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Traditional Chinese medicine — Ginseng seeds and seedlings —

Part 1: *Panax ginseng* C.A. Meyer

Médecine traditionnelle chinoise — Graines de ginseng et semis —

Partie 1: Panax ginseng *C.A. Meyer*

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Foreword

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The committee responsible for this document is ISO/TC 249, *Traditional Chinese medicine*.

ISO 17217 consists of the following parts, under the general title *Traditional Chinese medicine — Ginseng seeds and seedlings*:

— *Part 1:* Panax ginseng *C.A. Meyer*

Traditional Chinese medicine — Ginseng seeds and seedlings —

Part 1: *Panax ginseng* C.A. Meyer

1 Scope

This part of ISO 17217 specifies minimum requirements and test methods for ginseng seeds and seedlings, *Panax ginseng* C.A. Meyer. It is suitable for marketing of cultivated ginseng seeds and seedlings, *P. ginseng* C.A. Meyer. It is also suitable for quality assurance for ginseng cultivators.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

International Seed Testing Association (ISTA), *International Rules for Seed Testing*

International Seed Testing Association (ISTA), *Working Sheets on Tetrazolium testing*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
seed lot
specified quantity of seed that is physically and uniquely identifiable

[SOURCE: ISTA, International Rules for Seed Testing, definition 2.2.1]

3.2
primary sample
portion taken from the seed lot during one single sampling action

[SOURCE: ISTA, International Rules for Seed Testing, definition 2.2.2]

3.3
composite sample
formed by combining and mixing all the primary samples taken from the seed lot

[SOURCE: ISTA, International Rules for Seed Testing, definition 2.2.3]

3.4
subsample
portion of primary a sample obtained by reducing a sample

[SOURCE: ISTA, International Rules for Seed Testing, definition 2.2.4]

3.5
submitted sample
sample to be submitted to the testing laboratory that comprises either the whole of the composite sample or a subsample

Note 1 to entry: The submitted sample can be divided into subsamples, packed in different materials meeting conditions, for specific tests (e.g. moisture or health).

[SOURCE: ISTA, International Rules for Seed Testing, definition 2.2.5]

3.6
working sample
entire submitted sample or subsample to which one of the quality tests described in the ISTA Rules is applied and which has at least the weight prescribed by the ISTA Rules for the particular test

[SOURCE: ISTA, International Rules for Seed Testing, definition 2.2.7]

3.7
sealed
condition whereby a container which contains seeds is closed in such a way that it cannot be opened to get access to the seed and be closed again without either destroying the seal or leaving evidence of tampering

Note 1 to entry: This definition refers to the sealing of seed lots, as well as of seed samples.

[SOURCE: ISTA, International Rules for Seed Testing, definition 2.2.8]

3.8
purity
weight percentage of pure seed fraction over the total weight of the working sample, in percent

Note 1 to entry: The pure seed refers to the species stated by the applicant, or found to predominate in the test, and includes all botanical varieties and cultivars of that species.

[SOURCE: ISTA, International Rules for Seed Testing, definition 3.2.1]

3.9
seed width
largest distance(see Figure 1) from the side of raphe to its opposite, in millimetre

3.10
plump seed
seeds with a kernel to cavity ratio of not less than 3:4

Note 1 to entry: The plumpness of a single seed in this standard is estimated with its area ratio of the kernel to the cavity in the cross section when the seed is cut longitudinally through the raphe (see Figure 1).

3.11
plumpness
index to show the development of kernels of seeds in a seed lot

Note 1 to entry: It is expressed as the percentage of the plump seeds, determined by number, in the working sample.

3.12
mature seed
<dehydrated seed> seed with an embryo that is pyriform or saddle in the shape

3.13
maturity
<dehydrated seed> percentage of mature seed, determined by number, in the working sample

3.14
viability
index to show the potential ability of seed to germinate, or the capability of embryo to live

Note 1 to entry: It is expressed as the percentage of stained seeds in the working sample.

Note 2 to entry: It is estimated using the Topographical Tetrazolium Test.

3.15
100-seed weight
average weight of every 100 pure seeds of a working sample

3.16
seedling
young ginseng with hibernaculum, rhizome and root system and without aboveground stem and leaf

Note 1 to entry: Ginseng seedling is harvested in mid to late autumn or early spring when transplanting.

3.17
hibernaculum
hibernated bud with bud scales

3.18
rhizome
underground stem of ginseng seedling

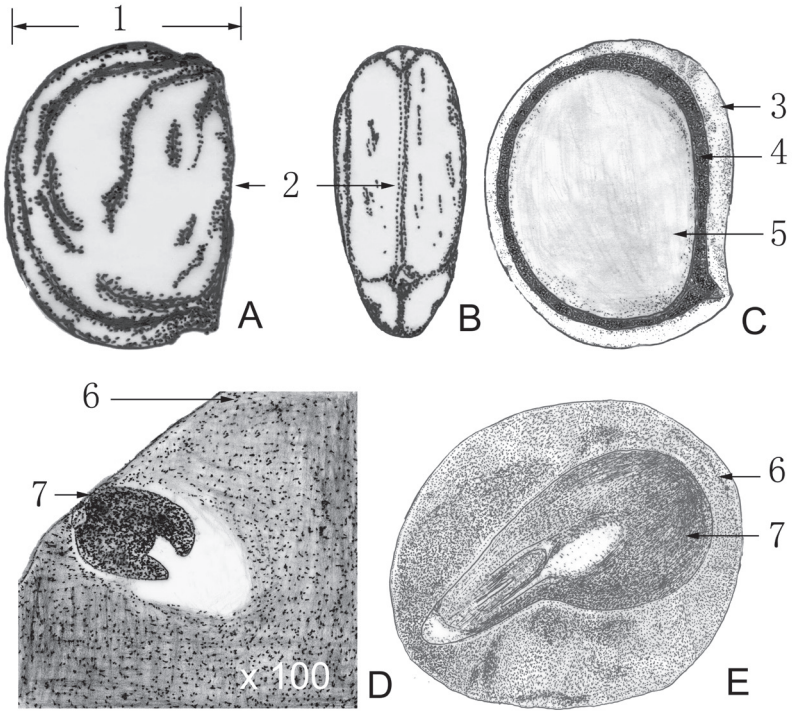
3.19
seedling weight
average weight of single seedling

3.20
root length
total length of the root in cm, the distance from the shoulder of the taproot to the tip of the root

3.21
taproot length
the length of the taproot in cm, the distance from the shoulder of the taproot to the first lateral root

4 Descriptions

In this part of ISO 17217, ginseng seed is the dehydrated seed of plant *P. ginseng* C.A. Mayer and consists of three basic parts: embryo, endosperm and the seed coat, as shown in Figure 1.

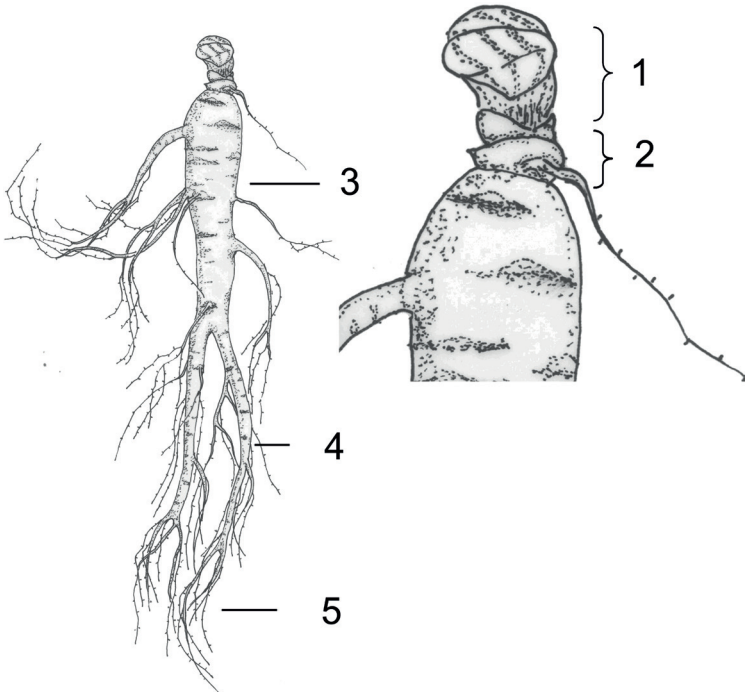


Key

A front view
B dorsal view
C cross section, longitudinally cut through the raphe
D slice of the kernel, shows the embryo
E section of the kernel of a stratified seed
1 seed width
2 raphe
3 seed coat
4 cavity of seed
5 kernel
6 endosperm
7 embryo

Figure 1 — Structure of ginseng seed

For practical application, seedlings are classified into three groups on the basis of their age: one-year-old seedlings, two-year-old seedlings and three-year-old seedlings. Ginseng seedlings consist of five parts: hibernaculum, rhizome, taproot, lateral root and fibrous root, as shown in Figure 2.



Key

1 hibernaculum
2 rhizome
3 taproot
4 lateral root
5 fibrous root

Figure 2 — Ginseng seedling

5 Requirements

5.1 General characteristics

The following requirements should be met before separating the bulk sample into test samples.

a) Ginseng seed shall be clean and free from foreign matter.

b) Ginseng seedling shall be healthy and intact.

c) The presence of living insects, moldy seed and external contaminants which are visible to the naked eye shall not be permitted.

5.2 Ginseng seed

5.2.1 The mass fraction of moisture shall not be greater than 10 %.

5.2.2 Seed purity shall not be less than 99 %.

5.2.3 Viability shall not be less than 95 %.

5.2.4 Maturity shall not be less than 95 %.

5.2.5 Both *Fusarium* spp. and *Alternaria* spp. shall not be detected.

5.2.6 The seed width, 100-seed weight and plumpness shall comply with the requirements in Table 1.

Table 1 — Grading requirements of ginseng seed

Grade	Seed width mm	100-seed weight[a] g	Plumpness %
First[b]	≥ 4,5	≥ 2,8	≥ 80
Second	≥ 3,5	≥ 2,1	≥ 85
Unqualified	< 3,5	—	—

Note The establishment of the above requirements is based on the seeds collected from different regions.

[a] The 100-seed weight is determined when the moisture content of the seed is not more than 10 %.

[b] For the first grade, the seeds, whose seed width are not less than 4,25 mm, shall not be less than 95 %; for the second grade, the seeds, whose seed width are not less than 3,25 mm, shall not be less than 95 % (determined by number). Otherwise, it shall be judged to be the inferior grade.

5.3 Ginseng seedling

5.3.1 Taproot, lateral root and fibrous root of ginseng seedling shall be intact. Taproot shall be full and substantial.

5.3.2 Hibernaculum of ginseng seedling shall be intact, full and substantial.

5.3.3 Both *Fusarium* spp. and *Alternaria* spp. shall not be detected.

5.3.4 Nematode shall not be detected.

5.3.5 Seedling weight shall comply with the requirements in Table 2.

Table 2 — Grading requirements of ginseng seedling

Years	Grade	Root weight[a] g	Taproot length[b] cm
One year	Qualified	≥ 0,5	≥ 10,0
	Unqualified	< 0,5	< 10,0
Two years	First	≥ 8,0	≥ 12,0
	Second	≥ 5,0	≥ 10,0
	Third	≥ 2,0	≥ 8,0
	Unqualified	< 2,0	< 8,0
Three years	First	≥ 15,0	≥ 12,0
	Second	≥ 10,0	≥ 10,0
	Third	≥ 5,0	≥ 8,0
	Unqualified	< 5,0	< 8,0

Note 1 The establishment of the above requirements is based on the seeds collected from different regions.

Note 2 Taproot of 1-year-old seedling is equal to the total root length.

[a] The seedlings whose weight meets the minimum weight requirements for a certain grade should not be less than 95 %. Otherwise, it shall be judged to be the inferior grade.

[b] This requirement is only suitable for those seedlings which will be used to produce good-shaped ginseng. It is not applicable when the shape of the ginseng product is not required.

6 Sampling

Sampling shall be carried out in accordance with ISTA, *International Rules for Seed Testing*, Chapter 2. Maximum weight of lot and minimum weight of sample are specified in Table 3.

Table 3 — Maximum weight of seed lot and minimum weight of sample

Maximum weight of seed lot kg	Minimum weight of sample g		
	Submitted sample	Purity analysis	Other seeds by number
2 000	600	100	200
Note The establishment of the above requirements is based on the seeds collected from different regions.			

7 Test methods

7.1 Moisture content

Determination of the mass fraction of moisture shall be in accordance with the high constant temperature method specified in ISTA, *International Rules for Seed Testing*.

7.2 Seed width

Take 100 to 150 intact seeds in duplicate from the submitted sample by quartering method. The seed width shall be measured with a vernier caliper in millimetres (to two decimal places). The percentage of seeds meeting the minimum width requirement in both tests shall be approximately similar.

7.3 Plumpness

The seed shall be dehydrated naturally in a shade before testing when the moisture content is more than 10 %.

Take duplicate samples of intact seeds by quartering method, each containing 100 to 150 seeds. The seed shall be cut into two parts along the raphe. The areas of the kernel and the cavity in the cross section are measured respectively. The plumpness of a single seed is the area ratio of its kernel to cavity. It is considered to be plump when the area ratio of a seed is not less than three quarters. Formula 1 is used to express the plumpness of a seed lot.

$$p_b = \frac{A_b}{A} \times 100 \quad (1)$$

where

P_b is plumpness (%);

A_b is the number of plump seeds;

A is the number of seeds in the working sample.

If the difference between the plumpness of the duplicate samples is less than 5 %, the plumpness of the seed lot shall be the arithmetic mean of two measured values. Otherwise, it shall be re-estimated.

7.4 Maturity

Take duplicate samples of dry seeds by quartering method, each containing 100 to 150 seeds. The seed shall be cut into two parts along the raphe. The shape of its embryo is determined with a microscope.

The seed is considered to be mature if its embryo is pyriform or saddle. Formula 2 is used to express the maturity of a seed lot.

$$M(\%) = \frac{A_m}{A} \times 100 \quad (2)$$

where

M is maturity (%);

A_m is the number of mature seeds;

A is the number of seeds in the working sample.

If the difference between measured maturities of the duplicate samples is less than 5 %, the maturity of the seed lot shall be the arithmetic mean of two measured values; otherwise, it shall be re-estimated.

7.5 Purity

Determination of the seed purity shall be in accordance with the purity analysis of ISTA, *International Rules for Seed Testing*.

7.6 Seed viability

Determination of the seed viability shall be in accordance with ISTA, *International Rules for Seed Testing* and ISTA, *Working Sheets on Tetrazolium Testing*.

7.7 100-seed weight

Determination of the 100-seed weight shall be in accordance with Weight Determination of ISTA, *International Rules for Seed Testing*.

7.8 Fungus testing

7.8.1 Preparation of seed

Add 100 seeds and 20 ml sterilized water into a sterilized flask and shake for 8 min. Centrifuge the suspension at 4 000 r/min for 20 min. Re-suspend the residue with 2 ml of sterilized water. Spot 100 µl of the final suspension on the blotter or filter paper in a plate for incubation (five spots total in the plate).

7.8.2 Preparation of seedling

Add 500 ml sterilized water into a flask. Take 10 to 20 seedlings. Immerse the seedling into the flask and shake for 8 min one by one. Centrifuge the suspension at 4 000 r/min for 20 min. Re-suspend the residue with 2 ml of sterilized water. Spot 100 µl of the final suspension on the blotter or filter paper in a plate for incubation (five spots total in the plate).

7.8.3 Test of *Alternaria* spp.

Alternaria spp. testing shall be in accordance with ISTA, *International Rules for Seed Testing*, method 7-001a.

7.8.4 Test of *Fusarium* spp

Fusarium spp. testing shall be in accordance with ISTA, *International Rules for Seed Testing*, method 7-009.

7.9 Nematode testing

Take 100 to 150 seedlings. Test nematode knot or lesion by naked eye. Check the root knot or root lesion nematode for nematode under microscope.

7.10 Seedling weight

Take triplicate samples randomly, each containing 20 to 30 seedlings. The seedlings shall be weighed one by one. If the relative standard deviation of the average weight of each sample is not more than 6 %, the arithmetic mean of all samples shall be the average weight of the seedling lot.

The percentage of seedlings not meeting the minimum weight requirement of the grade shall not be more than 5 %. Otherwise, it shall be judged to be of inferior grade and be tested accordingly.

8 Test report

For each test method, the test report shall specify the following:

a) All information necessary for the complete identification of the sample, including the production sites and origins of the seed, e.g. KOR Chunpoong, CHN Jimei etc;

b) The sampling method used;

c) The test method used;

d) The test result(s) obtained;

e) All operating details not specified in this standard, or regarded as optional, together with details of any incidents which can have influenced the test result(s);

f) Any unusual features (anomalies) observed during the test;

g) The date of the test.

9 Packaging, storage and transportation

The packaging shall not transmit any odour or flavour to the product and shall not contain substances which can damage the product or constitute a health risk.

The temperature of seed storage should be not higher than 15°C and the relative humidity should be not higher than 65 %.

The temperature of seedling storage should be 0°C to - 2°C for long distance delivery.

10 Marking

The following items shall be marked or labelled on the packages:

a) Grade of the product in accordance with 5.2 and 5.3

b) All quality features, indicated in 5.2 and 5.3, determined in accordance with methods specified in Clause 7.

c) The maximum weight of lot and that of samples specified in Table 3.

d) Country of origin and province/state of the seed.

e) Expiry date of the seeds.

f) Items required by regulatory body of destination country.

Bibliography

[1] ISO 78-2, *Chemistry — Layouts for standards — Part 2: Methods of chemical analysis*

[2] ISO 5725-1, *Accuracy (trueness and precision) of measurement methods and results — Part 1: General principles and definitions*

[3] ISO 5725-2, *Accuracy (trueness and precision) of measurement methods and results — Part 2: Basic method for the determination of repeatability and reproducibility of a standard measurement method*

[4] JCGM 100:2008, *Evaluation of measurement data — Guide to the expression of uncertainty in measurement*

[5] GB 6941-1986, *Ginseng seed*

[6] GB 6942-1986, *Ginseng seedling*

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