TG/PLEUR(proj.2)
ORIGINAL: English
DATE: 2011-06-22

UPOV

INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

GENEVA

DRAFT

OYSTER MUSHROOM

UPOV Code: PLEUR

Pleurotus ostreatus (Jacq.: Fr.) Kummer,
P. eryngii (DC.: Fr.) Quél.,
P. pulmonarius (Fr.) Quél.,
P. cystidiosus O.K. Mill.,
Pleurotus djamor (Rumph. ex Fr.) Boedijn
P. cornucopiae (Paulet) Rolland,
P. ferulea Lanzi

[*]

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 Vegetables
at its forty fifth session, to be held in Monterey, California, United States of America,
from July 25 to 29, 2011

Alternative Names:[*]

Botanical name	*English*	*French*	*German*	*Spanish*
Pleurotus ostreatus (Jacq.: Fr.) Kummer, *P. eryngii* (DC.: Fr.) Quél., *P. pulmonarius* (Fr.) Quél., *P. cystidiosus* O.K. Mill., *Pleurotus djamor* (Rumph. ex Fr.) Boedijn, *P. cornucopiae* (Paulet) Rolland, *P. ferulea* Lanzi	Tamogitake Oyster Mushroom	Oreille d'orme	Rillstieliger Seitling	Pleuroto

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 the genus *Pleurotus* spp.

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 spawn or as a pure culture on a suitable medium.

Pure cultures must be on slant agar tubes with an appropriate medium such as PDA (potato dextrose agar) or Malt extract agar. Tubes should be covered by cotton plugs or plastic caps allowing sterile air diffusion. Cultures should be fresh, i.e. not stored for longer than 2 weeks at low temperature.

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

2 liter of spawn or 2 slant tubes containing a pure culture.

2.4 The 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 two independent growing cycles. The growing cycle is considered to be from spawning until the end of the first flush.

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

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.

JP: In case of “*Pleurotus*”. The morphological characteristics are intensely influenced by the cultivation method. It is necessary to decide the cultivation method of each species of "*Pleurotus*".

3.4 Test Design

3.4.1 Each test should be designed to result in a total of at least 120 fruit bodies, which should be divided between at least 6 replicates. Only the first flush has to be observed.

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

3.5 Additional Tests

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

4. Assessment of Distinctness, Uniformity and Stability

4.1 Distinctness

4.1.1 General Recommendations

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

4.1.2 Consistent Differences

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

4.1.3 Clear Differences

Determining whether a difference between two varieties is clear depends on many factors, and should consider, in particular, the type of expression of the characteristic being examined, i.e. whether it is expressed in a qualitative, quantitative, or pseudo-qualitative manner. Therefore, it is important that users of these Test Guidelines are familiar with the recommendations contained in the General Introduction prior to making decisions regarding distinctness.

4.1.4 Number of Fruit Bodies / Parts of Fruit Bodies to be Examined

Unless otherwise indicated, for the purposes of distinctness, all observations on single plants should be made on 60 fruit bodies or parts taken from each of 60 fruit bodies and any other observations made on all plants in the test, disregarding any off-type plants.

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 For the assessment of uniformity, a population standard of 1% and an acceptance probability of at least 95% should be applied. In the case of a sample size of 120 fruit bodies, 3 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 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) Stipe: shape in longitudinal section (characteristic 3)
(b) Cap: curvature of upper surface in longitudinal section (characteristic 7)
(c) Cap: color (characteristic 8)
(d) Cap: position in relation to stipe (characteristic 9)

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)–(b) 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/ MS**	**Stipe: length**					
QN	**(a)**	short				Geumbit	3
		medium				HK 35, Suhan	5
		long					7

JP: the position of the measurement is indefinite. defines it. (e.g. 1/2 of length).

HU: the length of the stipe is from gill to the joint to other stipe.

2. **(+)**	**VG/ MS**	**Stipe: diameter**					
QN	**(a)**	narrow				Geumbit	3
		medium				HK 35, Suhan	5
		broad				Saesongi 1ho	7
3. **(*)** **(+)**	**VG/ MS**	**Stipe: shape in longitudinal section**					
PQ	**(a)**	slender and long				Yeoreumneutari	1
		slender and short				Geumbit, HK 35	2
		thick and long				Saesongi 1ho	3
		thick and short				Maehyang	4
		middle thick					5
		base thick					
4. **(+)**	**VG/ MS**	**Cap: height**					
QN	**(a)**	short				HK 35	3
		medium				Suhan	5
		tall				Chunchu	7

HU: change the drawing. See: Ch. 5.

		English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
5. (+)	**VG/ MS**	**Cap: width**					
QN	**(a)**	narrow				Helios	3
		medium				HK 35	5
		wide				Charnu	7

HU: the height and width are in connection with the degree of curving. In which curved stage will be easily affected with the passage of time.

6.	**VG/ MS**	**Cap: ratio height/width**					
QN	**(a)**	low				Miso	3
		medium				Suhan	5
		high				Chunchu	7

HU: the measurement has to be done at fully open fruit body. proposed example varieties – high(7): Ikaros(0, 9)

7. (*) (+)	**VG**	**Cap: curvature of upper surface in longitudinal section**					
QN	**(a)**	strongly convex				Heuknang	1
		moderately convex				Miso	2
		flat				Saesongi 1ho	3
		moderately concave				Suhan	4
		strongly concave				Chunchu	5

HU: check the example varieties for degree of 1, 2, 3.

		English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
8. (*)	**VG**	**Cap: color**					
PQ	**(a)**	white				Miso	1
		yellow				Geumbit	
		pink				Noeul	2
		light brown				Saesongi 1ho	3
		medium brown				Yeoreumntari	4
		dark brown				Hosan	5
		light grey				Chunchu, HK35	6
		medium grey				Suhan	7
		dark grey				Heukjinju	8
9. (+)	**VG**	**Cap: position in relation to stipe**					
QN		central				HK 35	1
		moderately offset				Suhan	2
		strongly offset				Yeoreumntari	3

JP: the position of the measurement is indefinite. Propose to define that “the shortest distance from the center of Cap surface to the base of Gill”.

		English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
10.	**VG/ MS**	**Cap: thickness**					
QN		thin					3
		medium					5
		thick					7
11.	**VS**	**Concentration of spores**					
QN		absent or very weak				Spoppo	1
		weak					3
		medium				HK 35	5
		strong				3014	7
		very strong					9

HU: chage QN → QL.

12.	**VG**	**Tendency to cluster formation: number of fruit bodies in the cluster**					
QN		few					3
		medium					5
		many					7
13. **(+)**	**VG/ MS**	**Fruit body: ratio stipe length/cap diameter**					
QN		stipe longer than cap diameter					1
		stipe same length as cap diameter					2
		stipe shorter than cap diameter				Maehyang	3

HU: propose to delete

		English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
Add. 1		**Gill: position in relation to stipe**					
(+)							
QN	**VG**	weak					3
		medium				Maehyang	5
		strong				Saesongi 1ho	7
Add. 2	**VG/ MS**	**Gill: width**					
QN		narow				HK 35	3
		medium					5
		broad				Spoppo	7

HU: propose to delete because there aren't any difference between the varieties.

Add. 3	**MS**	**Mycelium: growth rate at 25℃**					
QN		slow				HK 35	3
		medium					5
		fast				Helios	7

JP: propose to add low temperature (e.g. 10℃) and high temperature (e.g. 30℃).

Add. 4	**VS**	**Cap: appearance of finger(or incision)**					
QN		absent				Helios, P80	1
		present				Fotios	9

HU: new proposal

8. Explanations on the Table of Characteristics

8.1 Explanations covering several characteristics

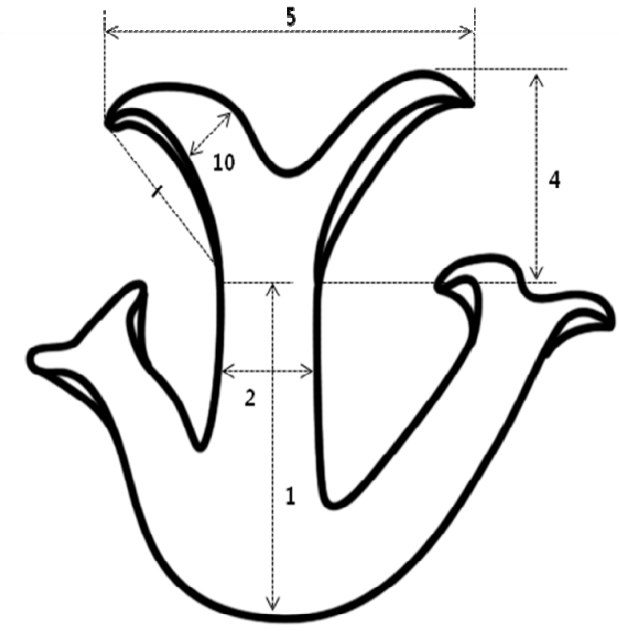
Characteristics containing the following key in the second column of the Table of Characteristics should be examined as indicated below:

(a) Stipe, cap: Unless otherwise indicated, all characteristics of the stipe and the cap should be made at harvest stage, when the cap of fruit body is not opened.
(b) Stipe, cap: Unless otherwise indicated, diameter of stipe and the cap should be measured long and wide region of mushroom.(**HU** proposal)

8.2 Explanations for individual characteristic

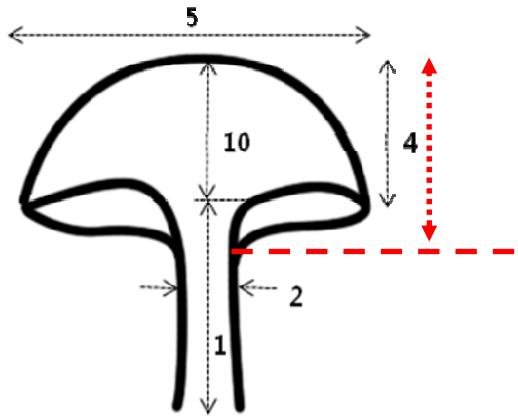
Characteristic 1: Stipe: length
Characteristic 2: Stipe: diameter
Characteristic 4: Cap: height
Characteristic 5: Cap: width
Characteristic 10: Cap: thickness

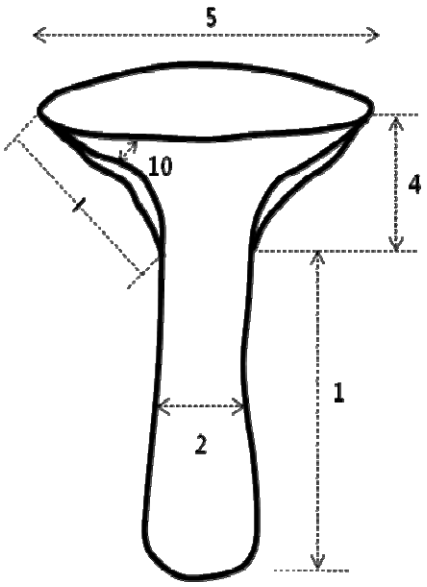
The fruit bodies observed at harvest stage for the above characteristics should be cut longitudinally and observed as follows:



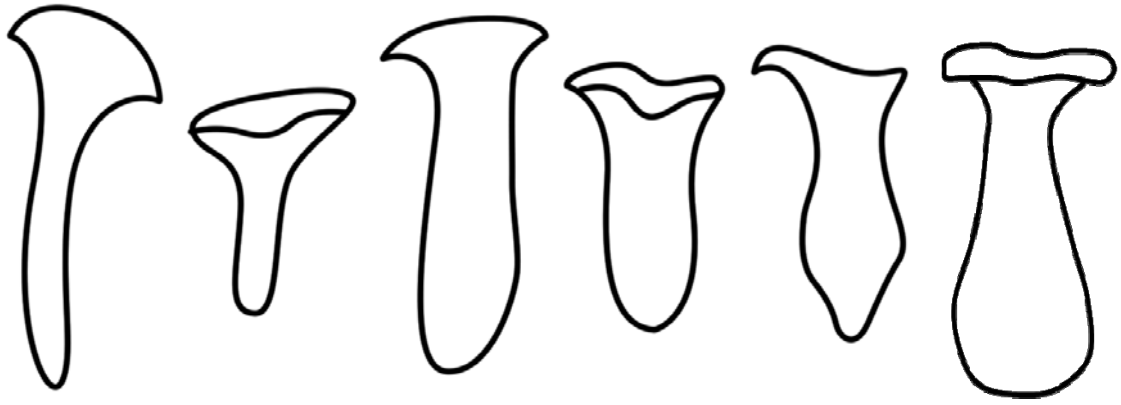
longitudinal section

1: Stipe: length
2: Stipe: diameter
4: Cap: height
5: Cap: width
10: Cap: thickness

 longitudinal section	JP: position of height of Cap 1: Stipe: length 2: Stipe: diameter 4: Cap: height 5: Cap: width 10: Cap: thickness

 longitudinal section	1: Stipe: length 2: Stipe: diameter 4: Cap: height 5: Cap: width 10: Cap: thickness

Ad. 3: Stipe: shape in longitudinal section

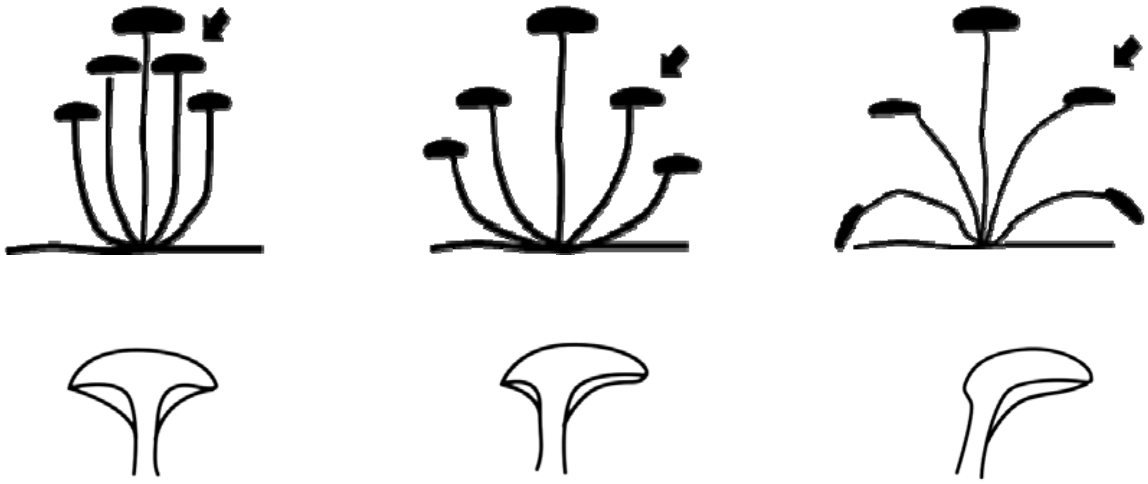


1	2	3	4	5	6
slender and long	slender and short	thick and long	thick and short	middle thick	base thick

Ad. 7: Cap: curvature of upper surface in longitudinal section

1	2	3	4	5
strongly convex	moderately convex	flat	moderately concave	strongly concave

Ad. 9: Cap: position in relation to stipe

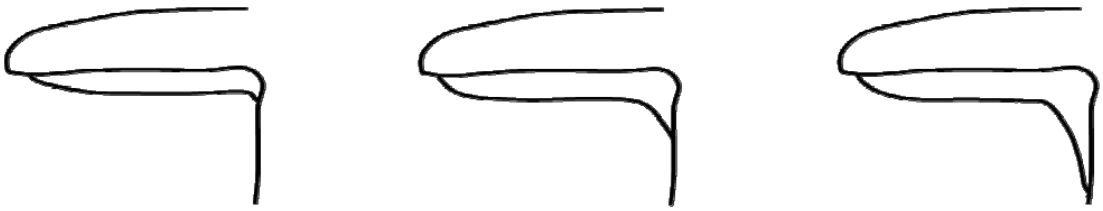


1
central

2
moderately offset

3
strongly offset

Add. 1: Gill: position in relation to stipe



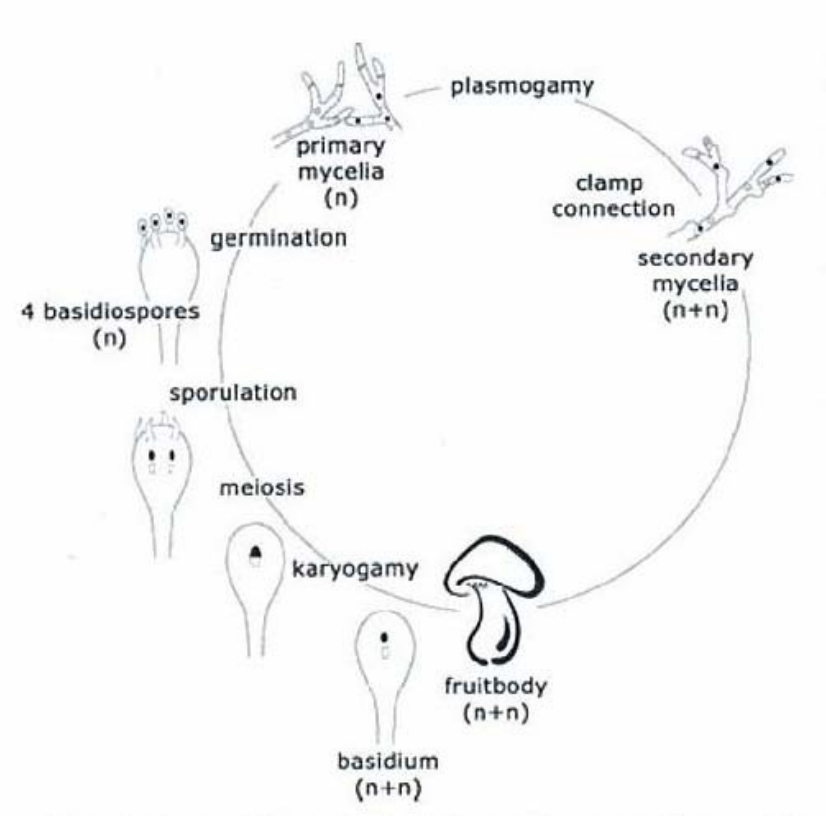
1
weak

2
medium

3
strong

Additional information: Life cycle of *Pleurotus* spp.

JP: To check whether life cycle is the same in each species or not (especially *P. pulmonarius*).



9. Literature

Kang, S.W, 2004: Oyster Mushroom Cultivation. MushWorld, 48pp.

Deacon, J.W.Deacon, 1997: Modern Mycology. Blackwell Science, 143pp.

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	*Pleurotus* spp.
1.2 Common Name	Oyster Mushroom
Species (please complete)	

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 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.

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

4.2 Method of propagating the variety

Vegetative propagation

(a) cuttings [ ]

(b) *in vitro* propagation [ ]

(c) other (state method) [ ]

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 (3)	**Stipe: shape in longitudinal section**		
	slender and long	Yeoreumneutari	1[ ]
	slender and short	Geumbit, HK 35	2[ ]
	thick and long	Saesongi 1ho	3[ ]
	thick and short	Maehyang	4[ ]
	middle thick		5[ ]
	base thick		6[ ]
5.2 (7)	**Cap: curvature of upper surface in longitudinal section**		
	strongly convex	Heuknang	1[ ]
	moderately convex	Miso	2[ ]
	flat	Saesongi 1ho	3[ ]
	moderately concave	Suhan	4[ ]
	strongly concave	Chunchu	5[ ]
5.3 (8)	**Cap: color**		
	white	Miso	1[ ]
	yellow	Geumbit	2[ ]
	pink	Noeul	3[ ]
	light brown	Saesongi 1ho	4[ ]
	medium brown	Yeoreumntari	5[ ]
	dark brown	Hosan	6[ ]
	light grey	Chunchu, HK 35	7[ ]
	dark grey	Heukjinju	8[ ]

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

5.4 (9) Cap: position in relation to stipe

central	HK35	1[ ]
moderately offset	Suhan	2[ ]
strongly offset	Yeoreumntari	3[ ]

6. Similar varieties and differences from these varieties

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

Denomination(s) of variety(ies) similar to your candidate variety	Characteristic(s) in which your candidate variety differs from the similar variety(ies)	Describe the expression of the characteristic(s) for the **similar** variety(ies)	Describe the expression of the characteristic(s) for your candidate variety
Example	*Cap: color*	*greyish white*	

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 Resistance to pests and diseases

(a) Resistance to *Verticillium fungicola* var. *fungicola*

susceptible	moderately resistant	highly resistant	not tested
[ ]	[ ]	[ ]	[ ]

(b) Other (please specify)

7.4 Aversion line

Yes [ ] No [ ]

7.5 Optimum temperature for fruit body formation

7.6 Stipe: color

7.4 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 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 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]