TG/FAGOP(proj.5)
ORIGINAL: English
DATE: 2011-04-21

UPOV

INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

GENEVA

DRAFT

BUCKWHEAT

UPOV Code: FAGOP_ESC

Fagopyrum esculentum Moench

GUIDELINES

FOR THE CONDUCT OF TESTS

FOR DISTINCTNESS, UNIFORMITY AND STABILITY

prepared by an expert from Japan

to be considered by the

Technical Working Party for Agricultural Crops
at its fortieth session, to be held in Brasilia, Brazil, from May 16 to 20, 2011

Alternative Names:*

Botanical name	*English*	*French*	*German*	*Spanish*
Fagopyrum esculentum Moench, (*Fagopyrum sagittatum* Gilib.)	Buckwheat	Blé noir, Sarrasin	Buchweizen	Alforfón

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.]

TABLE OF CONTENTS PAGE

1. Subject of these Test Guidelines

These Test Guidelines apply to all varieties of *Fagopyrum esculentum* Moench.

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 fruit.

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

500 g.

The fruit should meet the minimum requirements for germination, species and analytical purity, health and moisture content, specified by the competent authority. In cases where the fruit 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 Stage of development for the assessment

The optimum stage of development for the assessment of each characteristic is indicated by a number in the second column of the Table of Characteristics. The stages of development denoted by each number are described in Chapter 8.2**.**

3.4 Test Design

Each test should be designed to result in a total of at least 100 plants, which should be divided between at least 2 replicates.

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 60 plants or parts taken from each of 60 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 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 The assessment of uniformity should be according to the recommendations for cross-pollinated varieties in the General Introduction.

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 or plant 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) Time of beginning of flowering (characteristic 5)
(b) Plant: height (characteristic 7)
(c) Flower: color of petals (characteristic 11)
(d) Stem: number of nodes (characteristic 16)
(e) Time of maturity (characteristic 18)
(f) Fruit: skin color (characteristic 21)

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
09-99 See Explanations on the Table of Characteristics in Chapter 8.3

C special test

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

		English	français	deutsch	español	Example Varieties/ Exemples/ Beispielssorten/ Variedades ejemplo	Note/ Nota
1. **(+)**	**C VG**	**Plant: ploidy**					
QL		diploid				Shinano No.1	2
		tetraploid				Miyazaki-ohtsubu	4
2.	**09 VG**	**Cotyledon: anthocyanin coloration**					
QN		absent or very weak				Aelita	1
		weak				Astoria, Shinano No.1	3
		medium				Miyazaki-ohtsubu	5
		strong				Rubra	7
3.	**51 VG**	**Stem: anthocyanin coloration**					
QN		absent or weak				Shinano-natsusoba, Yangjeol	1
		medium				Daesan, Takane ruby	2
		strong				Shinei red	3
4.	**51 VG**	**Inflorescence: anthocyanin coloration of bud**					
QN		absent or very weak				Shinano No.1, Max	1
		weak					3
		medium				Lifago	5
		strong				Lifesturm, Takane ruby	7

5. **(*)** **(+)**	**MG**	**Time of beginning of flowering**		
QN		early	Kitawasesoba, Vokiai	3
		medium	Shinano No.1, Shinano-natsusoba, Zita	5
		late	La Harpe, Shinei red	7
6. **(+)**	**65 VG**	**Plant: growth type**		
QL		indeterminate	Kitawasesoba	1
		determinate	Kitanomashu	2
7. **(*)** **(+)**	**65 MS**	**Plant: height**		
QN		short	Shinano-natsusoba	3
		medium	Shinano No.1	5
		tall	Miyazaki-ohtsubu	7
8. **(a)** **(+)**	**65 VG**	**Leaf blade: shape of base**		
PQ	**(a)**	strongly cordate	Miyazaki-ohtsubu	1
		weakly cordate	Shinano No.1, Shinano-natsusoba	2
		flat		3
		sagittate	Daesan	4
9.	**65 VG**	**Leaf blade: color**		
QN	**(a)**	light green	Smuglianka, Takane ruby	1
		medium green	Luba, Panda, Shinano No.1	2
		dark green	Miyazaki-ohtsubu, Vokiai	3

10.	**65 VG**	**Flower: size**		
QN		small	Shinano No.1	1
		medium	Shinano-natsusoba	2
		large	Miyazaki-ohtsubu	3
11. (*)	**65 VG**	**Flower: color of petals**		
PQ		light green	Zelenotsvetkovaya 90	1
		white	Shinano No.1, Yangjeol	2
		light red	Shinei red	3
		dark red	Takane ruby	4
12. (+)	**65 VG**	**Flower: length of peduncle**		
QN		short	Miyazaki-ohtsubu	1
		medium	Shinano No.1	2
		long		3
13. (+)	**65 VG**	**Plant: total number of flower clusters**		
QN		few	Shinano-natsusoba	1
		medium	Shinano No.1	2
		many	Miyazaki-ohtsubu	3
14. (+)	**78 MS**	**Stem: length**		
QN		short	Shinano-natsusoba	3
		medium	Shinano No.1	5
		long		7

15. (*)	**78 MS**	**Stem: number of nodes**		
QN		few	Shinano-natsusoba	3
		medium	Shinano No.1	5
		many	Takane ruby	7
16. (+)	**78 MS**	**Stem: diameter**		
QN		small	Shinano-natsusoba	1
		medium	Shinano No.1	2
		large		3
17. (*) (+)	**89 MG**	**Time of maturity**		
QN		early	Shinano-natsusoba	3
		medium	Shinano No.1	5
		late	Shinei red	7
18.	**99 MS/ VG**	**Fruit: length**		
QN	**(b)**	short		1
		medium	Shinano No.1	2
		long	Miyazaki-ohtsubu	3
19. (+)	**99 VG**	**Fruit: shape**		
PQ	**(b)**	elliptic	Kubokawa-zairai	1
		ovate		2
		trullate	Shinano No.1, Yangjeol	3

20. **(*)**	**99 VG**	**Fruit: skin color**		
PQ	**(b)**	grey	La Harpe	1
		medium brown	Daesan, Kora, Luba, Panda, Takane ruby, Zita	2
		dark brown	Ilija, Shinano No.1, Yangjeol	3
		black	Czernoplodnaja, Shinano-natsusoba, Smuglianka	4
21. **(+)**	**99 MG**	**Fruit: 1000 fruit weight**		
QN	**(b)**	low	Kora, La Harpe, Luba, Panda, Shinei red	3
		medium	Shinano No.1, Smuglianka, Zita	5
		high	Ilija, Kara Dag, Kitawasesoba, Lena, Vokiai	7
22. **(+)**	**99 MG**	**Fruit: rutin content**		
QN	**(b)**	low		3
		medium	Shinano No.1	5
		high	Toyomusume	7

8. Explanations on the Table of Characteristics

8.1 Explanations covering several characteristics

(a): all observation on leaves should be observed on leaves from the middle part of the plant
(b): all observation on fruits should be observed on ripened fruits from the upper part of the plant

8.2 Explanations for individual characteristics

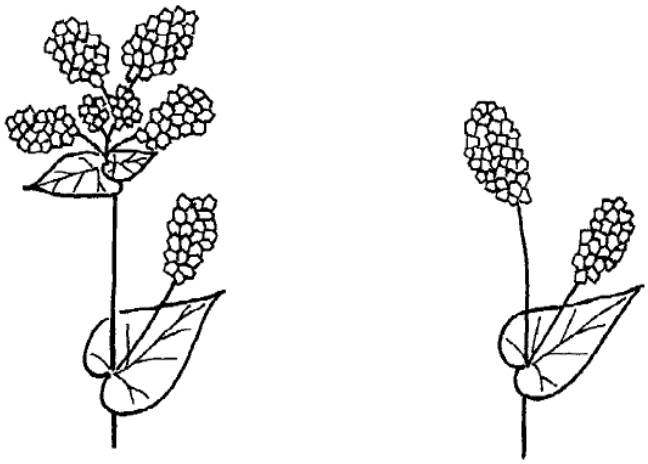
Ad. 1: Plant: ploidy

The ploidy of the plant can be determined by standard cytological methods.

Ad. 5: Time of beginning of flowering

The time when 10% of plants have at least one open flower.

Ad. 6: Plant: growth type



1
indeterminate

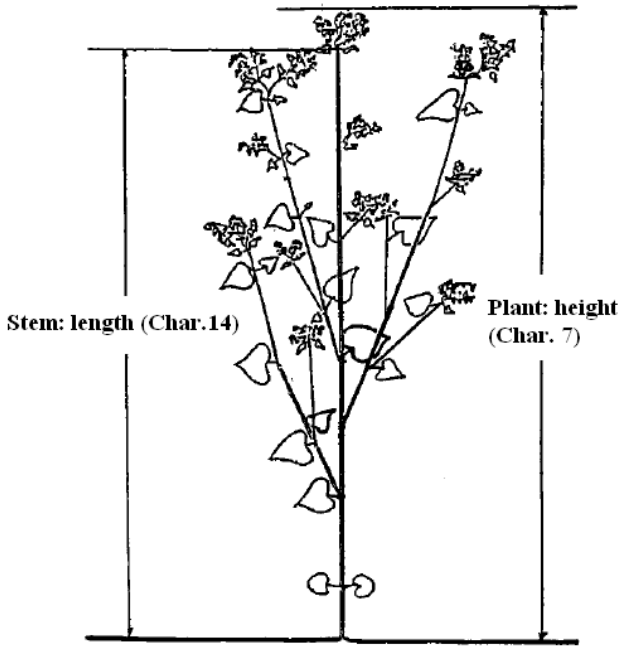
2
determinate

If the terminal inflorescence of the main stem has truss form, or consists of two to four flower clusters, the variety belongs to the determinate grow type. And if corymb has five and more flower clusters or it is cyme, the variety belongs to the indeterminate (unlimited) grow type.

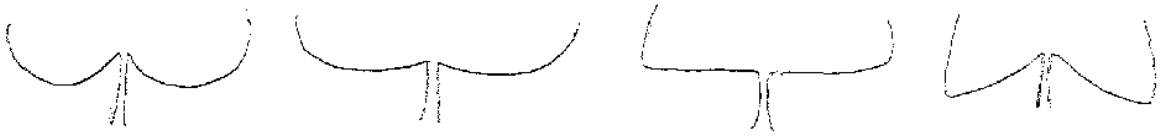
Ad. 7: Plant: height

To be measured on the main stem from the ground level to the tip of flower cluster.

Ad. 7: Plant: height
Ad. 14: Stem: length



Ad. 8: Leaf blade: shape of base



1	2	3	4
strongly cordate	weakly cordate	flat	sagittate

Ad. 12: Flower: length of peduncle

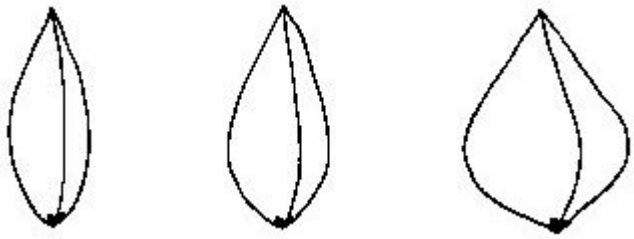
Ad. 16: Stem: diameter

To be measured on central part of internode between first and second node on main stem.

Ad. 17: Time of maturity

The time when 80% of fruits show fully-ripe color.

Ad. 19: Fruit: shape



1	2	3
elliptic	ovate	trullate

Ad.22: Fruit: rutin content

Analysis by High Performance Liquid Chromatography.

Example of sample preparation and rutin extraction

1) Drying samples for 24 hours at 70°C by using forced air flow oven.

2) Grinding 5g of seed samples into powder for 30 seconds.

3) Extracting rutin from 1.0g of seed powder with 10ml of methyl alcohol at 70°C for 30min.by using extraction apparatus and water bath.

4) Injecting 20µl of supernatant fluid obtained by centrifugation into chromatograph.

8.3 Phenological growth stages

Code	*Description*
Principal growth stage 0	**Sprouting**
09	Emergence: Cotyledons break through soil surface
Principal growth stage 5	**Inflorescence emergence**
51	Inflorescence buds visible
Principal growth stage 6	**Flowering**
65	Full flowering: about 50% of flowers open
Principal growth stage 7	**Development of fruit**
78	80% of fruits mature
Principal growth stage 8	**Ripening or maturity of fruit and seed**
89	Fruit shows fully-ripe color
Principal growth stage 9	**Senescence, beginning of dormancy**
99	Harvested product

9. Literature

Hayashi, H., Honda, Y., Katsuta, M., *etc*., 2004: Varieties of Buckwheat. The Japan Buckwheat Association. Tokyo, Japan .

Hoshikawa, K., 1980: Buckwheat in New Agricultural Crops. Yokendo. Tokyo, Japan, pp. 400-409.

Shigemori, I., Honda, Y., *etc*., 2003: Test Guideline for Buckwheat. Ando. Nagano, Japan, pp. 5-47.

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	*Fagopyrum esculentum* Moench, *(Syn. Fagopyrum sagittatum* Gilib.)
1.2 Common name	Buckwheat

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)

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

4.2 Method of propagating the variety

(a) Cross-pollination [ ]

(b) Self-pollination [ ]

(c) Other [ ]
(please provide details)

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 (5)	**Time of beginning of flowering**		
	very early		1 [ ]
	very early to early		2 [ ]
	early	Kitawasesoba, Vokiai	3 [ ]
	early to medium		4 [ ]
	medium	Shinano No.1, Shinano-natsusoba, Zita	5 [ ]
	medium to late		6 [ ]
	late	La Harpe, Shinei red	7 [ ]
	late to very late		8 [ ]
	very late		9 [ ]
5.2 (7)	**Plant: height**		
	very short		1 [ ]
	very short to short		2 [ ]
	short	Shinano-natsusoba	3 [ ]
	short to medium		4 [ ]
	medium	Shinano No.1	5 [ ]
	medium to tall		6 [ ]
	tall	Miyazaki-ohtsubu	7 [ ]
	tall to very tall		8 [ ]
	very tall		9 [ ]

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

	Characteristics	Example Varieties	Note
5.3 (11)	**Flower: color of petals**		
	light green	Zelenotsvetkovaya 90	1 [ ]
	white	Shinano No.1, Yangjeol	2 [ ]
	light red	Shinei red	3 [ ]
	dark red	Takane ruby	4 [ ]
5.4 (15)	**Stem: number of nodes**		
	very few		1 [ ]
	very few to few		2 [ ]
	few	Shinano-natsusoba	3 [ ]
	few to medium		4 [ ]
	medium	Shinano No.1	5 [ ]
	medium to many		6 [ ]
	many	Takane ruby	7 [ ]
5.5 (17)	**Time of maturity**		
	very early		1 [ ]
	very early to early		2 [ ]
	early	Shinano-natsusoba	3 [ ]
	early to medium		4 [ ]
	medium	Shinano No.1	5 [ ]
	medium to late		6 [ ]
	late	Shinei red	7 [ ]
	late to very late		8 [ ]
	very late		9 [ ]

	Characteristics	Example Varieties	Note
5.6 (20)	**Fruit: skin color**		
	grey	La Harpe	1 [ ]
	medium brown	Daesan, Kora, Luba, Panda, Takane ruby, Zita	2 [ ]
	dark brown	Ilija, Shinano No.1, Yangjeol	3 [ ]
	black	Czernoplodnaja, Shinano-natsusoba, Smuglianka	4 [ ]

Characteristics	Example Varieties	Note

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	*Plant: height*	*short*	*medium*

Comments:

Characteristics	Example Varieties	Note
#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		
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.		

Characteristics	Example Varieties	Note

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]