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Bee pollen — Specifications

Pollen — Spécifications

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Foreword

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This document was prepared by Technical Committee ISO/TC 34, *Food products*, Subcommittee SC 19, *Bee products*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Pollen is the male gametes of seed plant flowers (angiosperms and gymnosperms). Angiosperm pollen is formed on the stamens as tiny grains. It is a coarse, powdery substance used for transferring haploid male genetic material from the anther of a single flower to the stigma of another in cross-pollination. Commercial bee pollen is mainly the pollen collected by the honey bee (*Apis* spp.) to feed its larvae in the early stages of development.

Collected flower pollen is accumulated as orbicular pellets in pollen baskets on the rear legs of the honey bee. When visiting flowers, bees touch the stamens, moisten the pollen with nectar and salivary substances, and use their hind legs to compress and agglutinate the pollen into the pollen baskets. When the bees return to the hive, the bee pollen can be harvested at the hive entrance using a specific trap.

Bee pollen is the bees' primary source of essential nutrients: proteins, carbohydrates, lipids, crude fibre, minerals and other substances in minor concentrations, namely vitamins, carotenoids and flavonoids. Bee pollen is composed of all essential amino acids. Thus, bee pollen is harvested as a nutrient-rich food and tonic for humans, with various healthcare function claims. In addition, bee pollen is a raw material from which bees produce bee bread, mixed with honey and bee saliva stored in brood cells, and used as a fermented product rich in proteins and lipids in the bee diet.

This document clarifies the definition of various types of bee pollen (dried, frozen and lyophilized), establishes their composition indicators and test methods, specifies the storage, packaging, transportation and labelling requirements, and provides quality standards for the international bee pollen trade. It is a matter for the parties concerned whether to apply the requirements of this document to a consignment or a lot of bee pollen. The primary supply of protein and vitamins is necessary for the secretion of royal jelly during the larval breeding stage of the beehive. Although the bee pollen source presents a higher variability, which results from various local floral sources in the different countries, the relatively similar and stable characteristics of nutrients do not affect a beehive's nutritional requirements.

Bee pollen — Specifications

1 Scope

This document specifies the quality requirements, analytical methods, and packaging, labelling, marking, storage and transportation conditions for bee pollen.

This document is applicable to bee pollen collected at the entrance of beehives by *Apis mellifera* and other bees' species of colonies, as well as dried, frozen and lyophilized bee pollen.

It does not apply to crushed powdery bee pollen and products made from bee pollen.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3696, *Water for analytical laboratory use — Specification and test methods*

ISO 22005, *Traceability in the feed and food chain — General principles and basic requirements for system design and implementation*

3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
pollen
male gametophytes produced in the anther of the stamen of flower structures in plants (predominantly angiosperms), which appears as a fine to coarse powder of microscopic grains carried by insects or the wind

3.2
worker bee
female bee with underdeveloped reproductive abilities that is responsible for different duties, such as foraging, nursing, safeguarding and cleaning, within the colony of honey bees

3.3
bee pollen
result of the agglutination of flower *pollen* (3.1) grains with nectar and salivary substances and collected by *worker bees* (3.2)

Note 1 to entry: Bee pollens are collected at the hive entrance.

Note 2 to entry: Bee pollen is a raw material from which bees produce bee bread.

3.4
monofloral bee pollen
bee pollen (3.3) where the percentage of *pollen* (3.1) is linked to the size of the pollen grains

Note 1 to entry: After analysis of the pollens, the size of the pollen grains suspected of being dominant in the sample shall be checked to see if the percentage by volume is at least 80 % of the total volume of pollen present.

3.5
multifloral bee pollen
bee pollen (3.3) collected by *worker bees* (3.2) from different flowers but in an insufficient quantity that none of the *pollen* (3.1) reaches the percentage of volume required to be considered *monofloral bee pollen* (3.4)

3.6
dried bee pollen
bee pollen (3.3) obtained through dehydration to decrease water content under controlled conditions and a temperature no higher than 40 °C without ultraviolet (UV) light exposure

Note 1 to entry: Field-dried bee pollen shall be obtained without direct sunlight and preliminary treatment under clean hot air not exceeding 40 °C.

Note 2 to entry: Further addition of storage preservatives, e.g. SO_2, is not allowed.

Note 3 to entry: Before the drying process, a freezing period of a minimum of 24 h is recommended to kill any moth eggs or fungi.

3.7
frozen bee pollen
bee pollen (3.3) obtained immediately through a freezing process, at a temperature inferior to −18 °C, without any dried treatment until consumed

3.8
lyophilized bee pollen
bee pollen (3.3) produced from *frozen bee pollen* (3.7) after a process of lyophilization

4 Technical requirements and recommendations

4.1 General

The following general requirements and recommendations apply:

a) The bee pollen should be irregular orbicular sphere-like.

b) The bee pollen shall have organoleptic characteristics such as colour, appearance, odour and taste that vary according to the botanical origin.

c) The bee pollen shall be clean without contaminants from the beehive to the final product (live or dead insects, larvae, eggs, etc.) and environmental matter (soil, sand, etc.) and shall be free from any additives. Preserve the bee pollen from the development of other insects and parasites.

4.2 Chemical requirements

The chemical requirements of the product shall meet the criteria specified in Table 1. Regarding chemical composition, maximum values are established only for moisture content and pH (see Table 1). The other classes of compounds are in accordance with the botanical origin of the bee pollen. All the test methods were identified with their protocols. Each of the methods listed in Table 1 and in the annexes may be adapted or replaced provided that the modifications made can be shown to give similar results of at least equivalent quality to those of the basic method listed in the annexes.

Table 1 — Chemical requirements for bee pollen and test methods for each characteristic

Characteristic	Min. or max.	Requirements			Test method
		Type 1	Type 2	Type 3	
Determination method of pollen taxa at bee pollen	—	Limits only for monofloral bee pollen			Annex A
Moisture content with % vacuum drying oven method, in % mass fraction	min.	2	No upper and lower limits defined	2	Clause B.1
	max.	8		8	
Loss on drying content with drying oven method, in % mass fraction	min.	5		5	Clause B.2
	max.	9		9	
Halogen loss on drying analyser	min.	3		3	Clause B.3
	max.	9		9	
Protein content, in % mass fraction	min.	10	7,5	10	Annex C
Sugar content, in % mass fraction	—	No lower and upper limits were defined			Clause D.1
Total sugar, in % mass fraction	min.	15	12	15	Clause D.2
Lipid, in % mass fraction	min.	1,3	1	1,3	Annex E
Determination of pH	min.	3,3			Annex F
	max.	6,30			
Ash, in % mass fraction, by gravimetry	min.	1	0,7	1	Annex G
Key Type 1 – Dried bee pollen; Type 2 – Frozen bee pollen; Type 3 – lyophilized bee pollen.					

4.3 Safety and health requirements

The limit accepted for toxic substances (pyrrolizidine alkaloids, canabinoids, grayanotoxines, and others) naturally present in some plants (*Rhododendron* spp., *Cannabis* spp. and others) shall be taken into consideration.

5 Test methods

5.1 Reagents

Use only reagents of recognized analytical grade unless otherwise specified.

5.2 Sample collection

Bee pollen is a heterogeneous product; therefore, at least 0,5 % of the batch (minimum 250 g for batches less than 50 kg and 500 g of sample for batches less than 100 kg) shall be collected. A minimum of five representative points (a random set of points that optimally represents a distribution of the bee pollen container) shall be sampled to consider the diversity of the bee pollen. Pack them in a food-grade hermetic container and store them in a frozen condition.

5.3 Transportation from the hive to the factory or laboratory

Put the sample into the sterile sample bottle, stir sufficiently to mix it evenly and put it aside as the sample to be tested.

The collected bee pollen shall come to the laboratory to be stored in a freezer as soon as possible. Using an icebox (with ice inside) for transportation is recommended.

During the harvest, beekeepers shall be aware of the type of packaging material used to transport the product from the apiary to the processing sector or the laboratory for quality control and thus avoiding:

a) crushing of raw material;

b) contamination with dust;

c) transfer of odours and humidity and high temperatures, which can interfere with the quality of the product to be processed. Use only reagents of recognized analytical grade unless otherwise specified.

5.4 Test methods for chemical requirements

Each sample shall represent the collected bee pollen lot.

Bee pollen is very hydrophilic, and its exposure to humidity in the room shall be limited as much as possible. In this context, airtight containers are recommended until the beginning of the analysis.

Bee pollen collection for laboratory samples shall be made from homogenization containers in sterilized jars.

For a better homogenization of the sample, the bee pollen should be ground into a fine powder and stored according to the bee pollen state (dried, frozen and lyophilized).

The sample can be tested in the following different conditions:

— for dried bee pollen, the samples shall be stored at a temperature no higher than 4 °C in a well-conditioned area for no more than six months;

— for frozen bee pollen, the samples shall be stored at −18 °C for no more than six months;

— for lyophilized bee pollen the samples shall be stored at a temperature no higher than 4 °C in a well-conditioned area for no more than six months.

For all analytical procedures, the homogenization of bee pollen pellets is done by grinding in the mill until the bee pollen pellets become a powder (for up to 2 min).

All the test methods are explained in Annexes A to G.

6 Packing, labelling, marking, storage and transportation

6.1 Packing

The bee pollen shall be packed in closed, clean and dry food-grade containers, protected from UV light and made of a material that does not affect the quality of the bee pollen.

6.2 Labelling of the bee pollen plant taxa

It shall be stated in the labelling that the product is MNBP (monofloral) or MTBP (multifloral) type.

For MNBP monofloral bee pollen, only “monofloral bee pollen” with the name of the dominant plant shall appear on the face label (local and Latin name).

For MTBP multifloral bee pollen, the name “multifloral bee pollen” shall appear on the face label. It is optional to include a list of plants on the label (Latin names) for customers to refer to when purchasing. Nevertheless, the complete list is not required and can be limited to a reduced list of different botanical origins.

6.3 Marking

The packages of bee pollen information shall be labelled.

At least the following information shall be marked on each package or a label:

a) the name of the product, and trade name or brand name;

b) the name and address of the producer and packer, and country or countries of origin;

c) the type of treatment information needed to obtain a dried, field-dried, frozen and lyophilized product;

d) the labelling of the plant taxa in 6.2 (for MNBP is mandatory and for MTBP is optional);

e) the net mass;

f) the harvesting years and the "best-before" date;

g) the batch number and the traceable information of the product; ISO 22005 shall be followed to declare the traceability of bee pollen;

h) nutritional information.

6.4 Storage and transportation

Medium- and long-term storage should be in a shady and cool place or, preferably, within a temperature range of between +2 °C and +5 °C for dried bee pollen or lyophilized bee pollen. Frozen bee pollen shall be stored at less than –18 °C. The maximum shelf life of bee pollen as human food is recommended to be less than 24 months for frozen and lyophilized bee pollen and less than 18 months for dried bee pollen.

Bee pollen produced in different areas and times should be stored separately and given different batch numbers (in a bottle or a box).

Bee pollen shall be transported by cold-chain conditions, e.g. freezing transport (–22 °C to –18 °C) for frozen bee pollen, and transport for dried and lyophilized bee pollen at a temperature of no more than 25 °C (0 °C to 10 °C is recommended). Transport shall be in sealed containers to avoid moisture pick-up.

Bee pollen shall not be stored and transported with toxic, corrosive material or material with a peculiar odour or that can cause contamination.

Annex A
(normative)

Determination method of pollen taxa in bee pollen

A.1 Determination method of pollen taxa in bee pollen (alternative to Clause A.2)

A.1.1 Principle

The method is for the botanical origin identification and qualitative analysis (relative frequencies) of pollen taxa in bee pollen samples.

A.1.2 Consumables

A.1.2.1 Microscopic slide.

A.1.2.2 Lamella.

A.1.2.3 Dissection needle.

A.1.2.4 Centrifuge tube (15 ml and 50 ml).

A.1.3 Reagents

A.1.3.1 Ethanol (70 %) or **H_2SO_4** (5 %) (optional).

A.1.3.2 Distilled water.

A.1.3.3 Gelatin (powder) or **Kaiser's glycerol gelatine.**

A.1.3.4 Glycerine or **Kaiser's glycerol gelatine.**

A.1.3.5 Basic fuchsine (powder) (optional).

A.1.4 Apparatus

A.1.4.1 Hot plate.

A.1.4.2 Vortex.

A.1.4.3 Centrifuge.

A.1.4.4 Light microscope, 400×, 1 000× magnification with oil lens.