INTERNATIONAL STANDARD 605

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

Pulses — Methods of test

Légumineuses — Méthodes d'examen

First edition — 1977-11-01

UDC 635.65 : 620.1

Ref. No. ISO 605-1977 (E)

Descriptors : food products, leguminous grains, chemical tests, visual inspection, odour examination, contamination, impurities.

Price based on 4 pages

FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

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

It was submitted directly to the ISO Council, in accordance with clause 6.12.1 of the Directives for the technical work of ISO. It cancels and replaces ISO Recommendation R 605-1967, which had been approved by the member bodies of the following countries :

Australia	Greece	Romania
Canada	Hungary	Spain
Chile	India	Switzerland
Czechoslovakia	Iran	Turkey
Denmark	Israel	United Kingdom
Egypt, Arab Rep. of	Korea, Rep. of	U.S.S.R.
France	New Zealand	
Germany	Poland	

The member body of the following country had expressed disapproval of the document on technical grounds :

Netherlands

Printed in Switzerland

Pulses — Methods of test

1 SCOPE AND FIELD OF APPLICATION

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

2 REFERENCES

ISO 520, *Cereals and pulses — Determination of the mass of 1 000 grains.*

ISO 951, *Pulses — Sampling.*[1)]

ISO 1162, *Cereals and pulses — Method of test for infestation by X-ray examination.*

ISO 2164, *Pulses — Determination of glycosidic hydrocyanic acid.*

3 DETERMINATION OF IMPURITIES

3.1 Preparation of test sample

Thoroughly mix the final lot sample obtained according to ISO 951.

3.2 Test portion

Reduce the test sample (3.1), if necessary, by means of an automatic divider or by hand, to obtain the test portion.

The minimum mass of a test portion, for one determination, shall be 200 g, except for butter beans (*Phaseolus lunatus* L.), and horse beans (*Vica faba* L.), for which it shall be 300 g.

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

3.3 Separation

Separate the test portion (3.2) 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 3.3.1);

b) seeds typical of the species but of another variety (see 3.3.2);

c) defective seeds belonging to the same species (see 3.3.3);

d) organic impurities (see 3.3.4);

e) inorganic impurities (see 3.3.5).

3.3.1 *Seeds typical of the species and variety*

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

This group may be subdivided if desired.

3.3.2 *Seeds typical of the species but of another variety*

This group includes seeds of varieties which differ significantly in shape, size, colour or appearance.

3.3.3 *Defective seeds belonging to the same species*

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

3.3.4 *Organic impurities*

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

3.3.5 *Inorganic impurities*

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

3.4 Expression of results

Report the amount of material in each of the groups (3.3.1 to 3.3.5), as a percentage by mass of the test portion.

1) In preparation. (Revision of ISO/R 951-1969.)

4 DETERMINATION OF SIZE (of pulses intended for human consumption)

4.1 Sizing

Carry out the determination of size on material falling within the groups described in 3.3.1 and 3.3.2.

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 the sieve with the smallest holes, and the amounts on each of the sieves used.

4.2 Expression of results

Report the quantity of pulse

a) retained by the sieve with the largest holes;

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

c) passing the sieve with the smallest holes.

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

5 DETERMINATION OF THE MASS OF 1 000 GRAINS

Carry out the determination as specified in ISO 520.

6 TESTS FOR PRESENCE OF FOREIGN ODOURS

6.1 This examination shall be carried out as soon as possible after sampling, either on the sample in its original condition or on the ground sample.

6.2 Spread the sample and smell it. If no strong foreign odour is observed, reseal the sample container, leave it for 24 h and then re-examine the sample.

The sample may also be examined during grinding.

If, after these operations, no foreign odour can be detected with certainty, put about 3 to 5 g of the ground sample into a flask of 50 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 in a water-bath.

6.3 A rapid method (enhancing the development of the odour) is as follows : put a small quantity of the product in a beaker, pour in some warm water (60 to 70 °C), cover, decant the water after 2 to 3 min, and note whether foreign odours are present.

7 TESTS FOR INFESTATION BY INSECTS

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

Examine for infestation by the X-ray method specified in ISO 1162. If it is not possible, use one of the following methods, which are only to be considered as qualitative :

a) test for visible infestation (7.1);

b) flotation test for infestation by *Bruchid* beetles on peas and beans (7.2);

c) chemical test for infestation by *Bruchid* beetles on peas and beans (7.3).

7.1 Test for visible infestation

Scatter 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. In warm climates it may be advisable to cool the sample and then to sieve it quickly through a sieve of aperture 2 mm. Thus, 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 samples also for lace (filet) produced by the larvae of the house moth and related species.

Report the presence of infesting insects, stating the numbers found, whether living or dead, the species (if possible) and the stage of development (larval, adult, etc.).

7.2 Flotation test for infestation by *Bruchid* beetles on peas and beans

7.2.1 *Test solution*

Dissolve 400 to 500 g of sodium chloride or ammonium nitrate in 1 litre of water. To facilitate dissolution, use warm water. After cooling, filter the solution through gauze.

7.2.2 *Procedure*

Put 500 seeds in the vessel containing the test solution (7.2.1) and mix the contents thoroughly. The sound seeds sink, while infested seeds rise to the surface. Skim the latter by means of a suitable strainer. Count the seeds attacked by beetles and cut the others open with a knife. Count also the seeds containing larvae, nymphs or adult beetles. Determine thus the total number of seeds infested by living or dead parasites in relation to the number of seeds examined, and express the infestation as a percentage.

NOTE – With peas or beans of 13 to 15 % (*m/m*) moisture content, the solution should have a density of at least 1,13 g/ml [18 % (*m/m*) sodium chloride]; this will cause seeds containing adult beetles to float if the insect has perforated the seed-coat. A liquid of density 1,20 g/ml or more is required to float seeds containing immature insects, but at this density a considerable proportion of the unaffected seeds will also float. Seeds containing immature insects generally behave in the same way as clean seeds, and a flotation method therefore tends to give a low result. The flotation method should be considered as a sorting test and not equivalent to the methods specified in 7.1 and 7.3.

7.3 Chemical test for infestation by *Bruchid* beetles on peas and beans

7.3.1 *Test solution*

Use either of the following solutions :

a) 10 g/l iodine solution with potassium iodide

Dissolve 10 g of potassium iodide in water in a 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) 20 g/l ethanolic iodine solution (tincture of iodine)

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

7.3.2 *Procedure*

Place 500 seeds on a sieve and immerse the sieve in the test solution (7.3.1). Subsequently immerse the sieve with the seeds in a 5 g/l potassium or sodium hydroxide solution. Take out the sieve with the seeds from the solution and rinse with cold water for 20 s. The entry openings of the larvae and the points of attack are stained black by this treatment. The seeds on the surface of which round black spots are observed are considered as infested. The examination should be carried out as soon as possible, since the discoloration will gradually fade.

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

NOTE — 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, nymphs and adult beetles).

8 TESTS OF SPECIES AND VARIETY

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

8.1 Determination of rogues in lots of harvest peas

Use the morphological method (8.1.1), or, if the two kinds of peas cannot be distinguished in this way, use the chemical method (8.1.2) or the quartz-lamp method (8.1.3). Carry out four tests in parallel, take the mean and express the result as a percentage.

8.1.1 *Morphological method*

The value of harvest peas for human consumption, when containing light-coloured seeds, is lowered by the presence of rogues. Generally, it is not difficult to distinguish them from each other. The colour of harvest peas is, 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. The hilum is brown or black.

8.1.2 *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. Score the seed coats of seeds that do not swell.

When the seeds have swollen, decant the water and place them in a glass vessel containing a 10 g/l potassium carbonate solution or a 50 g/l sodium hydroxide solution. After 5 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 their colour.

8.1.3 *Quartz-lamp method*

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

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

Use the morphological method (8.2.1), or, if the two kinds of seeds cannot be distinguished in this way, use the quartz-lamp method (8.2.2). Carry out four tests in parallel, take the mean and express the result as a percentage.

8.2.1 *Morphological method*

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.

8.2.2 *Quartz-lamp method*

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

8.3 Examination of sweet and of bitter seeds of lupins

Use the chemical method (8.3.1) or the quartz-lamp method (8.3.2). Carry out four tests in parallel, take the mean and express the result as a percentage.

8.3.1 *Chemical method*

8.3.1.1 TEST SOLUTION

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

8.3.1.2 PROCEDURE

Form a test portion by drawing 100 seeds four times.

In the case of sweet yellow lupins and bitter lupins, cut the seeds in two and immerse half of them in the test solution (8.3.1.1), 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.

The seeds of sweet white lupins may be immersed in the test solution for 2 to 5 min, without previous cutting. The seeds will be coloured dark green. Rinse them 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 rather doubtful, these seeds may be also cut in halves and the cut surface coloured.

8.3.2 *Quartz-lamp method*

Examine cut surfaces of seeds under ultra-violet light. The cut surface of bitter lupin seeds becomes fluorescent, whereas that of sweet ones remains dark.

9 DETERMINATION OF GLYCOSIDIC HYDROCYANIC ACID

Carry out the determination as specified in ISO 2164.

10 TEST REPORT

The test report shall show the test concerned, the method used and the result obtained. It shall also mention any operating conditions not specified in this International Standard, or regarded as optional, as well as any circumstances that may have affected the result.

The report shall include all details required for complete identification of the sample.