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INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

Geneva

SOYA BEAN *

UPOV Code(s): GLYCI_MAX

Glycine max (L.) Merr.

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>Glycine max</i> (L.) Merr., <i>Soja hispida</i> Moench	Soya Bean, Soybean	Soja	Sojabohne	Soja

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

ASSOCIATED DOCUMENTS

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

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

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1. Subject of these Test Guidelines

These Test Guidelines apply to all varieties of *Glycine max* (L.) Merr.

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:

1 kg of seed.

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*

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

3.1.2 The two independent growing cycles should be in the form of two separate plantings.

3.1.3 The testing of a variety may be concluded when the competent authority can determine with certainty the outcome of the test.

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 optimum stage of development for the assessment of each characteristic is indicated by a number in the Table of Characteristics. The stages of development denoted by each number are described in Chapter 8.2.

3.4 *Test Design*

3.4.1 Each test should be designed to result in a total of at least 300 plants, which should be divided between at least two replicates.

3.4.2 The assessment of the characteristic "Plant: growth type" should be carried out on a total of at least 60 plants, which should be divided by at least two replicates.

3.4.3 The design of the tests should be such that plants or parts of plants may be removed for measurement or counting without prejudice to the observations which must be made up to the end of the growing cycle.

3.5 *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.

4.1.4 Number of Plants or Parts of Plants to be Examined

Unless otherwise indicated, for the purposes of distinctness, all observations on single plants should be made on 20 plants or parts of plants taken from each of 20 plants and any other observations made on all plants in the test, disregarding any off-type plants.

In the case of observations of parts taken from single plants, the number of parts to be taken from each of the plants should be 1.

4.1.5 Method of Observation

The recommended method of observing the characteristic for the purposes of distinctness is indicated by the following key in the Table of Characteristics (see document TGP/9 "Examining Distinctness", Section 4 "Observation 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

Type of observation: visual (V) or measurement (M)

"Visual" observation (V) is an observation made on the basis of the expert's judgment. For the purposes of this document, "visual" observation refers to the sensory observations of the experts and, therefore, also includes smell, taste and touch. Visual observation includes observations where the expert uses reference points (e.g. diagrams, example varieties, side-by-side comparison) or non-linear charts (e.g. color charts). Measurement (M) is an objective observation against a calibrated, linear scale e.g. using a ruler, weighing scales, colorimeter, dates, counts, etc.

Type of record: for a group of plants (G) or for single, individual plants (S)

For the purposes of distinctness, observations may be recorded as a single record for a group of plants or parts of plants (G), or may be recorded as records for a number of single, individual plants or parts of plants (S). In most cases, "G" provides a single record per variety and it is not possible or necessary to apply statistical methods in a plant-by-plant analysis for the assessment of distinctness.

In cases where more than one method of observing the characteristic is indicated in the Table of Characteristics (e.g. VG/MG), guidance on selecting an appropriate method is provided in document TGP/9, Section 4.2.

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 These Test Guidelines have been developed for the examination of self-pollinated varieties. For varieties with other types of propagation, the recommendations in the General Introduction and document TGP/13 "Guidance for new types and species" Section 4.5 "Testing Uniformity" should be followed.

4.2.3 For the assessment of uniformity of self-pollinated varieties, a population standard of 0.5% and an acceptance probability of at least 95% should be applied. In the case of a sample size of 300 plants, 4 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 further examined by testing a new seed stock to ensure that it exhibits the same characteristics as those shown by the initial material supplied.

5. Grouping of Varieties and Organization of the Growing Trial

5.1 The selection of varieties of common knowledge to be grown in the trial with the candidate varieties and the way in which these varieties are divided into groups to facilitate the assessment of distinctness are aided by the use of grouping characteristics.

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

5.3 The following have been agreed as useful grouping characteristics:

- (a) Plant: color of hairs on main stem (characteristic 9)
- (b) Flower: color (characteristic 10)
- (c) Time of maturity (characteristic 11)
- (d) Seed: coloration of hilum (characteristic 20)

5.4 Guidance for the use of grouping characteristics, in the process of examining distinctness, is provided through the General Introduction and document TGP/9 "Examining Distinctness".

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*

6.2.1 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.

6.2.2 All relevant states of expression are presented in the characteristic.

6.2.3 Further explanation of the presentation of states of expression and notes is provided in document TGP/7 "Development of Test Guidelines".

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

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
1	2	3	4	5	6	7	
		Name of characteristics in English	Nom du caractère en français	Name des Merkmals auf Deutsch	Nombre del carácter en español		
		states of expression	types d'expression	Ausprägungsstufen	tipos de expresión		

- 1 Characteristic number
- 2 (*) Asterisked characteristic – see Chapter 6.1.2
- 3 Type of expression
 QL Qualitative characteristic – see Chapter 6.3
 QN Quantitative characteristic – see Chapter 6.3
 PQ Pseudo-qualitative characteristic – see Chapter 6.3
- 4 Method of observation (and type of plot, if applicable)
 MG, MS, VG, VS – see Chapter 4.1.5
- 5 (+) See Explanations on the Table of Characteristics in Chapter 8.1
- 6 Not applicable
- 7 Growth stage key See Explanations on the Table of Characteristics in Chapter 8.2

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

	English		français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
1.	QN	VG	(+)	10			
	Hypocotyl: intensity of anthocyanin coloration	Hypocotyle : intensité de la pigmentation anthocyanique	Hypokotyl: Intensität der Anthocyanfärbung	Hipocótilo: intensidad de la pigmentación antocianica			
	absent or very weak	absente ou très faible	fehlend oder sehr gering	ausente o muy débil	VC 8080 IPRO		1
	weak	faible	gering	débil			2
	medium	moyenne	mittel	media			3
	strong	forte	stark	fuerte			4
	very strong	très forte	sehr stark	muy fuerte			5
2.	QN	MG	(+)	61			
	Time of beginning of flowering	Époque du début de la floraison	Zeitpunkt des Blühbeginns	Época de inicio de la floración			
	very early	très précoce	sehr früh	muy temprana			1
	very early to early	très précoce à précoce	sehr früh bis früh	muy temprana a temprana			2
	early	précoce	früh	temprana	NS 2018		3
	early to medium	précoce à moyenne	früh bis mittel	temprana a media	3806IPRO, DON MARIO 40R16		4
	medium	moyenne	mittel	media	53I53 RSF IPRO, RA 545		5
	medium to late	moyenne à tardive	mittel bis spät	media a tardía	NS 6448		6
	late	tardive	spät	tardía	RA 750		7
	late to very late	tardive à très tardive	spät bis sehr spät	tardía a muy tardía	VC 8080 IPRO		8
	very late	très tardive	sehr spät	muy tardía	NS 8288		9
3.	QN	VG		65			
	Leaf: blistering	Feuille : cloûre	Blatt: Blasigkeit	Hoja: abullonado			
	absent or very weak	absent ou très faible	fehlend oder sehr gering	ausente o muy débil			1
	very weak to weak	très faible à faible	sehr gering bis gering	muy débil a débil			2
	weak	faible	gering	débil			3
	weak to medium	faible à moyenne	gering bis mittel	débil a medio			4
	medium	moyenne	mittel	medio			5
	medium to strong	moyenne à forte	mittel bis stark	media a fuerte	SYN 1561 IPRO		6
	strong	forte	stark	fuerte			7
	strong to very strong	forte à très forte	stark bis sehr stark	fuerte a muy fuerte	RA 5816, RA 655		8
	very strong	très forte	sehr stark	muy fuerte			9

	English	français	deutsch	español	Example Varieties Exemples Beispielsorten Variedades ejemplo	Note/ Nota
4. (*)	PQ	VG	(+)	65		
	Leaf: shape of lateral leaflet	Feuille : forme de la foliole latérale	Blatt: Form der seitlichen Blatffieder	Hoja: forma del foliolo lateral		
	lanceolate	lancéolée	lanzettlich	lanceolada	Crina F, Opaline	1
	triangular	triangulaire	dreieckig	triangular	Sponsor	2
	ovate with acute apex	ovale avec un apex aigue	eiförmig mit spitzem Apex	oval con ápice agudo	Córdoba, Es Mentor, RGT Shouna	3
	ovate with rounded apex	ovale avec un apex arrondi	eiförmig mit abgerundetem Apex	oval con ápice redondeado	Es Gladiator, RGT Speeda	4
5.	QN	VG		65		
	Leaf: size of lateral leaflet	Feuille : taille de la foliole latérale	Blatt: Größe der seitlichen Blatffieder	Hoja: tamaño del foliolo lateral		
	very small	très petite	sehr klein	muy pequeño		1
	very small to small	très petite à petite	sehr klein bis klein	muy pequeño a pequeño		2
	small	petite	klein	pequeño	SYN 1561 IPRO	3
	small to medium	petite à moyenne	klein bis mittel	pequeño a medio	NS 5258	4
	medium	moyenne	mittel	medio	SJ 13397	5
	medium to large	moyenne à grande	mittel bis groß	medio a grande		6
	large	grande	groß	grande		7
	large to very large	grande à très grande	groß bis sehr groß	grande a muy grande	IPB 6.2 Y	8
	very large	très grande	sehr groß	muy grande		9
6.	QN	VG		65		
	Leaf: intensity of green color	Feuille : intensité de la couleur verte	Blatt: Intensität der Grünfärbung	Hoja: intensidad del color verde		
	very light	très claire	sehr hell	muy clara		1
	very light to light	très claire à claire	sehr hell bis hell	muy clara a clara		2
	light	claire	hell	clara		3
	light to medium	claire à moyenne	hell bis mittel	clara a media	63164 RSF IPRO	4
	medium	moyenne	mittel	media		5
	medium to dark	moyenne à foncée	mittel bis dunkel	media a oscura		6
	dark	foncée	dunkel	oscuro	53153 RSF IPRO	7
	dark to very dark	foncée à très foncée	dunkel bis sehr dunkel	oscuro a muy oscura	IPB 6.2 Y, RA 5816	8
	very dark	très foncée	sehr dunkel	muy oscura		9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
7. (*)	QN VS	(+)	66-89			
	Plant: growth type	Plante : type de croissance	Pflanze: Wuchstyp	Planta: tipo de crecimiento		
	determinate	déterminé	begrenzt wachsend	determinado	NS 8288	1
	semi-determinate	semi-déterminé	halb begrenzt wachsend	semideterminado	NS 6448	2
	indeterminate	indéterminé	unbegrenzt wachsend	indeterminado	5407IPRO, DON MARIO 40R16	3
8.	QN VG	(+)	66 80			
	Plant: attitude of branches	Plante : port des ramifications	Pflanze: Haltung der Seitentriebe	Planta: porte de las ramas		
	erect	dressé	aufrecht	erecto		1
	erect to semi-erect	dressé à demi-dressé	aufrecht bis halbaufrecht	erecto a semierecto	NS 5258	2
	semi-erect	demi-dressé	halbaufrecht	semierecto	50MS01	3
	semi-erect to horizontal	demi-dressé à horizontal	halbaufrecht bis waagerecht	semierecto a horizontal	GE642 CI	4
	horizontal	horizontal	waagerecht	horizontal		5
9. (*)	PQ VG	(+)	65-85			
	Plant: color of hairs on main stem	Plante : couleur de la pilosité de la tige principale	Pflanze: Farbe der Behaarung des Haupttriebes	Planta: color de la vellosidad del tallo principal		
	light brown	brun clair	hellbraun	marrón claro	53I53 RSF IPRO	1
	dark brown	brun foncé	dunkelbraun	marrón oscuro	NS 8288	2
	grey	gris	grau	gris	5407IPRO, RA 750	3
10. (*)	QL VG		66			
	Flower: color	Fleur : couleur	Blüte: Farbe	Flor: color		
	white	blanc	weiß	blanco	53I53 RSF IPRO	1
	violet	violet	violett	violeta	DON MARIO 40R16	2

	English		français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
11. (*)	QN	MG	(+)				
	Time of maturity	Époque de maturité	Zeitpunkt der Reife	Época de madurez			
	very early	très précoce	sehr früh	muy temprana			1
	very early to early	très précoce à précoce	sehr früh bis früh	muy temprana a temprana			2
	early	précoce	früh	temprana	NS 2018		3
	early to medium	précoce à moyenne	früh bis mittel	temprana a media	3420, 3806IPRO		4
	medium	moyenne	mittel	media	47MS01, DON MARIO 40R16		5
	medium to late	moyenne à tardive	mittel bis spät	media a tardía	53I53 RSF IPRO, 5407IPRO, RA 545		6
	late	tardive	spät	tardía	NS 6448		7
	late to very late	tardive à très tardive	spät bis sehr spät	tardía a muy tardía	RA 750		8
	very late	très tardive	sehr spät	muy tardía	8473 RSF, VC 8080 IPRO		9
12.	QN	MS/VG		85			
	Plant: height	Plante : hauteur	Pflanze: Höhe	Planta: altura			
	very short	très courte	sehr niedrig	muy baja			1
	very short to short	très courte à courte	sehr niedrig bis niedrig	muy baja a baja			2
	short	courte	niedrig	baja			3
	short to medium	courte à moyenne	niedrig bis mittel	baja a media	NS 5258		4
	medium	moyenne	mittel	media			5
	medium to tall	moyenne à haute	mittel bis hoch	media a alta	RA 655		6
	tall	haute	hoch	alta			7
	tall to very tall	haute à très haute	hoch bis sehr hoch	alta a muy alta	NS 6859 IPRO		8
	very tall	très haute	sehr hoch	muy alta			9
13. (*)	PQ	VG	(+)	85			
	Pod: color	Gousse : couleur	Hülse: Farbe	Vaina: color			
	light brown	brun clair	hellbraun	marrón claro	NS 2018		1
	medium brown	brun moyen	mittelbraun	marrón medio	DON MARIO 40R16		2
	dark brown	brun foncé	dunkelbraun	marrón oscuro			3
	light grey	gris clair	hellgrau	gris claro			4
	medium grey	gris moyen	mittelgrau	gris medio			5
	dark grey	gris foncé	dunkelgrau	gris oscuro			6
	black	noir	schwarz	negro			7

	English		français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
14.	QN	VG	(+)	85			
	Pod: grey coloration of seed convexities	Gousse : coloration grise des convexités des graines	Hülse: Graufärbung der Samenwölbungen	Vaina: coloración gris de las convexidades de semillas			
	absent or very weak	absente ou très faible	fehlend oder sehr gering	ausente o muy débil	NS 2018		1
	weak	faible	gering	débil	RA 750		2
	medium	moyenne	mittel	media	47MS01, 5407IPRO		3
	strong	forte	stark	fuerte	3420		4
	very strong	très forte	sehr stark	muy fuerte			5
15.	QN	MG		89			
	Seed: 1000 seed weight	Graine : poids de 1000 graines	Samen: 1000-Korngewicht	Semilla: peso de 1000 semillas			
	very low	très petit	sehr niedrig	muy bajo			1
	very low to low	très petit à petit	sehr niedrig bis niedrig	muy bajo a bajo			2
	low	petit	niedrig	bajo	NS 5258, NS 6859 IPRO		3
	low to medium	petit à moyen	niedrig bis mittel	bajo a medio			4
	medium	moyen	mittel	medio			5
	medium to high	moyen à grand	mittel bis hoch	medio a alto	IPB 6.2 Y		6
	high	grand	hoch	alto			7
	high to very high	grand à très grand	hoch bis sehr hoch	alto a muy alto			8
	very high	très grand	sehr hoch	muy alto			9
16.	PQ	VG	(+)	89			
	Seed: shape	Graine : forme	Samen: Form	Semilla: forma			
	spheric	sphérique	kugelförmig	esférica	NS 6859 IPRO		1
	spheric flattened	sphérique aplatie	kugelförmig abgeflacht	esférica aplanada	NS 5258		2
	elongated	allongée	länglich	alargada	DON MARIO 50i17 IPRO		3
	elongated flattened	allongée aplatie	länglich abgeflacht	alargada aplanada			4

	English		français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
17. (*)	PQ	VG	(+)	89			
	Seed: color of testa	Graine : couleur du tégument	Samen: Farbe der Samenschale	Semilla: color del tegumento			
	green	vert	grün	verde			1
	yellow green	vert-jaune	gelbgrün	verde amarillento	Befine		2
	yellow	jaune	gelb	amarillo	DON MARIO 40R16		3
	red	rouge	rot	rojo			4
	light brown	brun clair	hellbraun	marrón claro			5
	medium brown	brun moyen	mittelbraun	marrón medio			6
	dark brown	brun foncé	dunkelbraun	marrón oscuro			7
	purple	pourpre	purpurn	púrpura			8
	black	noir	schwarz	negro			9
18. (*)	QN	VG	(+)	89			
	Seed: glossiness	Graine : brillance	Samen: Glanz	Semilla: brillo			
	absent or weak	absente ou faible	fehlend oder gering	ausente o débil	DON MARIO 40R16, RA 545		1
	medium	moyenne	mittel	medio	NS 8288		2
	strong	forte	stark	fuerte	8473 RSF, TMG1155RR		3
19.	QL	VG	(+)	89			
	Seed: peroxidase reaction	Graine : réaction à la peroxydase	Samen: Peroxidase-Reaktion	Semilla: reacción a la peroxidasa			
	absent	absente	fehlend	ausente	DON MARIO 40R16		1
	present	présente	vorhanden	presente	NS 8288		9
20. (*)	PQ	VG	(+)	89			
	Seed: coloration of hilum	Graine : coloration du hile	Samen: Färbung des Nabels	Semilla: coloración del hilo			
	imperfect yellow	jaune imparfait	fast gelb	amarillo imperfecto	Ajico, OAC Strive		1
	yellow	jaune	gelb	amarillo	RA 545		2
	light brown	brun clair	hellbraun	marrón claro	NS 6448		3
	red brown	brun-rouge	rotbraun	marrón rojizo	5407IPRO		4
	dark brown	brun foncé	dunkelbraun	marrón oscuro	53153 RSF IPRO		5
	grey	gris	grau	gris	TMG1155RR		6
	imperfect black	noir imparfait	fast schwarz	negro imperfecto	RA 750		7
	black	noir	schwarz	negro	DON MARIO 40R16		8

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
21.	QL	VG	(+)	89		
	Seed: color of hilum funicle	Graine: couleur de l'attache hilaire	Samen: Farbe des Nabelansatzes	Semilla: color de la inserción del hilo		
	same as testa	même couleur que le tégument	wie Samenschale	igual que el del tegumento	Córdoba, Es Mentor, RGT Shouna	1
	different to testa	couleur différente du tégument	anders als Samenschale	diferente de el del tegumento	Amarok, SY Livius	2

8. Explanations on the Table of Characteristics

8.1 *Explanations for individual characteristics*

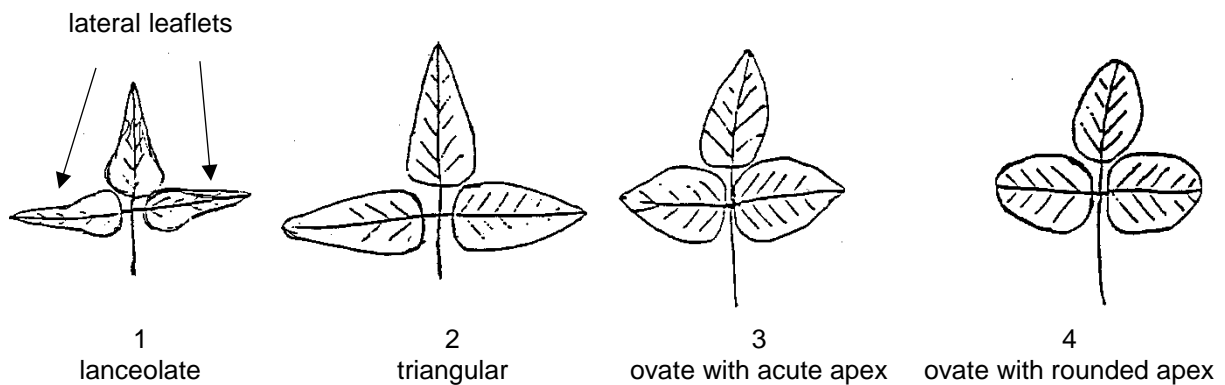
Ad. 1: Hypocotyl: intensity of anthocyanin coloration

Germinate 20 seeds in substrate. Seedlings should receive at least five hours of intense sunlight after emergence. Seedlings should be exposed to artificial lighting at night. Observations should be made three to five days after emergence.

Ad. 2: Time of beginning of flowering

Time of beginning of flowering is reached when 10% of plants show at least one open flower.

Ad. 4: Leaf: shape of lateral leaflet



Ad. 7: Plant: growth type

- Test design: Plant growth type should preferably be assessed in a special trial with 2 replicates of 30 plants each with about 9 cm between plants in the rows. Any border effect should be avoided.
- Plant material: Candidate and example varieties should be grown in groups according to their earliness at maturity (characteristic 11).
- Observation: At the beginning of flowering time (1 flower at any level of the main stem), the apex of the plant should be identified with a mark. At maturity (free kernels in the pod), the number of nodes between the mark and the top of the plant is counted. The average number of nodes per variety, in comparison with the example varieties, allows for the appropriate rating of this characteristic.

Determinate varieties:

- The main stem ends in a floral bud (the terminal cluster is long and with many flowers).
- The growth stops with the flowering of the terminal bud.
- The size of the terminal leaf is the same as the lower leaves in growth stage 60.

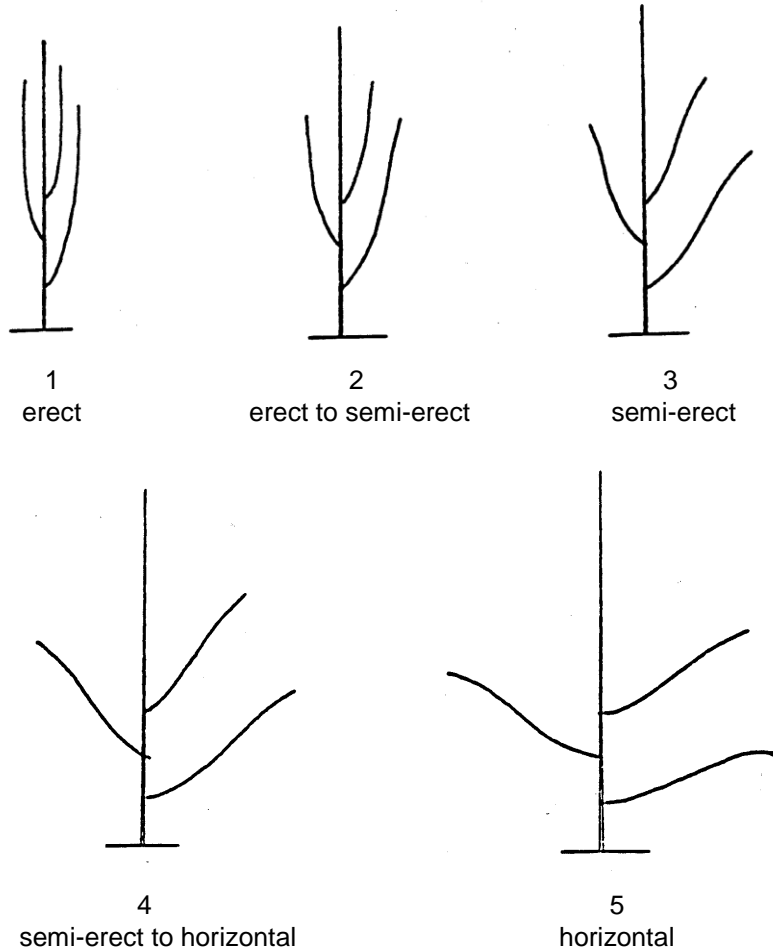
Semi-determinate varieties:

- The main stem ends in a floral bud (the terminal cluster is short and with few flowers).
- The growth stops with the flowering of the terminal bud.
- The size of the terminal leaf is smaller than the lower leaves in growth stage 60.

Indeterminate varieties:

- The main stem ends in a vegetative bud.
- The growth continues after flowering.
- The apical meristem remains vegetative and continues to differentiate nodes and leaves when flowers are being differentiated in the rest of the plant.
- The terminal leaf is smaller than the lower leaves in growth stage 60.

Ad. 8: Plant: attitude of branches



Ad. 9: Plant: color of hairs on main stem

Observations should be made on the middle third of the main stem.

Ad. 11: Time of maturity

Time of maturity is reached when 90% of plants have reached growth stage 80.

Ad. 13: Pod: color

Observations should be made on pods from the middle third of the plants, including pubescence and excluding grey coloration of the seed convexities.

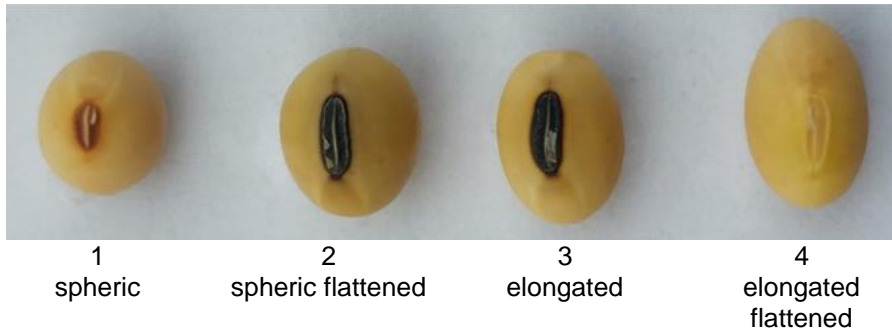
Observations should be made in bright daylight in comparison with other example varieties.

Ad. 14: Pod: grey coloration of seed convexities

Observations should be made on the seed convexities of the pod (shown with black arrows).



Ad. 16: Seed: shape



Ad. 17: Seed: color of testa

Observations should exclude hilum.

See Ad. 21

Ad. 18: Seed: glossiness

A sample of 20 seeds should be illuminated with a focus of no more than 75 watts and the brightness or opacity is observed with the naked eye.

Ad. 19: Seed: peroxidase reaction

The coloration due to peroxidase activity in the seed coat should be observed on 20 seeds.

The seed should be placed in water for 2 hours before the seed coat is removed carefully. No piece of cotyledons should remain on the removed seed coat.

The seed coat should be placed in a cell box or in tubes (one tube per seed) and 3 to 4 cm³ of 0.5% Guayacol solution should be added. The 0.5% Guayacol solution should be stored in a refrigerator for max. 2 months. After one day at room temperature, it can no longer be used.

After 10 minutes, one drop of 0.1% H₂O₂ solution should be added.

The solution changes to dark red/brown color for a positive reaction or remains without color for a negative reaction. In order to check the 0.5% Guayacol solution, some seeds of a reference variety with a positive reaction should be included. The reaction with H₂O₂ must be recorded within 60 seconds. Later observations can lead to wrong results.

The cell box or the tubes could be softly shaken for a better reaction. The cell box or the tubes should be placed on a white background for observation.

Other methods might be used as long as they yield the same results.

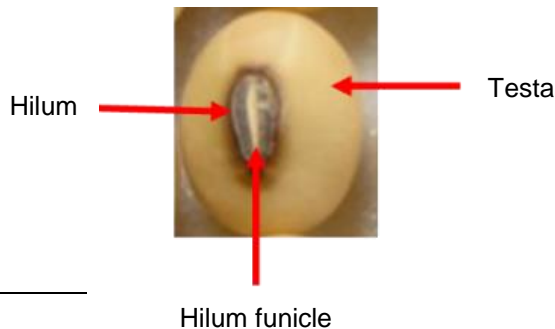
Ad. 20: Seed: coloration of hilum

Imperfect yellow: dark yellow center, surrounded by light yellow halo.

Imperfect black: black center, surrounded by a brown halo.

See Ad. 21

Ad. 21: Seed: color of hilum funicle



Courtesy of the Canadian Food Inspection Agency

8.2 Phenological Growth Stages and BBCH-Identification Keys of the Soybean *

CODE		DESCRIPTION
2- and 3 digit		
Principal growth stage 0: Germination		
00	000	Dry seed
01	001	Beginning of seed imbibition
02	002	-
03	003	Seed imbibition complete
04	004	-
05	005	Radicle emerged from seed
06	006	Elongation of radicle; formation of root hairs
07	007	Hypocotyl with cotyledons breaking through seed coat
08	008	Hypocotyl reaches the soil surface; hypocotyl arch visible
09	009	Emergence: hypocotyl with cotyledons emerged above soil surface ("cracking stage")
Principal growth stage 1: Leaf development (Main shoot)		
10	100	Cotyledons completely unfolded
11	101	First pair of true leaves unfolded (unifoliolate leaves on the first node)
12	102	Trifoliolate leaf on the 2nd node unfolded
13	103	Trifoliolate leaf on the 3rd node unfolded
1.	10.	States continuous until
19	109	Trifoliolate leaf on the 9th node unfolded. No side shoots visible ¹
-	110	Trifoliolate leaf on the 10th node unfolded ¹
-	111	Trifoliolate leaf on the 11th node unfolded ¹
-	112	Trifoliolate leaf on the 12th node unfolded ¹
-	113	Trifoliolate leaf on the 13th node unfolded ¹
-	11.	Stages continuous until
-	119	Trifoliolate leaf on the 19th node unfolded ¹
Principal growth stage 2: Formation of side shoots		
20	200	-
21	201	First side shoot visible
22	202	2nd side shoot of first order visible
23	203	3rd side shoot of first order visible
2.	20.	Stages continuous until ...
29	209	9 or more side shoots of first order visible (2 digit) 9th side shoot of first order visible (3 digit)
-	210	10th side shoot of first order visible
-	221	First side shoot of 2nd order visible
-	22.	Stages continuous until ...
-	229	9th side shoot of 2nd order visible
-	2N1	First side shoot of Nth order visible
-	2N9	9th side shoot of Nth order visible

* Reproduced with the kind permission of the authors of: "Growth Stages of Mono- and Dicotyledonous Plants" (see Literature, Meier, Uwe (Editor), 1997)

¹ The side shoot development may occur earlier; in this case continue with the principal growth stage 2

CODE		DESCRIPTION
2- and 3 digit		
Principal growth stage 3: ²		
Principal growth stage 4: Development of harvestable vegetative plant parts – Main shoot -		
40	400	-
41	401	-
42	402	-
43	403	-
44	404	-
45	405	-
46	406	-
47	407	-
48	408	-
49	409	Harvestable vegetative plant parts have reached final size (Cutting of soybean plants for feeding purposes)
Principal growth stage 5: Inflorescence emergence (Main shoot)		
50	500	-
51	501	First flower buds visible
52	502	-
53	503	-
54	504	-
55	505	First flower buds enlarged
56	506	-
57	507	-
58	508	-
59	509	First flower petals visible; flower buds still closed
Principal growth stage 6: Flowering (Main shoot)		
60	600	First flowers opened (sporadically in population)
61	601	Beginning of flowering about 10% of flowers open ³ Beginning of flowering ⁴
62	602	About 20% of flowers open ³
63	603	About 30% of flowers open ³
64	604	About 40% of flowers open ³
65	605	Full flowering: about 50% of flowers open ³ Main period of flowering ⁴
66	606	About 60% of flowers open ³
67	607	Flowering declining ³
68	608	-
69	609	End of flowering: first pods visible (approximately 5 mm length) ³

² The stem elongation of the soybean plant (Principal growth stage 3) proceeds parallel to the leaf development. Therefore a coding in the principal growth stage 3 has been omitted.

³ This definition refers to determinate varieties

⁴ This definition refers to indeterminate varieties

CODE		DESCRIPTION
2- and 3 digit		
Principal growth stage 7: Development of fruits and seeds		
70	700	First pod reached final length (15-20 mm)
71	701	About 10% of pods have reached final length (15-20 mm) ³ Beginning of pod development ⁴
72	702	About 20% of pods have reached final length (15-20 mm) ³
73	703	About 30% of pods have reached final length (15-20 mm) ³ Beginning of pod filling ⁴
74	704	About 40% of pods have reached final length (15-20 mm) ³
75	705	About 50% of pods have reached final length (15-20 mm) Continuation of pod filling. ³ Main period of pod development Continuation of pod filling ⁴
76	706	-
77	707	About 70% of pods have reached final length (15-20 mm): advanced pod filling. ³ Advanced pod filling ⁴
78	708	-
79	709	Approximately all pods have reached final length (15-20 mm). Seeds filling the cavity of the majority of pods ^{3,4}
Principal growth stage 8: Ripening of fruits and seeds		
80	800	First pod ripe, beans final color, dry and hard
81	801	Beginning of ripening; about 10% of pods are ripe, beans final color, dry and hard. ³ Beginning of pod and seed ripening ⁴
82	802	About 20% of pods are ripe; beans final color, dry and hard ³
83	803	About 30% of pods are ripe; beans final color, dry and hard ³
84	804	About 40% of pods are ripe; beans final color, dry and hard ³
85	805	Advanced ripening; about 50% of pods are ripe; beans final color, dry and hard. ³ Main period of pod and seed ripening ⁴
86	806	About 60% of pods are ripe; beans final color, dry and hard ³
87	807	About 70% of pods are ripe; beans final color, dry and hard ³
88	808	About 80% of pods are ripe; beans final color, dry and hard ³
89	809	Full maturity: approximately all pods are ripe; beans final color, dry and hard (= Harvest maturity) ³ Majority of pods are ripe; beans final color, dry and hard ⁴
Principal growth stage 9: Senescence		
90	900	-
91	901	About 10% of leaves discolored or fallen
92	902	About 20% of leaves discolored or fallen
93	903	About 30% of leaves discolored or fallen
94	904	About 40% of leaves discolored or fallen
95	905	About 50% of leaves discolored or fallen
96	906	About 60% of leaves discolored or fallen
97	907	Above ground parts of plants dead
98	908	-
99	909	Harvested product (seeds)

³ This definition refers to determinate varieties

⁴ This definition refers to indeterminate varieties

9. Literature

Buzzell, R. I., Buttery, B. R., 1969: Inheritance of Peroxidase Activity in Soybean Seed Coats 1. *Crop Science*, 9(3), pp. 387 to 388

Davis, J., Gutormson, T., 2021: Soybean Hilum Examination: Morphology of Hilum Development. SoDak Labs, Inc. Brookings, South Dakota, US

Fehr, W. R., Fehr, E. L., Jessen, H. J. 1987: Principles of cultivar development. Volume 1. Theory and technique. Macmillan publishing company. New York, US

Meier Uwe (Editor), 1997: Growth Stages of Mono and Dicotyledonous Plants, BBCH-Monographs, Blackwell Wissenschafts-Verlag Berlin-Wien

Objective Description of variety. Soybean (*Glycine max* (L.) Merr.). US Department of Agriculture Agricultural Marketing Service Science and Technology Plant Variety Protection. Beltsville, Maryland, US
Taxonomy: Usda Natural Resources Conservation Service, Plants database, classification
(<https://plants.usda.gov/home/plantProfile?symbol=GLMA4>)

Pioli, R. N., Morandi, E. N., Martínez, M. C., Lucca, F., Tozzini, A., Bisaro, V., Hopp, H. E., 2003: Morphologic, molecular, and pathogenic characterization of *Diaporthe phaseolorum* variability in the core soybean-producing area of Argentina. *Phytopathology*, 93(2), pp. 136 to 146

Taylor, B.H., Caviness C.E., 1982: Hilum Color Variation in Soybean Seed with Imperfect Black Genotype 1. *Crop Science*, 22(3), pp. 682 to 683

Wilcox, J.R., 1987: Soybeans: Improvement, Production, and Uses. Agronomy Series Publication 16. American Society of Agronomy. Crop Sci. Soc. of America and Soil Sci. Soc. of America. Madison, Wisc., US

10. Technical Questionnaire

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
		Application date: (not to be filled in by the applicant)
TECHNICAL QUESTIONNAIRE to be completed in connection with an application for plant breeders' rights		
1. Subject of the Technical Questionnaire		
1.1	Botanical name	<input type="text" value="Glycine max (L.) Merr."/>
1.2	Common name	<input type="text" value="Soya Bean, Soybean"/>
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"/>

#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 variety)
(.....) x (.....)
female parent male parent

(b) partially known cross []
(please state known parent variety(ies))
(.....) x (.....)
female parent male parent

(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)

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:
-------------------------	-----------------	-------------------

4.2	Method of propagating the variety	
4.2.1	Seed-propagated varieties	
(a)	Self-pollination	[]
(b)	Other (please provide details)	[]
	<input type="text"/>	
4.2.2	Other (Please provide details)	[]
	<input type="text"/>	

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

Characteristics	Example Varieties	Note
5.1 Leaf: shape of lateral leaflet (4)		
lanceolate	Crina F, Opaline	1 []
triangular	Sponsor	2 []
ovate with acute apex	Córdoba, Es Mentor, RGT Shouna	3 []
ovate with rounded apex	Es Gladiator, RGT Speeda	4 []
5.2 Plant: growth type (7)		
determinate	NS 8288	1 []
semi-determinate	NS 6448	2 []
indeterminate	5407IPRO, DON MARIO 40R16	3 []
5.3 Plant: color of hairs on main stem (9)		
light brown	53I53 RSF IPRO	1 []
dark brown	NS 8288	2 []
grey	5407IPRO, RA 750	3 []
5.4 Flower: color (10)		
white	53I53 RSF IPRO	1 []
violet	DON MARIO 40R16	2 []
5.5 Time of maturity (11)		
very early		1 []
very early to early		2 []
early	NS 2018	3 []
early to medium	3420, 3806IPRO	4 []
medium	47MS01, DON MARIO 40R16	5 []
medium to late	53I53 RSF IPRO, 5407IPRO, RA 545	6 []
late	NS 6448	7 []
late to very late	RA 750	8 []
very late	8473 RSF, VC 8080 IPRO	9 []

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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Characteristics	Example Varieties	Note
5.6 Pod: color (13)		
light brown	NS 2018	1 []
medium brown	DON MARIO 40R16	2 []
dark brown		3 []
light grey		4 []
medium grey		5 []
dark grey		6 []
black		7 []
5.7 Seed: color of testa (17)		
green		1 []
yellow green	Befine	2 []
yellow	DON MARIO 40R16	3 []
red		4 []
light brown		5 []
medium brown		6 []
dark brown		7 []
purple		8 []
black		9 []
5.8 Seed: glossiness (18)		
absent or weak	DON MARIO 40R16, RA 545	1 []
medium	NS 8288	2 []
strong	8473 RSF, TMG1155RR	3 []
5.9 Seed: coloration of hilum (20)		
imperfect yellow	Ajico, OAC Strive	1 []
yellow	RA 545	2 []
light brown	NS 6448	3 []
medium brown	5407IPRO	4 []
red brown	53153 RSF IPRO	5 []
grey	TMG1155RR	6 []
imperfect black	RA 750	7 []
black	DON MARIO 40R16	8 []

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

6. Similar varieties and differences from these varieties

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

Denomination(s) of variety(ies) similar to your candidate variety	Characteristic(s) in which your candidate variety differs from the similar variety(ies)	Describe the expression of the characteristic(s) for the similar variety(ies)	Describe the expression of the characteristic(s) for your candidate variety
<i>Example</i>	<i>Hypocotyl: intensity of anthocyanin coloration</i>	<i>absent or very weak</i>	<i>medium</i>
Comments:			

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

Indicate maturity group and subgroup of the variety

Group

Subgroup

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

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.

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 <input type="checkbox"/>	No <input type="checkbox"/>
(b) Chemical treatment (e.g. growth retardant, pesticide)	Yes <input type="checkbox"/>	No <input type="checkbox"/>
(c) Tissue culture	Yes <input type="checkbox"/>	No <input type="checkbox"/>
(d) Other factors	Yes <input type="checkbox"/>	No <input type="checkbox"/>

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]