CPVO · OCVV
Community Plant Variety Office
Office Communautaire des Variétés Végétales

PROTOCOL FOR TESTS ON DISTINCTNESS, UNIFORMITY AND STABILITY

Oryza sativa L.

RICE

UPOV Code: ORYZA_SAT

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1. SUBJECT OF THE PROTOCOL AND REPORTING

1.1 Scope of the technical protocol

This Technical Protocol applies to all varieties of ***Oryza sativa*** **L.**

The protocol describes the technical procedures to be followed in order to meet the requirements of Council Regulation 2100/94 on Community Plant Variety Rights. The technical procedures have been agreed by the Administrative Council and are based on documents agreed by the International Union for the Protection of New Varieties of Plants (UPOV), such as the General Introduction to DUS (UPOV Document TG/1/3 http://www.upov.int/export/sites/upov/resource/en/tg_1_3.pdf), its associated TGP documents (http://www.upov.int/tgp/en/) and the relevant UPOV Test Guideline TG/16/9 dated 17/12/2020 (https://www.upov.int/edocs/tgdocs/en/tg016.pdf) for the conduct of tests for Distinctness, Uniformity and Stability.

1.2 Entry into Force

The present protocol enters into force on **01.06.2025**. Any ongoing DUS examination of candidate varieties started before the aforesaid date will not be affected by the approval of the Technical Protocol. Technical examinations of candidate varieties are carried out according to the TP in force when the DUS test starts. The starting date of a DUS examination is considered to be the due date for submitting of plant material for the first test period.

In cases where the Office requests to take-over a DUS report for which the technical examination has either been finalized or which is in the process to be carried out at the moment of this request, such report can only be accepted if the technical examination has been carried out according to the CPVO TP which was in force at the moment when the technical examination started.

1.3 Reporting between Examination Office and CPVO and Liaison with Applicant

1.3.1 Reporting between Examination Office and CPVO

The Examination Office shall deliver to the CPVO a preliminary report ("the preliminary report") no later than four weeks after the date of the request for technical examination by the CPVO.

The Examination Office shall also deliver to the CPVO a report relating to each growing period ("the interim report") and, when the Examination Office considers the results of the technical examination to be adequate to evaluate the variety or the CPVO so requests, a report relating to the examination ("the final report").

The final report shall state the opinion of the Examination Office on the distinctness, uniformity and stability of the variety. Where it considers those criteria to be satisfied, or where the CPVO so requests, a description of the variety shall be added to the report.

In case the variety is a hybrid, the variety descriptions of the parental components shall be added as well. The variety descriptions of hybrid varieties shall not have any reference to the hybrid formula.

If a report is negative the Examination Office shall set out the detailed reasons for its findings.

The interim and the final reports shall be delivered to the CPVO as soon as possible and no later than on the deadlines as laid down in the designation agreement.

1.3.2 Informing on problems in the DUS test

In cases where the Examination Office identifies issues during the course of the technical examination that may lead to a negative report, the Examination Office shall inform the CPVO and in urgent cases the applicant/holder as soon as such issues become obvious.

1.3.3 Sample keeping in case of problems

As far as feasible the Examination Office shall keep a representative sample of any relevant testing material of the candidate variety and reference variety(ies) if the technical examination has resulted in a negative report. As soon as possible, the CPVO shall inform the Examination Office when the material can be destroyed.

2. MATERIAL REQUIRED

2.1 Plant material requirements

Information with respect to the agreed closing dates and submission requirements of plant material for the technical examination of varieties can be found on https://public.plantvarieties.eu/publication in the special issue S2/S3 of the Official Gazette of the Office. General requirements on submission of samples are also to be found following the same link.

2.2 Informing the applicant of plant material requirements

The CPVO informs the applicant that

- he is responsible for ensuring compliance with any customs and plant health requirements.
- the plant material supplied should be visibly healthy, not lacking germination and viability, nor affected by any important pest or disease.
- 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.

2.3 Informing about problems on the submission of material

The Examination Office shall report to the CPVO immediately in cases where the test material of the candidate variety has not arrived in time or in cases where the material submitted does not fulfil the conditions laid down in the request for material issued by the CPVO.

In cases where the examination office encounters difficulties to obtain plant material of reference varieties the CPVO should be informed in writing.

3. METHOD OF EXAMINATION

3.1 Number of growing cycles

The minimum duration of tests should normally be two independent growing cycles.

The testing of a variety may be concluded when the entrusted examination office can determine with certainty the outcome of the test.

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" http://www.upov.int/edocs/tgpdocs/en/tgp_9.pdf

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.

The optimum stage of development for the assessment of each characteristic is indicated by a number in the third column of the Table of Characteristics. The stages of development denoted by each number are described in Chapter 8.3.

3.4 Test design

3.4.1 Each test should be designed to result in a total of at least 1500 plants, which should be divided between at least two or more replicates.

In the case of transplanted plants, each test should be designed to result in a total of at least 400 plants which should be divided between at least 2 replicates.

If panicle rows are used, the test should be conducted on at least 100 panicle rows.

In case of hybrids, the parent components (including the maintainer line) have to be included in the test and should be tested and assessed as any other variety. The observation on the hybrid variety itself should be made on at least 500 plants.

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 Special tests for additional characteristics

In accordance with Article 23 of Implementing Rules N° 874/2009 an applicant may claim either in the Technical Questionnaire or during the test that a candidate has a characteristic which would be helpful in establishing distinctness. If such a claim is made and is supported by reliable technical data, a special test may be undertaken providing that a technically acceptable test procedure can be devised.

Special tests will be undertaken, with the agreement of the President of CPVO, where distinctness is unlikely to be shown using the characteristics listed in the protocol.

3.6 Constitution and maintenance of a variety collection

The process for the constitution and the maintenance of a variety collection can be summarized as follows:

Step 1: Making an inventory of the varieties of common knowledge

Step 2: Establishing a collection ("variety collection") of varieties of common knowledge which are relevant for the examination of distinctness of candidate varieties

Step 3: Selecting the varieties from the variety collection which need to be included in the growing trial or other tests for the examination of distinctness of a particular candidate variety.

3.6.1 Forms of variety collection
The variety collection shall comprise variety descriptions and living plant material, thus a living reference collection. The variety description shall be produced by the EO unless special cooperation exists between EOs and the CPVO. The descriptive and pictorial information produced by the EO shall be held and maintained in a form of a database.

3.6.2 Living Plant Material
The EO shall collect and maintain living plant material of varieties of the species concerned in the variety collection.

3.6.3 Range of the variety collection
The living variety collection shall cover at least those common knowledge varieties that are suitable to climatic conditions of a respective EO.

The variety collection shall include all varieties used as parental components of all the hybrid varieties included in the variety collection, as well as varieties of common knowledge in their own right.

3.6.4 Making an inventory of varieties of common knowledge for inclusion in the variety collection
The inventory shall include varieties protected under National and Community PBR, varieties registered in the Common Catalogue, the OECD list, the Conservation variety list.

The inventory shall take into account the list of varieties which are the subject of an on-going application for protection or official registration (candidate varieties).

3.6.5 Maintenance and renewal/update of a living variety collection
The EO shall maintain seeds in conditions which will ensure germination and viability, periodical checks, and renewal as required.

Living material in variety collections representing varieties for which a DUS test was carried out at that EO shall be renewed after verification in a side-by-side comparison. In case where no living material is available anymore in the collection, such verification could be done with any other test that has proven to give similar results between the material in the collection and the new material.

4. ASSESSMENT OF DISTINCTNESS, UNIFORMITY AND STABILITY

The prescribed procedure is to assess distinctness, uniformity and stability in a growing trial.

4.1 Distinctness

4.1.1 General recommendations

It is of particular importance for users of this Technical Protocol to consult the UPOV-General Introduction to DUS (link in chapter 1 of this document) and TGP 9 'Examining Distinctness' (http://www.upov.int/edocs/tgpdocs/en/tgp_9.pdf) prior to making decisions regarding distinctness. However, the following points are provided for elaboration or emphasis in this Technical Protocol.

To assess distinctness of hybrids, a pre-screening system on the basis of the parental lines and the formula may be established according to the following recommendations:

(i) description of parental lines according to the Technical Protocols;

(ii) check of the distinctness of the parental lines in comparison with the reference collection, based on the characteristics in the table of characteristics in order to screen the closest inbred lines;

(iii) check of the distinctness of the hybrid formula in comparison with those of the hybrids in common knowledge, taking into account the closest inbred lines;

(iv) assessment of the distinctness at the hybrid level of 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 Technical Protocols are familiar with the recommendations contained in the UPOV-General Introduction to DUS prior to making decisions regarding distinctness.

If distinctness is assessed using the 2 x 1% criterion, the difference between two varieties is clear if the respective characteristics are significantly different in the same direction at the 1% level in at least two out of three years. The tests in each year are based on Student's two-tailed t-test of the differences between variety means with standard errors estimated using the residual mean square from the analysis of the variety x replicate plot means.

If distinctness is assessed by the combined over years distinctness analysis (COYD) the difference between two varieties is clear if the respective characteristics are different at the 1% significance level or less ($p<0.01$) in a test over either two or three years.

If the significance level or statistical methods prescribed are not appropriate the method used should be clearly described.

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 10 plants or parts taken from each of 10 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 third 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. colour 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 this Technical Protocol to consult the UPOV-General Introduction to DUS (link in chapter 1 of this document) and TGP 10 'Examining Uniformity' (http://www.upov.int/edocs/tgpdocs/en/tgp_10.pdf) prior to making decisions regarding uniformity. However, the following points are provided for elaboration or emphasis in this Technical Protocol:

4.2.2 This Technical Protocol has been developed for the examination of self-pollinated and hybrid varieties. For varieties with other types of propagation the recommendations in the UPOV-General Introduction to DUS and document TGP/13 "Guidance for new types and species", Section 4.5 "Testing Uniformity" should be followed.

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 UPOV-General Introduction to DUS.

Where the assessment of a hybrid variety involves the parent components, the uniformity of the hybrid variety should, in addition to an examination of the hybrid variety itself, also be assessed by examination of the uniformity of its parent components.

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

{A} sample size of 100 plants/ parts of plants/ panicle-rows
{B} sample size of 1500/400 plants or in case of hybrids 500/400 plants

For self-pollinated varieties, a population standard of 0.1% and an acceptance probability of at least 95 % should be applied. In the case of a sample size of 1500 plants, 4 off-types are allowed. In the case of a sample size of 400 plants, 2 off-types are allowed.

For male sterile lines, a population standard of 0.2 % and an acceptance probability of at least 95 % should be applied. In the case of a sample size of 1500 plants,6 off-types are allowed.

For male sterile single cross hybrids used as parent in a 3-way-hybrid, a population standard of 0.5% and an acceptance probability of at least 95% should be applied. In case of a sample size of 500 plants, 5 off-types are allowed.

For the assessment of uniformity of 100 panicle rows, plants or 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 100 panicle rows, plants or parts of plants, 3 off-types are allowed. A panicle row is considered to be an off-type if there is more than one off-type plant within that panicle row.

For characteristics where the sample size are 100 plants (A), the assessment of uniformity can be done in 2 steps. In a first step, 20 plants or parts of plants are observed. If no off types are observed, the variety is declared to be uniform. If more than 3 off-types are observed, the variety is declared not to be uniform. If 1 to 3 off-types are observed, an additional sample of 80 plants or parts of plants must be observed.

For the assessment of uniformity of hybrid varieties, a population standard of 1% and an acceptance probability of at least 95 % should be applied. In the case of a sample size of 500 plants, 9 off-types are allowed. In case of sample size of 400 plants, 8 off-types is allowed.

For all varieties except hybrid varieties, a re-submission of plant material may be allowed for the second growing cycle if in the first growing cycle the number of off-types did not exceed 12 plants in a sample size of 1500 plants (Population standard of 0.5% with an acceptance probability of ≥ 95%) or 9 plants, parts of plants or ear rows in a sample size of 100 (Population standard of 5% with an acceptance probability of ≥ 95%).

4.3 Stability

It is of particular importance for users of this Technical Protocol to consult the UPOV-General Introduction to DUS (link in chapter 1 of this document) and TGP 11 'Examining Stability' (http://www.upov.int/edocs/tgpdocs/en/tgp_11.pd)

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.

Where appropriate, or in cases of doubt, stability may be further examined by testing a new seed or plant stock to ensure that it exhibits the same characteristics as those shown by the initial material supplied.

Where appropriate, or in cases of doubt, the stability of a hybrid variety may, in addition to an examination of the hybrid variety itself, also be assessed by examination of the uniformity and stability of its parent components.

5. GROUPING OF VARIETIES AND ORGANISATION 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 organise the growing trial so that similar varieties are grouped together.

5.3 The following have been agreed as useful grouping characteristics:

a) Leaf blade: anthocyanin coloration (characteristic 3)

b) Time of panicle emergence (characteristic 6)

c) Stem: length (characteristic 13)

d) Lemma: colour of tip (characteristic 19)

e) Grain: ratio length/width (characteristic 29)

f) Grain: colour (characteristic 30)

g) Grain: aroma (characteristic 31)

h) Endosperm: content of amylose (characteristic 32)

5.4 If characteristics other than those mentioned in the list of grouping characteristics and/or from the table of characteristics and/or from the Technical Questionnaire – sections 5 and 7 - are used for the selection of varieties to be included into the growing trial, the EO shall inform the CPVO and seek the prior consent of the CPVO before using these characteristics.

5.5 Guidance for the use of grouping characteristics, in the process of examining distinctness, is provided through the UPOV-General Introduction to DUS and document TGP/9 "Examining Distinctness".

6. INTRODUCTION TO THE TABLE OF CHARACTERISTICS

6.1 Characteristics to be used

The characteristics to be used in DUS tests and preparation of descriptions shall be those referred to in the table of characteristics. All the characteristics shall be used, providing that observation of a characteristic is not rendered impossible by the expression of any other characteristic, or the expression of a characteristic is prevented by the environmental conditions under which the test is conducted or by specific legislation on plant health. In the latter case, the CPVO should be informed.

The Administrative Council empowers the President, in accordance with Article 23 of Commission Regulation N°874/2009, to insert additional characteristics and their expressions in respect of a variety.

6.2. States of expression and corresponding notes

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

Further explanation of the presentation of states of expression and notes is provided in UPOV document TGP/7 "Development of Test Guidelines".

6.3 Example Varieties

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

6.4 Legend

For column 'CPVO N°':

G	Grouping characteristic	-see Chapter 5
QL	Qualitative characteristic	
QN	Quantitative characteristic	
PQ	Pseudo-qualitative characteristic	
(+)	Explanations for individual characteristics	-see Chapter 8.2

For column 'UPOV N°':

The numbering of the characteristics is provided as a reference to the UPOV guideline.

(*)	UPOV Asterisked characteristic	- Characteristics that are important for the international harmonization of variety descriptions.

For column 'Stage, method':

MG, MS, VG, VS		-see Chapter 4.1.5
(a)-(b)	Explanations covering several Characteristics	-see Chapter 8.1
00-99	Explanations on growth stages	-see Chapter 8.3
{A}, {B}	Recommended sample size for the assessment of uniformity	-see Chapter 4.2.2

7. TABLE OF CHARACTERISTICS

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
1.	**6.**	**VG|B**	**Basal leaf sheath: anthocyanin coloration**		
QL		**40-49**	absent	Gladio	1
			present	CL125 HP, Vialone nano	9
2.	**7.**	**VG|B**	**Leaf blade: intensity of green colour**		
QN		**40-49**	light	Baldo, Lemont	1
			medium	Bahia	2
			dark	Puntal	3
3.	**8. (*)**	**VG|B**	**Leaf blade: anthocyanin coloration**		
QL		**40-49**	absent	Gladio, Puntal	1
G		**(a)**	present	Gioiello, Vialone nano	9
4.		**VG|B**	**Leaf blade: distribution of anthocyanin coloration**		
PQ		**40-49**	on tips only	Lomellino	1
		(a)	on margin only	CL125HP, Vialone nano	2
			in blotches only	Kemet, Verelè	3
			degrading from margin to the leaf centre	Felix 2	4
			even	Gioiello	5
5.	**11.**	**VG|B**	**Ligule: colour**		
PQ		**40-49**	white	Gladio	1
		(a)	yellowish green		2
			purple	Gioiello	3

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
6. (+)	**12. (*)**	**MG|B**	**Time of panicle emergence**		
QN			very early	Tea	1
			very early to early		2
			early	Loto	3
			early to medium		4
			medium	Ariete	5
			medium to late		6
			late	Bomba, Puntal	7
			late to very late		8
G			very late	Libero	9
7. (+)	**13.**	**MS|B/ VG|B**	**Flag leaf: length of blade**		
QN		**60-79**	very short		1
			very short to short		2
			short	Tea	3
			short to medium		4
			medium	Gladio	5
			medium to long		6
			long	Gioiello	7
			long to very long		8
			very long		9
8. (+)	**14.**	**MS|B/ VG|B**	**Flag leaf: width of blade**		
QN		**60-79**	narrow	Ellebi	1
			narrow to medium		2
			medium	Senia	3
			medium to broad		4
			broad	RG300A	5

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
9.	**15.**	**VG|B**	**Lemma: pubescence**		
QN		**60-89**	absent or very sparse	Puntal, Thaibonnet	1
			sparse	Ellebi, Guadiamar	2
			medium	Vialone nano	3
			dense	Bomba, Gloria	4
			very dense	Samba	5
10.	**16. (*)**	**VG|B**	**Stigma: colour**		
PQ		**65**	white	Ariete, Bomba, Gladio	1
			green		2
			yellow		3
			purple	Puntal, Vialone nano	4
			black		5
11.		**VG/B**	**Glume: anthocyanin coloration**		
QL		**70-79**	absent	Gladio	1
			present	Gioiello	9
12.		**VG/B**	**Glume: colour**		
PQ		**70-79**	red	Zar	1
			purple	Vialone nano	2
			brown		3
			black	Gioiello, RG300A	4

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
13. (+)	**17. (*)**	**MG|B/ MS|B**	**Stem: length**		
QN		**70-92**	very short	Tea	1
			very short to short		2
			short	Loto, Thaibonnet	3
			short to medium		4
			medium	Ariete, Bahia	5
			medium to long		6
			long	Baldo	7
			long to very long		8
G			very long	Bomba, Carnaroli	9
14.	**19.**	**VG|B**	**Stem: anthocyanin coloration of nodes**		
QL		**70-79**	absent	Puntal	1
			present	Vialone nano	9
15.	**20.**	**VG|B**	**Stem: anthocyanin coloration of internodes**		
QL		**70-79**	absent	Puntal	1
			present	Vialone nano	9
16.	**22. (*)**	**VG|B**	**Panicle: distribution of awns**		
QN		**70-89**	absent	Gladio, Tea	1
			apical quarter	Ronaldo, Senia	2
			upper half		3
			upper three quarters	Samba	4
			whole length	Bomba, Carnaroli	5

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
17. (+)	**23.**	**VG|B**	**Awns: length**		
QN		**70-89**	very short	Ronaldo	1
			short	Senia	2
			medium	Bomba	3
			long	Carnaroli	4
			very long	Novara	5
18. (+)	**24. (*)**	**MS|B**	**Panicle: length**		
QN		**72-92**	very short		1
			very short to short		2
			short	Tea	3
			short to medium		4
			medium	Gladio	5
			medium to long		6
			long	Carnaroli	7
			long to very long		8
			very long	ECCO985 FP	9
19.	**25. (*)**	**VG|B**	**Lemma: colour of tip**		
PQ		**70-75**	white	Ariete, Bomba	1
			yellowish		2
			red	Gladio	3
			purple	Carnise, Vialone nano	4
			brown	Arborio	5
G			black	Gange	6

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
20. (+)	**26. (*)**	**VG|B**	**Flag leaf: attitude of blade**		
QN		**80-92**	erect	CL125HP	1
			erect to semi-erect		2
			semi-erect	Ariete	3
			semi-erect to horizontal		4
			horizontal	Loto	5
			horizontal to moderately reflexed		6
			moderately reflexed	Vialone nano	7
			moderately reflexed to strongly reflexed		8
			strongly reflexed		9
21. (+)	**28. (*)**	**VG|B**	**Panicle: attitude**		
QN		**90-92**	erect	Albufera, Teti	1
			semi-erect	Ariete	2
			semi-drooping	Gladio, Thaibonnet	3
			drooping		4
22. (+)	**29. (*)**	**VG|B**	**Panicle: attitude of branches**		
QN		**90-92**	adpressed	Teti	1
			adpressed to erect		2
			erect	Gladio	3
			erect to semi-erect		4
			semi-erect	Carnaroli	5
23. (+)	**31.**	**VG|B**	**Panicle: exsertion**		
QN		**90-92**	enclosed		1
			partly exserted	Unico	2
			just exserted	Gleva	3
			well exserted	Bomba, Carnaroli	4

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
24. (+)	**32. (*)**	**MG|B**	**Time of maturity**		
QN			very early	Tea	1
			very early to early		2
			early	Loto	3
			early to medium		4
			medium	Ariete	5
			medium to late		6
			late	Bomba, Puntal	7
			late to very late		8
			very late	Lemont, Libero	9
25.	**34. (*)**	**VG|B**	**Lemma: colour**		
PQ		**70-75**	white		1
			yellowish	Gladio, Puntal	2
			red	Il Cardinale	3
			purple	Vialone nano	4
			brown	Arborio	5
			black	Gioiello	6
26. (+)	**38.**	**MG|A**	**1000 grain weight**		
QN		**92**	very low		1
			very low to low		2
			low	Ellebi, Puntal	3
			low to medium		4
			medium	Ariete	5
			medium to high		6
			high	Arborio, Carnaroli	7
			high to very high		8
			very high	Reperso	9

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
27.	**39. (*)**	**MS|A**	**Grain: length**		
QN		**92**	very short		1
		(b)	very short to short		2
			short	Elio, Bomba	3
			short to medium	Bahia	4
			medium	Ariete	5
			medium to long		6
			long	Gladio, Thaibonnet	7
			long to very long		8
			very long	Artiglio	9
28.	**40. (*)**	**MS|A**	**Grain: width**		
QN		**92**	narrow	Gladio, Thaibonnet	1
		(b)	narrow to medium		2
			medium	Ariete	3
			medium to broad	Guadiamar	4
			broad	Arborio	5
29. (+)	**41. (*)**	**MS|A**	**Grain: ratio length/width**		
QN		**92**	low	Nano	1
		(b)	low to medium	Bahia, Elio, Fonsa	2
			medium	Arborio	3
			medium to high	Ariete, Marisma	4
G			high	Gladio, Thaibonnet	5

CPVO N°	UPOV N°	Stage, Method	Characteristics	Examples	Note
30.	**42. (*)**	**VG|A**	**Grain: colour**		
PQ		**92**	white	Gladio, Puntal	1
		(b)	red	Ermes, Galo, Kolorado	2
			brown red	Alegre, Il Cardinale	3
			purple		4
			light brown	Avana Gold, Delfo	5
			dark brown		6
G			black	Artemide, Venere	7
31. (+)	**44. (*)**	**VG|A**	**Grain: aroma**		
QL		**92**	absent	Gladio	1
G		**(b)**	present	Alfiero, Delmar, Gange	9
32. (+)	**2.**	**MG|A**	**Endosperm: content of amylose**		
QN		**92**	absent or very low	Castelmochi	1
			low	Jsendra, Loto	2
G			high	Gladio	3

8. EXPLANATIONS ON THE TABLE OF CHARACTERISTICS

8.1 Explanations covering several characteristics

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

a) Observations should be made on the penultimate leaf.

b) Observations should be made after removal of husks = decorticated grain.

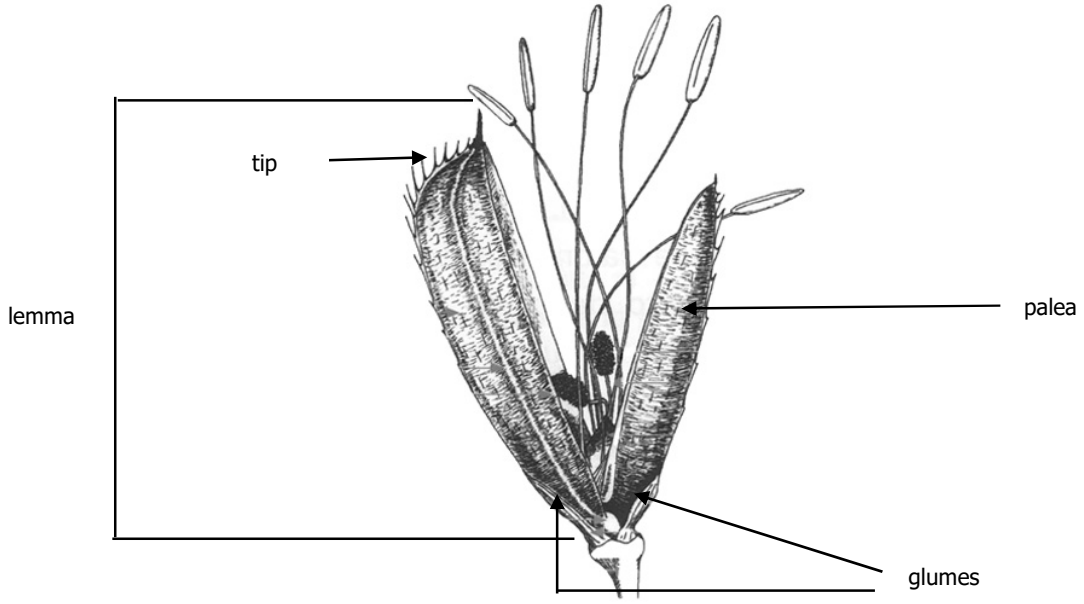
8.2 Explanations for individual characteristics

Ad. 6: Time of panicle emergence

Time of panicle emergence is reached when inflorescence emergence is completed in 50% of the panicles.

Ad. 7: Flag leaf: length of blade
Ad. 8: Flag leaf: width of blade

Length and width should be assessed on the same leaf blade. Length should be measured from the tip of the base. Width should be measured at the widest part.



Ad. 13: Stem: length

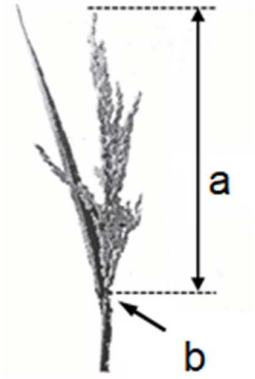
Measurements should be made from the base of the plant to the base of the panicle on the longest stem, excluding deep water rice.

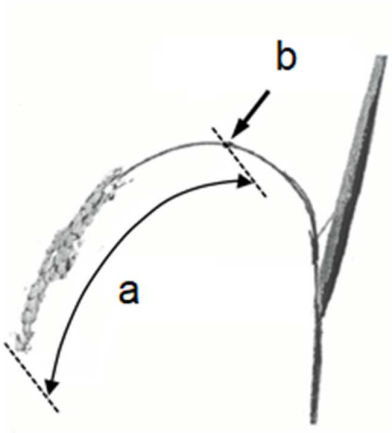
Ad. 17: Awns: length

Observations should be made on the longest awn in the panicle.

Ad. 18: Panicle: length

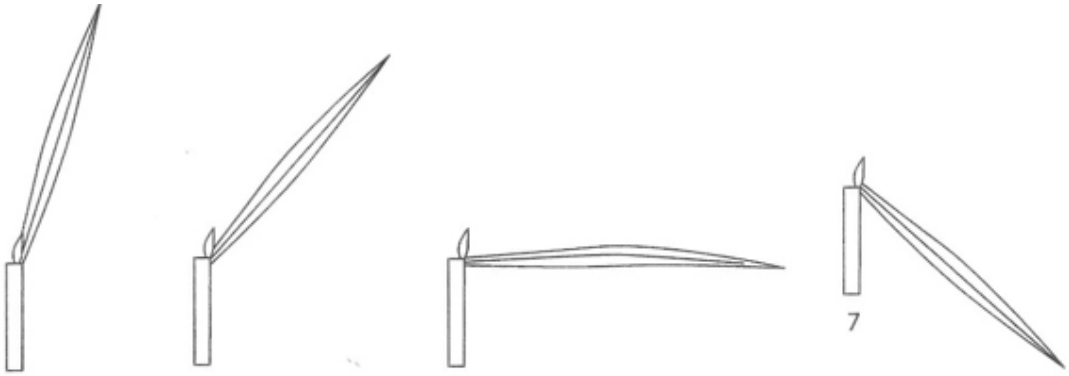
Length of panicle should be observed from panicle base to the top excluding awns.





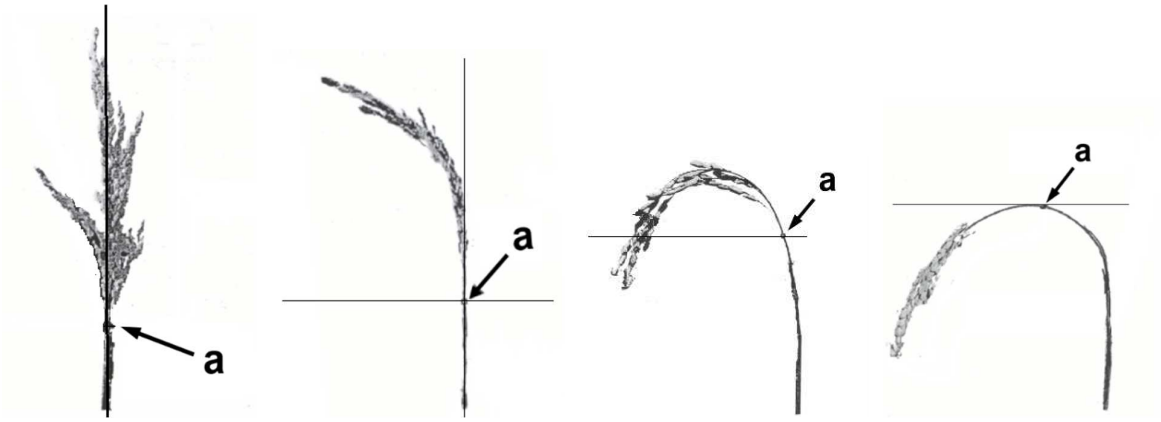
a = length
b = panicle base (node)

Ad. 20: Flag leaf: attitude of blade



1 erect | 3 semi-erect | 5 horizontal | 7 moderately reflexed

Ad. 21: Panicle: attitude



1 erect | 2 semi-erect | 3 semi-drooping | 4 drooping
a = panicle base (node)

Ad. 22: Panicle: attitude of branches



1
adpressed

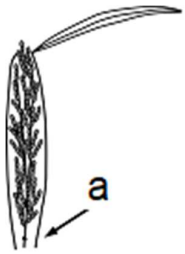


3
erect

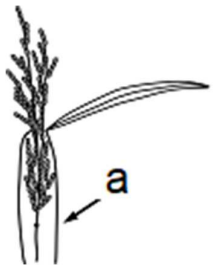


5
semi-erect

Ad. 23: Panicle: exsertion



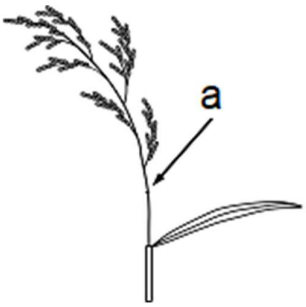
1
enclosed



2
partly exserted



3
just exserted



4
well exserted

a = panicle base

Ad. 24: Time of maturity

Time of maturity is reached when approximately 90% of the panicles present brown hulls. Before turning brown, the spikelets present a greenish or yellowish tone, excluding any anthocyanin pigmentation, and development occurs in an acropetal gradient. At maturity, most of the fully developed grains will have brown hulls, with the basal spikelets matching the colour of the apical spikelets. This method is adapted from Counce *et al.* (2000).

Ad. 26: 1000 grain weight

Observation should be made on non-decorticated grains. 1000 grain weight should be calculated at 14% moisture. For this determination, the ISTA Thousand-seed weight (TSW) method or any other equivalent method can be used.

Ad. 29: Grain: ratio length/width

1- low: <1.50
2- low to medium: 1.50 – 1.99
3- medium: 2.00 – 2.49
4- medium to high: 2.50 – 2.99
5- high: >2.99

Ad. 31: Grain: aroma

The main component of the aroma in rice is the 2-acetyl-1-pirroline (AcPy) responsible for developing the intense aroma of popcorn during cooking. For its evaluation, steam 6 g of rice (milled or husked) with the addition of 9 ml of distilled water, for 20 minutes and leave 10 minutes with the heating source off. Allow to cool to room temperature and subject to sensory analysis with an odd number of assessors. The sample may have an absent or present aroma (weak or strong). The level of expression is determined by reference to the example varieties.

Ad. 32: Endosperm: content of amylose

Method UNI ISO 6647 should be used.
Modified from IRRI system by rounding due to variability of data especially in cool climates and adding a rank of very high amylose content.

1. absent or very low < 3 % of amylose (waxy endosperm type)
2. low 3-21% of amylose
3. high >21% of amylose

8.3 Explanations on growth stages

Decimal code for the growth stage of codes of cereals

	Germination		Inflorescence emergence
00	Dry seed	50	-
01	Start of imbibition	51	First spikelet of inflorescence just visible
02	-	52	20% of inflorescence emerged
03	Imbibition complete	53	30% of inflorescence emerged
04	-	54	40% of inflorescence emerged
05	Radicle emerged from caryopsis	55	50% of inflorescence emerged
06	-	56	60% of inflorescence emerged
07	Coleoptile emerged from caryopsis	57	70% of inflorescence emerged
08	-	58	80% of inflorescence emerged
09	Leaf just at coleoptile tip	59	Emergence of inflorescence completed
	Seedling growth		**Anthesis**
10	First leaf through coleoptile	60	-
11	First leaf unfolded	61	Beginning of anthesis
12	2 leaves unfolded	62	-
13	3 leaves unfolded	63	-
14	4 leaves unfolded	64	-
15	5 leaves unfolded	65	Anthesis half-way
16	6 leaves unfolded	66	-
17	7 leaves unfolded	67	-
18	8 leaves unfolded	68	-
19	9 or more leaves unfolded	69	Anthesis complete
	Tillering		**Milk development**
20	Main shoot only	70	-
21	Main shoot and 1 tiller	71	Caryopsis watery ripe
22	Main shoot and 2 tillers	72	-
23	Main shoot and 3 tillers	73	Early milk
24	Main shoot and 4 tillers	74	-
25	Main shoot and 5 tillers	75	Medium milk
26	Main shoot and 6 tillers	76	-
27	Main shoot and 7 tillers	77	Late milk
28	Main shoot and 8 tillers	78	-
29	Main shoot and 9 or more tillers	79	-
	Stem elongation		**Dough development**
30	Pseudo stem erection [1]	80	-
31	1st node detectable	81	-
32	2nd node detectable	82	-
33	3rd node detectable	83	Early dough
34	4th node detectable	84	-
35	5th node detectable	85	Soft dough
36	6th node detectable	86	-
37	Flag leaf just visible	87	Hard dough
38	-	88	-
39	Flag leaf ligule/collar just visible	89	-

[1] Only applicable to cereals with a prostrate or semi-prostrate early growth habit.

	Booting
40	-
41	Flag leaf sheath extending
42	-
43	Boots just visibly swollen
44	-
45	Boots swollen
46	-
47	Flag leaf sheath opening
48	-
49	First awns visible

	Ripening
90	-
91	Caryopsis hard (difficult to divide by thumbnail)[2]
92	Caryopsis hard (can no longer be dented by thumbnail)[3][4]
93	Caryopsis loosening in day time
94	Over-ripe, straw dead and collapsing

	Ripening (continued)
95	Seed dormant
96	Viable seed giving 50% germination
97	Seed not dormant
98	Secondary dormancy included
99	Secondary dormancy lost

[2] Ripeness for binder (ca. 16% water content). Chlorophyll of inflorescence largely lost.
[3] Ripeness for combine harvester (<16% water content).
[4] Optimum harvest time.

9. LITERATURE

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Vol. 2 Physiology (1995)
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Zadoks, J.C., Chang, T.T., Konzak, C.F., 1974: A Decimal code for the Growth Stages of Cereals. Weed Research. NL, 14: pp. 415 – 421.

Counce, P. A., Keisling, T. C., & Mitchell, A. J. (2000): A uniform, objective, and adaptive system for expressing rice development. Crop Science, 40(2), 436-443. https://doi.org/10.2135/cropsci2000.402436x

10. TECHNICAL QUESTIONNAIRE

The Technical Questionnaire is available on the CPVO website under the following reference:
CPVO-TQ/016/4 – *Oryza sativa* L. – rice