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INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

Geneva

DRAFT

RICE*

UPOV Code(s):

ORYZA_SAT

Oryza sativa L.

GUIDELINES

FOR THE CONDUCT OF TESTS

FOR DISTINCTNESS, UNIFORMITY AND STABILITY

prepared by experts from Japan
to be considered by the
Technical Working Party for Agricultural Crops
at its forty-eighth session, to be held in Montevideo, Uruguay,
from 2019-09-16 to 2019-09-20

Disclaimer: this document does not represent UPOV policies or guidance

Alternative names:*

Botanical name	*English*	*French*	*German*	*Spanish*
Oryza sativa L.	Rice	Riz	Reis	Arroz

The purpose of these guidelines ("Test Guidelines") is to elaborate the principles contained in the General Introduction (document TG/1/3), and its associated TGP documents, into detailed practical guidance for the harmonized examination of distinctness, uniformity and stability (DUS) and, in particular, to identify appropriate characteristics for the examination of DUS and production of harmonized variety descriptions.

ASSOCIATED DOCUMENTS

These Test Guidelines should be read in conjunction with the General Introduction and its associated TGP documents.

* These names were correct at the time of the introduction of these Test Guidelines but may be revised or updated. [Readers are advised to consult the UPOV Code, which can be found on the UPOV Website (www.upov.int), for the latest information.]

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1. Subject of these Test Guidelines

These Test Guidelines apply to all varieties of *Oryza sativa* L..

2. Material Required

2.1 The competent authorities decide on the quantity and quality of the plant material required for testing the variety and when and where it is to be delivered. Applicants submitting material from a State other than that in which the testing takes place must ensure that all customs formalities and phytosanitary requirements are complied with.

2.2 The material is to be supplied in the form of seed and panicles (if requested).

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

Seed: 2 kg
Panicles (if requested): 120

The seed should meet the minimum requirements for germination, species and analytical purity, health and moisture content, specified by the competent authority. In cases where the seed is to be stored, the germination capacity should be as high as possible and should, be stated by the applicant.

The panicles should be well developed and should contain a sufficient number of viable seeds to establish a satisfactory row of plants for observation.

2.4 The plant material supplied should be visibly healthy, not lacking in vigor, nor affected by any important pest or disease.

2.5 The plant material should not have undergone any treatment which would affect the expression of the characteristics of the variety, unless the competent authorities allow or request such treatment. If it has been treated, full details of the treatment must be given.

3. Method of Examination

3.1 Number of Growing Cycles

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

3.1.2 The two independent growing cycles should be in the form of two separate plantings.

3.2 Testing Place

Tests are normally conducted at one place. In the case of tests conducted at more than one place, guidance is provided in TGP/9 “Examining Distinctness”.

3.3 Conditions for Conducting the Examination

3.3.1 The tests should be carried out under conditions ensuring satisfactory growth for the expression of the relevant characteristics of the variety and for the conduct of the examination.

3.3.2 The optimum stage of development for the assessment of each characteristic is indicated by a number in the Table of Characteristics. The stages of development denoted by each number are described in Chapter 8.

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 2 replicates.

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

3.4.3 If tests on panicle rows are conducted, at least 100 panicle rows should be observed.

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.

To assess distinctness of hybrids, the parent lines and the formula may be used according to the following recommendations:

(i) description of parent lines according to the Test Guidelines;

(ii) check of the originality of the parent lines in comparison with the variety collection, based on the characteristics in Chapter 7, in order to identify similar parent lines;

(iii) check of the originality of the hybrid formula in relation to the hybrids in the variety collection, taking into account the most similar lines; and

(iv) assessment of the distinctness at the hybrid level for 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 Test Guidelines are familiar with the recommendations contained in the General Introduction prior to making decisions regarding distinctness.

4.1.4 Number of Plants or 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 of plants 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 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 These Test Guidelines have been developed for the examination of self-pollinated varieties. For varieties with other types of propagation, the recommendations in the General Introduction and document TGP/13 "Guidance for new types and species" Section 4.5 "Testing Uniformity" should be followed.

4.2.3 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 General Introduction.

4.2.4 Where the assessment of a hybrid variety involves the parent lines, 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 lines.

4.2.5 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 plants

4.2.6 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.

4.2.7 For “A” characteristics, 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 considered to be uniform. If more than 3 off-types are observed, the variety is considered 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.

4.2.8 For the assessment of uniformity of hybrid varieties, a population standard of 10% and an acceptance probability of at least 95% should be applied. In case of characteristics indicated by B, the sample size for the assessment of uniformity may be reduced to 200 plants. In case of a sample size of 200 plants, 27 off-types are allowed. In case of a sample size of 100 ear-rows, plants or parts of plants, 15 off-types are allowed.

4.3 Stability

4.3.1 In practice, it is not usual to perform tests of stability that produce results as certain as those of the testing of distinctness and uniformity. However, experience has demonstrated that, for many types of variety, when a variety has been shown to be uniform, it can also be considered to be stable.

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

4.3.3 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) Endosperm: type (characteristic 1)
(b) Leaf blade: anthocyanin coloration (characteristic 8)
(c) Time of panicle emergence (characteristic 12)
(d) Stem: length (characteristic 17)
(e) Lemma: color of tip (characteristic 25)
(f) Decorticated grain: ratio length/width (characteristic 41)
(g) Decorticated grain: color (characteristic 42)

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

	English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
1 2	**3 4**	**5 6**	**7**			
	Name of characteristics in English	**Nom du caractère en français**	**Name des Merkmals auf Deutsch**	**Nombre del carácter en español**		
	states of expression	types d'expression	Ausprägungsstufen	tipos de expresión		

1 Characteristic number

2 (*) Asterisked characteristic – see Chapter 6.1.2

3 Type of expression
QL Qualitative characteristic – see Chapter 6.3
QN Quantitative characteristic – see Chapter 6.3
PQ Pseudo-qualitative characteristic – see Chapter 6.3

4 Method of observation (and type of plot, if applicable)
MG, MS, VG, VS – see Chapter 4.1.5

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

6 (a) See Explanations on the Table of Characteristics in Chapter 8.1

7 Growth stage key See Explanations on the Table of Characteristics in Chapter 8.3

7. Table of Characteristics/Tableau des caractères/Merkmalstabelle/Tabla de caracteres

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
1.	**(*)**	**PQ VG|B**	**(+)**	**00**			
		Endosperm: type					
		glutinous				Ruriaoba, Sayomurasaki	1
		intermediate					2
		non-glutinous				Koshihikari, Takanari	3
2.	**(*)**	**QN MG|B**	**(+)**	**00**			
		Endosperm: content of amylose					
		very low				Ruriaoba, Sayomurasaki	1
		low					3
		medium				Koshihikari	5
		high				Hoshiyutaka	7
		very high				Koshinokaori	9
3.		**QN VG|A**	**(+)**	**10**			
		Coleoptile: anthocyanin coloration					
		absent or weak				Koshihikari	1
		medium				Murasakikoboshi	3
		strong				Akaneasobi, Satsumakuromochi	5
4.	**(*)**	**QN VG|B**	**(+)**	**40**			
		Plant: growth habit					
		erect				Leafstar	1
		semi-erect				Koshihikari, Momiroman	3
		intermediate				Onari	5
		semi-prostrate					7
		prostrate					9

		English		français		deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
5.		**QN**	**VG|B**		**(a)**	**40**			
		Distal leaf sheath: anthocyanin coloration							
		absent or very weak						Koshihikari	1
		weak						Murasakikoboshi, Sayomurasaki	3
		medium						Minamiyutaka	5
		strong						Beniasobi, Shikibumochi	7
		very strong							9
6.		**QN**	**VG|B**		**(a)**	**40**			
		Basal leaf sheath: anthocyanin coloration							
		absent or very weak						Koshihikari	1
		weak						Murasakikoboshi, Sayomurasaki	3
		medium						Beniasobi	5
		strong							7
		very strong							9
7.		**QN**	**VG|B**		**(a)**	**40**			
		Leaf blade: intensity of green color							
		light						Koihonoka	3
		medium						Hinohikari, Koshihikari	5
		dark						Hoshiyutaka, Takanari	7
8.	**(*)**	**QN**	**VG|B**		**(a)**	**40**			
		Leaf blade: anthocyanin coloration							
		absent or weak						Koshihikari	1
		medium						Akaneasobi	3
		strong							5
9.		**QN**	**VG|B**	**(+)**	**(a)**	**40**			
		Leaf blade: pubescence							
		absent or weak						Leafstar	1
		medium						Koshihikari	3
		strong							5

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
10.		**PQ VG|B**	**(+) (a)**	**40**			
		Ligule: shape					
		truncate					1
		acute				Murasakikoboshi	2
		lobed				Onari, Salt star	3
11.		**PQ VG|B**	**(a)**	**40**			
		Ligule: color					
		white				Koshihikari	1
		green					2
		purple				Beniasobi, Sayomurasaki	3
12.	**(*)**	**QN MG|B**	**(+)**				
		Time of panicle emergence					
		early				Koshihikari	3
		medium				Momiroman	5
		late				Leafstar	7
13.		**QN MS|B/VG|B**	**(+)**	**60-70**			
		Flag leaf blade: length					
		short				Ouukan 383	3
		medium				Hinohikari	5
		long				Tachiaoba	7
14.		**QN MS|B/VG|B**	**(+)**	**60-70**			
		Flag leaf blade: width					
		narrow				Ouukan 383	1
		medium				Hinohikari	3
		broad				Tachiaoba	5
15.		**QN VG|B**		**60-80**			
		Lemma: pubescence					
		absent or very weak				Leafstar	1
		weak				Murasakikoboshi	2
		medium				Koshihikari	3
		strong					4
		very strong					5

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
16.	**(*)**	**PQ VG|B**		**65**			
		Stigma: color					
		white				Koshihikari	1
		light green					2
		yellow					3
		purple				Ouukan 383, Sayomurasaki	4
		black				Murasakikoboshi, Shikibumochi	5
17.	**(*)**	**QN MG|B/MS|B**	**(+)**	**70**			
		Stem: length					
		very short					1
		short				Takanari	3
		medium				Hinohikari	5
		long				Koshihikari	7
		very long				Minamiyutaka	9
18.		**QN VG|B**	**(+)**	**70**			
		Stem: thickness					
		thin				Murasakikoboshi	3
		medium				Hinohikari, Koshihikari	5
		thick				Hoshiyutaka, Momiroman	7
19.		**QN VG|B**	**(+)**	**70**			
		Node: anthocyanin coloration					
		absent or weak				Koshihikari	1
		medium				Sayomurasaki	3
		strong				Murasakikoboshi	5
20.		**QN VG|B**	**(+)**	**70**			
		Internode: anthocyanin coloration					
		absent or weak				Koshihikari	1
		medium					3
		strong				Shikibumochi	5

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
21.		**QN MS|B**		**70**			
		Plant: number of panicles					
		few				Momiroman, Takanari	3
		medium				Koshihikari	5
		many				Ouukan 383	7
22.	**(*)**	**QN VG|B**		**70**			
		Panicle: distribution of awns					
		absent				Momiroman, Onari	1
		apical quarter				Sari queen	2
		upper half					3
		3/4 of the total length				Beniroman	4
		whole length				Saikaikan 246	5
23.		**QN VG|B**	**(+)**	**70-80**			
		Awns: length					
		very short				Hinohikari	1
		short				Koshihikari	2
		medium				Benizomemochi, Leafstar	3
		long				Saikaikan 246	4
		very long					5
24.	**(*)**	**QN MS|B**	**(+)**	**72-90**			
		Panicle: length					
		short				Shikibumochi	3
		medium				Koshihikari, Leafstar	5
		long				Momiroman	7
25.	**(*)**	**PQ VG|B**		**80-90**			
		Lemma: color of tip					
		white				Koshihikari	1
		yellowish					2
		red				Minamiyutaka	3
		purple				Murasakikoboshi, Sayomurasaki	4
		brown				Koshinokaori, Leafstar	5
		black					6

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
26.	**(*)**	**QN VG|B**	**(+)**	**80-90**			
		Flag leaf: attitude of blade					
		erect				Leafstar, Minamiyutaka	1
		semi-erect				Momiroman, Onari	3
		horizontal				Murasakikoboshi, Ouukan 383	5
		semi-drooping					7
		drooping					9
27.		**QN VG|B**		**90**			
		Panicle: density					
		lax					3
		medium				Koshihikari	5
		dense				Hoshiyutaka, Takanari	7
28.		**QN VG|B**	**(+)**	**90**			
		Panicle: attitude					
		erect				Akaneasobi	1
		semi-erect				Ouukan 383	2
		semi-drooping				Koshihikari	3
		drooping					4
29.	**(*)**	**QN VG|B**	**(+)**	**90**			
		Panicle: attitude of branches					
		compact				Habataki	1
		semi-compact				Murasakikoboshi	3
		spreading					5
30.		**QN VG|B**	**(+)**	**90**			
		Panicle: number of secondary branches					
		absent or few					1
		medium				Koshihikari	2
		many				Takanari	3

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
31.		**QN VG|B**	**(+)**	**90**			
		Panicle: exsertion					
		enclosed					1
		partly exserted				Tachisuzuka	2
		just exserted				Minamiyutaka	3
		well exserted				Koshihikari	4
32.	**(*)**	**QN MG|B**	**(+)**	**90**			
		Time of maturity					
		early				Koshihikari	3
		medium				Asahinoyume	5
		late				Leafstar	7
33.		**QN VG|B**	**(+)**	**92**			
		Time of senescence					
		early				Onari	3
		medium				Salt star	5
		late				Koshihikari	7
34.		**PQ VG|B**		**92**			
		Lemma: color					
		white				Koshihikari	1
		yellowish				Leafstar	2
		red					3
		purple				Ouukan 383, Satsumakuromochi	4
		brown				Beniasobi	5
		black					6
35.		**QN VG|A**	**(+)**	**92**			
		Lemma: coloration with phenol					
		absent or very weak				Koshihikari, Momiroman	1
		weak					3
		medium				Onari, Salt star	5
		strong				Ruriaoba	7
		very strong					9

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
36.		**QN VG|B**	**(+)**	**92**			
		Glume: length					
		short				Ruriaoba	1
		medium				Koshihikari	2
		long					3
37.		**PQ VG|B**		**92**			
		Glume: color					
		white				Koshihikari	1
		yellowish					2
		red					3
		purple				Beniasobi, Ouukan 383	4
		brown					5
		black					6
38.	**(*)**	**QN MG|A**	**(+)**	**92**			
		Decorticated grain: 1000 seed weight					
		low				Beniasobi, Sari queen	3
		medium				Koshihikari, Takanari	5
		high				Momiroman	7
39.	**(*)**	**QN MS|B**		**92**			
		Decorticated grain: length					
		short				Murasakikoboshi	3
		medium				Koshihikari	5
		long				Hoshiyutaka, Leafstar	7
40.		**QN MS|B**		**92**			
		Decorticated grain: width					
		narrow				Hoshiyutaka, Leafstar	1
		medium				Koshihikari	3
		broad					5

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
41.	**(*)**	**QN MS|B**	**(+)**	**92**			
		Decorticated grain: ratio length/width					
		low				Akaneasobi	1
		low to medium				Koshihikari	2
		medium				Hoshiyutaka, Leafstar	3
		medium to high					4
		high					5
42.	**(*)**	**PQ VG|B**		**92**			
		Decorticated grain: color					
		white				Ruriaoba	1
		red				Benizomemochi	2
		purple					3
		light brown				Koshihikari, Takanari	4
		dark brown				Leafstar	5
		black				Murasakikoboshi, Sayomurasaki	6
43.		**QN MG|B**	**(+)**	**92**			
		Decorticated grain: alkali digestion					
		absent or very weak				Koshinokaori	1
		weak				Murasakikoboshi, Ouukan 383	3
		medium				Salt star	5
		strong				Koshihikari	7
		very strong					9
44.	**(*)**	**QN VG**	**(+)**	**92**			
		Decorticated grain: aroma					
		absent or weak				Koshihikari	1
		medium				Sari queen	2
		strong					3

8. Explanations on the Table of Characteristics

8.1 Explanations covering several characteristics

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

(a) Observations on the leaf should be made on the penultimate leaf.

8.2 Explanations for individual characteristics

Ad. 1: Endosperm: type

The three states of expression can be simply defined by reaction to KI-I solution which is prepared by mixing 0.1 % I2 solution and 0.2 % KI solution.
1 - glutinous: endosperm is stained to reddish purple.
2 - intermediate: endosperm is stained to reddish blue purple.
3 - non-glutinous: endosperm is stained to dark blue purple.

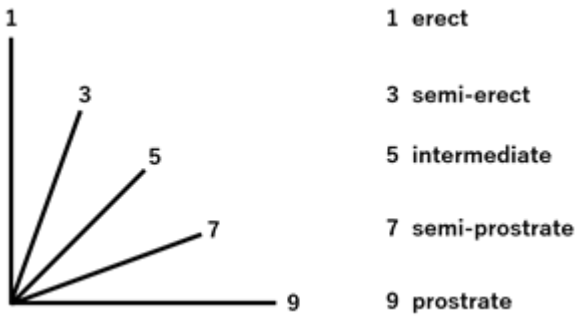
Ad. 2: Endosperm: content of amylose

The amylose content of endosperm should be determined using the iodine color reaction according to ISO 6647.
The absorbance of the amylose-iodine complex of endosperm starch formed by the iodine color reaction should be measured using a spectrophotometer.
The amylose mass fraction of the sample should be read from a calibration graph, which is repaired using mixtures of potato amylose and amylopectin to make allowance for the effect of amylopectin on the color of the amylose-iodine complex.

Ad. 3: Coleoptile: anthocyanin coloration

Non-dormant grains are placed on moistened filter paper and covered with a petri-dish lid during germination. After the coleoptiles have reached a length of about 5mm in darkness they are placed in artificial light (daylight equivalent) at 750-1250 lux continuously for 3 to 4 days, at a temperature of 25 to 30 degrees. The color of the coleoptiles is observed when they are fully developed at stage 09-11 (about 6 to 7 days).

Ad. 4: Plant: growth habit



Ad. 9: Leaf blade: pubescence

Observations should be made on the upper side of the blade.

Ad. 10: Ligule: shape

1
truncate

2
acute

3
lobed

Ad. 12: Time of panicle emergence

Time of panicle emergence is reached when the first spikelet is visible on 50% of panicles.

Ad. 13: Flag leaf blade: length

Measurements of flag leaf blade should be made on the same leaf.
Length should be measured from the tip to base of the leaf blade.
Width should be measured at the widest part of the leaf blade.

Ad. 14: Flag leaf blade: width

See Ad. 13

Ad. 17: Stem: length

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

Ad. 18: Stem: thickness

Observations should be observed at basal internode of the longest stem.

Ad. 19: Node: anthocyanin coloration

Observations should be made on all nodes.

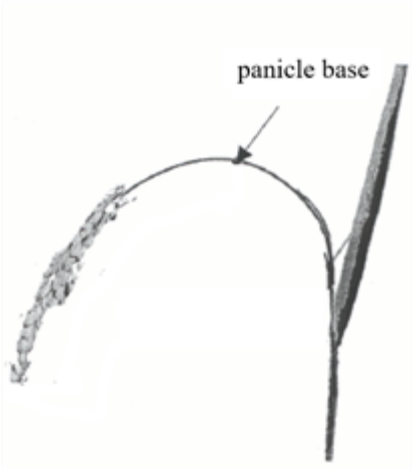
Ad. 20: Internode: anthocyanin coloration

Observations should be made on all internodes.

Ad. 23: Awns: length

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

Ad. 24: Panicle: length

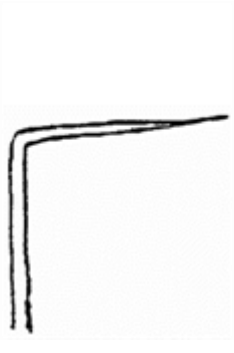


Length of panicle should be observed from panicle base to the top excluding awns.

Ad. 26: Flag leaf: attitude of blade

1
erect

3
semi-erect



5
horizontal

7
semi-drooping

9
drooping

Ad. 28: Panicle: attitude

1
erect

2
semi-erect

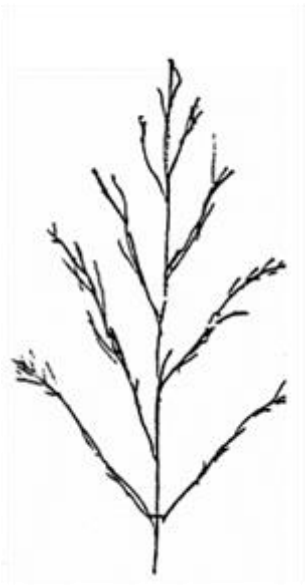
3
semi-drooping

4
drooping

Ad. 29: Panicle: attitude of branches

1
compact

3
semi-compact



5
spreading

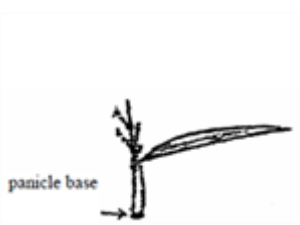
Ad. 30: Panicle: number of secondary branches

1
absent or few

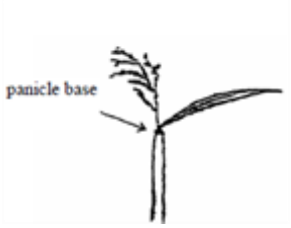
2
medium

3
many

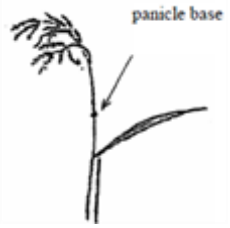
Ad. 31: Panicle: exsertion



2
partly exserted



3
just exserted



4
well exserted

Ad. 32: Time of maturity

The time of maturity is when at least 80% of the grains on the panicles are fully mature.
For visual assessment, the panicle should be considered mature when the husks of fully formed caryopses are senescent, with the distal section of the panicle showing the same color of the base.

Ad. 33: Time of senescence

The leaves are observed at the time of harvest for their retention of greenness.

3 - early: Leaves are dead when the grains have become fully ripened.
5 - medium: There must be 1 leaf which retains its color.
7 - late: 2 or more leaves retain their color at maturity.

Ad. 35: Lemma: coloration with phenol

Method of testing: Place hulls from 10 grains into a petri dish of 5cm diameter, and add 5ml of 1.5% phenol solution. Cover the petri dish, and keep at room temperature (not very cold) for one day.

Ad. 36: Glume: length

Measurements should be made on the longer glume.

Ad. 38: Decorticated grain: 1000 seed weight

Measurements should be calculated at 14% moisture.

Ad. 41: Decorticated grain: ratio length/width

1 - small: < 1.50
2 - small to medium: 1.50-1.99
3 - medium: 2.00-2.49
4 - medium to large: 2.50-2.99
5 - large: > 2.99

Ad. 43: Decorticated grain: alkali digestion

Put 10 milled complete (unbroken) rice grains in a petri dish with 1.5% solution of KOH, and keep still under room temperature of around 25 degree for about 24 hours.

1 - absent or very weak: Rice grains are not affected.
3 - weak: Only the margin of the grains are dissolved.
5 - medium: Shape of grains become unclear, but incompletely dissolved.
7 - strong: No margin is identified between the core part and the outer skirt.

Ad. 44: Decorticated grain: aroma

The main component of the aroma in rice is the 2-acetyl-1-pirroline (AcPy). To vaporize this chemical, 10ml of a 1.7% solution of KOH should be added to 2g 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 stage codes of cereals

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
11 First leaf unfolded (1)
12 2 leaves unfolded
13 3 leaves unfolded
14 4 leaves unfolded
15 5 leaves 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
22 Main shoot and 2 tillers
23 Main shoot and 3 tillers
24 Main shoot and 4 tillers
25 Main shoot and 5 tillers
26 Main shoot and 6 tillers
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)
31 1st node detectable
32 2nd node detectable
33 3rd node detectable
34 4th node detectable
35 5th node detectable
36 6th node detectable
37 Flag leaf just visible
38 -
39 Flag leaf ligule/collar just visible

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

Inflorescence emergence

50 -
51 First spikelet of inflorescence just visible
52 20% of inflorescence emerged
53 30% of inflorescence emerged
54 40% of inflorescence emerged
55 50% of inflorescence emerged
56 60% of inflorescence emerged
57 70% of inflorescence emerged
58 80% of inflorescence emerged
59 Emergence of inflorescence completed

Anthesis

60 -
61 Beginning of anthesis
62 -
63 -
64 -
65 Anthesis half-way
66 -
67 -
68 -
69 Anthesis complete

Milk development

70 -
71 Caryopsis watery ripe
72 -
73 Early milk
74 -
75 Medium milk
76 -
77 Late milk
78 -
79 -

Dough development

80 -
81 -
82 -
83 Early dough
84 -
85 Soft dough
86 -
87 Hard dough
88 -
89 -

Ripening

90 -
91 Caryopsis hard (difficult to divide by thumbnail) (3)
92 Caryopsis hard (can no longer be dented by thumbnail) (4) (5)
93 Caryopsis loosening in daytime
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 induced
99 Secondary dormancy lost

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

Matsuo, T. (edit.), 1993-97: Science of the Rice Plant. Nosan Gyoson Bunka Kyokai. Tokyo, JP
Vol. 1 Morphology (1993)
Vol. 2 Physiology (1995)
Vol. 3 Genetics (1997)

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.

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	*Oryza sativa* L.
1.2 Common name	Rice

2. Applicant

Name	
Address	
Telephone No.	
Fax No.	
E-mail address	
Breeder (if different from applicant)	

3. Proposed denomination and breeder's reference

Proposed denomination (if available)	
Breeder's reference	

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

#4. Information on the breeding scheme and propagation of the variety

4.1 Breeding scheme

Variety resulting from:

4.1.1 Crossing

(a) controlled cross [ ]

(please state parent varieties)
(……..……..…) x (……..……..…)

female parent male parent

(b) partially known cross [ ]
(please state known parent variety(ies))

(please state known parent varieties)
(……..……..…) x (……..……..…)

female parent male parent

4.1.2 Mutation [ ]
(please state parent variety)

4.1.3 Discovery and development [ ]
(please state where and when discovered and how developed)

4.1.4 Other [ ]
(Please provide details)

Authorities may allow certain of this information to be provided in a confidential section of the Technical Questionnaire.

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

4.2 Method of propagating the variety

4.2.1 Seed-propagated varieties

(a) Self-pollination [ ]
(b) Hybrid [ ]
(c) Other (please provide details) [ ]

4.2.2 Other [ ]
(Please provide details)

In the case of hybrid varieties the production scheme for the hybrid should be provided on a separate sheet. This should provide details of all the parent lines required for propagating the hybrid e.g.

Single Hybrid

(……..……..…) x (……..……..…)

female parent male parent

Three-Way Hybrid

(……..……..…) x (……..……..…)

female parent male parent

(……..……..…) x (……..……..…)

single hybrid used as female parent male parent

and should identify in particular:

(a) any male sterile lines

(b) maintenance system of male sterile lines.

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

5. Characteristics of the variety to be indicated (the number in brackets refers to the corresponding characteristic in Test Guidelines; please mark the note which best corresponds).

	Characteristics	Example Varieties	Note
5.1 (1)	**Endosperm: type**		
	glutinous	Ruriaoba, Sayomurasaki	1 [ ]
	intermediate		2 [ ]
	non-glutinous	Koshihikari, Takanari	3 [ ]
5.2 (8)	**Leaf blade: anthocyanin coloration**		
	absent or weak	Koshihikari	1 [ ]
	medium	Akaneasobi	3 [ ]
	strong		5 [ ]
5.3 (12)	**Time of panicle emergence**		
	very early		1 [ ]
	very early to early		2 [ ]
	early	Koshihikari	3 [ ]
	early to medium		4 [ ]
	medium	Momiroman	5 [ ]
	medium to late		6 [ ]
	late	Leafstar	7 [ ]
	late to very late		8 [ ]
	very late		9 [ ]
5.4 (17)	**Stem: length**		
	very short		1 [ ]
	very short to short		2 [ ]
	short	Takanari	3 [ ]
	short to medium		4 [ ]
	medium	Hinohikari	5 [ ]
	medium to long		6 [ ]
	long	Koshihikari	7 [ ]
	long to very long		8 [ ]
	very long	Minamiyutaka	9 [ ]

	Characteristics	Example Varieties	Note
5.5 (25)	**Lemma: color of tip**		
	white	Koshihikari	1 [ ]
	yellowish		2 [ ]
	red	Minamiyutaka	3 [ ]
	purple	Murasakikoboshi, Sayomurasaki	4 [ ]
	brown	Koshinokaori, Leafstar	5 [ ]
	black		6 [ ]
5.6 (41)	**Decorticated grain: ratio length/width**		
	low	Akaneasobi	1 [ ]
	low to medium	Koshihikari	2 [ ]
	medium	Hoshiyutaka, Leafstar	3 [ ]
	medium to high		4 [ ]
	high		5 [ ]
5.7 (42)	**Decorticated grain: color**		
	white	Ruriaoba	1 [ ]
	red	Benizomemochi	2 [ ]
	purple		3 [ ]
	light brown	Koshihikari, Takanari	4 [ ]
	dark brown	Leafstar	5 [ ]
	black	Murasakikoboshi, Sayomurasaki	6 [ ]

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

6. Similar varieties and differences from these varieties

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

Denomination(s) of variety(ies) similar to your candidate variety	Characteristic(s) in which your candidate variety differs from the similar variety(ies)	Describe the expression of the characteristic(s) for the **similar** variety(ies)	Describe the expression of the characteristic(s) for **your** candidate variety
Example	*Panicle: length*	*long*	*short to medium*

Comments:

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

#7. Additional information which may help in the examination of the variety

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

Yes [ ] No [ ]

(If yes, please provide details)

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

Yes [ ] No [ ]

(If yes, please provide details)

7.3 Other information

Authorities may allow certain of this information to be provided in a confidential section of the Technical Questionnaire.

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

8. Authorization for release

(a) Does the variety require prior authorization for release under legislation concerning the protection of the environment, human and animal health?

Yes [ ] No [ ]

(b) Has such authorization been obtained?

Yes [ ] No [ ]

If the answer to (b) is yes, please attach a copy of the authorization.

9. Information on plant material to be examined or submitted for examination

9.1 The expression of a characteristic or several characteristics of a variety may be affected by factors, such as pests and disease, chemical treatment (e.g. growth retardants or pesticides), effects of tissue culture, different rootstocks, scions taken from different growth phases of a tree, etc.

9.2 The plant material should not have undergone any treatment which would affect the expression of the characteristics of the variety, unless the competent authorities allow or request such treatment. If the plant material has undergone such treatment, full details of the treatment must be given. In this respect, please indicate below, to the best of your knowledge, if the plant material to be examined has been subjected to:

(a)	Microorganisms (e.g. virus, bacteria, phytoplasma)	Yes [ ]	No [ ]
(b)	Chemical treatment (e.g. growth retardant, pesticide)	Yes [ ]	No [ ]
(c)	Tissue culture	Yes [ ]	No [ ]
(d)	Other factors	Yes [ ]	No [ ]

Please provide details for where you have indicated “yes”.

.....

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]