environment until reading.

Duration of test

From sowing to inoculation: 21 days

From inoculation to first
reading: 7 days

Lay-out of test: 40 plants, in 4 replicates of 10 plants

Standard varieties:

After one week the plants should be individually observed and a note from 1 to 5 attributed to each plant depending on the degree of necrosis of the root system. The level of resistance of a variety is expressed by a figure calculated as the average of 40 plants:

After inoculation by isolate S 101, for example:

Yolo Wonder = 5
Phyo 636 = 2.5
Picador, PM 217 = 0.5

Varieties which have received a figure 3 or higher than 3 should be regarded as non-resistant.

Ad. 52: Resistance to Cucumber Mosaic Virus (CMV)

Maintenance of pathotypes

Strain: Fulton

Type of medium: On susceptible plants: *Vinca rosea*

Special conditions: -

Inoculum production: Crushing of 1g of fresh leaves of *Vinca rosea* in 4 ml of Phosphate buffer 0.03M pH 7 + DIECA (diethyl dithiocaremate de sodium) (1 for 1000) + 300 mg of activated carbon + 80 mg of carborundum

Execution of test:

Growth stage of plants: Young plants at the stage of developed cotyledons. First leaf non pointing

Number of plants: 50 plants

Growing conditions: 22°C, 12 hours of light

Growing method: Raising of plants in climatized room

Method of inoculation: Mechanical rubbing of cotyledons with a virus solution, the plants are kept in darkness for 48 hours

Duration of test:

From sowing to inoculation: 12 to 13 days

From inoculation to reading: 3 reading at 10,15 and 21 days after inoculation

Standard varieties:

Susceptible variety: Yolo Wonder

Tolerant (T) or resistant (R) varieties: Milord (T)
Vania (R)

Ad. 53: Resistance to Xanthomonas vesicatoria

Maintenance of pathotypes

Type of medium: PDA (Potato, Dextrose, Agar) medium
Special conditions: 48 hours Xanthomonas vesicatoria culture. Adjusting inoculum concentration of bacteria-cellular 10^7 .

Execution of test

Growth stage of plants: 6th to 8th true leaves
Temperature: 24 °C night, 25°C day
Relative humidity: 80%
Light: 30 000 lx, day length 16 hours
Growing method: Sowing in boxes in climate chamber or in glasshouse
Method of inoculation: Infiltration into abaxial surface of a leaf in 13-15 mm diameter spots
Duration of the test: 10-14 days

Number of plants tested: 15 to 30 plants

Remarks

Genetics of bacteria pathotypes and resistant genotypes:

Resistant varieties: Pasa, Kaldóm, Kalorez, Lancelot, Aladin, Camelot, ECR-20R

9. Literature

GENERAL INFORMATION

Palloix, A., Phaly, T., 1996: "Histoire du piment : de la plante sauvage aux variétés modernes", PHM Revue Horticole, FR, no. 365; 41-43

Pochard, E., 1987: "Histoire du piment et recherche", INRA Mensuel, FR, no. 29; 5-8

Pochard, E., Palloix, A., Daubeze, A.M., 1992: "Le piment", Gallais, A. (ed.), Bannerot, H. (ed.), Amelioration des espèces vegetales cultivées. Objectifs et critères de selection 420-434, INRA; Paris, FR

Genetic Resources

Daunay, M.C., Jullian, E., Dauphin, F., 2001: "Management of eggplant and pepper genetic resources in Europe : networks are emerging", EUCARPIA, European Association for Research on Plant Breeding, Paris, FR, Genetics and breeding of Capsicum and eggplant 11th EUCARPIA Meeting, Antalya, TR, 2001, 1-5

Disease Resistance

Caranta, C., Palloix, A., Gébré-Sélassié, K., Marchoux, G., Lefebvre, V., Daubèze, A.M., 1996: "Genomic organization of multi-virus resistance factors in pepper (*Capsicum annuum*): Co-localization between QTLs and major genes. Poster"

Lefebvre, V., Caranta, C., Moury, B., Pflieger, S., Daubèze, A.M., Blattes, A., Phaly, T., Nemouchi, G., Palloix, A., 1997: "Status of the intraspecific molecular map of pepper : genome distribution of multiple disease resistance loci and defence genes, Sherago International Inc., New York, US, Plant and animal genome V, International Conference on the Status of Plant and Animal Genome Research, San Diego, US, 1997/01/12-16, 115

Pflieger, S., Lefebvre, V., Blattes, A., Caranta, C., Palloix, A., 1998: "Candidate gene approach for identifying QTLs involved in pepper/pathogen interactions, EUCARPIA, European Association for Research on Plant Breeding, Avignon, FR, Genetics and breeding of Capsicum and eggplant, 10th Meeting EUCARPIA, Avignon, FR, 1998/09/07-11, 245-248

Stacey, G. (ed.), Mullin, B. (ed.), Gresshoff, P.M. (ed.), Biology of plant-microbe interactions 8. International Symposium on molecular plant-microbe interactions, Knoxville (USA), 1996/07/12-19, 1 p., International Society for Molecular Plant-Microbe Interactions, Saint-Paul, US

Potyvirus

Parrella, G., Ruffel, S., Moretti, A., Morel, C., Palloix, A., Caranta, C., 2002: "Recessive resistance genes against potyviruses are localized in colinear genomic regions of the tomato (*Lycopersicon* spp.) and pepper (*Capsicum* spp.) genomes", Theoretical and Applied Genetics, DE, vol. 105; 855-861

Ruffel, S., Dussault, M.H., Palloix, A., Moury, B., Bendahmane, A., Robaglia, C., Caranta, C., 2002: "A natural recessive resistance gene against potato virus Y in pepper corresponds to the eukariotic initiation factor 4E (eIF4E)", *Plant Journal*, GB, vol. 32 no. 6; 1067-1075

CMV

Caranta, C., Daubèze, A.M., Pflieger, S., Lefebvre, V., Thabuis, A., Blattes, A., Nemouchi, G., Phaly, T., Signoret, P., Palloix, A., 2001: "Identification of quantitative trait loci involved in partial restriction of cucumber mosaic virus (CMV) long-distance movement in pepper", EUCARPIA, European Association for Research on Plant Breeding, Paris (FRA), Genetics and breeding of Capsicum and eggplant, 11th EUCARPIA Meeting, Antalya, TR, 2001 176-180

Caranta, C., Palloix, A., Lefebvre, V., Daubèze, A.M., 1997: "QTLs for a component of partial resistance to cucumber mosaic virus in pepper : restriction of virus installation in host-cells", *Theoretical and Applied Genetics*, DE, no. 94; 431-438

Caranta, C., Pflieger, S., Lefebvre, V., Daubèze, A.M., Thabuis, A., Palloix, A., 2002: "QTLs involved in the restriction of cucumber mosaic virus (CMV) long-distance movement in pepper", *Theoretical and Applied Genetics*, DE, vol. 104; 586-591

Phytophthora

Lefebvre, V., Palloix, A., 1995: "Mapping QTL's affecting the resistance to *Phytophthora capsici* in pepper (*Capsicum annuum*)", Scherago International Inc., New York, US, USDA, United States Department of Agriculture, Agricultural Research Service, Washington, US, International Conference on the Status of Plant Genome Research, Plant Genome 3, San Diego, US, 1995/01/15-19 58, USDA-ARS, Washington, US

Lefebvre, V., Palloix, A., 1996: "Both epistatic and additive effects of QTLs are involved in polygenic induced resistance to disease: a case study, the interaction pepper *Phytophthora capsici* Leonian", *Theoretical and Applied Genetics*, DE, no. 93; 503-511

Thabuis, A., Palloix, A., Pflieger, S., Daubèze, A.M., Caranta, C., Lefebvre, V., 2003: "Comparative mapping of *Phytophthora* resistance loci in pepper germplasm: evidence for conserved resistance loci across Solanaceae and for a large genetic diversity", *Theoretical and Applied Genetics*, DE, vol. 106; 1473-1485

Xanthomonas

Márkus, F., Kapitány, J., Csilléry, G. and Szarka, J., 2001 b: *Xanthomonas* resistance in Hungarian spice pepper varieties. *Int. Jour. of Hort. Sci.*, Voil. 7. No. 3-4. 69-72

Szarka, J. and Csilléry, G., 1995: Defence system against *Xanthomonas campestris* pv. *vesicatoria*. *Eucarpia IXth Meeting on Genetics and Breeding of Capsicum and Eggplant*. Budapest, Hungary, August 21-25. 184-187

TSWV

Moury, B., Pflieger, S., Blattes, A., Lefebvre, V., Palloix, A., 2000: "A CAPS marker to assist selection of tomato spotted wilt virus (TSWV) resistance in pepper", Genome, CA, no. 43; 137-142

9. Technical Questionnaire

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
		Application date: (not to be filled in by the applicant)
TECHNICAL QUESTIONNAIRE to be completed in connection with an application for plant breeders' rights		
1. Subject of the Technical Questionnaire		
1.1 Botanical name	<input type="text" value="Capsicum annuum L"/>	
1.2 Common Name	<input type="text" value="Sweet Pepper, Hot Pepper, Paprika, Chili"/>	
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:
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#4. Information on the breeding scheme and propagation of the variety

4.1 Breeding scheme

Variety resulting from:

4.1.1 Crossing

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

4.1.2 Mutation []
(please state parent variety)

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

4.1.4 Other []
(please provide details)

4.2 Method of propagating the variety

4.2.1 Seed-propagated varieties

- (a) Self-pollination []
- (b) Cross-pollination []
- (c) Hybrid []
- (d) Other []
(please provide details)

4.2.2 Other []
(please provide details)

Authorities may allow certain of this information to be provided in a confidential section of the Technical Questionnaire.

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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5. Characteristics of the variety to be indicated (the number in brackets refers to the corresponding characteristic in Test Guidelines; please mark the note which best corresponds).

Characteristics	Example Varieties	Note
5.1 Plant: shortened internodes (in upper part) (4)		
absent	California Wonder, De Cayenne	1[]
present	Fehér, Kalocsai 601	9[]
5.2 Peduncle: attitude (20)		
erect	Fehér, Red Chili	1[]
semi-drooping	Blondy	2[]
drooping	Heldor, Lamuyo	3[]
5.3 Fruit: color (before maturity) (22)		
greenish white	Blanc d'Espagne, Twiggy	1[]
yellowish	Fehér, Sweet Banana	2[]
green	California Wonder, Lamuyo	3[]
purple	Violetta	4[]
5.4 Fruit: intensity of color (before maturity) (23)		
very light	Kaméleon, Jackson, Milka, Sofiane, Savó	1[]
light	Anthea, Daras, PCR	3[]
medium	Demon, PAZ szentesi	5[]
dark	California wonder, Greygo	7[]
very dark	Amato, Hot chilli, Kalocsai A, Olimpo	9[]

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
Characteristics	Example Varieties	Note
5.5 Fruit: shape in longitudinal section (29)		
oblate	Liebesapfel, PAZ szentesi, Topepo rosso	1[]
round	Cherry Sweet	2[]
cordate	Daniel, Pimiento L.	3[]
square	Delphin, Yolo Wonder	4[]
rectangular	Clovis, Nocera rosso	5[]
trapezoid	Piperade, Delta	6[]
triangular	Marconi, Fehér	7[]
narrow triangular	Demon, De Cayenne	8[]
horn-shaped	Corno di toro rosso, Lipari	9[]
5.6 Fruit: color (at maturity) (34)		
yellow	Golden Calwonder, Heldor	1[]
orange	Ariane	2[]
red	Fehér, Lamuyo	3[]
brown	Brupa, Negral	4[]
5.7 Fruit: number of locules (41)		
only two	De Cayenne	1[]
two and three	Fehér	2[]
three	Century	3[]
three and four	Lamuyo, Sonar	4[]
four and more	Palio, PAZ szentesi	5[]

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
Characteristics	Example Varieties	Note
5.8 Fruit: capsaicin in placenta (46)		
absent	Sonar	1[]
present	De Cayenne	9[]
5.9(i) Resistance to Tobamovirus - (49.1) Pathotype 0 (Tobacco Mozaic Virus (0))		
absent	Doux italien, Piperade	1[]
present	Lamuyo, Sonar, Yolo Wonder	9[]
5.9(ii) Resistance to Tobamovirus - (49.3) Pathotype 1-2 (Pepper Mild Mottle Virus (1-2))		
absent	Piperade, Yolo Wonder	1[]
present	Delgado, Festos, Novi, Orion	9[]
5.9(iii) Resistance to Tobamovirus - (49.4) Pathotype 1-2-3 (Pepper Mild Mottle Virus (1-2-3))		
absent	Piperade, Yolo Wonder	1[]
present	Cuby, Tasty	9[]
5.10 Resistance to Potato Virus Y (PVY) - (50.1) Pathotype 0		
absent	Yolo Wonder	1[]
present	Yolo Y	9[]

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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6. Similar varieties and differences from these varieties

Please use the following table and box for comments to provide information on how your candidate variety differs from the variety (or varieties) which, to the best of your knowledge, is (or are) most similar. This information may help the examination authority to conduct its examination of distinctness in a more efficient way.

Denomination(s) of variety(ies) similar to your candidate variety	Characteristic(s) in which your candidate variety differs from the similar variety(ies)	Describe the expression of the characteristic(s) for the similar variety(ies)	Describe the expression of the characteristic(s) for your candidate variety
<i>Example</i>	<i>Fruit: color after first color change</i>	<i>yellow</i>	<i>red</i>

Comments:

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
<p>#7. Additional information which may help in the examination of the variety</p> <p>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?</p> <p>Yes [] No []</p> <p>(If yes, please provide details)</p> <p>7.2 Are there any special conditions for growing the variety or conducting the examination?</p> <p>Yes [] No []</p> <p>(If yes, please provide details)</p> <p>7.3 Other information</p> <p>A representative color photograph of the variety should accompany the Technical Questionnaire.</p>		
<p>8. Authorization for release</p> <p>(a) Does the variety require prior authorization for release under legislation concerning the protection of the environment, human and animal health?</p> <p>Yes [] No []</p> <p>(b) Has such authorization been obtained?</p> <p>Yes [] No []</p> <p>If the answer to (b) is yes, please attach a copy of the authorization.</p>		

Authorities may allow certain of this information to be provided in a confidential section of the Technical Questionnaire.

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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9. Information on plant material to be examined or submitted for examination.

9.1 The expression of a characteristic or several characteristics of a variety may be affected by factors, such as pests and disease, chemical treatment (e.g. growth retardants or pesticides), effects of tissue culture, different rootstocks, scions taken from different growth phases of a tree, etc.

9.2 The plant material should not have undergone any treatment which would affect the expression of the characteristics of the variety, unless the competent authorities allow or request such treatment. If the plant material has undergone such treatment, full details of the treatment must be given. In this respect, please indicate below, to the best of your knowledge, if the plant material to be examined has been subjected to:

- | | | |
|-----------------------------------------------------------|---------|--------|
| (a) Microorganisms (e.g. virus, bacteria, phytoplasma) | Yes [] | No [] |
| (b) Chemical treatment (e.g. growth retardant, pesticide) | Yes [] | No [] |
| (c) Tissue culture | Yes [] | No [] |
| (d) Other factors | Yes [] | No [] |

Please provide details of where you have indicated "yes".

.....

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

Yes []

(please provide details as specified by the Authority)

No []

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

Applicant's name

Signature

Date

[End of document]