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INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

Geneva

DRAFT

POTATO

UPOV Code(s): SOLAN_TUB

Solanum tuberosum L.

GUIDELINES

FOR THE CONDUCT OF TESTS

FOR DISTINCTNESS, UNIFORMITY AND STABILITY

prepared by experts from Germany
to be considered by the
Technical Working Party for Agricultural Crops
at its forty-ninth session, to be held in Saskatoon, Canada,
from 2020-06-22 to 2020-06-26

Disclaimer: this document does not represent UPOV policies or guidance

Alternative names:*

Botanical name	*English*	*French*	*German*	*Spanish*
Solanum tuberosum L.	Potato	Pomme de terre	Kartoffel	Papa, Patata

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 *Solanum tuberosum* L.

2. Material Required

2.1 The competent authorities decide on the quantity and quality of the plant material required for testing the variety and when and where it is to be delivered. Applicants submitting material from a State other than that in which the testing takes place must ensure that all customs formalities and phytosanitary requirements are complied with.

2.2 The material is to be supplied in the form of tubers.

2.3 The minimum quantity of plant material, to be supplied by the applicant, should be:

150 tubers for each growing cycle

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 testing of a variety may be conducted 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 60 plants, which should be divided between at least 2 replicates.

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

3.4.3 The assessment of lightsprout characteristics should be carried out on at least 5 tubers.

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 10 plants or parts of plants taken from each of 10 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 vegetatively propagated 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, a population standard of 1% and an acceptance probability of at least 95% should be applied. In case of a sample size of 60 plants, 2 off-types are allowed. In case of a sample size of 5 tubers, no off-type is 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 or plant 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) Lightsprout: proportion of blue in anthocyanin coloration of base (characteristic 4)
(b) Flower corolla: intensity of anthocyanin coloration on inner side (characteristic 27)
(c) Flower corolla: proportion of blue in anthocyanin coloration on inner side (characteristic 28)
(d) Plant: time of maturity (characteristic 31)
(e) Tuber: color of skin (characteristic 34)

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 In the case of qualitative and pseudo-qualitative characteristics (see Chapter 6.3), all relevant states of expression are presented in the characteristic. However, in the case of quantitative characteristics with 5 or more states, an abbreviated scale may be used to minimize the size of the Table of Characteristics. For example, in the case of a quantitative characteristic with 9 states, the presentation of states of expression in the Test Guidelines may be abbreviated as follows:

State	*Note*
small	3
medium	5
large	7

However, it should be noted that all of the following 9 states of expression exist to describe varieties and should be used as appropriate:

State	*Note*
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

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 8.2

6 (a)-(e) See Explanations on the Table of Characteristics in Chapter 8.1

7 Growth stage key See Explanations on the Table of Characteristics in Chapter 8

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**		**(a)**				
		Lightsprout: size					
		small				Laura	3
		medium				Diamant, Victoria	5
		large				Solist	7
2.	**(*) PQ VG**		**(+) (a)**				
		Lightsprout: shape of base					
		spherical				Albatros	1
		ovoid				Laura	2
		conical				Bintje, Solist	3
		broad cylindrical				Diamant, Innovator	4
		narrow cylindrical				Valfi	5
3.	**(*) QN VG**		**(a), (b)**				
		Lightsprout: anthocyanin coloration of base					
		absent or very weak				Estima	1
		weak				Solist	3
		medium				Arielle	5
		strong				Abbot, Victoria	7
		very strong				Avano	9
4.	**(*) QN VG**		**(+) (a)**				
		Lightsprout: proportion of blue in anthocyanin coloration of base					
		absent or low				Arielle, Desiree, Solist, Victoria	1
		medium				Abbot	2
		high				Agria, Avano	3

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
5. **(*)**	**QN** **VG**	**(+)** **(a)**				
	Lightsprout: pubescence of base					
	absent or very weak				Valfi	1
	weak				Goldmarie	3
	medium				Albatros, Laura	5
	strong				Abbot	7
	very strong				Oxania	9
6.	**QN** **VG**	**(+)** **(a)**				
	Lightsprout: size of tip in relation to base					
	small				Laura	3
	medium				Albatros, King Edward	5
	large				Abbot, Erntestolz	7
7.	**QN** **VG**	**(+)** **(a)**				
	Lightsprout: habit of tip					
	closed				Laura	1
	intermediate				Arielle, Rita	3
	open				Diamant, Solist	5
8.	**QN** **VG**	**(a), (b)**				
	Lightsprout: anthocyanin coloration of tip					
	absent or very weak				Estima, Innovator	1
	weak				Solist	3
	medium				Laura, Spunta	5
	strong				Agria	7
	very strong				Valfi	9
9.	**QN** **VG**	**(+)** **(a)**				
	Lightsprout: pubescence of tip					
	absent or very weak				Goldmarie	1
	weak				Laura, Valfi	3
	medium				Albatros	5
	strong				Abbot	7
	very strong				Camilla	9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
10. (*)	**QN VG**	**(a)**				
	Lightsprout: number of root tips					
	few				Estima, Solist	3
	medium				Arielle, Bintje	5
	many				Innovator	7
11.	**QN VG**	**(+) (a)**				
	Lightsprout: length of lateral shoots					
	short				Laura, Producent	3
	medium				Estima, Princess	5
	long				Spunta	7
12.	**QN VG**	**(+)**	**51-69**			
	Plant: foliage structure					
	stem type				Agria, Estima	1
	intermediate type				Premiere	2
	leaf type				Kennebec	3
13. (*)	**QN VG**	**(+)**	**51-69**			
	Plant: growth habit					
	upright				Victoria	3
	semi-upright				Desiree, Secura	5
	spreading				Solist	7
14. (*)	**QN VG**	**(+) (b)**	**51-69**			
	Stem: anthocyanin coloration					
	absent or very weak				Estima	1
	weak				Victoria	3
	medium				Laura, Saturna	5
	strong				Desiree	7
	very strong				Valfi	9
15.	**QN VG**	**(c)**	**51-69**			
	Leaf: outline size					
	small				Kingston	3
	medium				Laura	5
	large				Kennebec	7

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
16.	**QN VG**	**(+) (c)**	**51-69**			
	Leaf: openness					
	closed				Albatros	1
	intermediate				Premiere, Solist	3
	open				Goldmarie	5
17.	**QN VG**	**(+) (c)**	**51-69**			
	Leaf: presence of secondary leaflets					
	weak				Goldmarie	3
	medium				Solist	5
	strong				Victoria	7
18.	**QN VG**	**(+)**	**51-69**			
	Leaf: green color					
	light				Solist	3
	medium				Victoria	5
	dark				Spunta	7
19.	**QN VG**	**(b), (c)**	**51-69**			
	Leaf: anthocyanin coloration of midrib on upper side					
	absent or very weak				Solist	1
	weak				Avano, Russet Burbank	3
	medium				Laura	5
	strong				Romanze	7
	very strong				Bildtstar , Roseval	9
20.	**QN VG**	**(+) (c)**	**51-69**			
	Second pair of lateral leaflets: width in relation to length					
	narrow				Innovator, Russet Burbank	3
	medium				Desiree	5
	broad					7

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
21.		**QN VG**	**(+)**	**51-69**			
		Terminal and lateral leaflets: frequency of coalescence					
		absent or very low				Courage	1
		medium				Goldmarie	3
		very high				Cardinia	5
22.		**QN VG**	**(+)** **(b)**	**55**			
		Flower bud: anthocyanin coloration					
		absent or very weak				Solist	1
		weak				Panda	3
		medium				Victoria	5
		strong				Osprey	7
		very strong				Valfi	9
23.	**(*)**	**QN VG**	**(+)**	**60-69**			
		Plant: frequency of inflorescences					
		absent or very low				King Edward, Rosalind	1
		low				Arielle	3
		medium				Laura, Rita	5
		high				Agria, Innovator	7
		very high				Sibu	9
24.		**QN VG**	**(+)** **(d)**	**60-69**			
		Inflorescence: size					
		small				Estima, Solist	3
		medium				Rubesse	5
		large				Innovator	7
25.		**QN VG**	**(b), (d)**	**60-69**			
		Inflorescence: anthocyanin coloration of peduncle					
		absent or very weak				Estima, Solist	1
		weak				Victoria	3
		medium				Saturna	5
		strong				Desiree	7
		very strong				Blauer St. Galler	9

		English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
26.		**QN**	**VG**		**(d)**	**60-69**			
		Flower corolla: size							
		very small							1
		small						Avano, Sommergold	3
		medium						Laura	5
		large						Innovator	7
		very large						Roseval	9
27.	**(*)**	**QN**	**VG**		**(b), (d)**	**60-69**			
		Flower corolla: intensity of anthocyanin coloration on inner side							
		absent or very weak						Solist	1
		weak						Laura, Pirol, Secura	3
		medium						Osprey, Quadriga	5
		strong						Courage, Valfi	7
		very strong						Ramona	9
28.	**(*)**	**QN**	**VG**	**(+)**	**(d)**	**60-69**			
		Flower corolla: proportion of blue in anthocyanin coloration on inner side							
		absent or very low						Laura, Osprey	1
		medium						Courage, Secura	2
		high						Pirol, Quadriga, Valfi	3
29.	**(*)**	**QN**	**VG**		**(d)**	**60-69**			
		Flower corolla: extent of anthocyanin coloration on inner side							
		absent or very small							1
		small						Laura	3
		medium						Pirol	5
		large						Panda	7
		very large						Courage	9

		English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
30.		**QN**	**VG**			**65-69**			
		Plant: height							
		very short						Mimi	1
		medium						Arielle, Leyla	3
		very tall						Panda	5
31.	**(*)**	**QN**	**MG**	**(+)**		**97**			
		Plant: time of maturity							
		very early						Leyla, Solist	1
		early						Courage	3
		medium						Laura	5
		late						Avano	7
		very late						Kuras, Producent	9
32.	**(*)**	**QN**	**VG**	**(+)**	**(e)**	**99**			
		Tuber: shape							
		round						Kuras	1
		short-oval						Courage	2
		oval						Diamant, Rubesse	3
		long-oval						Innovator	4
		long						Spunta	5
		very long						Pompadour	6
33.		**QN**	**VG**		**(e)**	**99**			
		Tuber: depth of eyes							
		very shallow						Nadine	1
		shallow							3
		medium						Courage, Erntestolz	5
		deep						Kuras, Sommergold	7
		very deep							9

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
34. (*)	**PQ VG**	**(e)**	**99**			
	Tuber: color of skin					
	light beige				Nadine	1
	yellow				Agria, Solist	2
	reddish brown				SF Balu	3
	light red				Rosalind	4
	medium red				Laura	5
	dark red				Romanze	6
	red parti-colored				Cara	7
	blue				Valfi	8
	blue parti-colored				Catriona, Kestrel	9
35.	**QN VG**	**(e)**	**99**			
	Tuber: smoothness of skin					
	smooth				SF Balu	1
	medium				Solist	2
	rough				Ivory Russet	3
36. (*)	**PQ VG**	**(+) (e)**	**99**			
	Tuber: color of base of eye					
	white				Nadine	1
	yellow				Agria, Solist	2
	red				Quarta, Romanze	3
	blue				Purple Majestry	4
37. (*)	**PQ VG**	**(+) (e)**	**99**			
	Tuber: color of flesh					
	white				Kuras, Russet Burbank	1
	cream				Desiree, Estima	2
	light yellow				Diamant, Solist	3
	medium yellow				Bildtstar , Quarta	4
	dark yellow				Laura, Princess	5
	red				Red Emmallie	6
	red parti-colored				Early Rose	7
	blue				Purple Majestry	8
	blue parti-colored				Valfi	9

8. Explanations on the Table of Characteristics

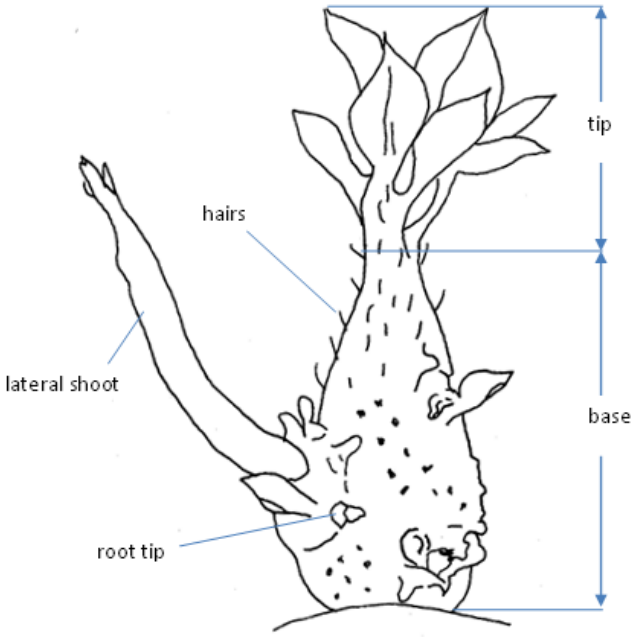
8.1 Explanations covering several characteristics

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

(a) Observations should be made on lightsprouts grown according to the following method:
The spectrum and the intensity of the light source are the most important factors for the expression of lightsprouts characteristics. This spectrum is defined by the type of lamps and the voltage used. When extremes of temperature are avoided, the influence of the temperature on the speed of development is small. A good expression of the characteristics is obtained when the lightsprouts are grown in a light-sealed cabinet at room temperature under continuous light provided by small incandescent bulbs (6V AC/0.05 A) giving an intensity of 7 to 11 lux (approximately 8 bulbs per square meter, 20-30 cm above the tubers).

Observations should be made in a room with indirect day light when the characteristics 7 (habit of tip) and 11 (length of lateral shoots) have reached their maximum differentiation. Example varieties should be used to determine the optimal stage for observations.

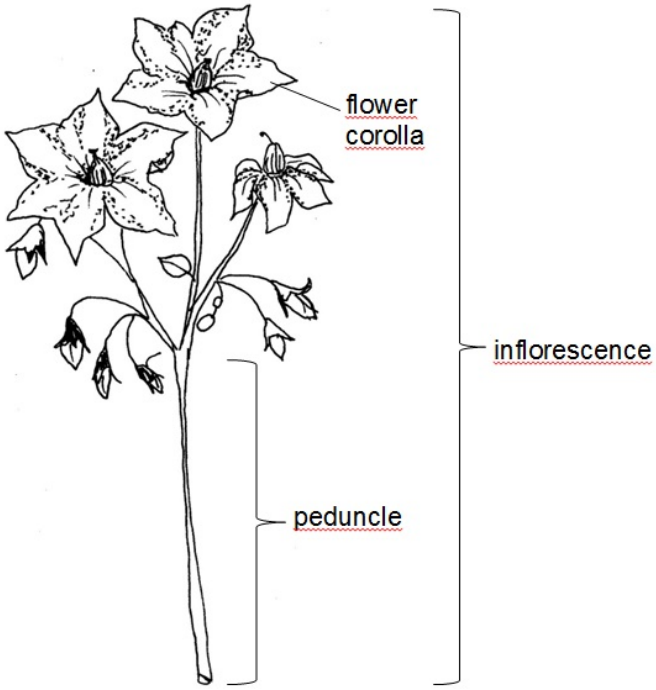
The development of lightsprouts depends on the time of test after harvest. Development increases with age of tubers. If the test is started already about 100 days after harvest, the appropriate stage for observations might be reached only after about 14 weeks due to dormancy and/or slow development. If the test is started later, the appropriate stage for observations might be reached after a shorter period.



(b) The intensity of the anthocyanin coloration should be observed. The extent and the distribution should not be considered.

(c) Observations should be made on fully developed leaves from the center of the plant. One leaf from each of 10 plants should be picked from a main stem midway between the top and the bottom of the plant.

(d)



Observations of flower color should be made on the inner side of freshly opened flowers, the best moment is early in the morning.

(e) Observations should be made within two weeks after harvest. Tubers should be shielded from sunlight as this may have an effect on the color.

8.2 Explanations for individual characteristics

Ad. 2: Lightsprout: shape of base

1 spherical | 2 ovoid | 3 conical | 4 broad cylindrical | 5 narrow cylindrical

Ad. 4: Lightsprout: proportion of blue in anthocyanin coloration of base

The color of anthocyanin results from a red and a blue component. If the proportion of blue is low the anthocyanin appears red-violet. If the proportion of blue is high the anthocyanin appears blue-violet.

Ad. 5: Lightsprout: pubescence of base

It is recommended to use a magnifier.

Pubescence is not always evenly distributed over the light sprout. The total amount of pubescence of the base should be averaged over the total area of the light sprout base.

Ad. 6: Lightsprout: size of tip in relation to base

The size of the tip should be examined in relation to the size of the base. The following table gives an indication between notes and ratio between size of tip and base

note	ratio size of tip : size of base
1	10:90
2	20:80
3	30:70
4	40:60
5	50:50
6	60:40
7	70:30
8	80:20
9	90:10

Ad. 7: Lightsprout: habit of tip

1
closed

3
intermediate

5
open

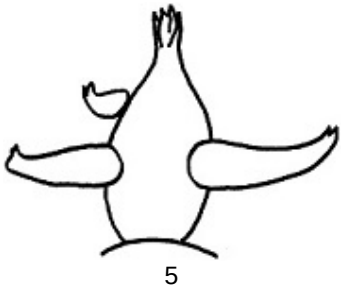
Ad. 9: Lightsprout: pubescence of tip

It is recommended to use a magnifier.

Pubescence is not always evenly distributed over the light sprout. The total amount of pubescence of the tip should be averaged over the total area of the light sprout tip.

Ad. 11: Lightsprout: length of lateral shoots

3
short

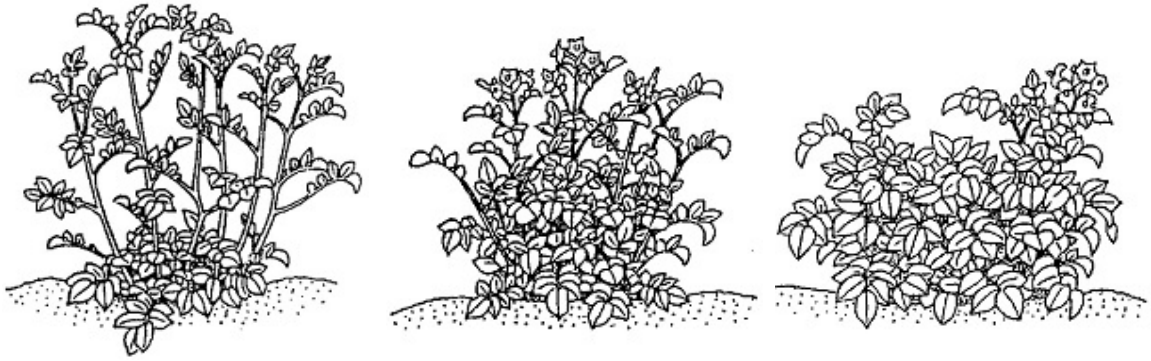


5
medium

7
long

Ad. 12: Plant: foliage structure

Stem type: foliage open, stems clearly visible
Intermediate type: foliage half open, stems partly visible
Leaf type: foliage closed, stems not or hardly visible

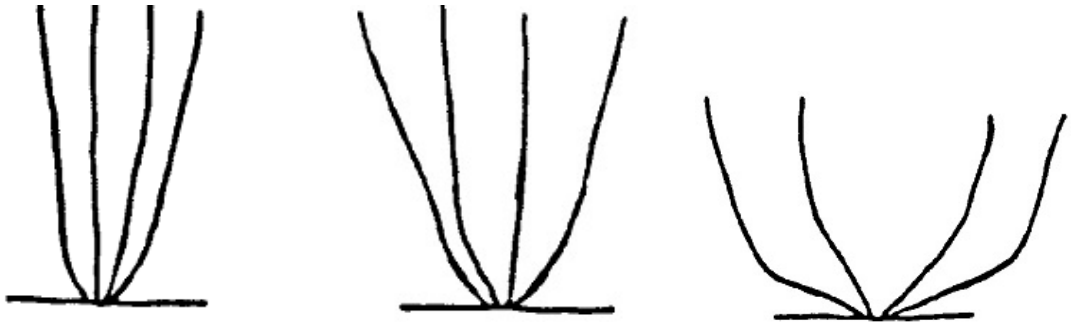


1
stem type

2
intermediate type

3
leaf type

Ad. 13: Plant: growth habit



3
upright

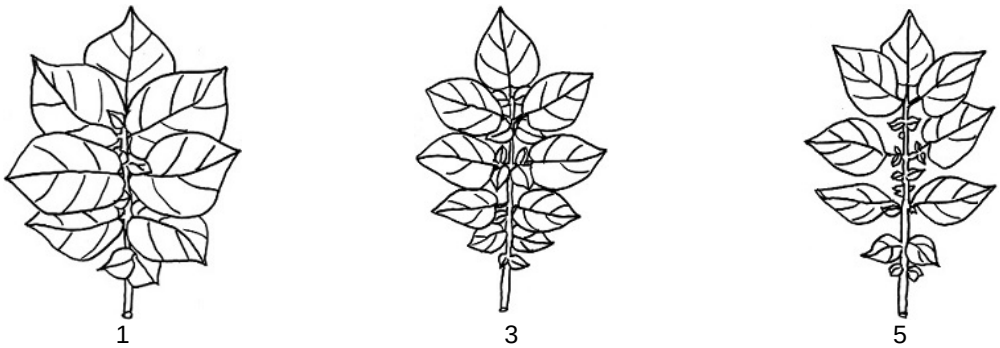
5
semi-upright

7
spreading

Ad. 14: Stem: anthocyanin coloration

Intensity should be observed on the lower three quarter of the stems.

Ad. 16: Leaf: openness

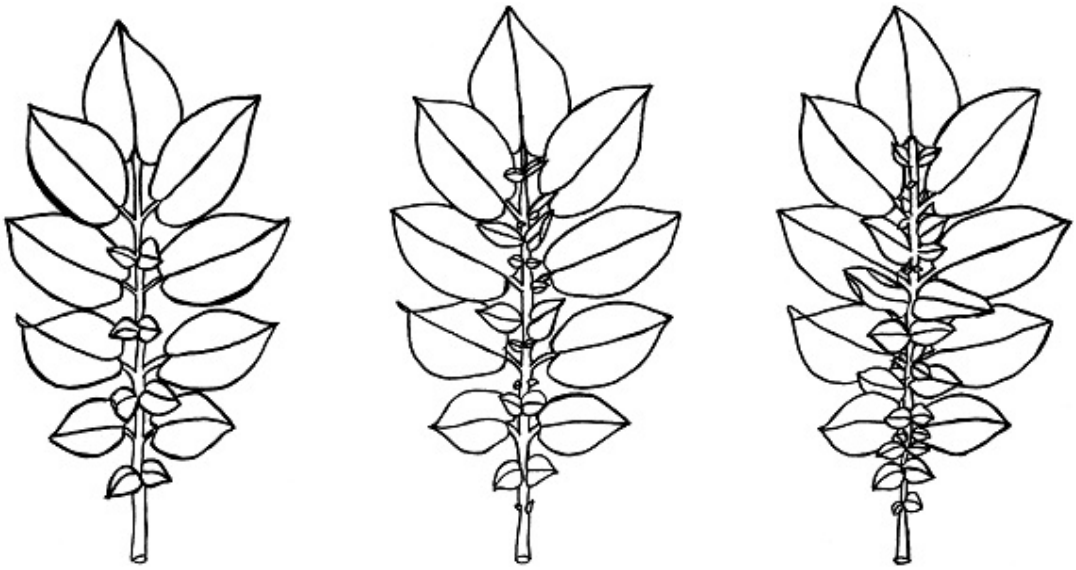


1
closed

3
intermediate

5
open

Ad. 17: Leaf: presence of secondary leaflets



3
weak

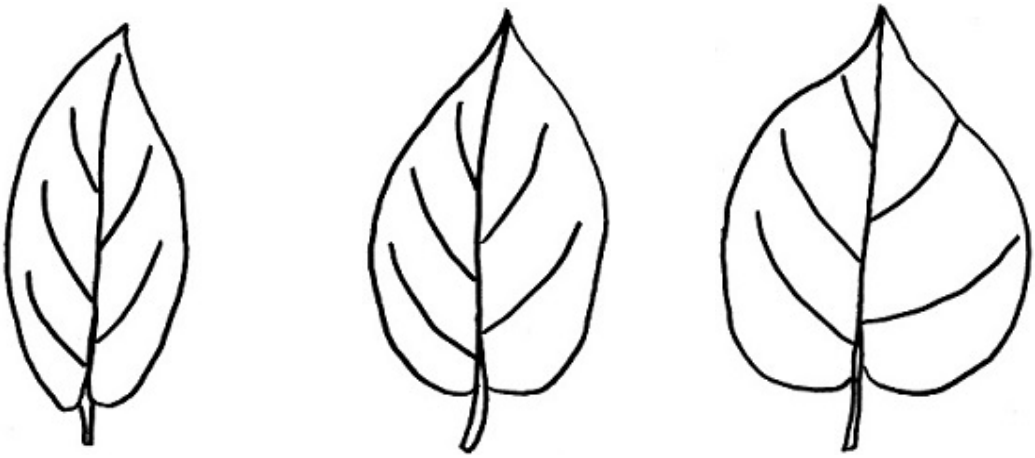
5
medium

7
strong

Ad. 18: Leaf: green color

Observations should be made on fully developed leaves in the center of the plant when it is slightly clouded.

Ad. 20: Second pair of lateral leaflets: width in relation to length



3
narrow

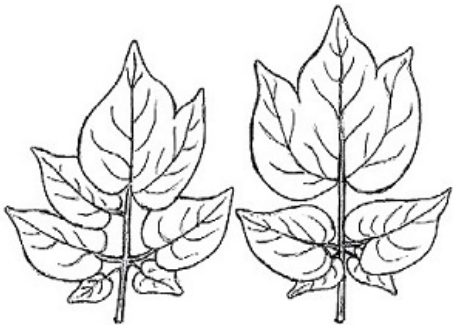
5
medium

7
broad

Ad. 21: Terminal and lateral leaflets: frequency of coalescence

Observations should be made on fully developed leaves in the center of the plant (middle third).

not coalescent



coalescent

Ad. 22: Flower bud: anthocyanin coloration

The observations should be made on fully developed buds before the corolla is visible.

Ad. 23: Plant: frequency of inflorescences

During the flowering period the plots are observed several times and the frequency is scored. The highest score reached is noted as the final state of expression.

Ad. 24: Inflorescence: size

The general impression of the whole plot is observed.

Ad. 28: Flower corolla: proportion of blue in anthocyanin coloration on inner side

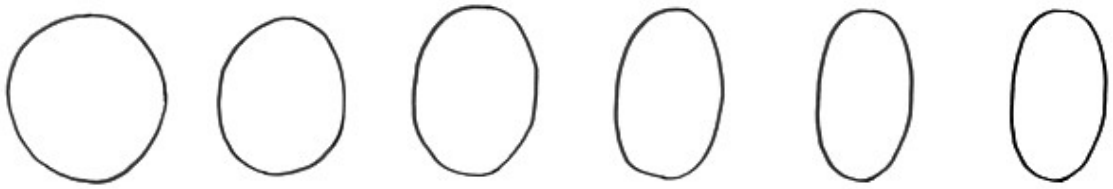
The color of anthocyanin results from a red and a blue component. If the proportion of blue is low the anthocyanin appears red-violet. If the proportion of blue is high the anthocyanin appears blue-violet.

Ad. 31: Plant: time of maturity

Time of maturity is reached when 80% of the leaves are dead.

Ad. 32: Tuber: shape

The predominant shape should be observed.



1	2	3	4	5	6
round	short-oval	oval	long-oval	long	very long

Ad. 36: Tuber: color of base of eye

Not applicable for varieties with particolored skin (note 7 an 9 in characteristic 34: Tuber: color of skin).

Ad. 37: Tuber: color of flesh

Observations should be made on freshly cut tubers. Already a few minutes after cutting the tuber, the flesh may be discolored.

8.3 **Phenological growth stages and BBCH-identification keys of potato** (Meier et al., 1997)

Codes 2digit	Codes 3digit	Description
Principal growth stage 0: Sprouting/Germination		
…		
Principal growth stage 1: Leaf development		
…		
Principal growth stage 2: Formation of basal side shoots below and above soil surface (main stem)		
…		
Principal growth stage 3: Main stem elongation (crop cover)		
…		
Principal growth stage 4: Tuber formation		
…		
Principal growth stage 5: Inflorescence (cyme) emergence		
51	501	First individual buds (1–2 mm) of first inflorescence visible (main stem)
55	505	Buds of first inflorescence extended to 5 mm
59	509	First flower petals of first inflorescence visible
…		
Principal growth stage 6: Flowering		
60	600	First open flowers in population
61	601	Beginning of flowering about 10% of flowers in the first inflorescence open (main stem)
…		
65	605	Full flowering: 50% of flowers in the first inflorescence open
…		
68	608	80% of flowers in the first inflorescence open
69	609	End of flowering in the first inflorescence
…		
Principal growth stage 7: Development of fruit		
…		
Principal growth stage 8: Ripening of fruit and seed		
…		
Principal growth stage 9: Senescence		
91	901	Beginning of leaf yellowing
93	903	Most of the leaves yellowish
95	905	50% of the leaves brownish
97	907	Leaves and stem dead, stems bleached and dry
99	909	Harvested product

9. Literature

Meier, U. (ed.), 1997: Growth stages of mono- and dicotyledonous plants / Entwicklungsstadien mono- und dikotyler Pflanzen / Estadios de las plantas mono- y dicotiledóneas / Stades phénologiques des mono- et dicotylédones cultivées: BBCH-Monograph. Blackwell Wissenschaftsverlag, Berlin, Wien.

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	*Solanum tuberosum* L.
1.2 Common name	Potato

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 Vegetative propagation

(a) Tuber [ ]
(b) Other (state method) [ ]

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 (4)	**Lightsprout: proportion of blue in anthocyanin coloration of base**		
	absent or low	Arielle, Desiree, Solist, Victoria	1 [ ]
	medium	Abbot	2 [ ]
	high	Agria, Avano	3 [ ]
5.2 (23)	**Plant: frequency of inflorescences**		
	absent or very low	King Edward, Rosalind	1 [ ]
	low	Arielle	3 [ ]
	medium	Laura, Rita	5 [ ]
	high	Agria, Innovator	7 [ ]
	very high	Sibu	9 [ ]
5.3 (27)	**Flower corolla: intensity of anthocyanin coloration on inner side**		
	absent or very weak	Solist	1 [ ]
	weak	Laura, Pirol, Secura	3 [ ]
	medium	Osprey, Quadriga	5 [ ]
	strong	Courage, Valfi	7 [ ]
	very strong	Ramona	9 [ ]
5.4 (28)	**Flower corolla: proportion of blue in anthocyanin coloration on inner side**		
	absent or very low	Laura, Osprey	1 [ ]
	medium	Courage, Secura	2 [ ]
	high	Pirol, Quadriga, Valfi	3 [ ]
5.5 (31)	**Plant: time of maturity**		
	very early	Leyla, Solist	1 [ ]
	early	Courage	3 [ ]
	medium	Laura	5 [ ]
	late	Avano	7 [ ]
	very late	Kuras, Producent	9 [ ]

	Characteristics	Example Varieties	Note
5.6 (32)	**Tuber: shape**		
	round	Kuras	1 [ ]
	short-oval	Courage	2 [ ]
	oval	Diamant, Rubesse	3 [ ]
	long-oval	Innovator	4 [ ]
	long	Spunta	5 [ ]
	very long	Pompadour	6 [ ]
5.7 (34)	**Tuber: color of skin**		
	light beige	Nadine	1 [ ]
	yellow	Agria, Solist	2 [ ]
	reddish brown	SF Balu	3 [ ]
	light red	Rosalind	4 [ ]
	medium red	Laura	5 [ ]
	dark red	Romanze	6 [ ]
	red parti-colored	Cara	7 [ ]
	blue	Valfi	8 [ ]
	blue parti-colored	Catriona, Kestrel	9 [ ]
5.8 (36)	**Tuber: color of base of eye**		
	white	Nadine	1 [ ]
	yellow	Agria, Solist	2 [ ]
	red	Quarta, Romanze	3 [ ]
	blue	Purple Majestry	4 [ ]
5.9 (37)	**Tuber: color of flesh**		
	white	Kuras, Russet Burbank	1 [ ]
	cream	Desiree, Estima	2 [ ]
	light yellow	Diamant, Solist	3 [ ]
	medium yellow	Bildtstar , Quarta	4 [ ]
	dark yellow	Laura, Princess	5 [ ]
	red	Red Emmallie	6 [ ]
	red parti-colored	Early Rose	7 [ ]
	blue	Purple Majestry	8 [ ]
	blue parti-colored	Valfi	9 [ ]

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

6. Similar varieties and differences from these varieties

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

Denomination(s) of variety(ies) similar to your	Characteristic(s) in which your candidate variety differs	Describe the expression of the characteristic(s) for the	Describe the expression of the characteristic(s) for **your**
Example	*Tuber: shape*	*short-oval*	*long-oval*

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]