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

Adopted on 01/10/2015

Entry into force on 01/08/2015

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CPVO-TP/016/3

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/en/publications/tgp/) and the relevant UPOV Test Guideline TG/036/8 dated 31/03/2004 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 **01.08.2015**. 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 two 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. 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

If problems arise during the course of the test the CPVO should be informed immediately so that the information can be passed on to the applicant. Subject to prior permanent agreement, the applicant may be directly informed at the same time as the CPVO particularly if a visit to the trial is advisable.

1.3.3 Sample keeping in case of problems

If the technical examination has resulted in a negative report, the CPVO shall inform the Examination Office as soon as possible in case that a representative sample of any relevant testing material shall be kept.

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 http://cpvo.europa.eu/applications-and-examinations/technical-examinations/submission-of-plant-material-s2-publication in the special issue S2 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

- they are responsible for ensuring compliance with any customs and plant health requirements.
- the plant material supplied should be visibly healthy, not lacking in vigour, 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.

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" 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.

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

In accordance with Article 83(3) of Council Regulation No. 2100/94 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, an additional test may be undertaken providing that a technically acceptable test procedure can be devised.

Additional tests will be undertaken, with the agreement of the President of CPVO, where distinctness is unlikely to be shown using the characters 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 varieties that are suitable to climatic conditions of a respective EO.

3.6.4 Making an inventory of varieties of common knowledge for inclusion in the variety collection
The inventory shall take into account the list of protected varieties and the official, or other, registers of varieties, in particular:

The inventory shall include varieties protected under National PBR (UPOV contracting parties) and Community PBR, varieties registered in the Common Catalogue, the OECD list, the Conservation variety list and varieties in trade or in commercial registers for those species not covered by a National or the Common Catalogue.

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. For the renewal of existing living material the identity of replacement living plant material shall be verified by conducting side-by-side plot comparisons 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.

Decision standards

If distinctness is assessed using the t-test least significant difference the difference between two varieties is clear if it occurs with the same sign at the 1% significance level or less ($p<0.01$) in two consecutive or two out of three growing cycles.

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

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.

4.1.4 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

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.

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 or parts of plants
B: sample size of 1500 plants or parts of plants

For the assessment of uniformity in a sample of 1500 plants, 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.

For the assessment of uniformity of 100 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 plants or parts of plants, 3 off-types are allowed.

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.

Hybrid varieties
For the assessment of uniformity in a sample of 1500 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 1500 plants, 22 off-types are allowed.

4.3 Stability

4.3.1 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 11 'Examining Stability' (http://www.upov.int/edocs/tgpdocs/en/tgp_11.pdf).

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 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 lines.

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) Leaf: anthocyanin coloration of auricles (characteristic 4)

b) Time of heading (50% of plants with heads) (characteristic 9)

c) Non-prostrate varieties only: Stem: length (excluding panicle) (characteristic 15)

d) Panicle: awns (characteristic 19)

e) Decorticated grain: length (characteristic 32)

f) Decorticated grain: shape (in lateral view) (characteristic 34)

g) Decorticated grain: colour (characteristic 35)

h) Decorticated grain: aroma (characteristic 38)

5.4 If other characteristics than those from the TP 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.

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.

States of expression and corresponding notes
In the case of qualitative and pseudo-qualitative characteristics, 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 Example Varieties

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

6.3 Legend

For the CPVO N° column:

G	Grouping characteristic	– see Chapter 5
QL	Qualitative characteristic	
QN	Quantitative characteristic	
PQ	Pseudo-qualitative characteristic	
(+); (a)	See Explanations on the Table of Characteristics in Chapter 8.2	

For the UPOV N° column:
The numbering of the characteristics is provided as a reference to the ad hoc UPOV guideline.

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

For the column "stage, method":

40 – 92	See Explanations on the Table of Characteristics in Chapter 8.3	
MG, MS, VG, VS	Method of observation	– see Chapter 4.1.5
A, B	Sample size	– see Chapter 3.3

7. TABLE OF CHARACTERISTICS

CPVO N°	UPOV N°	Stage Method	Characteristics	Examples	Note
1.	**3.**	**40**	**Leaf: intensity of green colour**		
QN		**B; VG**	light	Lemont	3
(a)			medium	Bahia	5
			dark	Puntal	7
2.	**4.**	**40**	**Leaf: anthocyanin coloration**		
QL		**B; VG**	absent	Puntal	1
(a)			present		9
3.	**5.**	**40**	**Leaf: distribution of anthocyanin coloration**		
PQ		**B; VG**	on tips only		1
(a)			on margin only		2
			in blotches only		3
			even		4
4. **QL**	**9. (*)**	**40**	**Leaf: anthocyanin coloration of auricles**		
(a)		**A; VG**	absent	Senia	1
G			present	Vialone Nano	9
5.	**13.**	**40**	**Leaf blade: length**		
QN		**A**	short	Fanga	3
(a)		**VG/MS**	medium	Galatxo	5
			long	Puntal	7
6.	**14.**	**40**	**Leaf blade: width**		
QN		**A**	narrow		3
(a)		**VG/MS**	medium		5
			broad		7

CPVO N°	UPOV N°	Stage Method	Characteristics	Examples	Note
7.	**15.**	**60**	**Flag leaf: attitude of blade (early observation)**		
(+)	**(*)**	**B; VG**	erect		1
QN			semi-erect	Galatxo	3
			horizontal	Veta	5
			recurved		7
8.	**16.**	**90**	**Flag leaf: attitude of blade (late observation)**		
(+)	**(*)**	**B; VG**	erect		1
QN			semi-erect	Fonsa	3
			horizontal	Puebla	5
			recurved		7
9.	**19.**	**55**	**Time of heading (50% of plants with heads)**		
	(*)	**B; VG**	very early	Tea	1
QN			early	Loto	3
			medium	Ariete	5
			late	Puntal	7
G			very late	Libero	9
10.	**20.**	**60**	**Male sterility**		
(+)		**A; VS**	absent		1
PQ			partially male sterile		2
			male sterile		3
11.	**21.**	**65**	**Lemma: anthocyanin coloration of keel (early observation)**		
(+)		**A; VG**	absent or very weak		1
QN			weak		3
			medium		5
			strong		7

CPVO N°	UPOV N°	Stage Method	Characteristics	Examples	Note
12.	**22.**	**65**	**Lemma: anthocyanin coloration of area below apex (early observation)**		
(+)		**A; VG**	absent or very weak		1
QN			weak		3
			medium		5
			strong		7
13.	**23.**	**65**	**Lemma: anthocyanin coloration of apex (early observation)**		
(+)	**(*)**	**A; VG**	absent or very weak	Ariete, Bomba	1
QN			weak		3
			medium	Cripto	5
			strong	Elio, Puntal	7
			very strong	Arborio	9
14.	**24.**	**65**	**Spikelet: colour of stigma**		
PQ	**(*)**	**A; VG**	white	Ariete, Bahia	1
			light green		2
			yellow		3
			light purple	Thaibonnet	4
			purple	Vialone Nano	5
15.	**26.**	**70**	**<u>Non prostrate varieties only</u>: Stem length (excluding panicle)**		
QN	**(*)**	**B; MG**	very short	Lampo, Leda	1
			short	Loto, Thaibonnet	3
			medium	Ariete, Bahia	5
			long	Baldo	7
G			very long	Carnaroli	9
16.	**27.**	**70**	**Stem: anthocyanin coloration of nodes**		
QL	**(*)**	**A; VG**	absent	Puntal	1
			present		9

CPVO N°	UPOV N°	Stage Method	Characteristics	Examples	Note
17.	**29.**	**70**	**Stem: anthocyanin coloration of internodes**		
QL		**A; VG**	absent	Puntal	1
			present		9
18.	**30.**	**72-90**	**Panicle: length of main axis**		
(+)	**(*)**	**A; MS/MG**	short	Ariete, Lido	3
QN			medium	Thaibonnet, Thainato	5
			long	Carnaroli, Lemont	7
19.	**32.**	**60**	**Panicle: awns**		
QL		**B; VG**	absent	Puntal	1
G			present	Bomba	9
20.	**34.**	**70-80**	**Panicle: distribution of awns**		
	(*)	**A; VG**	tip only	Senia, Thainato	1
PQ			¼ upper only		2
			upper half only	Puebla	3
			¾ of the total length		4
			whole length	Bomba, Carnaroli	5
21.	**35.**	**70-80**	**Panicle: length of longest awns**		
QN		**A; VG**	vey short	Ronaldo	1
			short	Arborio, Senia	3
			medium	Selenio	5
			long	Bomba, Carnaroli	7
			very long		9
22.	**36.**	**60-80**	**Spikelet: pubescence of lemma**		
QN	**(*)**	**A; VG**	absent or very weak	Puntal, Thaibonnet	1
			weak	Guadiamar	3
			medium	Galatxo, Vialone Nano	5
			strong	Calca, Bomba, S. Andrea	7
			very strong		9

CPVO N°	UPOV N°	Stage Method	Characteristics	Examples	Note
23.	**37.**	**70-75**	**Spikelet: colour of tip of lemma**		
PQ	**(+)**	**A; VG**	white	Calca, Veta	1
			yellowish	Senia	2
			brown	Lemont	3
			red	Thaibonnet	4
			purple	Vialone Nano	5
			black	Gange, Tarriso	6
24.	**39.**	**90**	**Panicle: attitude in relation to stem**		
(+)	**(*)**	**B; VG**	upright	Elio, Roncolo	1
PQ			semi-upright	Ariete, Lido	2
			slightly drooping	Guadiamar, Thaibonnet	3
			strongly drooping		4
25.	**42.**	**90**	**Panicle: attitude of branches**		
(+)	**(*)**	**B; VG**	erect	Lido	1
QN			semi-erect	Bahia, Senia	3
			spreading	Koral, Galatxo	5
26.	**43.**	**90**	**Panicle: exsertion**		
(+)		**A; VG**	enclosed		1
QN			partly exserted		3
			just exserted		5
			moderately-well exserted		7
			well exserted		9
27.	**44.**	**90**	**Time of maturity**		
(+)		**B; VG**	very early	Tea	1
QN			early	Loto	3
			intermediate	Ariete	5
			late	Puntal	7
			very late	Libero	9

CPVO N°	UPOV N°	Stage Method	Characteristics	Examples	Note
28.	**46.**	**A; VG**	**Lemma: colour**		
PQ			light gold		1
			gold		2
			brown		3
			reddish to light purple		4
			purple		5
			black		6
29.	**53.**	**92**	**Grain: weight of 1000 fully developed grains**		
(+)		**A; MG**	low	Puntal	3
QN			medium	Niva	5
			high	Galatxo	7
30.	**54.**	**92**	**Grain: length**		
QN		**A; MS**	short	Fonsa	3
			medium	Galatxo	5
			long	Thaibonnet	7
31.	**55.**	**92**	**Grain: width**		
QN		**A; MS**	narrow	Puntal	3
			medium	Lido	5
			broad	Galatxo	7
32.	**58.**	**92**	**Decorticated grain: length**		
QN		**A; MS**	short	Balilla, Bomba, Fonsa	3
G			medium	Bahia, Galatxo, Lido	5
			long	Puntal, Thaibonnet	7
33.	**59.**	**92**	**Decorticated grain: width**		
QN		**A; MS**	narrow	Thaibonnet	3
			medium	Milagrosos	5
			broad	Castell, Maso	7

CPVO N°	UPOV N°	Stage Method	Characteristics	Examples	Note
34.	**60.**	**92**	**Decorticated grain: shape (in lateral view)**		
(+)	**(*)**	**A; MS**	round		1
QN			semi-round	Bahia, Fonsa	2
			half spindle-shaped	Lido, Galatxo	3
			spindle-shaped	Ariete, Milagrosos	4
G			long spindle-shaped	Thaibonnet	5
35.	**61.**	**92**	**Decorticated grain: colour**		
	(*)	**A; VG**	white	Balilla, Senia	1
PQ			light brown		2
			variegated brown		3
			dark brown		4
			light red		5
			red		6
			variegated purple		7
			purple		8
G			dark purple / black	Venere	9
36.	**62.**	**92**	**Endosperm: type**		
(+)		**A; VG**	glutinous	Castelmochi	1
PQ			intermediate		2
			non-glutinous		3
37.	**63.**	**92**	**Endosperm: content of amylose**		
(+)		**A; MG**	low	Ariete	1
PQ			high	Carnaroli, Thaibonnet	2
38.	**65.**	**92**	**Decorticated grain: aroma**		
(+)	**(*)**	**A; MG**	absent or very weak	Bahia	1
QN			weak		2
G			strong	Arome, Gange, Delmar	3

8. EXPLANATIONS ON THE TABLE OF CHARACTERISTICS

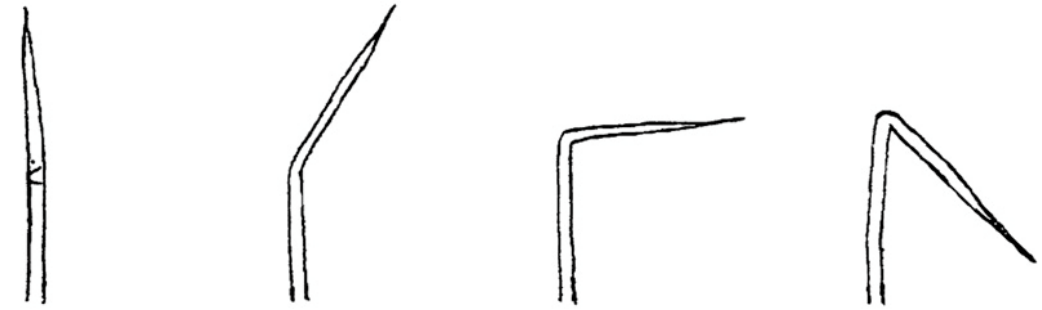
8.1 Explanations covering several characteristics

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

(a) Unless otherwise indicated, all observations on the leaf should be made on the penultimate leaf.

8.2 Explanations for individual characteristics

Ad. 7 and 8: Flag leaf: attitude of blade (early and late observation)

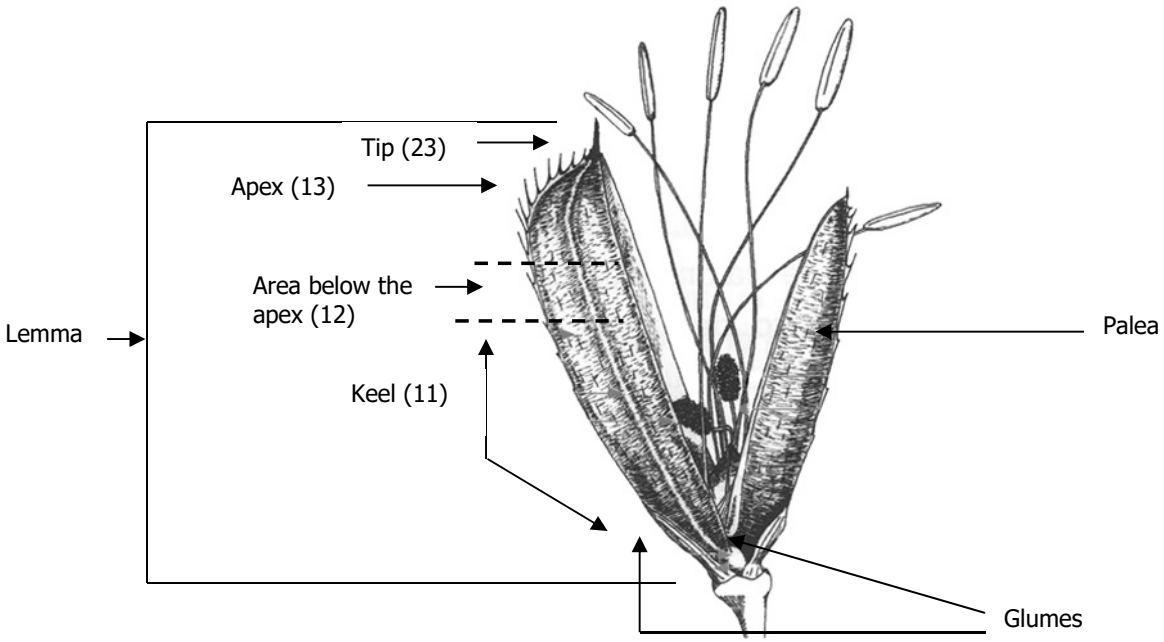


1 erect | 3 semi-erect | 5 horizontal | 7 recurved

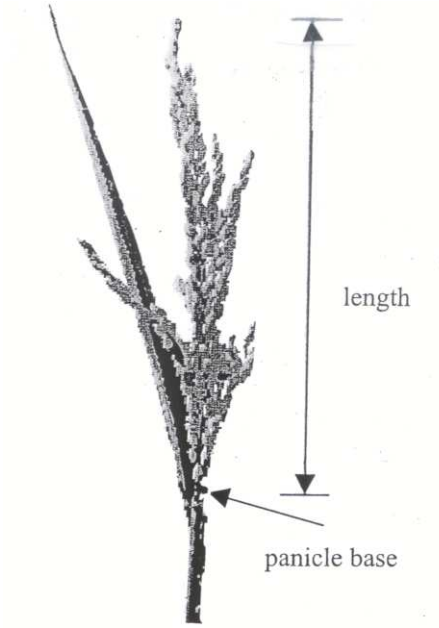
Ad. 10: Male sterility

absent	0 to 25% sterile pollen	1
partially male sterile	25 to 95% sterile pollen	2
male sterile	more than 95% sterile pollen	3

Ad. 11, 12, 13: Lemma: anthocyanin coloration and 23: Spikelet: colour of tip



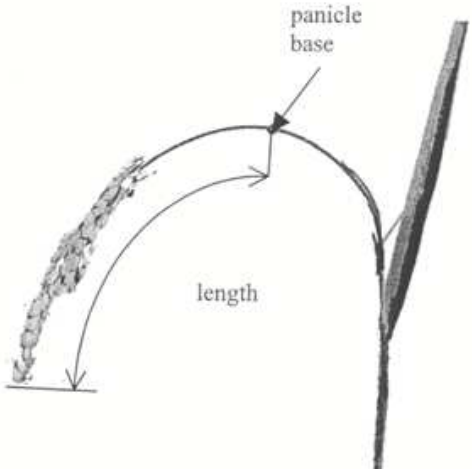
Ad. 18 and 24: Panicle: length of main axis (18) and attitude in relation to stem (24)



1
upright

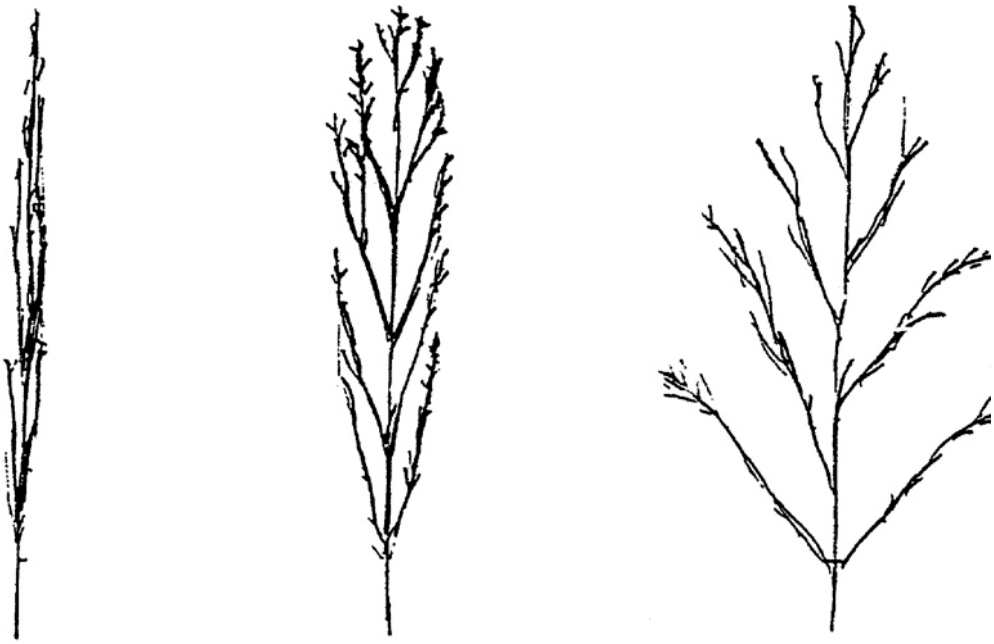
2
semi-upright

3
slightly drooping



4
strongly drooping

Ad. 25: Panicle: attitude of branches: to be observed on a flat, horizontal surface

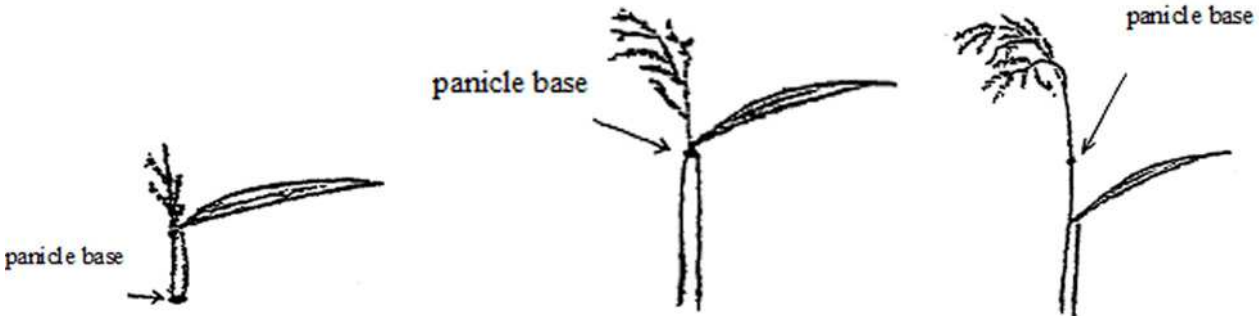


1
erect

3
semi-erect

5
spreading

Ad. 26: Panicle: exsertion



3
partly exserted

5
just exserted

9
well exserted

Ad. 27: Time of maturity

The sample will be collected in the field, saved in a container resistant to humidity and the water content will be measured by a thermo balance or by dryer-oven.

A variety is considered to be mature when its grains have reached a humidity of 22%.

Ad. 29: Grain: weight of 1000 fully developed grains

To be calculated at 14% moisture. The weight should be assessed by taking one harvested bunch each from the sample size of 100 plants ("A" characteristic).

Ad. 34: Decorticated grain: shape (in lateral view)

		length/width
round	1	< 1.50
semi-round	2	1.50-1.99
half spindle-shaped	3	2.00-2.49
spindle-shaped	4	2.50-2.99
long spindle-shaped	5	≥ 3.00

Ad. 36: Endosperm: type

The three states of expression can be simply defined by reaction to KI-I solution; glutinous type endosperm is stained to reddish purple, non-glutinous type to dark blue purple, and intermediate type to reddish blue purple.

One can observe that glutinous rice has waxy grains, and non-glutinous rice has non-waxy to transparent grains, with various grades according to the amylose content of the endosperm. When it is necessary to differentiate glutinous rice and rice with very low amylose content, chemical analysis is needed.

Note: In general, the amylose content of pure line varieties of glutinous rice is 0%. However, many commercial varieties, especially local and traditional varieties may contain between 1% and 4% of amylose. This is because the waxy gene is recessive, and when out-crossed by non-glutinous rice pollen, the endosperm becomes non-glutinous. Also, some methods of testing may result in a low % of amylose. Research on chemical structure of waxy rice is still in progress in Japan. Recently, various genes (named "dull" genes) for producing semi-waxy rice have been identified. At present, amylose content of those semi-waxy rice varieties is not less than 5%, though it is not sure if further lower amylose lines will be bred in the future.

Intermediate rice is non-glutinous but with very low amylose.

KI-I solution is prepared by mixing 0.1 % I2 solution and 0.2 % KI solution.

Ad. 37: 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 considering rice in some area of southern India.

Low < 21 %
High > 21 %

Ad. 38: Decorticated grain: aroma

The main component of the aroma in rice is the 2-acetyl-1-pirroline (AcPy). To vaporize this chemical, 10 ml. of a 1.7 % solution of KOH should be added to 2 gr. of decorticated grains. The aroma, which is similar to that in pop-corn, is released within 10 minutes. The level of expression is determined by reference to the example varieties.

8.3 Decimal Code for the Growth Stages of Cereals

2-digit Code	General Description	Feekes' Scale	Additional Remarks on Wheat, Barley, Rye, Oats and Rice
	Germination		
00	Dry seed		
01	Start of imbibition		
02	-		
03	Imbibition complete		
04	-		
05	Radicle emerged from caryopsis		
06	-		
07	Coleoptile emerged from caryopsis		
08	-		
09	Leaf just at coleoptile tip		
	Seedling growth		
10	First leaf through coleoptile	1	Second leaf visible (less than 1 cm)
11	First leaf unfolded (1)		
12	2 leaves unfolded		
13	3 leaves unfolded		
14	4 leaves unfolded		
15	5 leaves unfolded		50% of laminae unfolded
16	6 leaves unfolded		
17	7 leaves unfolded		
18	8 leaves unfolded		
19	9 or more leaves unfolded		
	Germination		
20	Main shoot only		
21	Main shoot and 1 tiller	2	
22	Main shoot and 2 tillers		This section to be used to supplement
23	Main shoot and 3 tillers		records from other sections of the table:
24	Main shoot and 4 tillers		"concurrent codes"
25	Main shoot and 5 tillers		
26	Main shoot and 6 tillers	3	
27	Main shoot and 7 tillers		
28	Main shoot and 8 tillers		
29	Main shoot and 9 or more tillers		
	Stem elongation		
30	Pseudo stem erection (2)	4 – 5	In rice: vegetative lag phase
31	1st node detectable	6	Jointing stage
32	2nd node detectable	7	
33	3rd node detectable		
34	4th node detectable		Above crown nodes
35	5th node detectable		
36	6th node detectable		
37	Flag leaf just visible	8	

2-digit Code	General Description	Feekes' Scale	Additional Remarks on Wheat, Barley, Rye, Oats and Rice
38	-		
39	Flag leaf ligule/collar just visible	9	Pre-boot stage In rice: opposite auricle stage
	<u>Booting</u>		
40	-		Little enlargement of the inflorescence, early-boot stage
41	Flag leaf sheath extending		
42	-		
43	Boots just visibly swollen		Mid-boot stage
44	-	10	
45	Boots swollen		Late-boot stage
46	-		
47	Flag leaf sheath opening		
48	-		
49	First awns visible	10.1	In awned forms only
	<u>Inflorescence emergence</u>		
50	First spikelet of	N	N = non-synchronous crops
	inflorescence just		
51	visible	S	S = synchronous crops
52		N	
	¼ of inflorescence emerged	10.2	
53		S	
54		N	
	½ of inflorescence emerged	10.3	
55		S	
56		N	
	¾ of inflorescence emerged	10.4	
57		S	
58		N	
	Emergence of inflorescence	10.5	
59	completed	S	
	<u>Anthesis</u>		
60		N	
	Beginning of anthesis	10.51	
61		S	Not easily detectable in barley. In rice: Usually immediately following heading
62	-		
63	-		
64		N	
	Anthesis half-way	10.52	
65		S	
66	-		
67	-		
68		N	
	Anthesis complete	10.53	
69		S	

2-digit Code	General Description	Feekes' Scale	Additional Remarks on Wheat, Barley, Rye, Oats and Rice
	Milk development		
70	-		
71	Caryopsis watery ripe	10.54	
72	-		
73	Early milk		
74	-		
75	Medium milk	11.1	Increase in solids of liquid endosperm notable when crushing the caryopsis between fingers
76	-		
77	Late milk		
78	-		
79	-		
	Dough development		
80	-		
81	-		
82	-		
83	Early dough		Fingernail impression not held.
84	-		
85	Soft dough	11.2	
86	-		
87	Hard dough		
88	-		Fingernail impression held, inflorescence losing chlorophyll
89	-		
	Ripening		
90	-		In rice: Terminal spikelets ripened.
91	Caryopsis hard (difficult to divide by thumbnail) (3)	11.3	In rice: 50% of spikelets ripened
92	Caryopsis hard (can no longer be dented by thumbnail) (4)	11.4	In rice: Over 90% of spikelets ripened (5)
93	Caryopsis loosening in daytime		Risk of grain loss by shedding
94	Over-ripe, straw dead and collapsing		
95	Seed dormant		
96	Viable seed giving 50% germination		
97	Seed not dormant		
98	Secondary dormancy induced		
99	Secondary dormancy lost		
	Transplanting and recovery (rice only)		
T1	Uprooting of seedlings		
T2	-		
T3	Rooting		
T4	-		
T5	-		
T6	-		
T7	Recovery of shoots		
T8	-		
T9	Resumption of vegetative growth		

Notes on the Table

(1) Stage of seedling inoculation with rust in the greenhouse.
(2) Only applicable to cereals with a prostrate or semi-prostrate early growth habit.
(3) Ripeness for binder (ca. 16% water content). Chlorophyll of inflorescence largely lost.
(4) Ripeness for combine harvester (< 16% water content).
(5) Optimum harvest time.

9. LITERATURE

J.C. Zadoks, T.T. Chang, C.F. Konzak, "A Decimal Code for the Growth Stages of Cereals", Weed Research 1974 14:415-421.

10. TECHNICAL QUESTIONNAIRE

The Technical Questionnaire is available on the CPVO website under the following reference: CPVO-TQ/016/3