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TG/125/7(proj.2)
**ORIGINAL:** English
**DATE:** 2014-04-10

# 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-fifth session, to be held in Marrakesh, Morocco, from May 26 to 30, 2014*

*Disclaimer: this document does not represent UPOV policies or guidance*

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 scions or grafted plants.

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

10 scions

6 grafted plants

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*

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.

*3.4 Test Design*

3.4.1 Each test should be designed to result in a total of at least 6 plants.

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 6 plants or parts taken from each of 6 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 2.

#### 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 6 plants, 1 off-type is 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) Flower: number of female flowers per cluster (characteristic 8)
(b) Female flower stigma: intensity of color (characteristic 9)
(c) Fruit: setting characteristics (characteristic 10)
(d) Nut: shape (characteristic 11)
(e) Nut: thickness of shell (characteristic 30)
(f) Time of male flowering compared to female flowering (characteristic 31)

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<br>Exemples<br>Beispielssorten<br>Variedades ejemplo | Note/<br>Nota |
|---|---|---|---|---|---|---|---|
| **1.**<br>**(*)**<br>**(+)** | **VG** | **Tree: growth habit** | | | | | |
| **PQ** | | upright | | | | Corne, Sorrento | 1 |
| | | semi-upright | | | | Franquette, Hartley, Marbot | 2 |
| | | spreading | | | | Gustine, Payne, Shangsong 6, Vina | 3 |
| **2.**<br>**(*)** | **VG** | **Tree: shape of crown** | | | | | |
| **PQ** | | circular | | | | Zhonglin 5 | 1 |
| | | semi-circular | | | | Baokexiang | 2 |
| | | conical | | | | Luhe 1 | 3 |
| **3.** | **VG** | **Tree: branching ability** | | | | | |
| **QN** | **(a)** | weak | | | | Jinmian 4 | 3 |
| | | medium | | | | Liaoning 1 | 5 |
| | | strong | | | | Baofeng | 7 |
| **4.**<br>**(*)** | **VG** | **Bud: shape** | | | | | |
| **QL** | **(a)** | circular | | | | Daihui | 1 |
| | | triangular | | | | Chuanhe 1 | 2 |
| **5.**<br>**(*)**<br>**(+)** | **VG** | **Lateral leaflet: shape** | | | | | |
| **PQ** | **(a)** | lanceolate | | | | Hartley, Payne, Vina, Xixiang | 1 |
| | | ovate | | | | Corne, Franquette, Marbot | 2 |
| | | elliptic | | | | Adam 10, Chase D 9, Liaoning 1 | 3 |
| **6.** | **VS** | **leaflet: glandular hair** | | | | | |
| **QN** | **(a)** | absent or few | | | | Xiangling | 1 |
| | | medium | | | | | 2 |
| | | many | | | | | 3 |
| **7.** | **VG** | **Plant: number of flowering times** | | | | | |
| **QL** | **(a)** | one | | | | Jinlong 1 | 1 |
| | | more than one | | | | Liaoning 4 | 9 |

| | | English | français | deutsch | español | Example Varieties<br>Exemples<br>Beispielssorten<br>Variedades ejemplo | Note/<br>Nota |
|---|---|---|---|---|---|---|---|
| **8.<br>(*)** | **VG** | **Flower: number of female flowers per cluster** | | | | | |
| **QN** | **(a)** | 1-2 | | | | Xiangling, Zhonglin 5 | 1 |
| | | 3-4 | | | | Xiluo 3 | 2 |
| | | 5-10 | | | | | 3 |
| | | 11-20 | | | | | 4 |
| | | more than 21 | | | | Suizhuanghetao | 5 |
| **9.<br>(*)** | **VG** | **Female flower stigma: intensity of color** | | | | | |
| **QN** | **(a)** | light | | | | Xilin 1 | 1 |
| | **(b)** | medium | | | | Xilin 3 | 3 |
| | | dark | | | | | 5 |
| **10.<br>(*)<br>(+)** | **VG** | **Fruit: setting characteristics** | | | | | |
| **QL** | **(a)** | solitary | | | | Jinlong 1 | 1 |
| | | binate | | | | Liaoning 1 | 2 |
| | | fascicled | | | | | 3 |
| | | bunchy | | | | | 4 |
| **11.<br>(*)<br>(+)** | **VG** | **Nut: shape** | | | | | |
| **PQ** | **(a)** | elliptic | | | | Corne, Franquette, Sorrento | 1 |
| | | broad elliptic | | | | Parisienne | 2 |
| | | long circular | | | | | 3 |
| | | circular | | | | Meylannaise | 4 |
| | | ovate | | | | Gustine, Jinfeng | 5 |
| | | broad ovate | | | | Marbot, Payne, Serr, Xiangling | 6 |
| | | triangular | | | | Hartley | 7 |
| | | trapezium | | | | Liaoning 1 | 8 |
| **12.<br>(*)<br>(+)** | **VG** | **Nut: shape in lateral view** | | | | | |
| **PQ** | **(a)** | circular | | | | Meylannaise | 1 |
| | | oblate | | | | Yuanbao | 2 |
| | | ovate | | | | Gustine, Jinfeng | 3 |
| | | broad ovate | | | | Payne, Serr, Xiangling | 4 |
| | | broad elliptic | | | | Franquette | 5 |
| | | triangular | | | | Hartley | 6 |

| | | English | français | deutsch | español | Example Varieties<br>Exemples<br>Beispielssorten<br>Variedades ejemplo | Note/<br>Nota |
|---|---|---|---|---|---|---|---|
| **13.<br>(*)<br>(+)** | **VG** | **Nut: shape in cross section** | | | | | |
| **PQ** | **(a)** | reniform | | | | | 1 |
| | | oblate | | | | Chico, Franquette, Liaoning 1 | 2 |
| | | elliptic | | | | Corne, Hartley, Serr | 3 |
| | | circular | | | | Marbot, Payne, Xiangling | 4 |
| **14.<br>(*)<br>(+)** | **VG** | **Nut: shape of base in lateral view** | | | | | |
| **PQ** | **(a)** | cuneate | | | | Corne | 1 |
| | | oblate | | | | Xiangling | 2 |
| | | rounded | | | | Chico, Franquette, Payne, Serr | 3 |
| | | truncate | | | | Mayette, Parisienne | 4 |
| **15.<br>(*)<br>(+)** | **VG** | **Nut: shape of apex in lateral view (excluding tip)** | | | | | |
| **PQ** | **(a)** | obtuse | | | | Shaanhe 2, Vina | 1 |
| | | rounded | | | | Zhonglin 1 | 2 |
| | | truncate | | | | Yunxin 21 | 3 |
| | | emarginate | | | | Xiangling | 4 |
| **16.<br>(*)<br>(+)** | **VG** | **Nut: length of tip** | | | | | |
| **QN** | **(a)** | absent or short | | | | Grandjean, Mayette, Xiangling | 1 |
| | | medium | | | | Chico, Corne, Hartley, Hexuan | 2 |
| | | long | | | | Franquette, Marbot, Payne, Serr | 3 |
| **17.<br>(*)<br>(+)** | **VG** | **Nut: extent of pad around 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 | | | | Honghuadian 1 | 5 |
| **18.<br>(*)<br>(+)** | **VG** | **Nut: prominence of pad on suture** | | | | | |
| **QN** | **(a)** | weak | | | | | 1 |
| | | medium | | | | Chico, Grandjean, Mayette | 3 |
| | | strong | | | | Franquette, Marbot, Payne, Serr, Xixiang | 5 |

| | | English | français | deutsch | español | Example Varieties<br>Exemples<br>Beispielssorten<br>Variedades ejemplo | Note/<br>Nota |
|---|---|---|---|---|---|---|---|
| **19.**<br>**(+)** | **VG** | **Nut: width of pad on suture in lateral view** | | | | | |
| **QN** | **(a)** | narrow | | | | Gustine, Payne, Serr, Xixiang | 3 |
| | | medium | | | | Chico, Corne, Franquette, Shaanhe 1 | 5 |
| | | broad | | | | Hartley, Marbot, Pedro | 7 |
| **20.** | **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 |
| **21.** | **VG** | **Nut: structure of surface of shell** | | | | | |
| **QN** | **(a)** | slightly grooved | | | | Huapi | 1 |
| | | moderately grooved | | | | Xiangling | 2 |
| | | strongly grooved | | | | Xilin 2 | 3 |
| | | embossed | | | | Erbazi | 4 |
| **22.** | **VG** | **Nut: color of shell** | | | | | |
| **PQ** | **(a)** | yellow | | | | Xiangling | 1 |
| | **(b)** | light brown | | | | | 2 |
| | | brown | | | | | 3 |
| **23.**<br>**(+)** | **VG** | **Nut: shell integrity** | | | | | |
| **QL** | **(a)** | none | | | | | 1 |
| | | partially missing | | | | Lufeng | 2 |
| | | complete | | | | Liaoning 1 | 3 |
| **24.** | **MS\ VG** | **Nut size** | | | | | |
| **QN** | **(a)** | small | | | | Zhenzhu | 3 |
| | **(f)** | medium | | | | Franquette, Yuanfeng | 5 |
| | | large | | | | Hartley, Heshang 1 | 7 |
| **25.**<br>**(+)** | **MG** | **Nut: thickness of primary and secondary dividing membranes** | | | | | |
| **QN** | **(a)** | very thin | | | | Lipin 2 | 1 |
| | | thin | | | | Chico, Payne, Serr, Xixiang | 3 |
| | | medium | | | | Franquette, Longmenmian, Marbot | 5 |
| | | thick | | | | Corne | 7 |

| | | English | français | deutsch | español | Example Varieties<br>Exemples<br>Beispielssorten<br>Variedades ejemplo | Note/<br>Nota |
|---|---|---|---|---|---|---|---|
| **26.** | **VG** | **Nut: inner pleat wall of shell** | | | | | |
| **QL** | **(a)** | papery | | | | Luren | 1 |
| | | leathery | | | | Xiangling | 2 |
| | | bony | | | | | 3 |
| **27.** | **VG** | **kernel: color of endopleura** | | | | | |
| **PQ** | **(a)** | white | | | | Jinmian 2 | 1 |
| | **(b)** | yellowish white | | | | Jinmian 3 | 2 |
| | | yellow | | | | Daifeng | 3 |
| | | dark red | | | | Shahe | 4 |
| | | purple | | | | Xiaozirang | 5 |
| | | yellow brown | | | | | 6 |
| | | light brown | | | | Ningcheng 2 | 7 |
| | | medium brown | | | | Daguo | 8 |
| | | dark brown | | | | | 9 |
| **28.** | **MS** | **Kernel: percentage of weight relative to total weight of nut (%)** | | | | | |
| **QN** | **(a)** | very low | | | | Corne | 1 |
| | | low | | | | Marbot, Mayette | 3 |
| | | medium | | | | Franquette, Duoguomian, Hartley, Pedro, Sorrento | 5 |
| | | high | | | | Chase D 9, Payne, Vina, Wen 185 | 7 |
| | | very high | | | | Beijing 861, Serr | 9 |
| **29.** | **VG** | **Kernel: ease of removal** | | | | | |
| **QN** | **(a)** | very easy | | | | Lipin 1, Payne, Pedro, Serr | 1 |
| | | easy | | | | Franquette, Hartley, Marbot | 3 |
| | | medium | | | | Jinlong 2, Meylannaise, Xinfeng | 5 |
| | | difficult | | | | Corne, Xinguang | 7 |
| **30.**<br>**(*)** | **MG/**<br>**VG** | **Nut: thickness of shell** | | | | | |
| | **(a)** | very thin | | | | Lipin 1, Pedro, Serr | 1 |
| **QN** | **(f)** | thin | | | | Chico, Grandjean, Gustine, Jinlong 2, Payne | 3 |
| | | medium | | | | Chahetao, Franquette, Hartley, Marbot | 5 |
| | | thick | | | | Corne, Shitou | 7 |

| | | English | français | deutsch | español | Example Varieties<br>Exemples<br>Beispielssorten<br>Variedades ejemplo | Note/<br>Nota |
|---|---|---|---|---|---|---|---|
| **31.<br>(*)** | **VG** | **Time of male flowering compared to female flowering** | | | | | |
| **QN** | **(a)** | before (protandry) | | | | Ashley, Franquette, Marbot, Payne, Xiangling | 1 |
| | **(c)** | simultaneous (homogamy) | | | | Heyue 4, Meylannaise, Ronde de Montignac | 2 |
| | | after (protogyny) | | | | Amigo, Chico, Lübo | 3 |
| **32.<br>(*)** | **VG** | **Tree age of initial female flowering** | | | | | |
| **QN** | **(a)** | early (<3) | | | | Liao 74023 | 1 |
| | | medium (3-6) | | | | Jinxiang | 2 |
| | | late (>6) | | | | Liao 30401 | 3 |
| **33.** | **VG/<br>MG** | **Time of female flowering** | | | | | |
| **QN** | **(a)** | early | | | | Chase D 9, Shaanhe1, Sorrento, | 3 |
| | | medium | | | | Marbot, Xiangling | 5 |
| | | late | | | | Hanfeng, Romaine | 7 |
| **34.** | **VG/<br>MG** | **time of male flowering** | | | | | |
| **QN** | **(a)** | early | | | | Chase D 9, Gustine, Sorrento, Xixiang | 3 |
| | | medium | | | | Lübo, Marbot | 5 |
| | | late | | | | Franquette, Hanfeng, Parisienne, | 7 |
| **35.** | **VG/<br>MG** | **Time of maturity** | | | | | |
| **QN** | **(a)** | early | | | | Beijing 861, Chico, Payné, Serr | 3 |
| | | medium | | | | Grandjean, Liaoning 1, Mayette | 5 |
| | | late | | | | Candelou, Wei 2 | 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

| | |
|---|---|
| Branches | Observations should be made on developmental branches from the middle part of the canopy. |
| Buds | Observations on buds should be made on terminal buds of branches described above. |
| Leaflet | Observations should be made on the terminal leaflet. |
| Flowers | Observations should be carried out during its full-blossom period. |
| Nut | Observations should be made on physiological ripe nuts excluding the pericarp immediately after 25% of the pericarp cracked. |

(b) Observations on color characteristics should collect samples as described above and follow RHS color chart or others else if available.
(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

| | |
|---|---|
| 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. |
| Kernel | Observations on the kernel should be made when the water content is less than 8% |

*8.2 Explanations for individual characteristics*

Ad. 1: Tree: growth habit

1
upright

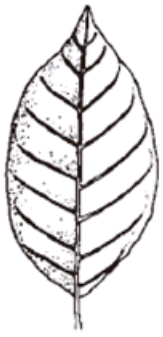
2
semi-upright

3
spreading

Ad. 5: Lateral leaflet: shape

1
lanceolate

2
ovate



3
elliptic

Ad. 10: Fruit: setting characteristics

1
solitary

2
binate

3
fascicled

4
bunchy

Ad. 11: Nut: shape

Observed 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. 12: Nut: shape in lateral view

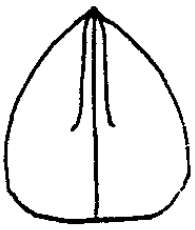
1
circular

2
oblate

3
ovate

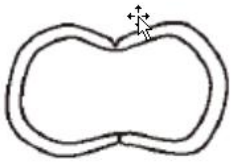
4
broad ovate

5
broad elliptic



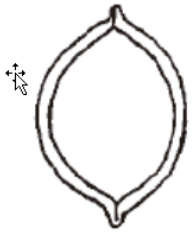
6
triangular

Ad. 13: Nut: shape in cross section



1
reniform

2
oblate



3
elliptic

4
circular

Ad. 14: Nut: shape of base in lateral view

1
cuneate

2
oblate

3
rounded

4
truncate

Ad. 15: Nut: shape of apex in lateral view (excluding tip)

1
obtuse

2
rounded

3
truncate

4
emarginate

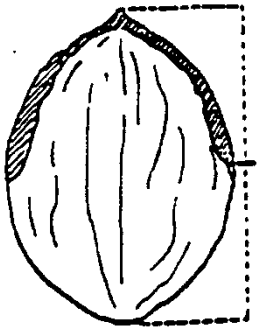
Ad. 16: Nut: length of tip

1
absent or short

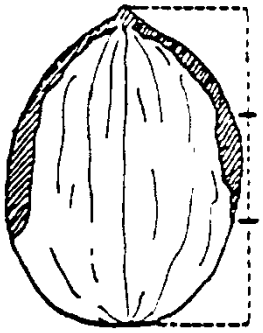
2
medium

3
long

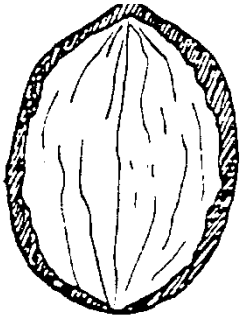
Ad. 17: Nut: extent of pad around suture



1
on upper half

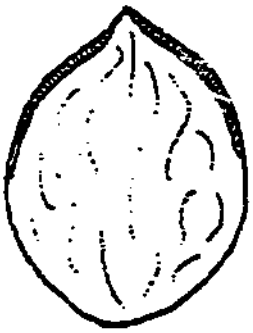


3
on upper 2/3

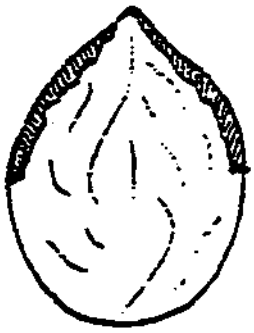


5
on whole length

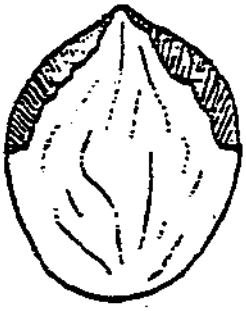
Ad. 18: Nut: prominence of pad on suture



1
weak



3
medium



5
strong

Ad. 19: Nut: width of pad on suture in lateral view

3
narrow

5
medium

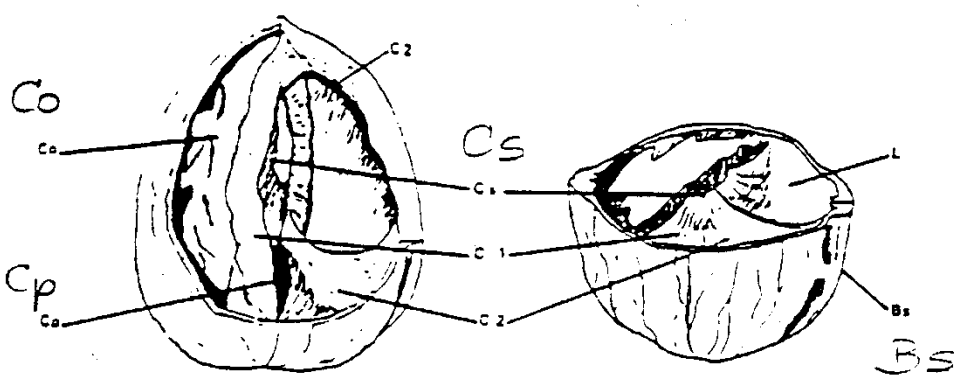
7
broad

Ad. 23: Nut: shell integrity

| 1 | 2 | 3 |
|---|---|---|
| none | partially missing | complete |

Ad. 25: Nut: thickness of primary and secondary dividing membranes

inner structure of nut




longitudinal section cross section

Legend:

| | | |
|---|---|---|
| | Co: | Kernel |
| | Cs: | Septem |
| | Cp: | Placenta |
| | L: | Chamber |
| | Bs: | Margins of suture of valves |
| | C1: | Primary dividing membrane |
| | C2: | Secondary dividing membrane |

## 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)

## 10. Technical Questionnaire

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

| | Application date:<br>(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: |
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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: growth habit** | | |
| | upright | Corne, Sorrento | 1 [ ] |
| | semi-upright | Franquette, Hartley, Marbot | 2 [ ] |
| | spreading | Gustine, Payne, Shangsong 6, Vina | 3 [ ] |
| **5.2 (2)** | **Tree: shape of crown** | | |
| | circular | Zhonglin 5 | 1 [ ] |
| | semi-circular | Baokexiang | 2 [ ] |
| | conical | Luhe 1 | 3 [ ] |
| **5.3 (4)** | **Bud: shape** | | |
| | circular | Daihui | 1 [ ] |
| | triangular | Chuanhe 1 | 2 [ ] |
| **5.4 (5)** | **Lateral leaflet: shape** | | |
| | lanceolate | Hartley, Payne, Vina, Xixiang | 1 [ ] |
| | ovate | Corne, Franquette, Marbot | 2 [ ] |
| | elliptic | Adam 10, Chase D 9, Liaoning 1 | 3 [ ] |
| **5.5 (8)** | **Flower: number of female flowers per cluster** | | |
| | 1-2 | Xiangling, Zhonglin 5 | 1 [ ] |
| | 3-4 | Xiluo 3 | 2 [ ] |
| | 5-10 | | 3 [ ] |
| | 11-20 | | 4 [ ] |
| | more than 21 | Suizhuanghetao | 5 [ ] |
| **5.6 (9)** | **Female flower stigma: intensity of color** | | |
| | light | Xilin 1 | 1 [ ] |
| | light to medium | | 2 [ ] |
| | medium | Xilin 3 | 3 [ ] |
| | medium to dark | | 4 [ ] |
| | dark | | 5 [ ] |

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

| | Characteristics | Example Varieties | Note |
|---|---|---|---|
| **5.7 (10)** | **Fruit: setting characteristics** | | |
| | solitary | Jinlong 1 | 1 [ ] |
| | binate | Liaoning 1 | 2 [ ] |
| | fascicled | | 3 [ ] |
| | bunchy | | 4 [ ] |
| **5.8 (11)** | **Nut: shape** | | |
| | elliptic | Corne, Franquette, Sorrento | 1 [ ] |
| | broad elliptic | Parisienne | 2 [ ] |
| | long circular | | 3 [ ] |
| | circular | Meylannaise | 4 [ ] |
| | ovate | Gustine, Jinfeng | 5 [ ] |
| | broad ovate | Marbot, Payne, Serr, Xiangling | 6 [ ] |
| | triangular | Hartley | 7 [ ] |
| | trapezium | Liaoning 1 | 8 [ ] |
| **5.9 (12)** | **Nut: shape in lateral view** | | |
| | circular | Meylannaise | 1 [ ] |
| | oblate | Yuanbao | 2 [ ] |
| | ovate | Gustine, Jinfeng | 3 [ ] |
| | broad ovate | Payne, Serr, Xiangling | 4 [ ] |
| | broad elliptic | Franquette | 5 [ ] |
| | triangular | Hartley | 6 [ ] |
| **5.10 (13)** | **Nut: shape in cross section** | | |
| | reniform | | 1 [ ] |
| | oblate | Chico, Franquette, Liaoning 1 | 2 [ ] |
| | elliptic | Corne, Hartley, Serr | 3 [ ] |
| | circular | Marbot, Payne, Xiangling | 4 [ ] |
| **5.11 (14)** | **Nut: shape of base in lateral view** | | |
| | cuneate | Corne | 1 [ ] |
| | oblate | Xiangling | 2 [ ] |
| | rounded | Chico, Franquette, Payne, Serr | 3 [ ] |
| | truncate | Mayette, Parisienne | 4 [ ] |

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

| | Characteristics | Example Varieties | Note |
|---|---|---|---|
| **5.12 (15)** | **Nut: shape of apex in lateral view (excluding tip)** | | |
| | obtuse | Shaanhe 2, Vina | 1 [ ] |
| | rounded | Zhonglin 1 | 2 [ ] |
| | truncate | Yunxin 21 | 3 [ ] |
| | emarginate | Xiangling | 4 [ ] |
| **5.13 (16)** | **Nut: length of tip** | | |
| | absent or short | Grandjean, Mayette, Xiangling | 1 [ ] |
| | medium | Chico, Corne, Hartley, Hexuan | 2 [ ] |
| | long | Franquette, Marbot, Payne, Serr | 3 [ ] |
| **5.14 (17)** | **Nut: extent of pad around suture** | | |
| | on upper half | Chico, Hartley, Marbot, Mayette, Parisienne, Xiangling | 1 [ ] |
| | upper half to upper 2/3 | | 2 [ ] |
| | on upper 2/3 | Franquette, Gustine, Payne, Pedro, Xixiang | 3 [ ] |
| | upper 2/3 to whole length | | 4 [ ] |
| | on whole length | Honghuadian 1 | 5 [ ] |
| **5.15 (18)** | **Nut: prominence of pad on suture** | | |
| | weak | | 1 [ ] |
| | weak to medium | | 2 [ ] |
| | medium | Chico, Grandjean, Mayette | 3 [ ] |
| | medium to strong | | 4 [ ] |
| | strong | Franquette, Marbot, Payne, Serr, Xixiang | 5 [ ] |

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

| | Characteristics | Example Varieties | Note |
|---|---|---|---|
| **5.16 (30)** | **Nut: thickness of shell** | | |
| | very thin | Lipin 1, Pedro, Serr | 1 [ ] |
| | very thin to thin | | 2 [ ] |
| | thin | Chico, Grandjean, Gustine, Jinlong 2, Payne | 3 [ ] |
| | thin to medium | | 4 [ ] |
| | medium | Chahetao, Franquette, Hartley, Marbot | 5 [ ] |
| | medium to thick | | 6 [ ] |
| | thick | Corne, Shitou | 7 [ ] |
| | thick to very thick | | 8 [ ] |
| | very thick | | 9 [ ] |
| **5.17 (31)** | **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, Lübo | 3 [ ] |
| **5.18 (32)** | **Tree age of initial female flowering** | | |
| | early (<3) | Liao 74023 | 1 [ ] |
| | medium (3-6) | Jinxiang | 2 [ ] |
| | late (>6) | Liao 30401 | 3 [ ] |

| 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* | *Nut: thickness of shell* | *thick* | *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.

[#] 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: |
|---|---|---|

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]