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INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

Geneva

DRAFT

Quinoa

UPOV Code: CHENO_QUI

Chenopodium quinoa Willd.

GUIDELINES

FOR THE CONDUCT OF TESTS

FOR DISTINCTNESS, UNIFORMITY AND STABILITY

prepared by (an) expert(s) from Denmark

to be considered by the

*Technical Working Party for Agricultural Crops
 at its forty-third session
 to be held in Mar del Plata, Argentina
 from 2014-11-17
 to 2014-11-21*

Alternative Names: [*]				
<i>Botanical name</i>	<i>English</i>	<i>French</i>	<i>German</i>	<i>Spanish</i>
Chenopodium quinoa Willd.,	Goosefoot, Pigweed; Quinoa	Chénopode quinoa, Quinoa	Getreidekraut, Kleiner Reis von Peru, Reisspinat	Quinoa, Quinoa

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 *Chenopodium quinoa* Willd..

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 seeds.

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

200 g 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.

3.2 *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 second column of 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 160 plants, which should be divided between 2 replicates.

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.

To assess distinctness of hybrids, the parent lines and the formula may be used according to the following recommendations:

- (i) description of parent lines according to the Test Guidelines;
- (ii) check of the originality of the parent lines in comparison with the variety collection, based on the characteristics in Chapter 7, in order to identify similar parent lines;
- (iii) check of the originality of the hybrid formula in relation to the hybrids in the variety collection, taking into account the most similar lines; and
- (iv) assessment of the distinctness at the hybrid level for varieties with a similar formula.

Further guidance is provided in documents TGP/9 "Examining Distinctness" and TGP/8 "Trial Design and Techniques Used in the Examination of Distinctness, Uniformity and Stability".

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 / Parts of Plants to be Examined

Unless otherwise indicated, for the purposes of distinctness, all observations on single plants should be made on 60 plants or parts taken from each of 60 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 60.

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 second column of 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 The assessment of uniformity should be according to the recommendations for cross-pollinated varieties in the General Introduction.
- 4.2.3 The assessment of uniformity for hybrid varieties depends on the type of hybrid and should be according to the recommendations for hybrid varieties in the General Introduction.
- 4.2.4 For the assessment of uniformity, a population standard of 95% and an acceptance probability of at least 2 % should be applied. In the case of a sample size of 160 plants, 6 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) Inflorescence: type (characteristic 14)
- (b) Seed head: position (characteristic 17)

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*

(*) 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, MS, VG, VS – see Chapter 4.1.5

(a)-(a) See Explanations on the Table of Characteristics in Chapter 8.

(+) 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
<hr/>					
1. (*) PQ VG 5 (a)					
Foliage: color	Feuillage: couleur	Laub: Farbe	Follaje: color		
yellow green	vert jaune	gelbgrün	verde amarillento		1
green	vert	grün	verde		2
blue green	vert bleu	blaugrün	verde azulado		3
Purple					4
Other					5
<hr/>					
2. QN VG 5 (a)					
Foliage: intensity of green color	Feuillage: intensité de la couleur verte	Laub: Intensität der Grünfärbung	Follaje: intensidad del color verde		
weak					1
medium					3
strong					5
<hr/>					
3. QN VG 5 (a)					
Foliage: intensity of glaucosity					
weak					1
medium					3
strong					5
<hr/>					
4. QN MG A VG A 6					
Leaf: size					
small					1
medium					3
large					5
<hr/>					

English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
---------	----------	---------	---------	--	------------

5. PQ VGJA 6

Leaf shape

rhomboid

1

triangular

2

6. QN VG 6 (a)

**Leaf:
indentations of
margin**

**Feuille :
denticulations
du bord**

**Blatt:
Randeinschnitte**

**Hoja:
indentaciones del
borde**

weak

1

medium

3

strong

5

7. PQ VG 7 (a)

**Leaf:
pigmentation of
apex**

Absent

1

Red

2

Pink

3

Other

4

8. QN VG 7 (a)

**Stem: intensity of
pigmentation at
leaf axil**

weak

3

medium

5

strong

7

9. (*) QN MG 8 (+)

(a)

Time of flowering

**Époque de
floraison**

Zeitpunkt der Blüte

**Época de
floración**

early

précoce

früh

temprana

3

medium

moyenne

mittel

media

5

late

tardive

spät

tardía

7

English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
---------	----------	---------	---------	--	------------

10. PQ VG|A 8

**Inflorescence: color
at flowering time**

green					1
purple					2
red					3
other					4

11. QN MG VG 8 (a)

**Stem: length at
flowering time**

short					3
medium					5
long					7

12. PQ VG|A 9

**Stem: base color
after flowering time**

green					1
yellow					2
other					3

13. PQ VG 9 (a)

**Stem: pigmentation
after flowering time**

absent					1
orange					2
red					3
pink					4
other					5

English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
<hr/>					
<hr/>					
14. (*) QL VG 9 (+) (a) Inflorescence: type	Inflorescence :	Blütenstand: Typ	Inflorescencia:		
	type		tipo		
Key					1
shape/glomerulate					
Amaranth shape					2
<hr/>					
<hr/>					
15. QN VG 9 (+) (a) Stem: tendency to branch					
weak					1
medium					3
strong					5
<hr/>					
<hr/>					
16. QN MG VG 10 (a) Stem: height at maturity					
short					3
medium					5
tall					7
<hr/>					
<hr/>					
17. (*) QL VG 11 (+) (a) Seed head: position					
towards terminal					1
distributed across plant					2
<hr/>					
<hr/>					
18. QN VG 11 (a) Seed head: density					
lax					3
medium					5
compact					7
<hr/>					

English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
---------	----------	---------	---------	--	------------

19. (*) PQ VG 11

(a)

Seed head:

color at

maturity

white

1

orange

2

red

3

pink

4

purple

5

other

6

20. QN MG|A

VG|A 11

Seed head:

length

short

3

medium

5

long

7

21. (*) QN VG

12 (a)

Seed: color

**Graine :
couleur**

Samen: Farbe

Semilla: color

whitish

1

yellow-light

2

brown

red

3

grey

4

black

5

other

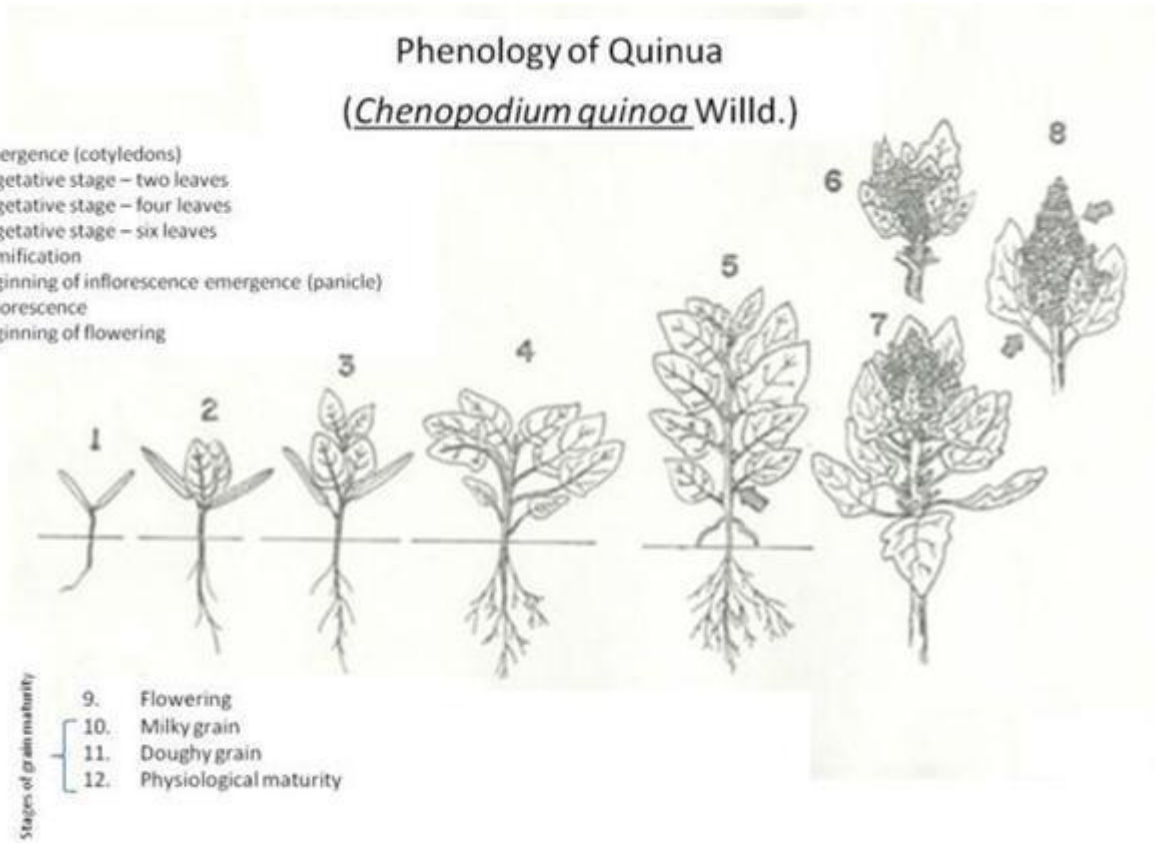
6

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)



Growth stages

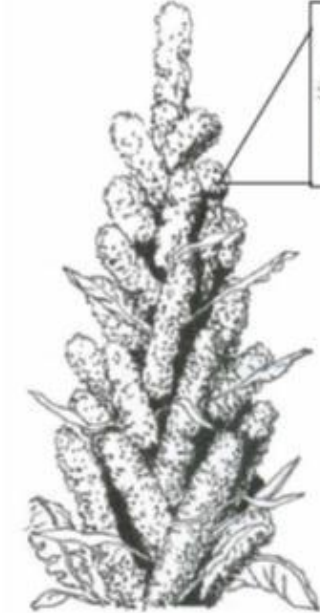
8.2 *Explanations for individual characteristics*

Ad. 9: Time of flowering

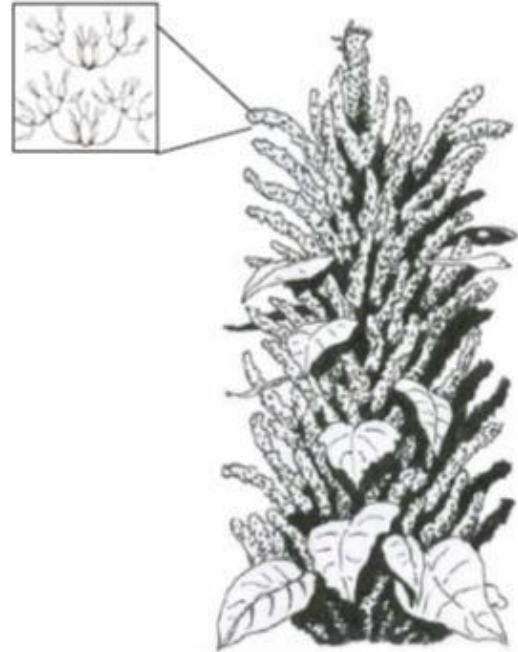
Time of 50% flowering.

Ad. 14: Inflorescence: type

Key shape/glomerulate: small groups of flowers originate from tertiary axes. Amaranth shape: small groups of flowers originate from secondary axes



1. Key shape



2. Amaranth shape

Inflorescence: type

Ad. 15: Stem: tendency to branch



1: weak tendency to branch



5: strong tendency to branch

Stem: tendency to branch

Ad. 17: Seed head: position

Towards terminal: seed head can be easily differentiated from the rest of the plant. Distributed across plant: racemes are distributed over more than half of the plant's length.

9. Literature

Jacobsen, S.-E., Stølen, O., 1993: Quinoa - Morphology, phenology and prospects for its production as a new crop in Europe. European Journal of Agronomy 2(1). Frederiksberg, DK, 19 to 29

Mujica, A., Canahua, A., 1989: Fenología del cultivo de la quinua. En Curso Taller de Fitopatología de Cultivos Andinos y Uso de la Información Agrometeorológica. PICA. INIIA. Puno, PE

10. Technical Questionnaire

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

	Application date: (not to be filled in by the applicant)
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TECHNICAL QUESTIONNAIRE
 to be completed in connection with an application for plant breeders' rights

1. Subject of the Technical Questionnaire			
1.1.1	Botanical Name	Chenopodium quinoa Willd.	
1.1.2	Common Name	Goosefoot, Pigweed; Quinoa	

2. Applicant	
Name	<input type="text"/>
Address	<input type="text"/>
Telephone No.	<input type="text"/>
Fax No.	<input type="text"/>
E-mail address	<input type="text"/>
Breeder (if different from applicant)	<input type="text"/>

3. Proposed denomination and breeder's reference	
Proposed denomination (if available)	<input type="text"/>
Breeder's reference	<input type="text"/>

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

4.1 Breeding scheme

Variety resulting from:

4.1.1 Crossing

(a) controlled cross []
(please state parent varieties)

(.....) 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.

4.2 Method of propagating the variety

4.2.1 Seed-propagated varieties

- | | | |
|-----|--------------------------|-----|
| (a) | Self-pollination | [] |
| (b) | Cross-pollination | |
| | (i) population | [] |
| | (ii) synthetic variety | [] |
| (c) | Hybrid | [] |
| (d) | Other | [] |
| | (please provide details) | |

[]

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 (14) Inflorescence: type		
Key shape/glomerulate		1[]
Amaranth shape		2[]
5.2 (17) Seed head: position		
terminal		1[]
in leaf axils		2[]
5.3 (19) Seed head: color at maturity		
white		1[]
orange		2[]
red		3[]
pink		4[]
purple		5[]
other		6[]

6. Similar varieties and differences from these varieties

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

Denomination(s) of variety(ies) similar to your candidate variety	Characteristic(s) in which your candidate variety differs from the similar variety(ies)	Describe the expression of the characteristic(s) for the similar variety(ies)	Describe the expression of the characteristic(s) for your candidate variety
<i>Example</i>			

Comments:

#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

A representative color image of the variety should accompany the Technical Questionnaire.

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.

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="239 560 1356 761"><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></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> <table data-bbox="223 1008 1404 1187"><tr><td data-bbox="223 1008 494 1075">Applicant's name</td><td colspan="2" data-bbox="494 1008 1404 1075"></td></tr><tr><td data-bbox="223 1075 494 1187">Signature</td><td data-bbox="494 1075 989 1187"></td><td data-bbox="989 1075 1404 1187">Date</td></tr></table>			Applicant's name			Signature		Date						
Applicant's name														
Signature		Date												