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INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS
GENEVA

DRAFT**SWEET POTATO**

UPOV Code: IPOMO_BAT

Ipomoea batatas (L.) Lam.**GUIDELINES****FOR THE CONDUCT OF TESTS****FOR DISTINCTNESS, UNIFORMITY AND STABILITY***prepared by an expert from the Republic of Korea**to be considered by the Technical Working Party for Agricultural Crops
at its thirty-fifth session, to be held in Beijing, China, from July 3 to 7, 2006*

Alternative Names:*

<i>Botanical name</i>	<i>English</i>	<i>French</i>	<i>German</i>	<i>Spanish</i>
<i>Ipomoea batatas</i> (L.) Lam	Sweet Potato	Patate	Batate	Batata, Patata dulce

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 vegetatively propagated varieties of *Ipomoea batatas* (L.) Lam.

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 roots tuber, within the medium size of the variety.

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

50 storage roots for each year of testing.

2.4 The plant material (storage roots) supplied should be visibly healthy, not lacking in vigor, nor affected by any important pest or disease.

2.5 The plant material should not have undergone any treatment which would affect the expression of the characteristics of the variety, unless the competent authorities allow or request such treatment. If it has been treated, full details of the treatment must be given.

3. Method of Examination

3.1 *Number of Growing Cycles*

The minimum duration of tests should normally be single growing cycles.

3.2 *Testing Place*

Tests are normally conducted at one place. In the case of tests conducted at more than one place, guidance is provided in TGP/9 "Examining Distinctness".

3.3 *Conditions for Conducting the Examination*

3.3.1 Type of observation

The recommended method of observing the characteristic is indicated by the following key in the second column of the Table of Characteristics:

MG: single measurement of a group of plants or parts of plants
MS: measurement of a number of individual plants or parts of plants
VG: visual assessment by a single observation of a group of plants or parts of plants
VS: visual assessment by observation of individual plants or parts of plants”

3.4 *Test Design*

3.4.1 Each test should be designed to result in a total of at least 120 plants, which should be divided between at least three 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.

3.5 *Number of Plants / Parts of Plants to be Examined*

Unless otherwise indicated, all observations should be made on 30 plants or parts taken from each of 30 plants.

3.6 *Additional Tests*

Additional tests, for examining relevant characteristics, may be established.

4. Assessment of Distinctness, Uniformity and Stability

4.1 *Distinctness*

4.1.1 General Recommendations

It is of particular importance for users of these Test Guidelines to consult the General Introduction prior to making decisions regarding distinctness. However, the following points are provided for elaboration or emphasis in these Test Guidelines.

4.1.2 Consistent Differences

The differences observed between varieties may be so clear that more than one growing cycle is not necessary. In addition, in some circumstances, the influence of the environment is not such that more than a single growing cycle is required to provide assurance that the differences observed between varieties are sufficiently consistent. One means of ensuring that a difference in a characteristic, observed in a growing trial, is sufficiently consistent is to examine the characteristic in at least two independent growing cycles.

4.1.3 Clear Differences

Determining whether a difference between two varieties is clear depends on many factors, and should consider, in particular, the type of expression of the characteristic being examined, i.e. whether it is expressed in a qualitative, quantitative, or pseudo-qualitative

manner. Therefore, it is important that users of these Test Guidelines are familiar with the recommendations contained in the General Introduction prior to making decisions regarding distinctness.

4.2 *Uniformity*

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:

For the assessment of uniformity, a population standard of 0.1% and an acceptance probability of at least 95% should be applied. In the case of a sample size of 120 plants, 1 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 tested, either by growing a further generation, or by testing a new seed or plant stock to ensure that it exhibits the same characteristics as those shown by the previous material supplied.

5. Grouping of Varieties and Organization of the Growing Trial

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

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

5.3 The following have been agreed as useful grouping characteristics:

- (a) Plant: type (characteristic 1)
- (b) Leaf: shape (characteristic 9)
- (c) Leaf: color (characteristic 12)
- (d) Storage root: shape (characteristic 16)
- (e) Storage root: predominant skin color (characteristic 18)
- (f) Storage root: predominant flesh color (characteristic 19)

5.4 Guidance for the use of grouping characteristics, in the process of examining distinctness, is provided through the General Introduction.

6. Introduction to the Table of Characteristics

6.1 *Categories of Characteristics*

6.1.1 Standard Test Guidelines Characteristics

Standard Test Guidelines characteristics are those which are approved by UPOV for examination of DUS and from which members of the Union can select those suitable for their particular circumstances.

6.1.2 Asterisked Characteristics

Asterisked characteristics (denoted by *) are those included in the Test Guidelines which are important for the international harmonization of variety descriptions and should always be examined for DUS and included in the variety description by all members of the Union, except when the state of expression of a preceding characteristic or regional environmental conditions render this inappropriate.

6.2 *States of Expression and Corresponding Notes*

States of expression are given for each characteristic to define the characteristic and to harmonize descriptions. Each state of expression is allocated a corresponding numerical note for ease of recording of data and for the production and exchange of the description.

6.3 *Types of Expression*

An explanation of the types of expression of characteristics (qualitative, quantitative and pseudo-qualitative) is provided in the General Introduction.

6.4 *Example Varieties*

Where appropriate, example varieties are provided to clarify the states of expression of each characteristic.

6.5 *Legend*

(*) Asterisked characteristic – see Chapter 6.1.2

QL: Qualitative characteristic – see Chapter 6.3

QN: Quantitative characteristic – see Chapter 6.3

PQ: Pseudo-qualitative characteristic – see Chapter 6.3

MG: single measurement of a group of plants or parts of plants – see Chapter 3.3.2

MS: measurement of a number of individual plants or parts of plants – see Chapter 3.3.2

VG: visual assessment by a single observation of a group of plants or parts of plants – Chapter 3.3.2

VS: visual assessment by observation of individual plants or parts of plants” –see Chapter 3.3.2

A: spaced plants
B: row plot
C: special test

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

(+) 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. (*)	VG					
	Plant: type					
QN	erect				Sinchunmi	1
	semi-erect				Younmi	2
	spreading				Yulmi	3
2.	MS					
	Vine: length of the main vines					
QN	short				Sinchunmi	3
	medium				Yulmi	5
	long				Zami	7
3.	MS					
	Vine: internode diameter					
QN	(a) very thin				Zami	1
	thin				Sinchunmi	3
	intermediate				Yulmi	5
	thick				Shinyulmi	7
	very thick				Chinmi	9
4.	MS					
	Vine: internode length					
QN	(a) very short				Sinchunmi	1
	short				Younmi	3
	intermediate				Yulmi	5
	long				Shinhwangmi	7
	very long				Shinyulmi	9

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
5. (*)	VG					
	Vine: color					
PQ	(b)					
	light green				Yulmi	1
	green				Singeonmi	2
	mostly purple				Shinyulmi	3
	purple				Hayanmi	4
	dark purple					5
6. (*)	VG					
	Vine: tip color					
PQ	(b)					
	light green					1
	green				Yulmi	2
	light purple				Sinjami	3
	purple				Hayanmi	4
7. (*)	VG					
	Vine: node color					
PQ	(b)					
	light green					1
	green				Yulmi	2
	light purple					3
	purple				Hayanmi	4
8.	VS					
	Vine: tip pubescence					
QN	(b)					
	absent or very weak					1
	weak				Yulmi	3
	medium					5
	strong				Zami	7
	very strong					9

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
9. (*) (+)	VG Leaf: shape					
QL (b)	round					1
	reniform (kidney shape)					2
	cordate (heart shape)				Yulmi	3
	triangular					4
	hastate (spear shape)					5
	lobe				Sinchunmi	6
	almost divide					7
10. (+)	VG Leaf: type of lobes					
PQ (b)	absent or very slight					1
	slight				Sinchunmi	2
	moderate					3
	deep					4
	very deep					55
11. (+)	VG Leaf: number of lobes					
PQ (b)	one					1
	three				Sinchumi	2
	five					3
	seven					4
	nine					5

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
12. (*)	VG					
	Leaf: color					
PQ	(b)	yellow green				1
		green			Yulmi	2
		grey green				3
		light purple			Hayanmi	4
		purple				5
13. (*) (+)	VG					
	Leaf: anthocyanin coloration and distribution of abaxial leaf vein					
QL	(b)	green			Yulmi	1
		purple spot at base of main rib				2
		purple spot in several veins				3
		main rib purple			Hayanmi	4
		all veins partially purple				5
		all veins mostly purple				6
14. (*)	VG					
	Petiole: anthocyanin coloration and distribution					
QL	(b)	green			Yulmi	1
		green with purple near leaf				2
		green with purple strip				3
		purple with green tint			Hayanmi	4
		purple				5

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
15.						
(+)	VG Petiole: length					
QN	(b) very short				Sinchunmi	1
	short					3
	intermediate				Yulmi	5
	long					7
	very long				Shinmi	9
16.						
(*)	VG Storage root: shape					
(+)						
PQ	(c) round					1
	round elliptic				Geonmi	2
	elliptic				Yulmi	3
	ovate					4
	obovate					5
	oblong					6
	long oblong					7
	long elliptic				Shinyulmi	8
	long irregulate or curved					9
17.						
MS	Storage root: cortex thickness					
QN	(c) very thin					1
	thin				Yulmi	3
	intermediate					5
	thick				Younmi	7
	very thick					9

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
18. (*)	VG	Storage root: predominant skin color				
PQ	(c)	white				1
		cream			Chinmi	2
		yellow				3
		orange				4
		brownish orange				5
		pink			Yulmi	6
		red			Shinhwangmi	7
		purple red				8
		dark purple			Zami	9
19. (*)	VG	Storage root: predominant flesh color				
PQ	(c)	white			Hayanmi	1
		cream				2
		dark cream				3
		pale yellow			Yulmi	4
		yellow			Shinyulmi	5
		pale orange			Sinhwangmi	6
		orange			Juhwangmi	7
		dark orange				8
		purple			Zami	9
20. (*)	MS	Storage root: hardness				
QN	(c)	soft			Sinhwangmi	3
		medium			Gunmi	5
		hard			Yulmi	7

8. Explanations on the Table of Characteristics

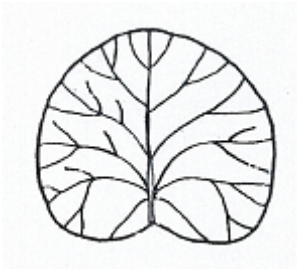
8.1 *Explanations covering several characteristics*

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

- (a) Vine internodes and diameter should be checked with average expression of three internodes located in middle section of vine
- (b) All the characteristics except storage roots should be made after 90 days from planting
- (c) All the root storage characteristics should be made after harvest

8.2 *Explanations for individual characteristics*

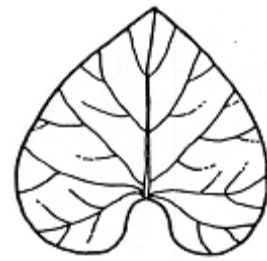
Ad. 9: Leaf: shape



1
round



2
reniform



3
cordate



4
triangular



5
hastate



6
lobe



7
almost divide

Ad. 10: Leaf: type of lobes



1 absent or very slight 2 slight 3 moderate 4 deep 5 very deep

Ad. 11: Leaf: number of lobes



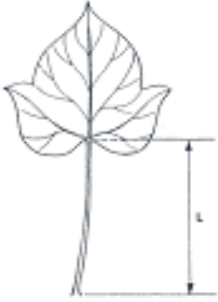
1 one 2 three 3 five 4 seven 5 nine

Ad. 13: Leaf: anthocyanin coloration and distribution of abaxial leaf vein

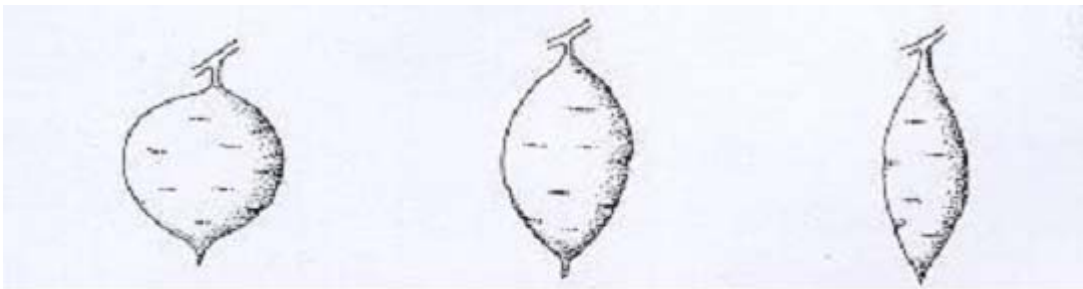


2 purple spot at base of main rib 3 main rib purple 4 all veins partially purple 5 all veins mostly purple

Ad. 15: Petiole length



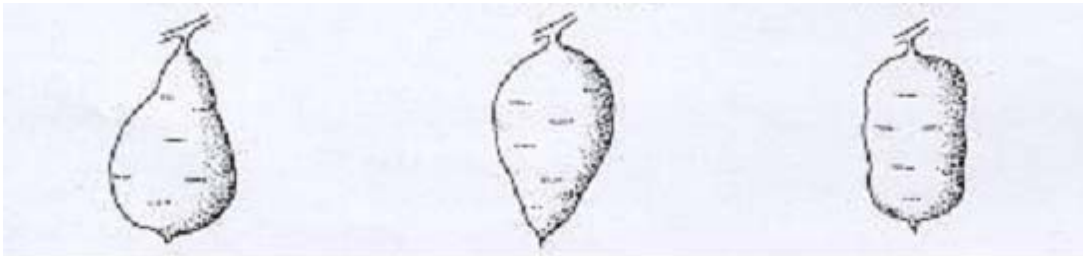
Ad. 16: Storage root: shape



1
round

2
round elliptic

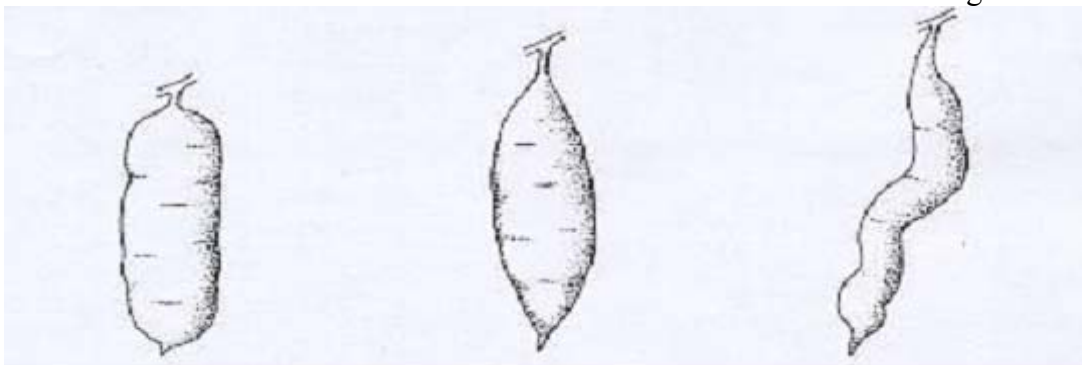
3
elliptic



4
ovate

5
obovate

6
oblong



7
long oblong

8
long elliptic

9
long irregular or curved

9. Literature

NSMO. 2000. Test Guideline for Sweetpotato. NSMO/RDA. Rep. of Korea. pp12.

Zosimo Huaman. 1992. Morphologic Identification of Duplicates in Collections of *Ipomoea batatas*. CIP Research guide 36. CIP pp28.

Mokpo experiment station/RDA. 2002. Production and use of sweetpotato. Mokpo experiment station/RDA. pp214

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="Ipomoea batatas (L.) Lam."/>	
1.2 Common name	<input type="text" value="Sweet Potato"/>	
2. Applicant		
Name	<input type="text"/>	
Address	<input type="text"/>	
Telephone No.	<input type="text"/>	
Fax No.	<input type="text"/>	
E-mail address	<input type="text"/>	
Breeder (if different from applicant)	<input type="text"/>	
3. Proposed denomination and breeder's reference		
Proposed denomination (if available)	<input type="text"/>	
Breeder's reference	<input type="text"/>	

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
<p>#4. Information on the breeding scheme and propagation of the variety</p> <p>4.1 Breeding scheme</p> <p>Variety resulting from:</p> <p>4.1.1 Crossing</p> <p>(a) controlled cross <input type="checkbox"/> [] (please state parent varieties)</p> <p>(b) partially known cross <input type="checkbox"/> [] (please state known parent variety(ies))</p> <p>(c) unknown cross <input type="checkbox"/> []</p> <p>4.1.2 Mutation <input type="checkbox"/> [] (please state parent variety)</p> <p>4.1.3 Discovery and development <input type="checkbox"/> [] (please state where and when discovered and how developed)</p> <p>4.1.4 Other <input type="checkbox"/> [] (please provide details)</p> <div data-bbox="479 1213 1166 1310" style="border: 1px solid black; height: 46px; width: 423px; margin-left: 200px;"></div>		

Authorities may allow certain of this information to be provided in a confidential section of the Technical Questionnaire.

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:	
<p>5. Characteristics of the variety to be indicated (the number in brackets refers to the corresponding characteristic in Test Guidelines; please mark the note which best corresponds).</p>			
Characteristics	Example Varieties	Note	
<p>5.1 Plant: type (1)</p>			
erect	Sinchunmi	1 []	
semi-erect	Younmi	2 []	
spreading	Yulmi	3 []	
<p>5.2 Vine: color (5)</p>			
light green	Yulmi	1 []	
green	Singeonmi	2 []	
mostly purple	Shinyulmi	3 []	
purple	Hayanmi	4 []	
dark purple		5 []	
<p>5.3 Vine: tip color (6)</p>			
light green		1 []	
green	Yulmi	2 []	
light purple	Sinjami	3 []	
purple	Hayanmi	4 []	
<p>5.4 Vine: node color (7)</p>			
light green		1 []	
green	Yulmi	2 []	
light purple		3 []	
purple	Hayanmi	4 []	

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:	
Characteristics		Example Varieties	Note
5.5 Vine: tip pubescence (8)			
absent or very weak			1 []
weak		Yulmi	3 []
medium			5 []
strong		Zami	7 []
very strong			9 []
5.6 Leaf: shape (9)			
round			1 []
reniform (kidney shape)			2 []
cordate (heart shape)		Yulmi	3 []
triangular			4 []
hastate (spear shape)			5 []
lobe		Sinchunmi	6 []
almost divide			7 []
5.7 Leaf: color (12)			
yellow green			1 []
green		Yulmi	2 []
grey green			3 []
light purple		Hayanmi	4 []
purple			5 []

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:	
Characteristics	Example Varieties	Note	
5.8 Leaf: anthocyanin coloration and distribution of abaxial leaf vein (13)			
green	Yulmi	1 []	
purple spot at base of main rib		2 []	
purple spot in several veins		3 []	
main rib purple	Hayanmi	4 []	
all veins partially purple		5 []	
All veins mostly purple		6 []	
Petiole: anthocyanin coloration and distribution			
green	Yulmi	1 []	
green with purple near leaf		2 []	
green with purple strip		3 []	
purple with green tint	Hayanmi	4 []	
purple		5 []	
5.10 Storage root: shape (16)			
round		1 []	
round elliptic	Geonmi	2 []	
elliptic	Yulmi	3 []	
ovate		4 []	
obovate		5 []	
oblong		6 []	
long oblong		7 []	
long elliptic	Shinyulmi	8 []	
long irregulate or curved		9 []	

TECHNICAL QUESTIONNAIRE		Page {x} of {y}	Reference Number:
Characteristics	Example Varieties	Note	
5.11	Storage root: predominant skin color		
(18)			
white		1 []	
cream	Chinmi	2 []	
yellow		3 []	
orange		4 []	
brownish orange		5 []	
pink	Yulmi	6 []	
red	Shinhwangmi	7 []	
purple red		8 []	
dark purple	Zami	9 []	
5.12	Storage root: predominant flesh color		
(19)			
white	Hayanmi	1 []	
cream		2 []	
dark cream		3 []	
pale yellow	Yulmi	4 []	
yellow	Shinyulmi	5 []	
pale orange	Sinhwangmi	6 []	
orange	Juhwangmi	7 []	
dark orange		8 []	
purple	Zami	9 []	
5.13	Storage root: hardness		
(20)			
soft	Sinhwangmi	3 []	
medium	Gunmi	5 []	
hard	Yulmi	7 []	

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:	
<p>6. Similar varieties and differences from these varieties</p> <p><i>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.</i></p>			
Denomination(s) of variety(ies) similar to your candidate variety	Petiole: anthocyanin coloration and distribution	Describe the expression of the characteristic(s) for the similar variety(ies)	Describe the expression of the characteristic(s) for your candidate variety
<i>Plant type</i>		<i>erect, semi-erect, spreading</i>	
<p>Comments:</p>			

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
<p>#7. Additional information which may help in the examination of the variety</p> <p>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?</p> <p>Yes [] No []</p> <p>(If yes, please provide details)</p> <p>7.2 Are there any special conditions for growing the variety or conducting the examination?</p> <p>Yes [] No []</p> <p>(If yes, please provide details)</p> <p>7.3 Other information</p>		
<p>8. Authorization for release</p> <p>(a) Does the variety require prior authorization for release under legislation concerning the protection of the environment, human and animal health?</p> <p>Yes [] No []</p> <p>(b) Has such authorization been obtained?</p> <p>Yes [] No []</p> <p>If the answer to (b) is yes, please attach a copy of the authorization.</p>		

Authorities may allow certain of this information to be provided in a confidential section of the Technical Questionnaire.

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:												
<p>9. Information on plant material to be examined or submitted for examination.</p> <p>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.</p> <p>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:</p> <table data-bbox="292 724 1421 997"><tbody><tr><td>(a) Microorganisms (e.g. virus, bacteria, phytoplasma)</td><td>Yes []</td><td>No []</td></tr><tr><td>(b) Chemical treatment (e.g. growth retardant, pesticide)</td><td>Yes []</td><td>No []</td></tr><tr><td>(c) Tissue culture</td><td>Yes []</td><td>No []</td></tr><tr><td>(d) Other factors</td><td>Yes []</td><td>No []</td></tr></tbody></table> <p>Please provide details for where you have indicated "yes".</p> <p>.....</p>			(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 []
(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 []												
<p>10. I hereby declare that, to the best of my knowledge, the information provided in this form is correct:</p> <p>Applicant's name <input data-bbox="555 1281 1433 1339" type="text"/></p> <p>Signature <input data-bbox="440 1358 995 1417" type="text"/> Date <input data-bbox="1146 1358 1433 1417" type="text"/></p>														

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