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INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

Geneva

DRAFT

SOYA BEAN*

UPOV Code(s):GLYCI_MAX

Glycine max (L.) Merr.

GUIDELINES

FOR THE CONDUCT OF TESTS

FOR DISTINCTNESS, UNIFORMITY AND STABILITY

prepared by experts from Argentina
to be considered by the
Technical Working Party for Agricultural Crops
at its fiftieth session, to be held in Arusha, United Republic of Tanzania,
from 2021-06-21 to 2021-06-25

Disclaimer: this document does not represent UPOV policies or guidance

Alternative names:*

Botanical name	*English*	*French*	*German*	*Spanish*
Glycine max (L.) Merr., *Soja hispida* 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.

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 2 replicates.

3.4.2 The assessment of the characteristic "Plant: growth type" should be carried out on at least 30 plants.

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 5)
(b) Flower: color (characteristic 10)
(c) Time of maturity (characteristic 11)
(d) Seed: color 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 Be ejemplo	Note
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					
		absent or very weak					1
		weak					2
		medium					3
		strong					4
		very strong					5
2.		**QN MG**	**(+)**	**61**			
		Time of beginning of flowering					
		very early					1
		very early to early					2
		early				NS 2018	3
		early to medium				3806IPRO, DON MARIO 40R16	4
		medium				53I53 RSF IPRO, RA 545	5
		medium to late				NS 6448	6
		late				RA 750	7
		late to very late				VC 8080 IPRO	8
		very late				NS 8288	9
3.	**(*)**	**QN VS**	**(+)**	**66-89**			
		Plant: growth type					
		determinate				NS 8288	1
		semi determinate				NS 6448	2
		semi determinate to indeterminate					3
		indeterminate				DON MARIO 40R16	4
4.		**QN VG**	**(+)**	**66 80**			
		Plant: attitude of branches					
		erect					1
		erect to semi erect					2
		semi erect					3
		semi erect to horizontal					4
		horizontal					5

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
5.	**(*)**	**PQ VG**	**(+)**	**65-85**			
		Plant: color of hairs on main stem					
		light brown				53I53 RSF IPRO	1
		dark brown				NS 8288	2
		grey				RA 750	3
6.		**QN VG**		**65**			
		Leaf: blistering					
		absent or very weak					1
		very weak to weak					2
		weak					3
		weak to medium					4
		medium					5
		medium to strong					6
		strong					7
		strong to very strong					8
		very strong					9
7.		**PQ VG**	**(+)**	**65**			
		Leaf: shape of the lateral leaflet					
		lanceolate					1
		trullate					2
		ovate					3
		elliptic					4
8.		**QN VG**		**65**			
		Leaf: size of lateral leaflet					
		very small					1
		very small to small					2
		small					3
		small to medium					4
		medium					5
		medium to large					6
		large					7
		large to very large					8
		very large					9

		English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
9.		**QN**	**VG**			**65**			
		Leaf: intensity of green color							
		very light							1
		very light to light							2
		light							3
		light to medium							4
		medium							5
		medium to dark							6
		dark							7
		dark to very dark							8
		very dark							9
10	**(*)**	**QL**	**VG**			**66**			
		Flower: color							
		white						53I53 RSF IPRO	1
		violet						DON MARIO 40R16	2
11	**(*)**	**QN**	**MG**	**(+)**					
		Time of maturity							
		extremely early							1
		extremely early to very early							2
		very early							3
		very early to early							4
		early						NS 2018	5
		early to medium						3420, 3806IPRO	6
		medium						47MS01, DON MARIO 40R16	7
		medium to late						53I53 RSF IPRO, RA 545	8
		late						NS 6448	9
		late to very late						RA 750	10
		very late						VC 8080 IPRO	11
		very late to extremely late						NS 8288	12
		extremely late							13

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
12	**QN MS/VG**		**85**			
	Plant: height					
	very short					1
	very short to short					2
	short					3
	short to medium					4
	medium					5
	medium to tall					6
	tall					7
	tall to very tall					8
	very tall					9
13	**PQ VG**	**(+)**	**85**			
	Pod: color					
	light brown				NS 2018	1
	medium brown				DON MARIO 40R16	2
	dark brown					3
	yellow brown					4
	light grey					5
	dark grey					6
	black					7
14	**QN VG**	**(+)**	**85**			
	Pod (external seed cavity): Grey coloration					
	absent or very weak				NS 2018	1
	weak				RA 750	2
	medium				47MS01	3
	strong				3420	4
	very strong					5

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
15	**QN VG**	**(+)**	**89**			
	Seed: 100 seed weight					
	very low					1
	very low to low					2
	low					3
	low to medium					4
	medium					5
	medium to high					6
	high					7
	high to very high					8
	very high					9
16	**PQ VG**	**(+)**	**89**			
	Seed: shape					
	spherical					1
	spherical flattened					2
	elongated					3
	elongated flattened					4
17	**PQ VG**	**(+)**	**89**			
	Seed: color of testa					
	green					1
	yellow green					2
	yellow				DON MARIO 40R16	3
	red					4
	light brown					5
	medium brown					6
	dark brown					7
	purple					8
	black					9
18	**QN VG**	**(+)**	**89**			
	Seed: glossiness					
	absent or weak					1
	medium					2
	strong					3

		English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
19	**(*)**	**QL**	**MG**	**(+)**		**89**			
		Seed: peroxidase reaction							
		absent						DON MARIO 40R16	1
		present						NS 8288	9
20	**(*)**	**PQ**	**VG**	**(+)**		**89**			
		Seed: color of hilum							
		yellow						RA 545	1
		light brown						NS 6448	2
		dark brown						53I53 RSF IPRO	3
		grey							4
		black						DON MARIO 40R16	5
21	**(*)**	**PQ**	**VG**	**(+)**		**89**			
		Seed: imperfect hilum							
		absent						DON MARIO 40R16	1
		imperfect yellow							2
		imperfect black						RA 750	3
22		**QL**	**VG**	**(+)**		**89**			
		Seed: color of hilum funicle							
		same as testa							1
		different to testa							2

8.1 Explanations for individual characteristics

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. 3: Plant: growth type

Test design: this characteristic should preferably be evaluated in a special test with at least 2 replicates (preferably 3 or 4 replicates not more than 300 plants in total) of 30 plants each with approximately 9 cm between plants in the rows. Any edge effect should be avoided. - Plant material: the candidate and example varieties should be grown in groups according to their early flowering time: maturity (characteristic 15 or 16). - Observation: At the beginning of flowering (1 flower on any level of the main stem), the apex of the plant must be identified with a mark.

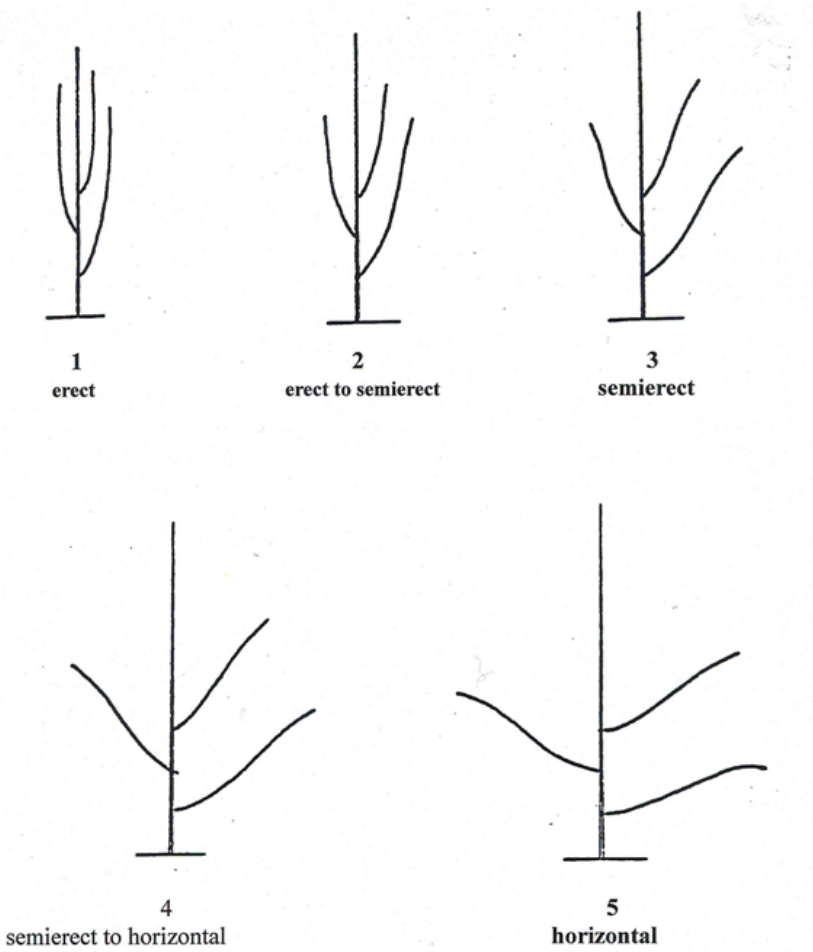
At maturity (free grains in the pod), the number of nodes between the brand and the top of the plant is counted. The average number by variety provides, in comparison with standard varieties, the state of expression of the characteristics.

Determinate growth habit is when the terminal bud ends its growth at the beginning of flowering. All the floral raceme bloom almost at the same time. Most of nodes are formed at that period and there is no change in height after that.

Indeterminate growth habit is when after the beginning of flowering, still continuous his vegetative growth, and the total number of flowers and the final height were not reached. Indeterminate genotypes keep his vegetative growth upward at the tip of the stem for several weeks after flowering begins further down the stem. The upper nodes will flower later.

Indeterminate genotypes are also recognized because their final height and the total number of nodes on the main stem are reached at the end of the maturity period. The lower flower clusters start flowering before the upper ones and the final trifoliate leaf is smaller than the rest.
Semi determinate cultivars have indeterminate type of stem and his vegetative growth keep after beginning of flower but ends after the flowering time.

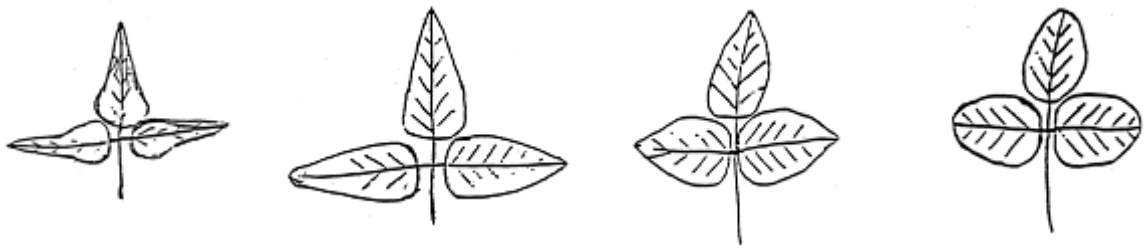
Ad. 4: Plant: attitude of branches



Ad. 5: Plant: color of hairs on main stem

Observation should be made on the middle third of the plant.

Ad. 7: Leaf: shape of the lateral leaflet



1 lanceolate | 2 trullate | 3 ovate | 4 elliptic

Ad. 11: Time of maturity

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

Equivalence table to maturity groups:

Time of maturity	*Maturity groups*
extremely early	GM 000
extremely early to very early	GM 00
very early	GM 0
very early to early	GM I
early	GM II
early to medium	GM III
medium	GM IV
medium to late	GM V
late	GM VI
late to very late	GM VII
very late	GM VIII
very late to extremely late	GM IX
extremely late	GM X

Ad. 13: Pod: color

Observation should be made on pods from the middle third of the plants, including pubescence.
Observation should be made in bright daylight in comparison with other well-known varieties.

Ad. 14: Pod (external seed cavity): Grey coloration

1
absent or very weak

2
weak

3
medium

4
strong

Ad. 15: Seed: 100 seed weight

Observe on harvested material.

Ad. 16: Seed: shape

Observe on harvested material.

Ad. 17: Seed: color of testa

Observe on harvested material. Observation should exclude hilum.

Ad. 18: Seed: glossiness

Observe on harvested material. A lot of 20 seeds in a square of ten by ten, are 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

Observe on harvested material.

Seed: coloration due to peroxidase activity in seed coat

20 seeds per variety should be tested.

The seed coat of the seed should be removed carefully so that no piece of cotyledon remains. To facilitate this procedure, the seed should be placed in water for 2 hours.

The seed coat should be placed in a cell box or in tubes (one tube per seed) and 3 to 4 cm^3 of 0.5% Guayacol (or another reagent might be used as long as they yield the same result) solution should be added. The 0.5% Guayacol solution should be stored in the refrigerator for a period of not longer than 2 months. After having left it at room temperature for one day or more, it can no longer be used.

After 10 minutes waiting time, one drop of 0.1% H_2O_2 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% Guaycacol solution, it is advisable to include some seeds of a reference variety with a positive reaction. The recording of this reaction must be done not longer than 60 seconds after the H_2O_2 was added. It is very important that the observation must not be done longer than 60 seconds because it could lead to wrong results.

The cell box or the tubes could be softly shaken for a better reaction. For a better recording of the observation, the tubes or the cell box should be placed over a white surface.

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

Ad. 20: Seed: color of hilum

Observe on harvested material.

Ad. 21: Seed: imperfect hilum

Observe on harvested material.
Imperfect black: dark center, surrounded by a brown halo
Imperfect yellow: dark yellow center, surrounded by light yellow halo

1
absent

3
imperfect black

Ad. 22: Seed: color of hilum funicle

Observe on harvested material.

1
same as testa

2
different to testa

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
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]

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)

* 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

[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

9. Literature

Taylor, B.H, Caviness C.E, MAY - JUNE 1982, Hilum color variation in soybean seed with Imperfect Black genotype, Crop Science Vol. 22.

Pioli R.N, Morandi E.N. 2003 Morphologic, molecular, and pathogenic characterization of Diaphorthe phaseolorum viariability in the core soybean-producing area of Argentina. Vol 93, Nº 2 136-146.

Buzzell and Buttery, 1969: Inheritance of peroxidase activity on soybean seed coats. Crop Sci., 9, 387-388.

Meier Uwe (Editor), 1997: Growth Stages of Mono and Dicotyledonous Plants, BBCH-Monographs, Blackwell Wissenschafts-Verlag Berlin-Wien (quadrilingual version: English, Francaise, Deutsch, Español).

J.R Wilcox - 1987. Soybeans: Improvement, Production, and Uses.

Objective Description of variety. Soybean (*Glycine max* (L.) Merr.). US Department of Agriculture Agricultural Marketing Service Science and Technology Plant Variety Protection. Beltsville, MD.

Taxonomy: Usda Natural Resources Conservation Service, Plants database, clasification (https://plants.usda.gov/java/ClassificationServlet?source=display&classid=GLMA4).

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	*Glycine max* (L.) Merr.
1.2 Common name	Soya Bean, Soybean

2. Applicant

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

3. Proposed denomination and breeder's reference

Proposed denomination (if available)	
Breeder's reference	

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

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

4.1 Breeding scheme

Variety resulting from:

4.1.1 Crossing

(a) controlled cross [ ]

(please state parent 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) [ ]

4.2.2 Other [ ]
(Please provide details)

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

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

	Characteristics	Example Varieties	Note
5.1 (1)	**Hypocotyl: intensity of anthocyanin coloration**		
	absent or very weak		1 [ ]
	weak		2 [ ]
	medium		3 [ ]
	strong		4 [ ]
	very strong		5 [ ]
5.2 (2)	**Time of beginning of flowering**		
	very early		1 [ ]
	very early to early		2 [ ]
	early	NS 2018	3 [ ]
	early to medium	3806IPRO, DON MARIO 40R16	4 [ ]
	medium	53I53 RSF IPRO, RA 545	5 [ ]
	medium to late	NS 6448	6 [ ]
	late	RA 750	7 [ ]
	late to very late	VC 8080 IPRO	8 [ ]
	very late	NS 8288	9 [ ]
5.3 (3)	**Plant: growth type**		
	determinate	NS 8288	1 [ ]
	semi determinate	NS 6448	2 [ ]
	semi determinate to indeterminate		3 [ ]
	indeterminate	DON MARIO 40R16	4 [ ]
5.4 (4)	**Plant: attitude of branches**		
	erect		1 [ ]
	erect to semi erect		2 [ ]
	semi erect		3 [ ]
	semi erect to horizontal		4 [ ]
	horizontal		5 [ ]

	Characteristics	Example Varieties	Note
5.5 (5)	**Plant: color of hairs on main stem**		
	light brown	53I53 RSF IPRO	1 [ ]
	dark brown	NS 8288	2 [ ]
	grey	RA 750	3 [ ]
5.6 (6)	**Leaf: blistering**		
	absent or very weak		1 [ ]
	very weak to weak		2 [ ]
	weak		3 [ ]
	weak to medium		4 [ ]
	medium		5 [ ]
	medium to strong		6 [ ]
	strong		7 [ ]
	strong to very strong		8 [ ]
	very strong		9 [ ]
5.7 (7)	**Leaf: shape of the lateral leaflet**		
	lanceolate		1 [ ]
	trullate		2 [ ]
	ovate		3 [ ]
	elliptic		4 [ ]
5.8 (8)	**Leaf: size of lateral leaflet**		
	very small		1 [ ]
	very small to small		2 [ ]
	small		3 [ ]
	small to medium		4 [ ]
	medium		5 [ ]
	medium to large		6 [ ]
	large		7 [ ]
	large to very large		8 [ ]
	very large		9 [ ]

	Characteristics	Example Varieties	Note
5.9 (9)	**Leaf: intensity of green color**		
	very light		1 [ ]
	very light to light		2 [ ]
	light		3 [ ]
	light to medium		4 [ ]
	medium		5 [ ]
	medium to dark		6 [ ]
	dark		7 [ ]
	dark to very dark		8 [ ]
	very dark		9 [ ]
5.10 (10)	**Flower: color**		
	white	53I53 RSF IPRO	1 [ ]
	violet	DON MARIO 40R16	2 [ ]
5.11 (11)	**Time of maturity**		
	extremely early		1 [ ]
	extremely early to very early		2 [ ]
	very early		3 [ ]
	very early to early		4 [ ]
	early	NS 2018	5 [ ]
	early to medium	3420, 3806IPRO	6 [ ]
	medium	47MS01, DON MARIO 40R16	7 [ ]
	medium to late	53I53 RSF IPRO, RA 545	8 [ ]
	late	NS 6448	9 [ ]
	late to very late	RA 750	10 [ ]
	very late	VC 8080 IPRO	11 [ ]
	very late to extremely late	NS 8288	12 [ ]
	extremely late		13 [ ]

	Characteristics	Example Varieties	Note
5.12 (12)	**Plant: height**		
	very short		1 [ ]
	very short to short		2 [ ]
	short		3 [ ]
	short to medium		4 [ ]
	medium		5 [ ]
	medium to tall		6 [ ]
	tall		7 [ ]
	tall to very tall		8 [ ]
	very tall		9 [ ]
5.13 (13)	**Pod: color**		
	light brown	NS 2018	1 [ ]
	medium brown	DON MARIO 40R16	2 [ ]
	dark brown		3 [ ]
	yellow brown		4 [ ]
	light grey		5 [ ]
	dark grey		6 [ ]
	black		7 [ ]
5.14 (14)	**Pod (external seed cavity): Grey coloration**		
	absent or very weak	NS 2018	1 [ ]
	weak	RA 750	2 [ ]
	medium	47MS01	3 [ ]
	strong	3420	4 [ ]
	very strong		5 [ ]
5.15 (15)	**Seed: 100 seed weight**		
	very low		1 [ ]
	very low to low		2 [ ]
	low		3 [ ]
	low to medium		4 [ ]
	medium		5 [ ]
	medium to high		6 [ ]
	high		7 [ ]
	high to very high		8 [ ]
	very high		9 [ ]

	Characteristics	Example Varieties	Note
5.16 (16)	**Seed: shape**		
	spherical		1 [ ]
	spherical flattened		2 [ ]
	elongated		3 [ ]
	elongated flattened		4 [ ]
5.17 (17)	**Seed: color of testa**		
	green		1 [ ]
	yellow green		2 [ ]
	yellow	DON MARIO 40R16	3 [ ]
	red		4 [ ]
	light brown		5 [ ]
	medium brown		6 [ ]
	dark brown		7 [ ]
	purple		8 [ ]
	black		9 [ ]
5.18 (18)	**Seed: glossiness**		
	absent or weak		1 [ ]
	medium		2 [ ]
	strong		3 [ ]
5.19 (19)	**Seed: peroxidase reaction**		
	absent	DON MARIO 40R16	1 [ ]
	present	NS 8288	9 [ ]
5.20 (20)	**Seed: color of hilum**		
	yellow	RA 545	1 [ ]
	light brown	NS 6448	2 [ ]
	dark brown	53I53 RSF IPRO	3 [ ]
	grey		4 [ ]
	black	DON MARIO 40R16	5 [ ]
5.21 (21)	**Seed: imperfect hilum**		
	absent	DON MARIO 40R16	1 [ ]
	imperfect yellow		2 [ ]
	imperfect black	RA 750	3 [ ]

	Characteristics	Example Varieties	Note
5.22 (22)	**Seed: color of hilum funicle**		
	same as testa		1 [ ]
	different to testa		2 [ ]

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

6. Similar varieties and differences from these varieties

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

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

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

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:

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 [ ]	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]