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INTERNATIONAL UNION
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OF NEW VARIETIES OF
PLANTS

UNION INTERNATIONALE
POUR LA PROTECTION
DES OBTENTIONS
VÉGÉTALES

INTERNATIONALER
VERBAND ZUM SCHUTZ
VON PFLANZEN-
ZÜCHTUNGEN

UNIÓN INTERNACIONAL
PARA LA PROTECCIÓN
DE LAS OBTENCIONES
VEGETALES

DRAFT

GUIDELINES
FOR THE CONDUCT OF TESTS
FOR DISTINCTNESS, UNIFORMITY AND STABILITY

LETTUCE
(Lactuca sativa L.)

These Guidelines should be read in conjunction with document TG/1/2, which contains explanatory notes on the general principles on which the Guidelines have been established.

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I. Subject of these Guidelines

These Test Guidelines apply to all varieties of *Lactuca sativa* L.

II. Material Required

1. The competent authorities decide when, where and in what quantity and quality the seed required for testing the variety is to be delivered. Applicants submitting material from a State other than that in which the testing takes place must make sure that all customs formalities are complied with. As a minimum, for each year of test the following quantity of seed is recommended:

20 g.

The quality of the seed to be delivered should not be below the standards of seeds for marketing standard seed in the country concerned, especially with regard to germination capacity and moisture content.

2. The seed must not have undergone any treatment unless the competent authorities allow or request such treatment. If it has been treated, full details of the treatment must be given.

III. Conduct of Tests

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

2. The tests should normally be conducted at one place. If any important characteristics of the variety cannot be seen at that place, the variety may be tested at an additional place.

3. The tests should be carried out under conditions ensuring normal growth. The size of the plots should be such that plants or parts of plants may be removed for measurement and counting without prejudice to the observations which must be made up to the end of the growing cycle. As a minimum, each test should include a total of 60 plants which should be divided between two or more replicates. Separate plots for observation and for measuring should only be used if they have been subject to similar environmental conditions.

4. Additional tests for special purposes may be established.

IV. Methods and Observations

1. All observations determined by measuring or counting should be made on 20 plants or parts of 20 plants.

2. Unless otherwise indicated, all characteristics of the plant, the head, the leaf and the leaf blade (characteristics 7 to 36) should be recorded at harvest maturity.

3. When disease resistance characteristics are used for assessing distinctness, uniformity and stability, records must be taken under conditions of controlled infection with a defined pathotype. In the case of resistance to downy mildew, each race should be tested separately and the results should also be indicated separately.
4. For the assessment of uniformity, a population standard of 1% with an acceptance probability of at least 95% should be applied. In the case of a sample size of 60 plants, the maximum number of off-types allowed would be 2.
5. Unless otherwise indicated, all example varieties mentioned in the Table of Characteristics represent the corresponding state of expression under long day conditions. The variety descriptions should always state whether the tests have been made under long day conditions or, if not, under which other daylight conditions.

V. Grouping of Varieties

1. The collection to be grown should be divided into groups to facilitate the assessment of distinctness.
2. Suitable characteristics for grouping purposes are those which are known from experience not to vary, or to vary only slightly, within a variety and which in their various states are fairly evenly distributed within the collection.
3. In the first place, the collection should be divided according to the following growth types:

Plant: growth type at harvest maturity

- | | |
|---------------------------------|--|
| 1. Butterhead lettuce | Clarion, Merveille de 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 "Key to lettuce types" in Chapter VIII, page 19

4. It is recommended that the competent authorities use the following characteristics for grouping varieties:
 - (i) Seed: color (characteristic 1)
 - (ii) Leaf: anthocyanin coloration (characteristic 20)
 - (iii) Time of beginning of bolting under long day conditions (characteristic 39)

VI. Characteristics and Symbols

1. To assess distinctness, uniformity and stability, the characteristics and their states as given in the Table of Characteristics should be used.
2. Notes (1 to 9), for the purposes of electronic data processing, are given opposite the states of the different characteristics.
3. Legend:
 - (*) Characteristics that should be used every growing cycle for the examinations of all varieties and should always be included in the description of the variety, except when the state of expression of a preceding characteristic or regional environmental conditions render this impossible.
 - (+) See Explanations on the Table of Characteristics in Chapter VIII.

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

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
1. Seed: color (*)	Seed: color	Graine: couleur	Samen: Farbe	Semilla: color		
	white	blanche	weiss	blanco	Verpia	1
	yellow	jaune	gelb	amarillo	Durango	2
	black	noire	schwarz	negro	Kagraner Sommer	3
2. Seedling: anthocyanin coloration (*)	Seedling: anthocyanin coloration	Plantule: pigmentation anthocyanique	Keimpflanze: Anthocyanfärbung	Plántula: pigmentación antociánica		
	absent	absente	fehlend	ausente	Verpia	1
	present	présente	vorhanden	presente	Pirat	9
3. Seedling: size of cotyledon (fully developed)	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)		
	small	petit	klein	pequeño	Romance	3
	medium	moyen	mittel	medio	Expresse	5
	large	grand	gross	grande	Verpia	7
4. Seedling: shape of cotyledon	Seedling: shape of cotyledon	Plantule: forme du cotylédon	Keimpflanze: Form des Keimblatts	Plántula: forma del cotiledón		
	narrow elliptic	elliptique étroit	schmalelliptisch	elíptica estrecha	Calmar	3
	elliptic	elliptique	elliptisch	elíptica	Frisette	5
	broad elliptic	elliptique large	breitelliptisch	elíptica ancha	Fiorella, Sunrise	7
5. Leaf: attitude at 10-12 leaf stage	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		
	erect	dressé	aufrecht	erecto	Baby Star, Romance	1
	semi-erect	demi-dressé	halbaufrecht	semierecto	Great Lakes 118, Soraya	3
	prostrate	étalé	waagerecht	postrado	Unicum, Vanguard 75	5

English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
6. Leaf blade: division (time as for 5)	Limbe: division (époque comme pour 5)	Blattspreite: Teilung (Zeitpunkt wie unter 5)	Limbo: división (época como para 5)		
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	Logan, Monet	3
7. Plant: diameter (*)	Plante: diamètre	Pflanze: Durchmesser	Planta: diámetro		
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. Plant: head formation (*)	Plante: formation d'une pomme	Pflanze: Kopfbildung	Planta: formación de la cabeza		
no head	pas de pomme	kein Kopf	sin cabeza	Blonde à couper améliorée, Lollo rossa	1
open head	pomme ouverte	offener Kopf	cabeza abierta	Manfred, Monet	2
closed head (overlapping)	pomme fermée (chevauchement)	geschlossener Kopf (Ueberlappung)	cabeza cerrada (solapándose)	Kelvin, Sunrise	3

English	français	deutsch	español	Example Varieties Exemples Beispielsorten Variedades ejemplo	Note/ Nota
9. <u>Varieties with closed heads only:</u> Head: degree of overlapping of upper part of leaves	<u>Variétés à pomme fermée seulement:</u> Pomme: degré du chevauchement de la partie supérieure des feuilles	<u>Nur Sorten mit geschlossenem Kopf:</u> Kopf: Stärke des Ueberlappens des oberen Teils der Deckblätter	<u>Sólo para las variedades con cabeza cerrada:</u> Cabeza: grado de solapación de la parte superior de las hojas		
very weak	très faible	sehr gering	muy débil		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. Head: density	Pomme: densité	Kopf: Dichte	Cabeza: densidad		
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. Head: size	Pomme: taille	Kopf: Grösse	Cabeza: tamaño		
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
12. Head: closing of base	Pomme fermeture de la base	Kopf: Geschlossenheit der Basis	Cabeza: cierre de la base		
weak	faible	gering	débil	Passe Partout	3
medium	moyenne	mittel	medio	Carmelita	5
strong	forte	stark	fuerte	Dustin, Manfred	7

English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
13. Head: shape in longitudinal section (* (+)	Pomme: forme en section longitudinale	Kopf: Form im Längsschnitt	Cabeza: forma en sección longitudinal		
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. Leaf: thickness	Feuille: épaisseur	Blatt: Dicke	Hoja: grosor		
thin	mince	dünn	delgada	Raisa, Royal Red	3
medium	moyenne	mittel	media	Dustin, Sunrise	5
thick	épaisse	dick	gruesa	Frisée de Beauregard	7
15. 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 la cosecha (hojas externas de lechuga de cabeza u hojas adultas de lechuga frisé y lechuga espárrago)		
erect	dressé	aufrecht	erecto	Feria, Riva	1
semi-erect	demi-dressé	halbaufrecht	semierecto	Amelia, Toronto	3
horizontal	horizontal	aagerecht	horizontal	Chambery, Divina	5

English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
16. Leaf: shape (* (+)	Feuille: forme	Blatt: Form	Hoja: forma		
narrow elliptic	elliptique étroite	schmal elliptisch	elíptica estrecha	Riva, Verte maraîchère	1
elliptic	elliptique	elliptisch	elíptica	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 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
17. Leaf: tip of leaf blade	Feuille: sommet du limbe des feuilles	Blatt: Spitze der Blattspreite	Hoja: ápice del limbo		
rounded	arrondi	abgerundet	redondeado	Blonde Maraîchère, Maserati	1
acute	aigu	spitz	agudo	Celtuce, Dear Tongue, Karola, Tempra	2
18. Leaf: color of outer leaves (* (+)	Feuille: couleur des feuilles externes	Blatt: Farbe der äußeren Blätter	Hoja: color de las hojas externas		
yellowish	jaunâtres	gelblich	amarillento	Dorée de printemps	1
green	vertes	grün	verde	Donatello, Verpia	2
greyish green	vert grisâtre	gräulichgrün	verde grisáceo	Celtuce, Du bon jardinier	3
blueish green	vert bleuâtre	bläulichgrün	verde azulado	Bibb	4
reddish	rougeâtres	rötlich	rojizo	Lollo rossa, Revolution, Rosa	5

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
19.	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		
(*)						
(+)						
	very light	très claire	sehr hell	muy claro		1
	light	claire	hell	claro		3
	medium	moyenne	mittel	medio		5
	dark	foncée	dunkel	oscuro		7
	very dark	très foncée	sehr dunkel	muy oscuro		9
20.	Leaf: anthocyanin coloration	Feuille: pigmentation anthocyanique	Blatt: Anthocyanfärbung	Hoja: pigmentación antociánica		
(*)						
	absent	absente	fehlend	ausente	Fiorella, Sunrise	1
	present	présente	vorhanden	presente	Commodore, Pirat	9
21.	Leaf: intensity of anthocyanin coloration	Feuille: intensité de la pigmentation anthocyanique	Blatt: Intensität der Anthocyanfärbung	Hoja: intensidad de la pigmentación antociánica		
(*)						
	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.	Leaf: distribution of anthocyanin	Feuille: répartition de l'anthocyane	Blatt: Verteilung des Anthocyan	Hoja: distribución de la antocianina		
	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

English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
23. Leaf: kind of anthocyanin distribution	Feuille: type de répartition de l'anthocyane	Blatt: Art der Anthocyan- verteilung	Hoja: tipo de distribución de la antocianina		
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
24. Leaf: glossiness of upper side	Feuille: brillance de la face supérieure	Blatt: Glanz der Oberseite	Hoja: brillo del haz		
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
very strong	très forte	sehr stark	muy fuerte		9
25. Leaf: surface profile of outer leaves	Feuille: profil de la surface des feuilles externes	Blatt: Profil der Oberfläche der äußeren Blätter	Hoja: perfil de la superficie de las hojas externas		
concave	concave	konkav	cóncavo	Verpia	3
flat	plat	flach	llano	Augusta, Fiorella	5
convex	convexe	konvex	convexo	Little Leprechaun	7
26. (*) Leaf: blistering	Feuille: cloûre	Blatt: Blasigkeit	Hoja: abullonado		
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

English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
27. Leaf: size of blisters	Feuille: taille des cloques	Blatt: Grösse der Blasen	Hoja: tamaño de las vejigas		
small	petites	klein	pequeñas	Dorée de printemps	3
medium	moyennes	mittel	medianas	Dustin, Sunrise	5
large	grandes	gross	grandes	Fiorella, Massilia	7
28. (*) Leaf blade: degree of undulation of margin	Limbe: importance de l'ondulation du bord	Blattspreite: Grad der Randwellung	Limbo: grado de ondulación del borde		
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
29. 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		
absent	absentes	fehlend	ausentes	Verpia	1
present	présentes	vorhanden	presentes	Calmar, Gloire du Dauphiné, Unicum	9
30. (*) 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		
shallow	peu profondes	flach	poco profundas	Pentared, Unicum	3
medium	moyennes	mittel	medias	Ithaca Great Lakes	5
deep	profondes	tief	profundas	Lagon, Monet	7

English	français	deutsch	español	Example Varieties Exemples Beispielsorten Variedades ejemplo	Note/ Nota
31. 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		
very sparse	très lâches	sehr locker	muy laxa		1
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
32. <u>Only for varieties with shallow incisions on margin on apical part:</u> Leaf blade: type of incisions on apical part	<u>Variétés avec des découpures sur le bord de la partie apicale seulement:</u> Limbe: type d'incisions sur la partie apicale	<u>Nur Sorten mit Einschnitten am Rand der oberen Hälfte:</u> Blattspreite: Typ der Einschnitte an der <u>oberen</u> Hälfte	<u>Solamente variedades con incisiones del borde de la zona apical:</u> Limbo: tipo de incisiones en la zona apical		
sinuate	sinueuses	gebuchtet	sinuosas	Gloire du Dauphiné	1
dentate	dentées	gezähnt	dentadas	Calmar	2
33. Leaf blade: venation	Limbe: nervation	Blattspreite: Aderung	Limbo: venación		
not flabellate	non flabelliforme	nicht fächerförmig	no flabeliforme	Donatella, Verpia, Xanadu	1
flabellate	flabelliforme	fächerförmig	flabeliforme	Gloire du Dauphiné, Locarno, Monet	2
34. Plant: height (flowering plant)	Plante: hauteur (plante à floraison)	Pflanze: Höhe (im Blühstadium)	Planta: altura (planta fanerógama)		
short	courte	niedrig	baja	Gotte à graine blanche	3
medium	moyenne	mittel	media	Samourai	5
tall	haute	hoch	alta	Danilla, Hilde II	7
35. Plant: fasciation (flowering plant)	Plante: fasciation (plante à floraison)	Pflanze: Verbänderung (im Blühstadium)	Planta: fasciación (planta fanerógama)		
absent	absente	fehlend	ausente	Calmar, Romance	1
present	présente	vorhanden	presente	Gotte jaune d'or	9

English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
36. 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 fanerógama)		
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
37. Axillary sprouting	Bourgeons axillaires	Seitentriebbildung	Brotos axilares		
absent or very weak	absents ou très faibles	fehlend oder sehr gering	ausentes o muy débiles	Valmaine	1
weak	faibles	gering	débiles	Aprilia, Sunrise	3
medium	moyens	mittel	medios		5
strong	forts	stark	fuertes	Riva	7
very strong	très forts	sehr stark	muy fuertes	Doncella	9
38. Time of harvest maturity	Epoque de maturité de récolte	Zeitpunkt der Erntereife	Época de madurez para la cosecha		
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
39. (*)	Time of beginning of bolting under long day conditions	Epoque de début de montaison en jours longs	Zeitpunkt des Schossbeginns unter Langtagsbedingungen	Época del comienzo de la salida a flor en condiciones de días largos	
	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
40. (+)	Resistance to downy mildew (Bremia lactucae)	Résistance au mildiou (Bremia lactucae)	Resistenz gegen Falschen Mehltau (Bremia lactucae)	Resistencia al mildiú (Bremia lactucae)	
40.1	Isolate IL4	Isolat IL4	Isolat IL4	Aislado IL4	
	absent	absente	fehlend	ausente	Hilde II 1
	present	présente	vorhanden	presente	Mildura 9
40.2	Isolate S1	Isolat S1	Isolat S1	Aislado S1	
	absent	absente	fehlend	ausente	Hilde II 1
	present	présente	vorhanden	presente	Maikönig 9
40.3	Isolate NL13	Isolat NL13	Isolat NL13	Aislado NL13	
	absent	absente	fehlend	ausente	Hilde II 1
	present	présente	vorhanden	presente	Pansoma 9
40.4	Isolate NL12	Isolat NL12	Isolat NL12	Aislado NL12	
	absent	absente	fehlend	ausente	Hilde II
	present	présente	vorhanden	presente	Danilla, Geisha
40.5	Isolate SF1	Isolat SF1	Isolat SF1	Aislado SF1	
	absent	absente	fehlend	ausente	Hilde II 1
	present	présente	vorhanden	presente	Colorado, Ninja 9

English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
40.6 Isolate NL7	Isolat NL7	Isolat NL7	Aislado NL7		
absent	absente	fehlend	ausente	Hilde II	1
present	présente	vorhanden	presente	Verpia	9
40.7 Isolate NL15	Isolat NL15	Isolat NL15	Aislado NL15		
absent	absente	fehlend	ausente	Hilde II	1
present	présente	vorhanden	presente	Mirian	9
40.8 Isolate NL14	Isolat NL14	Isolat NL14	Aislado NL14		
absent	absente	fehlend	ausente	Hilde II	1
present	présente	vorhanden	presente	Santis, Verpia	9
40.9 Isolate TV	Isolat TV	Isolat TV	Aislado TV		
absent	absente	fehlend	ausente	Hilde II	1
present	présente	vorhanden	presente	Elsa, Sangria	9
40.10 Isolate CS9	Isolat CS9	Isolat CS9	Aislado CS9		
absent	absente	fehlend	ausente	Hilde II	1
present	présente	vorhanden	presente	Kinemontepas	9
40.11 Isolate BI-16	Isolat BI-16	Isolat BI-16	Aislado BI-16		
absent	absente	fehlend	ausente	Cobham Green, Hilde II	1
present	présente	vorhanden	presente	Argelès, Ninja	9
40.12 Isolate BI-17	Isolat BI-17	Isolat BI-17	Aislado BI-17		
absent	absente	fehlend	ausente	Cobham Green, Hilde II	1
present	présente	vorhanden	presente	Argelès, Ninja	9
40.13 Isolate BI-18	Isolat BI-18	Isolat BI-18	Aislado BI-18		
absent	absente	fehlend	ausente	Cobham Green, Hilde II	1
present	présente	vorhanden	presente	Argelès, Ninja	9
40.14 Isolate BI-19	Isolat BI-19	Isolat BI-19	Aislado BI-19		
absent	absente	fehlend	ausente	Cobham Green, Hilde II	1
present	présente	vorhanden	presente	Colorado, Ninja	9

English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
40.15 Isolate BI-20	Isolat BI-20	Isolat BI-20	Aislado BI-20		
absent	absente	fehlend	ausente	Cobham Green, Hilde II	1
present	présente	vorhanden	presente	Argelès, Ninja	9
40.16 Isolate BI-21	Isolat BI-21	Isolat BI-21	Aislado BI-21		
absent	absente	fehlend	ausente	Cobham Green, Hilde II	1
present	présente	vorhanden	presente	Colorado, Ninja	9
40.17 Isolate BI-22	Isolat BI-22	Isolat BI-22	Aislado BI-22		
absent	absente	fehlend	ausente	Cobham Green, Hilde II	1
present	présente	vorhanden	presente	Coralis, Torpedo	9
40.18 Isolate BI-23	Isolat BI-23	Isolat BI-23	Aislado BI-23		
absent	absente	fehlend	ausente	Cobham Green, Hilde II	1
present	présente	vorhanden	presente		9
41. (+) Resistance to lettuce mosaic virus (LMV)	Résistance au virus de la mosaïque de la Laitue (LMV)	Resistenz gegen Salat-mosaikvirus (LMV)	Resistencia al virus del mosaico de la lechuga (LMV)		
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

VIII. Explanations on the Table of Characteristics

Ad. Chapter V, paragraph 3: Key to Lettuce types:

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

1. Butterhead

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

2. Crisphead (including the 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, predominately 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.

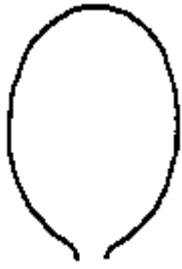
5. Cutting or Gathering lettuce

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.

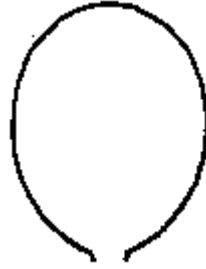
6. Stem lettuce

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.

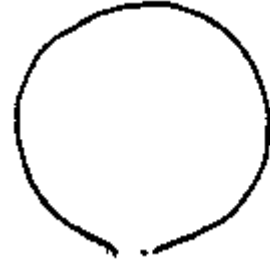
Ad. 13: Head: shape in longitudinal section



1
elliptic



2
broad elliptic

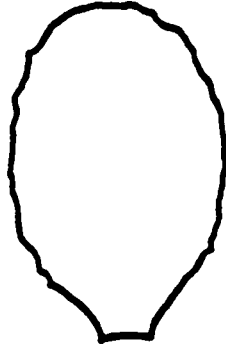


3
circular

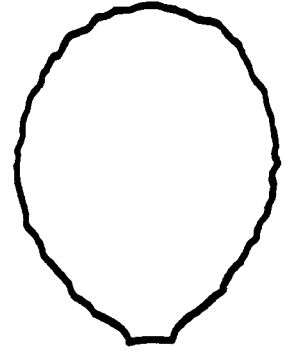
Ad. 16: Leaf: shape



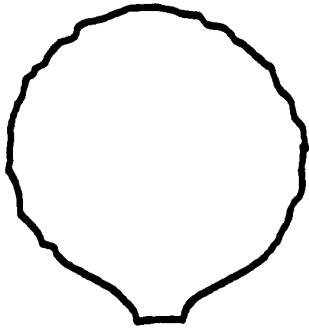
1
narrow elliptic



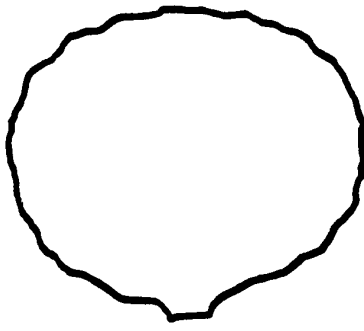
2
elliptic



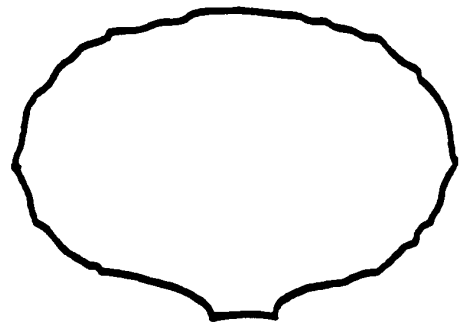
3
broad elliptic



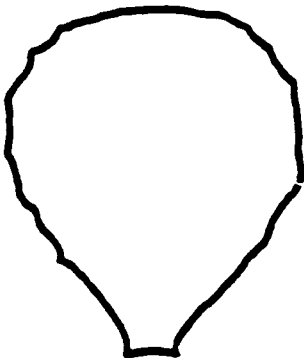
4
circular



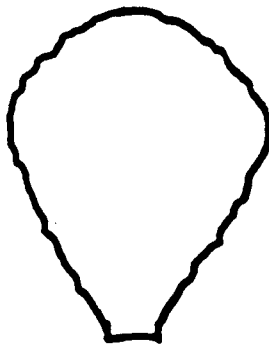
5
transverse broad elliptic



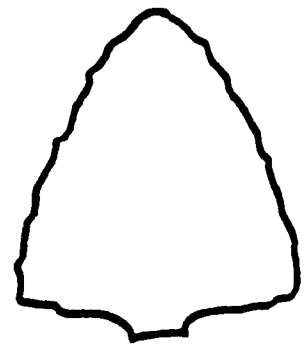
6
transverse elliptic



7
obovate



8
broad obtrullate



9
triangular

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

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

Ad. 40: Resistance to downy mildew (*Bremia lactucae*)

Isolates With at Least One Dm-Gene Component

Lettuce varieties should be described as being either resistant to defined by known Dm virulence component(s) or as having in their genetic make-up at least the Dm-genes. This takes into account the possibility of Dm-genes, both known and unknown, whose absence or presence has not been tested.

The system of Dm-gene nomenclature developed by Dr. I.R. Crute, A.G. Johnson, B.F. Farrara, T.W. Ilott and R.W. Michelmore should be accepted as the internationally agreed system to describe the Dm-gene components of lettuce varieties. (For more details see the article by 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 and further articles listed in Chapter IX.) More recent information can be found in Ettekoven, K. van, and Arend, A.J.M. van der, 1999 (see Chapter IX).

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, 16 and 18*, as well as R17*, R36*, R37* and R38* factors. Only these should be tested on a routine basis. The role of new Dm-genes (*) should be constantly reviewed.

Special Tests

Special tests may be required for Dm1, Dm4, Dm15 and Dm10 (useful in the USA or 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: IL4, S1, NL13, NL12, SF1, NL7, NL14, NL15, TV, CS9, BL16 and BL17 to 21.

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 Plant Research International (PRI) (formerly IPO) 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 other testing centres in UPOV member States.

The addresses of the centres are as follows:

SNES
Rue Georges Morel
P.O. Box 24
49071 Beaucouzé Cedex
France
Tel: +33 (0) 2 42 22 58 00
Fax: +33 (0) 2 41 22 58 01
E-mail: michel.guenard@geves.fr
Plant Research International (PRI)

Section Diagnostics, Production and
Service (DPS)
P.O. Box 16
6700 AA Wageningen
Netherlands
Tel: + 31 (0) 317 477001
Fax: + 31 (0) 317 418094
E-mail: post@plant.wag-ur.nl

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 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, the Netherlands:

GEVES Brion
Domaine de la Boisselière
49250 Brion
France

NAK Tuinbouw
Sotaweg 20, P.O. Box 40
2370 AA Roelofarendsveen
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 15-18°C.

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:

1st recording: when the control has maximum sporulation

2nd recording: 3 days after 1st recording

3rd recording: 3 days after 2nd recording

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

Ad. 41: 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 Na₂HPO₄-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 Na₂HPO₄ 12H₂O, 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: New 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 recently 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.

IX. 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: "Sallatssorternas 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

GUËNARD, 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")

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

X. Technical Questionnaire

	Reference Number (not to be filled in by the applicant)
<p>TECHNICAL QUESTIONNAIRE to be completed in connection with an application for plant breeders' rights</p>	
1. Species	<p><i>Lactuca sativa</i> L. LETTUCE</p>
2. Applicant (Name and address)	
3. Proposed denomination or breeder's reference	

4. Information on origin, maintenance and reproduction of the variety

5. Characteristics of the variety to be indicated (the number in brackets refers to the corresponding characteristic in Test Guidelines; please mark the state of expression which best corresponds).

Characteristics	Example Varieties	Note
5.1 Seed: color (1)		
white	Verpia	1[]
yellow	Durango	2[]
black	Kagraner Sommer	3[]

Characteristics	Example Varieties	Note
5.2 Leaf: color of outer leaves (18)		
yellowish	Dorée de Printemps	1[]
green	Donatello, Verpia	2[]
greyish green	Celtuce, Du bon jardinier	3[]
bluish green	Bibb	4[]
reddish	Lollo rossa, RevolutionRosa	5[]
5.3 Leaf: anthocyanin coloration (20)		
absent	Fiorella, Sunrise	1[]
present	Commodore, Pirat	9[]
5.4 Time of beginning of bolting under long day conditions (39)		
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[]
5.5 Growth types according to Chapter V of the Test Guidelines		
Butterhead lettuce	Clarion, Merveille de 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	[]

6. Similar varieties and differences from these varieties

Denomination of similar variety	Characteristic in which the similar variety is different ^{o)}	State of expression of similar variety	State of expression of candidate variety
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^{o)} In the case of identical states of expressions of both varieties, please indicate the size of the difference.

