

UPOV

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INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

GENEVA

DRAFT

OYSTER MUSHROOM

UPOV Code: PLEUR

Pleurotus spp.

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-fourth session, to be held in Veliko Tarnovo, Bulgaria from July 5 to 9, 2010

Alternative Names:*

<i>Latin</i>	<i>English</i>	<i>French</i>	<i>German</i>	<i>Spanish</i>
<i>Pleurotus spp.</i>	Oyster Mushroom			

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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Highlighting: amendments in accordance with document TGP/7/2

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 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.

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 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 fruit bodies or parts of fruit bodies~~

~~MS: measurement of a number of individual fruit bodies or parts of fruit bodies~~

~~VG: visual assessment by a single observation of a group of fruit bodies or parts of fruit bodies~~

~~VS: visual assessment by observation of individual fruit bodies or parts of fruit bodies.~~

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 has to be at harvest stage.**

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, all observations for the purposes of distinctness should be made on 60 fruit bodies or parts taken from each of 60 fruit bodies, 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 ~~tested, either by growing a further generation, or~~ by testing a new stock to ensure that it exhibits the same characteristics as those shown by the ~~initial~~ ~~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) Cap: shape in longitudinal section (characteristic 8 3)

(b) Cap: color (characteristic 9 7)

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*

(*) Asterisk 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				Suhan, HK 35	5
	long					7
2.	VG/ MS					
	Stipe: diameter					
(+)						
QN	(a) narrow				Geumbit	3
	medium				Suhan, HK 35	5
	broad				Saesongi Iho	7
3.	VG/ MS					
	Stipe: ratio length/diameter					
(+)						
QN	(a) slender and long				Yeoreumneutari	1
	slender and short				Geumbit, HK 35	2
	thick and long				Saesongi Iho	3
	thick and short					4
	spindle					5
4.	VG					
	Stipe: color					
(*)						
PQ	white				Suhan, HK 35	1
	yellow-white				Geumbit	2
5.	VG/ MS					
	Cap: height					
(+)						
QN	(a) short				HK 35	3
	medium				Suhan	5
	tall				Chunchu	7

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
6.	VG/ MS					
(+)	Cap: width					
QN	(a) narrow					3
	medium					5
	wide					7
7.	VG/ MS					
	Cap: ratio height/width					
QN	(a) small				Miso	3
	medium				Suhan	5
	large					7
8.	VG					
(*)	Cap: shape in longitudinal section					
(+)						
PQ	(a) semi-convex				Miso	1
	convex					2
	flat				Saesongi Iho	3
	shallow funnel-shaped				Suhan	4
	deep funnel-shaped				Chunchu	5
9.	VG					
(*)	Cap: color					
PQ	(a) white				Miso	1
	light gray				Saesongi Iho	2
	gray				Chunchu, HK 35	3
	light brown				Yeoreumntari	4
	dark gray				Suhan	5
	dark brown				Hosan	6
	black				Heukjinju	7
	pink				Noeul	8
	yellow				Geumbit	9

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
10. VG	Attachment type of stipe for cap					
(+)						
PQ	central				Miso, HK 35	1
	eccentric				Suhan	2
	adnate				Yeoreumntari	3
11. VG	Fruit body: Type of fruiting					
QL	single				Yeoreumntari	1
	group				Suhan, HK 35	2
12. VS	Aversion line					
QL	absent					1
	present					9
13. VS	Appearance spore					
QL	absent				Spoppo	1
	present				HK 35	9
14. VG/ MS	Cap: thickness					
QN	thin					3
	medium					5
	thick					7
15. VG/ MS	Ratio: stipe length/ cap diameter					
QN	stipe longer					1
	stipe/cap same					2
	stipe shorter					3

	English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
16. VG	Tendency to cluster formation: number of fruit bodies in the cluster					
QN	few					3
	medium					5
	much					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) 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. (see Chapter 8.3).

(b) Aversion line: Unless otherwise indicated, all observations on the media (PDA or MEA) should be made after anastomosis of strains, when the each strain is fully fused on the same plate. (see Chapter 8.3).

(c) General illustration:

8.2 *Explanations covering several for individual characteristic*

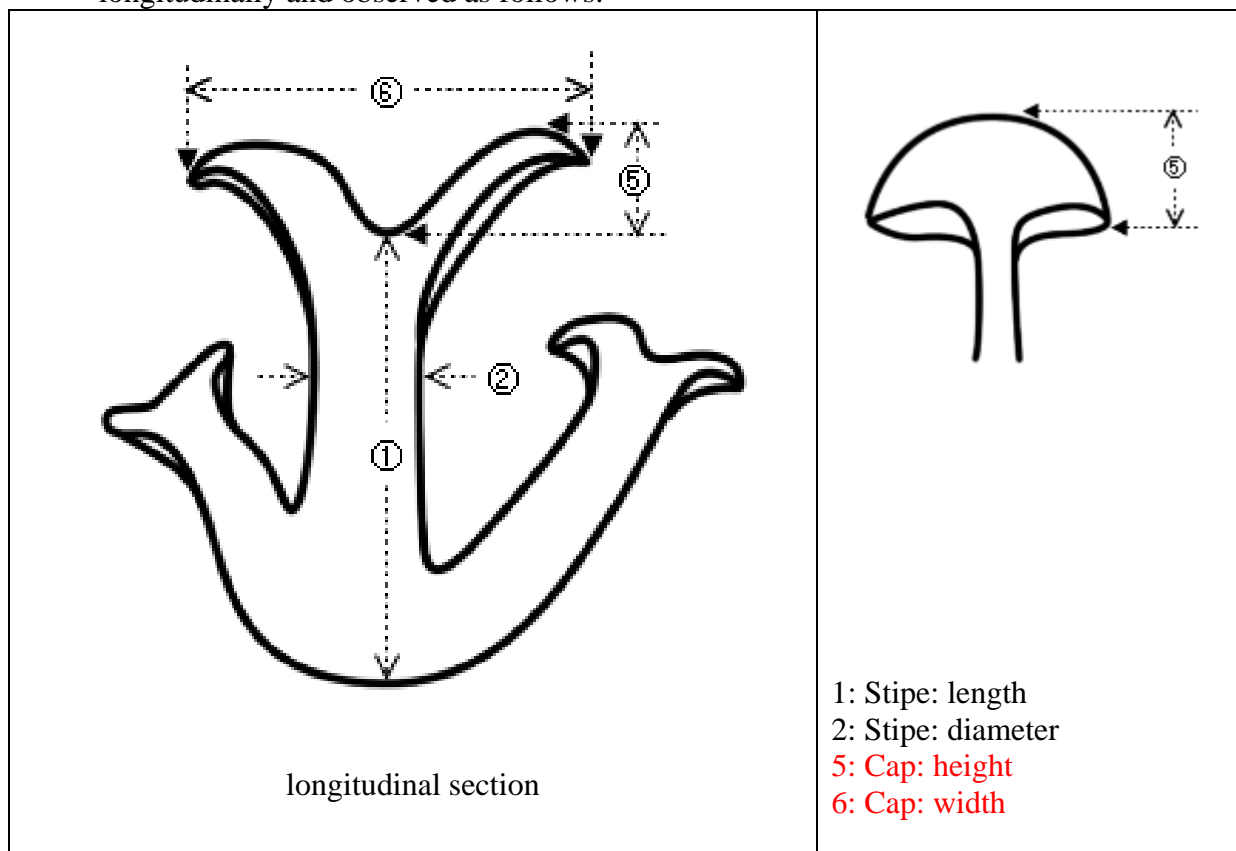
Characteristic 1: Stipe: length

Characteristic 2: Stipe: diameter

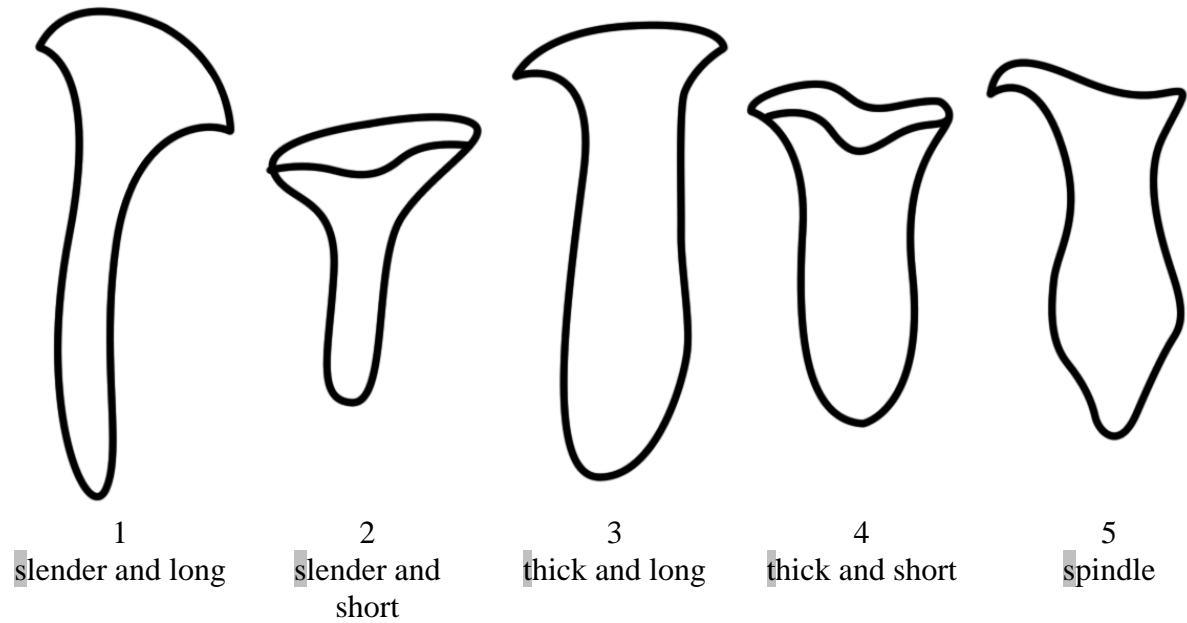
Characteristic 5: Cap: height

Characteristic 6: Cap: width

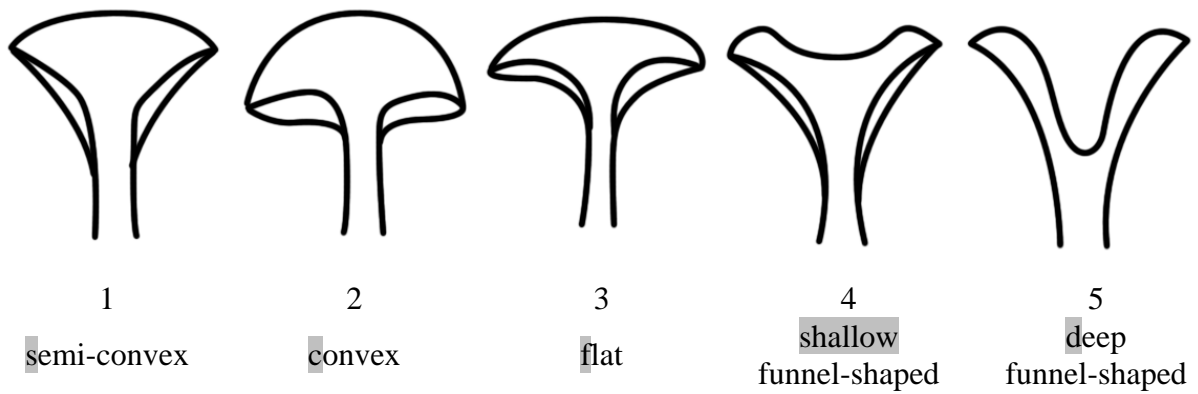
The fruit bodies observed at harvest stage for the above characteristics should be cut longitudinally and observed as follows:



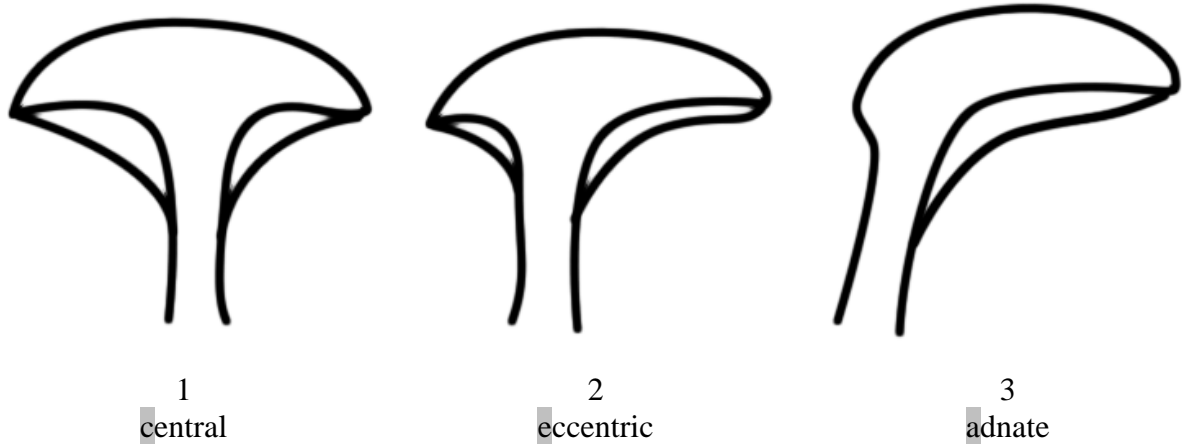
Ad. 3: Stipe: ratio/length/diameter



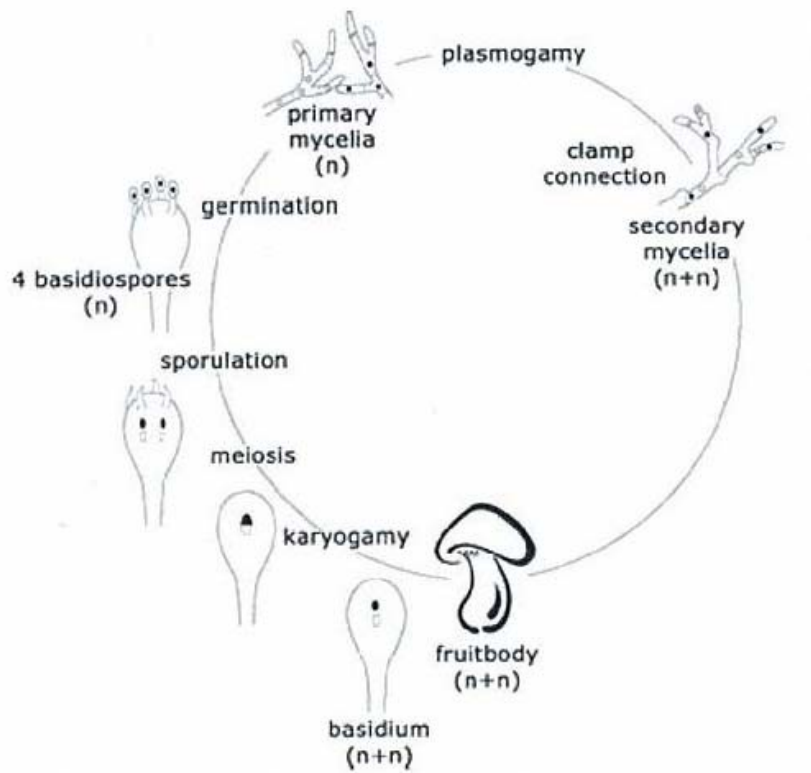
Ad. 8: Cap: shape in longitudinal section



Ad. 10: Attachment type of stipe for cap



Additional information: Life cycle of *Pleurotus* spp.



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	<input type="text" value="Pleurotus spp."/>	
1.2 Common Name	<input type="text" value="Oyster Mushroom"/>	
	Species (please complete)	
	<input type="text"/>	
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.

TECHNICAL QUESTIONNAIRE	Page {x} of {y}	Reference Number:
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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:
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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 Stipe: color (4)		
white	Suhan, HK35	1 []
yellow-white	Geumbit	2 []
5.2 Cap: shape in longitudinal section (8 9)		
semi-convex	Miso	1 []
convex		2 []
flat	Saesongi lho	3 []
shallow funnel-shaped	Suhan	4 []
deep funnel-shaped	Chunchu	5 []
5.3 Cap: color (9 12)		
white	Miso	1 []
light gray	Saesongi lho	2 []
gray	Chunchu, HK35	3 []
light brown	Yeoreumtari	4 []
dark gray	Suhan	5 []
dark brown	Hosan	6 []
black	Heukjinju	7 []
pink	Noeul	8 []
yellow	Geumbit	9 []
5.4 Attachment type of stipe for cap (10 15)		
central	Miso, HK35	1 []
eccentric	Suhan	2 []
adnate	Yeoreumtari	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>Cap: color</i>	<i>greyish white</i>	<i>brown</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 Resistance to pests and diseases

	susceptible	moderately resistant	highly resistant	not tested
a) Resistance to <i>Verticillium fungicola</i> var. <i>fungicola</i>	[]	[]	[]	[]

b) Other (please specify)

7.4 Other information

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 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]