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INTERNATIONAL UNION FOR THE PROTECTION OF NEW VARIETIES OF PLANTS

Geneva

DRAFT

WALNUT

UPOV Code: JUGLA_REG

Juglans regia L.

[*]

GUIDELINES

FOR THE CONDUCT OF TESTS

FOR DISTINCTNESS, UNIFORMITY AND STABILITY

prepared by an expert from China

to be considered by the

Technical Working Party for Fruit Crops
at its forty-fourth session, to be held in Napier, New Zealand, from April 29 to May 3, 2013

Alternative Names:[*]

Botanical name	*English*	*French*	*German*	*Spanish*
Juglans regia L.	Walnut	Noyer	Walnuß	Nogal

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 *Juglans regia* L. (Juglandaceae).

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 scion or plants.

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

10 scions (with at least 3 full buds each)

6 plants (height: 0.8-1.0 m; Basal stem diameter should be more than 1.0 cm)

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 If any important characteristics of the variety can be seen only if it is grafted, species or cultivars of the rootstocks should be specified.

3.4 Test Design

3.4.1 Each test should be designed to result in a total of at least 6 plants. Plants under test, example varieties and similar varieties should be planted on the same place and subject to similar environmental conditions.

3.4.2 Parts collected from plants in the tests should not interfere other tests during the plants’ growing periods.

3.4.3 All observations should be made on 6 plants or the same part growing on the same location from 6 plants unless the competent authorities request.

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 10 plants or parts 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 3.

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 For the assessment of uniformity, a population standard of 1% and an acceptance probability of at least 95% should be applied. In the case of a sample size of 5 plants, no off-type is allowed. In case of a sample size of 20 plants, 1 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, 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) Tree: plant height (characteristic 1)
(b) Tree: stem color (characteristic 5)
(c) Leaf: terminal leaflet (characteristic 10)
(d) Leaf: glandular hair of lateral leaflet (characteristic 11)
(e) Flower: number of female flowers (characteristic 18)
(f) Flower: color of catkins (characteristic 19)
(g) Fruit: setting characteristics (characteristic 24)

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)- (f)	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. **(*)**	**MG**	**Tree: plant height (m)**				Chico, Gustine, Vina	
QN		low (<12.0)				Franquette, Hartley, Marbot	3
		medium (12.0-20.0)				Corne, Parisienne	5
		high (>20.0)				Serr	7
2. **(*)** **(+)**	**VG**	**Tree: growth habit**	**Arbre: port**	**Baum: Wuchsform**	**Árbol: porte**		
PQ		upright	dressé	aufrecht	erecto	Corne, Sorrento	1
		semi-upright	demi-dressé	halbaufrecht	semierecto	Franquette, Hartley, Marbot	2
		spreading	étalé	breitwüchsig	rastrero	Gustine, Payne, Shangsong 6, Vina	3
3. **(*)**	**VG**	**Tree: shape of crown**					
PQ		spherical				Zhonglin 5	1
		semi spherical				Baokexiang	2
		conical					3
4.	**VG**	**Tree: branching ability**					
QN	**(a)**	weak					3
		medium				Liaoning 1	5
		strong				Yangbipaohetao	7
5.	**VG**	**Tree: stem color**					
QN	**(b)**	light gray					1
		gray				Liaoning 1	2
		taupe					3
		brown				Chuanhe 2	4
6.	**VG**	**Tree: secondary branch**					
QL	**(a)**	absent					1
		present					9
7. **(*)**	**VG**	**Bud: longitudinal section of mixed bud**					
PQ	**(a)**	circular					1
		triangular				Shanhe 1	2
8. **(*)** **(+)**	**VG**	**Leaf: shape of lateral leaflet**					
PQ	**(a)**	lanceolate				Hartley, Payne, Vina, Xixiang	1
		oval				Corne, Franquette, Marbot	2
		elliptic				Adam 10, Chase D 9, Liaoning 1	3

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
9.	**VS**	**Leaf: number of leaflets**					
QN	**(a)**	few (<9)				Luguang	1
		medium (9-18)				Santaihetao	3
		many (14-17)					5
		very many (>17)					7
10. **(*)** **(+)**	**VG**	**Leaf: leaflet margin**					
QN	**(a)**	entire				Xiangling	3
		crenated					5
		serrulate					7
11.	**VS**	**Leaf: terminal leaflet**					
QN	**(a)**	small				Xixiang	1
		medium					2
		large				Jinlong 1	3
12. **(*)**	**VS**	**Leaf: glandular hair of lateral leaflet**					
QN	**(a)**	absent				Xiangling	1
		present					9
13. **(*)**	**VG**	**Flower: Time of male flowering compared to female flowering**					
QL	**(a)**	before (protandry)				Ashley, Franquette, Marbot, Payne, Xiangling	1
	(c)	simultaneous (homogamy)				Heyue 4, Meylannaise, Ronde de Montignac	2
		after (protogyny)				Amigo, Chico, Lvbo	3
14. **(*)**	**VG**	**Flower: tree age of initial female flowering**					
PQ	**(a)**	early (<3)				Liao 74023	1
		medium (3-6)				Jinxiang	2
		late (>6)				Yangbipaohetao	3
15.	**VG**	**Flower: time of female flowering**					
QN	**(a)**	early				Santaihetao, Chase D 9, Sorrento,	3
		medium				Marbot, Xiangling	5
		late				Hanfeng, Romaine	7
16.	**VG**	**Flower: time of male flowering**					
QN	**(a)**	early				Chase D 9, Gustine, Sorrento, Xixiang	3
		medium				Lvbo, Marbot	5
		late				Franquette, Hanfeng, Parisienne,	7

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
17.	**VG**	**Flower: number of florescences**					
QL	**(a)**	one				Jinlong 1	1
		more than one				Liaoning 4	9
18. **(*)**	**VG**	**Flower: number of female flowers**					
QN	**(a)**	few (1-2)				Parisienne, Xiangling	1
		medium (3-4)				Franquette, Hartley, Marbot, Yangbipaohetao	3
		many (5-10)				Adams 10, Ronde de Montignac	5
		very many (>10)				Serr	7
19.	**VG**	**Flower: stigma color**					
(*)	**(a)**	pale yellow				Xilin 1	1
PQ	**(b)**	yellow				Xilin 3	2
		light red					3
		red					4
		dark red					5
		purple red					6
20.	**VG**	**Capacity of continuously bearing**					
QN	**(a)**	weak				Gege	3
	(e)	medium				Chico	5
		strong				Liaoning 1	7
21.	**VG**	**Fruit: Time of maturity**					
QN	**(a)**	early				Beijing 861, Chico, Payné, Serr	3
		medium				Grandjean, Liaoning 1, Mayette	5
		late				Candelou, Wei 2	7
22. **(*)**	**VG**	**Fruit: Pericarp crack when mature**					
QL	**(a)**	absent					1
		present					9
23. **(*)**	**VG**	**Fruit: Bearing capacity**					
QN	**(a)**	weak					1
		medium					2
		strong				Liaoning 1	3
24. **(*)**	**VG**	**Fruit: setting characteristics**					
QL	**(a)**	solitary				Jinlong 1	1
		binate				Liaoning 1	2
		fascicled					3
		bunchy					4

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
25. (*)	**VG**	**Fruit: fuzz**					
QN	**(a)**	few				Beijing 861	1
		medium					2
		many					3
26.	**VG**	**Fruit: tannin content of pericarp**					
QN	**(a)**	little				Baishui	1
		medium					2
		much				Baopi	3
27. (*) (+)	**VG**	**Nut: shape in longitudinal section <u>through</u> suture**					
PQ	**(a)**	elliptic				Corne, Franquette, Sorrento	1
		broad elliptic				Parisienne	2
		long circular					3
		circular				Meylannaise	4
		ovate				Gustine, Yangbipaohetao	5
		broad ovate				Marbot, Payne, Serr, Xiangling	6
		triangular				Hartley	7
		trapezium				Liaoning 1	8
28. (*) (+)	**VG**	**Nut: shape in longitudinal section <u>perpendicular</u> to suture**					
PQ	**(a)**	circular				Meylannaise	1
		oblate				Yuanbao	2
		ovate				Gustine, Yangbipaohetao	3
		broad ovate				Payne, Serr, Xiangling	4
		broad elliptic				Franquette	5
		triangular				Hartley	6
29. (*) (+)	**VG**	**Nut: shape in cross section**					
PQ	**(a)**	emarginated oblate					1
		oblate				Chico, Franquette, Liaoning 1	2
		circular				Marbot, Payne, Xiangling	3
		elliptic				Corne, Hartley, Serr	4

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
30. (*) (+)	**VG**	**Nut: shape of base perpendicular to suture**					
PQ	**(a)**	rounded				Chico, Franquette, Payne, Serr	1
		oblate				Xiangling	2
		cuneate				Corne	3
		truncate				Mayette, Parisienne	4
31. (*) (+)	**VG**	**Nut: shape of apex perpendicular to suture**					
PQ	**(a)**	rounded				Chico, Marbot, Serr, Zhonglin 1	1
		truncate				Corne, Grandjean, Pedro, Yunxin 21	2
32. (*) (+)	**VG**	**Nut: shape of apical tip**					
QN	**(a)**	emarginate					1
		flat				Grandjean, Mayette, Xiangling	3
		bulge				Chico, Corne, Hartley, Yangbipaohetao	5
		pointed				Franquette, Marbot, Payne, Serr	7
33. (*)	**VG**	**Nut: number of pads on suture**					
QL	**(a)**	none					1
		two				Xiangling	2
		more than two					3
34. (*) (+)	**VG**	**Nut: position of pad on suture**					
QN	**(a)**	on upper half				Chico, Hartley, Marbot, Mayette, Parisienne, Xiangling	1
		on upper 2/3				Franquette, Gustine, Payne, Pedro, Xixiang	3
		on whole length					5
35. (*) (+)	**VG**	**Nut: prominence of pad on suture**					
QN	**(a)**	emarginate					1
		flat				Chico, Grandjean, Mayette	3
		bulge				Franquette, Marbot, Payne, Serr, Xixiang	5

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
36. **(+)**	**VG**	**Nut: width of pad on suture**					
QN	**(a)**	narrow				Gustine, Payne, Serr, Xixiang	3
		medium				Chico, Corne, Franquette, Shaanhe 1	5
		broad				Hartley, Marbot, Pedro	7
37.	**VG**	**Nut: depth of groove along pad on suture**					
QN	**(a)**	shallow				Chico, Grandjean, Parisienne, Xiangling	3
		medium				Gustine, Hartley, Mayette, Xixiang	5
		deep				Corne, Marbot, Payne, Serr	7
38.	**VG**	**Nut: depth of groove in the shell surface**					
QN	**(a)**	flat				Huapi	1
		shallow				Xiangling	3
		medium				Xilin 2	5
		deep				Erbazi	7
39. **(*)**	**VG**	**Nut: number of pits in the surface**					
QN	**(a)**	few				Yunxin 303	1
		medium				Santaihetao	3
		many				Baohe 4	5
		very many					7
40.	**VG**	**Nut: color of shell surface**					
PQ	**(a)**	yellow				Xiangling	3
	(b)	brown					5
		tan					7
41.	**VG**	**Nut: shell integrity**					
QL	**(a)**	none					1
		partially missing					2
		complete					3
42.	**MS**	**Nut: single nut weight (g)**					
QN	**(a)**	very light (<5.0)				Lozeronne, Zhenzhu	1
	(f)	light (5.0-8.0)				Chico, Grandjean, Longzhu	3
		medium (8.0-15.0)				Franquette, Marbot, Payne, Serr, Yuanfeng	5
		heavy (>15.0)				Hartley, Heshang 1	7

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
43.	**MG**	**Nut: thickness of primary and secondary dividing membranes**					
QN	**(a)**	very thin				Lipin 2	1
		thin				Chico, Grandjean, Payne, Serr, Xixiang	3
		medium				Franquette, Longmenmian, Marbot	5
		thick				Corne	7
44.	**VG**	**Nut: characteristics of inner pleat wall**					
QL	**(a)**	absent or very weak				Luren	1
		leathery				Xiangling	2
		bony					3
45.	**VG**	**Kernel: color of endopleura**					
PQ	**(a)**	white				Li 53	1
	(b)	flavescent				Santaihetao	2
		yellow				Wei 2	3
		beige				Shahe	4
		brown				Xiaozirang	5
		rufous				Honghetao	6
		puce				Li 3	7
46.	**MS**	**Kernel: percentage of weight relative to total weight of nut (%)**					
QN	**(a)**	very low (<10.0)				Corne	1
		low (10.0-38.0)				Marbot, Mayette	3
		medium (38.0-50.0)				Franquette, Duoguomian, Hartley, Pedro, Sorrento	5
		high (50.0-60.0)				Chase D 9, Payne, Vina, Wen 185	7
		very high (>60.0)				Beijing 861, Serr	9
47.	**VG**	**Kernel: ease of removal**					
QN	**(a)**	very easy				Lipin 1, Payne, Pedro, Serr	1
		easy				Franquette, Hartley, Marbot	3
		medium				Jinlong 2, Meylannaise	5
		difficult				Corne, Tiehetao	7

		English	français	deutsch	español	Example Varieties Exemples Beispielssorten Variedades ejemplo	Note/ Nota
48.	**MS**	**Nut: thickness of shell (mm)**					
(*)	**(a)**	very thin (0.1-0.9)				Lipin 1, Pedro, Serr	1
QN	**(f)**	thin (1.0-1.5)				Chico, Grandjean, Gustine, Jinlong 2, Payne	3
		medium (1.6-2.0)				Chahetao, Franquette, Hartley, Marbot	5
		thick (>2.0)				Corne, Shitou	7
49.	**VG**	**Nut: dividing membranes characteristics**					
QL	**(a)**	membranous				Lipin 2	1
		paper-like				Luguang	2
		leathery				Zuoquan	3
		bony					4
50.	**MS**	**Kernal: crude protein content (%)**					
QN	**(a)**	low (<15.0)				Zhonglin 1	3
	(f)	medium (15.0-20.0)				Xiangling	5
		high (>20.0)				Luguang	7
51.	**MS**	**Kernal: crude fat content (%)**					
QN	**(a)**	low (<60.0)				Hetianhetao	3
	(f)	medium (60.0-68.0)				Xiangling	5
		high (>68.0)				Li 53	7

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) see Below table

Shoots	All observations on shoots should be made on one-year-old shoots located on the upper part of the canopy toward the sun (3-4 shoots each plant). Applicants should clearly state in the Technical Questionnaire attached if shoot characteristics would be used as specific characteristics for the new variety.
Buds	Observations on buds should be made on terminal buds from shoots described above.
Leaves	Observations on leaves should be made on leaves from the middle part of a growing current season's shoot (3-4 shoots each plant, 3-4 lateral leaflets and terminal leaflets of the compound leaf separately).
Flowers	Observations on flowers should be carried out during its full-bloom stage. Take female flowers generated from mixed buds located on bearing branch and male flowers located on the middle of one-year-old shoots (3-4 shoots each plant).
Fruit	At least 30 fruits from the upper part of the canopy toward the sun should be observed when 10% of the pericarp turned to yellow or starting to crack.
Nut	All observations on the nut should exclude the pericarp and should be made on physiological ripe nuts immediately after 25% of the pericarp cracked.

(b) All observations on color characteristics should collect samples as described above and follow RHS color chart.

(c) The time of male and female flowering should be observed when 10% of the catkins or female flowers are in full bloom (at dehiscence of pollen or at full development of stigmas).

(d) Tree age of initial female flowering refers to the age of seedling trees when its first female flowers blooms.

(e) Observations of continuous fruit setting should be made according to the fruit scars on bearing shoots.

(f) Take 30 nuts randomly and determine the characteristics listed below

Single nut weight	should be measured (accurate to 0.1 g) when the water content is less than 8%.
Thickness of shell	Thickness of the mid part of the shell should be measured and take the average value (accurate to 0.1 mm) as the thickness of shell.
Crude protein content of the kernel	should be measured according to GB/T 5009.5-2010(accurate to 0.1%)
Crude fat content of the kernel	should be measured according to GB/T 5009.6-2003(accurate to 0.1%)

8.2 Explanations for individual characteristics

Ad. 2: Tree: growth habit

1
upright

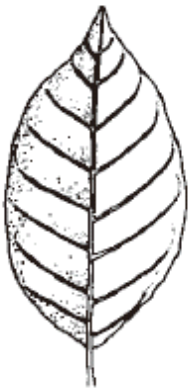
2
semi-upright

3
spreading

Ad. 8: Leaf: shape of lateral leaflet

1
lanceolate

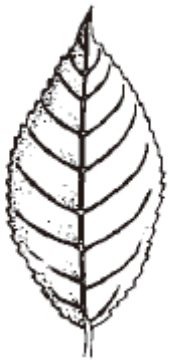
2
oval



3
elliptic

Ad. 10: Leaf: leaflet margin

3
entire



5
crenated

7
serrulate

Ad. 27: Nut: shape in longitudinal section through suture

1
elliptic

2
broad elliptic

3
long circular

4
circular

5
ovate

6
broad ovate

7
triangular

8
trapezium

Ad. 28: Nut: shape in longitudinal section perpendicular to suture

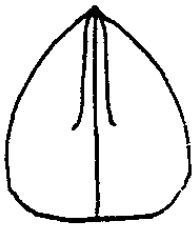
1
circular

2
oblate

3
ovate

4
broad ovate

5
broad elliptic



6
triangular

Ad. 29: Nut: shape in cross section

1
emarginated oblate

2
oblate

3
circular

4
elliptic

Ad. 30: Nut: shape of base perpendicular to suture

1
rounded

2
oblate

3
cuneate

Ad. 31: Nut: shape of apex perpendicular to suture

1
rounded

2
truncate

Ad. 32: Nut: shape of apical tip

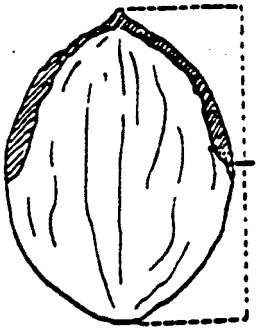
1
emarginate

3
flat

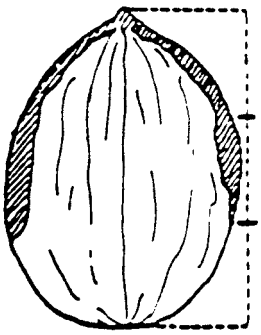
5
bulge

7
pointed

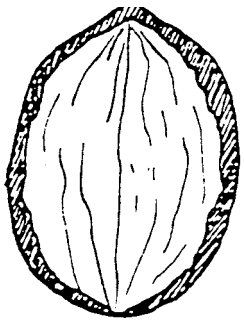
Ad. 34: Nut: position of pad on suture



1
on upper half

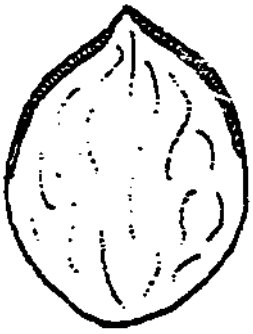


3
on upper 2/3

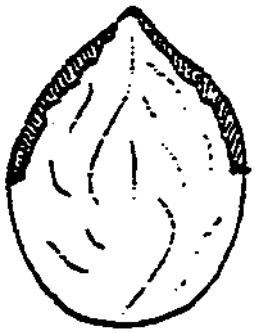


5
on whole length

Ad. 35: Nut: prominence of pad on suture



1
emarginated



3
flat

5
bulge

Ad. 36: Nut: width of pad on suture

3
narrow

5
medium

7
broad

9. Literature

GB/T 20398-2006 Walnut quality grade.

IPGRI, descriptors for walnut (*Juglans* spp.). International Plant Genetic Resource Institute, Rome, Italy, 1994

Liu Qing-zhong and Zhang Li-si. 2007: Descriptors and Data Standard for walnut (*Juglans regia* L.). Beijing: China Agriculture Press. (in Chinese)

Pei Dong and Lu Xin-zheng. 2011: Walnut germplasm resources in China. Beijing: China forestry publishing house. (in Chinese)

TGP/10 Examining Uniformity

TGP/11 Examining Stability

TGP/14 Glossary of technical, botanical and statistical terms used in UPOV documents

TGP/15 New types of characteristics

TGP/5 Experience and cooperation in DUS testing

TGP/6 Arrangements for DUS testing

TGP/7 Development of Test Guidelines

TGP/8 Use of statistical procedures in Distinctness, Uniformity and Stability testing

TGP/9 Examining Distinctness

UPOV/TG/125/6 Guidelines for the conduct of tests for Distinctness, Uniformity and Stability. *Juglans regia* L. (walnut)

GB/T 5009.6-2003 Determination of fat in foods

GB/T 5009.5-2010 National food safety standard Determination of protein in foods.

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	*Juglans regia* L.
1.2 Common name	Walnut

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)

[#] 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 Vegetative propagation

(a) cuttings [ ]

(b) *in vitro* propagation [ ]

(c) grafting (budding) [ ]

(d) *in vitro* propagation [ ]

(e) other (state method) [ ]

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)	**Tree: plant height**		
	very low		1 […]
	very low to to low		2 […]
	low (<12.0)	Franquette, Hartley, Marbot	3 […]
	low to medium		4 […]
	medium (12.0-20.0)	Corne, Parisienne	5 […]
	medium to high		6 […]
	high (>20.0)	Serr	7 […]
	high to very high		8 […]
	very high		9 […]
5.2 (2)	**Tree: growth habit**		
	upright	Corne, Sorrento	1 […]
	semi-upright	Franquette, Hartley, Marbot	2 […]
	spreading	Gustine, Payne, Shangsong 6, Vina	3 […]
5.3 (3)	**Tree: shape of crown**		
	spherical	Zhonglin 5	1 […]
	semi spherical	Baokexiang	2 […]
	sphere		3 […]
5.4 (5)	**Tree: stem color**		
	light gray		1 […]
	gray	Liaoning 1	2 […]
	taupe		3 […]
	brown	Chuanhe 2	4 […]
5.5 (7)	**Leaf: shape of lateral leaflet**		
	lanceolate	Hartley, Payne, Vina, Xixiang	1 […]
	oval	Corne, Franquette, Marbot	2 […]
	elliptic	Adam 10, Chase D 9, Liaoning 1	3 […]

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

	Characteristics	Example Varieties	Note
5.6 (10)	**Leaf: leaflet margin**		
	entire	Xiangling	3 […]
	crenated		5 […]
	serrulate		7 […]
5.7 (11)	**Leaf: glandular hair of lateral leaflet**		
	absent	Xiangling	1 […]
	present		9 […]
5.8 (12)	**Bud: longitudinal section of mixed bud**		
	circular		1 […]
	triangular	Shanhe 1	2 […]
5.9 (13)	**Flower: Time of male flowering compared to female flowering**		
	before (protandry)	Ashley, Franquette, Marbot, Payne, Xiangling	1 […]
	simultaneous (homogamy)	Heyue 4, Meylannaise, Ronde de Montignac	2 […]
	after (protogyny)	Amigo, Chico, Lvbo	3 […]
5.10 (14)	**Flower: tree age of initial female flowering**		
	very early		1 […]
	very early to early		2 […]
	early (<3)	Santaihetao, Chase D 9, Sorrento,	3 […]
	early to medium		4 […]
	medium (3-6)	Marbot, Xiangling	5 […]
	medium to late		6 […]
	late (>6)	Hanfeng, Romaine	7 […]
	late to very late		8 […]
	very late		9 […]
5.11 (18)	**Flower: number of female flowers**		
	few (1-2)	Parisienne, Xiangling	1 […]
	medium (3-4)	Franquette, Hartley, Marbot, Yangbipaohetao	3 […]
	many (5-10)	Adams 10, Ronde de Montignac	5 […]
	very many (>10)	Serr	7 […]

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

	Characteristics	Example Varieties	Note
5.12 (19)	**Flower: stigma color**		
	pale yellow	Xilin 1	1 […]
	yellow	Xilin 3	2 […]
	light red		3 […]
	red		4 […]
	dark red		5 […]
	purple red		6 […]
5.13 (22)	**Pericarp crack when mature**		
	crack		1 […]
	no crack		9 […]
5.14 (23)	**Fruit: Bearing capacity**		
	weak		1 […]
	medium		2 […]
	strong	Liaoning 1	3 […]
5.15 (24)	**Fruit: setting characteristics**		
	solitary	Jinlong 1	1 […]
	binate	Liaoning 1	2 […]
	fascicled		3 […]
	bunchy		4 […]
5.16 (25)	**Fruit: fuzz**		
	few	Beijing 861	1 […]
	medium		2 […]
	many		3 […]
5.17 (27)	**Nut: shape in longitudinal section <u>through</u> suture**		
	elliptic	Corne, Franquette, Sorrento	1 […]
	broad elliptic	Parisienne	2 […]
	long circular		3 […]
	circular	Meylannaise	4 […]
	ovate	Gustine, Yangbipaohetao	5 […]
	broad ovate	Marbot, Payne, Serr, Xiangling	6 […]

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

	Characteristics	Example Varieties	Note
5.18 (28)	**Nut: shape in longitudinal section perpendicular to suture**		
	circular	Meylannaise	1 […]
	oblate	Yuanbao	2 […]
	ovate	Gustine, Yangbipaohetao	3 […]
	broad ovate	Payne, Serr, Xiangling	4 […]
	broad elliptic	Franquette	5 […]
	triangular	Hartley	6 […]
5.19 (29)	**Nut: shape in cross section**		
	emarginated oblate	Chico, Franquette, Liaoning 1	1 […]
	oblate	Marbot, Payne, Xiangling	2 […]
	circular	Corne, Hartley, Serr	3 […]
	elliptic		4 […]
5.20 (30)	**Nut: shape of base perpendicular to suture**		
	rounded	Chico, Franquette, Payne, Serr	1 […]
	oblate	Xiangling	2 […]
	cuneate	Corne	3 […]
	truncate	Mayette, Parisienne	4 […]
5.21 (31)	**Nut: shape of apex perpendicular to suture**		
	rounded	Chico, Marbot, Serr, Zhonglin 1	1 […]
	truncate	Corne, Grandjean, Pedro, Yunxin 21	2 […]
5.22 (32)	**Nut: shape of apical tip**		
	emarginate	Grandjean, Mayette, Xiangling	1 […]
	flat	Chico, Corne, Hartley, Yangbipaohetao	3 […]
	bulge	Franquette, Marbot, Payne, Serr	5 […]
	pointed		7 […]
5.23 (33)	**Nut: number of pads on suture**		
	none		1 […]
	two	Xiangling	2 […]
	more than two		3 […]

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

	Characteristics	Example Varieties	Note
5.24 (34)	**Nut: position of pad on suture**		
	on upper half	Chico, Hartley, Marbot, Mayette, Parisienne, Xiangling	1 […]
	on upper 2/3	Franquette, Gustine, Payne, Pedro, Xixiang	3 […]
	on whole length		5 […]
5.25 (35)	**Nut: prominence of pad on suture**		
	emarginate		1 […]
	flat	Chico, Grandjean, Mayette	3 […]
	bulge	Franquette, Marbot, Payne, Serr, Xixiang	5 […]
5.26 (39)	**Nut: number of pits in the surface**		
	few	Yunxin 303	1 […]
	medium	Santaihetao	3 […]
	many	Baohe 4	5 […]
	very many		7 […]
5.27 (48)	**Nut: thickness of shell (mm)**		
	very thin (0.1-0.9)	Lipin 1, Pedro, Serr	1 […]
	thin (1.0-1.5)	Chico, Grandjean, Gustine, Jinlong 2, Payne	3 […]
	medium (1.6-2.0)	Chahetao, Franquette, Hartley, Marbot	5 […]
	thick (>2.0)	Corne, Shitou	7 […]

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	*thickness of shell*	*thin*	*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

A representative color image of the variety should accompany the Technical Questionnaire.

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”.

.....

[#] 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:

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]