



TG/13/10 Rev. 2

ORIGINAL: English

DATE: 2006-04-05 +

2011-04-06 + 2013-03-20

# INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

GENEVA

<p><b>LETTUCE</b></p> <p>UPOV Code: LACTU_SAT</p> <p><i>Lactuca sativa L.</i></p>
---

## GUIDELINES

### FOR THE CONDUCT OF TESTS

#### FOR DISTINCTNESS, UNIFORMITY AND STABILITY

Alternative Names: \*

<i>Botanical name</i>	<i>English</i>	<i>French</i>	<i>German</i>	<i>Spanish</i>
<i>Lactuca sativa L.</i>	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](http://www.upov.int)), for the latest information.]

<u>TABLE OF CONTENTS</u>	<u>PAGE</u>
1. SUBJECT OF THESE TEST GUIDELINES.....	3
2. MATERIAL REQUIRED .....	3
3. METHOD OF EXAMINATION.....	3
3.1 Number of Growing Cycles .....	3
3.2 Testing Place .....	3
3.3 Conditions for Conducting the Examination.....	3
3.4 Test Design .....	4
3.5 Number of Plants / Parts of Plants to be Examined.....	4
3.6 Additional Tests .....	4
4. ASSESSMENT OF DISTINCTNESS, UNIFORMITY AND STABILITY .....	4
4.1 Distinctness .....	4
4.2 Uniformity.....	5
4.3 Stability .....	5
5. GROUPING OF VARIETIES AND ORGANIZATION OF THE GROWING TRIAL .....	5
6. INTRODUCTION TO THE TABLE OF CHARACTERISTICS .....	6
6.1 Categories of Characteristics.....	6
6.2 States of Expression and Corresponding Notes.....	6
6.3 Types of Expression .....	7
6.4 Example Varieties .....	7
6.5 Legend.....	7
7. TABLE OF CHARACTERISTICS/TABLEAU DES CARACTERES/MERKMALSTABELLE/TABLA DE CARACTERES.....	8
8. EXPLANATIONS ON THE TABLE OF CHARACTERISTICS .....	23
8.1 Key to Lettuce Types (under Section 5.3).....	23
8.2 Explanations covering several characteristics .....	24
8.3 Explanations for individual characteristics .....	24
9. LITERATURE .....	34
10. TECHNICAL QUESTIONNAIRE.....	36

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, MS, VG, VS: 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
<b>1. VG</b>	<b>Seed: color</b>	<b>Semence: couleur</b>	<b>Samen: Farbe</b>	<b>Semilla: color</b>		
(*)						
<b>QL</b>	white	blanche	weiß	blanco	Verpia	1
	yellow	jaune	gelb	amarillo	Durango	2
	black	noire	schwarz	negro	Kagraner Sommer	3
<b>2. VG</b>	<b>Seedling: anthocyanin coloration</b>	<b>Plantule: pigmentation anthocyanique</b>	<b>Keimpflanze: Anthocyanfärbung</b>	<b>Plántula: pigmentación antociánica</b>		
(*)						
(+)						
<b>QL</b>	absent	absente	fehlend	ausente	Verpia	1
	present	présente	vorhanden	presente	Pirat	9
<b>3. VG</b>	<b>Seedling: size of cotyledon (fully developed)</b>	<b>Plantule: taille du cotylédon (à complet développement)</b>	<b>Keimpflanze: Größe des Keimblatts (voll entwickelt)</b>	<b>Plántula: tamaño del cotiledón (plenamente desarrollado)</b>		
<b>QN</b>	small	petit	klein	pequeño	Romance	3
	medium	moyen	mittel	medio	Expresse	5
	large	grand	groß	grande	Verpia	7
<b>4. VG</b>	<b>Seedling: shape of cotyledon</b>	<b>Plantule: forme du cotylédon</b>	<b>Keimpflanze: Form des Keimblatts</b>	<b>Plántula: forma del cotiledón</b>		
<b>QN</b>	narrow elliptic	elliptique étroit	schmal elliptisch	elíptica estrecha	Calmar	3
	medium elliptic	elliptique moyen	mittel elliptisch	elíptica media	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	
<b>5.</b>	<b>VG</b>	<b>Leaf: attitude at 10-12 leaf stage</b>	<b>Feuille: port au stade 10-12 feuilles</b>	<b>Blatt: Stellung im 10-12 Blattstadium</b>	<b>Hoja: porte en el estado de 10 a 12 hojas</b>		
<b>QN</b>		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
<b>6.</b>	<b>VG</b>	<b>Leaf blade: division (as for 5)</b>	<b>Limbe: division (comme pour 5)</b>	<b>Blattspreite: Gliederung (wie bei 5)</b>	<b>Limbo: división (como para 5)</b>		
<b>(+)</b>							
<b>PQ</b>		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
<b>7.</b>	<b>VG</b>	<b>Plant: diameter</b>	<b>Plante: diamètre</b>	<b>Pflanze: Durchmesser</b>	<b>Planta: diámetro</b>		
<b>(*)</b>							
<b>QN</b>	<b>(a)</b>	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
<b>8.</b>	<b>VG</b>	<b>Plant: head formation</b>	<b>Plante: formation d'une pomme</b>	<b>Pflanze: Kopfbildung</b>	<b>Planta: formación del cogollo</b>		
<b>(*)</b>							
<b>PQ</b>	<b>(a)</b>	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
<b>9. VG</b>	<b><u>Varieties with closed head formation only:</u> Head: degree of overlapping of upper part of leaves</b>	<b><u>Variétés à pomme fermée seulement:</u> Pomme: degré du chevauchement de la partie supérieure des feuilles</b>	<b><u>Nur Sorten mit geschlossenem Kopf:</u> Kopf: Stärke des Überlappens des oberen Teils der Blätter</b>	<b><u>Solamente variedades con cogollo cerrado:</u> Cogollo: grado de solapamiento de la parte superior de las hojas</b>		
<b>QN (a)</b>	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
<b>10. VG</b>	<b>Head: density</b>	<b>Pomme: densité</b>	<b>Kopf: Dichte</b>	<b>Cogollo: densidad</b>		
<b>QN (a)</b>	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
<b>11. VG</b>	<b>Head: size</b>	<b>Pomme: taille</b>	<b>Kopf: Größe</b>	<b>Cogollo: tamaño</b>		
<b>QN (a)</b>	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	
<b>12.</b>	<b>VG</b>	<b><u>Butterhead type varieties in glasshouse only:</u></b> <b>Head: closing of base</b>	<b><u>Seulement les variétés de type laitue de serre pommée:</u></b> <b>Pomme: fermeture de la base</b>	<b><u>Nur Sorten vom Typ Kopfsalat für Unterglasanbau:</u></b> <b>Kopf: Geschlossenheit der Basis</b>	<b><u>Solamente para variedades de tipo lechuga Trocadero en invernadero:</u></b> <b>Cogollo: cierre de la base</b>		
<b>QN</b>	<b>(a)</b>	weak	faible	gering	débil	Passe Partout	3
		medium	moyenne	mittel	medio	Carmelita	5
		strong	forte	stark	fuerte	Dustin, Manfred	7
<b>13.</b>	<b>VG</b>	<b>Head: shape in longitudinal section</b>	<b>Pomme: forme en section longitudinale</b>	<b>Kopf: Form im Längsschnitt</b>	<b>Cogollo: forma en sección longitudinal</b>		
<b>(*)</b> <b>(+)</b>							
<b>PQ</b>	<b>(a)</b>	narrow elliptic	elliptique étroite	schmal elliptisch	elíptica estrecha	Verte maraîchère	1
		broad elliptic	elliptique large	breit elliptisch	elíptica ancha	Amadeus, Sucrine	2
		circular	arrondie	rund	circular	Passe Partout, Verpia	3
<b>14.</b>	<b>VG</b>	<b>Leaf: thickness</b>	<b>Feuille: épaisseur</b>	<b>Blatt: Dicke</b>	<b>Hoja: grosor</b>		
<b>QN</b>	<b>(a)</b>	thin	mince	dünn	delgada	Raisa, Royal Red	3
		medium	moyenne	mittel	media	Dustin, Sunrise	5
		thick	épaisse	dick	gruesa	Frisée de Beauregard	7
<b>15.</b>	<b>VG</b>	<b>Leaf: attitude at harvest maturity (outer leaves from head lettuce or adult leaves from cutting and stem lettuce)</b>	<b>Feuille: port à maturité de récolte (feuilles externes de laitue pommée ou feuilles adultes de laitue à couper et de laitue-tige)</b>	<b>Blatt: Stellung im Erntestadium (äußere Blätter bei Kopfsalat bzw. vollentwickelte Blätter bei Schnitt- und Stengelsalat)</b>	<b>Hoja: porte durante la madurez para cosecha (hojas externas de lechuga de cogollo u hojas adultas de lechugas de cortar y de tallo)</b>		
<b>QN</b>	<b>(a)</b>	erect	dressé	aufrecht	erecto	Feria, Riva	1
		semi-erect	demi-dressé	halbaufrecht	semierecto	Amelia, Toronto	3
		horizontal	horizontal	waagrecht	horizontal	Chambery, Divina	5

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota	
<b>16.</b>	<b>VG</b>	<b>Leaf: shape</b>	<b>Feuille: forme</b>	<b>Blatt: Form</b>	<b>Hoja: forma</b>		
(*)							
(+)							
<b>PQ</b>	<b>(a)</b>	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 narrow elliptic	elliptique transverse étroite	quer schmal elliptisch	elíptica transversal estrecha	Elvira, Madison	6
		obovate	obovale	verkehrt eiförmig	oboval	Raisa, Toronto	7
		broad obtrullate	losangique transverse large	verkehrt breit rautenförmig	rómbica ancha	Delicato, Monet	8
		triangular	triangulaire	dreieckig	triangular	Deer Tongue	9
<b>17.</b>	<b>VG</b>	<b>Leaf: shape of tip</b>	<b>Feuille: forme du sommet</b>	<b>Blatt: Form der Spitze</b>	<b>Hoja: forma del ápice</b>		
<b>PQ</b>	<b>(a)</b>	acute	aigu	spitz	agudo	Celtuce, Deer Tongue, Karola, Tempura	1
		obtuse	obtus	stumpf	obtus	Chicon des Charentes, Grise maraîchère	2
		rounded	arrondi	abgerundet	redondeado	Blonde Maraîchère, Maserati	3

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota	
<b>18.</b>	<b>VG</b>	<b>Leaf: hue of green color of outer leaves</b>	<b>Feuille: teinte de la couleur verte des feuilles externes</b>	<b>Blatt: Ton der Grünfärbung der äußeren Blätter</b>	<b>Hoja: tonalidad del color verde de las hojas externas</b>		
<b>(*)</b>							
<b>(+)</b>							
<b>PQ</b>	<b>(a)</b>	absent	absente	fehlend	ausente	Donatello, Verpia	1
		yellowish	jaunâtre	gelblich	amarillento	Dorée de printemps	2
		greyish	grisâtre	gräulich	grisáceo	Celtuțe, Du bon jardinier	3
		reddish	rougeâtre	rötlich	rojizo	Lollo rossa, Revolution, Rosa (see also Ad. 18/ voir aussi Ad. 18/ siehe auch zu 18/ véase también Ad. 18)	4
<b>19.</b>	<b>VG</b>	<b>Leaf: intensity of color of outer leaves</b>	<b>Feuille: intensité de la couleur des feuilles externes</b>	<b>Blatt: Intensität der Farbe der äußeren Blätter</b>	<b>Hoja: intensidad del color de las hojas externas</b>		
<b>(*)</b>							
<b>(+)</b>							
<b>QN</b>	<b>(a)</b>	very light	très claire	sehr hell	muy claro	(see also Ad. 18/ voir aussi Ad. 18/ siehe auch zu 18/ véase también Ad. 18)	1
		light	claire	hell	claro	(see also Ad. 18/ voir aussi Ad. 18/ siehe auch zu 18/ véase también Ad. 18)	3
		medium	moyenne	mittel	medio	(see also Ad. 18/ voir aussi Ad. 18/ siehe auch zu 18/ véase también Ad. 18)	5
		dark	foncée	dunkel	oscuro	(see also Ad. 18/ voir aussi Ad. 18/ siehe auch zu 18/ véase también Ad. 18)	7
		very dark	très foncée	sehr dunkel	muy oscuro	(see also Ad. 18/ voir aussi Ad. 18/ siehe auch zu 18/ véase también Ad. 18)	9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>20. (*)</b>	<b>VG Leaf: anthocyanin coloration</b>	<b>Feuille: pigmentation anthocyanique</b>	<b>Blatt: Anthocyanfärbung</b>	<b>Hoja: pigmentación antociánica</b>		
<b>QL (a)</b>	absent	absente	fehlend	ausente	Fiorella, Sunrise	1
	present	présente	vorhanden	presente	Commodore, Pirat	9
<b>21. (*)</b>	<b>VG Leaf: intensity of anthocyanin coloration</b>	<b>Feuille: intensité de la pigmentation anthocyanique</b>	<b>Blatt: Intensität der Anthocyanfärbung</b>	<b>Hoja: intensidad de la pigmentación antociánica</b>		
<b>QN (a)</b>	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
<b>22.</b>	<b>VG Leaf: distribution of anthocyanin</b>	<b>Feuille: répartition de l'anthocyane</b>	<b>Blatt: Verteilung des Anthocyanans</b>	<b>Hoja: distribución de la antocianina</b>		
<b>QL (a)</b>	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
<b>23.</b>	<b>VG Leaf: kind of anthocyanin distribution</b>	<b>Feuille: type de répartition de l'anthocyane</b>	<b>Blatt: Art der Anthocyanverteilung</b>	<b>Hoja: tipo de distribución de la antocianina</b>		
<b>QL (a)</b>	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
<b>24.</b>	<b>VG</b>	<b>Leaf: glossiness of upper side</b>	<b>Feuille: brillance de la face supérieure</b>	<b>Blatt: Glanz der Oberseite</b>	<b>Hoja: brillo del haz</b>	
<b>QN</b>	<b>(a)</b>	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
<b>25.</b>	<b>VG</b>	<b>Leaf: blistering</b>	<b>Feuille: cloûre</b>	<b>Blatt: Blasigkeit</b>	<b>Hoja: abullonado</b>	
<b>(*)</b>						
<b>QN</b>	<b>(a)</b>	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
<b>26.</b>	<b>VG</b>	<b>Leaf: size of blisters</b>	<b>Feuille: taille des cloques</b>	<b>Blatt: Größe der Blasen</b>	<b>Hoja: tamaño del abullonado</b>	
<b>QN</b>	<b>(a)</b>	small	petites	klein	pequeñas	Dorée de printemps 3
		medium	moyennes	mittel	medianas	Dustin, Sunrise 5
		large	grandes	groß	grandes	Fiorella, Massilia 7
<b>27.</b>	<b>VG</b>	<b>Leaf blade: degree of undulation of margin</b>	<b>Limbe: importance de l'ondulation du bord</b>	<b>Blattspreite: Grad der Randwellung</b>	<b>Limbo: grado de ondulación del borde</b>	
<b>(*)</b>						
<b>QN</b>	<b>(a)</b>	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	
<b>28.</b>	<b>VG</b>	<b>Leaf blade: incisions of margin on apical part</b>	<b>Limbe: découpures du bord de la partie apicale</b>	<b>Blattspreite: Einschnitte am Rand der oberen Hälfte</b>	<b>Limbo: incisiones del borde de la zona apical</b>		
<b>QL</b>	<b>(a)</b>	absent	absentes	fehlend	ausentes	Verpia	1
		present	présentes	vorhanden	presentes	Calmar, Gloire du Dauphiné, Unicum	9
<b>29.</b>	<b>VG</b>	<b>Leaf blade: depth of incisions on margin on apical part</b>	<b>Limbe: profondeur des découpures sur le bord de la partie apicale</b>	<b>Blattspreite: Tiefe der Einschnitte am Rand der oberen Hälfte</b>	<b>Limbo: profundidad de las incisiones del borde de la zona apical</b>		
<b>(*)</b>							
<b>QN</b>	<b>(a)</b>	shallow	peu profondes	flach	poco profundas	Pentared, Unicum	3
		medium	moyennes	mittel	medias	Ithaca Great Lakes	5
		deep	profondes	tief	profundas	Lagon, Monet	7
<b>30.</b>	<b>VG</b>	<b>Leaf blade: density of incisions on margin on apical part</b>	<b>Limbe: densité des découpures sur le bord de la partie apicale</b>	<b>Blattspreite: Dichte der Einschnitte am Rand der oberen Hälfte</b>	<b>Limbo: densidad de las incisiones del borde de la zona apical</b>		
<b>QN</b>	<b>(a)</b>	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
<b>31. VG</b>	<b><u>Varieties with shallow incisions on margin on apical part only:</u> Leaf blade: type of incisions on apical part</b>	<b><u>Variétés avec des découpures peu profondes sur le bord de la partie apicale seulement:</u> Limbe: type d'incisions sur la partie apicale</b>	<b><u>Nur Sorten mit flachen Einschnitten am Rand der oberen Hälfte:</u> Blattspreite: Typ der Einschnitte an der oberen Hälfte</b>	<b><u>Solamente variedades con incisiones poco profundas del borde de la zona apical:</u> Limbo: tipo de incisiones en la zona apical</b>		
<b>QL (a)</b>	sinuate	sinueuses	gebuchtet	sinuosas	Gloire du Dauphiné	1
	dentate	dentées	gezähnt	dentadas	Calmar	2
<b>32. VG</b>	<b>Leaf blade: venation</b>	<b>Limbe: nervation</b>	<b>Blattspreite: Aderung</b>	<b>Limbo: nervaduras</b>		
<b>QL (a)</b>	not flabellate	non flabelliforme	nicht fächerförmig	no flabeliforme	Donatella, Verpia, Xanadu	1
	flabellate	flabelliforme	fächerförmig	flabeliforme	Gloire du Dauphiné, Locarno, Monet	2
<b>33. VG</b>	<b>Axillary sprouting</b>	<b>Développement des bourgeons axillaires</b>	<b>Seitentriebbildung</b>	<b>Brotación axilar</b>		
<b>QN</b>	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
<b>34. MG</b>	<b>Time of harvest maturity</b>	<b>Epoque de maturité de récolte</b>	<b>Zeitpunkt der Erntereife</b>	<b>Época de madurez para cosecha</b>		
<b>QN (a)</b>	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
<b>35. MG (*)</b>	<b>Time of beginning of bolting under long day conditions</b>	<b>Epoque de début de montaison en jours longs</b>	<b>Zeitpunkt des Schossbeginns unter Langtagsbedingungen</b>	<b>Época del comienzo de la subida a flor en condiciones de día largo</b>		
<b>QN</b>	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
<b>36. VG/ MG</b>	<b>Plant: height (flowering plant)</b>	<b>Plante: hauteur (plante à floraison)</b>	<b>Pflanze: Höhe (im Blühstadium)</b>	<b>Planta: altura (planta en floración)</b>		
<b>QN</b>	short	courte	niedrig	baja	Gotte à graine blanche	3
	medium	moyenne	mittel	media	Samourai	5
	tall	haute	hoch	alta	Danilla, Hilde II	7
<b>37. VG</b>	<b>Plant: fasciation (at flowering stage)</b>	<b>Plante: fasciation (à la floraison)</b>	<b>Pflanze: Verbänderung (im Blühstadium)</b>	<b>Planta: fasciación (en floración)</b>		
<b>QL</b>	absent	absente	fehlend	ausente	Calmar, Romance	1
	present	présente	vorhanden	presente	Gotte jaune d'or	9
<b>38. VG</b>	<b>Plant: intensity of fasciation (flowering plant)</b>	<b>Plante: intensité de la fasciation (plante à floraison)</b>	<b>Pflanze: Stärke der Verbänderung (im Blühstadium)</b>	<b>Planta: intensidad de la fasciación (planta en floración)</b>		
<b>QN</b>	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	
<b>39.</b>	<b>VG</b>	<b>Resistance to downy mildew</b> <i>(Bremia lactucae)</i>	<b>Résistance au mildiou</b> <i>(Bremia lactucae)</i>	<b>Resistenz gegen Falschen Mehltau</b> <i>(Bremia lactucae)</i>	<b>Resistencia al mildiú</b> <i>(Bremia lactucae)</i>		
(+)							
<b>39.1</b>		<b>Isolate BI: 2</b>	<b>Isolat BI: 2</b>	<b>Isolat BI: 2</b>	<b>Aislado BI: 2</b>		
<b>QL</b>	<b>(b)</b>	absent	absente	fehlend	ausente	Green Towers	1
	<b>(c)</b>	present	présente	vorhanden	presente	Ninja	9
<b>39.2</b>		<b>Isolate BI: 5</b>	<b>Isolat BI: 5</b>	<b>Isolat BI: 5</b>	<b>Aislado BI: 5</b>		
<b>QL</b>	<b>(b)</b>	absent	absente	fehlend	ausente	Green Towers	1
	<b>(c)</b>	present	présente	vorhanden	presente	Sabine	9
<b>39.3</b>		<b>Isolate BI: 7</b>	<b>Isolat BI: 7</b>	<b>Isolat BI: 7</b>	<b>Aislado BI: 7</b>		
<b>QL</b>	<b>(b)</b>	absent	absente	fehlend	ausente	Green Towers	1
	<b>(c)</b>	present	présente	vorhanden	presente	Valmaine	9
<b>39.4</b>		<b>Isolate BI: 12</b>	<b>Isolat BI: 12</b>	<b>Isolat BI: 12</b>	<b>Aislado BI: 12</b>		
<b>QL</b>	<b>(b)</b>	absent	absente	fehlend	ausente	Green Towers	1
	<b>(c)</b>	present	présente	vorhanden	presente	Dandie, UCDM2	9
<b>39.5</b>		<b>Isolate BI: 14</b>	<b>Isolat BI: 14</b>	<b>Isolat BI: 14</b>	<b>Aislado BI: 14</b>		
<b>QL</b>		absent	absente	fehlend	ausente	Green Towers	1
		present	présente	vorhanden	presente	Colorado, Ninja	9
<b>39.6</b>		<b>Isolate BI: 15</b>	<b>Isolat BI: 15</b>	<b>Isolat BI: 15</b>	<b>Aislado BI: 15</b>		
<b>QL</b>	<b>(b)</b>	absent	absente	fehlend	ausente	Green Towers	1
	<b>(c)</b>	present	présente	vorhanden	presente	Colorado, Sabine	9
<b>39.7</b>		<b>Isolate BI: 16</b>	<b>Isolat BI: 16</b>	<b>Isolat BI: 16</b>	<b>Aislado BI: 16</b>		
<b>(*)</b>							
<b>QL</b>	<b>(b)</b>	absent	absente	fehlend	ausente	Green Towers	1
	<b>(c)</b>	present	présente	vorhanden	presente	Argelès, Ninja	9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>39.8</b>	<b>Isolate BI: 17</b>	<b>Isolat BI: 17</b>	<b>Isolat BI: 17</b>	<b>Aislado BI: 17</b>		
<b>QL</b>	<b>(b)</b> absent	absente	fehlend	ausente	Green Towers	1
	<b>(c)</b> present	présente	vorhanden	presente	Argelès, Ninja	9
<b>39.9</b>	<b>Isolate BI: 18</b>	<b>Isolat BI: 18</b>	<b>Isolat BI: 18</b>	<b>Aislado BI: 18</b>		
<b>QL</b>	<b>(b)</b> absent	absente	fehlend	ausente	Green Towers	1
	<b>(c)</b> present	présente	vorhanden	presente	Argelès, Ninja	9
<b>39.10</b>	<b>Isolate BI: 20</b>	<b>Isolat BI: 20</b>	<b>Isolat BI: 20</b>	<b>Aislado BI: 20</b>		
<b>QL</b>	<b>(b)</b> absent	absente	fehlend	ausente	Green Towers	1
	<b>(c)</b> present	présente	vorhanden	presente	Argelès, Ninja	9
<b>39.11</b>	<b>Isolate BI: 21</b>	<b>Isolat BI: 21</b>	<b>Isolat BI: 21</b>	<b>Aislado BI: 21</b>		
<b>QL</b>	<b>(b)</b> absent	absente	fehlend	ausente	Green Towers	1
	<b>(c)</b> present	présente	vorhanden	presente	Argelès, Colorado	9
<b>39.12</b>	<b>Isolate BI: 22</b>	<b>Isolat BI: 22</b>	<b>Isolat BI: 22</b>	<b>Aislado BI: 22</b>		
<b>QL</b>	<b>(b)</b> absent	absente	fehlend	ausente	Green Towers	1
	<b>(c)</b> present	présente	vorhanden	presente	Discovery, Ninja	9
<b>39.13</b>	<b>Isolate BI: 23</b>	<b>Isolat BI: 23</b>	<b>Isolat BI: 23</b>	<b>Aislado BI: 23</b>		
<b>QL</b>	<b>(b)</b> absent	absente	fehlend	ausente	Green Towers	1
	<b>(c)</b> present	présente	vorhanden	presente	Colorado, Discovery, Ninja	9
<b>39.14</b>	<b>Isolate BI: 24</b>	<b>Isolat BI: 24</b>	<b>Isolat BI: 24</b>	<b>Aislado BI: 24</b>		
<b>QL</b>	<b>(b)</b> absent	absente	fehlend	ausente	Argelès, Colorado	1
	<b>(c)</b> present	présente	vorhanden	presente	Dandie, NunDm15, UC DM14	9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>39.15</b>	<b>Isolate Bl: 25</b>	<b>Isolat Bl: 25</b>	<b>Isolat Bl: 25</b>	<b>Aislado Bl: 25</b>		
<b>QL</b>	<b>(b)</b> absent	absente	fehlend	ausente	Colorado, Discovery	1
	<b>(c)</b> present	présente	vorhanden	presente	Argelès, Ninja	9
<b>39.16</b>	<b>Isolate Bl: 26</b>	<b>Isolat Bl: 26</b>	<b>Isolat Bl: 26</b>	<b>Aislado Bl: 26</b>		
<b>QL</b>	<b>(b)</b> absent	absente	fehlend	ausente	Colorado, Discovery	1
	<b>(c)</b> present	présente	vorhanden	presente	Balesta, Bedford	9
<b>39.17</b>	<b>Isolate Bl: 27</b>	<b>Isolat Bl: 27</b>	<b>Isolat Bl: 27</b>	<b>Aislado Bl: 27</b>		
<b>QL</b>	<b>(b)</b> absent	absente	fehlend	ausente	Balesta, Colorado	1
	<b>(c)</b> present	présente	vorhanden	presente	Bedford, Discovery	9
<b>40.</b>	<b>VG Resistance to lettuce mosaic virus (LMV)</b>	<b>Résistance au virus de la mosaïque de la laitue (LMV)</b>	<b>Resistenz gegen Salatmosaikvirus (LMV)</b>	<b>Resistencia al virus del mosaico de la lechuga (LMV)</b>		
<b>(+)</b>						
<b>QL</b>	<b>(b)</b> Strain Ls 1	<b>Souche Ls 1</b>	<b>Pathotyp Ls 1</b>	<b>Cepa Ls 1</b>		
	<b>(c)</b> absent	absente	fehlend	ausente	Hilde II, Salvina	1
	present	présente	vorhanden	presente	Corsica	9
<b>41.</b>	<b>VG Resistance to <i>Nasonovia ribisnigri</i> biotype Nr: 0</b>	<b>Résistance au <i>Nasonovia ribisnigri</i> biotype Nr: 0</b>	<b>Resistenz gegen <i>Nasonovia ribisnigri</i> Biotyp Nr: 0</b>	<b>Resistencia al <i>Nasonovia ribisnigri</i> biotype Nr: 0</b>		
<b>(+)</b>						
	absent	absente	fehlend	ausente	Green Towers, Abel, Nadine	1
	present	présente	vorhanden	presente	Silvinas, Barcelona, Dynamite	9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<b>42.</b>	<b>VG</b>	<b>Resistance to</b>	<b>Résistance à</b>	<b>Resistenz gegen</b>	<b>Resistencia a</b>	
(+)	<i>Fusarium oxysporum</i> f. sp. <i>lactucae</i>	<i>Fusarium oxysporum</i> f. sp. <i>lactucae</i>	<i>Fusarium oxysporum</i> f. sp. <i>lactucae</i>	<i>Fusarium oxysporum</i> f. sp. <i>lactucae</i>		
	<b>Race 1</b>	<b>Race 1</b>	<b>Pathotyp 1</b>	<b>Raza 1</b>		
<b>QL</b>	susceptible	sensible	anfällig	susceptible	Cobham Green, Patriot Salinas	1
	resistant	resistante	resistent	resistente	Costa Rica No.4, Romasol	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:

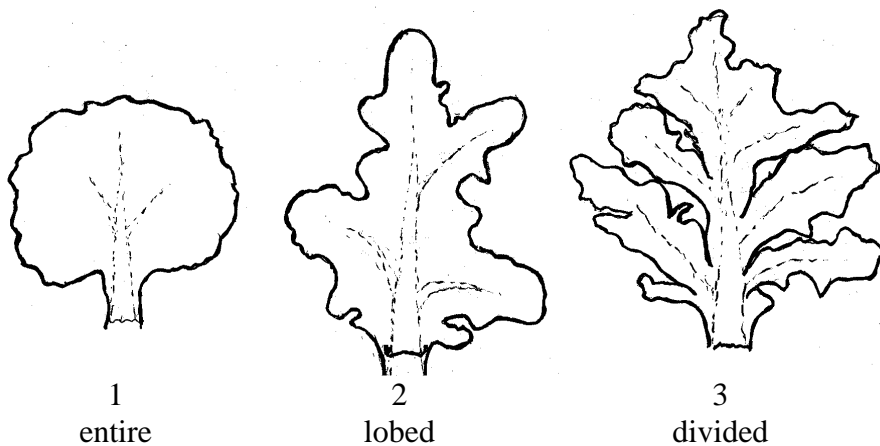
- (a) Plant, head, leaf, leaf blade: Observations on the plant, head, leaf and leaf blade should be made at harvest maturity.
- (b) Disease resistance: When disease resistance characteristics are used for assessing distinctness, uniformity and stability, records should be taken under conditions of controlled 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

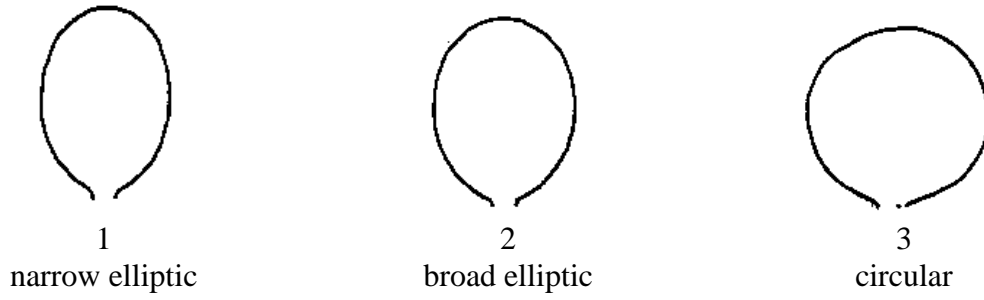
This characteristic can easily be observed by keeping the remaining seedlings after pricking out in the seeding tray without watering and under cold(er) conditions. Within two or three days all seedlings of varieties with anthocyanin will show this characteristic.

### Ad. 6: Leaf blade: division

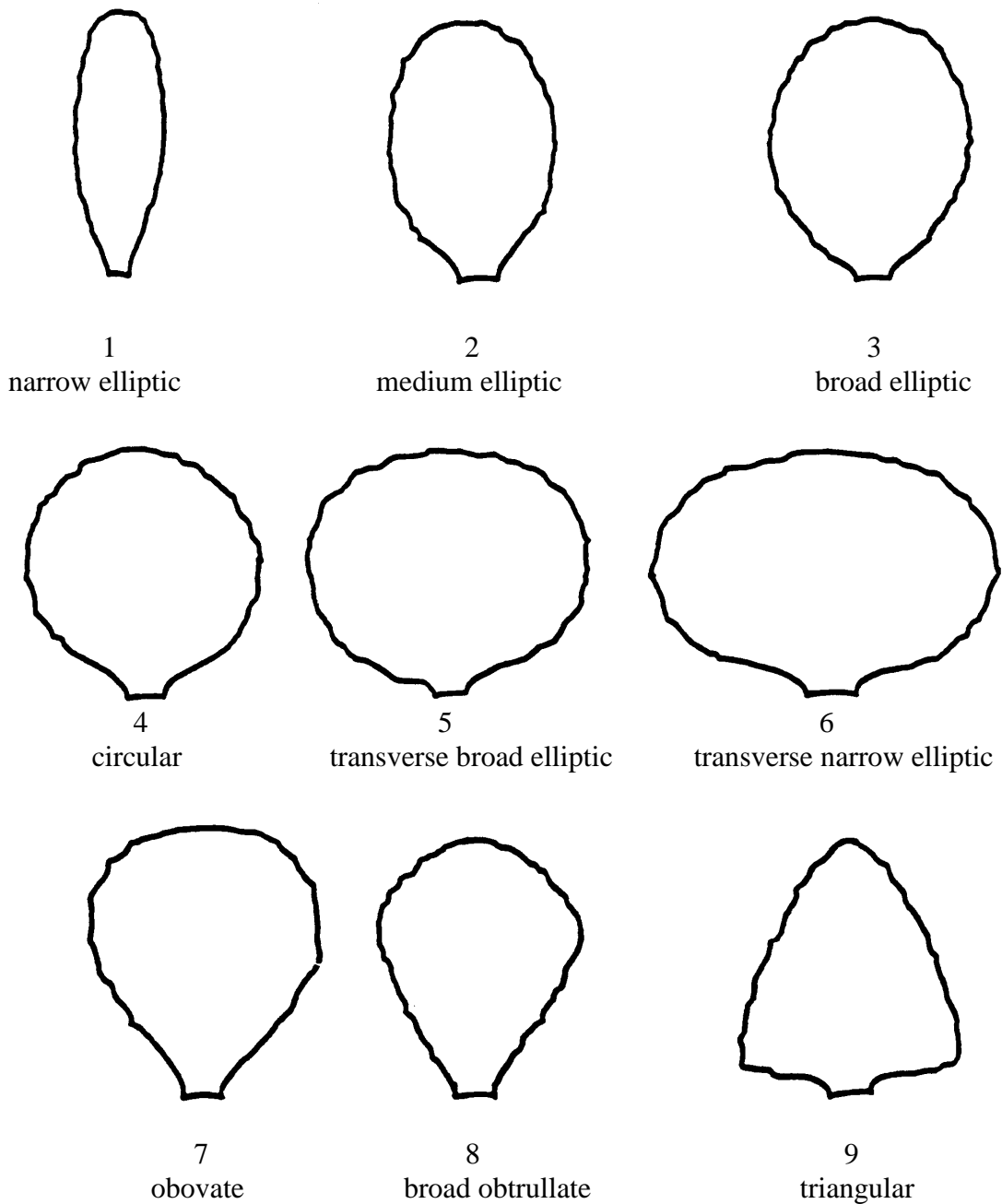




Ad. 13: Head: shape in longitudinal section



Ad. 16: Leaf: shape



Ad. 18: Leaf: hue of green color of outer leaves

Ad. 19: Leaf: intensity of color 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 Trotskopf, 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*)

1. Pathogen ..... *Bremia lactucae*
2. Quarantine status ..... -
3. Host species ..... *Lactuca sativa* L.
4. Source of inoculum ..... GEVES (FR) or Naktuinbouw (NL)
5. Isolate ..... Bl: 1 – Bl: 27 (see table below)
6. Establishment isolate identity ..... test on differentials
7. Establishment pathogenicity ..... test on susceptible varieties
8. Multiplication inoculum
  - 8.1 Multiplication medium ..... lettuce leaf
  - 8.2 Multiplication variety ..... susceptible variety, for example Green Towers  
for higher races, a variety with defeated resistance may  
be preferable to keep the isolate fit
  - 8.3 Plant stage at inoculation ..... cotyledon to first leaf
  - 8.4 Inoculation medium ..... tap water
  - 8.5 Inoculation method ..... spraying a spore suspension
  - 8.6 Harvest of inoculum ..... washing off from leaves
  - 8.7 Check of harvested inoculum ..... counting spores
  - 8.8 Shelf life/viability inoculum ..... 2 hours at room temperature; 2 days in fridge
9. Format of the test
  - 9.1 Number of plants per genotype .. normally 60, minimum 20
  - 9.2 Number of replicates ..... 1 replicate

- 9.3 Control varieties ..... (informative) differentials
- 9.4 Test design..... include control varieties
- 9.5 Test facility..... climate room
- 9.6 Temperature ..... 15°C-17°C
- 9.7 Light ..... adequate for good plant growth;  
seedlings should not etiolate;  
reduced light 24 hours after inoculation
- 9.9 Special measures ..... Plants may grow on wet blotting paper with or without  
a nutrient solution, or on potting soil. High humidity  
(>90%) is essential for infection and sporulation.
10. Inoculation
- 10.1 Preparation inoculum ..... washing off from leaves by vigorous shaking in a  
closed container
- 10.2 Quantification inoculum..... counting spores ; spore density should be  $3.10^4$ - $1.10^5$
- 10.3 Plant stage at inoculation..... cotyledon stage
- 10.4 Inoculation method..... spraying till run-off  
reduced light 24 hours after inoculation
- 10.5 First observation ..... 7 days after inoculation
- 10.6 Second observation ..... 10 days after inoculation
- 10.7 Final observations ..... 13 days after inoculation; two of these three time points  
may be sufficient. The day of maximum sporulation  
should occur in this period.
11. Observations
- 11.1 Method ..... visual observation of sporulation and necrotic reaction  
to infection
- 11.2 Observation scale ..... + 1. abundant sporulation on both sides of the  
cotyledon  
(+) 2. normal sporulation on the lower side of the  
cotyledon  
(+) 3. normal sporulation on the lower side of the  
cotyledons combined with necrotic spots  
(-) 4. sparse sporulation on the lower side of the  
cotyledons combined with necrosis  
(-) 5. necrotic pinpoint  
- 6. no symptoms
- 11.3 Validation of test ..... on standards
- 11.4 Off-types..... susceptible plants in a resistant variety  
resistant plants in a susceptible variety  
3 or less off-types in 60 plants
12. Interpretation of data ..... class 1, 2 and 3: susceptible  
class 4, 5 and 6: resistant
13. Critical control points:..... Reaction of standards. The infection pressure may vary  
between experiments, leading to slight differences in  
sporulation intensity. When the reactions are not clear  
the experiment should be repeated.



The common differential set of lettuce varieties and lines for determination of *Bremia* isolates is available from Naktuinbouw in the Netherlands (address as above) and GEVES in France at the following address:

GEVES Brion  
Domaine de la Boisselière  
49250 Brion  
France

#### 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 4°C. 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 16°C during night (N) and of 22°C during day (D) or, alternatively, temperature of 20°C N, 25°C D during 5 days after inoculation followed by 12°C N and 18°C 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<sub>2</sub>HPO<sub>4</sub>-buffer containing 0.2% DIECA<sup>(\*)</sup>. Prior to inoculation 75 mg/ml carborundum and 75 mg/ml activated charcoal should be added.

<sup>(\*)</sup> Composition of buffer: per 100 ml: 1.07 g Na<sub>2</sub>HPO<sub>4</sub> 12H<sub>2</sub>O, 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.

Ad. 41: Resistance to *Nasonovia ribisnigri* biotype Nr: 0

Maintenance of biotype

*Nasonovia ribisnigri* is a leaf aphid and may be maintained alive on susceptible lettuce plants in aphid-proof chambers or tents in a glasshouse. *N. ribisnigri* is usually green, but some biotypes are red. A red aphid is easier to see on a green leaf. Therefore red biotypes are usually preferable. The aphid's body size is 1.5-2.5 mm. The body has 7 dark spots. The ends of the legs are black.

The common biotype Nr: 0 can be distinguished from resistance-breaking biotypes by means of a biotest using a suitable resistant control variety, for example Silvinas.

Multiplication:

On a susceptible variety at 20-22°C for 10-14 days. Aphids are shaken off into a Petri-dish.

Sowing:

12°C for germination and early growth; plant distance at least 5 cm.

Number of plants to be tested: 28.

Inoculation method:

Careful transfer of 5 aphids per plant using a fine paintbrush.

Plant stage at inoculation: 15 days.

Temperature: 20-22°C.

Observation:

First observation: 10 days after inoculation.

Second observation: daily check whether newborn aphids are mature (= red).

End of test: max. 15 days after inoculation.

Observation at end of test: Count the number of mature (= red) aphids on each plant.

<u>Scale for observations:</u>		<u>Interpretation of data</u>
0	no aphids	Resistant
1	1-5 aphids per plant	Resistant
2	6-10 aphids per plant	Undecided
3	> 10 aphids per plant	Susceptible

Remarks

Resistant control varieties and susceptible control varieties should have at least 95% (26/28) resistant plants and susceptible plants, respectively.

If more than 2 of 28 plants of the control varieties are undecided or off type, the experiment should be repeated.

Ad. 42: Resistance to *Fusarium oxysporum* f.sp. *lactucae* -Race 1

1. Pathogen.....	<i>Fusarium oxysporum</i> f.sp. <i>lactucae</i>
2. Quarantine status.....	EPPO alert list
3. Host species .....	<i>Lactuca sativa</i> L.
4. Source of inoculum.....	NIAS Genebank (JP), INRAN (IT), Naktuinbouw (NL), GEVES (FR)
5. Isolate.....	Fol: 1 and Fol: 2
6. Establishment isolate identity .....	use microscope and inoculation to lettuce susceptible standard
7. Establishment pathogenicity .....	use lettuce susceptible standard
8. Multiplication inoculum	
8.1 Multiplication medium .....	inoculation by sowing on contaminated soil: Wheat bran-soil medium inoculation by soaking seedlings: on synthetic liquid medium (e.g. Potatoes Dextrose Broth)
8.3 Plant stage at inoculation .....	see 10.3
8.5 Inoculation method .....	see 10.4
8.6 Harvest of inoculum.....	inoculation by sowing on contaminated soil: 7-10 day-old culture inoculation by soaking seedlings: 15 days
9. Format of the test	
9.1 Number of plants per genotype..	20 plants
9.2 Number of replicates.....	1 replicate
9.3 Control varieties.....	
Susceptible.....	Cobham Green, Salinas, Patriot Cobham Green is slightly less and Salinas is less susceptible than Patriot
Resistant to Fol: 1 .....	Costa Rica No.4, Romasol
9.4 Test design .....	include control varieties
9.5 Test facility .....	greenhouse or climate room
9.6 Temperature .....	20-28 °C
9.7 Light.....	under natural day length

10. Inoculation

- 10.1 Preparation inoculum..... inoculation by sowing on contaminated soil:  
 Wheat bran-soil medium culture are mixed with  
 sterilized soil  
 inoculation by soaking seedlings: soaking of roots and  
 of hypocotyls axis for 5 to 15 min in the inoculums  
 suspension and transplantation of inoculated plantlets in  
 soil
- 10.2 Quantification inoculum ..... inoculation by sowing on contaminated soil: soil: culture  
 =20: 1  
 inoculation by soaking seedlings: spores are harvested  
 and adjusted to  $10^7$  sp/mL
- 10.3 Plant stage at inoculation ..... inoculation by sowing on contaminated soil: seeds  
 stimulated to emerge  
 remark: avoid seeds rotted by factors other than  
 pathogen.  
 inoculation by soaking seedlings: cotyledons
- 10.4 Inoculation method ..... two methods can be used for inoculation:  
 by sowing seeds to contaminated soil or by soaking  
 seedlings
- 10.5 First observation ..... after 7- 10 days from inoculation
- 10.6 Second observation ..... 14 days from inoculation
- 10.7 Final observations ..... 20-25 days after inoculation (sowing or soaking)
11. Observations
- 11.1 Method..... visual and/or counting number of plants with symptom
- 11.2 Observation scale..... inoculation by sowing on contaminated soil:  
 symptoms: stunting, wilting, dead plant  
 as reference calculate of Disease Severity Index (DSI)  
 and Disease Incidence(DI)  
 0: healthy  
 1: slightly stunting, growing reduction  
 2: severely stunting  
 3: die  

$$DSI = (0A + 1B + 2C + 3D) / (A + B + C + D)$$
 \*A ~ D: number of plants of each category  

$$DI = (0A + 1B + 2C + 3D) *100 / ((A + B + C + D)*3)$$
 inoculation by soaking seedlings:  
 symptoms: growth reduction and brown vessels above  
 cotyledons, dead plant
- 11.3 Validation of test..... analysis of results should be calibrated with results of  
 controls
12. Interpretation of data..... inoculation by sowing on contaminated soil:  
 susceptible: severely stunting, wilting, dead plant  
 (DSI :Relative evaluation to DSI of example variety)  
 (Race1:DI Value is higher than 10%)  
 resistant: no stunting, no wilting  
 (DSI: relative evaluation to DSI of example variety),  
 (Race1: DI value is lower than 10%)  
 inoculation by soaking seedlings:  
 susceptible: growth reduction and brown vessels above  
 cotyledons, dead plant



resistant: no growth reduction and no brown vessels  
above cotyledons

### 13. Critical control points

#### Availability of *Fusarium oxysporum* f.sp. *lactucae* Race 1

NIAS: National Institute of Agrobiological Sciences

2-1-2, Kannondai, Tsukuba, Ibaraki, 305-8602, Japan

Tel: +81-29(838)7406, fax: +81-29(838)7408,

E-mail: [genebank@nias.affrc.go.jp](mailto:genebank@nias.affrc.go.jp)

[http://www.gene.affrc.go.jp/about\\_en.php](http://www.gene.affrc.go.jp/about_en.php)

INRAN: National Research Institute for Food and Nutrition

Loc. Corno d'Oro SS 18, km 77.70 – 84091 Battipaglia (SA) Italy

Tel: +39 0828 309484, fax +39 0828 302382, E-mail: [romana.bravi@entecra.it](mailto:romana.bravi@entecra.it)

<http://www.ense.it>

Naktuinbouw Sotaweg 22, P.O. Box 40, 2370 AA Roelofarendsveen, Netherlands

Tel.: + 31 (0) 71 332 62 62, Fax.: + 31 (0) 71 332 63 63

Email: [info@naktuinbouw.nl](mailto:info@naktuinbouw.nl)

GEVES: Groupe d'Etude et de Contrôle des Variétés et des Semences

25 Rue Georges Morel, CS 90 024, 49071 Beaucouzé Cedex, France

[Valerie.GRIMAULT@geves.fr](mailto:Valerie.GRIMAULT@geves.fr)

## 9. Literature

Bowring, J.D.C., 1969: "The identification of varieties of lettuce," National Institute of Agricultural Botany, XI, pp 499-520.

Casallo, A., Sobrino, E., 1965: "Variedades de Hortalizas Cultivadas en España", Ministerio de Agricultura, Manuales Técnicos A29, Madrid, pp 257-285.

Christensen, I., 1980: "Sallatssorterernas morfologi enligt UPOV", Swedish University of Agricultural Sciences, Research Information Centre, Alnarp Trädgårds 190, SE.

Crute, I.R., Johnson, A.G., 1976: "The genetic relationship between races of *Bremia lactucae* and cultivars of *Lactuca sativa*," Ann. appl. Biol. 83, pp 125-137.

Crute, I.R., Johnson, A.G., 1976: "Breeding for resistance to lettuce downy mildew, *Bremia lactucae*," Ann. appl. Biol. 84, pp 287-290.

Ettekoven, K. van, Arend, A.J.M. van der, 1999: "Identification and denomination of "new" races of *Bremia lactucae*," in: Eucarpia Leafy Vegetables 1999, Olomouc (CZ), (Eds. Lebeda, A and Kristkova, E.).

Farrara, B.F., et al., 1987: "Genetic Analysis Factors for Resistance to Downy Mildew (*Bremia Lactucae*) in Species of Lettuce (*Lactuca sativa* and *L. serriola*)," Plant Pathology 36, pp 499-514.

Guenard, M., Cadot, V., Boulineau, and Fontagnes, H. de, 1999: "Collaboration between breeders and GEVES-SNES for the harmonisation and evaluation of disease resistance test: *Bremia lactucae* of lettuce," in: Eucarpia Leafy Vegetables 1999, Olomouc (CZ), (Eds. Lebeda, A and Kristkova, E.).

Johnson, A.G., Crute, I.R Gordon, P.L., 1977: "The genetics of race specific resistance in lettuce (*Lactuca sativa*) to downy mildew (*Bremia lactucae*)," Ann. appl. Biol. 86, pp 87-103.

Lebeda, A., Crute, I.R., Blok, I., Norwood, J.M., 1980: "The identification of factors determining race specific resistance to *Bremia lactucae* in some Czechoslovakian Lettuce Cultivars," Z. Pflanzenzüchtg. 85, pp 71-77.

Lebeda, A., and Kristkova, E., 1999: "EUCARPIA Leafy Vegetables '99", Proceedings of the Eucarpia Meeting on Leafy Vegetables Genetics and Breeding, Olomouc, CZ, June 1999, Palacky University.

Michelmore, R.W., Norwood, J.M., Ingram, D.S., Crute, I.R., Nicholson, P., 1984: "The inheritance of virulence in *Bremia lactucae* to match resistance factors 3, 4, 5, 6, 8, 9, 10 and 11 in lettuce (*Lactuca sativa*)," Plant Pathology 33, pp 301-315.

Noguera Garcia, V., Alba Bartual, V., 1979: "Caracterización de Variedades de Lechuga Cultivadas en España", Patronato Prov. de Capacitación Agr., ES.

Norwood, J.M., Michelmore, R.W., Crute, I.R, Ingram, D.S., 1983: "The inheritance of specific virulence in *Bremia lactucae* (downy mildew) to match resistance factors 1, 2, 4, 6 and 11 in *Lactuca sativa* (lettuce)," Plant Pathology 32, pp 177-186.

Rodenburg, C.M., et al., 1960: "Varieties of lettuce. An international monograph," Instituut voor de Veredeling van Tuinbouwgewassen (IVT), Wageningen, NL, 228 pp. (Also in French: "Variétés de laitues"; and German: "Salatsorten").

Van der Arend et al., 2007: Identification and nomination of new races of *Bremia lactucae* in Europe by IBEB until 2006. Eucarpia Leafy Vegetables 2007 Conference Abstracts, 18-20 April 2007, University of Warwick, Poster presentations, pp. 27 v.v.

Zinkernagel, V., Gensler, H., Bamberg, D., 1989: "Die Virulenzgene von Isolaten von *Bremia lactucae* Regel in der Bundesrepublik Deutschland"; Gartenbauwissenschaft 54 (6), pp 244-249.

10. Technical Questionnaire

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

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

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

4.1 Breeding Scheme

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:
<p>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).</p>		
Characteristics	Example Varieties	Note
<p><b>5.1 Growth types (according to Section 8.1 of the Test Guidelines)</b></p>		
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	[ ]
<p><b>5.2 Seed: color (1)</b></p>		
white	Verpia	1[ ]
yellow	Durango	2[ ]
black	Kagraner Sommer	3[ ]
<p><b>5.3 Leaf: hue of green color of outer leaves (18)</b></p>		
absent	Donatello, Verpia	1[ ]
yellowish	Dorée de printemps	2[ ]
greyish	Celtuce, Du bon jardinier	3[ ]
reddish	Lollo rossa, Revolution, Rosa	4[ ]
<p><b>5.4 Leaf: anthocyanin coloration (20)</b></p>		
absent	Fiorella, Sunrise	1[ ]
present	Commodore, Pirat	9[ ]

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
Characteristics	Example Varieties	Note
<b>5.5 Time of beginning of bolting under long day conditions</b>		
<b>(35)</b>		
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[ ]
<b>5.6 Resistance to downy mildew</b>		
<b>(39.7) (<i>Bremia lactucae</i>)</b>		
<b>Isolate BI: 16</b>		
absent	Green Towers	1[ ]
present	Argelès, 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 <b>similar</b> variety(ies)	Describe the expression of the characteristic(s) for <b>your</b> candidate variety
<i>Example</i>	<i>Leaf: intensity of color of outer leaves</i>	<i>medium</i>	<i>dark</i>

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]