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INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

GENEVA

DRAFT

GROUNDNUT

UPOV Code: ARACH_HYP

Arachis hypogaea L.

GUIDELINES

FOR THE CONDUCT OF TESTS

FOR DISTINCTNESS, UNIFORMITY AND STABILITY

prepared by an expert from South Africa

to be considered by the

Technical Working Party for Agricultural Crops

at its fortieth session, to be held in Brasilia, Brazil, from May 16 to 20, 2011

Alternative Names: *

<i>Botanical name</i>	<i>English</i>	<i>French</i>	<i>German</i>	<i>Spanish</i>
<i>Arachis hypogaea</i> L.	Groundnut; Peanut	Arachide	Erdnuß	Cacahuete; Maní

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 *Arachis hypogaea* 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 seed.

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

2kg

The seed should meet the minimum requirements for germination, species and analytical purity, health and moisture content, specified by the competent authority.

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*

The minimum duration of tests should normally be a single growing cycle.

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 8.1.

3.3.3 Because daylight varies, color determinations made against a color chart should be made either in a suitable cabinet providing artificial daylight or in the middle of the day in a room without direct sunlight. The spectral distribution of the illuminant for artificial daylight should conform with the CIE Standard of Preferred Daylight D 6500 and should fall

within the tolerances set out in the British Standard 950, Part I. These determinations should be made with the plant part placed against a white background. The color chart and version used should be specified in the variety description.”

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.

3.5 *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.

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 20 plants or parts 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 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 Uniformity assessment by off-types (characteristics observed on different sample sizes).

In cases where samples of different sizes are used for the assessment of uniformity of different characteristics, guidance should be given for all sample sizes. In such cases, the relevant sample size for each characteristic should be indicated in the Table of Characteristics.

4.2.2.1 Uniformity assessment on all plants in the test

For the assessment of uniformity in a sample of 60 plants, a population standard of 1% and an acceptance probability of at least 95 % should be applied. In the case of a sample size of 60 plants, 3 off-types are allowed.

4.2.2.2 Uniformity assessment on a sub-sample

For the assessment of uniformity of plants, parts of plants, a population standard of 1% and an acceptance probability of at least 95 % should be applied. In the case of a sample size of 20 plants, parts of plants, 1 off-type is allowed.

4.2.2.3 Indication of sample size in the Table of Characteristics

The recommended sample size for the assessment of uniformity is indicated by the following key in the table of characteristics:

- (A) sample size of 60 plants
- (B) sample size of 20 plants/parts of plants

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: growth habit (Characteristic 1)
- (b) Stem: anthocyanin coloration (Characteristic 5)
- (c) Pod: number of kernels (Characteristic 14)
- (d) Kernel: color of uncured mature testa (Characteristic 17)
- (e) Varieties with moncrome testa only: Kernel: color of mature uncured testa (Characteristic 18)
- (f) Commercial grouping (Characteristic 22)

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

(+) See Explanations on the Table of Characteristics in Chapter 8.2.

(A)-(B) - see Chapter 4.2.2.3

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: growth habit	Plante: port	Pflanze: Wuchsform	Planta: porte		
QN (a)	upright				Tufa	1
A	semi-upright				Kwarts	2
	spreading				Inkanyezi	3
2. VG	<u>Spreading varieties</u> only: Main stem: growth habit					
QN (a)	upright				Inkanyezi	1
A	horizontal					2
3. VG	<u>Spreading varieties</u> only: Side branches: growth habit					
QN (a)	horizontal					1
A	tips slightly upturned					2
	tips moderately upturned					3
	tips strongy upturned				Inkanyezi	4
4. VG (+)	Plant: density	Plante: densité	Pflanze: Dichte	Planta: densidad		
QN (a)	sparse	faible	locker	laxa	Mwenje	3
A	medium	moyenne	mittel	media	Nyanda	5
	dense	dense	dicht	densa		7

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
5. (*) (+)	VG	Stem: anthocyanin coloration	Tige: pigmentation anthocyanique	Stengel: Anthocyanfärbung	Tallo: pigmentación antociánica	
QN	(a)	absent or very weak	absente ou très faible	fehlend oder sehr gering	ausente o muy débil	1
A		weak	faible	gering	débil	3
		medium	moyenne	mittel	media	5
		strong	forte	stark	fuerte	7
		very strong	très forte	sehr stark	muy fuerte	9
6. (*)	VG/ MG	Leaflet: length	Feuille: longueur	Blatt: Länge	Hoja: longitud	
QN	(a)	short	courte	kurz	corta	3
B	(b)	medium	moyenne	mittel	media	Tufa 5
		long	longue	lang	larga	Nyanda 7
7. (+)	VG	Leaflet: position of broadest part				
PQ	(a)	towards the apex				1
B	(b)	middle				2
8. (+)	VG	Leaflet: shape of base	Limbe: forme de la base	Blattspreite: Form der Basis	Limbo: forma de la base	
PQ	(a)	acute				1
B	(b)	obtuse	obtuse	stumpf	obtusa	2
9. (+)	VG	Leaflet: shape of apex				
PQ	(a)	acute				1
B	(b)	obtuse				2
		rounded				3
		cordate				4

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
10. VG	Leaf: green color	Feuille: couleur verte	Blatt: Grünfärbung	Hoja: color verde		
QN	(a) light	légère	hell	claro		3
A	(b) medium	moyenne	mittel	medio		5
	dark	foncée	dunkel	oscuro		7
11. VG	Flowering: pattern					
	(+)					
QL	(a) alternate					1
B	sequential					2
12. VG	Pod: constrictions					
	(+)					
QN	(c) absent or very shallow					1
B	shallow					3
	medium					5
	deep					7
	very deep					9
13. VG	Pod: texture of surface					
QN	(c) fine					3
B	medium					5
	coarse					7
14. VG	Pod: number of kernels					
	(*)					
QN	(c) mostly one or two					1
B	mostly two					2
	mostly more than two					3

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
15. VG	Pod: prominence of beak					
QN	(c)	absent or inconspicuous				1
B		medium prominent				5
		Very prominent				7
16. VG	Pod: shape of beak					
QL	(c)	straight				1
B		curved				2
17. VG	Kernel: color of uncured mature testa					
QL	(c)	monochrome			Akwa	1
B		variegated			Billy	9
18. VG	<u>Varieties with monochrome testa only</u>: Kernel: color of mature uncured testa					
PQ	(c)	white to cream				1
B		flesh			Akwa, Kwarts	2
		brown				3
		pink				4
		red			Harts	5
		purple				6
		dark purple				7
19. VG	Kernel: shape					
PQ	(c)	spheriodal				1
B		cylindrical				2

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
20. VG	Kernel: size					
QN	(c)	small				3
B		medium				5
		large			Rambo	7
21. MG	Kernel: percentage of shell					
(+)						
QN	(d)	low				3
		medium				5
		high				7
22. (*)	Commercial Grouping					
(+)						
QL		Spanish			Sellie	1
		Valencia			Kangwane Red	2
		Virginia			Inkanyezi	3

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) at flowering
- (b) all leaf characteristics should be made on a fully developed basal leaflet
- (c) at harvesting

8.2 *Explanations for individual characteristics*

Ad. 4: Plant: density



3
sparse



5
medium



7
dense

Ad. 5: Stem: anthocyanin coloration



1
absent or very weak



3
weak



5
medium



7
strong



9
very strong

Ad. 7: Leaflet: position of broadest part



1
towards the apex



2
in middle

Ad. 8: Leaflet: shape of base



1
acute



2
obtuse

Ad. 9: Leaflet: shape of apex



1
acute



2
obtuse



3
rounded



4
cordate

Ad. 11: Flowering: pattern

alternate (1): flowers on 2 successive nodes followed by 2 nodes without flowers
sequential (2): flowers on every node

Ad. 12: Pod: constrictions



1
absent or very shallow



3
shallow



5
medium



7
deep



9
very deep

Ad. 21: Kernel: percentage of shell

The kernel is to be observed at 7% of moisture content.

Ad. 22: Commercial Grouping

VIRGINIA

Arachis hypogaea L. subsp. *hypogaea*

2 reproductive branches followed by two vegetative branches

No floral axes on main stem

Branches short

Less hairy

- Bunch: Billy, Rambo
- Runner: Selmani, Norden

SPANISH – tan

A. hypogaea subsp. *vulgaris*

Erect axis with inflorescences in central axes and without regular pattern in sequence of reproductive and vegetative branches. Can be simple or compound. Fruits are concentrated around central axes.

- Bunch such as Akwa & Kwarts

VALENCIA – 3-4 kernels/pod, kernels big or small, red or tan

A.hypogaea subsp. *fastigiata*

Valencia types subsp. *fastigiata* have floral axes on the main stem and sequential floral axes on branches.

Little branched

Upright

Deep pod reticulation

- Bunch: Kano, KanGwane Red

9. Literature

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="Arachis hypogaea L."/>	
1.2 Common name	<input type="text" value="Groundnut"/>	
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:
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#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)

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4.2.2 Vegetatively propagated varieties []

4.2.3 Other [] (please provide details)

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

Characteristics	Example Varieties	Note
5.1 Plant: growth habit		
(1) upright	Tufa	1[]
semi-upright	Kwarts	2[]
spreading	Inkanyezi	3[]
5.2 Stem: anthocyanin coloration		
(5) absent or very weak		1[]
absent or 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[]
5.3 Pod: number of kernels		
(14) mostly one or two		1[]
mostly two		2[]
mostly more than two		3[]
5.4 Kernel: color of uncured mature testa		
(17) monochrome	Harts	1[]
variegated	Billy	2[]

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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Characteristics	Example Varieties	Note
5.5 Varieties with monochrome testa only: Kernel: color of mature uncured testa		
(18) white to cream		1[]
flesh	Akwa	2[]
brown		3[]
pink		4[]
red	Harts	5[]
purple		6[]
dark purple		7[]
5.6 Commercial grouping		
(22) Spanish	Sellie	1[]
Valencia	Kangwane Red	2[]
Virginia	Inkanyezi	3[]

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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6. Similar varieties and differences from these varieties

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

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

Comments:

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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#7. Additional information which may help in the examination of the variety

7.1 In addition to the information provided in sections 5 and 6, are there any additional characteristics which may help to distinguish the variety?

Yes [] No []

(If yes, please provide details)

7.2 Are there any special conditions for growing the variety or conducting the examination?

Yes [] No []

(If yes, please provide details)

7.3 Other information

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.

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:
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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".

.....

9.3 Has the plant material to be examined been tested for the presence of virus or other pathogens?

Yes []
(please provide details as specified by the Authority)

No []

10. I hereby declare that, to the best of my knowledge, the information provided in this form is correct:

Applicant's name

Signature

Date