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Pulses — Determination of impurities, size, foreign odours, insects, and species and variety — Test methods

Légumineuses — Détermination des impuretés, des dimensions, des odeurs étrangères, des insectes et des espèces et variétés — Méthodes d'examen

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Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 605 was prepared by Technical Committee ISO/TC 34, *Agricultural food products*.

This second edition cancels and replaces the first edition (ISO 605:1977), clause 5 and subclause 7.2 of which have been deleted.

Annex A of this International Standard is for information only.

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Pulses — Determination of impurities, size, foreign odours, insects, and species and variety — Test methods

1 Scope

This International Standard specifies methods not given in other International Standards for testing pulses which have not been processed and which are intended for human consumption or for animal feeding stuffs.

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 951:1979, *Pulses in bags — Sampling*.

3 Sampling

The laboratory sample shall have been taken in accordance with ISO 951.

4 Preparation of the test sample

Thoroughly mix the laboratory sample (clause 3).

5 Determination of impurities

5.1 Test portion

If necessary, reduce the test sample (clause 4) using an automatic divider or by quartering by hand, to obtain a test portion, for one determination, of at least 200 g, except for butter beans (*Phaseolus lunatus* L.) and horse beans (*Vicia faba* L.) for which the test portion shall be at least 300 g.

NOTE 1 If the content of impurities is very small, it may be necessary to increase considerably the mass of the test portion.

5.2 Separation

Separate the test portion (5.1) into component groups in order to obtain information relevant to the use for which the lot is suitable.

Generally the test portion is separated into five groups, as follows:

a) seeds typical of the species and variety (see 5.2.1);

b) seeds typical of the species but of another variety (see 5.2.2);

c) defective seeds belonging to the same species (see 5.2.3);

d) organic impurities (see 5.2.4);

e) inorganic impurities (see 5.2.5).

5.2.1 Seeds typical of the species and variety

This group includes all intact sound typical seeds, seeds with a cracked or injured seed coat, seeds slightly damaged by insects and broken typical seeds larger than one-half their original size.

This group may be subdivided if desired.

5.2.2 Seeds typical of the species but of another variety

This group includes seeds of varieties which differ significantly in shape, size, colour or appearance from the seeds of the variety under consideration.

5.2.3 Defective seeds belonging to the same species

This group includes broken, partially eaten and injured seeds equal to or less than one-half their original size, seeds markedly damaged by insects, and shrivelled, unripe, germinated, rotten, mouldy and diseased seeds.

5.2.4 Organic impurities

This group includes seed coats, parts of stems, pods, leaves, Sclerotia bodies etc., other crop seeds and weed seeds.

5.2.5 Inorganic impurities

This group includes lumps of earth, sand, dust, stones, etc.

5.3 Expression of results

Report the amount of material in each of the component groups (generally 5.2.1 to 5.2.5), as a percentage by mass of the test portion.

6 Determination of size (of pulses intended for human consumption)

6.1 Sizing

Carry out the determination of size on pulses falling within the groups described in 5.2.1 and 5.2.2.

According to the species of pulse, use sieves either with round holes (for example, for peas and lentils) or with suitable elongated holes (for example, for beans).

Weigh the amount passing through the sieve with the smallest holes, and the amounts retained on each of the sieves used.

6.2 Expression of results

Report the quantity of pulse

a) retained by the sieve with the largest holes;

b) in each size range defined by the upper and lower sizes of sieve aperture;

c) passing through the sieve with the smallest holes.

Express each of these quantities as a percentage by mass of the test portion.

7 Tests for the presence of foreign odours

7.1 Procedure

7.1.1 Carry out the examination described in 7.1.2 or 7.1.3 (a rapid sensitive method) as soon as possible after sampling.

7.1.2 Spread out the sample and smell it. If no strong foreign odour is detected, return the sample to the container and seal it, leave it for 24 h and then re-examine the sample.

The sample may be further examined during or after grinding.

If, after these operations, no foreign odour can be detected with certainty, put about 3 g to 5 g of the ground sample into a flask of 50 ml to 100 ml capacity. Examine the ground sample heated to a temperature not higher than 60 °C by cautiously moving the open flask over a flame or repeatedly shaking it and immersing it in a water-bath.

7.1.3 Put a small quantity of the ground or unground product in a beaker, pour in some warm water (60 °C to 70 °C) and cover the beaker. After 2 min to 3 min decant the water, and note whether foreign odours are present.

7.2 Expression of results

Report the presence or absence of foreign odours.

8 Tests for infestation by insects (see also ISO 6639)

Note the presence of insect pests, especially adults or larvae of the house moth type (for example *Endrosis* or *Hofmannophila* species) or Bruchid beetles, either on sacks or within the bulk of the product.

8.1 Test for visible infestation

8.1.1 Procedure

Spread out part of the laboratory sample on a warm plate (about 40 °C) and cover immediately with a bell jar in order to prevent the escape of insects.

NOTE 2 In warm climates it may be advisable to cool the sample and then to sieve it quickly using a sieve of aperture size appropriate to the sample and through which the smaller insects will pass. The adult insects can easily be collected in a test tube and, if it is desired to know whether living insects are present, the closed test tube can be warmed for a few minutes by hand.

If no living insects are observed within 15 min, open if possible 100 obviously infested seeds to check the

possible presence of living or dead insects and larvae. Examine the sample also for webbing produced by the larvae of the house moth and related species.

8.1.2 Expression of results

Report the presence of insects, stating the numbers found, whether they are living or dead, the species (if possible) and the stage of development (larvae, adult, etc.). Report also the presence of webbing.

8.2 Chemical test for infestation by Bruchid beetles of peas and beans

8.2.1 Test solution

Use either of the following solutions:

a) iodine, 10 g/l solution in potassium iodide.

Dissolve 10 g of potassium iodide in water in a 500 ml flask fitted with a ground glass stopper. Add to the solution 5 g of crystalline iodine and shake until the latter is completely dissolved. Dilute to 500 ml with water.

b) iodine, 20 g/l ethanolic solution (tincture of iodine).

Dissolve 10 g of crystalline iodine in 500 ml of 96 % (V/V) ethanol.

8.2.2 Procedure

Place 500 seeds on a sieve and immerse the sieve with the seeds in the test solution (8.2.1). Subsequently immerse the sieve with the seeds in a 5 g/l potassium hydroxide or sodium hydroxide solution. Take out the sieve with the seeds from the solution and rinse with cold water for 20 s.

NOTE 3 The entry openings of the larvae and the points of attack are stained black by this treatment.

As soon as possible, examine the seeds to determine those showing round black spots or stains on their surface. Consider these seeds as infested.

NOTE 4 It is necessary to carry out the examination as soon as possible since the discoloration will gradually fade.

8.2.3 Expression of results

Count the number of seeds with black spots or stains and express the number determined as a percentage of the number of seeds examined.

NOTE 5 By agreement between buyer and seller the state of development of the beetles may be determined as follows: open visibly infested seeds and count separately the living and dead insects (larvae, pupae and adult beetles).

9 Tests to determine species and variety

By examination of the seeds, their species and variety can be determined using morphological, physical and chemical methods.

9.1 Determination of rogues in lots of harvest peas (peas for human consumption)

Use the morphological method (9.1.1), or, if the two kinds of peas cannot be distinguished in this way, use the chemical method (9.1.2) or the quartz-lamp method (9.1.3). Carry out four tests in parallel.

9.1.1 Morphological method

NOTE 6 The value of harvest peas for human consumption is lowered by the presence of rogues. Generally, it is not difficult to distinguish them from each other.

Examine the seeds to determine the number of rogues present using the following criteria.

Harvest peas are, as a rule, light yellow or green, and their hilum has, in almost all cases, a light shade.

The seed coat of the rogue is uniformly grey, or shows violet spots or a marbled brown coloration. The hilum is brown or black.

9.1.2 Chemical method

Soak the selected seeds in water at room temperature for 3 h. The test can be accelerated by boiling the seeds for 20 min instead of soaking them. If the swelling of the seeds proceeds slowly, extend the period of soaking or boiling as necessary. Score the seed coats of seeds that do not swell.

When the seeds have swollen, decant the water and place the seeds in a glass vessel containing a 10 g/l potassium carbonate solution or a 50 g/l sodium hydroxide solution. After 5 min to 10 min, a dark discoloration (brown or black) can be observed on the rogues or on their hilum, whereas the harvest peas do not change in colour.

9.1.3 Quartz-lamp method

WARNING — Care should be taken to prevent ultraviolet light from reaching the eyes and other parts of the body.

Examine the seeds under ultraviolet light. The seeds show a blue or pink fluorescence, that of harvest peas being slightly shaded by violet, whereas the rogues show a brownish shade.

9.1.4 Expression of results

Take as the result the arithmetic mean of the four determinations, expressed as a percentage of the number of seeds examined.

9.2 Determination of lentil vetch (*Vicia sativa* var. *lentil-sperma*) occurring in lentils as an impurity

Use the morphological method (9.2.1), or, if the two kinds of seeds cannot be distinguished in this way, use the quartz-lamp method (9.2.2). Carry out four tests in parallel.

9.2.1 Morphological method

Examine the seeds to determine the number of lentil vetch present using the following criteria.

Lentil vetches are characterized by rather thick borders of the seeds, by deep centres of the hilum and by a larger hilum than those of the lentils.

Lentil seeds have thinner borders and exhibit darker colours along the borders.

9.2.2 Quartz-lamp method

WARNING — Care should be taken to prevent ultraviolet light from reaching the eyes and other parts of the body.

Remove the seed coat from the two flat sides of the seeds and examine them under ultraviolet light. Lentil seeds show a greenish-grey fluorescence, whereas lentil vetch seeds show a pink fluorescence.

9.2.3 Expression of results

Take as the result the arithmetic mean of the four determinations, expressed as a percentage of the number of seeds examined.

9.3 Determination of sweet and of bitter seeds of lupins

Use the chemical method (9.3.1) or the quartz-lamp method (9.3.2). Carry out four tests in parallel.

9.3.1 Chemical method

9.3.1.1 Test solution

Dissolve 60 g of iodine and 93 g of potassium iodide in 1 l of water; before use, leave this stock solution to stand for 2 days to 3 days. For each test, dilute 75 ml of the stock solution with water to 1 l and leave it to stand for 24 h.

9.3.1.2 Procedure

Prepare four test portions, each of 100 seeds.

In the case of sweet yellow lupins (*Lupinus luteus* L.) and bitter lupins, cut the seeds in two and immerse half of them in the test solution (9.3.1.1), at a temperature of about 20 °C, for a few seconds, then rinse with water. The cut surface of the seeds of bitter lupins shows a dark brown colour, while that of the sweet ones shows a light yellow colour.

In the case of sweet white lupins (*Lupinus albus* L.) and bitter lupins, immerse the whole seeds in the test solution (9.3.1.1) for 2 min to 5 min. The seeds will become dark green in colour. Rinse the seeds in lukewarm water until the sweet lupin seeds become white and the bitter ones rusty brown. Seeds having a hard seed coat will not become green, but will only assume a light rusty brown colour. If the distinction is doubtful, cut the seeds in two, soak them in the test solution (9.3.1.1) and examine the cut surfaces.

9.3.2 Quartz-lamp method

WARNING — Care should be taken to prevent ultraviolet light from reaching the eyes and other parts of the body.

Cut the seeds in two. Examine the cut surfaces of the seeds under ultraviolet light. The cut surface of bitter lupin seeds is fluorescent, whereas that of sweet lupin seeds remains dark.

9.3.3 Expression of results

Take as the result the arithmetic mean of the four determinations, expressed as a percentage of the number of seeds examined.

10 Test report

The test report shall specify the test concerned, the method used and the result obtained. It shall also mention all operating details not specified in this International Standard, or regarded as optional, together with details of any incidents which may have influenced the result.

The test report shall include all information necessary for the complete identification of the sample.

Annex A
(informative)

Bibliography

[1] ISO 6639-1:1986, *Cereals and pulses — Determination of hidden insect infestation — Part 1: General principles.*

[2] ISO 6639-2:1986, *Cereals and pulses — Determination of hidden insect infestation — Part 2: Sampling.*

[3] ISO 6639-3:1986, *Cereals and pulses — Determination of hidden insect infestation — Part 3: Reference method.*

[4] ISO 6639-4:1987, *Cereals and pulses — Determination of hidden insect infestation — Part 4: Rapid methods.*

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