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INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

Geneva

DRAFT

RHODESGRASS

UPOV Code: CHLRS_GAY

Chloris gayana Kunth

GUIDELINES

FOR THE CONDUCT OF TESTS

FOR DISTINCTNESS, UNIFORMITY AND STABILITY

prepared by an expert from Australia

to be considered by the

Technical Working Party for Agricultural Crops
at its forty-second session, to be held in Kyiv, Ukraine, from June 17 to 21, 2013

Alternative Names:*

Botanical name	*English*	*French*	*German*	*Spanish*
Chloris gayana Kunth	Rhodesgrass	Herbe de Rhodes	Rhodesgras	Hierba de Rhodes

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 *Chloris gayana* Kunth.

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.

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

500g.

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.

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

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

3.2 Testing Place

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

3.3 Conditions for Conducting the Examination

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

3.3.2 The recommended type of plot in which to observe the characteristic is indicated by the following key in the second column of the Table of Characteristics:

A: spaced plants
C: special test

3.4 Test Design

3.4.1 Each test should be designed to result in a total of at least 60 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.

3.5 Additional Tests

Additional tests, for examining relevant characteristics, may be established.

4. Assessment of Distinctness, Uniformity and Stability

4.1 Distinctness

4.1.1 General Recommendations

It is of particular importance for users of these Test Guidelines to consult the General Introduction prior to making decisions regarding distinctness. However, the following points are provided for elaboration or emphasis in these Test Guidelines.

4.1.2 Consistent Differences

The differences observed between varieties may be so clear that more than one growing cycle is not necessary. In addition, in some circumstances, the influence of the environment is not such that more than a single growing cycle is required to provide assurance that the differences observed between varieties are sufficiently consistent. One means of ensuring that a difference in a characteristic, observed in a growing trial, is sufficiently consistent is to examine the characteristic in at least two independent growing cycles.

4.1.3 Clear Differences

Determining whether a difference between two varieties is clear depends on many factors, and should consider, in particular, the type of expression of the characteristic being examined, i.e. whether it is expressed in a qualitative, quantitative, or pseudo-qualitative manner. Therefore, it is important that users of these Test Guidelines are familiar with the recommendations contained in the General Introduction prior to making decisions regarding distinctness.

4.1.4 Number of Plants / Parts of Plants to be Examined

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.

4.1.5 Method of Observation

The recommended method of observing the characteristic for the purposes of distinctness is indicated by the following key in the second column of the Table of Characteristics (see document TGP/9 “Examining Distinctness”, Section 4 “Observation of characteristics”):

MG: single measurement of a group of plants or parts of plants
MS: measurement of a number of individual plants or parts of plants
VG: visual assessment by a single observation of a group of plants or parts of plants
VS: visual assessment by observation of individual plants or parts of plants

Type of observation: visual (V) or measurement (M)

“Visual” observation (V) is an observation made on the basis of the expert’s judgment. For the purposes of this document, “visual” observation refers to the sensory observations of the experts and, therefore, also includes smell, taste and touch. Visual observation includes observations where the expert uses reference points (e.g. diagrams, example varieties, side-by-side comparison) or non-linear charts (e.g. color charts). Measurement (M) is an objective observation against a calibrated, linear scale e.g. using a ruler, weighing scales, colorimeter, dates, counts, etc.

Type of record: for a group of plants (G) or for single, individual plants (S)

For the purposes of distinctness, observations may be recorded as a single record for a group of plants or parts of plants (G), or may be recorded as records for a number of single, individual

plants or parts of plants (S). In most cases, “G” provides a single record per variety and it is not possible or necessary to apply statistical methods in a plant-by-plant analysis for the assessment of distinctness.

In cases where more than one method of observing the characteristic is indicated in the Table of Characteristics (e.g. VG/MG), guidance on selecting an appropriate method is provided in document TGP/9, Section 4.2.

4.2 Uniformity

4.2.1 It is of particular importance for users of these Test Guidelines to consult the General Introduction prior to making decisions regarding uniformity. However, the following points are provided for elaboration or emphasis in these Test Guidelines:

4.2.2 Cross-pollinated varieties

The assessment of uniformity for cross-pollinated varieties should be according to the recommendations for cross-pollinated varieties in the General Introduction. For the characteristics Plant: ploidy (characteristic 1) and Inflorescence: color of spike (characteristic 24), a population standard of 1% and an acceptance probability of 95% should be applied. In the case of a sample size of 60 plants, 2 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.

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) Plant: ploidy (characteristic 1)
(b) Stolon: number of branches (characteristic 4)
(c) Plant: time of flowering (characteristic 27)

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

(*)	Asterisked characteristic	– see Chapter 6.1.2
QL	Qualitative characteristic	– see Chapter 6.3
QN	Quantitative characteristic	– see Chapter 6.3
PQ	Pseudo-qualitative characteristic	– see Chapter 6.3
MG, MS, VG, VS		– see Chapter 4.1.5
(a)-(b)	See Explanations on the Table of Characteristics in Chapter 8.1	
(+)	See Explanations on the Table of Characteristics in Chapter 8.2.	

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

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
1. **(*)** **(+)**	**VG** **C**	**Plant: ploidy**					
QL		diploid				Finecut, Gulfcut, Nemkat, Pioneer, Reclaimer, Salcut, Topcut	2
		tetraploid				Boma, Callide, Elmba, Mariner, Sabre, Toro	4
2. **(*)** **(+)**	**VS** **A**	**Plant: growth habit**					
QN		prostrate				KP8	1
		semi-prostrate				KP4	3
		intermediate				KG2	5
		semi-erect				Reclaimer	7
		erect				Gulfcut	9
3.	**VG** **A**	**Plant: expression of stolons**					
QN	**(a)**	weak				Asatsuyu	3
		medium				Pioneer	5
		strong				KG2, KP4, KP8	7
4. **(*)** **(+)**	**VS** **A**	**Stolon: number of branches**					
QN	**(a)**	few				Asatsuyu	3
		medium				Pioneer	5
		many				KG2, KP8	7
5. **(+)**	**MS** **A**	**Stolon: length of internode**					
QN	**(a)**	short				KG2, KP8	3
		medium				KP4	5
		long				Mariner, Sabre	7
6. **(+)**	**MS** **A**	**Stolon: width of internode**					
QN	**(a)**	narrow				KP4	3
		medium				Samford, Topcut	5
		broad				Callide, Sabre, Toro	7
7. **(+)**	**MG** **A**	**Stolon: color (exposed to sun)**					
PQ	**(a)**	RHS Colour Chart (indicate reference number)					

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
8. **(+)**	**MS** **A**	**Stolon: length of leaf sheath**					
QN	**(a)**	short				KG2, KP4	3
		medium					5
		long				Mariner, Samford	7
9. **(+)**	**MS** **A**	**Stolon: length of leaf blade**					
QN	**(a)**	short				KG2, KP4	3
		medium				Mariner, Samford	5
		long				Toro, Sabre	7
10. **(+)**	**MS** **A**	**Stolon: width of leaf blade**					
QN	**(a)**	narrow				KP4	3
		medium				Mariner	5
		broad				Sabre, Toro	7
11. **(+)**	**MS** **A**	**Culm: length**					
QN		short				KG2	3
		medium				KP4, Salcut	5
		long				Callide, Mariner	7
12. **(+)**	**MS** **A**	**Culm: width**					
QN		narrow				Salcut, Topcut	3
		medium				Mariner, Samford	5
		broad				Callide, Toro	7
13.	**MG** **A**	**Culm: leaf color**					
PQ		RHS Colour Chart (indicate reference number)					
14. **(+)**	**MS** **A**	**Peduncle: length**					
QN		short					3
		medium				KG2	5
		long				Finecut, KP4, KP8, Salcut	7
15. **(+)**	**MS** **A**	**Peduncle: width**					
QN		narrow				Salcut, Topcut	3
		medium				KG2, KP4, KP8	5
		broad				Callide, Toro	7

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
16.	**MS A**	**Penultimate leaf: length of sheath**					
QN		short				KP8	3
		medium				KG2, KP4	5
		long					7
17.	**MS A**	**Penultimate leaf: length of blade**					
QN		short				KP8	3
		medium				KG2, KP4	5
		long					7
18.	**MS A**	**Penultimate leaf: width of blade**					
QN		narrow				KG2, KP4	3
		medium				KP8	5
		broad				Sabre	7
19.	**MS A**	**Flag leaf: length of sheath**					
QN		short				KP8	3
		medium				KG2, KP4	5
		long					7
20. (*)	**MS A**	**Flag leaf: length of blade**					
QN		short				KP4	3
		medium				Mariner	5
		long				Sabre, Toro	7
21.	**MS A**	**Flag leaf: width of blade**					
QN		narrow				KP4	3
		medium				KP8	5
		broad				Sabre	7
22. (*)	**MS A**	**Inflorescence: number of spikes**					
QN		few				KP8	3
		medium				KG2, KP4	5
		many				Mariner	7
23. (+)	**VG A**	**Inflorescence: attitude of spikes**					
QN		semi-erect				KP8	1
		pendulous to semi-erect				KG2, KP4	2
		pendulous				Mariner	3

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
24. (*)	**VG A**	**Inflorescence: color of spikes**					
PQ		light yellow				Asatsuyu	1
		light brown				KG2	2
		medium brown				KP8	3
		dark brown				KP4	4
		black					5
25. (+)	**MS A**	**Inflorescence: length of spikes**					
QN		short				KG2, KP4	3
		medium				Callide, Samford	5
		long				Mariner, Toro	7
26.	**VS A**	**Awn: length**					
QN		short				Salcut, Topcut	3
		medium				KG2, KP4, KP8	5
		long				Callide	7
27. (*)	**MG A**	**Plant: time of flowering**					
QN		very early				Finecut, Gulfcut, Reclaimer, Topcut	1
		early				Nemkat	3
		medium				KG2, KP4, KP8	5
		late				Callide, Samford	7
		very late				Mariner, Toro	9

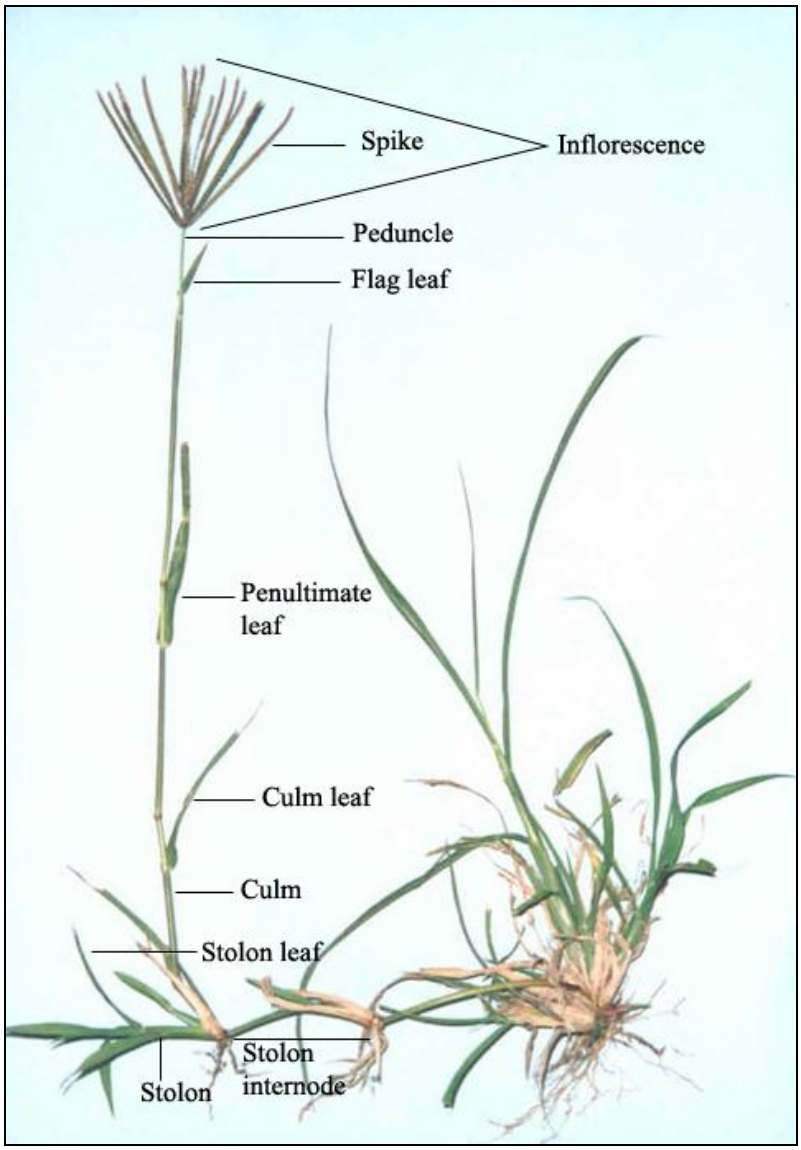
8. Explanations on the Table of Characteristics

8.1 Explanations covering several characteristics

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

(a) All stolon observations are taken at the 4th visible stolon node/internode from the tip.

(b) A Rhodesgrass plant showing the position of:
Stolon (characteristics 4, 5, 6, 7, 8, 9, 10);
Culm (characteristic 11, 12);
Culm leaf (characteristic 13);
Peduncle (characteristic 14, 15);
Penultimate leaf (characteristic 16, 17, 18);
Flag leaf (characteristic 19, 20, 21); and
Inflorescence (characteristic 22, 23, 24, 25).
The image is provided to identify the various plant parts.



A Rhodesgrass plant showing different plant parts

(Image courtesy: NSW Trade and Investment - Primary Industries)

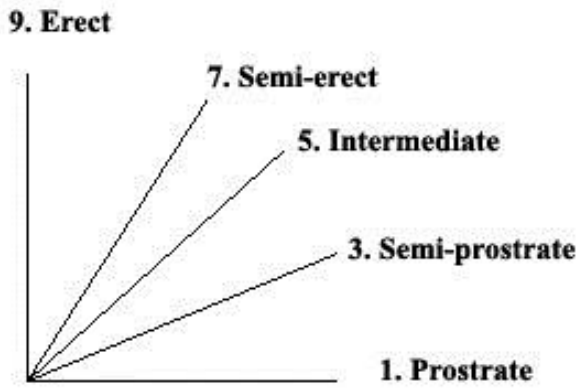
8.2 Explanations for individual characteristics

Ad. 1: Plant: ploidy

The ploidy of the plants is determined by cytological techniques using root-tip method. The root tips are collected from the actively growing plants. Root tips are pre-fixed in a freshly-made aqueous solution of α-bromonapthalene for 4 hours. After 4 hours the root tips are fixed for at least 1 hour in a freshly-made 3:1 mixture of absolute ethanol and acetic acid. Then hydrolysed in 1 N hydrochloric acid at 60^0C for 10 minutes. After hydrolysis root tips are stained in leuco-basic fuchsin (Darlington and La Cour 1962) for at least 30 minutes. Extreme tip of the root is removed and mounted on a slide in aceto-orcein (Darlington and La Cour 1962). Tap out under a coverslip before squashing with the thumb. View under high power oil immersion. Count the chromosomes from at least two mitotic divisions per plant. The diploid plants have 20 chromosomes (2n=20) and the tetraploid plants have 40 chromosomes (2n=40).

Ad. 2: Plant: growth habit

Plant growth habit is assessed at the vegetative stage just before flowering or during the early flowering stage. It should be assessed visually from the attitude of the leaves and the development of lateral stolons. The angle formed by the outer leaves with an imaginary middle axis should be used. The following 1-9 scale is used to describe the states.



Ad. 7: Stolon: color (exposed to sun)

A portion of the stolon which has been exposed to direct sunlight is removed and the color is observed by matching against the Royal Horticultural Society (RHS) color chart. The reference number is recorded.

Ad. 11: Culm: length

The length is measured from the bottom of the culm to the base of the inflorescence.

Ad. 12: Culm: width

The width is measured at the top internode below the flag leaf and the second bottom internode. The average width is taken from these two measurements.

Ad. 14: Peduncle: length

The length is measured from the top most node to the bottom of the inflorescence.

Ad. 15: Peduncle: width

The width is measured 1-2 cm below the inflorescence.

Ad. 23: Inflorescence: attitude of spikes

1	2	3
semi-erect	pendulous to semi-erect	pendulous

Ad. 25: Inflorescence: length of spikes

The average length of spikes is taken by taking the total length of all the spikes within an inflorescence and then dividing the total length by the total number of spikes.

9. Literature

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NSW Trade and Investment -Primary Industries, Rhodes grass image from Agnote DPI-298 (3rd Ed).Orange, NSW.

Oram, R.N., 1990: Register of Australian Herbage Plant Cultivars. 3rd edition, Australian Herbage Plant Registration Authority, CSIRO Division of Plant Industry, Melbourne, AU

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	*Chloris gayana* Kunth
1.2 Common name	Rhodesgrass

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))

(……..……..…) x (……..……..…)
female parent male parent

(c) unknown cross [ ]

4.1.2 Mutation [ ]
(please state parent variety)

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

4.1.4 Other [ ]
(please provide details)

4.2 Method of propagating the variety

4.2.1 Seed-propagated varieties

(a) Self-pollination [ ]
(b) Cross-pollination
(i) population [ ]
(ii) synthetic variety [ ]
(c) 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:

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)	**Plant: ploidy**		
	diploid	Finecut, Gulfcut, Nemkat, Pioneer, Reclaimer, Salcut, Topcut	2 [ ]
	tetraploid	Boma, Callide, Elmba, Mariner, Sabre, Toro	4 [ ]
5.2 (4)	**Stolon: number of branches**		
	very few		1 [ ]
	very few to few		2 [ ]
	few	Asatsuya	3 [ ]
	few to medium		4 [ ]
	medium	Pioneer	5 [ ]
	medium to many		6 [ ]
	many	KG2, KP8	7 [ ]
	many to very many		8 [ ]
	very many		9 [ ]
5.3 (27)	**Plant: time of flowering**		
	very early	Finecut, Gulfcut, Reclaimer, Topcut	1 [ ]
	very early to early		2 [ ]
	early	Nemkat	3 [ ]
	early to medium		4 [ ]
	medium	KG2, KP4, KP8	5 [ ]
	medium to late		6 [ ]
	late	Callide, Samford	7 [ ]
	late to very late		8 [ ]
	very late	Mariner, Toro	9 [ ]

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	*Awn: length*	*short*	*long*

Comments:

[#]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)

[#] 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]