

**TWA/30/14****ORIGINAL:** English**DATE:** August 23, 2001

INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS
GENEVA

**TECHNICAL WORKING PARTY
FOR
AGRICULTURAL CROPS**

**Thirtieth Session
Texcoco, Mexico, September 3 to 7, 2001**

COMMENTS ON TEST GUIDELINES FOR RICE, DOCUMENT TG/16/6(proj.)

prepared by experts from Australia, China, Japan and IRRI

Comments on Rice Guidelines TG/16/6 (Proj.) from Australia

Chapter V: Grouping of Varieties

We would prefer to have Endosperm: type (Ch 54) to include as a grouping characteristic. Because it would be useful to have waxy and non-waxy varieties grouped separately for DUS testing.

Chapter VII: Table of Characteristics

Characteristics 1 to 6

We are not sure which leaf these characteristics refer to. Stage 40 is early booting stage when the blade of the flag leaf is not fully emerged. At this stage the penultimate leaf is the one that would naturally be recorded but characteristics 9 - 16 again refer to the penultimate leaf. Similarly the flag leaf is referred to at a later time (Ch. 18).

Characteristics affected by environment (particularly 19,20,37,42,43,44,55)

We are concerned that some of these characters are affected by environment. Some of this can be overcome by specifying location and time of sowing. Some (particularly photoperiod or temperature sensitive) varieties are influenced by location. 'Calrose', for example is mid- to late- maturing under temperate conditions but very early in tropical conditions. This not only affects maturity but can have extreme effects on plant height and leaf length.

Awn length (Ch 37, Panicle: length of longest awns) tends to be affected by environment within the same location and can be short or long depending on conditions.

Chalkiness (Ch 55, Polished grain: expression of white core) is also influenced by environment - particularly temperature during ripening and can be absent to extreme in different circumstances.

We would prefer these two characteristics (Ch 37 and 55) be removed from the guideline.

Amylose Content (Ch 56)

We are concerned at the current interpretation of amylose content. There is a lot of confusion about standard amylose measurement as different labs get different readings even with the same method. We do not think there is any need to distinguish Asian types from other types and a suggested range may be:

Very low <5%
Low >5 to 15%
Medium >15% to 20%
High >20% to 25%
Very High >25 %

Gelatinisation Temperature (Ch 57)

We are happy to go along with the belief that alkali reaction can be used as a substitute for gelatinisation temperature. If this is the case, specification of the concentration of KOH is important as three concentrations are often used (1.1%; 1.4% and 1.7%). IRRI, in their publication - "Standard Evaluation System for Rice (IRTP Second edition 1980) suggest 1.7% with the following states of expression:

Code		Alkali digestion	Gelatinisation temperature
1	Not affected but chalky	Low	High
2	Swollen		
3	Swollen with collar incomplete and narrow	Low or intermediate	High or intermediate
4	Swollen with collar complete and wide	Intermediate	Intermediate
5	Split or segmented with collar complete and wide		
6	Dispersed, merging with collar	High	Low
7	Completely dispersed and cleared		

Comments on Rice Guidelines TG/16/6 (Proj) from China

1. The characteristics for grouping of varieties:

- (a) Rice variety type: Indica, Javanica, Japonica
- (b) Rice type: Upland rice, rice, deepwater rice (including floating rice)
- (c) Rice photosensitivity: early season rice, medium season rice, late season rice.
- (d) Time of heading (50% of plants with heads) (characteristic 19)
- (e) Stem: length (excluding panicle; excluding floating rice) (characteristic 26)

Reason:

For meeting with III 3 “The field tests should be carried out under conditions ensuring normal growth.” and V 1 “The collection of varieties to be grown should be divided into groups to facilitate the assessment of distinctness.”, the characteristics (a) to (c) is very important for grouping. Those characteristics decide which kind of field care method and which kind of condition applied for rice testing. Those three characteristics need not list in the VII “Table of Characteristics”, because every breeder who breeds the new rice variety know the state of those characteristics which his rice variety is in.

2. Characteristic 4 should be merged with characteristics 17,

name is: Leaf: sheath color

state is: 2 (green); 3 (purple line); 4 (purple); 5 (dark purple)

Reason: Five states is so many states for color intensity that is affected easily by growth situation.

3. Characteristic 21, 22, 23 and 35 should be instead by:

Lemma: color of apex

State is: 2 (yellow); 3 (red); 4(purple); 5(brown)

And Lemma: color (excluding apex)

State is: 2 (yellow); 3 (orange yellow); 4 (spot); 5 (red brown); 6 (brown); 7 (dark purple)

4. Delete characteristic 36, because “sometimes present” do not meet with the rule of stability of plant new variety, and characteristic 38 has expressed this character.

5. Delete characteristic 54, because the endosperme type is decided by the amylose content.

6. Delete characteristic 55, because its expression is not only decided by gene, but also decided by the position of spikelet in panicle and the growing condition.

7. Add a limited usage in characteristic 57. The limiting is “excluding hybrid rice”. There are two reasons. One is: in the stage 92, the testing conduct on F2 seed, the state characteristics has separated; Second is: For keeping high rate of seed germination and protect from germinating during maturity, not all the F1 seed of hybrid rice is full maturity.

8. Addition characteristics

Stage	Characteristics	state	note
10	coleoptile color	green	2
		purple	3
40	Penultimate leaf: ligule length	short <1.0cm	1
		medium 1.0~2.0cm	5
		long >2.0cm	9
11-49	Main stem: number of leaf	few	1
		medium	4
		more	6
		most	9
50-60	Flag leaf: length	short <25.0cm	1
		medium 25.0~35.0cm	4
		long 35.1~45.0cm	6
		very long >45.0cm	9
50-60	Flag leaf: width	narrow <1.0cm	1
		medium 1.0-2.0cm	5
		long >2.0cm	9
50-60	Flag leaf: degree of circumnutating	absent	1
		clock direction	2
		athwart clock direction	3
		helix	4
50-60	Flag leaf: shape of apex	truncate	1
		acute	2
		round	3
		serration	4
65	Sterile pollen: type	no pollen	1
		typical abortive type	2
		spherical abortive type	3
		mixed abortive type	4
		partly stained pollen abortive type	5
		stained pollen abortive type	6
69	Basal stem: node wrapping	absent	1
		present	9
90	Panicle: grain numbers	seldom <60	1
		few 60~100	3
		medium 101~200	5
		much 201~300	7
		very much >300	9

Stage	Characteristics	state	note
90	Panicle: threshability	difficult	1
		mediate	5
		Easy	9
90	Panicle: rate of fructification	no	1
		low	3
		medium	5
		higher	7
		highest	9

9. Change the contents at the 5 part of technical questionnaire according the changing of grouping characteristics.

Comments on TG/16/6(proj.) 2001-07-05 (RICE) from Japan**V. Grouping of Varieties, and X. Technical Questionnaire**

2. Characteristics for grouping varieties

Waxy and non-waxy (no.54) was already admitted in the Beijing meeting. Regarding the following characteristics discussed there, Japan proposes as follows:

1) indica and japonica (including javanica = tropical japonica)

According to recent studies, indica and japonica can be clearly differentiated by the sequence of ORF100 of chloroplast DNA. However, plant features are determined by the nucleus DNA, and recombination of chromosomes from indica and japonica is becoming more and more complicated. Therefore, it is very difficult to use this as the grouping characteristics, and it is advised to describe this only in 4.4 Other information in the Technical Questionnaire.

2) photoperiod sensitivity

The two major components of growth duration determine the sensitivity: the basic vegetative phase (bvp) and the critical daylength to initiate panicle differentiation, of which bvp, described as 'day ×degree celsius', is largely affected by the temperature. Therefore, its expression cannot be avoidable to be location specific. However, describing the degree of photoperiod sensitivity will be very important when rice varieties are internationally exchanged. For example, when the latest group of Japanese rice (grown in Kyushu area) were planted in the Philippines, they flowered the earliest among Japanese rice except those from Hokkaido.

In spite of complicated nature of this characteristics, considering its importance in international cooperation, this should be noted as follows and be used as grouping characteristics: none (1), weak (2), strong (3).

3) paddy/upland/floating

Discrimination of paddy and upland rice is often difficult in many tropical countries, but floating rice should be informed in the Technical Questionnaire.

4) Other characteristics such as No. 8 (pubescence of leaf blade) and No. 58 (aroma of grains) can be used for grouping with more stability than time of heading and stem length.

As for time of heading and stem length, these are important for grouping varieties, but in Asian countries where rice is grown in much wider area and latitudes than in Europe (for example, 25 to 43 °N in Japan), such characteristics can be useful only with information on the location (i.e. latitude and altitude).

VIII. Ad.56 Content of amylose for Asian types

very low	< 15 %
low	15 - 22 %
medium	22 - 25 %
high	25 - 28 %
very high	> 28 %

VII. Table of Characteristics**4. Leaf sheath: anthocyanin coloration** (combined with 3. and 17.)

1 (absent/very weak), 3 (purple lines), 5 (light purple), 7 (purple), 9 (dark purple)

6. Leaf blade attitude (combined with 11. and 18.)

The stage should be 60 and 90. Some variety group show quite different attitude at heading and at maturity (example: some US tall varieties).

1 (erect) 3 (semi-erect) 5 (horizontal) 7 (semi-descending) 9 (descndending)

8. through 16 -- When tested at the stage 60, instead of 40, the flag leaf can be checked instead of penultimate leaf.

22. anthocyanin coloration of area below apex : Is this character independent from 23. ?

23 “apex of lemma” : Can't be combined with **35. “tip of lemma”** ?

The stage should be 65 and 90, because the color at 65 may fade away at 90 in some varieties, but not in others. The same description system of characteristics can be applicable, as in Japan, for **33. colour of awns** and **35. colour of apiculus (tip of lemma)**.

27. anthocyanin coloration of nodes and **28. intensity of anthocyanin coloration of nodes** can be merged like 3. and 4.

1 (absent) 3 (weak) 5 (medium) 7 (strong) 9 (very strong)

33. colour of awns should be placed after 36. Panicle: awns

36. (presence of) **awns**, and **38. distribution of awns** can be merged together, because “sometimes present” in 36. is the same as “tip only” in 38., and “always present” in 36 can be separated into “upper half” and “whole length”. Therefore: 1 (absent) 3 (some on tips) 5 (on tips of upper branches) 7 (down to half) 9 (whole length)

We observe that varieties of (1) become in some years (3), depending on perhaps interaction between climate and soil fertility (or plant nutrition).

39. presence of secondary branching and **40. secondary branching** can be merged as shown in Fig. of Ad. 39 and 40 on p. 24.

49. phenol reaction Note should be expanded to 1 (absent), 3 (light brown), 5 (medium), 7 (purple), 9 (dark purple) as shown in a color-slide at Beijing.

57a. KOH solubility

Testing method : Ten grains of polished rice are dipped into 20cc of 1.4% KOH solution in a petri dish and maintained at 20 °C for 24 Hrs. and rated as follows: 1 (no, or slight swelling), 3 (grains slightly collapse), 5 (intermediate), 7 (grains are broken and dispersed like clouds), 9 (very dispersed and fairly clear “clouds”)

add Panicle: threshability

1 (very hard), 3 (hard), 5 (intermediate), 7 (easy), 9 (very easy)

It should be noted that the lower temperatures at maturing stage tend to stimulate formation of absciss layer, and cause easier shattering.

Correction

IX. Literature Publisher of English editions : Food and Agriculture Policy Research Center, Tokyo

**Comments of the Genetic Resources Center, IRRI on
TG 16/6 (Proj): Table VIII. Table of characteristics**

Comments for specific characteristics:

2. Leaf: distribution of anthocyanin

For absence of a particular characteristic like absence of anthocyanin, awn, sterility, etc, we suggest the scale/note “0.”

3 & 4. Leaf sheath: presence of anthocyanin and intensity of anthocyanin coloration.

We can combine the two criteria into one – leaf sheath: color. The classes are green (anthocyanin is absent), light purple, purple, dark purple and purple lines. The classes in the draft guidelines for intensity of anthocyanin coloration do not include the category “purple lines.”

5. Leaf thickness

How do we determine thickness? Indicate the range of values for each class given.

6. Leaf: Blade: attitude

We suggest the term “leaf angle” instead of “attitude” and “droopy” instead of “recurved.” Is this character evaluated as the angle of openness of the leaf blade tip against the culm on the leaf below the flagleaf?

8. Penultimate leaf: pubescence of the blade;

How is it determined? Visual? Feel method? Use of magnifying lenses?

9. Penultimate leaf: anthocyanin coloration of auricles

We suggest that the characteristics be referred to as “auricle color” with the following classes: absent (auricleless), light green, green, and purple.

10. Penultimate leaf: anthocyanin coloration of collar

We suggest that the characteristics be referred to as “collar color” with the following classes: absent (collarless), light green, green, and purple.

11. Penultimate leaf: attitude (leaf angle)

See comment on #6.

12. Penultimate leaf: ligule

We suggest that this characteristics be combined with trait # 14 with the following classes: absent (liguleless), whitish, purple and purple lines.

13. Penultimate leaf: shape of the ligule

Many rice workers are more familiar with the term “2-cleft” than “split.”

15. Penultimate leaf: length of the blade.

Indicate the range of values (cm) for each category.

16. Penultimate leaf: width

Indicate the range of values (mm) for each category.

19. Time of Heading: (50% of the plants with heads)
This characteristic is measured as the number of days from sowing to 50% heading for photoperiod insensitive varieties. Indicate the range of values for each category. For photoperiod sensitive ones, indicate the heading date.
22. Lemma: anthocyanin coloration of area below apex
We suggest that this characteristic be referred to as “lemma and palea color” with the following classes: white, straw, gold and/or gold furrows on straw background, brown (tawny), brown spots on straw, brown furrows on straw, reddish to light purple, purple spots on straw, purple furrows on straw, purple and black. We agree with the suggestion of Dr. C. Kaneda that this characteristic be taken at two crop stages since it is influenced by the stages of grain development.
23. Lemma: anthocyanin coloration of apex
We suggest that this characteristic be referred to as “apiculus color” and that the following classes be used: white, straw, brown or tawny, red, red apex, purple, purple apex, and black.
25. Stem (culm): thickness
Indicate the range of values (mm, taken using a dial caliper) for each category.
26. Stem (culm): length
Indicate the range of values (cm) for each category.
27. & 28. Stem (culm): anthocyanin coloration and intensity of coloration of nodes
We suggest that the two be combined into one characteristic called “node color” with the following classes: light gold, green, purple, and light purple.
29. Stem (Culm): anthocyanin coloration of internodes
We suggest that the characteristic be called “internode color” with the following classes: light gold, green, purple, and purple lines.
30. Panicle: length of main axis (panicle length)
Indicate the range of values (cm) for each category.
32. Panicle: Number per plant
Include range of values for each category.
33. Panicle: Color of awn
Evaluate this character at two stages of growth like lemma and palea color (22).
34. Spikelet: pubescence of the lemma
How do you determine the degree of pubescence? We classify pubescence of the hull (lemma and palea) as follows: glabrous (no hairs), hairs on lemma keel only; hairs on upper portion; short hairs (pubescent) all over; and long hairs (velvety) all over.
35. Spikelet: color of the tip of the lemma
Evaluate this character at two stages of growth like lemma and palea color (22).

36. & 38. Panicle: presence and distribution of awns
We agree with the suggestion of Dr. C. Kaneda regarding these two traits.
39. & 40. Panicle: secondary branching
These two can be combined into one characteristic with the following categories:
absent, light; heavy; and clustering.
43. Time of maturity
This characteristic is very much related to Time of Heading. It takes 30-35 days from 50% flowering to maturity. This is quantified as the number of days from sowing to maturity for photoperiod insensitive varieties. Indicate the range of values for each category. For photoperiod sensitive ones, indicate the maturity date.
45. Sterile lemma length:
Include range of values for each category.
46. Grain: 1000 grain weight
Include range of values (gm) for each category.
47. & 48. Grain: length and width
Include range of values (mm) for each scale.
50. & 51. Decorticated grain length and width
Include range of values (mm) for each scale. For grain length, we use the following categories: extra long (> 7.5mm), long (6.6 to 7.5mm), medium (5.51 to 6.6mm), and short (5.51mm)
52. Decorticated grain: shape (in lateral view)
This is the ratio of length over width. Include range of values for each scale. At IRRI, we use the following classes: slender (.3.0), medium (2.1-3.0), bold (1.1-2.0) and round (<1.0).
54. Endosperm type
How is this determined? Visual? I₂KI test?
55. Non-waxy type varieties only - Polished grain: expression of white core
For the expression of chalkiness (white belly; white center; or white back), we suggest the following categories: absent or very small = 0-5%; small = 6-10%; medium = 10-20%; large = 20-30%; very large = >30%.
56. Endosperm: Content of Amylose (Amylose content)
Include range of values for each category.
57. Alkali solubility test
Indicate range of values for each category.

Other comments:

- a. Sterile lemma color – We suggest that we include this qualitative characteristic in the guideline. It is observed when the terminal spikelets are approaching maturity. The color of sterile lemmas is classified into four classes – straw, gold, red, and purple.

- b. Example varieties – We can delete example varieties for quantitative traits.
- c. Color – To harmonize color description, we can use the color description given in Table 1.
- d. Trait measurement – We suggest that the technical guidelines for rice should include the method by which a given characteristic is observed or measured.

Table 1. Color descriptions in Methuen and RHS Color charts being used in Genebank characterization activities.

CODE	COLOR	METHUEN HANDBOOK OF COLOURS (COLOR CODES)	The ROYAL HORTICULTURAL SOCIETY (RHS) COLOR CHART
10	White	A1	
11	Whitish	1-3 A2	155A-D; 157C; 158CD
20	Straw	2A2-3; 3A2-3	158AB; 159ABC;160BCD; 161CD;162CD; 163D; 2C; 4C;
30	Yellow	1A7-8; 2A7-8	1-4AB; 5-6ABC; 7BCD; 8-9AB
40	Gold	3-4 AB8	13A; 14AB; 15AB; 16A; 17AB; 21AB
41	Light Gold	3A6-7	18A; 19A; 20AB; 21CD;
50	Brown	5E7-8; 6-7E7-8	172A; 173A; 174AB; 175CD; 176D; 177CD; 178D
51	Light Brown	5-6CD6-8	163A; 164BC; 165CD; 166D
52	Brown (Tawny)	6-7DE7-8	175AB; 176AB; 177A; 178AB;
56	Blackish Brown	5-6F5-8	200ABCD
60	Green	26ABC7-8; 27ABC8	129A; 131D; 132C; 134A;
61	Light Green	26AB5-6; 27AB6-7; 28AB6-8;	129A; 130A; 134B;
62	Yellowish Green	29-30ABC7-8	134B; 140AB; 141D; 142A;
63	Dark Green	27E7-8; 28F6-8; 29F8	126A; 127A; 131ABC; 132AB 135BC; 136A; 139A;141A
70	Red	9-11AB7-8	41A; 42AB; 43AB; 44ABC; 45ABCD; 46BCD; 47A; 50A

CODE	COLOR	METHUEN HANDBOOK OF COLOURS (COLOR CODES)	The ROYAL HORTICULTURAL SOCIETY (RHS) COLOR CHART
80	Purple	10EF7-8;	59AB; 60AB; 61AB; 64AB;
		11-14DEF7-8	71AB; 72AB; 77A; 78A; 80A; 81A;
81	Light Purple	10-12BCD4-5;	66B; 67BC; 68AB; 70B; 72BC;
		13-14ABC4-5	73A; 74B; 75A; 77BC; 78CD;
82	Reddish to Light Purple	10-14AB4-6;	57BCD; 58CD; 63C; 66C;
			67BCD; 72CD; 74CD;
83	Purple Shade	10-14A2-3	65A; 63D; 68CD; 69A;
100	Black	F1	202A

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