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UPOV

INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

GENEVA

DRAFT

LETTUCE *

UPOV Code: LACTU_SAT

Lactuca sativa L.

GUIDELINES

FOR THE CONDUCT OF TESTS

FOR DISTINCTNESS, UNIFORMITY AND STABILITY

prepared by an expert from France

to be considered by the Enlarged Editorial Committee at its meeting to be held in Geneva, Switzerland, January 10, 2006

Alternative Names:*

Botanical name	*English*	*French*	*German*	*Spanish*
Lactuca sativa L.	Lettuce	Laitue	Salat	Lechuga

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 *Lactuca sativa* 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:

15 g or 15,000 seeds.

The seed should meet the minimum requirements for germination, species and analytical purity, health and moisture content, specified by the competent authority. In cases where the seed is to be stored, the germination capacity should be as high as possible and should be stated by the applicant.

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

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

3. Method of Examination

3.1 Number of Growing Cycles

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

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 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.

3.4.2 Each test should be designed to result in a total of at least 60 plants, which should be divided between two or more replicates.

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 a population standard of 1% and an acceptance probability of at least 95% should be applied. In the case of a sample size of 60 plants, 2 off-types are allowed.

4.3 Stability

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

4.3.2 Where appropriate, or in cases of doubt, stability may be 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 In the first place, the collection should be divided according to the following growth types:

Plant: growth type

	Examples:
1. Butterhead Lettuce:	Clarion, Merveille des quatre saisons, Verpia
2. Crisphead Lettuce:	Blonde de Paris (Batavia), Calmar, Saladin (Iceberg)
3. Cos Lettuce (Roman Lettuce):	Blonde maraîchère (Roman types)
4. “Grasse” or Latin Lettuce:	Bibb, Sucrine
5. Cutting or Gathering Lettuce:	Frisée d’Amérique, Lollo rossa, Oakleaf, Salad Bowl
6. Stem Lettuce:	Celtuce

For further information, see Section 8.1 “Key to Lettuce Types”.

5.4 The following have been agreed as useful grouping characteristics:

(a) Seed: color (characteristic 1);
(b) Leaf: anthocyanin coloration (characteristic 20);
(c) Time of beginning of bolting under long day conditions (characteristic 35).
(d) Resistance to downy mildew (*Bremia lactucae*): Isolate Bl 16 (characteristic 39.7)

5.5 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 3.3.1
MS: Measurement of a number of individual plants or parts of plants – see Chapter 3.3.1
VG: Visual assessment by a single observation of a group of plants or parts of plants – see Chapter 3.3.1
VS: Visual assessment by observation of individual plants or parts of plants – see Chapter 3.3.1

(a)-(c) See Explanations on the Table of Characteristics in Chapter 8.2

(+) See Explanations on the Table of Characteristics in Chapter 8.3

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

		English	français	Deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
1. **(*)**	**VG**	**Seed: color**	**Semence: couleur**	**Samen: Farbe**	**Semilla: color**		
QL		white	blanche	weiß	blanco	Verpia	1
		yellow	jaune	gelb	amarillo	Durango	2
		black	noire	schwarz	negro	Kagraner Sommer	3
2. **(*)** **(+)**	**VG**	**Seedling: anthocyanin coloration**	**Plantule: pigmentation anthocyanique**	**Keimpflanze: Anthocyanfärbung**	**Plántula: pigmentación antociánica**		
QL		absent	absente	fehlend	ausente	Verpia	1
		present	présente	vorhanden	presente	Pirat	9
3.	**VG**	**Seedling: size of cotyledon (fully developed)**	**Plantule: taille du cotylédon (à complet développement)**	**Keimpflanze: Größe des Keimblatts (voll entwickelt)**	**Plántula: tamaño del cotiledón (plenamente desarrollado)**		
QN		small	petit	klein	pequeño	Romance	3
		medium	moyen	mittel	medio	Expresse	5
		large	grand	groß	grande	Verpia	7
4.	**VG**	**Seedling: shape of cotyledon**	**Plantule: forme du cotylédon**	**Keimpflanze: Form des Keimblatts**	**Plántula: forma del cotiledón**		
QN		narrow elliptic	elliptique étroit	schmal elliptisch	elíptica estrecha	Calmar	3
		elliptic	elliptique	elliptisch	elíptica	Frisette	5
		broad elliptic	elliptique large	breit elliptisch	elíptica ancha	Fiorella, Sunrise	7

		English	français	Deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
5.	**VG**	**Leaf: attitude at 10-12 leaf stage**	**Feuille: port au stade 10-12 feuilles**	**Blatt: Stellung im 10-12 Blattstadium**	**Hoja: porte en el estado de 10 a 12 hojas**		
QN		erect	dressé	aufrecht	erecto	Baby Star, Romance	1
		semi-erect	demi-dressé	halbaufrecht	semierecto	Great Lakes 118, Soraya	3
		prostrate	étalé	liegend	postrado	Unicum, Vanguard 75	5
6. **(+)**	**VG**	**Leaf blade: division (as for 5)**	**Limbe: division (comme pour 5)**	**Blattspreite: Gliederung (wie bei 5)**	**Limbo: división (como para 5)**		
PQ		entire	entier	ungeteilt	entero	Fiorella, Sunrise	1
		lobed	lobé	gelappt	lobulado	A couper à feuille de chêne blonde à graine noire, Salad Bowl	2
		divided	fendu	gespalten	dividido	Lagon, Monet	3
7. **(*)**	**VG**	**Plant: diameter**	**Plante: diamètre**	**Pflanze: Durchmesser**	**Planta: diámetro**		
QN	**(a)**	very small	très petit	sehr klein	muy pequeña	Pavane, Tom Thumb	1
		small	petit	klein	pequeña	Bastion, Gotte à graine blanche	3
		medium	moyen	mittel	media	Clarion, Verpia	5
		large	grand	groß	grande	Great Lakes 659, Musette	7
		very large	très grand	sehr groß	muy grande	El Toro, Yuma	9
8. **(*)**	**VG**	**Plant: head formation**	**Plante: formation d'une pomme**	**Pflanze: Kopfbildung**	**Planta: formación del cogollo**		
PQ	**(a)**	no head	pas de pomme	kein Kopf	sin cogollo	Blonde à couper améliorée, Lollo rossa	1
		open head	pomme ouverte	offener Kopf	cogollo abierto	Manfred, Monet	2
		closed head (overlapping)	pomme fermée (chevauchement)	geschlossener Kopf (Überlappung)	cogollo cerrado (solapándose)	Kelvin, Sunrise	3

		English	français	Deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
9.	**VG**	**Varieties with closed head formation only: Head: degree of overlapping of upper part of leaves**	**Variétés à pomme fermée seulement: Pomme: degré du chevauchement de la partie supérieure des feuilles**	**Nur Sorten mit geschlossenem Kopf: Kopf: Stärke des Überlappens des oberen Teils der Blätter**	**Solamente variedades con cogollo cerrado: Cogollo: grado de solapamiento de la parte superior de las hojas**		
QN	**(a)**	very weak	très faible	sehr gering	muy débil	Colorado	1
		weak	faible	gering	débil	Danilla, Novita	3
		medium	moyen	mittel	medio	Augusta, Fiorella	5
		strong	fort	stark	fuerte	Master, Minas	7
		very strong	très fort	sehr stark	muy fuerte	Kelvin, Roxette	9
10.	**VG**	**Head: density**	**Pomme: densité**	**Kopf: Dichte**	**Cogollo: densidad**		
QN	**(a)**	very loose	très lâche	sehr locker	muy laxa	Ninja	1
		loose	lâche	locker	laxa	Danilla, Nanda	3
		medium	moyenne	mittel	media	Blonde maraîchère	5
		dense	dense	dicht	densa	Hilde II, Kelvin	7
		very dense	très dense	sehr dicht	muy densa	Musette, Toronto	9
11.	**VG**	**Head: size**	**Pomme: taille**	**Kopf: Größe**	**Cogollo: tamaño**		
QN	**(a)**	very small	très petite	sehr klein	muy pequeña	Tom Thumb	1
		small	petite	klein	pequeña	Bastion, Gotte à graine blanche	3
		medium	moyenne	mittel	media	Fiorella, Soraya	5
		large	grande	groß	grande	Great Lakes 659, Musette	7
		very large	très grande	sehr groß	muy grande	Blonde maraîchère, El Toro	9

		English	français	Deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
12.	**VG**	**Butterhead type varieties in glasshouse only: Head: closing of base**	**Seulement les variétés de type laitue de serre pommée: Pomme: fermeture de la base**	**Nur Sorten vom Typ Kopfsalat für Unterglasanbau: Kopf: Geschlossenheit der Basis**	**Solamente para variedades de tipo lechuga Trocadero en invernadero: Cogollo: cierre de la base**		
QN	**(a)**	weak	faible	gering	débil	Passe Partout	3
		medium	moyenne	mittel	medio	Carmelita	5
		strong	forte	stark	fuerte	Dustin, Manfred	7
13. **(*)** **(+)**	**VG**	**Head: shape in longitudinal section**	**Pomme: forme en section longitudinale**	**Kopf: Form im Längsschnitt**	**Cogollo: forma en sección longitudinal**		
PQ	**(a)**	elliptic	elliptique	elliptisch	elíptica	Verte maraîchère	1
		broad elliptic	elliptique large	breit elliptisch	elíptica ancha	Amadeus, Sucrine	2
		circular	arrondie	rund	circular	Passe Partout, Verpia	3
14.	**VG**	**Leaf: thickness**	**Feuille: épaisseur**	**Blatt: Dicke**	**Hoja: grosor**		
QN	**(a)**	thin	mince	dünn	delgada	Raisa, Royal Red	3
		medium	moyenne	mittel	media	Dustin, Sunrise	5
		thick	épaisse	dick	gruesa	Frisée de Beauregard	7
15.	**VG**	**Leaf: attitude at harvest maturity (outer leaves from head lettuce or adult leaves from cutting and stem lettuce)**	**Feuille: port à maturité de récolte (feuilles externes de laitue pommée ou feuilles adultes de laitue à couper et de laitue-tige)**	**Blatt: Stellung im Erntestadium (äußere Blätter bei Kopfsalat bzw. vollentwickelte Blätter bei Schnitt- und Stengelsalat)**	**Hoja: porte durante la madurez para cosecha (hojas externas de lechuga de cogollo u hojas adultas de lechugas de cortar y de tallo)**		
QN	**(a)**	erect	dressé	aufrecht	erecto	Feria, Riva	1
		semi-erect	demi-dressé	halbaufrecht	semierecto	Amelia, Toronto	3
		horizontal	horizontal	waagerecht	horizontal	Chambery, Divina	5

		English	français	Deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
16. (*) (+)	**VG**	**Leaf: shape**	**Feuille: forme**	**Blatt: Form**	**Hoja: forma**		
PQ	**(a)**	narrow elliptic	elliptique étroite	schmal elliptisch	elíptica estrecha	Riva, Verte maraîchère	1
		medium elliptic	elliptique moyenne	mittel elliptisch	elíptica media	Angela, Xanadu	2
		broad elliptic	elliptique large	breit elliptisch	elíptica ancha	Amadeus, Amelia	3
		circular	arrondie	rund	circular	Elsa, Sunrise, Verpia	4
		transverse broad elliptic	elliptique transverse large	quer breit elliptisch	elíptica transversal ancha	Commodore, Fiorella	5
		transverse elliptic	elliptique transverse	quer elliptisch	elíptica transversal	Elvira, Madison	6
		obovate	obovale	verkehrt eiformig	oboval	Raisa, Toronto	7
		broad obtrullate	losangique transverse large	verkehrt breit rautenförmig	rómbica ancha	Delicato, Monet	8
		triangular	triangulaire	dreieckig	triangular	Deer Tongue	9
17.	**VG**	**Leaf: tip of leaf blade**	**Feuille: sommet du limbe des feuilles**	**Blatt: Spitze der Blattspreite**	**Hoja: ápice del limbo**		
QL	**(a)**	rounded	arrondi	abgerundet	redondeado	Blonde Maraîchère, Maserati	1
		acute	aigu	spitz	agudo	Celtuce, Dear Tongue, Karola, Tempra	2
18. (*) (+)	**VG**	**Leaf: hue of green color of outer leaves**	**Feuille: teinte de la couleur verte des feuilles externes**	**Blatt: Ton der Grünfärbung der äußeren Blätter**	**Hoja: tonalidad del color verde de las hojas externas**		
PQ	**(a)**	absent	absente	fehlend	ausente	Donatello, Verpia	1
		yellowish	jaunâtre	gelblich	amarillento	Dorée de printemps	2
		greyish	grisâtre	gräulich	grisáceo	Celtuce, Du bon jardinier	3
		reddish	rougeâtre	rötlich	rojizo	Lollo rossa, Revolution, Rosa (see also Ad. 18/ voir aussi Add. 18/ siehe auch zu 18/ véanse también Ad. 18)	4

		English	français	Deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
19. (*) (+)	**VG**	**Leaf: intensity of color of outer leaves**	**Feuille: intensité de la couleur des feuilles externes**	**Blatt: Intensität der Farbe der äußeren Blätter**	**Hoja: intensidad del color de las hojas externas**		
QN	**(a)**	very light	très claire	sehr hell	muy claro	(see also Ad. 18/ voir aussi Add. 18/ siehe auch zu 18/ véanse también Ad. 18)	1
		light	claire	hell	claro	(see also Ad. 18/ voir aussi Add. 18/ siehe auch zu 18/ véanse también Ad. 18)	3
		medium	moyenne	mittel	medio	(see also Ad. 18/ voir aussi Add. 18/ siehe auch zu 18/ véanse también Ad. 18) (see Ad. 18)	5
		dark	foncée	dunkel	oscuro	(see also Ad. 18/ voir aussi Add. 18/ siehe auch zu 18/ véanse también Ad. 18)	7
		very dark	très foncée	sehr dunkel	muy oscuro	(see also Ad. 18/ voir aussi Add. 18/ siehe auch zu 18/ véanse también Ad. 18)	9
20. (*)	**VG**	**Leaf: anthocyanin coloration**	**Feuille: pigmentation anthocyanique**	**Blatt: Anthocyan-färbung**	**Hoja: pigmentación antociánica**		
QL	**(a)**	absent	absente	fehlend	ausente	Fiorella, Sunrise	1
		present	présente	vorhanden	presente	Commodore, Pirat	9

		English	français	Deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
21. (*)	**VG**	**Leaf: intensity of anthocyanin coloration**	**Feuille: intensité de la pigmentation anthocyanique**	**Blatt: Intensität der Anthocyanfärbung**	**Hoja: intensidad de la pigmentación antociánica**		
QN	**(a)**	very weak	très faible	sehr gering	muy débil	Chicon de Charentes, Muranta, Rumina	1
		weak	faible	gering	débil	Du bon jardinier	3
		medium	moyenne	mittel	media	Trocadéro à graine noire	5
		strong	forte	stark	fuerte	Amandine, Merveille des quatre saisons	7
		very strong	très forte	sehr stark	muy fuerte	Little Leprechaun, Revolution	9
22.	**VG**	**Leaf: distribution of anthocyanin**	**Feuille: répartition de l'anthocyane**	**Blatt: Verteilung des Anthocyans**	**Hoja: distribución de la antocianina**		
QL	**(a)**	localised	localisée	lokal begrenzt	localizada	Muranta, Rumina	1
		entire	répartie sur toute la surface	auf der gesamten Blattfläche	en toda la superficie	Delicato, Liberty	2
23.	**VG**	**Leaf: kind of anthocyanin distribution**	**Feuille: type de répartition de l'anthocyane**	**Blatt: Art der Anthocyan-verteilung**	**Hoja: tipo de distribución de la antocianina**		
QL	**(a)**	diffused only	seulement diffuse	nur diffus	únicamente difusa	Amandine, Pirat, Sanguine	1
		in spots only	seulement en taches	nur in Flecken	únicamente en manchas	Passion blonde à graine blanche, Unicum	2
		diffused and in spots	diffuse et en taches	diffus und in Flecken	difusa y en manchas	Lovina, Rougette du Midi	3

		English	français	Deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
24.	**VG**	**Leaf: glossiness of upper side**	**Feuille: brillance de la face supérieure**	**Blatt: Glanz der Oberseite**	**Hoja: brillo del haz**		
QN	**(a)**	absent or very weak	nulle ou très faible	fehlend oder sehr gering	ausente o muy débil	Divina, Du bon jardinier	1
		weak	faible	gering	débil	Elsa, Fiorella	3
		medium	moyenne	mittel	medio	Feria, Sunrise	5
		strong	forte	stark	fuerte	Ibis, Noisette	7
25. (*)	**VG**	**Leaf: blistering**	**Feuille: cloqûre**	**Blatt: Blasigkeit**	**Hoja: abullonado**		
QN	**(a)**	absent or very weak	nulle ou très faible	fehlend oder sehr gering	ausente o muy débil	Donia, Frillblond	1
		weak	faible	gering	débil	Fiorella, Minas	3
		medium	moyenne	mittel	medio	Commodore	5
		strong	forte	stark	fuerte	Blonde de Paris, Smile	7
		very strong	très forte	sehr stark	muy fuerte	Blonde de Doulon	9
26.	**VG**	**Leaf: size of blisters**	**Feuille: taille des cloques**	**Blatt: Größe der Blasen**	**Hoja: tamaño del abullonado**		
QN	**(a)**	small	petites	klein	pequeñas	Dorée de printemps	3
		medium	moyennes	mittel	medianas	Dustin, Sunrise	5
		large	grandes	groß	grandes	Fiorella, Massilia	7
27. (*)	**VG**	**Leaf blade: degree of undulation of margin**	**Limbe: importance de l'ondulation du bord**	**Blattspreite: Grad der Randwellung**	**Limbo: grado de ondulación del borde**		
QN	**(a)**	absent or very weak	nulle ou très faible	fehlend oder sehr gering	ausente o muy débil	Dustin, Manfred	1
		weak	faible	gering	débil	Commodore, Sunrise	3
		medium	moyenne	mittel	medio	Noisette, Pentared	5
		strong	forte	stark	fuerte	Calmar, Invicta	7
		very strong	très forte	sehr stark	muy fuerte	Lollo rossa, Madison	9

		English	français	Deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
28.	**VG**	**Leaf blade: incisions of margin on apical part**	**Limbe:découpures du bord de la partie apicale**	**Blattspreite: Einschnitte am Rand der oberen Hälfte**	**Limbo: incisiones del borde de la zona apical**		
QL	**(a)**	absent	absentes	fehlend	ausentes	Verpia	1
		present	présentes	vorhanden	presentes	Calmar, Gloire du Dauphiné, Unicum	9
29. (*)	**VG**	**Leaf blade: depth of incisions on margin on apical part**	**Limbe: profondeur des découpures sur le bord de la partie apicale**	**Blattspreite: Tiefe der Einschnitte am Rand der oberen Hälfte**	**Limbo: profundidad de las incisiones del borde de la zona apical**		
QN	**(a)**	shallow	peu profondes	flach	poco profundas	Pentared, Unicum	3
		medium	moyennes	mittel	medias	Ithaca Great Lakes	5
		deep	profondes	tief	profundas	Lagon, Monet	7
30.	**VG**	**Leaf blade: density of incisions on margin on apical part**	**Limbe: densité des découpures sur le bord de la partie apicale**	**Blattspreite: Dichte der Einschnitte am Rand der oberen Hälfte**	**Limbo: densidad de las incisiones del borde de la zona apical**		
QN	**(a)**	sparse	lâches	locker	laxa	Maravilla de Verano	3
		medium	moyennes	mittel	media	Calmar, De Pierre Benite	5
		dense	denses	dicht	densa	Grand Rapids, Ithaca Great Lakes	7
		very dense	très denses	sehr dicht	muy densa	Locarno, Madison	9

		English	français	Deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
31.	**VG**	**Varieties with shallow incisions on margin on apical part only: Leaf blade: type of incisions on apical part**	**Variétés avec des découpures peu profondes sur le bord de la partie apicale seulement: Limbe: type d'incisions sur la partie apicale**	**Nur Sorten mit flachen Einschnitten am Rand der oberen Hälfte: Blattspreite: Typ der Einschnitte an der oberen Hälfte**	**Solamente variedades con incisiones poco profundas del borde de la zona apical: Limbo: tipo de incisiones en la zona apical**		
QL	**(a)**	sinuate	sinueuses	gebuchtet	sinuosas	Gloire du Dauphiné	1
		dentate	dentées	gezähnt	dentadas	Calmar	2
32.	**VG**	**Leaf blade: venation**	**Limbe: nervation**	**Blattspreite: Aderung**	**Limbo: nervaduras**		
QL	**(a)**	not flabellate	non flabelliforme	nicht fächerförmig	no flabeliforme	Donatella, Verpia, Xanadu	1
		flabellate	flabelliforme	fächerförmig	flabeliforme	Gloire du Dauphiné, Locarno, Monet	2
33.	**VG**	**Axillary sprouting**	**Développement des bourgeons ascillaires**	**Seitentriebbildung**	**Brotación axilar**		
QN		absent or very weak	absent ou très faible	fehlend oder sehr gering	ausentes o muy débiles	Valmaine	1
		weak	faible	gering	débiles	Aprilia, Sunrise	3
		medium	moyen	mittel	medios		5
		strong	fort	stark	fuertes	Riva	7
		very strong	très fort	sehr stark	muy fuertes	Doncella	9
34.	**MG**	**Time of harvest maturity**	**Epoque de maturité de récolte**	**Zeitpunkt der Erntereife**	**Época de madurez para cosecha**		
QN	**(a)**	very early	très précoce	sehr früh	muy temprana	Blonde à couper améliorée	1
		early	précoce	früh	temprana	Attraction	3
		medium	moyenne	mittel	media	Newton	5
		late	tardive	spät	tardía	Calmar	7
		very late	très tardive	sehr spät	muy tardía	El Toro	9

		English	français	Deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
35. (*)	**MG**	**Time of beginning of bolting under long day conditions**	**Epoque de début de montaison en jours longs**	**Zeitpunkt des Schossbeginns unter Langtagsbedin-gungen**	**Época del comienzo de la subida a flor en condiciones de día largo**		
QN		very early	très précoce	sehr früh	muy temprana	Blonde à couper améliorée	1
		early	précoce	früh	temprana	Gotte à graine blanche	3
		medium	moyenne	mittel	media	Carelia	5
		late	tardive	spät	tardía	Hilde II	7
		very late	très tardive	sehr spät	muy tardía	Erika, Kinemontepas, Rex	9
36.	**VG/ MG**	**Plant: height (flowering plant)**	**Plante: hauteur (plante à floraison)**	**Pflanze: Höhe (im Blühstadium)**	**Planta: altura (planta en floración)**		
QN		short	courte	niedrig	baja	Gotte à graine blanche	3
		medium	moyenne	mittel	media	Samourai	5
		tall	haute	hoch	alta	Danilla, Hilde II	7
37.	**VG**	**Plant: fasciation (at flowering stage)**	**Plante: fasciation (à la floraison)**	**Pflanze: Verbänderung (im Blühstadium)**	**Planta: fasciación (en floración)**		
QL		absent	absente	fehlend	ausente	Calmar, Romance	1
		present	présente	vorhanden	presente	Gotte jaune d'or	9
38.	**VG**	**Plant: intensity of fasciation (flowering plant)**	**Plante: intensité de la fasciation (plante à floraison)**	**Pflanze: Stärke der Verbänderung (im Blühstadium)**	**Planta: intensidad de la fasciación (planta en floración)**		
QN		very weak	très faible	sehr gering	muy débil	Gotte à graine blanche	1
		weak	faible	gering	débil	Verte maraîchère	3
		medium	moyenne	mittel	media	Amadeus	5
		strong	forte	stark	fuerte	Gotte jaune d'or	7
		very strong	très forte	sehr stark	muy fuerte	Chicon des Charentes	9

		English	français	Deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
39. **(+)** **QL**	**VG**	**Resistance to downy mildew (*Bremia lactucae*)**	**Résistance au mildiou (*Bremia lactucae*)**	**Resistenz gegen Falschen Mehltau (*Bremia lactucae*)**	**Resistencia al mildiú (*Bremia lactucae*)**		
39.1	**(b) (c)**	**Isolate Bl 2**	**Isolat Bl 2**	**Isolat Bl 2**	**Aislado Bl 2**		
		absent	absente	fehlend	ausente	Hilde II	1
		present	présente	vorhanden	presente	Ninja	9
39.2	**(c)**	**Isolate Bl 5**	**Isolat Bl 5**	**Isolat Bl 5**	**Aislado Bl 5**		
		absent	absente	fehlend	ausente	Hilde II	1
		present	présente	vorhanden	presente	Sabine	9
39.3	**(c)**	**Isolate Bl 7**	**Isolat Bl 7**	**Isolat Bl 7**	**Aislado Bl 7**		
		absent	absente	fehlend	ausente	Hilde II	1
		present	présente	vorhanden	presente	Verpia	9
39.4	**(c)**	**Isolate Bl 12**	**Isolat Bl 12**	**Isolat Bl 12**	**Aislado Bl 12**		
		absent	absente	fehlend	ausente	Hilde II	1
		present	présente	vorhanden	presente	Danilla, Geisha	9
39.5	**(c)**	**Isolate Bl 14**	**Isolat Bl 14**	**Isolat Bl 14**	**Aislado Bl 14**		
		absent	absente	fehlend	ausente	Hilde	1
		present	présente	vorhanden	Presente	Santis, Sifra, Verpia	9
39.6	**(c)**	**Isolate Bl 15**	**Isolat Bl 15**	**Isolat Bl 15**	**Aislado Bl 15**		
		absent	absente	fehlend	ausente	Hilde II	1
		present	présente	vorhanden	presente	Mirian	9
39.7 **(*)**	**(c)**	**Isolate Bl 16**	**Isolat Bl 16**	**Isolat Bl 16**	**Aislado Bl 16**		
		absent	absente	fehlend	ausente	Cobham Green, Hilde II	1
		present	présente	vorhanden	presente	Argelès, Ninja	9

		English	français	Deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
39.8	**(c)**	**Isolate Bl 17**	**Isolat Bl 17**	**Isolat Bl 17**	**Aislado Bl 17**		
		absent	absente	fehlend	ausente	Cobham Green, Hilde II	1
		present	présente	vorhanden	presente	Argelès, Ninja	9
39.9	**(c)**	**Isolate Bl 18**	**Isolat Bl 18**	**Isolat Bl 18**	**Aislado Bl 18**		
		absent	absente	fehlend	ausente	Cobham Green, Hilde II	1
		present	présente	vorhanden	presente	Argelès, Ninja	9
39.10	**(c)**	**Isolate Bl 20**	**Isolat Bl 20**	**Isolat Bl 20**	**Aislado Bl 20**		
		absent	absente	fehlend	ausente	Cobham Green, Hilde II	1
		present	présente	vorhanden	presente	Argelès, Ninja	9
39.11	**(c)**	**Isolate Bl 21**	**Isolat Bl 21**	**Isolat Bl 21**	**Aislado Bl 21**		
		absent	absente	fehlend	ausente	Cobham Green, Hilde II	1
		present	présente	vorhanden	presente	Colorado, Ninja	9
39.12	**(c)**	**Isolate B1 22**	**Isolat Bl 22**	**Isolat Bl 22**	**Aislado Bl 22**		
		absent	absente	fehlend	ausente	Cobham Green, Hilde II	1
		present	présente	vorhanden	presente	Coralis, Torpedo	9
39.13	**(c)**	**Isolate B1 23**	**Isolat Bl 23**	**Isolat Bl 23**	**Aislado Bl 23**		
		absent	absente	fehlend	ausente	Cobham Green, Hilde II	1
		present	présente	vorhanden	presente	Colorado	9
39.14	**(c)**	**Isolate B1 24**	**Isolat Bl 24**	**Isolat Bl 24**	**Aislado Bl 24**		
		absent	absente	fehlend	ausente	Argeles, Colorado	1
		present	présente	vorhanden	presente	Dandie, UC DM14, PIVT 1309	9
39.15	**(c)**	**Isolate B1 25**	**Isolat Bl 25**	**Isolat Bl 25**	**Aislado Bl 25**		
		absent	absente	fehlend	ausente	Colorado, Penlake	1
		present	présente	vorhanden	presente	Angela, Ninja	9

		English	français	Deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
40. **(+)**	**VG**	**Resistance to lettuce mosaic virus (LMV)**	**Résistance au virus de la mosaïque de la Laitue (LMV)**	**Resistenz gegen Salatmosaikvirus (LMV)**	**Resistencia al virus del mosaico de la lechuga (LMV)**		
QL	**(b)** **(c)**	**Strain Ls 1**	**Souche Ls 1**	**Pathotyp Ls 1**	**Cepa Ls 1**		
		absent	absente	fehlend	ausente	Hilde II, Salvina	1
		present	présente	vorhanden	presente	Corsica	9

8. Explanations on the Table of Characteristics

8.1 Key to Lettuce Types (under Section 5.3)

Cultivated lettuce varieties (vegetables) can be grouped into the following growth types:

(1) Butterhead Lettuce

Heading or with a tightly filled heart, thin to medium thick tender leaves with a clear midrib; head shape ranging from broad elliptic to transverse elliptic.

(2) Crisphead Lettuce (including the Iceberg, Batavia and Maravilla types)

Weak to very strong heading, rather thin to very thick and tough leaves, no clear midrib but with flabellate venation.

Iceberg types (like Calmar and Saladin) are mainly thick and tough-leaved, predominantly green and greygreen, leaf margin hardly to rather strongly incised.

Batavia types are generally medium thick-leaved and with rather strongly blistered leaves, predominantly yellowish or medium green; under cold conditions not always clearly heading.

Maravilla types have rather thick and tough leaves, only slightly or not blistered.

(3) Cos Lettuce (Roman Lettuce)

Heading or semi-heading, elongated and rather tough leaves with a clear midrib, head shape in longitudinal section elliptic, length of head >1.5 x diameter.

(4) "Grasse" or Latin Lettuce (sometimes included under Cos Lettuce)

Heading or semi-heading, tough thick leaves with clear midrib, head shape short elliptic to slightly obovate. Some types only have a tightly filled heart, others are more similar to a short Cos Lettuce. Suitable for semi-arid conditions.

(5) Cutting or Gathering Lettuce

Rather heterogeneous group ranging from non-heading butterhead-like, non-heading Batavia-like, non-heading crisp types to Oakleaf and Catalogna (lobed) types with deeply dissected leaves (Monet) and types with strongly undulated leaf margin (Lollo). Varieties partly with a clear midrib and partly with flabellate venation of the leaves. Common characteristic: loose-leaved rosette.

(6) Stem Lettuce

Forms a fleshy stem before bolting, at least under (semi-) short day conditions; leaves are mainly tough and have a clear midrib. Leaves and/or stem are consumed.

8.2 Explanations covering several characteristics

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

(a) Plant, head, leaf, leaf blade: Observations on the plant, head, leaf and leaf blade should be made at harvest maturity.

(b) Disease resistance: When disease resistance characteristics are used for assessing distinctness, uniformity and stability, records should be taken under conditions of controlled infection with a defined pathotypes.

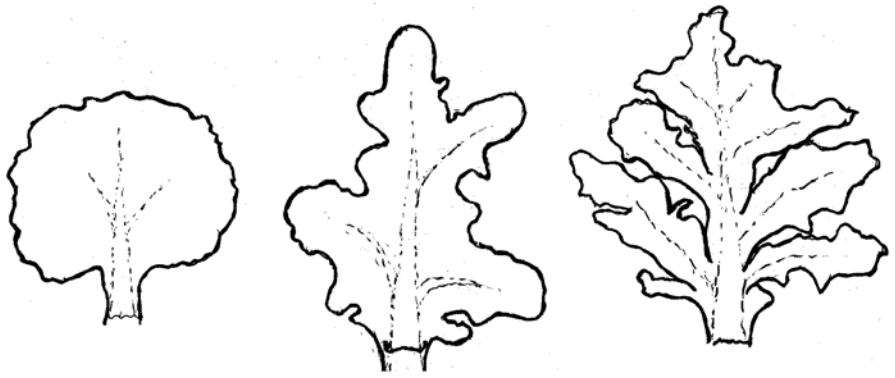
(c) Resistance to downy mildew: Each race should be tested separately and the results should also be indicated separately.

8.3 Explanations for individual characteristics

Ad. 2: Seedling: anthocyanin coloration

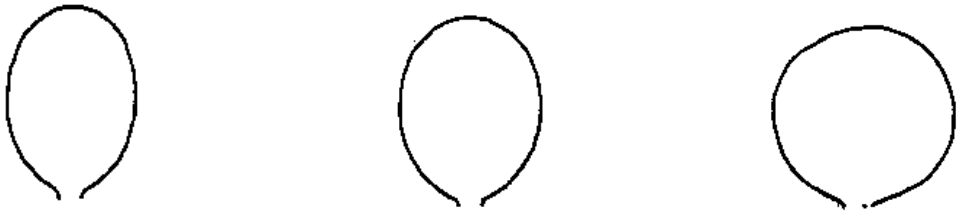
This characteristic can easily be observed by keeping the remaining seedlings after pricking out in the seeding tray without watering and under cold(er) conditions. Within two or three days all seedlings of varieties with anthocyanin will show this characteristic.

Ad. 6: Leaf blade: division



1	2	3
entire	lobed	divided

Ad. 13: Head: shape in longitudinal section

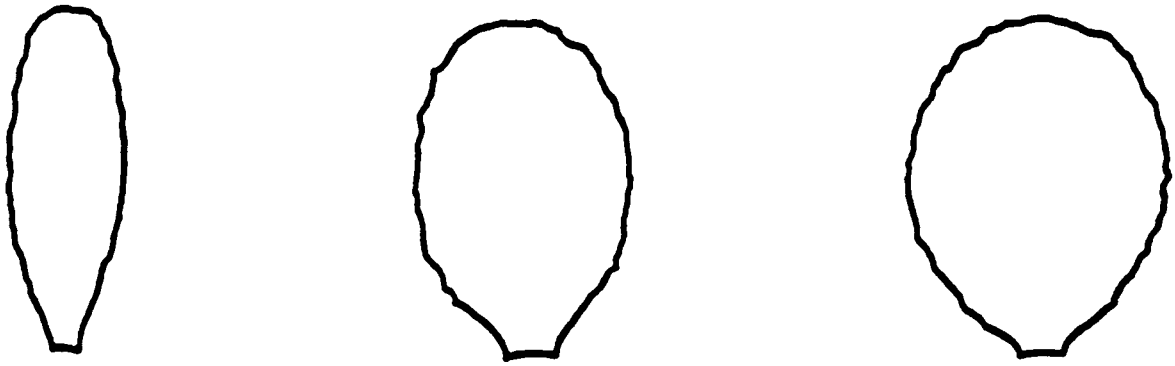


1
elliptic

2
broad elliptic

3
circular

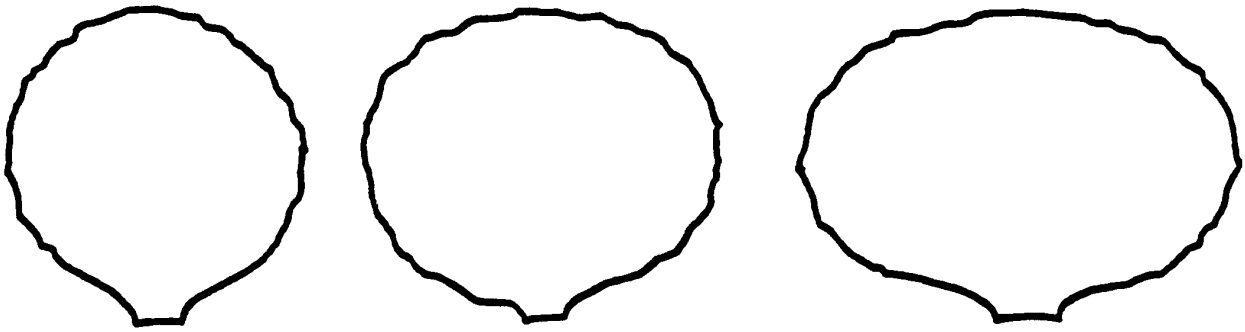
Ad. 16: Leaf: shape



1
narrow elliptic

2
elliptic

3
broad elliptic



Ad. 18 + 19: Leaf: hue of green color (18) and intensity of color (19) of outer leaves

Intensity of color (Ch. 19)	Hue of green color (Ch. 18)			
	1 absent	2 yellowish	3 greyish	4 reddish
1 very light	Krizet	Marbello Black Seeded Simpson	Hohlblättriger Butter	
3 light	Blonde maraîchère, Mondial, Reskia	Blondine (= Viktoria), Locarno, Pia	Celtuce, Kinemontepas, Natina	Brauner Trotzkopf, Maravilla de Verano
5 medium	Florian, Frillblond, Sunrise, Têtue de Nîmes	Australische Gele, Dorée de printemps, Gotte jaune d'or	Clarion, Du bon jardinier, Durango, Kelvin	Lollo rossa, Pirat, Prizehead (= Frisée d'Amérique)
7 dark	Baby Star, Donatello, Verpia, Waldemann Dark Green	Batavia, Chicon	Chou de Naples (= Webb's Wonderful), Galaxy, Toledo	Merveille des quatre saisons, Rosa, Rouge d'Hiver
9 very dark	Pavane		(Sudia)	Liberty, Malibu, Pentared, Revolution

Ad. 39: Resistance to downy mildew (*Bremia lactucae*)

Useful Dm-Genes

DUS examiners should test for Dm-genes of practical value which are directly involved in giving useful resistance in lettuce varieties, and obscure or irrelevant Dm-genes need not routinely be tested.

The currently useful Dm-genes are: 2, 3, 5/8, 6, 7, 11, 14, 16 and 18, as well as R17, R36, R37 and R38 factors. Only these should be tested on a routine basis.

Special Tests

Special tests may be required for Dml, Dm4, Dm15 and Dm10 (useful in the United States of America and Australia).

If breeders claim the presence of Dm-genes other than those mentioned above, then they should state in the Technical Questionnaires how the presence of these genes could be detected and, if appropriate, submit the relevant *Bremia* isolate to the testing centre to verify the claim. Special tests may be carried out for other Dm-genes if claimed by breeders as being appropriate for DUS examination.

Bremia Races

The following *Bremia* races should be used to determine whether a lettuce variety possesses the Dm-genes listed above: Bl 2, Bl 5, Bl 7, Bl 12, Bl 14, Bl 15, Bl 16, Bl 17, Bl 18, Bl 20, Bl 21, Bl 22, Bl 23 and Bl 24. For special discrimination between Dm 5/8 and Dm 7, Bl 7 is proposed.

These isolates possess a wide range of virulences. For details, please refer to relevant literature.

New Isolates

Additional isolates could be added to test for any useful new Dm-genes that might arise.

If new isolates of *Bremia* arise that can either detect novel Dm-genes in lettuce varieties or effectively replace an isolate listed above, then these isolates should be added to those listed.

Testing of *Bremia* Isolates

There are two centres, the "Station nationale d'essais de semences" (SNES) in France and the NAK Tuinbouw in the Netherlands, which would verify and test the isolates listed above and any new isolates that are used in routine tests. These centres should make these verified isolates available, against payment of prescribed fees, to the testing centres of other UPOV members.

The addresses of the centres are as follows:

Station nationale d'essais de semences (SNES)
Rue Georges Morel
B.P. 24
49071 Beaucouzé Cedex
France
Tél. : +33 (0) 2 41 22 58 00
Tlcp. : +33 (0) 2 41 22 58 01
Mél. : service.clients@geves.fr

NAK Tuinbouw
Sotaweg 20
P.O. Box 40
2370 AA Roelofarendsveen
Pays-Bas
Tél. : + 31 (0) 71 332 62 62
Tlcp. : + 31 (0) 71 332 63 63
Mél. : info@naktuinbouw.nl

Table of *Bremia* differentials:

		Variety	Cobham Green		Lednicky	UC DM2	Dandie	R4T57D	Valmaine	Sabine		LSE 57/15	UC DM10	Capitan	Hilde II	Pennlake	UC DM14		PIVT 1309	LSE /18	LS-102	Colorado	Ninja	Discovery		Argeles	Sextet code
	Dm nr/R nr		0		1	2	3	4	5/8	6		7	10	11	12	13	14		15	16	17	18/	36	37		38	
	Sextet nr				1	2	3	4	5	6		7	8	9	10	11	12		13	14	15	16	17	18		19	
	Sextet value				1	2	4	8	16	32		1	2	4	8	16	32		1	2	4	8	16	32		1	
IBEB code	Alias																										
Bl:1	NL 1		+		+	+	-	+	-	-		-	+	-	+	+	+		-	-	-	-	-	-		-	BL-A 11/58/00/00
Bl:2	NL 2		+		+	+	+	+	+	+		-	+	(-)	+	+	+		-	-	-	(-)	-	-		+	BL-A 63/58/00/01
Bl:3	NL 3		+		-	-	-	+	+	+		+	+	-	+	+	(+)		+	-	-	-	-	(-)		-	BL-A 56/59/01/00
Bl:4	NL 4		+		+	+	-	+	+	(-)		+	+	(-)	+	+	+		-	(-)	-	(-)	-	-		-	BL-A 27/59/00/00
Bl:5	NL 5		+		+	-	+	-	-	-		+	+	-	+	+	-		+	-	-	-	-	-		-	BL-A 05/27/01/00
Bl:6	NL 6		+		+	+	-	+	+	(-)		-	+	+	+	+	+		-	(-)	-	-	-	-		-	BL-A 27/62/00/00
Bl:7	NL 7		+		+	+	+	+	-	+		+	+	-	+	+	+		-	-	-	-	-	-		-	BL-A 47/59/00/00
Bl:10	NL 10		+		+	+	+	+	+	+		+	+	(-)	+	+	(+)		(-)	-	-	-	-	-		-	BL-A 63/59/00/00
Bl:11	NL 11		+		+	-	-	+	+	+		+	+	-	+	+	+		+	+	-	-	-	-		-	BL-A 57/59/03/00
Bl:12	NL 12		+		+	-	-	+	+	+		+	+	+	+	+	+		+	+	-	-	-	-		-	BL-A 57/63/03/00
Bl:13	NL 13		+		+	-	+	-	+	(-)		+	+	+	+	+	+		-	-	-	-	-	-		-	BL-A 21/63/00/00
Bl:14	NL 14		+		+	+	+	+	+	+		-	+	+	+	+	+		-	-	-	-	-	-		-	BL-A 63/62/00/00
Bl:15	NL 15		+		+	+	+	+	+	-		+	+	+	+	+	-		-	-	-	-	-	-		-	BL-A 31/31/00/00
Bl:16	NL 16/BL-16		+		+	+	+	+	+	+		+	+	+	+	+	-		-	+	-	-	-	-		-	BL-A 63/31/02/00
Bl:17	BL-17		+		-	+	+	-	+	-		+	+	-	+	+	+		+	-	-	+	-	+		-	BL-A 22/59/41/00
Bl:18	BL-18		+		+	+	-	+	+	+		+	+	+	+	+	-		-	+	-	+	-	-		-	BL-A 59/31/10/00
Bl:19	BL-19		+		+	+	+	+	+	+		-	+	+	+	+	+		-	-	-	-	-	-		+	BL-A 63/62/00/01

		Variety	Cobham Green		Lednicky	UC DM2	Dandie	R4T57D	Valmaine	Sabine		LSE 57/15	UC DM10	Capitan	Hilde II	Pennlake	UC DM14		PIVT 1309	LSE /18	LS-102	Colorado	Ninja	Discovery		Argeles	Sextet code
Bl:20	BL-20		+		+	+	+	+	+	+		+	+	+	+	+	-		-	+	-	+	-	-		-	BL-A 63/31/10/00
Bl:21	BL-21		+		+	+	+	+	+	+		+	+	+	+	+	-		+	+	-	-	+	+		-	BL-A 63/31/51/00
Bl:22	BL-22		+		+	+	-	+	+	+		+	+	+	+	+	+		+	-	-	+	-	-		-	BL-A 59/63/09/00
Bl:23	BL-23		+		+	+	+	+	+	+		+	+	+	+	+	-		-	+	-	-	-	-		+	BL-A 63/31/02/01
Bl:24	BL-24		+		+	+	-	+	+	+		+	+	+	+	+	-		-	+	-	+	-	-		+	BL-A 59/31/10/01
Bl:25	BL-25		+		+	+	-	+	+	+		+	+	+	+	+	-		-	+	-	+	-	+		-	BL-A 59/31/42/00
	S1		+		+	-	+	+	+	+		+	+	-	+	+	+		+	-	-	-	-	-		-	BL-A 61/59/01/00
	SF1		+		+	+	+	-	+	-		+	+	-	+	+	+		+	+	-	-	-	+		-	BL-A 23/59/35/00
	IL4		+		+	+	-	+	+	-		+	+	+	+	+	+		+	+	-	-	-	-		+	BL-A 27/63/03/01
	CS9		+		+	+	+	+	+	+		+	+	+	+	+	+		+	-	-	-	-	-		-	BL-A 63/63/01/00
	TV		+		+	+	+	+	+	+		+	+	-	+	+	+		+	+	-	-	-	-		-	BL-A 63/59/03/00

Use of the sextets method to describe the resistance of varieties of lettuce to *Bremia*:

The resistance genes or Dm factors are grouped together in sixes (sextet):

1st sextet : 1, 2, 3, 4, 5/8, 6
2nd sextet : 7, 10, 11, 12, 13, 14
3rd sextet : 15, 16, 17, 18, 36, 37
4th sextet : 38

Each resistance gene or Dm factor receives a sextet number and each sextet number has a specific value (see table below).

Within each sextet, the values are allocated as follows:

- race overcoming the gene or Dm factor – (+) = sextet value
- race not overcoming the gene or Dm factor – (-) = 0 value.

All these values are then added together within the sextet in order to obtain an overall number per sextet. This number allows the race virulence spectrum to be found (only one virulence combination can correspond to a sextet value).

	1st sextet						2nd sextet						3rd sextet		
Dm	1	2	3	4	5/8	6	7	10	11	12	13	14	15	16	…
Sextet number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	…
Sextet value	1	2	4	8	16	32	1	2	4	8	16	32	1	2	…
Sextet value	+	+	-	+	-	-	-	+	-	+	+	+	-	-	
	1 + 2 + 0 + 8 + 0 + 0 = 11						0 + 2 + 0 + 8 + 16 + 32 = 58						0 + 0		…

Thus, a race with a maximum value of 63 for a sextet is virulent on all the genes or Dm and, conversely, a 0 value characterizes non-virulence on the six genes or Dm of the same sextet.

Resistance Testing Methods

The following guidelines are suggested for *Bremia* testing:

(a) Maintenance: *Bremia* races should be maintained on varieties possessing no known Dm-genes, or only obscure Dm-genes, e.g. Cobham Green, Lobjoits Green Cos, Hilde (Dm12), Olof. An alternative would be to use varieties/breeding lines which are selective for each particular isolate. The purity and quality of these maintenance varieties is important and it may be necessary to commission a seed producer to produce an adequate supply of good quality seed.

(b) Host differentials: Standard control varieties, that express the resistance genes that are being tested for, should always be used in tests, as a check. These standard varieties are available from GEVES Brion in France and NAK Tuinbouw, Netherlands:

GEVES Brion	NAK Tuinbouw
Domaine de la Boisselière	Sotaweg 20, P.O. Box 40
49250 Brion	2370 AA Roelofarendsveen
France	Netherlands

(c) Sample Size: At least 30 separate plants of each variety should be tested to establish the uniformity of the variety's Dm-gene component.

(d) Temperature: Incubation of inoculated seedlings or leaf discs should be at 15-18ºC.

(e) Inoculum Concentration: The optimum is around 1×10^5 spores per ml; at least 3×10^4 should be used. If inoculated seedlings are used, they may be inoculated prior to the emergence of the first leaf.

(f) Illumination: Adequate illumination should be provided for good plant growth. Seedlings should have fully expanded cotyledons and the plants should not be etiolated.

(g) Recording: The recording time should be as follows:

- First recording: when the control has maximum sporulation;
- Second recording: 3 days after first recording;
- Third recording: 3 days after second recording.

(In case of resistant varieties some plants may show leaf necrosis at the first recording.)

Ad. 40: Resistance to Lettuce Mosaic Virus (LMV)

Maintenance of strains

Maintenance:	After 15-20 days of incubation infected tissue should be sliced and desiccated over calcium chloride and stored at 4ºC. Infectivity may last 1 to 3 years. Contamination can be avoided in this way.
Multiplication:	Pre-multiplication of the virus on a susceptible variety (e.g. Hilde or Trocadero) prior to testing under normal conditions. Only virus-free seed samples should be used for this purpose.

Execution of test

Growth stage of plants:	First inoculation at 2 to 3 leaves stage.
Temperature:	Constant temperature of 16ºC during night (N) and of 22ºC during day (D) or, alternatively, temperature of 20ºC N, 25ºC D during 5 days after inoculation followed by 12ºC N and 18ºC D.
Light conditions:	From emergence: 16 hours per day, at least 15,000 Lux.
Preparation of inoculum:	Young leaves of diseased lettuce plants showing clear LMV symptoms (after 15-25 days of incubation) should be ground (1 g fresh leaves per 4 ml) in a mortar adding a 0.03 M Na_2HPO_4-buffer containing 0.2% DIECA(*). Prior to inoculation 75 mg/ml carborundum and 75 mg/ml activated charcoal should be added. (*) Composition of buffer: per 100 ml: 1.07 g $Na_2HPO_4\,12H_2O$, 0.2 g DIECA
Method of inoculation:	Mechanical inoculation by rubbing on the two first leaves, followed by a second inoculation 2-3 days afterwards. The inoculum is kept in an ice bucket during inoculation.
Duration of test:	- From sowing to inoculation: about 2 weeks - From inoculation to reading: about 2 to 3 weeks; first reading after 15 days
Number of plants tested:	30 plants and 6 repetitions

Remarks:

Strains: Other strains of LMV have been isolated in Europe (France, Greece, Spain) by Dinant and Lot (1992), Plant Pathology 41:528-542. The naming of the strains is not yet internationally accepted; but names of pathotypes have been proposed (Pink, Lot and Johnson (1992), Euphytica 63:169-174).

Symptoms (under test conditions): The expression of the symptoms depends on the strains and the lettuce genotypes. For the old Ls-1 strain used for testing the 'Gallega'-gene, the typical reactions can be summarized as follows:

· Butterhead cultivars show essentially vein clearing and mosaic;

· Crisp or Iceberg cultivars show chlorosis along the veins and faint mosaic;

· Cos cultivars show reduced growth of the inner leaves and blistering;

· In red varieties symptoms are particularly difficult to observe.

9. Literature

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10. 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	*Lactuca sativa* L.
1.2 Common Name	Lettuce

2. Applicant

Name	
Address	
Telephone No.	
Fax No.	
E-mail address	
Breeder (if different from applicant)	

3. Proposed denomination and breeder's reference

Proposed denomination (if available)	
Breeder's reference	

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

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

4.1 Breeding Scheme

Variety resulting from:

4.1.1 Crossing

(a) controlled cross [ ]
(please state parent varieties)

(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

(a) Self-pollination [ ]

(b) 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:

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	**Growth types (according to Section 8.1 of the Test Guidelines)**		
	Butterhead lettuce	Clarion, Merveille des quatre saisons, Verpia	[ ]
	Crisphead lettuce	Blonde de Paris (Batavia), Calmar, Saladin (Iceberg)	[ ]
	Cos lettuce (Roman lettuce)	Blonde maraîchère (Roman types)	[ ]
	"Grasse" or Latin lettuce	Bibb, Sucrine	[ ]
	Cutting or Gathering lettuce	Frisée d'Amérique, Lollo rossa, Oakleaf, Salad Bowl	[ ]
	Stem lettuce	Celtuce	[ ]
5.2 (1)	**Seed: color**		
	white	Verpia	1[ ]
	yellow	Durango	2[ ]
	black	Kagraner Sommer	3[ ]
5.3 (18)	**Leaf: hue of green color of outer leaves**		
	absent	Donatello, Verpia	1[ ]
	yellowish	Dorée de printemps	2[ ]
	greyish	Celtuce, Du bon jardinier	3[ ]
	reddish	Lollo rossa, Revolution, Rosa	4[ ]
5.4 (20)	**Leaf: anthocyanin coloration**		
	absent	Fiorella, Sunrise	1[ ]
	present	Commodore, Pirat	9[ ]

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

	Characteristics	Example Varieties	Note
5.5 (35)	**Time of beginning of bolting under long day conditions**		
	very early	Blonde à couper améliorée	1[ ]
	early	Gotte à graine blanche	3[ ]
	medium	Carelia	5[ ]
	late	Hilde II	7[ ]
	very late	Erika, Kinemontepas, Rex	9[ ]
5.6 (39.15)	**Resistance to downy mildew (*Bremia lactucae)* Isolate B1 25**		
	absent	Colorado, Penlake	1[ ]
	present	Angela, Ninja	9[ ]

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

6. Similar varieties and differences from these varieties

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

Denomination(s) of variety(ies) similar to your candidate variety	Characteristic(s) in which your candidate variety differs from the similar variety(ies)	Describe the expression of the characteristic(s) for the **similar** variety(ies)	Describe the expression of the characteristic(s) for **your** candidate variety
Example	*Leaf: intensity of color of outer leaves*	*medium*	*dark*

Comments:

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

[#]7. Additional information which may help in the examination of the variety

7.1 In addition to the information provided in sections 5 and 6, are there any additional characteristics which may help to distinguish the variety?

Yes [ ] No [ ]

(If yes, please provide details)

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

Yes [ ] No [ ]

(If yes, please provide details)

7.3 Other information

8. Authorization for release

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

Yes [ ] No [ ]

(b) Has such authorization been obtained?

Yes [ ] No [ ]

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

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

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

9. Information on plant material to be examined or submitted for examination

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

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

(a) Microorganisms (e.g. virus, bacteria, phytoplasma) Yes [ ] No [ ]

(b) Chemical treatment (e.g. growth retardant, pesticide) Yes [ ] No [ ]

(c) Tissue culture Yes [ ] No [ ]

(d) Other factors Yes [ ] No [ ]

Please provide details for where you have indicated “yes”.

……

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]